



# Training Unit I: Resilience in Tourism

Tourism Resilience Education in Digital Security



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## TABLE OF CONTENTS

|                                                                      |    |
|----------------------------------------------------------------------|----|
| INTRODUCTION.....                                                    | 3  |
| TRAINING UNIT 1: RESILIENCE IN TOURISM .....                         | 5  |
| Course objectives .....                                              | 5  |
| Learning outcomes.....                                               | 8  |
| Unit's framework and methodology .....                               | 9  |
| 2.1 Introduction to Resilience .....                                 | 11 |
| 1. Theory to be taught (6 hours) .....                               | 15 |
| 2. Skills developed in the module.....                               | 16 |
| 3. Specific cases by region (2 hours).....                           | 17 |
| 4. Deliverables (6 hours).....                                       | 30 |
| 5. Assesment (2 hours).....                                          | 36 |
| 2.2 Resilience and Twin Transitions (Green & Digital) .....          | 40 |
| 2.2.1 Climate Impact and Resource Management (2 hours) .....         | 41 |
| 1. Theory to be taught (1 hour).....                                 | 43 |
| 2. Skills developed in the unit.....                                 | 44 |
| 3. Case studies (1 hour).....                                        | 44 |
| 2.2.2 Smart Technologies (SmartTech) for Resilience (2.5 hours)..... | 47 |
| 1. Theory to be taught (1.5 hours).....                              | 49 |
| 2. Skills developed in the unit.....                                 | 51 |
| 3. Specific cases (1 hour) .....                                     | 51 |
| 2.2.3 The European Framework and Smart Destinations (2.5 hours)..... | 53 |
| 1. Theory to be taught (1 hour).....                                 | 55 |
| 2. Skills developed in this unit.....                                | 56 |
| 3. Specific cases by region (1.5 hours) .....                        | 56 |
| 2.2.4 Collaboration and Ecosystem (2 hours) .....                    | 66 |
| 1. Theory (1 hour) .....                                             | 68 |
| 2. Skills developed in this unit.....                                | 68 |
| 3. Specific cases (1 hour) .....                                     | 69 |

## Training Unit I: Resilience in Tourism

|                                                       |    |
|-------------------------------------------------------|----|
| 2.2.5 Group Activities and Outputs (7 hours) .....    | 70 |
| 2.3 Resilience Planning in Tourism .....              | 79 |
| 1. Theoretical Framework. The Crisis Life Cycle ..... | 82 |
| 2. Skills Acquired .....                              | 82 |
| 3. Case Studies .....                                 | 83 |
| 4. Work dynamics and deliverables .....               | 85 |
| 5. Assessment .....                                   | 88 |
| REFERENCES .....                                      | 90 |

## LIST OF FIGURES

|                                 |    |
|---------------------------------|----|
| Figure 1: The Risk Matrix ..... | 31 |
|---------------------------------|----|

## LIST OF TABLES

|                                            |    |
|--------------------------------------------|----|
| Table 1: Example of a deliverable .....    | 32 |
| Table 2: Example of a synergy matrix ..... | 73 |

1

## INTRODUCTION

Tourism is one of the economic sectors most exposed to uncertainty, disruption and rapid change. Tourism organisations and destinations operate within complex systems that depend on transport, infrastructure, local communities, natural resources, digital platforms, public authorities, suppliers and customer confidence. As a result, a disruption in one part of this ecosystem can quickly affect the continuity, reputation and financial viability of the entire tourism activity.

Recent health emergencies, extreme weather events, geopolitical instability, cyberattacks, infrastructure failures and sudden changes in tourism demand have shown that resilience is no longer an optional organisational quality. It is a fundamental professional capacity that allows tourism businesses and destinations to anticipate risks, prepare for disruption, respond effectively during a crisis, recover essential operations and learn from experience.

This course introduces resilience as a dynamic and continuous process rather than simply the ability to return to normal after a crisis. A resilient tourism organisation is able to identify its vulnerabilities, recognise early warning signals, protect people and critical assets, maintain essential services and adapt its procedures when conditions change. It also understands that recovery should not merely restore the previous situation, but should strengthen the organisation and reduce its exposure to similar risks in the future.

The course adopts a systemic approach that connects organisational resilience with community and destination resilience. A hotel, restaurant, travel agency, tourist attraction or transport provider cannot be fully resilient in isolation. Its ability to continue operating depends on the preparedness of its staff, the reliability of its digital and physical infrastructure, the resilience of local suppliers and public services, and the capacity of stakeholders to cooperate during emergencies. For this reason, learners will examine resilience at individual, organisational, community and destination levels.

A central feature of the course is the integration of resilience with the green and digital transitions. Climate adaptation, efficient resource management, circular economy practices, smart technologies, artificial intelligence, the Internet of Things and shared tourism data can improve operational efficiency and crisis preparedness.

However, these developments can also create new vulnerabilities when technologies are implemented without appropriate cybersecurity, data protection and contingency measures. The course therefore encourages learners to understand sustainability, digitalisation and security as interconnected dimensions of modern tourism resilience.

The training also places strong emphasis on the human factor. Technology and formal procedures are important, but effective crisis management ultimately depends on the ability of staff to recognise warning signs, communicate clearly, cooperate with others, make responsible decisions and remain adaptable under pressure. Learners will therefore develop not only technical knowledge, but also teamwork, leadership, communication, prioritisation and problem-solving skills.

The course consists of three interconnected sub-units. The first establishes the conceptual and operational foundations of resilience, including risk identification, vulnerability assessment, early warning systems and the human factors that influence organisational reliability. The second examines how green and digital solutions can strengthen tourism resilience through climate adaptation, resource efficiency, smart technologies, European frameworks and stakeholder cooperation. The third focuses on practical resilience planning, crisis response, recovery, reputation management and post-crisis learning.

Learning is supported through real tourism cases, risk-mapping exercises, simulations, group workshops, role-play activities and the preparation of professional outputs. These include risk matrices, resilience plans, diagnostic reports, cooperation protocols, crisis communication materials and after-action reviews. The activities are designed to help learners transfer theoretical knowledge into practical tools that can be applied within tourism businesses and destinations.

By the end of the course, learners should be better prepared to contribute actively to the resilience of their organisation, cooperate with internal and external stakeholders and support tourism services that are safer, more sustainable, digitally secure and capable of adapting to future challenges.

## Course objectives

The general objective of the course is to provide learners with the knowledge, practical skills and professional competencies required to identify, assess and manage risks affecting tourism organisations and destinations, and to contribute effectively to resilience planning, crisis response, business continuity and post-crisis recovery.

The course aims to enable learners to understand resilience as an integrated organisational capacity that combines risk management, sustainability, digitalisation, cybersecurity, stakeholder cooperation, crisis communication and continuous improvement.

By the end of the course, learners will be able to:

### **1. Understand the concept of resilience in tourism**

Explain the main principles of organisational, community and destination resilience and recognise their importance for the continuity, competitiveness and long-term sustainability of tourism activities.

### **2. Identify risks and vulnerabilities**

Recognise the principal health, climate, environmental, geopolitical, operational, human and digital risks that may affect tourism businesses and destinations.

### **3. Assess and prioritise risks**

Apply basic risk-management tools, including probability and impact matrices, to assess the seriousness of identified threats and determine priorities for preventive and corrective action.

### **4. Recognise early warning signals**

Identify indicators and warning signs that may signal the escalation of a crisis and understand how early intervention can reduce operational, financial and reputational damage.

### **5. Understand the crisis life cycle**

Describe and apply the five phases of crisis management—prevention, preparedness, response, recovery and learning—in tourism-related situations.

### **6. Contribute to resilience and crisis response plans**

Support the development of basic operational plans that define preventive measures, roles, responsibilities, communication channels, response procedures and recovery actions.

### **7. Make informed decisions under pressure**

Prioritise actions during crisis scenarios by distinguishing between urgent tasks and measures that are vital for protecting people, infrastructure, data, operations and organisational reputation.

### **8. Integrate sustainability into resilience planning**

Understand how climate adaptation, responsible resource use, circular economy principles and the Sustainable Development Goals can reduce vulnerability and improve the long-term resilience of tourism organisations.

### **9. Identify green and digital synergies**

Evaluate how digital technologies can support environmental sustainability, resource efficiency, risk prevention and operational continuity within tourism businesses and destinations.

### **10. Evaluate smart tourism technologies**

Recognise the potential use of IoT sensors, artificial intelligence, Big Data, early warning systems and Smart Tourism Destination infrastructures for monitoring risks, managing resources and supporting crisis response.

### **11. Recognise digital vulnerabilities**

Identify cybersecurity and data-protection risks associated with digital tourism systems, connected devices, booking platforms, customer databases and smart infrastructure.

### **12. Apply basic cyber-resilience principles**

Understand the importance of cyber hygiene, secure data management, system isolation, backups, network protection and cybersecurity by design in maintaining tourism business continuity.

### **13. Relate resilience practices to European frameworks**

Recognise the relevance of the Sustainable Development Goals, the European Green Deal, the EU Digital Strategy, Smart Tourism Destination models and other European initiatives supporting the green and digital transition of tourism.

### **14. Cooperate with relevant stakeholders**

Identify the public authorities, technology providers, tourism associations, suppliers and community organisations that should participate in resilience planning and crisis management.

### **15. Develop cooperation protocols**

Define basic responsibilities, communication procedures and mechanisms for collaboration between tourism businesses, public authorities and technology providers before, during and after a crisis.

### **16. Communicate risks clearly**

Translate technical or complex risk information into clear and understandable messages for managers, employees, customers and other non-technical stakeholders.

### **17. Participate effectively in crisis simulations**

Take an active role in crisis committees, role-play activities and group exercises, demonstrating cooperation, adaptability, responsible decision-making and problem-solving skills.

### **18. Manage crisis communication and reputation**

Prepare appropriate responses for customers, the media and online platforms, using empathy, transparency and accurate information to help restore confidence after a crisis.

### **19. Support post-crisis recovery**

Propose actions to restore essential services, customer trust, financial stability, digital operations and organisational reputation following a disruption.

## **20. Apply post-crisis learning and continuous improvement**

Conduct basic after-action reviews, identify weaknesses in the organisational response and recommend preventive measures and adjustments to strengthen future resilience.

## **21. Demonstrate professional autonomy and responsibility**

Carry out routine resilience-related tasks according to established procedures, take responsibility for assigned actions and recognise when an issue must be referred to technical specialists or senior management.

## **22. Produce practical resilience tools**

Prepare professional outputs such as risk matrices, risk maps, resilience plans, smart diagnostic reports, synergy plans, cooperation agreements, prioritisation matrices, crisis communication materials and after-action review reports.

Upon completion of the course, learners will be able to contribute meaningfully to the resilience of a tourism business or destination. They will be capable of identifying risks, proposing preventive measures, supporting crisis planning, participating in coordinated responses and contributing to recovery strategies that protect people, operations, data, resources and organisational reputation.

## **Learning outcomes**



### **KNOWLEDGE**

By the end of the training, the learner will be able to explain the key concepts of organisational and community resilience and understand their relevance to the tourism sector. They will be able to identify major risk and vulnerability factors that can affect tourism activities, including health, climate, geopolitical, and digital risks. The learner will also be able to describe the relationship between resilience and the ongoing green and digital transitions in tourism, and recognise relevant European policy frameworks, such as the Sustainable Development Goals (SDGs), the EU Green Deal, and the EU Digital Strategy. Furthermore, they will understand the basic principles of crisis management and post-crisis recovery within tourism organisations.

### SKILLS

Learners will be able to identify and assess risks and vulnerabilities in a tourism business or destination. They will be able to contribute to the development of basic resilience and crisis response plans, applying sustainability and digitalisation principles to strengthen tourism resilience. In addition, learners will participate effectively in crisis simulations and role-play activities, and support recovery strategies following a crisis scenario in a tourism context.

### COMPETENCIES

Learners will demonstrate a degree of autonomy when performing routine resilience-related tasks, following established procedures. They will cooperate with colleagues and other stakeholders during crisis situations and take responsibility for implementing resilience measures within their role in a tourism organisation.

## Unit's framework and methodology

### DURATION

48 hours (16 for each subunit)

### METHODS OF DELIVERY

The unit can be delivered online, in person or group-based learning.

### PRACTICAL ACTIVITIES AND RELATED OUTPUTS

## Training Unit I: Resilience in Tourism

- Analysis of real-world examples of resilient destinations, followed by the drafting of a report
- Group workshop: design of resilience plans tailored to different destinations, leading to the drafting of a comprehensive Tourism Resilience Plan and a group presentation to the trainer and fellow students
- Role-play activity: simulating a hotel management committee's decision-making process during a crisis, followed by the drafting of a debriefing report

The practical activities may be carried out individually or in groups, depending on the context.

### ASSESSMENT

- Online quizzes on European frameworks and SDGs
- Assessment of practical activities through, for example, questionnaires, quizzes, hackathons, reports and group presentations

Learners' performance will be assessed based on their ability to correctly identify and classify risks in a given tourism case study and to demonstrate appropriate decision-making during simulated crisis scenarios. They will contribute to the preparation of written or oral resilience action plans for tourism organisations and actively participate in role-play and group activities, demonstrating problem-solving skills and teamwork. In addition, learners will be expected to complete knowledge-based tests or quizzes with satisfactory results.

## 2.1 Introduction to Resilience

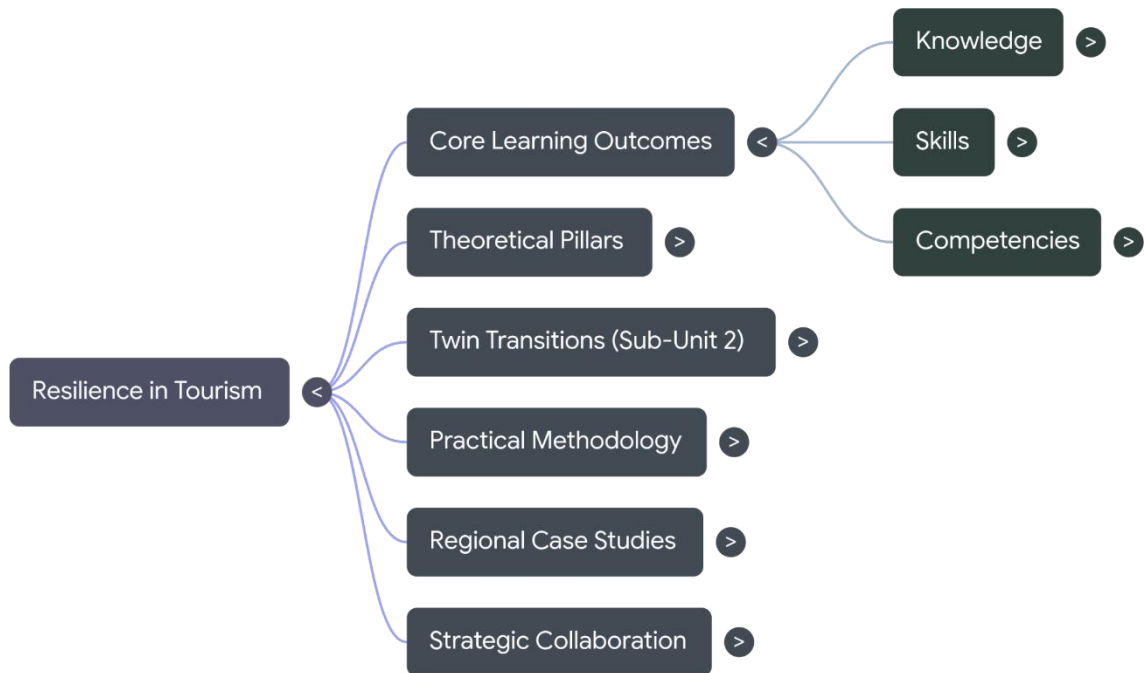
By the end of this sub-unit, learners will be able to identify vulnerabilities in a tourism business or destination, assess the probability and impact of risks, recognise signs of potential crises and communicate risks to non-technical stakeholders.

- Types of resilience (organisational resilience, community resilience, destination resilience) and their relevance to the tourism sector
- The human factor in resilience (staff adaptability, leadership, teamwork, mental well-being)
- Risk and vulnerability factors in tourism (for example, natural disasters, pandemics, geopolitical instability, digital threats)
- Early warning systems (indicators and signals of crisis escalation)
- Suggested practical activity:
  - Risk mapping exercise for a small hotel or travel agency

In a world characterised by volatility and constant change, an organisation's ability to withstand, adapt to and thrive in the face of adversity is no longer an option, but an essential requirement for competitiveness and trust in the digital age.

This unit is based on the premise that resilience in tourism is not a static state, but a dynamic process that spans from the individual and organisational levels to the community and the destination as a whole. Students will learn that being resilient involves a deep understanding of the risk and vulnerability factors that can affect the industry, including not only natural disasters or health crises, but also geopolitical risks and, critically, emerging digital threats.

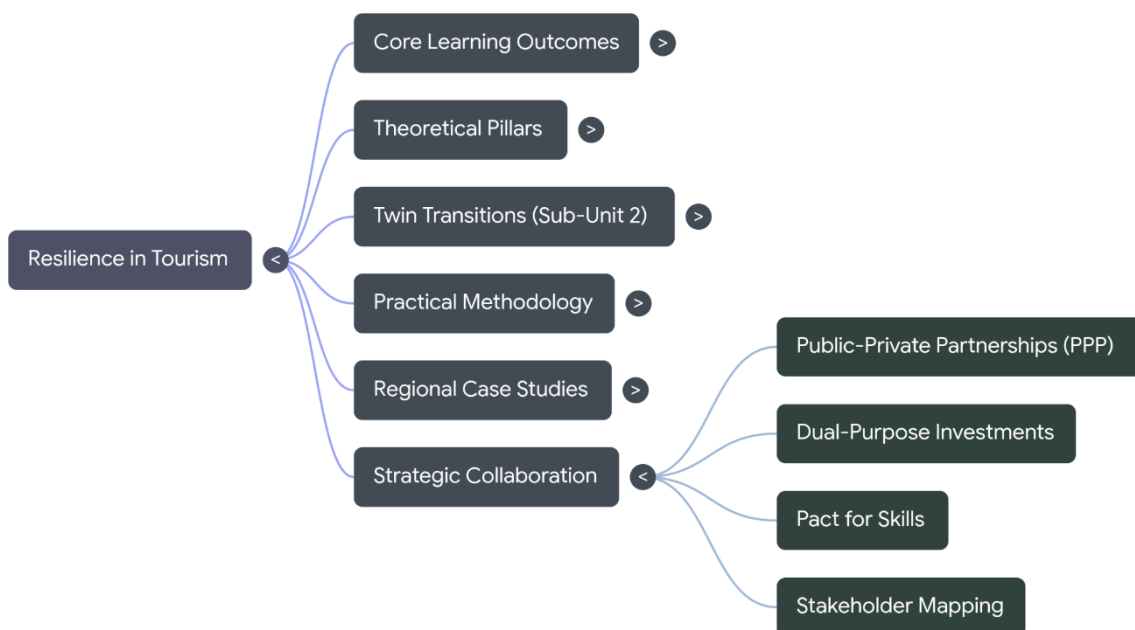
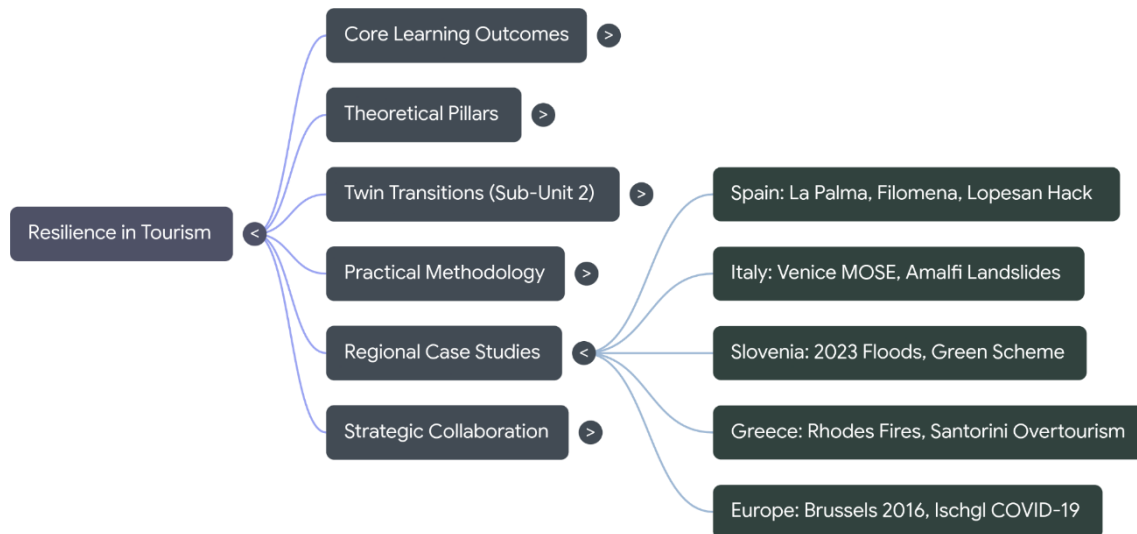
### Unit outline



## Training Unit I: Resilience in Tourism



## Training Unit I: Resilience in Tourism



## 1. Theory to be taught (6 hours)

This module lays the conceptual foundations for understanding resilience as an operational rather than a static capacity.

The theoretical framework on which the training is based draws on the **Theory of Socio-Ecological Systems (SES)** and the **Theory of High-Reliability Organisations (HRO)**, specifically adapted to the context of the TREADS programme.

To underpin this unit, the content must be structured around four main theoretical pillars that enable the learner to understand resilience not as a static concept, but as an operational capacity.

### I. Socio-Ecological Systems (SES) Theory

This theory explains the interdependence between the tourism business, the community and the environment.

**Destination Resilience:** The course is based on the premise that a hotel or agency is not an island; its survival depends on the infrastructure and security of the entire destination.

**Interconnectivity:** Analyses how risks in one area (e.g. a cyberattack on supply systems) affect the resilience of the local community and the sector's reputation.

### II. The Crisis Life Cycle (Crisis Management Theory)

This is the reference model for understanding the phases of a disruption.

**Prevention and Preparedness:** Knowledge regarding the proactive identification of early warning signals (EWS) to mitigate risks before they escalate.

**Response and Recovery:** Theory on the mobilisation of resources and decision-making under pressure to restore operational normality.

**Post-Crisis Learning:** The concept of organisational 'post-traumatic growth', where the company uses the crisis to strengthen its weaknesses.

### III. Highly Reliable Organisations (HRO) Theory

This framework is essential for documenting the **Human Factor**. It focuses on organisations operating in high-risk environments (such as digitalised tourism) without making catastrophic errors.

**Failure Awareness:** Fostering the mindset that any minor anomaly (a suspicious email, a technical delay) could be the start of a crisis.

**Operational Sensitivity:** The recognition that frontline staff are best placed to detect day-to-day vulnerabilities.

**Deference to Experience:** In a crisis, decision-making should fall to those with technical knowledge (e.g. the digital security expert), not necessarily to those with the highest hierarchical rank.

### IV. Risk Management Model (Probability and Impact Matrix)

This is the technical basis for the **Risk Mapping** exercise.

**Risk Quantification:** Students must learn to assign numerical or qualitative values to the probability of occurrence and the potential impact of climatic, geopolitical or digital threats.

**Strategic Prioritisation:** Theory on how to decide which risks to ignore, which to mitigate and which to transfer (e.g. through insurance or system redundancy).

## 2. Skills developed in the module

- **Risk Identification and Assessment:** Ability to detect specific vulnerabilities in a business or tourist destination, assigning probability and impact values to prioritise climate, geopolitical or digital threats.
- **Proactive Management and Early Warning:** The ability to recognise signs and 'red flags' (Early Warning Systems – EWS) that signal the escalation of a crisis, enabling action to be taken before the situation spirals out of control.
- **Strategic Communication with Non-Technical Stakeholders:** The ability to “translate” complex technical threats (such as cyberattacks) into information that is understandable to managers, employees and customers, facilitating informed decision-making.
- **Decision-Making and Autonomy under Pressure:** The ability to prioritise critical actions during a crisis, taking responsibility for routine resilience tasks and prioritising data protection over immediate operations if necessary.

- **Cooperation and Human Factor Management:** Ability to collaborate with colleagues and external stakeholders during emergency situations, fostering adaptability and leadership within the team.
- **Implementation of Cyber Hygiene Measures:** Ability to apply basic technical protocols, such as training in *phishing* detection, isolation of compromised systems, and compliance with regulations such as the GDPR and the NIS2 Directive.

### 3. Specific cases by region (2 hours)

To facilitate learning, the **Hotel Horizonte** (50 rooms, coastal location, flood risk and high digital dependency) is used as the evolving scenario for all activities.

#### 1. Spain: Analysis of the eruption in La Palma (Destination Resilience), Storm Filomena (Human Factor), the collapse of Thomas Cook (Channel Dependency) and the cyberattack on Lopesan (Cyber Hygiene)

A. Destination Resilience: The eruption of the Cumbre Vieja volcano (La Palma, 2021)

- **Context:** The eruption destroyed key infrastructure and brought tourism in the Aridane Valley to a standstill.
- **Applied Theory:** Socio-Ecological Systems (SES). The hotel is not an island; its survival depended on the destination's safety net and the management of the Cabildo.
- **Lesson for the student:** Identification of geographical vulnerabilities and the importance of volcanic Early Warning Systems (EWS).
- **Resilient Action:** The use of tourism vouchers and a shift towards 'volcanology tourism' to transform the disaster into a post-crisis learning opportunity.



### Giant boulders float down rivers of lava from La Palma volcano eruption

B. Economic Vulnerability: The collapse of Thomas Cook (Canary Islands and Balearic Islands, 2019)

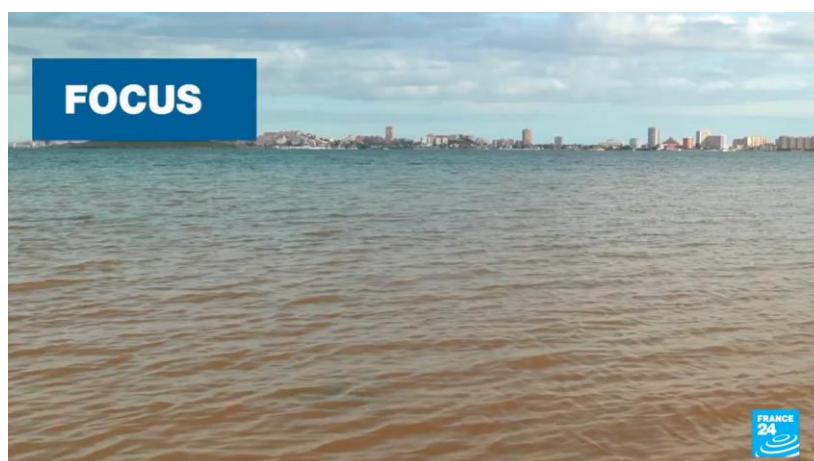
- **Context:** The collapse of the world's oldest tour operator left 70,000 British tourists stranded in Spain and left hotels with millions in debt.
- **Applied Theory:** Risk Matrix (Strategic Prioritisation).
- **Lesson for the student:** The risk of relying on a single channel. Assess the impact of an external geopolitical/economic threat on the business's cash flow.
- **Resilient Action:** Diversification of source markets and acceleration of digitalisation to sell directly to the customer (B2C), reducing the power of large tour operators.



### The collapse of Thomas Cook sent shockwaves across the industry

#### C. Ecological and Reputational Crisis: The Mar Menor (Murcia)

- **Context:** The crisis of anoxia and eutrophication in the saltwater lagoon has led to a systematic decline in demand and property values.
- **Applied Theory:** High-Reliability Organisations (HRO) Theory.
- **Lesson for the student:** Operational Sensitivity. Detecting environmental 'early warning signs' (chlorophyll, turbidity) before the crisis affects the destination's overall reputation.
- **Resilient Action:** Implementation of the BELICH project (2026) to anticipate ecological crises using intelligent prediction models.



Spain's Mar Menor lagoon granted legal personhood in European first • FRANCE 24 English

**2. Italy: The MOSE system in Venice (Infrastructure), the floods in Cinque Terre (Landscape Conservation) and the digitalisation of SMEs following the pandemic**

**A. Destination Resilience: Venice and the MOSE System + Entry Fee**

- **Context:** The city faces the dual threat of rising sea levels (*Acqua Alta*) and 'overtourism', which is driving residents away.
- **Applied Theory: Destination Resilience and Critical Infrastructure.** MOSE is a physical barrier against flooding, whilst the entry fee is a tool for managing visitor flows.
- **Lesson for the student:** How a destination must protect both its physical heritage (against the climate) and its social fabric (against overcrowding) to remain viable.
- **Resilient Action:** Use of large-scale hydraulic technology and digital booking/payment systems to regulate the destination's carrying capacity.



Venice Is Drowning: Engineering Expert Explains How to Save It | WSJ Pro Perfected

**B. Disaster Recovery: Cinque Terre and the 2011 Floods (Vernazza)**

- **Context:** In October 2011, torrential rain caused catastrophic flooding and landslides that buried the village of Vernazza under metres of mud.
- **Applied Theory:** Crisis Life Cycle (Response and Recovery). The fragility of the terraced landscape of Cinque Terre is a critical point of failure.
- **Lesson for the student:** The importance of landscape conservation as infrastructure. The abandonment of agricultural terraces increased soil instability.
- **Resilient Action:** Reconstruction based on the restoration of traditional dry stone walls and the creation of an integrated water management plan to prevent future collapses.

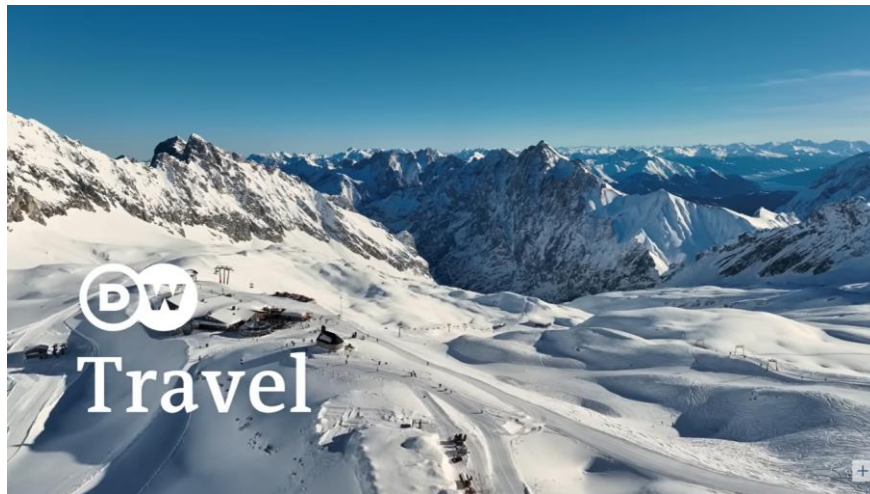


Flood Vernazza 25/10/2011 18:17

### C. Climate Risk and Seasonality: The Dolomites and Artificial Snow

- **Context:** Rising temperatures are shortening the natural skiing season in the Italian Alps, affecting the winter economy of regions such as Trentino-Alto Adige.
- **Applied Theory: Socio-Ecological Systems (SES) and Resource Management.** The reliance on water to produce snow conflicts with the community's needs during droughts.

- **Lesson for the student:** Identifying the vulnerability of seasonality. How to diversify the business model towards 'four-season tourism' to avoid relying exclusively on the weather.
- **Resilient Action:** Diversification towards digitally guided hiking, cycle tourism and the use of multi-purpose water storage reservoirs.



### Winter Sports: How Climate Change Is Affecting Ski Resorts

#### 3. Slovenia: Management of the record floods of 2023, climate adaptation in Kranjska Gora and the “Green Destination” scheme

##### A. Climate Resilience: Adaptation in Kranjska Gora and Planica

- **Context:** Low-altitude ski resorts face snowless winters and a shortened ski season due to global warming.
- **Applied Theory:** Resilience to the Climate Emergency and Socio-Ecological Systems (SES).
- **Lesson for the student:** The vulnerability of seasonal tourism. Kranjska Gora is redesigning its model to embrace 'four-season tourism', similar to the case of the French Alps mentioned in the original plan.
- **Resilient Action:** Investment in digitalised green mobility (parking reservations and shuttle buses) to manage tourist flows throughout the year and protect the environment of Triglav National Park.



Climate Resilience

B. Environmental Monitoring: Monitoring of Postojna Cave

- **Context:** An extremely fragile karst ecosystem that has welcomed visitors for over 200 years and is home to endemic species such as the proteus (baby dragons).
- **Applied Theory:** High-Reliability Organisations (HRO) theory and Operational Sensitivity.
- **Lesson for the student:** Use of biological and microclimatic indicators as early warning signals. Any change in temperature or air quality detected by their systematic studies is used to adjust tourist flows.
- **Resilient Action:** The “Predjama Sustainable” project to reduce road traffic and groundwater pollution, achieving certification as a Zero Waste destination.



### POSTOJNA CAVE PARK - I FEEL SLOVENIA

#### C. National Resilience Framework: Slovenian Green Scheme for Tourism (GSST)

- **Context:** Slovenia was the first country in the world to be declared a “Green Destination”. Its national scheme (GSST) brings together destinations and providers under sustainability standards.
- **Applied Theory:** Destination and Community Resilience.
- **Lesson for the student:** The interdependence between businesses and the community. The GSST offers standardised measurement tools to help hotels reduce operating costs (energy and water) and increase their efficiency.
- **Resilient Action:** Integrating sustainability into the national recovery strategy, making public support conditional on environmental and social resilience criteria.



[Slovenia Green](#)  [The story of green Slovenia](#)

#### 4. Greece: Evacuation due to fires in Rhodes (crisis communication), management of overtourism in Santorini and seismic resilience in hotels

##### A. Real-Time Crisis Management: Fires in Rhodes (2023)

- **Context:** The evacuation of over 19,000 people due to out-of-control wildfires, representing the largest evacuation operation in the country's history.
- **Applied Theory:** Early Warning Systems (EWS) and crisis escalation indicators.
- **Lesson for students:** Illustrates the importance of crisis communication and coordination between the private sector (TUI, local hotels) and public authorities to prioritise people's safety above all else.
- **Resilient Action:** The use of social media and digital channels to provide minute-by-minute updates, preventing panic and managing the destination's reputation even during the emergency.



Thousands flee homes and hotels on Rhodes as fires spread

B. Destination Resilience: Santorini and the Management of 'Overtourism'

- **Context:** The saturation of cruise passengers on an island with limited infrastructure jeopardises the tourist experience and the community's quality of life.
- **Applied Theory:** Socio-Ecological Systems (SES) Theory. The business (hotel/agency) cannot be resilient if the destination's ecosystem collapses due to overcrowding.
- **Lesson for the student:** Identification of critical points of failure in the infrastructure (ports, local transport) and how excess demand can become an operational risk.
- **Resilient Action:** Implementation of a digital cruise flow management system (daily quotas) to balance the tourism economy with the sustainability of the destination.



[Santorini tourism: Instagram vs. reality - On Assignment | ITV News](#)

C. Human Factor and Physical Safety: Seismic Resilience in the Hospitality Sector

- **Context:** Greece is one of the areas with the highest seismic activity in Europe.
- **Applied Theory:** The Theory of High-Reliability Organisations (HROs) and the Human Factor.
- **Lesson for students:** Staff adaptability and leadership under pressure. A team trained in seismic protocols detects anomalies and acts autonomously without waiting for orders from above during the critical first few seconds.
- **Resilient Action:** Systematic drills and structural safety certifications communicated transparently to build customer trust (Reputation).
- **Climate Risk and Health:** The Closure of the Acropolis due to Heatwaves
- **Context:** In summer, extreme temperatures exceed 40°C, forcing the closure of Greece's most visited monument to prevent heatstroke.

5. **Europe: Trust management following the Brussels attacks, COVID-19 early warning failures in Ischgl and Eurotunnel protocols**

A. Geopolitical and Security Risk: Brussels (Belgium) after 2016

- **Context:** The 2016 attacks paralysed the “heart of Europe”, affecting the airport and the metro, which caused hotel occupancy to plummet for months.
- **Applied Theory:** Destination and Community Resilience. Recovery depended not only on security, but on collective trust in public spaces.
- **Lesson for the student:** How to manage risk communication in an environment of geopolitical instability to restore the destination’s reputation.
- **Resilient Action:** The "Call Brussels" campaign, where citizens answered calls from tourists around the world to demonstrate that the city was safe, reinforcing the Human Factor.



BELGIUM: HEIGHTENED SECURITY IN BRUSSELS

### B. Failure in Early Warning: Ischgl (Austria) and COVID-19

- **Context:** At the start of the pandemic in 2020, this ski resort became a hotspot for mass transmission across Europe because it failed to act in time on the warning signs.
- **Applied Theory:** High-Reliability Organisations (HRO) theory. There was a failure in ‘concern for failures’ and the detection of early anomalies.

- **Lesson for the student:** The importance of recognising early warning signs and not ignoring indicators for the sake of immediate economic interests.
- **Resilient Action:** A complete overhaul of its health and communication protocols, integrating digital tracking systems and transparent information sharing to restore market confidence.

### C. Natural Disaster Risk and Continuity: Grindavík (Iceland, 2023–2024)

- **Context:** The total evacuation of a tourist town and the intermittent closure of the Blue Lagoon due to recurring volcanic eruptions.
- **Applied Theory:** Probability and Impact Matrix. Here, the impact is critical and the probability is very high.
- **Lesson for the student:** Carry out dynamic risk mapping. The student learns to prioritise people's safety over commercial operations when a 'warning sign' is imminent.
- **Resilient Action:** Design of smart physical barriers and digitalised evacuation plans that enable facilities to reopen within hours of seismic activity ceasing.



[Iceland's Masterclass in Volcano Risk Management in Grindavik](#)

### D. Digital Resilience and Infrastructure: Eurotunnel (France-UK)

- **Context:** Massive technical failures or strikes blocking the main transport artery between the mainland and the islands, leaving thousands of tourists stranded.
- **Applied Theory:** Crisis Life Cycle (Response).
- **Lesson for the student:** Decision-making under pressure. The student must simulate how to prioritise the provision of information and basic services to customers stranded at a 'single point of failure'.
- **Resilient Action:** Implementation of automated multilingual communication protocols and technical redundancy systems to ensure that a digital anomaly does not escalate into a full-blown operational crisis.

### 4. Deliverables (6 hours)

To help the student move from theory to real-world competence, these three deliverables serve as the professional portfolio of **the “Digitally Upskilled and Resilient Tourism Expert”**. They are not merely assignments, but technical documents that the student will be able to apply in their company the very next day after completing the course.

#### 1. Personalised Risk Matrix

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This deliverable focuses on the ability to identify and assess risks and vulnerabilities within a company or destination. The student must quantify threats to prioritise investment in security through:

- a) **Threat Inventory:** A list categorised by type: digital risks (cyberattacks), climate-related, health-related and geopolitical risks.

**Rating Scale (1-5) for the above categories:**

- **Probability:** From 'Very unlikely' to 'Almost certain'.
- **Impact:** From "Negligible" to "Catastrophic" (total loss of data or business closure).
- **Calculation of Risk Level ( $R = P * I$ ):** Application of the formula to classify risks into a heat map (green, yellow, red).

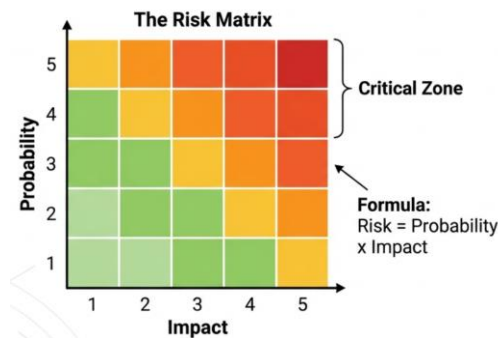


Figure 1: The Risk Matrix

## b) Identification and Classification

**Threat:** Specific description of the event (e.g. “Ransomware in the booking system” or “Flooding due to extreme storm”).

**Category:** Classification according to the plan’s axes: **Digital, Environmental (Climate), Geopolitical, Health or Human.**

The student must assign values from 1 to 5 to calculate the magnitude of the risk:

- Probability (P):** How likely is it to occur? (1: Very rare, 5: Frequent).
- Impact (I):** What damage would it cause to business continuity? (1: Minimal, 5: Shutdown or total data loss).
- Risk Level:** The result of multiplying both values defines the **Priority** (Low, Medium, High or Critical).

## Resilience and Response Strategy

- Preventive Measure (Resilience):** Actions to strengthen the organisation before the event occurs (e.g. training in ‘Cyber Hygiene’, NIS2 Directive protocols, or climate insurance).
- Response Plan (Contingency):** Steps to be taken *during* the crisis to ensure survival (e.g. server isolation, communication with data protection authorities or evacuation).

| Threat | Category | Risk (P x I) | Priority | Resilience Measure | Response Plan |
|--------|----------|--------------|----------|--------------------|---------------|
|--------|----------|--------------|----------|--------------------|---------------|

## Training Unit 1: Resilience in Tourism

|                    |           |              |              |                                      |                                     |
|--------------------|-----------|--------------|--------------|--------------------------------------|-------------------------------------|
| Ransomware Attack  | Digital   | $4 * 5 = 20$ | Critical     | Offline backups and NIS2 training    | Isolating systems / Crisis protocol |
| Social engineering | Human     | $5 * 3 = 15$ | Registration | Fraud detection training             | Account blocking / DPA report       |
| Power Cut          | Operation | $3 * 3 = 9$  | Average      | Uninterruptible power supply systems | Switch to manual operation          |

*Table 1: Example of a deliverable*

## 2. Debriefing Report

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This is the document in which the student critically analyses their performance following a crisis simulation. This exercise is essential for assessing the student's ability to 'communicate risks to non-technical stakeholders' and 'prioritise actions under pressure', as set out in the training plan.

Critical analysis written following the *role-play* activity ("The Unexpected Guest"), assessing decision-making under pressure and communication with non-technical personnel.

This report is written immediately after the simulation activity. Its aim is to assess **communication and decision-making skills under pressure**.

### a) Report Contents:

- **Chronology of the Incident:** Summary of what occurred during the crisis simulation.
- **Communication Analysis:** Assessment of how risk information was conveyed to non-technical *stakeholders* (management, customers, employees).
- **Cooperation Assessment:** Analysis of how colleagues and stakeholders collaborated during the critical situation.

- **Lessons Learned:** Identification of errors in the response and proposals for improvement for the future.

Proposed scenario and a detailed example of what this report would look like.

Role-Play Scenario: "The Unexpected Guest".

**Context:** A boutique hotel receives an email purportedly from a well-known travel agency, requesting urgent confirmation of a group booking for that very night. The email contains a link to a "payment receipt" which, when clicked, blocks access to the property management system (PMS).

### Roles:

**Student (Receptionist/Shift Manager):** Must detect the anomaly, decide whether to switch off the equipment, and report the situation to management and to guests who are checking *in*.

**Facilitator (General Manager):** A non-technical role that prioritises not inconveniencing customers and avoiding extra costs.

**Facilitator (External IT Technician):** Provides complex technical information that the student must 'translate'.

### Example of a Debriefing Report (Completed by the Student)

- **Activity ID:** RP-01-Digital Resilience
- **Student:** [Student Name]
- **Date:** XX/XX/202X
- **Simulated Scenario:** Ransomware attack via phishing on the PMS.

### Incident Summary (Timeline)

- **10:00 am:** Receipt of a suspicious email containing an external link. System slowdown detected after opening the link.
- **10:15 am:** The PMS system displays a file encryption error message. This is identified as a possible *ransomware* attack.
- **10:20 am:** Decision to disconnect the main server from the local network to prevent the spread (containment measure).
- **10:30 am:** The incident is reported to senior management and the technical support team.

### Analysis of Actions and Decision-Making

- **Successes:** The 'Zero Trust' principle was applied upon suspecting the email, although opening the link was the initial mistake. Physically disconnecting the equipment prevented the virus from affecting the accounting database, which was on a separate network.
- **Challenges:** There was an initial 5-minute delay due to the lack of a written protocol specifying which cables to physically disconnect.

### Communication Assessment (Key Competency)

- **Communication with Non-Technical Stakeholders:** We managed to explain to the Manager that the system was not 'down', but 'under attack', and that the priority was to protect customers' credit card details over the speed of the check-in process.
- **Customer Management:** A verbal message was prepared for customers waiting in the queue, explaining that "due to technical issues with the network" a temporary manual check-in process would be implemented, whilst maintaining a calm and professional manner.

### Lessons Learned and Improving Resilience

- **Cyber Hygiene:** It is necessary to implement a stricter email filtering system and provide specific training in *phishing* detection for all reception staff.
- **Business Continuity:** We must always have a physical "Emergency Kit" to hand (paper registration forms, printed emergency contact lists) so as not to be 100% dependent on the network during the first few hours of a crisis.
- **Reporting Protocol:** Communication must be faster; time was wasted looking for the on-call technician's phone number.

### Assessment Framework for the Trainer

When reviewing this report, the trainer must check whether the trainee has met the objectives of the TREADS programme:

- Have they correctly identified the vulnerability?
- Have they demonstrated autonomy in routine resilience tasks?
- Have they prioritised data protection over immediate operational requirements?

### 3. Final Risk Map (Resilience Plan Skeleton)

This is the most ambitious deliverable, acting as an operational roadmap, including critical points, EWS indicators, action strategies and confidence recovery plans.

- **Identification of Critical Points:** Description of the specific vulnerabilities of your business (e.g. reliance on a single booking channel, lack of external backups).
- **Early Warning Signals (EWS):** Definition of signs that herald a crisis (e.g. unusual network slowness, official weather warnings, systematic complaints on social media).
- **Immediate Resilience Measures:** List of preventive (cybersecurity hygiene) and reactive actions to ensure business continuity.
- **Recovery Roadmap:** Basic strategies for restoring reputation and trust following the incident.

This technical document is structured into **five key sections** that transform theoretical analysis into an operational roadmap.

1. Business Profile and Vulnerability Audit
  1. The student should begin by defining their organisation's ecosystem to identify specific weak points.
  2. **Critical Assets:** List of elements essential to operations (e.g. booking software, customer database, power supply, online reputation).
  3. **Single Points of Failure:** Identification of processes which, if they fail, halt all activity (e.g. total reliance on a single OTA or a single physical server).
2. Risk Visualisation (Strategic Mapping). Using the assessment methodology, the student plots the identified threats on a technical matrix.
  1. **Calculation of the Risk Index (R):** The mathematical formula for criticality is applied to each threat:
    - $R = P * I$
  2. Where P is the Probability of occurrence and I is the Organisational Impact.

- **Graphical Representation:** Plotting threats on a heat map to visualise priorities for investment in resilience.
3. Early Warning Systems (EWS). The student must define specific indicators that act as 'red flags' to anticipate a crisis.
- **Digital Indicators:** E.g. unusual increase in failed login attempts or security alerts from technology providers.
  - **Environmental/Social Indicators:** E.g. changes in official weather warnings or spikes in negative reviews on review sites.
4. Action Strategy and the Human Factor. Preventive and reactive measures are defined, incorporating staff adaptability.
- **Preventive Measures (Green & Digital):** Actions to reduce vulnerability, such as migration to the cloud or water-saving protocols in the event of droughts.
  - **Response Protocol:** Assignment of roles and responsibilities. Who leads communication? Who contacts technical support?
5. Recovery and Learning Strategy. The roadmap must include how to return to normality and emerge stronger following the incident.
- **Continuity Plan:** Minimum actions to continue operating 'in degraded mode' (e.g. manual customer registration).
  - **Restoring Trust:** Communication strategies to inform customers and restore brand reputation.
  - **Post-Incident Review:** Protocol for analysing what went wrong and continuously updating the risk map.

This deliverable demonstrates whether the student has achieved the necessary autonomy to carry out routine resilience tasks and cooperate with other stakeholders in crisis situations.

## 5. Assessment (2 hours)

The students' performance will be assessed based on their ability to:

- **Correctly classify** risks in a real-life case study.

## Training Unit 1: Resilience in Tourism

- **Demonstrate autonomy** when proposing resilience measures.
- **Collaborate actively** in group work and oral presentations.

And also via an **assessment questionnaire**: a 10-question quiz on the theoretical pillars and practical case studies covered in the module.

### Questions:

1. How is 'Destination Resilience' defined according to the pillars of the unit?
- A. The ability of an individual hotel to recover its data following a cyberattack.
  - B. The interdependence between businesses, the community and infrastructure to maintain collective security.
  - C. The exclusive use of renewable energy in a tourist area.
  - D. The ability of tourists to adapt to sudden changes in weather.

**Correct answer: B**

2. Within the 'Human Factor', which is a critical element for organisational resilience?
- A. Installing the most expensive antivirus software on the market.
  - B. The absolute centralisation of all decision-making in the Managing Director.
  - C. Staff adaptability, leadership and the team's mental wellbeing.
  - D. Replacing employees with Artificial Intelligence systems.

**Correct answer: C**

3. Which of the following is considered a specific 'Digital Risk Factor' in the tourism sector?
- A. A flood in the hotel reception.
  - B. Political instability in a source country for tourists.
  - C. The hacking of booking websites or the theft of customer data.
  - D. A shift in consumer preferences towards rural tourism.

**Correct answer: C**

4. What is an 'Early Warning System' in the context of this unit?

- A. An audible alarm indicating a fire in the building.
- B. Indicators and signals that enable the escalation of a crisis to be detected before it becomes uncontrollable.
- C. An automated messaging system to welcome customers.
- D. A quarterly report on the company's financial performance.

**Correct answer: B**

5. In a Risk Matrix, if an event has a 'High Probability' and a 'Critical Impact', which action should be prioritised?

- A. Ignore the risk because it is too complex to manage.
- B. Monitor the risk passively once a year.
- C. Implement immediate mitigation measures and response plans.
- D. Delegate responsibility exclusively to external suppliers.

**Correct answer: C**

6. Based on the real-life case of Meliá Hotels (2021), which characteristic defines its response as 'resilient'?

- A. The immediate payment of the ransom to the cybercriminals to avoid negative press.
- B. The ability to isolate systems and use backups to maintain business continuity.
- C. The complete closure of the hotel chain until the virus disappeared on its own.
- D. The public denial of the attack so as not to alarm investors.

**Correct answer: B**

7. According to the High Reliability Organisation (HRO) theory, who is usually best placed to detect day-to-day vulnerabilities?

- A. External auditors who visit the company annually.

- B. Front-line staff who operate the systems on a daily basis.
- C. The company's shareholders who analyse the financial results.
- D. The marketing department via social media.

**Correct answer: B**

8. In the crisis lifecycle, which phase occurs immediately after the 'Response'?

- A. Prevention.
- B. Preparedness.
- C. Recovery.
- D. Mitigation.

**Correct answer: C**

9. What is the main objective of a 'Risk Mapping' exercise for a travel agency?

- A. To create a brochure advertising the world's best destinations.
- B. To identify vulnerabilities and assess the likelihood of specific threats.
- C. To draw up a map of the emergency exits in the physical office.
- D. Calculate the time it takes employees to get to their workplace.

**Correct answer: B**

10. What skill does a student demonstrate who knows how to communicate risks to 'non-technical stakeholders'?

- A. The ability to write advanced code to stop a virus.
- B. The ability to explain a technical threat in a way that is understandable for decision-making.
- C. Proficiency in several languages to assist foreign tourists.
- D. The ability to draft complex legal contracts without the help of lawyers.

**Correct answer: B**

## 2.2 Resilience and Twin Transitions (Green & Digital)

By the end of this sub-unit, students will be able to apply the SDGs to tourism operations, identify green and digital synergies, evaluate smart solutions for improving resilience, and collaborate with public authorities and technology providers.

- The impact of climate change on tourism (heatwaves, water scarcity, shifts in seasonality)
- Integration of the UN Sustainable Development Goals (SDGs) and circular economy principles into tourism models.
- Smart technologies in tourism (Smart Tourism Destinations, IoT sensors – energy, water, occupancy, AI for demand forecasting and crisis response)
- European framework: EU Green Deal, EU Digital Strategy and inclusion.

### Suggested practical activity:

- Case study of a smart tourism destination in Europe

The central focus of this unit is the **strategic convergence** between environmental sustainability and digital transformation, a process known within the European framework as the ‘**Twin** Transition’. The aim is not merely for tourism professionals to use digital tools or recycle waste, but to learn how to use advanced technology as the driving force behind sustainability and, in turn, ensure that such technology is resilient to environmental threats.

This unit is divided into 3 sub-units:

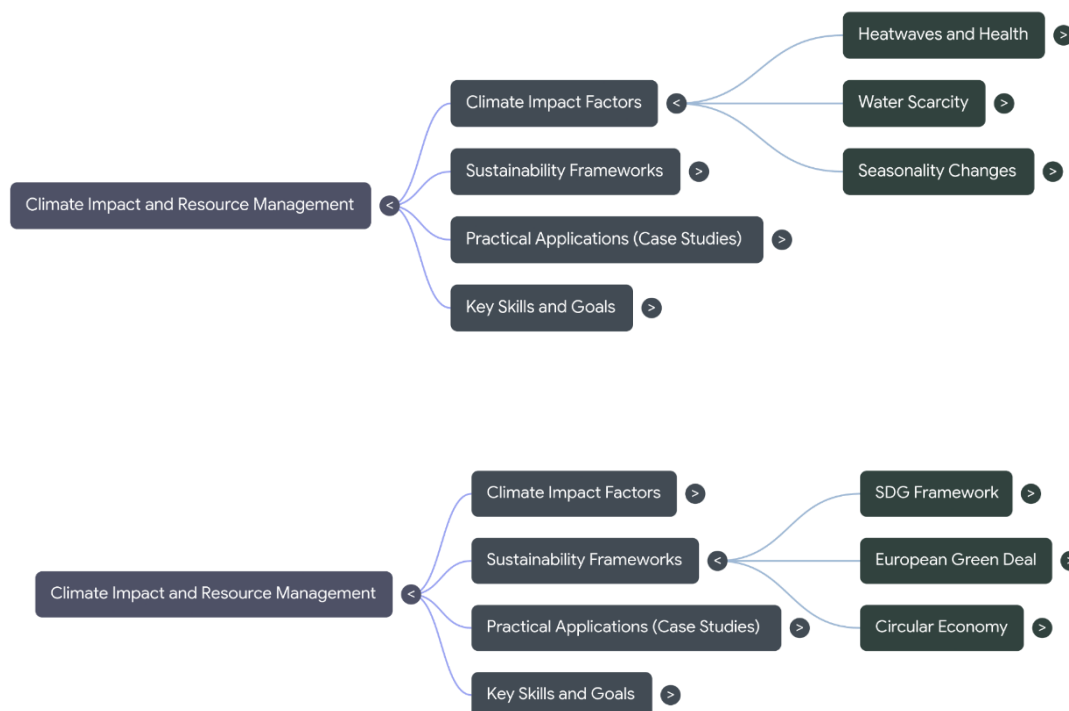
1. Climate Impact and Resource Management.
2. Smart Technologies (Smart Tech) for Resilience.
3. The European Framework and Smart Destinations.

### 2.2.1 Climate Impact and Resource Management (2 hours)

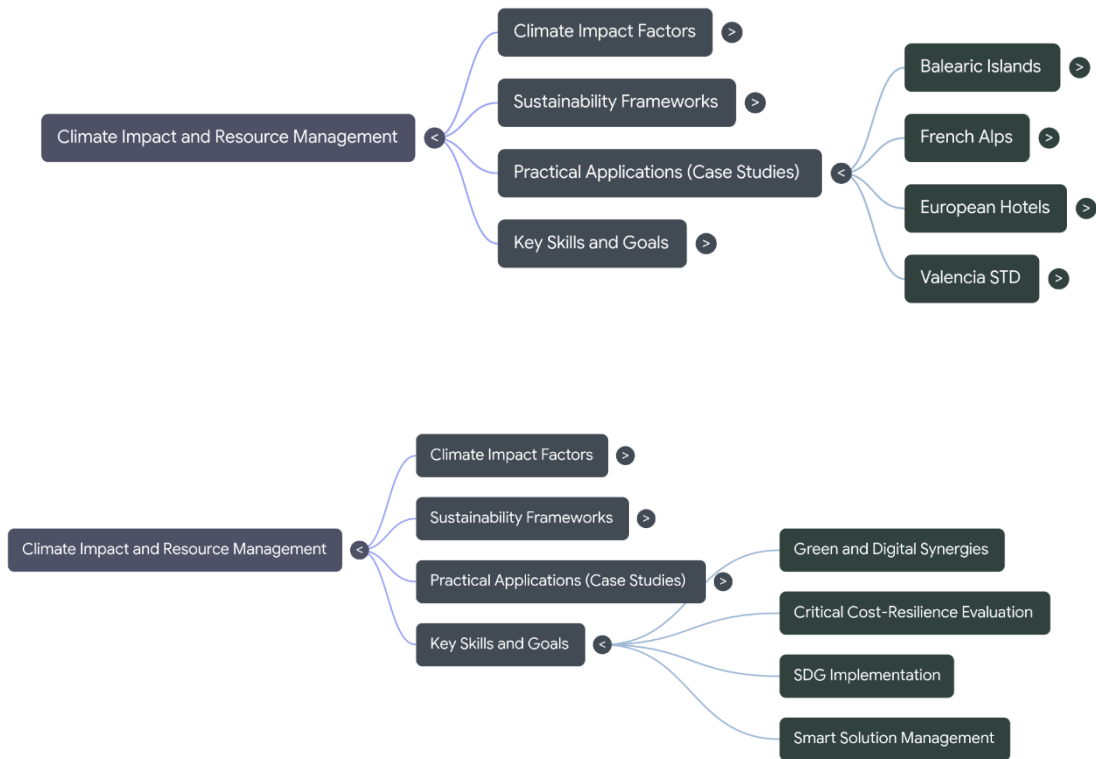
The starting point is the recognition that climate change is not a distant threat, but a factor that is already disrupting tourism operations through **heatwaves, water shortages and drastic changes in seasonality**.

- **Practical approach:** Students will stop viewing the climate as an uncontrollable variable and instead analyse it as a risk factor that can be managed using data.
- **Integrated Sustainability:** We explore the application of the **Sustainable Development Goals (SDGs)** and the principles of the **circular economy**. This involves transforming the business model from one of ‘consumption and disposal’ to one of ‘efficiency and regeneration’.

#### Unit outline



## Training Unit I: Resilience in Tourism



## 1. Theory to be taught (1 hour)

### 1. Climate Impact: Data and Operational Reality:

The impact of climate change on tourism is not a future projection, but a reality that is altering current supply and demand.

- **Heatwaves and Health:** According to reports from the European Environment Agency, rising extreme temperatures are reducing the appeal of southern European destinations during the summer, shifting demand northwards or towards shoulder seasons (spring/autumn).
- **Water Scarcity:** In island or Mediterranean destinations, water scarcity is becoming a critical operational risk. Water Resource Management theory holds that tourism consumes significantly more water per person than the local population, necessitating the implementation of metering technologies (IoT) to avoid social conflicts and ensure operational continuity.
- **Changes in Seasonality:** The loss of climate predictability affects the financial and staffing planning of tourism businesses.

### 2. Climate Impact and the SDG Framework

This pillar incorporates the Sustainable Development Goals (specifically SDGs 12 and 13) as a compass for strengthening resilience.

- **SDG 12 (Responsible Consumption and Production):** This is based on the 'Life Cycle' theory. Businesses must monitor their supply chains to reduce waste.
- **SDG 13 (Climate Action):** It underlines the need for climate mitigation and adaptation plans within tourism organisations.
- **Alignment with the European Green Deal:** This framework aims to make Europe the first climate-neutral continent by 2050. Resilient tourism must comply with energy efficiency and emissions reduction regulations to remain competitive and eligible for EU funding.

Climate change (heatwaves, water scarcity) is analysed as a risk factor that can be managed through data and circular economy principles.

### 3. The Theory of the Circular Economy Applied to Tourism

The circular economy is the antidote to supply chain vulnerability.

- **The 'R' Model:** Reduce, Reuse and Recycle. In tourism, this translates to the elimination of single-use plastics, the efficient management of organic waste and the design of hotel buildings using sustainable materials.
- **Resilience of Inputs:** By circularising resources, the company is less vulnerable to external price fluctuations or global supply disruptions.
- **Real Sustainability:** The EU is promoting the Circular Economy Action Plan, which requires industries (including tourism) to redesign their processes to maintain the value of products and materials for as long as possible.

### 2. Skills developed in the unit

Upon mastering this theory, the student will be able to:

1. **Evaluate smart solutions** from technology providers from a critical cost-resilience perspective.
2. **Identify synergies** where a digital investment also reduces environmental impact.
3. **Collaborate with technical experts** to ensure that the green transition leaves no backdoors for cybercriminals.

### 3. Case studies (1 hour)

- I. **Case Study 1:** Managing Water Scarcity in the Balearic Islands (Theory: Water and the IoT)
  - **Real-world context:** In Mediterranean island destinations, water scarcity is a critical risk affecting resilience. Tourist consumption is typically three times that of local residents.
  - **Practical Application:** Major hotel chains (such as Iberostar or Meliá) have implemented **IoT water sensors** to monitor consumption in real time and detect hidden leaks immediately.

Through this use case, we can evaluate smart solutions for improving resilience and the use of technologies to manage water scarcity.



[Managing water scarcity on the Canary Islands](#)

### II. **Case 2:** Adapting to Seasonality in the French Alps (Theory: Climate and Strategy)

- **Real-world context:** Due to heatwaves and a lack of consistent snowfall, ski resorts are experiencing **changes in seasonality**.
- **Practical Application:** Destinations such as Chamonix are diversifying their model towards '4-season tourism', using **AI to forecast** weather-related **demand** and redesigning their offering to include digitally guided hiking when there is no snow.

This case aligns with the identification of green and digital synergies and the application of climate change resilience principles.



In the Alps, climate change is turning glaciers into lakes • FRANCE 24 English

III. **Case 3: 'Zero Waste' Initiative in European Hotels** (Theory: Circular Economy and SDGs)

- **Real-world context:** Waste management is a pillar of the circular economy. An average hotel generates tonnes of food waste and single-use plastics.
- **Practical Application:** Hotels that have adopted the UN SDGs (specifically SDG 12) use digital platforms to measure kitchen waste and redistribute surplus food via apps (such as Too Good To Go), applying circularity principles.

The aim is to demonstrate the ability to apply the SDGs to tourism operations and collaborate with technology providers.

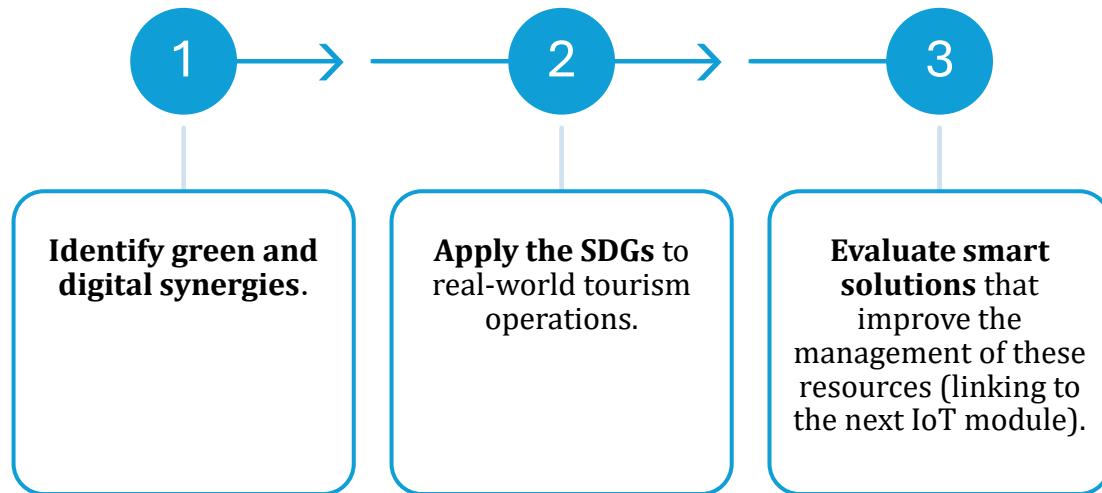
IV. **Case 4: Carbon Monitoring in Valencia, an STD City** (Theory: EU Green Deal and Digital Strategy)

- **Real-world context:** Valencia is a **Smart Tourism Destination** that measures the carbon footprint of its tourism activity.
- **Practical Application:** Using the **EU Digital Strategy**, the city integrates transport, energy and water data to provide climate transparency, aligning with the **EU Green Deal**.

This enables a case study of a smart tourism destination in Europe, as suggested in the programme's practical activities.

### Practical Application of Knowledge

For the learner to demonstrate competence in this area, the course requires them to be able to:



### 2.2.2 Smart Technologies (SmartTech) for Resilience (2.5 hours)

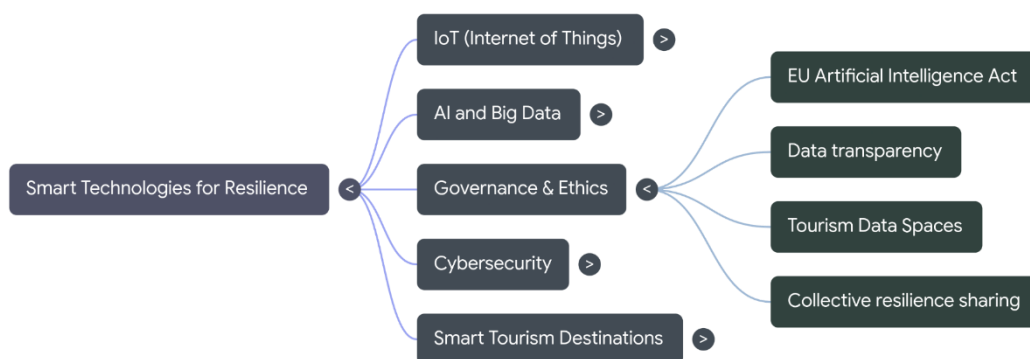
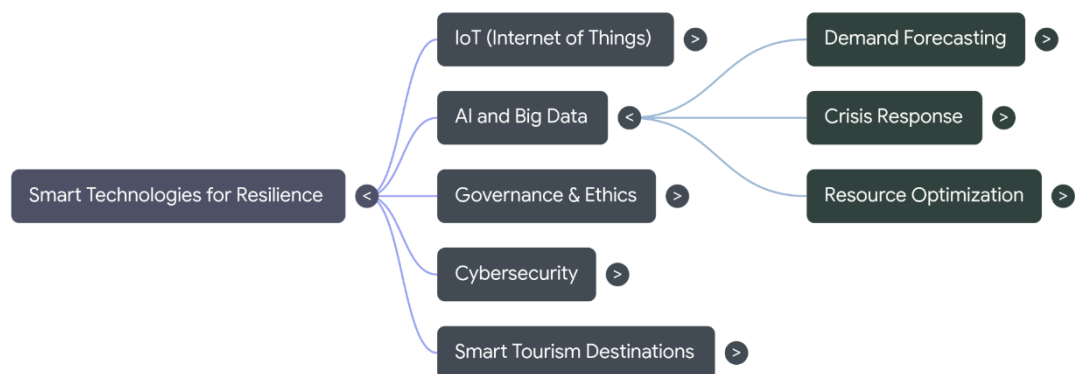
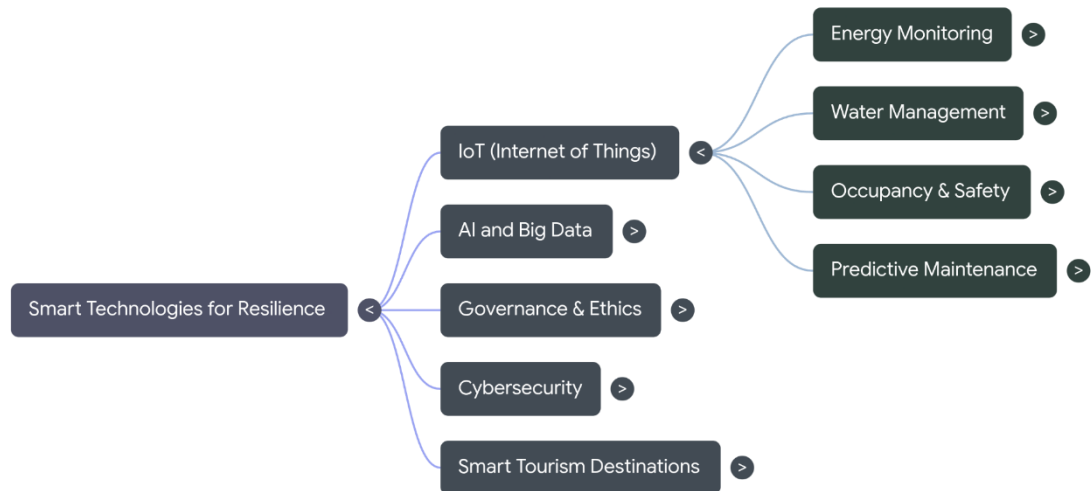
The theoretical objective is to enable students to evaluate and implement smart solutions that improve crisis management and sustainability.

The module proposes that technology is the indispensable tool for achieving environmental objectives. There is no real sustainability without measurement, and there is no efficient measurement without digitalisation.

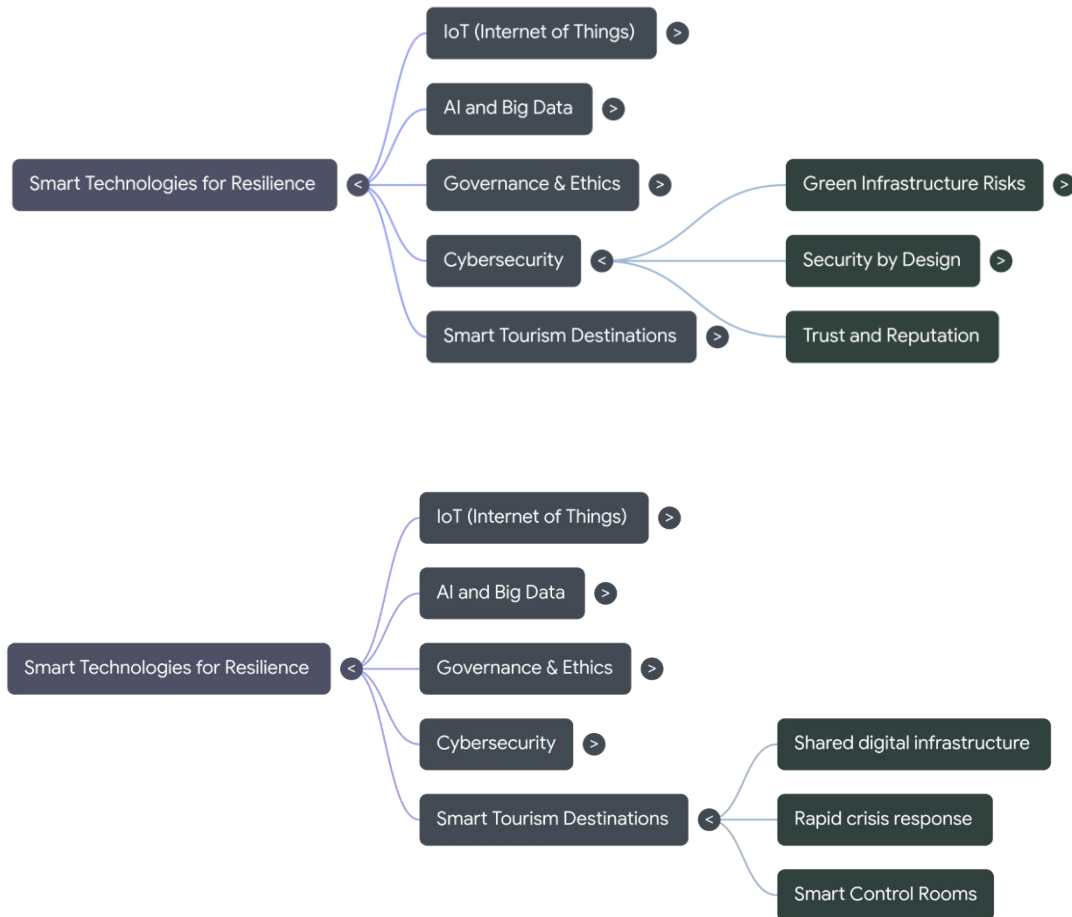
- **Smart Technologies:** Solutions such as **IoT sensors** for real-time monitoring of energy and water consumption are explored, as well as the use of **Artificial Intelligence (AI)** to predict demand and optimise resources, thereby reducing the carbon footprint. **Smart Destinations:** The concept of **Smart Tourism Destinations** is introduced,
- where resilience is built through shared digital infrastructure that enables a rapid response to climate or health crises.

### Unit outline

## Training Unit I: Resilience in Tourism



## Training Unit I: Resilience in Tourism



### 1. Theory to be taught (1.5 hours)

#### IoT (Internet of Things): The Eyes of the Business

The IoT is defined as the network of interconnected physical objects that collect and share data in real time. In resilient tourism, these sensors eliminate 'operational blindness'.

- **Energy Monitoring:** Smart sensors that detect abnormal spikes in consumption, helping to prevent grid failures or electrical fires.
- **Water Management:** Devices that measure water flow and immediately detect invisible leaks, protecting the resource in areas of scarcity.
- **Occupancy Levels:** Use of presence sensors or heat maps to optimise climate control and physical security, preventing dangerous crowding.

- **Predictive Maintenance:** Moving from repairing what is broken to preventing failure before it occurs, ensuring business continuity.

### AI and Big Data: The Brain of Crisis Response

If the IoT is the 'eyes', Artificial Intelligence (AI) is the ability to **predict and make decisions** based on that data.

- **Demand Forecasting:** AI models that analyse historical data and weather trends to predict occupancy, optimising the procurement of supplies and reducing food waste.
- **Crisis Response:** Algorithms that process 'early warning' (EWS) signals to automatically trigger emergency protocols (e.g. alerts to guests in the event of a fire or flood).
- **Optimisation of Critical Resources:** AI can manage microgrids to prioritise power supply to vital areas (such as food refrigeration or security systems) during a partial power cut.

### Ethics and accountability in AI

Ethical and responsible use of AI in accordance with the EU Artificial Intelligence Act. It focuses on transparency in the handling of biometric data and the removal of demand-prediction algorithms to ensure an equitable response to crises.

- **Tourism Data Spaces**

Introduction to Tourism Data Spaces. This theory explains how businesses can securely share risk indicators and sustainability information with competitors and public authorities. The aim is to strengthen the destination's collective resilience through the exchange of real-time data (e.g. alerts regarding overcrowding or resource consumption) without compromising trade secrets or customer privacy.

### Cybersecurity in the Twin Transition: Protecting Green Infrastructure

The integration of green technologies (water sensors, smart solar panels, automated climate control) creates new attack vectors. A business cannot be sustainable if it is not **digitally secure**.

1. **The Threat of Interconnectivity:** If a water sensor is hacked, an attacker could cause deliberate flooding or supply cuts, affecting health and operational resilience.
2. **Protecting Critical Infrastructure:** Students must understand that cybersecurity must apply not only to the reception computer, but to every connected sensor (security by design).
3. **Trust and Reputation:** In the digital age, losing control over a hotel's smart systems destroys customer trust and the viability of the business.

## 2. Skills developed in the unit

Upon completing this module, the student will have developed the following professional skills:

- **Technical evaluation of IoT solutions:** Ability to identify and implement monitoring sensors (energy, water, occupancy) that eliminate operational blind spots and enable predictive maintenance.
- **Proactive management using AI and Big Data:** Ability to use demand forecasting models and early warning systems (EWS) to optimise resources and automate crisis response.
- **Implementation of Cybersecurity by Design principles:** Ability to protect green infrastructure (sensors, BMS, HVAC) through network segmentation and compliance with regulatory frameworks such as the NIS2 Directive.
- **Ethical and collaborative data governance:** Competence to manage data transparently in accordance with the EU AI Regulation and to participate in Tourism Data Spaces to strengthen collective resilience.

## 3. Specific cases (1 hour)

### Use Case 1: IoT (The Eyes of the Business)

The **IoT** enables a shift from reactive management ("it's broken") to proactive management ("it's going to fail").

1. **Real-world case: NH Hotel Group and Iberostar (Efficiency and Prevention).**

- **Context:** These chains use building management systems (BMS) with IoT sensors to monitor water and energy consumption in real time.
- **Applied Resilience:** In the event of an invisible water leak in a main pipe at 3:00 am, the sensor detects the abnormal flow and automatically cuts off the supply or sends an immediate alert. This prevents serious structural damage and the closure of rooms, safeguarding business continuity.

## 2. Real-world example: Occupancy sensors in communal areas.

- **Context:** Use of heat sensors or Wi-Fi pings to measure crowd density in spas or restaurants.
- **Applied Resilience:** In the context of health crises or evacuations, this allows managers to know exactly where crowds are gathering and to safely redeploy staff or customers.

### Use Case 2: AI and Big Data (The Brain)

AI processes data ‘noise’ to provide accurate predictions that save resources.

#### 1. Real-world example: Benidorm or Venice (Smart Control Rooms).

- **Context:** As **Smart Tourist Destinations**, they use Big Data (telephone, camera and social media data) and AI to predict occupancy.
- **Applied Resilience:** If AI detects an excessive occupancy peak combined with a heatwave warning, the destination can activate protocols to bolster health and transport services before a collapse occurs.

#### 2. Real-world example: Winnow Solutions (AI against food waste).

- **Context:** Hotels and cruise ships use AI-powered cameras in kitchens to analyse which food is being thrown away.
- **Operational Resilience:** AI identifies patterns (e.g. “we always throw away 30% of the rice on Tuesdays”). This enables us to adjust purchasing, thereby reducing costs and aligning with **SDG 12** on responsible production and consumption.

### Use Case 3: Cybersecurity (Protecting the Green Shield)

Cybersecurity is essential for a reliable digital transition.

### 1. "Alert" Case: The Aquarium Thermometer Hack.

- **Context:** At a US casino, attackers breached the corporate network via a smart (IoT) thermometer in a lobby aquarium.
- **Resilience Lesson:** This real-world case serves to teach students that every water or energy sensor installed to be 'green' is a potential entry point. Resilience requires network segmentation: water sensor data must never be on the same network as customers' credit card details.

### 2. Real-World Case: Implementation of the NIS2 Directive in Hotel Chains.

- **Context:** European hotels are strengthening the security of their building management systems (HVAC, lighting) to comply with the EU framework.
- **Applied Resilience:** By securing climate control systems, a cybercriminal is prevented from taking control of the air conditioning during a heatwave, which would force the evacuation of the hotel and trigger a massive reputational crisis.

## 2.2.3 The European Framework and Smart Destinations (2.5 hours)

This module is not about distant laws, but about how the European Union helps make your business more modern and secure. We will learn that concepts such as the **EU Green Deal** or the **Digital Strategy** are actually 'quality labels' and survival guides.

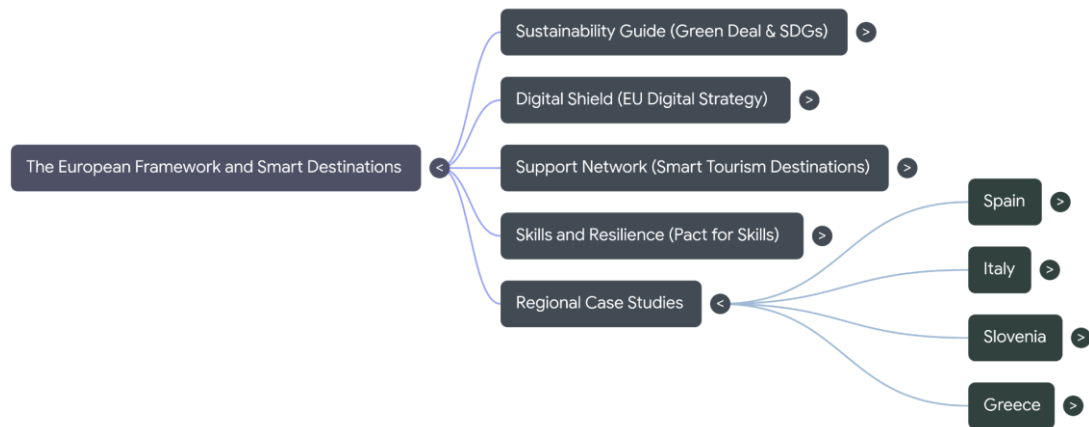
When a hotel decides to stop printing brochures and uses a QR code, or when a tourist office uses an app to warn that a beach is full, they are applying these European policies. The aim here is for the student to understand that being a 'Smart Destination' involves using the information we already have to ensure tourists are safer and the environment is better cared for.

### Unit outline

## Training Unit I: Resilience in Tourism



## Training Unit I: Resilience in Tourism



### 1. Theory to be taught (1 hour)

To facilitate learning, we have divided the theory into three operational concepts that students need to know:

#### I. The Sustainability Guide (Green Deal and SDGs)

- **What it is:** A commitment for businesses to pollute less and save more.
- **In day-to-day practice:** This means favouring local suppliers, reducing plastic use and using energy efficiently.
- **Resilience:** If you use less electricity and water, your business is more resilient to price rises and droughts.

#### II. The Digital Shield (EU Digital Strategy)

- **What it is:** Rules to make the internet a safe place for businesses and customers.
- **In practice:** It means protecting customer data and using digital tools that don't fail.
- **Resilience:** Staff who can spot a phishing email protect the company's money and reputation.

#### III. The Support Network (Smart Tourism Destinations – STD)

- **What it is:** Destinations that share data to help everyone.
- **In everyday life:** Check the city's official website for crowd forecasts or weather alerts.

- **Resilience:** Knowing how to act before the problem arises (e.g. warning a group not to go to an area due to a heatwave warning).

### 1. Skills developed in this unit

Upon completing this module, the learner will be able to:

- **Align business strategy with European policies:** Understand and apply the *EU Green Deal* and the *EU Digital Strategy* as survival guides and 'quality labels' for business modernisation.
- **Operate under the Smart Tourist Destination (STD) model:** Use shared data infrastructures and technological tools to improve tourist safety and environmental protection.
- **Implement green and digital resilience measures:** Digitise operational processes (such as the use of QR codes or digital menus) to reduce costs, save resources and comply with EU sustainability standards.
- **Manage cybersecurity and data privacy:** Apply the "Digital Shield" to protect customer data and detect threats such as *phishing*, safeguarding the organisation's reputation.
- **Promote continuous learning and regional collaboration:** Participate in cooperation frameworks such as the *Pact for Skills* to ensure that human capital is the primary defence against technological crises.

### 2. Specific cases by region (1.5 hours)

#### I. Spain

##### A. Case 1: The "Plastic-Free Menorca" Programme

- **Context:** EU Green Deal and SDG 12 (Responsible Consumption).
- **Action:** Small hotels and local businesses are replacing plastic bottles with filtered water dispensers and QR codes for tourist guides.
- **Application for the student:** The student learns that digitising information (QR codes instead of paper) is a green resilience measure that saves costs and complies with EU regulations.



### [Plastic Free Menorca Alliance \(ENG\)](#)

#### B. **Case 2:** The TREADS course (Pact for Skills)

- **Framework:** Pact for Skills.
- **Action:** The course the students are taking is a real-life example of this European pact to ensure workers do not fall behind in technology.
- **Application for the learner:** Understanding that their training is a tool for resilience. A trained worker is a company's best defence against any crisis.

#### C. **Case 3:** 'No Overflow' Waste Management (Santander, Spain)

- **The Problem:** During the high season, litter bins in tourist areas fill up quickly, creating a mess and a poor image.
- **The "Smart" Action:** The city installed sensors in the bins that alert the cleaning service only when they are 80% full.
- **Relation to the European Framework:**
  - **EU Digital Strategy:** Use of data and IoT to improve a public service.
  - **EU Green Deal:** Fuel is saved by not sending refuse collection lorries to empty bins.
- **Resilience for Students:** If you work at an information point, you can identify which areas are clean and well-maintained to recommend them, thereby avoiding complaints from tourists about poor hygiene.

D. **Case 4:** The Beach Occupancy ‘Traffic Light’ System (Benidorm, Spain)

- **The Problem:** Overcrowding on a beach poses safety risks, causes heat stress and leads to a poor customer experience.
- **The ‘Smart’ Solution:** A simple web application shows in real time whether the beach is green (free), yellow (moderate) or red (full).
- **Relation to the European Framework:**
  - **Smart Tourism Destination (STD):** Use of technology to manage the flow of people safely.
  - **Inclusion:** Enables people with reduced mobility to choose less crowded times to visit safely.
- **Resilience for the Student:** A hotel receptionist can check the website and advise the customer: “Don’t go to Levante beach now, the AI indicates it’s full; try this other, safer cove instead.”

E. **Case 5:** Cybersecurity Training for Guides (Pact for Skills)

- **The Problem:** Self-employed guides often use public Wi-Fi networks to manage their clients’ bookings, exposing them to data theft.
- **The ‘Smart’ Action:** A local training programme (such as this TREADS course) teaches guides how to use secure networks and protect tourists’ data.
- **Link to the European Framework:**
  - **Pact for Skills:** Investment in workers’ digital skills to ensure they are not left behind.
  - **EU Digital Strategy:** Protection of privacy and data in the European digital space.
- **Resilience for the Learner:** The learner understands that their own training is what makes them resilient: knowing which networks to avoid protects their business and their customers’ trust.

## II. Italy

A. **Case 1:** Venice’s “Smart Control Room”

- **The Problem:** The extreme overcrowding in Venice creates safety risks, degrades the tourist experience and puts pressure on emergency services in a complex geographical environment.
- **The "Smart" Action:** An advanced control centre that integrates data from sensors, mobile phone signals, AI-powered cameras and GPS from the vaporettos to monitor the flow and density of people in real time.
- **Relationship with the European Framework:**
  - **Smart Tourism Destination (STD):** Use of cutting-edge technology for the safe management of the destination's carrying capacity.
- **Resilience for the Visitor:** A hotel manager can receive overcrowding alerts for specific areas (such as St Mark's Square) and recommend alternative routes or less crowded museums to their guests, avoiding stressful situations and improving safety.



### Dentro la smart control room di Venezia

#### B. **Case 2:** Sustainable Mobility in the Dolomites (South Tyrol Guest Pass)

- **The Problem:** Reliance on private cars in the Alpine valleys causes traffic jams, pollution in fragile ecosystems and vulnerability to landslides that block roads.
- **The 'Smart' Action:** The full digitalisation of public transport via the 'Guest Pass', which allows tourists to use trains and mountain buses

for free and without limits, integrating digital bookings for shuttle services to critical high-altitude locations.

- **Relation to the European Framework:**

- 1. **EU Green Deal:** Drastic reduction in the carbon footprint of tourist transport in protected areas.

- **Resilience for the Student:** The student learns that facilitating digitalised green mobility is not only sustainable, but also reduces the operational risk of customers becoming trapped in traffic jams or on blocked secondary roads.

C. **Case Study 3:** IoT-based Water Management in Hotels on the Amalfi Coast

- **The Problem:** Water scarcity and the steep terrain make it difficult to ensure a stable water supply in summer, posing a critical risk to hygiene and customer satisfaction in luxury hotels.

- **The 'Smart' Action:** Installation of IoT sensors in the hotels' pipes and tanks to detect invisible leaks and monitor consumption in real time.

- **Relation to the European Framework:**

- **SDGs 6 and 12:** Efficient water management and responsible consumption.

- **Resilience for the Student:** Faced with an anomaly in the flow at 4:00 am, the system alerts the receptionist, allowing a leak to be repaired before the hotel's reserve tank runs dry, ensuring continuity of service.

D. **Case 4:** "Feel Florence" – Application of Digital Diversification

- **The Problem:** Florence's historic centre suffers from excessive wear and tear on its heritage, whilst other nearby artistic neighbourhoods receive no visitors, affecting the destination's social and economic resilience.

- **The "Smart" Action:** An official app that uses real-time data to suggest less crowded itineraries and experiences off the beaten track based on the tourist's profile.

- **Relationship with the European Framework:**

- **EU Digital Strategy:** Ethical use of behavioural data to improve coexistence between residents and tourists.

- **Resilience for the Student:** A guide or receptionist can use the app to show the customer that visiting a suburb is a more comfortable and 'safer' option compared to the endless queues in the city centre.



[Feel Florence](#)

### III. Slovenia

#### A. **Case 1:** The Slovenian Green Tourism Scheme (GSST)

- **The Problem:** Ensuring that all sector stakeholders (hotels, destinations, agencies) adhere to genuine sustainability standards to prevent 'greenwashing' and improve resource efficiency.
- **The 'Smart' Action:** A national digital platform that unifies sustainability criteria and measurement tools under a single brand. It enables businesses to monitor their energy and water consumption to obtain official certifications.
- **Link to the European Framework:**
  - **EU Green Deal and SDG 12:** Using technology to promote responsible consumption and production patterns.
- **Resilience for the Student:** The student understands that operating under a national digital sustainability umbrella reduces operational costs and makes the business more resilient to energy price crises.



[Slovenia Green](#)  [The story of green Slovenia.](#)

B. **Case 2:** Alpine Mobility Management in the Bohinj and Bled Valleys

- **The Problem:** The saturation of private vehicles in the Alpine valleys and around the lakes degrades the environment, generates noise and hinders access for emergency services.
- **The ‘Smart’ Action:** Implementation of digital booking systems for out-of-town car parks and the use of shuttle buses monitored via GPS and apps for tourists.
- **Relationship with the European Framework:**
  - **Smart Tourism Destination (STD):** Technological management of visitor flows to protect natural heritage.
- **Resilience for Students:** A receptionist at a mountain hotel can check car park occupancy in real time and advise guests to use digital transport options, thereby avoiding traffic congestion at the destination due to overcrowding.

C. **Case 3:** Digital Monitoring of the Microclimate in Postojna Cave

- **The Problem:** The karst ecosystem is extremely fragile; even minor changes in temperature or CO2 levels caused by excessive visitor numbers can damage the formations and endemic fauna.
- **The ‘Smart’ Action:** Use of advanced IoT sensors that monitor the cave’s biological and microclimatic conditions in real time, sending alerts if levels deviate from safe limits.
- **Relation to the European Framework:**

- **Twin Transition:** Digital technology (sensors) serving a critical green goal (biodiversity protection).
- **Resilience for Students:** Learning to recognise environmental ‘early warning signs’ that necessitate adjusting tourist flows to ensure the long-term survival of the tourist asset.

D. **Case 4:** TSI Data Infrastructure for Decision-Making

- **The Problem:** The lack of up-to-date and shared data prevented rapid responses to external shocks (such as pandemics or natural disasters).
- **The ‘Smart’ Action:** Creation of a Digital Tourism Data Hub that centralises statistical and operational information for citizens and businesses.
- **Relationship with the European Framework:**
  - **EU Digital Strategy:** Use of data infrastructures to improve governance and crisis response capacity.
- **Resilience for the Learner:** The resilient expert uses this hub to monitor digitalisation and sustainability trends in their area, enabling them to adapt proactively to demand.

IV. Greece

A. **Case 1:** Digital Cruise Ship Management in Santorini

- **The Problem:** The simultaneous docking of several large-capacity cruise ships overwhelms the port and the streets of Fira, degrading the experience and creating safety risks in a geologically fragile destination.
- **The ‘Smart’ Action:** Implementation of a digital berthing management system that allocates slots based on the destination’s real-time capacity, preventing more than 8,000 cruise passengers from arriving on the island at the same time.
- **Relation to the European Framework:**
  - **Smart Tourism Destination (STD):** Use of technology to balance the tourism economy with social and physical sustainability.
- **Resilience for the Student:** A receptionist or guide can consult the digital cruise calendar and advise the customer to avoid critical areas

during peak disembarkation times, ensuring the tourist's satisfaction and safety.

### B. Case 2: Astypalaia – The First 'Smart & Sustainable' Island

- **The Problem:** Dependence on fossil fuels for energy and transport on small islands leads to high costs, pollution and vulnerability to supply issues.
- **The "Smart" Initiative:** A comprehensive pilot project that replaces traditional transport with shared electric vehicles managed via an app ("AstyMove") and a smart grid powered by renewable energy.
- **Relationship with the European Framework:**
  - **EU Green Deal:** Drastic reduction of emissions in isolated areas and promotion of clean mobility.
- **Resilience for Students:** Students learn how the digital energy transition makes a destination more self-sufficient and resilient to energy price crises or disruptions to external supply.



[Astypalea - Smart & Sustainable Island](#)

### C. Case 3: "Extrema" App for Heatwaves in Athens

- **The Problem:** Temperatures exceeding 40°C in summer pose a life-threatening risk to tourists visiting the Acropolis and other exposed archaeological sites.

- **The "Smart" Action:** An app that uses real-time satellite data to provide street-by-street heat risk information and suggests "cool routes" and nearby water points.
- **Relation to the European Framework:**
  - **SDG 3 (Good Health and Well-being) and 13 (Climate Action):** Using technology to protect human life from extreme weather events.
- **Resilience for the Student:** The resilient expert uses these digital tools to recommend safe visiting times for their groups, activating health protocols before a medical emergency occurs.

D. **Case 4:** Heritage Digitisation and Queue Management (E-Ticket)

- **The Problem:** Overcrowding at Greece's 25 main archaeological sites leads to queues lasting several hours in the sun, affecting visitors' health and staff efficiency.
  - **The 'Smart' Action:** A national e-ticket system with mandatory time slots that spreads demand throughout the day.
- **Relation to the European Framework:**
  - **EU Digital Strategy:** Digitisation of public services to improve efficiency and citizen safety.
- **Resilience for Students:** Students understand that digitising access is not just a matter of convenience, but a measure of operational resilience that allows for the orderly evacuation of a site in the event of an emergency.

E. **Case 5:** Digital Emergency Communication in Rhodes (2023)

- **The Problem:** Uncontrolled forest fires require the rapid mass evacuation of thousands of tourists of different nationalities.
- **The 'Smart' Action:** Extensive use of social media, official digital channels and mobile alert systems to coordinate repatriations and relocations in real time.
- **Relationship with the European Framework:**
  - **Early Warning Systems (EWS):** Integration of danger signals into direct communication with tourists.

- **Resilience for the Student:** The student practises managing information under pressure, using digital channels to reassure customers and offer rapid logistical solutions, protecting the destination's reputation even during a crisis.

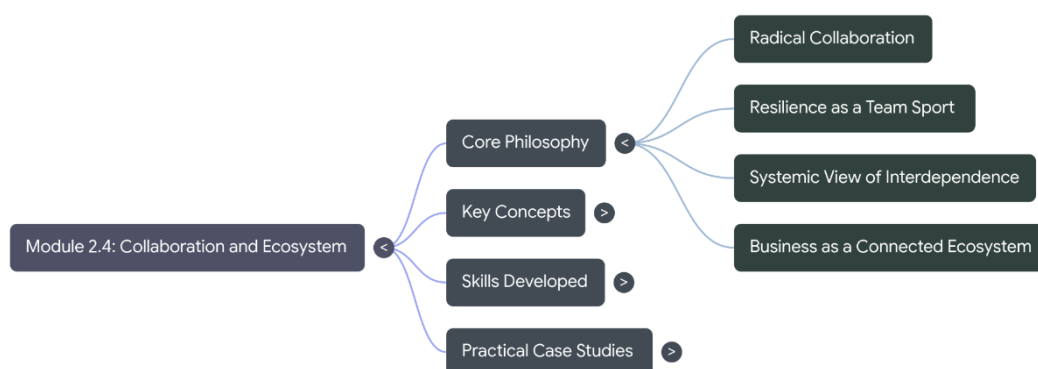
### 2.2.4 Collaboration and Ecosystem (2 hours)

This final module of **Sub-Unit 2** is where all the pieces of the puzzle come together. Here, students learn that resilience is not a “solo effort”, but a **team sport**. Over these 4 hours, we will transform the idea of the business as an island into the vision of a **connected ecosystem**, where collaboration with neighbours, local councils and tech companies is what truly saves the business when a crisis strikes.

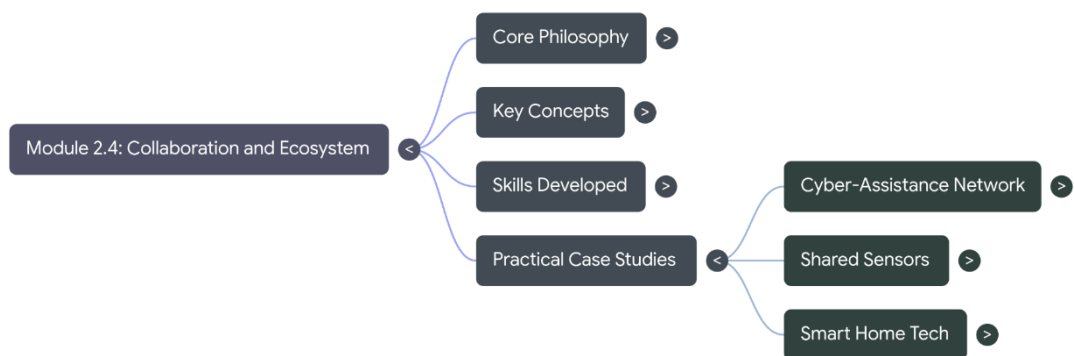
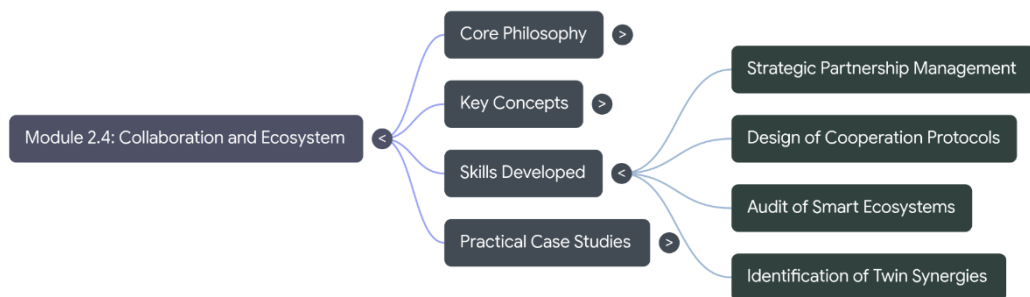
The focus of this module is **radical collaboration**. In the tourism sector, if the destination fails (there is a flood, a massive cyberattack on the city's network or a reputational crisis), your hotel or agency will fail, even if your internal systems are flawless. Therefore, the resilient professional must be able to forge strategic alliances before an emergency strikes.

We will discuss how to speak the same language as technology providers and how to participate in public authorities' decision-making forums. Furthermore, we will delve into the ‘magic’ of **synergies**: how a single investment (for example, a smart lock) can save energy (sustainability), facilitate check-in (digitalisation) and provide data on who enters and exits in the event of an emergency (security). The aim is for students to understand that collaborating and seeking synergies is not an expense, but the smartest way to invest in the future of the business.

### Unit outline



## Training Unit I: Resilience in Tourism



## 1. Theory (1 hour)

### I. The Theory of the Tourism Ecosystem

- **Concept:** Organisational resilience depends on community and destination resilience.
- **Application:** A tourism business must identify its *stakeholders*: from the local police to the Wi-Fi provider and neighbourhood associations.
- **Resilience:** If everyone is coordinated, recovery after a crisis is much faster.

### II. Public-Private Partnerships (PPPs)

- **Concept:** Cooperation between government and businesses to achieve common goals.
- **Application:** Participating in the local council's emergency plans or 'Smart City' projects.
- **Resilience:** Provides access to official early warning systems (EWS) that the business could not afford on its own.

### III. Dual-Purpose Investments (Twin Synergies)

- **Concept:** To seek technological solutions that address two or more problems at the same time.
- **Application:** Implementing smart home systems (IoT).
- **Synergy:** An AI-powered camera can count tourists to prevent overcrowding (safety/resilience) and, at the same time, switch off lights in empty areas (sustainability/energy saving).

## 2. Skills developed in this unit

Upon completion of this module and the practical activities in the unit, the student will have acquired the following skills:

- **Strategic Partnership Management:** Ability to actively collaborate with public authorities (local councils, civil protection) and technology providers, participating in decision-making forums and emergency plans.

- **Identification of "Twin Synergies":** Ability to identify investment opportunities where a digital solution simultaneously improves sustainability and operational safety (e.g. home automation and IoT).
- **Design of Cooperation Protocols:** Competence in drafting shared responsibility agreements that define specific tasks for the business, the technical provider and the public authority during a crisis.
- **Critical Analysis of Smart Ecosystems:** Ability to audit technological solutions in Smart Tourism Destinations (STD), assessing their impact on climate resilience and digital vulnerability.
- **Systemic View of Resilience:** Understanding of the interdependence between organisational and community resilience, identifying critical *stakeholders* in the environment.

### 3. Specific cases (1 hour)

#### I. Case 1: The Hotel Network and Local 'Cyber-Assistance'

- **Scenario:** A group of small rural hotels in a village decide that they cannot each afford to pay for a cybersecurity expert.
- **The Action:** They collaborate with a local technology association to create a "mutual aid protocol". If one detects a suspicious email, it automatically alerts the others and the police.

Demonstrates the ability to cooperate with colleagues and other *stakeholders* in high-risk situations.

#### II. Case 2: The Town Council and 'Shared Sensors'

- **Scenario:** A tourist office and the restaurants in a square collaborate to install air quality and noise sensors.
- **The Action:** The council provides the Wi-Fi network and the businesses provide the space for the sensors.
- **The Synergy:** The data helps the council manage noise (neighbourly relations) and enables the restaurant to demonstrate to its customers that its terrace is a healthy and safe space.

This allows us to identify synergies between digitalisation and sustainability.

### III. Case 3: Smart Home Technology that Protects and Saves (Pure Synergy Case)

- **Scenario:** A modern hostel installs electronic locks that work via the guest's mobile phone.
- **The Action:** The system is connected to the air conditioning in the rooms.
- **The Result:** When the guest leaves (the sensor detects that no one is present), the air conditioning switches off (savings/sustainability). Furthermore, the system records that the room is empty, which facilitates the work of the emergency services in the event of a fire (resilience/safety).

Evaluation of smart solutions for improving resilience.

#### 2.2.5 Group Activities and Outputs (7 hours)

For these 16 hours, three activities are proposed:

##### Activity 1: 'Smart Destination' Case Study (3 hours)

- **Task:** The student (or group) must choose one of the following Smart Tourism Destinations recognised by the European Commission:
  - Málaga (Spain): A leader in mobility management and energy efficiency.
  - Gothenburg (Sweden): A benchmark in environmental sustainability and digital accessibility.
  - Valencia (Spain): A pioneer in measuring carbon and water footprints using real-time data.
- **Deliverable: Smart Diagnostic Report.** The student must **identify a technological solution used by the destination** and explain how it improves resilience to climate change.

The report must follow this technical framework to ensure that all the competencies of the TREADS profile are covered:

1. "Twin Synergies" Audit (Green & Digital)
  - **Identification of SDGs:** Which Sustainable Development Goals is the destination targeting with its technological strategy?

- **Synergy identified:** Describe an instance where digital technology directly improves an environmental factor (e.g. water-saving irrigation sensors).

## 2. Assessment of Implemented Technologies

The student must critically analyse the use of:

- **IoT sensors:** How do they monitor energy and water consumption or occupancy levels at the destination?
- **AI systems:** How is artificial intelligence used to predict tourism demand or respond to climate crises (e.g. heat alerts)?

## 3. Digital Vulnerability Analysis

In line with the vision of a 'digital risk-aware expert', the student must answer:

- **Detected Threat:** What would happen if the smart infrastructure analysed (sensors, data network) were to suffer a cyberattack?
- **Cyber-Resilience Measure:** Propose a basic security measure to protect these technological assets (e.g. access protocols or data encryption).

## 4. Diagnostic Matrix (Working Tool)

To facilitate the analysis, the student will complete the following table within their report:

| Smart Component   | Technology (IoT/AI)              | Climate Risk Mitigated        | Associated Digital Vulnerability       |
|-------------------|----------------------------------|-------------------------------|----------------------------------------|
| Water Management  | Flow sensors in urban networks   | Water scarcity / Drought      | Consumption data manipulation          |
| Energy Management | Smart Grids and Hotel Automation | Heatwaves / Consumption peaks | Unauthorised access to control systems |
| Tourist flows     | AI for occupancy forecasting     | Overcrowding / Instability    | Theft of customer behaviour data       |

## 5. Conclusion and Recommendations

The student must conclude the report with a **proposal for improvement**. What additional technology or digital security measure would you recommend to the destination to make it more resilient in the future?

### Assessment methodology for Activity 1

To pass this activity, the trainer will assess the student's ability to:

1. **Correctly identify and classify the risks** in the chosen case study.
2. **Evaluate smart solutions** that improve resilience.
3. **Collaborate on the preparation of the written report**, demonstrating problem-solving skills.

### Activity 2: Synergy Audit (2 hours)

- **Task:** Develop a critical eye to identify technological solutions that reduce environmental impact and, at the same time, assess how to digitally secure this new infrastructure to ensure business resilience.

Students, preferably **working in groups**, should **select a tourism-related business** (a hotel, a travel agency or a transport company) and **analyse its current processes** in order to **propose three 'Twin Transition' implementations**.

#### Step 1: Identifying Areas for Improvement

The group must choose three critical areas of consumption or impact:

- Water and waste management.
- Energy consumption and air conditioning.
- Waste management and single-use plastics.
- Mobility and customer transport.

#### Step 2: Technology Proposal (Digital Synergy)

For each area, you must propose a specific technology (IoT, AI or Big Data) that optimises that resource, based on the principles of the **circular economy** and the **SDGs**.

#### Step 3: Security Analysis (Resilience)

In line with the profile of a 'digital risk-aware expert', you must identify what would happen if that technology were attacked and how to protect it.

- **Deliverable:**

### 1. Synergy Plan.

The final result will be a **Synergy Plan** (2–3-page document) that includes:

1. **A brief description of the chosen company.**
2. **The completed Synergy Matrix.**

| Area of Impact | Proposed Digital Solution                     | Environmental Benefit (SDGs)                          | Digital Risk (Cybersecurity)                              | Protective Measure                                        |
|----------------|-----------------------------------------------|-------------------------------------------------------|-----------------------------------------------------------|-----------------------------------------------------------|
| E.g.: Energy   | Smart thermostats with presence sensors (IoT) | Reduction in CO2 emissions (SDG 13) and cost savings. | Unauthorised remote access to manipulate the temperature. | Communications encryption and Wi-Fi network segmentation. |
| Point 1        |                                               |                                                       |                                                           |                                                           |
| Point 2        |                                               |                                                       |                                                           |                                                           |
| Point 3        |                                               |                                                       |                                                           |                                                           |

*Table 2: Example of a synergy matrix*

3. **Strategic Rationale:** A brief explanation of how these measures align the company with the EU Green Deal and the EU Digital Strategy.
4. **Conclusion on Resilience:** How the company is now better equipped to deal with simultaneous climate and digital crises.

### Assessment methodology for Activity 2

The trainer will assess the deliverable based on:

- **Identification capacity:** Are the proposed synergies realistic and applicable?
- **Risk awareness:** Has the digital vulnerability associated with the new technology been correctly identified?
- **Systems thinking:** Are the principles of sustainability and digitalisation integrated in a coherent manner?
- **Teamwork:** In the case of group work, the quality of the presentation and problem-solving during the workshop.

### Activity 3: The Resilience Circle (2 hours)

- **Objective:** To develop the ability to **collaborate with public authorities and technology providers** to implement resilience measures based on digitalisation and sustainability.

### Phase 1: Stakeholder Mapping and Governance (60 mins)

In this phase, the student must **identify** who they need to **cooperate** with to ensure their **resilience plan is effective**.

- **Task 1.1:** Select a 'Public Stakeholder' (e.g. Tourist Office, Civil Protection) and define what early warning system (EWS) information they can provide.
- **Task 1.2:** Select a "Technology Provider" (e.g. IoT company, cybersecurity support) and define which smart tools they will provide to support resilience.
- **Task 1.3:** Define a mutual communication channel to cooperate with these stakeholders during a crisis situation.

### Phase 2: Designing the "Dual" Synergy (60 mins)

The student must **propose an investment** that meets the objectives of the **"Twin Transition" (Green and Digital)**.

- **Task 2.1:** Identify a climate or environmental vulnerability (e.g. water scarcity or heatwaves).
- **Task 2.2:** Propose a digital solution (e.g. IoT water flow sensors or smart home systems for climate control).
- **Task 2.3:** Assess how this smart solution simultaneously improves resilience and sustainability (synergy).
- **Task 2.4:** Identify the digital risk associated with this new technology and propose a basic cybersecurity measure.

### Phase 3: Shared Responsibility Protocol (60 mins)

In this phase, students practise autonomy and accountability in carrying out resilience tasks. The student will draft a brief "Cooperation Agreement" that includes:

1. **Business Responsibility:** Routine resilience tasks to be carried out by the student in accordance with established procedures (e.g. monitoring the consumption dashboard).

2. **Supplier Responsibility:** Technical support in the event of failures in smart systems.
3. **Authority's Responsibility:** Provision of real-time climate data or safety alerts.

## Example of Deliverable: Cooperation Agreement Form

**Student Name:** \_\_\_\_\_

**Organisation Name:** \_\_\_\_\_

**Date:** XX/XX/202X

### 1. Identification of the Ecosystem

Identify your strategic partners for the implementation of resilience measures.

| Stakeholder                | Organisation / Company           | Role in Resilience                                |
|----------------------------|----------------------------------|---------------------------------------------------|
| <b>Public Authority</b>    | (e.g. Local Tourist Office)      | Provide early warnings and legal frameworks.      |
| <b>Technology Provider</b> | (e.g. Cybersecurity/IoT company) | Implement and secure smart solutions.             |
| <b>Community Partner</b>   | (e.g. Hotel Association)         | Cooperation and mutual support during the crisis. |

### 2. Definition of the 'Twin' Synergy (Twin Transition)

Describe the solution that integrates sustainability and digitalisation to improve resilience.

- **Sustainability Goal (SDG):** (e.g. SDG 6 – Efficient water management).
- **Smart Digital Solution:** (e.g. IoT sensors for real-time leak detection).
- **Justification for the Synergy:** (Explain how technology supports the green goal and how it protects the business from environmental risk).

### 3. Protocol on Responsibilities and Autonomy

Define the specific tasks of each party to ensure business continuity.

- **Student Responsibility (Autonomy):** Routine tasks such as monitoring early warning indicators and adhering to resilience procedures.

- **Tech Provider Responsibility:** Support with data recovery following a crisis and maintaining cybersecurity within the infrastructure.
- **Responsibility of the Authority:** Issuing crisis escalation signals and coordinating the response at the destination level.

#### 4. Crisis Management and Communication

Establish how cooperation will take place under pressure.

- **Communication Channel:** (e.g. Secure instant messaging group or Smart Destination platform).
- **Early Warning Signals (EWS):** List the indicators that will trigger this agreement (e.g. report of extreme drought or alert of a massive cyberattack).
- **Priority of Action:** Definition of which services will be protected first in the event of a crisis.

### Activity 3 Assessment Methodology

The trainer will assess the learner's performance based on the following criteria from the TREADS plan:

1. **Ability to collaborate:** Have you correctly identified and categorised the stakeholders and their roles?
2. **Problem-solving:** Is the proposed synergy logical and does it apply principles of sustainability and digitalisation?
3. **Autonomy:** Have you demonstrated the ability to make decisions and propose actions under simulated pressure?

In addition, students' performance will be assessed through quizzes.

#### Quizz:

1. Which technology is key to monitoring water and energy consumption in a resilient hotel?
  - A. Social media.
  - B. IoT sensors.
  - C. Manual spreadsheets.
  - D. Programmatic advertising.
2. The "Twin Transition" refers to the joint transition towards:
  - A. Luxury and low cost.
  - B. Rural and urban.
  - C. Green (sustainable) and digital.
  - D. Air and sea transport.
3. What is one impact of climate change on tourism seasonality?
  - A. A reduction in marketing costs.
  - B. A shift in tourist flows due to extreme heatwaves.
  - C. Improved cybersecurity.
  - D. An automatic increase in community resilience.

## 2.3 Resilience Planning in Tourism

By the end of this sub-unit, learners will be able to contribute to a basic crisis response plan, participate in crisis decision-making processes and prioritise actions under pressure.

- I. Crisis lifecycle: prevention, preparedness, response, recovery, learning
- II. Focus on:
  - post-crisis recovery strategies for tourism businesses
  - reputation and trust recovery (online reviews, media relations, customer communication)
  - post-action reviews and continuous improvement
- III. Crisis management in three areas: health, climate and digital.

### Suggested practical activity:

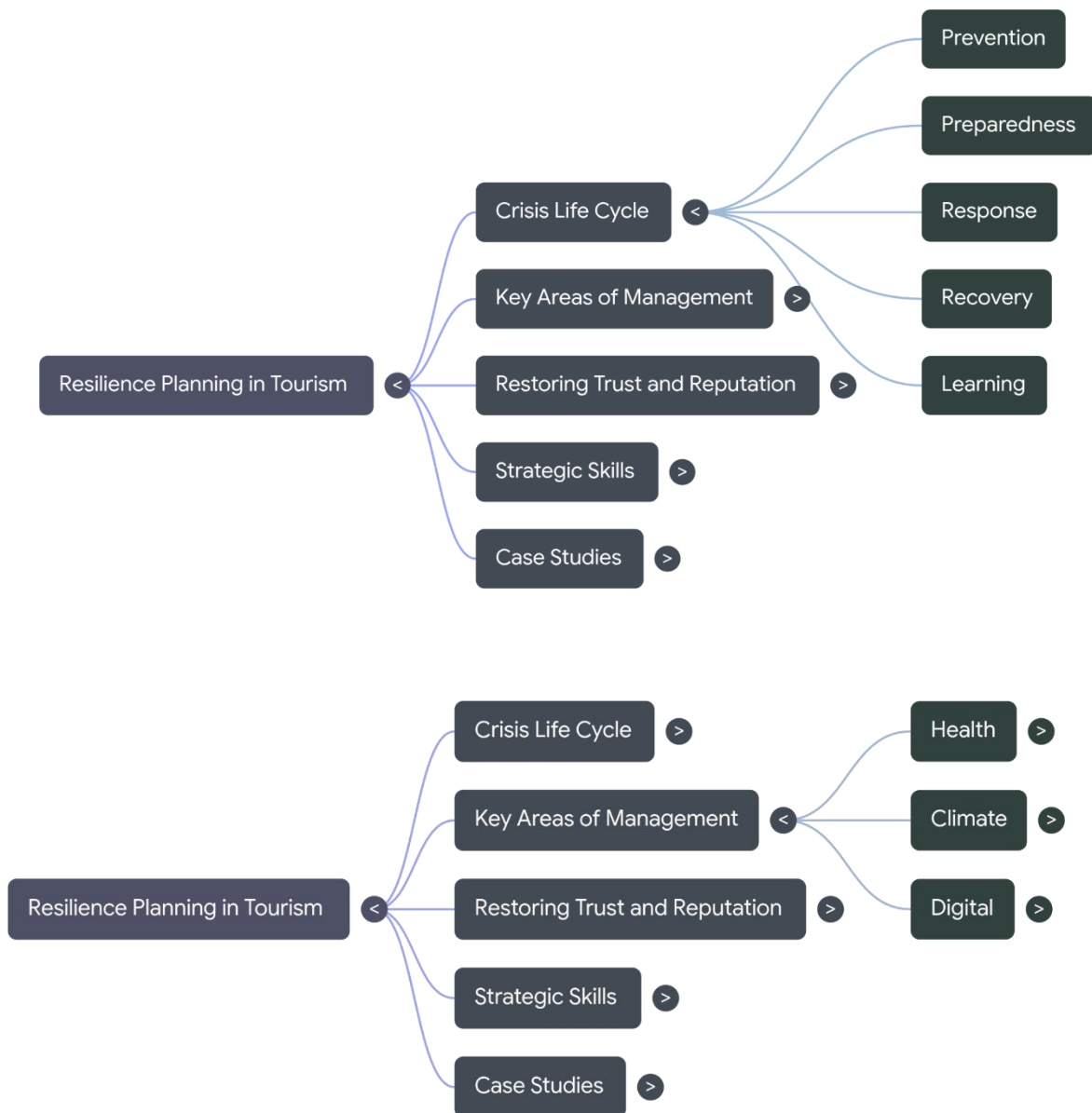
**Role-play:** simulating a management committee responding to a crisis in a tourism business, such as a hotel.

Whilst the previous units dealt with assessing the situation (Unit 1) and equipping oneself with sustainable technology (Unit 2), **Sub-Unit 3** is the combat simulation. This is where the learner stops being an observer and becomes an active manager who must make difficult decisions whilst the clock is ticking.

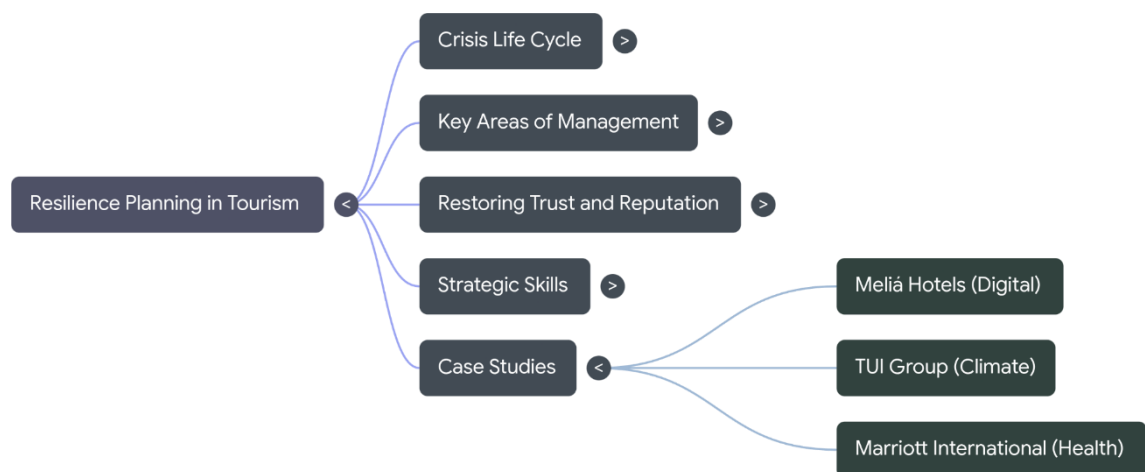
This sub-unit is not about preventing things from going wrong; it is about what to do when, inevitably, something does go wrong. The main focus is **on response planning** and, most importantly, **restoring confidence**. In an environment where news spreads like wildfire on social media and a single negative review can ruin a season, resilience is measured by the speed and quality of the response.

Students will learn to navigate the **crisis lifecycle**—from quiet preparation to post-incident learning—specialising in three critical areas: health, weather and digital. We are not looking for theorists, but professionals capable of sitting on a crisis committee, keeping a cool head under pressure and prioritising actions that protect both people and the brand's reputation.

### Unit outline



## Training Unit I: Resilience in Tourism



## 1. Theoretical Framework. The Crisis Life Cycle

The theory covered in this sub-unit is as follows:

### 1. The Crisis Life Cycle and Preparedness (4 hours)

- **Theoretical Session (1.5 hours):** Introduction to the five phases of the crisis life cycle: prevention, preparedness, response, recovery and learning.
- **Audit Workshop (1.5 hours):** Identification of specific prevention and preparedness protocols for health, climate and digital issues.
- **Leadership Session (1 hour):** The role of adaptability and the human factor in decision-making under pressure.

### 2. Operational Response in the Three Key Areas (1 hour)

- **Theoretical Session (1 hour):** Prioritising actions at the 'zero point' of the crisis. Analysis of the focus areas of personal safety (health), infrastructure protection (climate) and system isolation (digital).

### 3. Restoring Trust and Reputation (1.5 hours)

- **Theoretical Session (1.5 hours):** Post-crisis recovery strategies for tourism businesses. Focus on managing online reviews, media relations and direct communication with customers.

## 2. Skills Acquired

By the end of these 16 hours, the student will have developed the following critical skills:

- **Technical Contribution:** Ability to contribute specific content to a basic crisis response plan.
- **Decision-Making:** Active participation in decision-making processes during critical situations, demonstrating leadership and adaptability.
- **Strategic Prioritisation:** Ability to prioritise and execute actions under high pressure, distinguishing between what is urgent and what is vital.

- **Reputation Management:** Competence in designing strategies to restore trust and manage communication with customers and the media.
- **Critical Analysis:** Ability to conduct *after-action* reviews to foster continuous improvement.
- **Prevention:** Actions to prevent risks from occurring (maintenance, cyber hygiene).
- **Preparedness (Proactivity):** Creation of protocols, assignment of roles and conducting drills.
- **Action under pressure**
- **Recovery:** Strategies to return to operational and financial normality.
- **Learning (True Resilience):** The 'After-action review'. Analysing what went wrong and updating the plan to ensure it does not happen again.

### 3. Case Studies

#### I. Digital Sector: Meliá Hotels International (2021 Cyberattack) (1 hour)

This is the quintessential case study for analysing **response and recovery** in the face of a digital threat.

- **The Crisis:** The hotel chain suffered a *ransomware* attack that blocked its operating systems in the midst of the tourism recovery phase.
- **Application of the Cycle (Response):** Meliá decided **not to pay the ransom**. Instead, they activated a crisis committee that prioritised "business continuity" through manual processes whilst restoring the systems from backups.
- **Restoring Trust:** The company maintained transparent communication with customers and the market, which is a cornerstone of **reputation recovery**.
- **Lessons Learnt:** They strengthened their infrastructure under the "Zero Trust" model, implementing continuous improvement following the incident review.

## II. Climate Section: TUI Group and the Fires on Rhodes (2023) (1 hour)

A perfect example of how **to prioritise actions under pressure** in the face of a natural disaster.

- **The Crisis:** Thousands of tourists had to be evacuated due to uncontrollable forest fires in Greece.
- **Application of the Cycle (Response):** TUI activated a rapid response team (Crisis Management Team) to coordinate repatriation flights and the relocation of customers, prioritising **people's safety**.
- **Crisis Communication:** They used their digital channels and social media to provide minute-by-minute updates, managing **online reviews and media relations** to prevent panic.
- **Recovery Strategy:** Once the danger had passed, they launched campaigns to show that the destination was safe again, working to **restore market confidence**.

## III. Health Sector: Marriott International (Global Cleanliness Council) (1 hour)

This case illustrates the **prevention and preparedness** phase on a global scale.

- **The Crisis:** The COVID-19 pandemic radically altered health standards in tourism.
- **Application of the Cycle (Preparation):** Marriott did not merely react, but created a "Global Cleanliness Council" to design new hygiene protocols prior to full reopening.
- **Reputation and Trust:** They implemented visual safety seals and contactless technologies to make customers feel safe, which is key to **restoring consumer confidence**.
- **Learning:** These standards have become routine resilience tasks that staff carry out independently.

#### 4. Work dynamics and deliverables

##### I. Practical Application: Role-Play “The Crisis Committee. The Post-Crisis Lab” (6.5 hours)

This activity transports the student to the day after the storm. The aim is for students to analyse a real-life failure, manage the damaged reputation and design improvements to make the organisation more resilient in the future.

- **Preparation and Diagnosis (Analysis Phase)**

The class is divided into groups of 3 or 4 people. Each group is given a “**Real Crisis Dossier**” (based on the health, climate or digital cases discussed previously).

- **Task:** Identify at which point in the life cycle the company failed (was it poor prevention? Lack of preparation? Poor response?).
- **Output:** A diagram of the life cycle of that specific crisis, highlighting the ‘breaking points’.

- **The Reputation Cabinet (Trust Management)**

Students must address the public consequences of the incident.

- **Activity:** They are given 5 “critical negative reviews” from fictional customers on platforms such as TripAdvisor or Google Reviews following the incident.
- **Task:** Draft the company’s official responses and design a press release that prioritises transparency and the restoration of trust.

- **The Continuous Improvement Workshop (After-Action Review)**

Following the principles of continuous improvement, the group must act as resilience consultants.

- **Task:** Draft an **After-Action Review (AAR) report**. This document must include:
  - Three new preventive measures to avoid a recurrence.

- A specific adjustment to the company's basic response plan.
- Post-crisis recovery strategies to ensure financial and operational stability.
- **Database of Critical Reviews for the Exercise**

To carry out the activity, students will be provided with a set of reviews to work from:

- **Health Crisis (Food Poisoning/Hygiene Outbreak)**

**Review 1 (TripAdvisor – 1 star):**

*"Avoid this hotel! My family and I spent our holiday in hospital because of the buffet. None of the staff helped us or gave us any explanations. All they cared about was that we didn't make any noise. A disgraceful management!"*

- **Challenge for the student:** How can you apologise without admitting immediate legal liability before the investigation, whilst showing human empathy?

- **Climate Crisis (Failure in Evacuation/Information)**

**Review 2 (Google Maps – 2 stars):**

*"We were evacuated because of the flooding, but it was total chaos. The staff didn't know where to send us and left us out in the rain for two hours without blankets or water. I understand the weather isn't their fault, but the lack of a plan certainly is. We won't be back."*

- **Challenge for the student:** To argue that safety was the priority, but to acknowledge the logistical failures and explain the improvements for the future.

- **Digital Crisis (Cyberattack/Data Breach)**

**Review 3 (Booking.com – 1 star):**

*"I've just been told that my bank details have been leaked due to a 'computer glitch' on your booking website. It's unacceptable for a*

*company of this calibre to have such poor security. Now I have to cancel all my cards. I demand compensation!"*

- **Challenge for the student:** Restore technical confidence. What cybersecurity measures have been taken to ensure this does not happen again?
- **Answer Guide: The "Golden Rules" for Students**

For students to respond professionally, they must follow these 4 steps in every response:

- **Validation:** Acknowledge the customer's feelings (e.g. *"We deeply regret your frustration..."*).
- **Immediate Action:** Explain what was done at the time to contain the damage.
- **Commitment to Improvement (Learning):** Mention the specific change (e.g. *"We have implemented new protocols for..."*).
- **Private Channel:** Move the discussion away from the public forum (e.g. *"Please contact us at [email] so we can resolve your issue personally"*).
- **Supplementary Activity: Prioritisation Matrix**

The **prioritisation matrix** is a fundamental technical and strategic tool within the TREADS programme, designed to enable tourism professionals to make effective decisions under high-pressure situations. Its main objective is to help classify the tasks and responses required during a crisis, allowing a clear distinction to be made between what is **urgent** and what is **vital** for the organisation's survival.

In the context of crisis management, the matrix acts as a **decision-making filter**. Not all threats or incidents require the same speed or type of response. The matrix allows **resources** (time, staff, money) to be allocated logically, based on an analysis of the potential damage.

Students should complete this table before drafting their responses:

| Overview | Risk Level (1-10) | Impact on the Brand | Priority Action |
|----------|-------------------|---------------------|-----------------|
|----------|-------------------|---------------------|-----------------|

## Training Unit I: Resilience in Tourism

|                |    |                         |                                               |
|----------------|----|-------------------------|-----------------------------------------------|
| <b>Health</b>  | 10 | Very High (Legal/Lives) | Health research and disinfection.             |
| <b>Climate</b> | 7  | Medium (Operational)    | Review of evacuation protocols.               |
| <b>Digital</b> | 9  | High (Privacy/Legal)    | System audit and notification to authorities. |

*Where Risk (R) = Probability (P) × Impact (I)*

### ◦ Conclusion of the Exercise

At the end of the class, each group will read out their most difficult response. The rest of the class will act as the ‘audience’ and decide whether the response restores their confidence in the company or whether it sounds like a ‘corporate excuse’.

## 5. Assessment

The trainer will assess the learner’s ability to participate in decision-making processes and their skill in drafting coherent action plans that integrate the areas of health, climate and digital technology based on the following points:

### 1. Diagnosis and Analysis Phase

- **Accuracy in identifying the failure:** The group’s ability to correctly pinpoint at which stage of the life cycle (prevention, preparedness or response) the company’s main error occurred.
- **Technical quality of the diagram:** Clarity and coherence of the ‘breakpoints’ diagram illustrating the escalation of the specific crisis.

### 2. Reputation and Trust Management

- **Application of the “Golden Rules”:** Strict adherence to the four steps in responses to reviews: validation of sentiment, explanation of immediate action, commitment to improvement, and referral to a private channel.
- **Communicative balance:** Ability to demonstrate human empathy and transparency without compromising the company’s legal liability before investigations are concluded.

- **Effectiveness of the press release:** Ability to craft a message that restores the confidence of the market and the media following the incident.

### 3. Continuous Improvement Workshop (AAR Report)

- **Relevance of preventive measures:** Feasibility and relevance of the three new measures proposed to prevent a recurrence of the incident.
- **Consistency in plan adjustment:** Technical quality of the proposed change to the organisation's basic response plan.
- **Recovery vision:** Soundness of the strategies proposed to ensure post-crisis financial and operational stability.

### 4. Prioritisation Matrix

- **Classification criteria:** Ability to correctly distinguish between 'urgent' actions and actions that are 'vital' for the survival of the business under pressure.
- **Logic in resource allocation:** Consistency in using the matrix as a decision-making filter based on the analysis of potential damage.

### 5. Cross-cutting Skills

- **Decision-making under pressure:** Active participation and demonstrated leadership during the real-time crisis simulation.
- **Integration of critical areas:** Ability to draft action plans that unify management across the health, climate and digital sectors.
- **Teamwork and advocacy:** Effective collaboration within the group and the ability to defend results and risk maps to the rest of the class.

### 1. Socio-Ecological Systems (SES) Theory

- Adger, W. N. (2000). Social and ecological resilience: are they related? *Progress in Human Geography*, 24(3), 347–364.
- Berkes, F., Folke, C., & Colding, J. (2002). *Navigating Social-Ecological Systems: Building Resilience for Complexity and Change*. Cambridge University Press.
- Folke, C. (2016). Resilience (Republished). *Ecology and Society*, 21(4).
- García González, E. D., López Guevara, V. M., & López Pardo, G. (2022). Analysis of social resilience in socio-ecological systems: an interdisciplinary proposal for tourist destinations and their sustainable development. *Tourism Research*, (23), 48–72.
- Ostrom, E. (2009). A general framework for analysing the sustainability of socio-ecological systems. *Science*, 325(5939), 419–422.

### 2. The Crisis Life Cycle (Crisis Management Theory)

- Faulkner, B. (2001). Towards a framework for tourism disaster management. *Tourism Management*, 22(2), 135–147.
- Glaesser, D. (2006). *Crisis management in the tourism industry*. Elsevier Butterworth-Heinemann.
- Santana, G. (2004). Crisis management and tourism. *Journal of Travel & Tourism Marketing*, 15(4), 299–321.

### 3. High-Reliability Organisations (HRO) Theory and the Human Factor

- Hall, C. M. (2010). Crisis and resilience in tourism. *Tourism Recreation Research*, 35(3), 229–245.
- Sutcliffe, K. M. (2011). High reliability organisations (HROs). *Best Practice & Research Clinical Anaesthesiology*, 25(2), 133–144.
- Weick, K. E., & Sutcliffe, K. M. (2007). *Managing the Unexpected: Resilient Performance in an Age of Uncertainty*. Jossey-Bass.
- Weick, K. E., Sutcliffe, K. M., & Obstfeld, D. (1999). Organizing for high reliability: Processes of collective mindfulness. *Research in Organizational Behavior*, 21, 81–123.

#### 4. Risk Management Model (Probability and Impact Matrix)

- APEC International Centre for Sustainable Tourism. (2007). *Tourism Risk Management: An Authoritative Guide to Managing Crisis in Tourism*. APEC.
- International Organization for Standardization. (2018). *Risk management — Guidelines* (ISO Standard No. 31000:2018).
- Ritchie, B. W. (2004). Chaos, crises and disasters: a strategic approach to crisis management in the tourism industry. *Tourism Management*, 25(6), 669–683.

#### 5. Climate Adaptation and Operational Risk Management

These sources underpin the theory of socio-ecological systems and the technical analysis of climate-related threats in coastal and mountain destinations.

- Adger, W. N. (2000). Social and ecological resilience: are they related? *Progress in Human Geography*, 24(3), 347–364.
- European Environment Agency (EEA). (n.d.). *Climate change as a threat to tourism*.
- García González, E. D., López Guevara, V. M., & López Pardo, G. (2022). Analysis of social resilience in socio-ecological systems. *Tourism Research*, (23), 48–72.
- IPCC. (2023). Sixth Assessment Report (AR6). Summary for Policymakers.

#### 6. "Twin Transition" (Green and Digital Transition)

European Union policy document defining the legal and strategic framework for the twin transition over the coming decade.

- European Commission. (2019). *The European Green Deal*. COM(2019) 640 final.
- European Commission. (2020). *Shaping Europe's digital future*.
- European Commission. (2022). *Transition Pathway for Tourism*.

#### 7. Circular Economy and Sustainability in Tourism

Resources to support the 'R-Model' and the integration of the Sustainable Development Goals into hotel management.

- Ellen MacArthur Foundation. (n.d.). *Circular Economy in Travel and Tourism*.
- United Nations. (2015). *Transforming our world: the 2030 Agenda for Sustainable Development*. Resolution 70/1.

- World Tourism Organisation (UNWTO). (n.d.). *Tourism in the 2030 Agenda*.

## 8. Digital Technologies for Resource Efficiency

Theoretical foundations for the implementation of IoT, Artificial Intelligence and data governance in Smart Tourism Destinations.

- European Commission. (2021). *Artificial Intelligence Act (Proposed Regulation)*.
- Gretzel, U., et al. (2015). Smart tourism: foundations and developments. *Electronic Markets*, 25(3), 179–188.
- SEGITTUR. (2022). *Guide to Smart Tourism Destinations*.

## 9. IoT (Internet of Things): The Eyes of the Business

This section is based on the ability of interconnected physical objects to collect real-time data and eliminate operational blind spots.

- **Atzori, L., Iera, A., & Morabito, G. (2010).** The Internet of Things: A survey. *Computer Networks*, 54(15), 2787–2805. (A seminal work for understanding the network architecture behind flow and energy sensors).
- **Gubbi, J., Buyya, R., Marusic, S., & Palaniswami, M. (2013).** Internet of Things (IoT): A vision, architectural elements, and future directions. *Future Generation Computer Systems*, 29(7), 1645–1660. (Supports the theory of shared infrastructure in smart destinations).
- **SEGITTUR. (2022).** *Guide to Smart Tourist Destinations*. Ministry of Industry, Trade and Tourism. (Technical basis for monitoring occupancy levels and predictive maintenance).

## 10. AI and Big Data: The Brain of Crisis Response

Resources explaining how Artificial Intelligence processes large volumes of data to predict demand and activate early warning systems (EWS).

- **Gretzel, U., Sigala, M., Xiang, Z., & Koo, C. (2015).** Smart tourism: foundations and developments. *Electronic Markets*, 25(3), 179–188. (Defines the ‘predict and decide’ capability of smart systems).
- **Mayer-Schönberger, V., & Cukier, K. (2013).** *Big Data: A Revolution That Will Transform How We Live, Work, and Think*. Eamon Dolan/Houghton Mifflin Harcourt. (Supports the use of *forecasting* models and the optimisation of critical resources).

- **Zhang, Y., & Li, G. (2023).** Artificial intelligence in crisis management: A systematic review and future research directions. *Journal of Management Analytics*. (Specifically for algorithms responding to climate or health crises).

## 11. Ethics and Responsibility in AI

Sources focusing on the responsible use of AI in accordance with European regulations, transparency and the ethical handling of data.

- **European Commission. (2021).** *Artificial Intelligence Act (Proposed Regulation)*. (Key legal document on transparency in the handling of biometric data).
- **Floridi, L., & Cowls, J. (2022).** *A Unified Framework of Five Principles for AI in Society*. In *Ethics, Governance, and Policies in Artificial Intelligence*. Springer. (Theory on fairness and non-manipulation in predictive algorithms).
- **Jobin, A., Ienca, M., & Vayena, E. (2019).** The global landscape of AI ethics guidelines. *Nature Machine Intelligence*, 1(9), 389–399. (Foundation for the implementation of responsible AI in the service sector).

## 12. Tourism Data Spaces

Theory on the secure exchange of risk indicators and sustainability information without compromising privacy or trade secrets.

- **European Commission. (2022).** *A European strategy for data*. (Defines the framework for common data spaces to strengthen collective resilience).
- **International Data Spaces Association (IDSA). (2021).** *Rulebook for Data Spaces*. (Supports security protocols for sharing real-time saturation and consumption alerts).
- **World Economic Forum. (2021).** *Data Collaboration for the Common Good: Enabling Trust and Innovation in Tourism*. (Explains how companies collaborate with authorities through shared data).

## 13. Cybersecurity in the Twin Transition: Protecting Green Infrastructure

Bibliography addressing the protection of water sensors, smart panels and automated climate control against new attack vectors.

- **European Union Agency for Cybersecurity (ENISA). (2023).** *Cybersecurity in the Tourism Sector*. (Focused on the protection of critical infrastructure and BMS systems).

- **Directive (EU) 2022/2555 (NIS2).** Measures aimed at ensuring a high common level of cybersecurity across the Union. (Legal framework requiring hotel chains to strengthen their digital security).
- **Humayun, M., Jhanjhi, N. Z., Hamid, B., & Ahmed, G. (2020).** Emerging Smart Logistics and Transportation as a System of Systems: A Resilience Perspective. *IEEE Access*. (Analyses the threat of interconnectivity and security by design in IoT systems).

#### 14. The Sustainability Guide (Green Deal and SDGs)

This section focuses on how European commitments to reduce pollution and increase savings translate into operational resilience.

- **Fletcher, R., et al. (2020).** *Tourism and the Sustainable Development Goals*. Routledge. (Analyses the practical implementation of the 17 SDGs in tourism business models).
- **Hall, C. M. (2019).** Constructing sustainable tourism development: The 2030 agenda and the SDGs. *Journal of Sustainable Tourism*, 27(7), 1044-1060. (Explains the relationship between the global agenda and the sector's economic viability).
- **Pascual, J. M., & Arcos, M. J. (2023).** *Tourism and the European Green Deal: Towards climate neutrality by 2050*. Editorial Universitaria. (Supports the theory that energy saving and plastic reduction are measures of resilience).

#### 15. The Digital Shield (EU Digital Strategy)

Resources focused on the rules to make the internet a safe place, protecting data and reputation through robust digital tools.

- **Directive (EU) 2022/2555 (NIS2 Directive).** Measures aimed at ensuring a high common level of cybersecurity across the Union. (Legal framework underpinning the 'Digital Shield' for the tourism supply chain).
- **European Commission. (2020).** *A European Strategy for Data*. COM (2020) 66 final. (Defines digital sovereignty and the use of tools that "do not fail" to protect corporate reputation).
- **Floridi, L. (2021).** *The Ethics of Information*. Oxford University Press. (Provides the ethical basis for the secure handling of customer data, essential for preventing phishing and loss of trust).

## 16. The Support Network (Smart Tourism Destinations – STD)

Theoretical foundations for understanding how destinations share data to prevent overcrowding and respond to weather alerts.

- **Ivars-Baidal, J. A., Celdrán-Bernabeu, M. A., & Mazón, J. N. (2021).** Smartness in tourism destinations: A management and planning perspective. *Journal of Destination Marketing & Management*, 21. (Explains the use of shared information for tourist safety).
- **López de Ávila, A. (2015).** *Smart Destinations: Eleventh-hour Innovation*. UN Tourism. (The lead author of the Spanish STD model, ideal for underpinning cases such as Benidorm’s ‘traffic light’ system).
- **Buhalis, D. (2022).** *Encyclopedia of Tourism Management and Marketing*. Edward Elgar Publishing. (Contains the most up-to-date sections on governance in destinations using AI for weather alerts).

## 17. Climate Adaptation and Operational Risk Management

These sources are essential for understanding disaster management and vulnerability from a systemic and community-based perspective.

- **APEC International Centre for Sustainable Tourism. (2007).** *Tourism Risk Management: An Authoritative Guide to Managing Crisis in Tourism*. APEC.
- **Faulkner, B. (2001).** Towards a framework for tourism disaster management. *Tourism Management*, 22(2), 135–147.
- **Filimonau, V., & De Coteau, D. (2020).** Tourism resilience in the context of integrated destination and disaster management (IDDM). *International Journal of Tourism Research*, 22(2), 202–215.
- **García González, E. D., López Guevara, V. M., & López Pardo, G. (2022).** Analysis of social resilience in socio-ecological systems. *Tourism Research*, (23), 48–72.
- **Hall, C. M. (2010).** Crisis and resilience in tourism. *Tourism Recreation Research*, 35(3), 229–245.
- **Ritchie, B. W. (2004).** Chaos, crises and disasters: a strategic approach to crisis management in the tourism industry. *Tourism Management*, 25(6), 669–683.

## 18. "Twin Transition" (Green and Digital Transition)

European Union strategic frameworks defining the collaboration required for the sector's transition towards 2030.

- **European Commission.** (2019). *The European Green Deal*. COM(2019) 640 final.
- **European Commission.** (2020). *Shaping Europe's digital future*.
- **European Commission.** (2022). *Transition Pathway for Tourism*. Document on the sector's green and digital transition.

## 19. Circular Economy and Sustainability in Tourism

Theories on the interdependence between business, community and the environment for regenerative resilience.

- **Adger, W. N.** (2000). Social and ecological resilience: are they related? *Progress in Human Geography*, 24(3), 347–364.
- **Berkes, F., Folke, C., & Colding, J.** (2002). *Navigating Social-Ecological Systems: Building Resilience for Complexity and Change*. Cambridge University Press.
- **Ellen MacArthur Foundation.** (n.d.). *Circular Economy in Travel and Tourism*.
- **United Nations.** (2015). *Transforming our world: the 2030 Agenda for Sustainable Development*. Resolution 70/1.
- **World Tourism Organisation (UNWTO).** (n.d.). *Tourism in the 2030 Agenda*.
- **Ostrom, E.** (2009). A general framework for analysing the sustainability of social-ecological systems. *Science*, 325(5939), 419–422.

## 20. Digital Technologies for Resource Efficiency

Technical foundations for digital risk management, the human factor in high-reliability organisations and smart destinations.

- **Glaesser, D.** (2006). *Crisis management in the tourism industry*. Elsevier Butterworth-Heinemann.
- **Gretzel, U., Sigala, M., Xiang, Z., & Koo, C.** (2015). Smart tourism: foundations and developments. *Electronic Markets*, 25(3), 179–188.
- **ISO.** (2018). *Risk management — Guidelines (ISO 31000:2018)*.

- **SEGITTUR. (2022).** *Guide to Smart Tourism Destinations*. Ministry of Industry, Trade and Tourism.
- **Sutcliffe, K. M. (2011).** High reliability organisations (HROs). *Best Practice & Research Clinical Anaesthesiology*, 25(2), 133–144.
- **Weick, K. E., & Sutcliffe, K. M. (2007).** *Managing the Unexpected: Resilient Performance in an Age of Uncertainty*. Jossey-Bass.

## 21. Strategic Crisis Management in Tourism

These texts form the basis of the crisis life cycle framework (prevention, preparedness, response, recovery and learning) as applied specifically to the sector.

- **Ritchie, B. W. (2004).** *Chaos, crises and disasters: a strategic approach to crisis management in the tourism industry*. Tourism Management. This is the seminal work that defines the strategic model for managing disruptions in tourism.
- **Pfarr, C., & Hosie, P. J. (2009).** *Crisis Management in the Tourism Industry: Beating the Odds*. Ashgate Publishing. Provides a comprehensive overview of how tourism organisations can survive natural disasters and man-made crises.
- **Glaesser, D. (2006).** *Crisis Management in the International Tourism Industry*. Routledge. A practical handbook focusing on operational response and international risk assessment.

## 22. Communication and Reputation Recovery

It supports the theory on managing online reviews, media relations and restoring customer trust.

- **Coombs, W. T. (2007).** *Ongoing Crisis Communication: Planning, Managing, and Responding*. Sage Publications. Essential reading for understanding the ‘Situational Crisis Communication Theory’ and how to protect reputational capital.
- **Benoit, W. L. (1997).** *Image repair discourse and crisis communication*. Public Relations Review. Defines the discursive strategies for repairing an organisation’s image following a critical failure.
- **UNWTO (2011).** *Toolbox on Crisis Communications in Tourism*. World Tourism Organization. A practical guide for destinations and businesses on how to manage communication with *stakeholders* during and after a crisis.

## 23. Post-Crisis Learning and Continuous Improvement

It underpins the After-Action Review (AAR) process and the organisation’s post-traumatic growth.

- **Donahue, A. K., & Tuohy, R. V. (2006).** *Lessons we don't learn: A study of the lessons of disaster, management, and strategy*. Homeland Security Affairs. Analyses why

organisations often fail in the learning phase and how to improve the process of capturing lessons.

- **Garvin, D. A. (2000).** *Learning in Action: A Guide to Putting the Learning Organisation to Work*. Harvard Business School Press. Provides tools for turning the experience of a crisis into lasting organisational knowledge.

### 24. Sectoral Management: Health, Climate and Digital Risks

Specific references for the unit's three focus areas.

- **Hall, C. M., Scott, D., & Gössling, S. (2020).** *Pandemics, transformations and tourism: be careful what you wish for*. Tourism Geographies. An in-depth analysis of resilience in the face of global health crises.
- **Becken, S., & Hughey, K. F. (2013).** *Linking tourism into emergency management structures: structures and networks of response*. Journal of Sustainable Tourism. Focuses on the response to climate-related disasters and integration with public authorities.



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