



# Alias

## LIABILITIES AND AUTOMATION IN AVIATION

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ALIAS (Addressing Liability in Automated Systems) co-financed by EUROCONTROL on behalf of the SESAR Joint Undertaking - Work Package E.

The project focuses on the legal implications of automation exploring the wide spectrum of relations between automation and liability.

Main focus on Air Traffic Management, but also on various domains that face similar issues, such as HealthCare, ICT, Train Transport, Navy, the automotive industry.



- In the time horizon of SESAR, that is over the next 30 years, a new generation of air traffic management systems will be developed.
- Such systems will be highly automated. They will make choices and engage in actions with some level of human supervision, or even without any such supervision.

- How different degrees of autonomy of agents and machines shape the responsibilities of the different actors.
- How forthcoming operational concepts and procedures provide challenges in the involvement of the different actors and their consequent responsibilities.
- How existing laws regulate the allocation of liabilities in ATM, and the assessment of whether such laws and regulations provide an adequate normative framework.
- How to optimally allocate responsibilities in present and future highly-automated socio-technical systems. Allocation of responsibilities, not only as a way to distribute risks and sanctions, but also as a means to prevent accidents and to increase levels of safety and performance in ATM.

the “**Legal Case**”, a methodological tool including recommendations and guidelines to ensure that relevant legal aspects are taken into consideration in design, development and deployment process.

a **Network of legal research**: a multidisciplinary community that will support knowledge construction and distribution, sharing of cases and best practices, discussion on the topics of interest, archiving of documents and references useful to develop this research area.

[www.aliasnetwork.org](http://www.aliasnetwork.org)

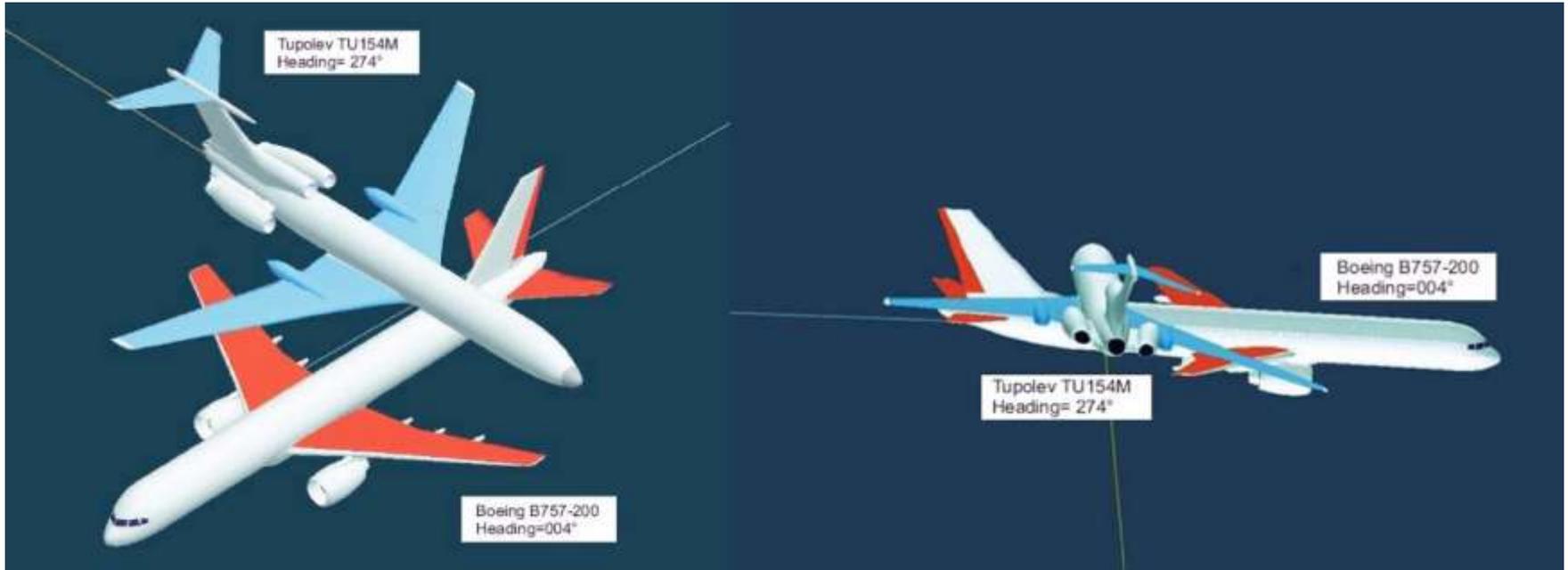
## Framework of liability

- **Methodology:**
  - Initial framework based on literature, jurisprudence
  - Collection of real and hypothetical scenarios (ATM and other domains (railways, maritime transport, automotive, medical, etc))
  - Twofold Analysis: Safety/Human factors analysis and legal analysis
  - Refinement of the framework, link of legal analysis with safety analysis



# Alias

## Überlingen: The accident



Bashkirian Airlines Flight 2937 **collides** with DHL Flight 611

**None** of the 71 persons onboard the aircrafts **survives**.



## ÜBERLINGEN: Accident analysis I

- **STANDARD DEVIATION FROM PROCEDURES (latent condition):**
  - Only one controller
- **TECHNICAL MALFUNCTION (active error):**
  - As effect of maintenance interventions the ATC system slowed down, phones were not working and STCA deactivated.
- **TECHNICAL MAINTENANCE FAILURE (latent condition):**
  - no information about update



## ÜBERLINGEN: Accident analysis II

- **HUMAN ERROR (active error):**
  - Controller did not notice that DHL611 and BAL2937 were both at FL360 on a collision course.
- **HUMAN ERROR (active error):**
  - Controller cleared BAL2937 to expedite the descent, being not aware of the TCAS resolution advisory on board.
- **INADEQUATE PROCEDURES (active error):**
  - the BAL2937's pilot starts descent manoeuvre, although the TCAS suggest climbing, according to Russian procedures incoherent with international one



# Alias

## Uberlingen legal analysis: responsible actors I (individuals)

- **Pilots (died on the accident):**
  - fault civil liability (e.g. professional liability), but possibly exempted for obeying procedures
- **ATCOs**
  - Criminal liability (manslaughter): acquitted by the Swiss judge; a wise choice?
  - Civil liability (only as as ground for vicarious liability)
- **Managers:**
  - Criminal liability (manslaughter): condemned by the judges
  - Civil liability (only as as ground for vicarious liability)



# Alias

## Überlingen legal analysis: responsible actors II (final providers)

- **Air companies (Baskyrrian Airlines)**
  - strict civil liability: condemned
  - vicarious civil liability: acquitted
- **Air navigation service provider (Skyguide)**
  - strict civil liability
  - vicarious civil liability (for ATCOs and managers)



# Alias

## Uberlingen legal analysis: responsible actors III (additional providers)

- **Technology providers (TCAS producers)**
  - Product liability: condemned
- **Maintenance providers**
  - Fault liability (ATSEP manager): condemned
- **Insurance companies**
  - First party insurance
  - Third party insurance
- **States**
  - civil liability towards BAL (Germany)
- **Standard-setters**
  - No legal procedures against standard-setters



## Überlingen: general considerations

- **No criminal/civil liability for operators.**
- **Liability for airlines (with recourse against ANSP/State)**
- **Criminal liability for ANSP managers**
- **Civil liability for ANSP**
- **Civil liability for State (with recourse against ANSP?)**
- **Civil liability for technology producer**
  
- **A correct framework? How to share the costs? According to causality?**



## Überlingen case: new developments concerning automation

- **Barcelona court on TCAS**
- **New Jersey and Arizona Law applied in a European Court**
- **TCAS considered DEFECTIVE for:**
  - Design defect
  - Production defect
  - Warning defect
- **Compliance with available standards does not always protect from liability claims**
- **Relevance of expectations on TCAS scopes and capabilities**
- **Relevance of the State of the art (with reference to Eurocontrol projects!)**
- **High compensations for familiars of the victims**



# Alias

## Linate: the accident



**All 114 people** on board the two aircrafts  
and **4 persons** on the ground are **killed**



## LINATE: Accident Analysis I

- **LACK OF RADAR SUPPORT (latent condition)**
  - Old radar dismissed, new radar not operative
- **LACK OF PERSONNEL (latent condition)**
  - Ground controller too busy
- **HUMAN ERROR (active behaviour)**
  - Cessna was allowed to land, although aircraft and pilot were not licensed to operate in this airport
- **TECHNICAL MALFUNCTION (latent condition)**
  - Due to problems in the R/T, audio was often distorted and unclear.



## LINATE: Accident Analysis II

- **AMBIGUOUS LIGHTS (latent condition)**
- **INADEQUATE ROAD SIGNS (latent condition)**
- **INADEQUATE STOP BAR LIGHTS (latent condition)**
  
- **UNRELIABLE MAPS (latent condition)**
- **MISINTERPRATION AND WRONG CLEARANCE (active error)**
- **RUNWAY INCURSION SENSOR DEACTIVATED (latent condition)**
  
- **Details in ALIAS Deliverable 3.1**



# Alias

## Linate legal analysis: responsible actors I (individuals)

- **Cessna Pilot (died on the accident):**
  - Possible fault civil liability (e.g. professional liability)
- **Flight 686 Pilot (died on the accident):**
  - Innocent mistake (no liability)
- **ATCOs**
  - Criminal liability (manslaughter): condemned
  - Civil liability (only as as ground for vicarious liability)
- **Managers:**
  - Criminal liability (manslaughter):
    - airport director : condemned in first instance, acquitted in appeal
    - Head of aviation authority (ENAC): condemned in first instance, acquitted in appeal
    - Head of ATC (ENAV): condemned for manslaughter (no prison for amnesty)
  - Civil liability (only as as ground for vicarious liability)



# Alias

## **Linate legal analysis: responsible actors II (final providers)**

- **Air companies**
  - strict civil liability to passengers, costs shared according to responsibility (for CESSNA)
- **Air navigation service provider (ENAV)**
  - strict civil liability
  - vicarious civil liability (for ATCOs and managers)



# Alias

## Linate legal analysis: responsible actors III (additional providers)

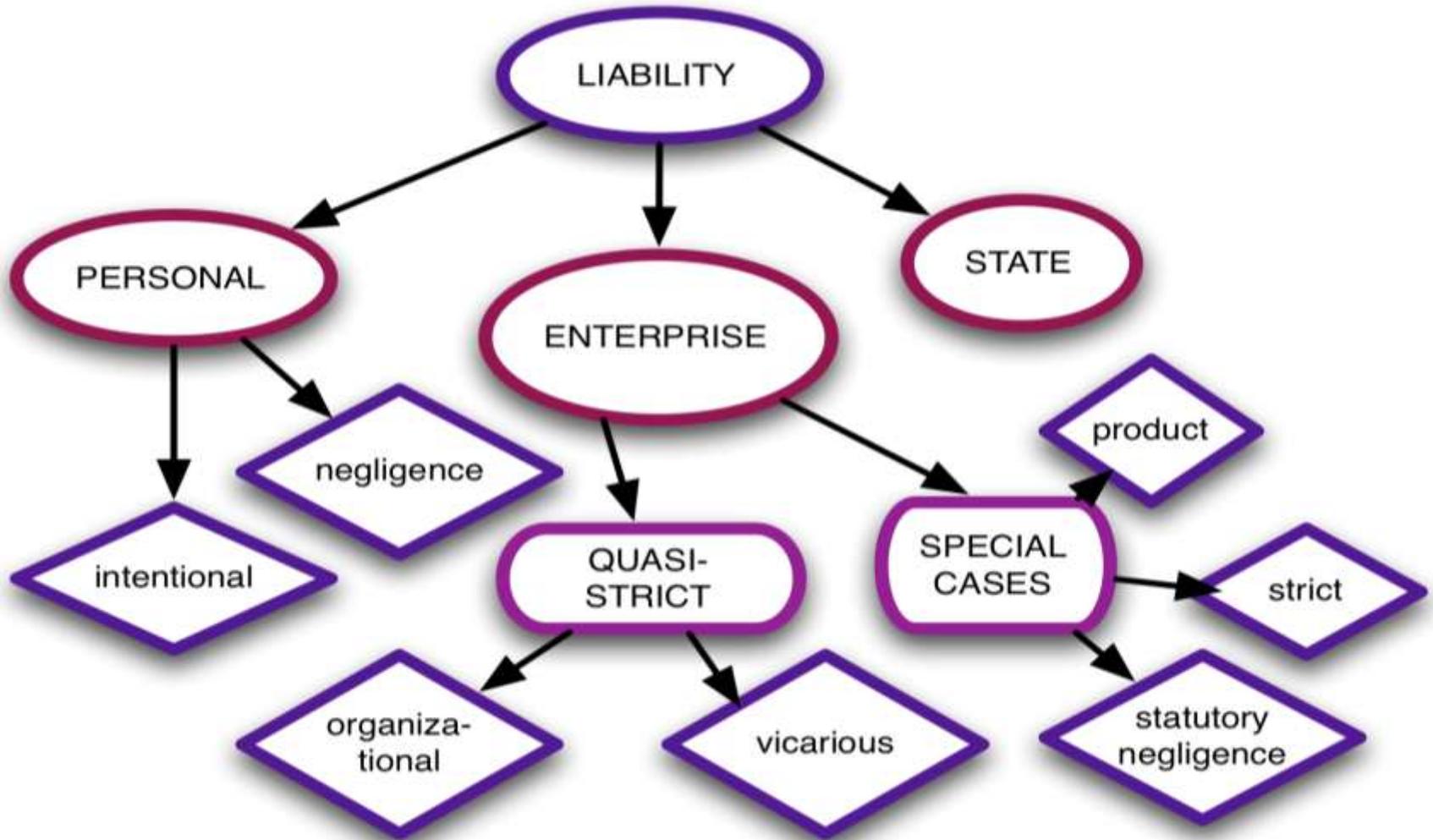
- **Technology providers (map producers)**
  - Product liability: not addressed
- **Maintenance providers**
  - Fault liability (radar): condemned ENAV for failed maintenance
- **Insurance companies**
  - First party insurance
  - Third party insurance
- **States**
  - Not relevant
- **Standard-setters**
  - Acquitted ENAC since not task-responsible for safety

## **Linate: general considerations**

- **Operator criminally liable, even if working under pressure**
- **Criminal liability for ANSP managers (through minor sentence)**
- **No criminal liability for standard setting body (ENAC)**
- **Civil liability for technology producer not addressed**
  
- **A correct framework? How to share the costs? According to causality?**



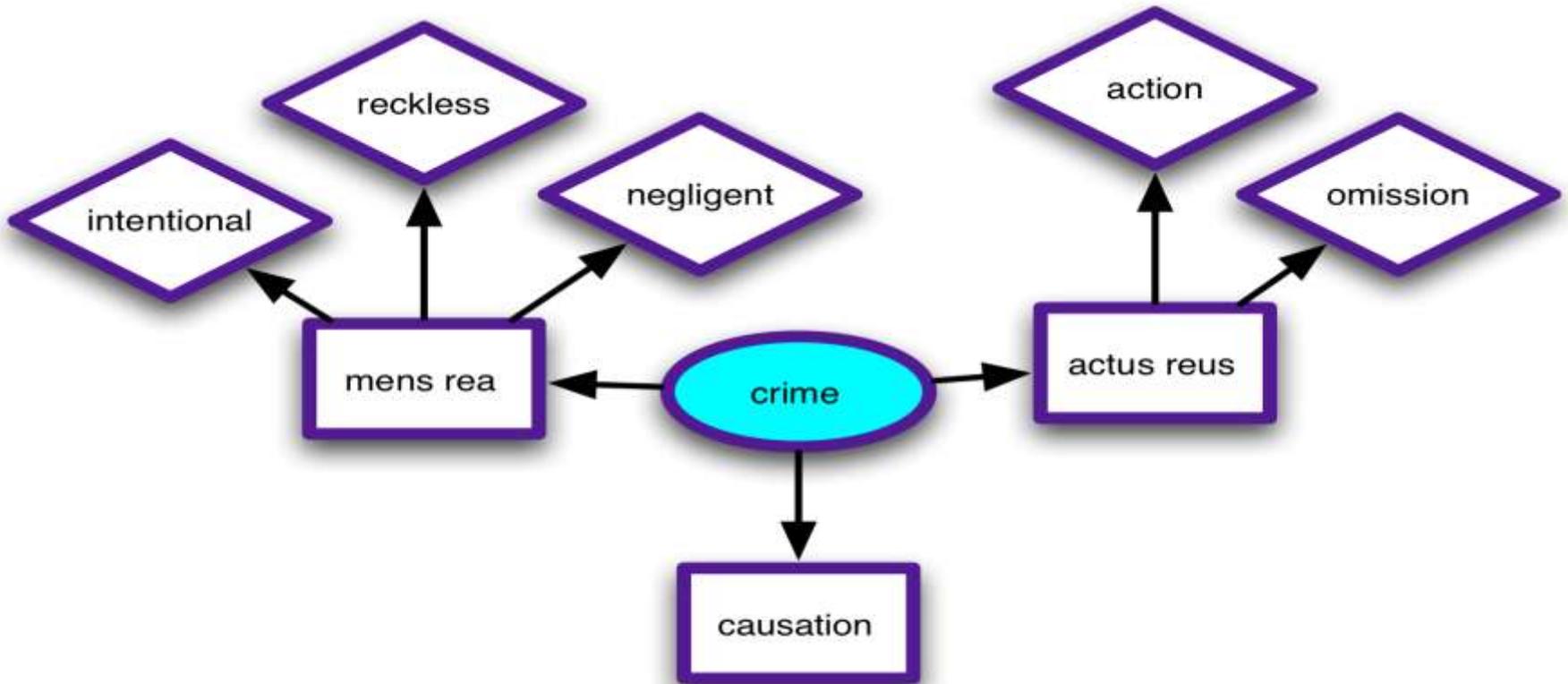
## Framework of liability –civil liabilities



- Other: insurances, compensation funds



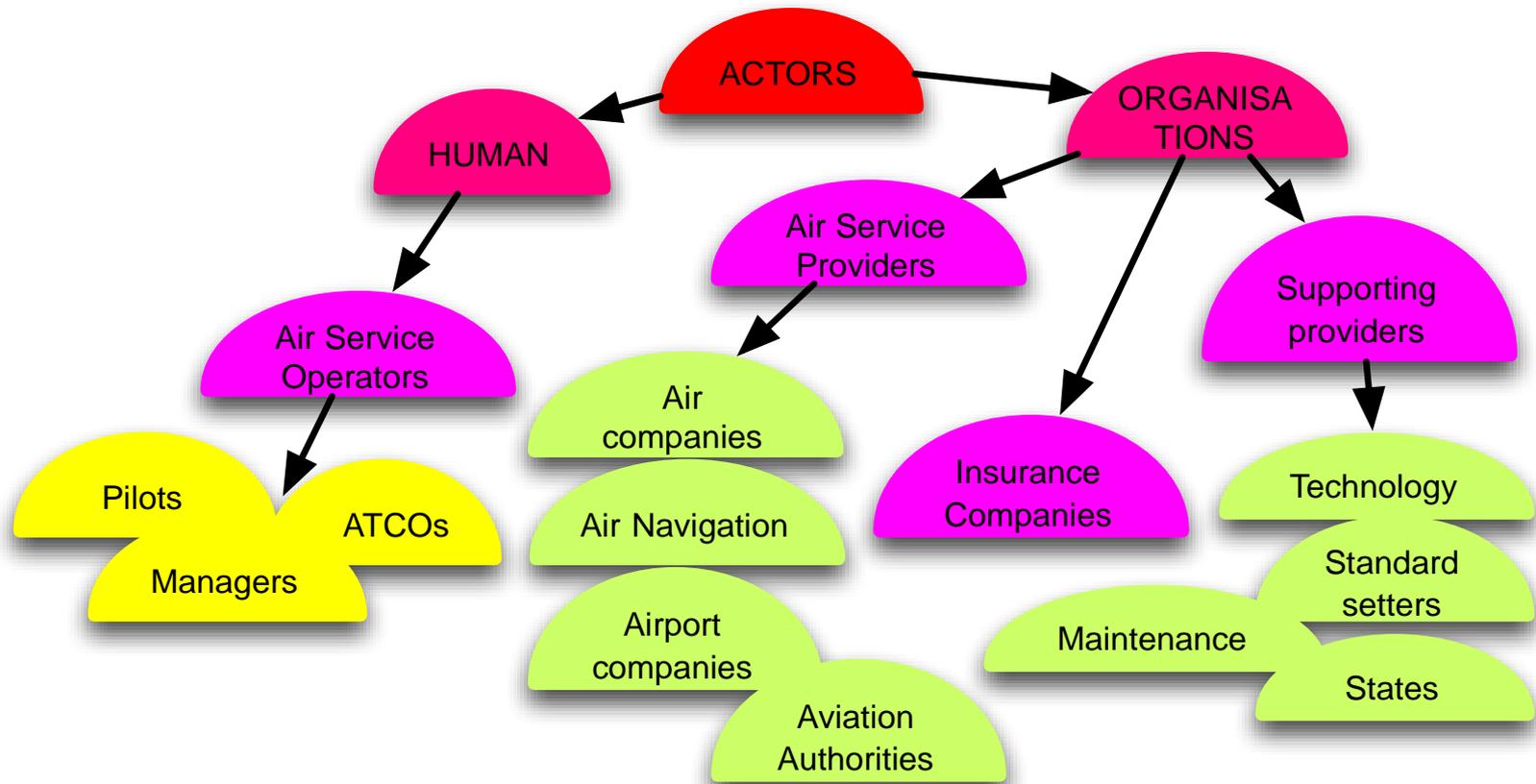
## Framework of liability –criminal liabilities



- Some remarks: criminal corporate liability, Just Culture



## Actors in ATM





## Liability Framework: impacts of automation

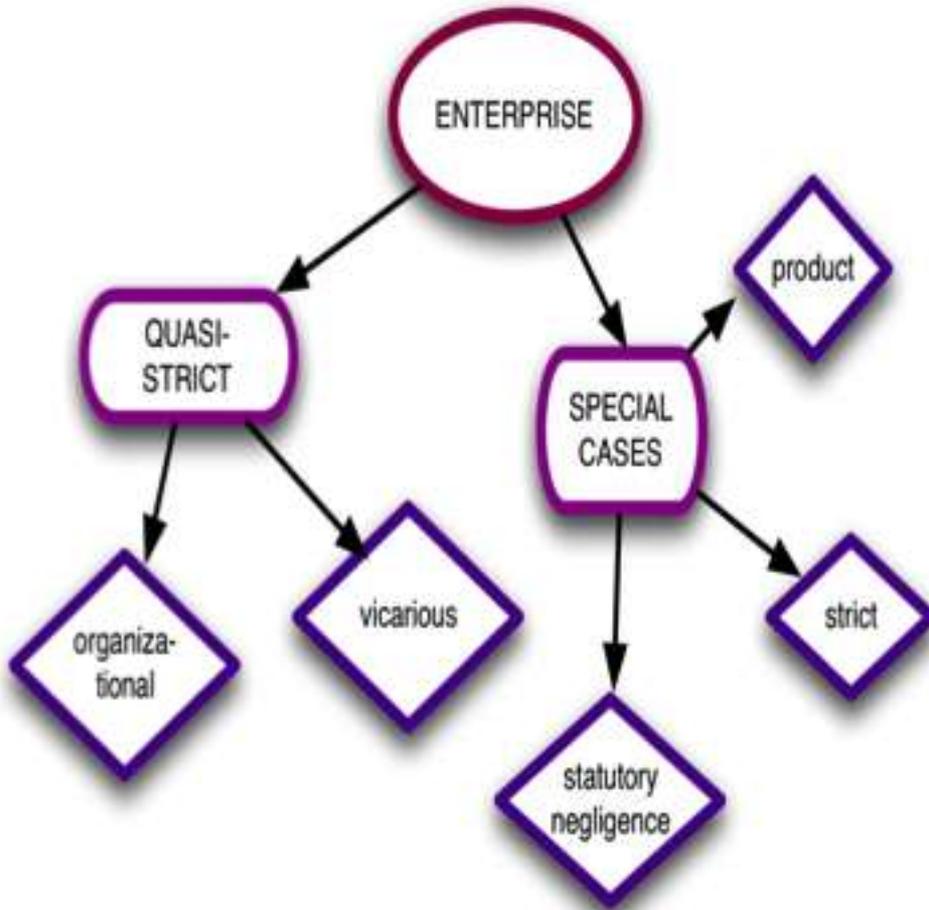
- liability for damage caused by technological failure transferred to
  - the organisation developing the technology
  - the organisation using the technology
  - the organisation maintaining the technology
- Grounds for the attribution
  - generation of risks and ability to prevent them (and possibility to distribute losses)
  - vicarious liability (for faults of employees)
- individual liability of the individual operator would persist only when the operator acted
  - with an intention to cause harm or damages or
  - with recklessness

# Liability Framework: impacts of automation

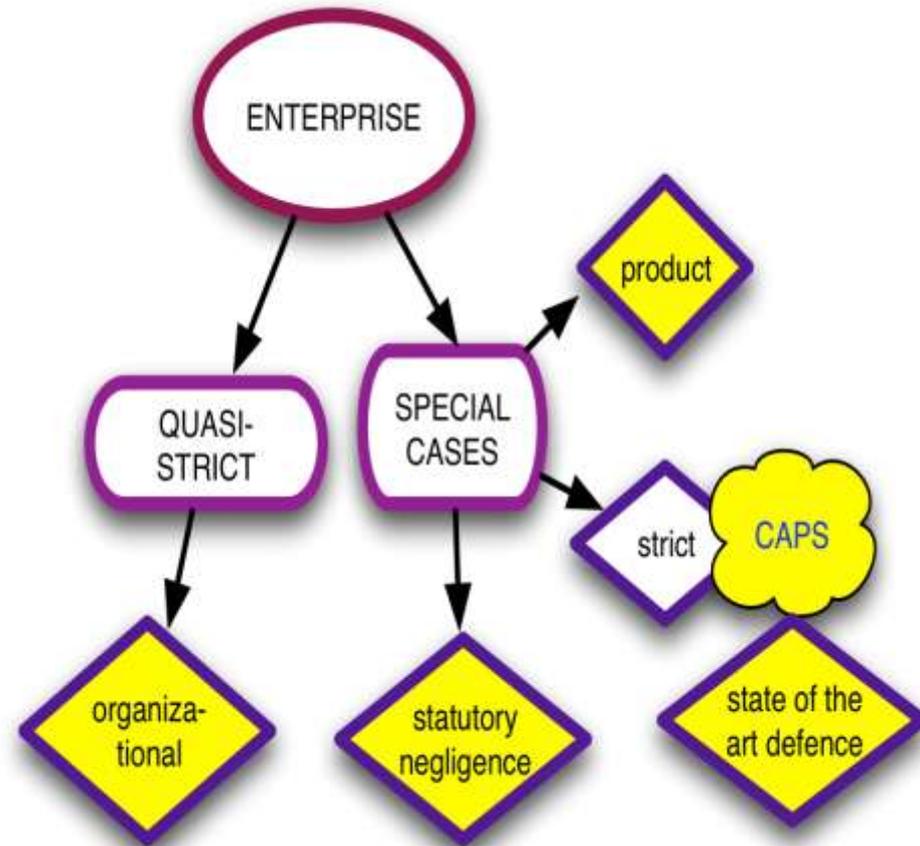
- **Strict (no-fault) liability? Yes, but with limitations**
  - Caps
  - “state of the art” defence
  - Force majeure defence
  
- **Recourse. Who will pay in the end?**
  - Liability is channeled towards the airline company, but
  - Recourse against the one who had control over the malfunctioning component of the system
  
- **New grounds for liability**
  - Liability for inadequate technology (including inadequate man-machine interaction)
  - Liability for failing in introducing a useful technology



## Enterprise Liability and automation



No automation



Full automation

## How to build the Legal Case?



- **The starting point is clearly defined:**

The Legal Case is intended to be a process to systematically identify, address and manage legal issues

throughout ATM projects lifecycles

## How to proceed?

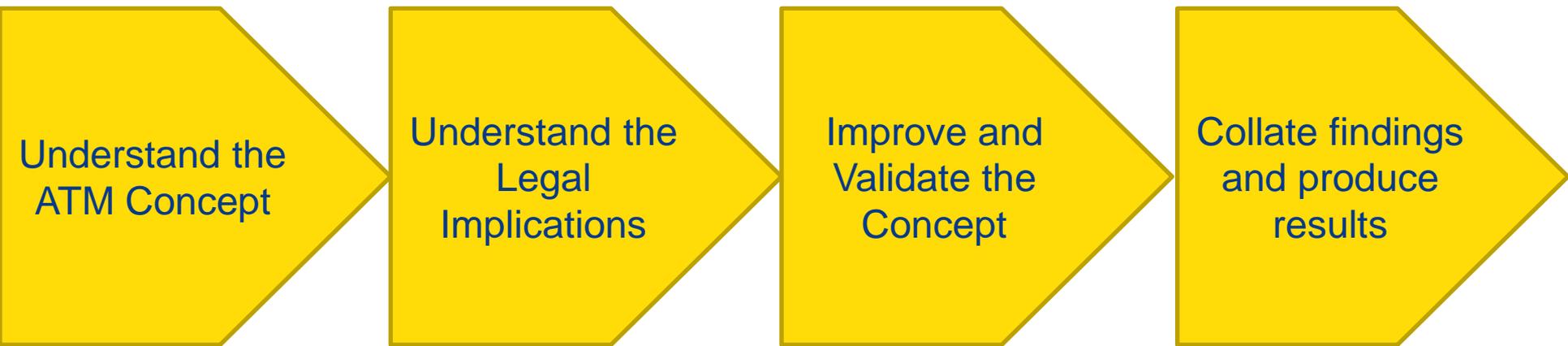
We shall start from the state of the art.



**Among these, we can identify features that can be of interest for the development of the Legal Case**



- **The Legal Case may be the result of a stepped process based on an argument structure (where the legal arguments are predefined), compliant with the SESAR HP Assessment Process, as follows:**



## **Legal Case**

### **How to**

- **Understand the ATM concept. Outputs: level of automation and a description of the relevant aspects of the operational concept**
- **Identify the legal issues. Output: relationships between levels of automation and liability issues**
- **Improve and validate the ATM concept. Output: acceptability and sustainability of the legal implications of the ATM concept (for all stakeholders)**
- **Collect the findings and produce results. Output: recommendations and proposal for changes**

## The team

- **Giovanni Sartor, EUI - Project Leader**
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- **Hans Micklitz, EUI**
- **Hanna Schebesta, EUI**
- **Paola Tommasello, DBL**

**Thanks for your attention**

**Please register to the ALIAS network!**

**[www.aliasnetwork.org/register.html](http://www.aliasnetwork.org/register.html)**