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Eu 261 / 2004: Unruly Passenger Behaviour And Compensation

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Abstract

In accordance with EU Regulation 261/2004 airlines are legally obliged to compensate passengers for denied boarding, cancellations or delays unless the carrier can prove that the event was caused by extraordinary circumstances, namely, something that is not inherent in its normal activity, could not have been avoided even if all reasonable measures had been taken and was beyond the carrier's control.

An examination of unruly or disruptive passenger behaviour, the legal framework governing such behaviour and the ramifications to both the passenger and the airline as well as a discussion of important EU judicial precedent which widens the scope of EU 261, prompts the following questions which are considered this paper:

Where should the line be drawn ending the airlines responsibility towards its passenger; for the purpose of compensation, should a distinction be made between unintentional passenger damage and disruptive passenger claims; should passenger damage be considered to be an extraordinary circumstance; and, should an airline be solely responsible for the tremendous cost of a delay caused by unruly or disruptive passenger behaviour or should it claim reimbursement from the passenger?

Introduction

In a very interesting case heard in the United Kingdom, the court ruled that airlines have to take a level of responsibility for passenger actions and are therefore obliged to compensate passengers under EU Regulation 261/2004 for delays caused by other passengers. In this case, the Birmingham County Court ordered Thomas Cook to pay €1,068 to a passenger after her family of four suffered a nine hour delay when another passenger accidentally damaged an emergency door handle on an earlier flight. Replacement parts had to be flown in from France and as the maintenance crew were attempting to fix the door handle, they accidentally deployed the emergency slide, causing a further delay. Thomas Cook gave the passengers a €5 meal voucher and argued that, as the damage was caused by another passenger and not the airline, they were not obliged to compensate the passengers for the delay. The judge ruled in favour of the passengers saying "The operational effectiveness of the Thomas Cook's fleet was the sole responsibility of the airline, regardless of whether they directly caused the disruption." As this was a decision of the County Court, it did not set a precedent that airlines are legally obliged to compensate passengers for delays by unruly passenger behaviour, but it does prompt a number of points to consider.

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*AVIATION***Unruly passenger behaviour**

A disruptive passenger is defined in IAO Annex 17 as someone who fails to respect the rules of conduct at an airport or on board an aircraft or does not follow the instructions of the airport staff or crew members and disturbs the good order and discipline at an airport or on board the aircraft.

Disruptive or unruly passenger behaviour, aptly termed 'air rage', has always been a major concern in the aviation industry and impacts passengers, airlines, airport authorities, governments and legislators globally. Unruly passenger behaviour can merely be annoying and includes verbal outbursts, shouting, belligerence, and use of profanity, but, it can also disrupt operation resulting in delays, cancellations or diversions and when the behaviour poses a safety and security threat it could amount to criminal behavior. IATA provides the following examples of unruly and disruptive behaviours and the levels: illegal consumption of narcotics; refusal to comply with safety instructions; verbal or physical confrontation with crew members or other passengers; uncooperative passengers who interfere with the crew's duties; making threats which includes threats against a person or intended to cause confusion and chaos such as making bomb threat or any threatening behaviour; sexual abuse/harassment; and any other behaviour such as screaming, annoying behaviour, kicking and banging heads on seat backs/tray tables. Unruly behaviour is categorised into four levels according to the level of threat: Level 1, which can include verbal aggression or failure to comply with crew instructions; Level 2 including physical aggression or lewdness against fellow passengers or crew and damage to the cabin; Level 3 which includes threats to life, and presenting of weapons onboard; and Level 4 which includes a breach of the flight deck (intended or unintended), an act of sabotage or a credible threat of seizing the aircraft.

Unruly behaviour is committed by a small number of passengers, however, the impact of such incidents is much greater.

Cases of unruly passenger behaviour

There are many cases which include physical aggression where cabin crew are pushed, punched, bitten, grabbed, scratched and sworn at, including the following cases: A crew member was attacked with a vodka bottle and required 18 stitches and an operation; a drunken passenger rammed a steward with a drink cart and broke the co-pilot's nose with a head butt; a cabin crew was punched as there was no fruit on the passenger's tray; a pilot was slapped and the first officer was bitten on his arm; a passenger who was an investment banker, who was in a drunken rage defecated on a food cart when his demand for more alcohol was refused.

The following recent examples illustrate the severity of the cases as well as the manner in which the courts in different jurisdictions dealt with such cases:

A passenger on a Thomson Airways flight (now called TUI Airways) from Manchester to Kos, swore profusely and punched a male steward in the groin when the crew began serving drinks. Her angry, loud and abusive behaviour was said to be as a result of consuming too much alcohol which included half a bottle of wine, a number of vodkas and gin and tonics. She was arrested on arrival in Greece and jailed for 21 weeks at Manchester Crown Court.

Another passenger on board a Jet2 flight from Newcastle to Ibiza allegedly had his ear bitten off. Passengers screamed in horror as the man, covered in blood



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with half of his hair hanging off ran towards the front of the aircraft when the aircraft landed.

In 2014 the daughter of Korean Air's chairman was served macadamia nuts in a bag instead of a plate. She went into a rage, resulting in the aircraft scheduled to fly from Seoul to New York being delayed. She was charged with violating aviation safety, coercion and abuse of power. The lower court found her guilty of assault and sentenced her to a year in prison. She served five months in prison before the High Court sentenced her to 10 months in prison and then suspended her sentences for two years.

The crew member who had served her the nuts was forced to apologise to her on his knees and was then ejected from the aircraft and demoted by the airline. He sued Korean Air for "physical and psychological suffering" and in December 2018 he was awarded \$18,000 damages. The court awarded him an amount less than what he had claimed and also supported the airlines decision to demote him.²

A Delta Air flight from Seattle to China with 210 passengers and 11 flight crew member was forced to return back when a passenger walked out of the first class rest room and tried to open the exit door while the aircraft was in flight. When two flight attendants tried to stop him, he threw one on the floor and punched the other. A passenger then tried to assist the flight attendants but was hit over the head with a wine bottle. More passengers intervened whilst the passenger was throwing punches, a flight attendant managed to hit him over the head with a wine bottle, passengers then held him down and he was restrained. A passenger and a flight attendant needed medical treatment after the assaults. The belligerent passenger was indicted by a federal grand jury on five federal charges, one count of interfering with the flight crew, which carries a maximum sentence of 20 years, and four counts of assault on an aircraft, three of which carry a maximum penalty of 10 years and one of the assault counts is a misdemeanour with a maximum sentence of one year in prison.³

As a result of non-existent laws or lacunae in existing laws many offenses have often gone unpunished, particularly in the past as is evidenced by a case in 1950. In *United States v Cordova* the judge dismissed charges against a man who bit the pilot's ear and struck a flight attendant during a flight to New York because the law at that time did not apply to crimes committed on board an aircraft while flying over an ocean.⁴

The increase in the number of cases as well as the severity of the incidents have led to a more stringent approach towards tackling unruly or disruptive behaviour. Passengers may now be faced with imprisonment, large fines and a ban from flying. However, the great impact that unruly passenger behaviour has on all stakeholders in the aviation industry as well as the seriousness of many of the incidents continues to be a great challenge and requires a joint effort and a balanced approach by all concerned to take action. This includes inter alia, more stringent legislation on both the international and domestic fronts, enhanced policies, taking a zero-tolerance approach to such behaviour, awareness, campaigns, training, penalties, etc.

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Legal Framework: International Conventions

Unruly passenger behaviour is not dealt with under a single law. Passenger behaviour is judged in accordance with the domestic laws of the State in which the aircraft is registered, which largely conform to an international legal framework. The Tokyo Convention 1963 (as amended by the Montreal Protocol 2014) deals with crimes on board an aircraft and lays down the framework for dealing with unruly passengers and the jurisdiction to prosecute them.

It governs criminal offences on board an aircraft that jeopardise safety. The Tokyo Convention makes it unlawful to commit “*acts which, whether or not they are offences [against the penal law of a State], may or do jeopardize the safety of the aircraft or of persons or property therein or which jeopardize good order and discipline on board.*”

The Tokyo Convention also provides the Pilot in Command (PIC) with the authority and the legal obligation to deal with persons who commit any criminal offence or endangering acts in an appropriate manner. The PIC has the power to act when there is, subjectively, reasonable grounds to believe that such an act has been or is about to be committed in flight (defined in Art 1(3) as being from the moment power is applied for take-off until the moment when the landing run ends). The PIC can use reasonable force to restrain the offender(s) and may require or authorise the crew and request or authorise (not require) the assistance of passengers in imposing such restraint or other measures necessary. In addition, the Commander has the power to disembark and deliver the offender(s) into custody. It is important to note that the Commander has this power while the aircraft is ‘in flight’ and this is defined wider in Art 5(1) as being from ‘*the moment when all external doors are closed following embarkation until any such door is opened for disembarkation*’ The law also provides protection and the Commander, crew and passengers are exempted from any subsequent legal proceedings for actions taken against the offender(s).

Other conventions have expanded and enhanced the provisions dealing with crimes committed on board an aircraft, such as the 1970 Hague Convention and the 1971 The Montreal Convention and in 2014, a Diplomatic Conference was held to revise the Tokyo Convention. This led to the Montreal Protocol 2014 which makes a number of key improvements with regards to unruly passenger behaviour. The Montreal Protocol states that an in-flight offence includes physical assault or threat to commit such assault against a crew member and a refusal to follow a lawful instruction. It also merely requires reasonable grounds to believe a serious offence has been committed and includes, for the first time, an in-flight security officer and the role of the officer with respect to disruptive passengers. The Montreal Protocol extends jurisdiction to try unruly passengers by including States in which the operator is located and the State of destination, including the State to which a flight may be diverted. In addition, it includes provisions which recognize an airline's right to recover compensation for expenses incurred by unruly passenger behavior. The Montreal Protocol 2014 will only come into force when 22 states ratify it and as of August 2019, 21 states have ratified the Protocol.



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Domestic framework

In addition to State criminal laws defining criminal behavior, passengers who behave unruly may also be committing a criminal offence in violation of an Air Navigation Order (ANO). Most ANOs have provisions which stipulate that a passenger who is drunk, under the influence of drugs, smokes on board, refuses a security check, uses threatening, abusive or insulting words or behaves in a threatening, abusive, insulting or disorderly way towards ground staff, passengers or crew, endangers the safety of the aircraft or any person, disobeys a command given by the captain, or acts in a disruptive manner, will be committing a criminal offence.

European Framework: Reg 261/2004

Disruptive passenger behaviour, whether or not it constitutes criminal behaviour, is one of the main reasons for aircraft diversions and delays and EU legislation in the form of Reg 261/2004⁵ obliges airlines to compensate passengers for cancelled or delayed flights. EU 261 was mainly introduced to provide compensation to passengers who had their flights cancelled or who were denied boarding.

In 2008 the European Court in the Wallentin-Hermann⁶ case considered technical problems and held that technical problems are NOT “extraordinary circumstance” and thus Alitalia was obliged to compensate passengers for the cancelled flight. In 2009 in the Sturgeon⁷ case the courts held that the Regulation should be extended to include delays of at least 3 hours and passengers can therefore claim compensation for a delay of 3 hours or more UNLESS the carrier can prove the delay was caused by extraordinary circumstances. The judgment was confirmed in 2012 by the Grand Chamber of the Court of Justice of the European Union (CJEU) in the joined cases of TUI and Nelson.⁸

Extraordinary circumstances

In the Wallentin-Hermann and Sturgeon cases, the judge stated that Regulation 261 aims at striking a balance between airlines and passengers and that airlines are not obliged to pay compensation IF they can prove that the cancellation or long delay was caused by extraordinary circumstances. Regulation 261 provides that extraordinary circumstances by their nature or origin are not inherent in the normal exercise of the activity of the air carrier concerned and are beyond its actual control. In other words there are circumstances which cannot be avoided, even if all reasonable measures had been taken. In addition, Article 19 of the Montreal Convention stipulates that a carrier may be exempted from its liability for damage for a delay if the carrier proves that it, its servants and agents took all measures that could reasonably be required to avoid the damage or that it was impossible to take such measures.

In light of these two cases, passengers can therefore claim for compensation for a delay in excess of three hours, UNLESS the carrier can prove that the delay was caused by extraordinary circumstances, beyond the control of the airline. Since the Regulation coming into force in 2005 there have been many cases heard by the EU Court of Justice shedding light on the term “extraordinary circumstances” and the following have been held to be extraordinary: hidden manufacturing defect; weather conditions; lightning strikes; bird strikes; crew flight time limitations; medical grounds such as passenger illness; security risks; political instability; air traffic management; airport operations and limitations.

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The question of passenger compensation becomes more complex in light of recent cases which seem to continuously widen the scope of the application of EU 261, laying down judicial precedent in favour of passengers including non-EU passengers.

In 2017 the UK Court of Appeal decision in *Gahan v Emirates* and *Buckley v Emirates*,⁹ which was confirmed by the Supreme Court in 2018, held that EU261 applies to a non-EU carrier when it is present in the EU. Passengers flying from the EU to a non-European destination via a non-European connecting hub can therefore get compensation for a delay of three or more hours to their overall journey, even if the delay on the European leg is below the ordinary three-hour delay and it leads to missed connections.

In July 2019, the court further extended the obligation of a carrier to compensate passengers under EU 261 in the landmark ruling in the case of *CS and Others v. České aerolinie a.s.*¹⁰ The European Court of Justice held that airlines must compensate passengers who are flying on partner airlines or codeshare flights outside of the EU. The case involved 11 passengers who were booked with Czech Airlines to fly from Prague to Bangkok with a connecting flight with Etihad Airways in Abu Dhabi. The first leg of the flight with Czech Airlines was on time, however the Etihad flight from Abu Dhabi arrived eight hours late and the passengers sought compensation. Czech Airlines submitted that as it was not responsible for the Etihad flight and the delay, it should therefore not be obliged to pay the passengers compensation. The court stated that a flight with one or more connections which is the subject of a single reservation is a whole for the purposes of the regulation and passenger compensation. In addition, the court also said that the EU airline could recover the expenses from its partner.

There is clearly a legal framework assigning liability on airlines to compensate passengers for flight cancellations and delays, particularly in light of EU Reg 261 and the EU court decisions regarding what is deemed to be 'extraordinary circumstances' for which the airline is not legally obliged to compensate passengers. What needs to be considered is whether this legal framework provides a consistent, balanced and just approach which balances the rights of both passengers and airlines.

Passenger compensation is a great additional cost that airlines have to bear in addition to the additional costs of a delay, which often include inter alia, fuel costs, accommodation, re-booking costs, the cost of deploying extra crew, etc., There is no applicable single rule or universally binding court decision on whether airlines should be forced to bear the cost of a delay caused by an unruly passenger with clear and effective means for the airline to claim restitutionary damages for some or all of the costs incurred as a result of the delay. The Montreal Protocol 2014 at Article 18 bis states that "Nothing in this Convention shall preclude any right to seek the recovery, under national law, of damages incurred, from a person disembarked or delivered pursuant to Article 8 or 9 respectively". The Convention therefore does have provisions that allow an airline to recover compensation for expenses caused by unruly behavior, and even though it is not yet in force, many airlines make use of similar provisions and do claim restitutionary damages from unruly passengers who have caused delays as can be seen from the following examples.

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Cases

A WestJet flight from Calgary to London was returned back to Calgary when a passenger who had too much to drink prior to boarding became aggressive and refused to take his seat. The passenger was charged under the Aeronautics Act and Criminal Code and pleaded guilty to resisting arrest and failing to comply with safety instructions. The pilot had to dump 20,000 pounds of fuel before it was safe to land and the cost to the airline was said to be over \$200 000. The passenger was also banned from entering Canada .The airline claimed CAD \$65,000 damages and the Canadian court ordered him to pay WestJet CAD \$21,260.68 which amounted to the cost of the wasted fuel.¹¹

On 22 June 2019, a passenger on board a Jet2 flight from London to Turkey who behaved aggressively, abusively and dangerously was arrested when the flight diverted back to London. She allegedly attempted to open the aircraft doors and yelled threats to both passengers and crew. Her outburst triggered a hijack alert, resulting in two fighter planes to escort the Jet2 flight back to Stansted Airport. She was banned for life by the airline and faces charges of assault, criminal damage and endangering an aircraft. In addition she was ordered to pay £85,000 to compensate the airline for emergency landing costs.¹²

In July 2018 a Delta Airline flight scheduled to go from Portland to Atlanta was diverted to Tulsa as a result of a passenger who verbally assaulted a flight attendant. The passenger was ordered to pay Delta Air Lines \$9,118 for the cost of the diversion.¹³

In 2017 the court ordered a passenger to pay Hawaiian Airlines \$97,817 for his disruptive behaviour on a flight from New York City to Honolulu causing the plane to return back. He pleaded guilty to interfering with flight crew. His abusive and belligerent behaviour included insulting his girlfriend, her children, other passengers, and flight crew, making a number of life-threatening comments and slapping a flight attendant on the shoulder with the back of his hand. The US District judge ordered the passenger to repay the airline the costs of returning the flight including inter alia, fuel, maintenance, additional crew, landing fees and the cost of rebooking passengers with other airlines, but excluding the \$46,900 of meal vouchers the airline had handed out to the passengers delayed on both sides. In addition to the nearly \$98 000 damages ordered to be paid to Hawaiian Airlines, the passenger received a three year probation sentence.¹⁴

On 27 March 2013, an Air Transat flight from Vancouver to the United Kingdom had to make an emergency landing as a result of the unruly behaviour of a passenger who had to be restrained. The drunk passenger allegedly punched a coffee maker, “jokingly” grabbed a flight attendant by the throat, and spat on those trying to restrain him. He twice managed to get out of the plastic wrist restraints, bent back the thumb of someone trying to restrain him and tried to bite the people who were holding him back. He was also allegedly verbally abusive, shouting that he would “slit their throats,” and “send their genitals to their mothers.” He was arrested when the flight landed and spent nine days in prison. He pleaded guilty to one count of unruly behaviour under the Aeronautics Act and the court ordered him to pay a \$2,000 fine and reimburse Air Transat for approximately \$13,875.¹⁵

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In August 2012, an Air Canada flight from London to Calgary was diverted after an intoxicated passenger was grinding his pelvis two inches from a flight attendant's face whilst making sexual innuendos. He then grazed her breast in an attempt to grab her buttocks and also punched a TV screen before he was wrestled to the ground by crew and passengers. He was then restrained until the emergency landing. He pleaded guilty to assault, mischief and failing to follow directions of a flight crew and in February 2014, he received a one-year suspended sentence, was ordered to receive alcohol counselling and fined \$4,000. The court also ordered him to pay \$15,200 in restitution to Air Canada.¹⁶

In December 2011, an Air Canada flight from Toronto to Beijing diverted as a result of two unruly passengers who had allegedly mixed sleeping pills with alcohol and had to be restrained by the airline crew after kicking seats, yelling and swearing at flight staff and passengers. One of the passengers tried to break plastic restraints with his mouth and then chewed through the restraints. The two executives spent two nights in police custody and subsequently lost their jobs after the incident. Both were charged and pleaded guilty to mischief and received suspended sentences and probation for one year. They were banned from flying with Air Canada and sued for \$71,757 as restitution to the airline. Initially, they were ordered to pay \$35,878 each, but the Appeal Court reduced each to about \$10,528. The cost to the airline submitted to the court included \$75,475 in extra fuel, \$42,200 in pay for the crew and \$2,560 in navigation service.¹⁷

There are even a number of cases where passengers throw coins in the engine for good luck, causing lengthy and costly delays. One such case occurred in 2017 when a domestic flight in China was grounded and re-scheduled when a passenger threw coins in the engine for good luck. He was taken into a custody and detained for seven days. The 162 passengers were flown the next day following a full engine check. The airline claimed that the cancelling of the flight cost approximately 140,000 yuan (\$AU29,360), and said that they would be suing the passenger for damages.¹⁸

Conclusion

Passengers often have to endure flight delays or diversions and if the cause is as a result of circumstances which are beyond the control of the airline and deemed to be extraordinary circumstances, airlines are not legally obliged to compensate passengers for such delays. However, if the delay is as a result of other circumstances such as unruly passenger behaviour, a legal framework exists which obliges airlines to compensate passengers for the delay. In light of EU 261 and judicial precedent which makes the regulation applicable to non-EU carriers and partner airlines or codeshare flights outside the EU, the airline costs of a delay are even greater. Unruly passengers causing delays can now be faced with paying large amounts of money, which they often cannot afford, to reimburse airlines for some of the costs incurred, in addition to fines and imprisonment. In today's highly competitive market and the increasing costs which airlines are faced with, this additional cost has had, and will continue to have, a great impact on struggling airlines as can be seen by a number of low cost carriers that have filed for bankruptcy in Europe which now includes Thomas Cook Group Plc, which filed for administration and ceased operation in September 2019 after 178 years in business.

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Restitutionary damages are imposed as a form of punishment and are also meant to serve as a deterrent to other passengers but is this an effective measure to deter passengers from consuming too much alcohol for example, or from behaving unruly or belligerently? Perhaps the bigger question is whether the legislative framework and the courts would, or should, consider that unruly passenger behaviour is beyond the control of the airline amounting to an extraordinary circumstance (perhaps, with the exception of cases where the airline serves too much alcohol to a passenger), for which the airline will not be legally obliged to pay passenger compensation for delays caused by such behaviour. However, in light of the Birmingham case and EU judicial precedent, it seems that the intention of EU 261 is to lean more in favour of passengers and grant them compensation, thus increasing the likelihood that unruly passenger behaviour resulting in delays and diversions will not be considered as extraordinary circumstances. This will increase the airlines cost and places an even heavier burden on the operator to take appropriate mitigating actions to reduce unruly passenger behaviour.

A possible action that could be considered is for airlines to amend their website to include a box that needs to be checked, similar to the dangerous goods box that passengers check prior to purchasing a ticket, confirming that the passenger has read and understood the notification outlining what would constitute unruly passenger behaviour, stressing that such behaviour could amount to a criminal offence with the corresponding punishment and penalties that could be imposed. The notification should also include a warning that passengers may be liable to reimburse the airline for the costs incurred as a result of such behaviour. The notice should also be displayed at the check-in counter and be inserted in the front of the passenger seats together with the aircraft safety card. Such measures could possibly assist airlines in showing that all reasonable measures had been taken to avoid the delay and that the circumstances are thus beyond the air carrier's actual control, for which the airline is not liable.

¹Stuff 'Nightmare passengers: Six people you don't want to sit next to on a plane', 19 July 2019. Available at <https://www.stuff.co.nz/travel/travel-troubles/114350845/nightmare-passengers-six-people-you-dont-want-to-sit-next-to-on-a-plane>

²BBC 'Korean Air 'nut rage' flight attendant awarded \$18, 000', 19 December 2018. Available at <https://www.bbc.com/news/world-asia-46624293?fbclid=IwAR179Q4AHUasH8Wxv3S4fTxMk2muQs0fb1hXz3p6-00l0a9Cn5BE4bfrnLU>

³Associated Press, 'Delta passenger indicted for brawl on international flight', 20 July 2017. Available at <https://nypost.com/2017/07/20/delta-passenger-indicted-for-brawl-on-international-flight/>

⁴United States v. Cordova, 89 F. Supp. 298 (E.D.N.Y 1950) District Court, E.D. New York, Docket Number: Cr. 42082. Available at <https://www.courtlistener.com/opinion/2597411/united-states-v-cordova/>

⁵Air Passenger Rights Regulation (EC) 261/2004 of the European Parliament and of the Council. Repealed Regulation (EEC) No 295/91, JO L46/1 of 17-2-2004 and became effective from February 2005

⁶Friederike Wallentin-Hermann v Alitalia - Linee Aeree Italiane SpA, ECLI:EU:C:2008:771 In Case C-549/07. Available at <http://curia.europa.eu/juris/liste.jsf?num=C-549/07>

⁷Sturgeon v Condor Flugdienst GmbH and Bock and Others v Air France SA [2009] ECR I-10923. Available at <https://www.bailii.org/eu/cases/EUECJ/2009/C43207.html>

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⁸Judgment of the Court (Grand Chamber), 23 October 2012 in *Emeka Nelson and Others v Deutsche Lufthansa AG and TUI Travel plc and Others v Civil Aviation Authority*. Available at <https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX:62010CJ0581>

⁹*Gahan v Emirates* [2017] EWCA Civ 1530. Available at http://res.cloudinary.com/lbresearch/image/upload/v1508838491/gahan_buckley_v_emiratesfinalised_for_hand_down_12_10_17_249117_1049.pdf

¹⁰Judgment of the Court (Ninth Chamber) of 11 July 2019 *CS and Others v České aerolinie a.s.* Available at <http://curia.europa.eu/juris/liste.jsf?language=en&num=C-502/18>

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¹²Romano, A., *‘Woman Fined \$105,000 for Violent Outburst on a Jet2 Flight’*, 18 July 2019. Available at <https://www.travelandleisure.com/travel-news/jet2-passenger-outburst-emergency-landing>

¹³Shadare, W., *New Telegraph*, *“Unruly passengers: Getting worse?”* 18 December 2018. Available at <https://www.newtelegraphng.com/2018/12/unruly-passengers-getting-worse/>

¹⁴Lieberman, M., *‘Uncontrollable Passenger Forced to Pay \$98,000 to Hawaiian Airlines’*, 31 August 2017. available at <https://www.travelandleisure.com/airlines-airports/unruly-passenger-pays-major-penalty-hawaiian-airlines>

¹⁵Tucker, E., *‘What happens to unruly passengers who divert your flight?’* 28 August 2014. Available at <https://globalnews.ca/news/1532329/what-happens-to-unruly-passengers-who-divert-your-flight/>

¹⁶Kozicka, T., *Global News*, *‘Calgary man pays the price for bad behaviour on plane’*, 4 February 2013. Available at <https://globalnews.ca/news/388479/calgary-man-pays-the-price-for-bad-behaviour-on-plane/>

¹⁷Tucker, E., *op cit*

¹⁸Coffey, H., *‘Chinese airline to sue passenger who threw coins into plane engine for good luck, grounding flight’*, 26 February 2019. Available at <https://www.msn.com/en-sg/news/world/chinese-airline-to-sue-passenger-who-threw-coins-into-plane-engine-for-good-luck-grounding-flight/ar-BBU5NUk>

737 MAX Grounding Likely to Usher In New Paradigm of International Cooperation in Airworthiness Certification

Gene Kaskiw*

Introduction

A comprehensive discussion of hot topics in the aviation regulatory world would be incomplete without mention of the worldwide grounding of Boeing's latest airliner, the 737MAX series. After two catastrophic crashes in Indonesia (November 2018) and Ethiopia (March 2019) killing 189 and 157 people, respectively, regulators took the dramatic step of grounding all 737MAXs globally, a total of 387 aircraft either in service or delivered to 59 operators.

This article provides background on the airworthiness type certification process under the laws of the United States of America as carried out by the Federal Aviation Administration ("FAA"), a crucible of regulatory muster viewed, until recently, to be the international leading aviation authority. Following the 737MAX disasters, the FAA has come under fire for what has been characterized as a "cozy relationship"¹ with the private sector, including aircraft and component part manufacturers, as well as operators of the finished and delivered aircraft. This arises from a deliberate effort on the part of the FAA to increase delegation of traditional supervisory and oversight responsibilities to the companies seeking certification or approval. For its part, the private sector has long lobbied the FAA to delegate more certification related duties to manufacturers, with the goal of accelerating time-to-market for new products and derivatives.

The 737MAX disasters threaten to disrupt the certification paradigm and all stakeholders, including Boeing, the FAA and airline operators, are left to answer serious questions about the path forward, taking into account that however, the resources assigned by Governments to aviation authorities will not increase, while the demand for oversight will²⁴. In the case of the 737MAX, the primary culprit in these devastating crashes now appears to be a flaw in the aircraft's flight control logic, known as Maneuvering Control Augmentation System ("MCAS"). The core objective of the 737MAX, for Boeing, was to integrate recent advances in turbofan engine technology into the venerable, best-selling 737 platform, boasting over 6,500 examples in service by 2012.² The catalyst for the launch of the 737MAX was a blockbuster July 20, 2011 American Airlines order³ of 130 of Airbus SE's A320neo ("New Engine Option").

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The A320neo, and its stablemates, the A319neo and A321neo, comprise the first major update to the A320 family and incorporated cutting-edge, fuel-efficient engines from both General Electric and 1 Kasperowicz, Peter. “Capt. Sullenberger: 737 MAX crashes reveal ‘cozy’ relationship between Boeing, FAA.” Washington Examiner, March 20, 2019.

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Available at: <http://www.b737.org.uk/history.htm> 3 “AMR Corporation Announces Largest Aircraft Order in History With Boeing and Airbus.” PRNewswire, July 20, 2011. Available at: <http://news.aa.com/news/news-details/2011/AMRCorporation-Announces-Largest-Aircraft-Order-in-History-With-Boeing-and-Airbus/default.aspx> 4817-8559-1461.1 2

Pratt & Whitney. Boeing, eager to retain American as a customer, on August 30, 2011 announced its latest 737 derivative, the 737MAX, using a variant of the General Electric LEAP engine originally developed for the A320neo.⁴ The main advantages of the 737MAX are the fuel efficiency of the new engine, coupled with lower development costs associated with using the existing, type-certificated 737 design, in the same way the A320neo arises directly from the original A320 family. Boeing encountered difficulties early on, when wind tunnel tests demonstrated an unintended consequence of the LEAP-1B engine’s larger fan diameter. Specifically, testing showed during an extreme maneuver, bringing the airplane close to an aerodynamic stall, the shape and position of the engine housing disrupted airflow over the wings and caused a gradually-increasing nose-up pitch. This nose-up pitch moment resulted in an abruptly lighter elevator control “feel” for pilots, as compared to the earlier 737 Next Generation (“737NG”), a troubling finding for Boeing considering the importance of commonality of 737MAX to prior variants.

The FAA would not have certified the 737MAX as a variant of the 737 with such dramatically different control characteristics, and in fact would not award type certification if changes to control feel do not transition smoothly from one variant of a type to a subsequent variant. However, rules on commercial air transport operations all over the world, impose maximum two “type ratings” to pilots. Therefore a new “type” will entail greater costs and rostering problems for customer airlines, while a “variant” of the same “type” may be smoothly and cheaply be integrated into daily operations.

Boeing’s request from its biggest customers, many flying massive fleets of 737s, was hence to design an airplane safely flyable by any 737 type-rated pilot with minimal additional training, because 737MAX was in fact deemed to be a “variant” and not a new type. This unexpected phenomenon threatened the critical type certification process that would make-or-break the program. To address the problem, Boeing engineers first devised mechanical solutions. The most obvious answer was to lengthen the landing gear of the 737MAX to accommodate the larger LEAP1B engine in a similar position to the outgoing 737NG. Unfortunately, the landing gear alteration was ruled out early on, because substantial revision of the system would necessitate major changes to the airframe, increasing costs to a level tantamount to building an all-new type. This would undoubtedly destroy the economics of the 737MAX and lead to mass order cancellations. Other structural changes, like modifications to the shape of the wing, or the addition of so-called vortex generators, failed to correct the undesirable handling tendencies. Boeing turned to a software change to the flight con-

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trol system, in an effort to provide automated assistance to pilots flying the 737MAX in challenging, manual conditions. MCAS, as initially proposed, would apply increments of nose-down trim to the horizontal stabilizer in the tail of the airplane, helping to smooth control feel in the hazardous low-speed, high angle-of-attack scenarios identified in wind tunnel tests. The system would function without input from the crew, causing the 737MAX to perform like any other 737 and, critically, help pilots avoid flying the airplane into an aerodynamic stall. Satisfied with the plan, Boeing sought FAA approval of the revised system now known as MCAS as “major change” to already approved “type”, and in this process, with the design of the airplane continuing to evolve, problems arose.⁴

FAA Aircraft Type Certification

At its core, the FAA has the mission to promote safety in civil aviation. To carry out this mandate, the United States Congress enacted a series of laws enabling FAA oversight of the civil aviation system. The governing regulations, codified at 14 C.F.R. §1, et seq., otherwise known as the Federal Aviation Regulations (“FAR”), contain extensive guidance on the matter of aircraft certification. Augmenting these legislative prescriptions are FAA Administrative Orders, Airworthiness Directives, Continued Airworthiness Notifications, Service Bulletins, along with various guides, handbooks, forms and other publications. 14 C.F.R. §21, et seq. (“FAR Part 21” or “Part 21”) pertains to initial airworthiness, including type certification and subsequent design changes, while, as relevant to this topic, 14 C.F.R. §25, et seq. (“FAR Part 25” or “Part 25”) contains general technical certification specifications for transport category aircraft, surprisingly published as legally binding law.

The most comprehensive initial airworthiness approval, the original Type Certificate (“TC”), is awarded when the FAA determines that a design is a new type of aircraft, engine or propeller and that it meets design and reliability standards in effect at the time. The TC represents the culmination of testing, demonstration and/or inspection of such characteristics as handling quality, systems reliability, noise requirements, and structural integrity. For transport-category aircraft, like the Boeing 737, the aircraft flight manual must also meet standards for FAA approval in order to issue a TC. The Boeing 737-100, the first model in the 737 line, received its TC (No. A16WE) on December 15, 1967. A TC holder has the right to modify the design to include new variants and derivatives incorporating changes conferring an “appreciable effect on the weight, balance, structural strength, reliability, operational characteristics, or other characteristics affecting the airworthiness of the product.”⁵

The advantage of an approved change to an existing TC is the certification requirements generally relate back to those in effect on the date of the original TC. In addition, documentation and flight testing for a change to the TC are not as exhaustive as the original type certification process. Aircraft variants based on a TC change are generally faster to market and less-costly to certify than an application for a new TC related to a new aircraft model. Each successive Boeing 737 variant, from the 737-200 in 1968 to the 737MAX-8 in 2017, has therefore been approved as a change to the original 737-100 TC. Once an aircraft design receives a TC, or change thereof, the FAA will evaluate a manufacturer’s compliance with regulations pertaining to production and inspection. Upon satisfaction of the criteria set forth in FAR 21 Subpart G, the FAA issues a Production Certificate (“PC”), clearing an aircraft type to enter production. Of course, all transport-category aircraft produced under a TC and PC must meet airworthiness technical specifications under FAR Part 25, demonstrating

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compliance with these prescriptions by post-production inspection and flight testing. After type certification and production, modifications to individual aircraft, often involving performance enhancements, interior reconfiguration or changes to equipment installed on aircraft, are subject to Supplemental Type Certification (“STC”). The FAA will grant a STC to any party, and certificated domestic repair stations (under FAR Part 145) are even given authority to independently issue STCs. STC applications must meet the requirements of FAR 21 Subpart E.

Delegation of Certification Responsibilities

The FAA, by nature, is a decentralized organization, with local (District Offices) and regional offices conducting most oversight of civil aviation operations, with reporting on those activities sent up to the Office of the Administrator at FAA Headquarters in Washington, D.C. At the national level, the FAA Aircraft Certification Service (“AIR”) provides resources for review and approval of applications for initial certifications and subsequent changes. AIR “employs more than 1,300 engineers, scientists, inspectors, test pilots and other experts responsible for oversight of design, production, airworthiness certification, and continued airworthiness programs for all U.S. civil aviation products and foreign import products.”⁶

Even with the benefit of AIR personnel and expertise, the FAA struggles to keep up with demand and historically places significant product certification responsibilities on Designated Engineering Representatives (“DER”), generally employees of certificate applicants. The FAA acknowledges, “[t]he use of designees has been a part of the fabric of global aviation for decades.”⁷

Congress specifically directed the FAA to make full use of delegation authority in the FAA Reauthorization Act of 2018, having acknowledged the constant increase of demand for approvals in the face of the budget difficulties to significantly increase the volume of resources assigned to the FAA.

Employees of sophisticated component part and airframe manufacturers, like Boeing, have expertise in aviation regulatory compliance matters, and the FAA recognizes the efficiency of applying those skills as a “force multiplier” to carry out traditional type certification tasks.

This is no novel concept, as in a 1993 report, the Government Accountability Office (“GAO”) found the FAA delegated to Boeing DERs as much as 95% of overall certification related work for the 747-400 series, entering service in 1989.⁸

The GAO noted the level of delegation, while fundamentally sound, was “too ad-hoc” and directed the FAA to develop a program to account for its lack of familiarity with new aircraft systems.⁹

In view of the GAO’s 1993 report findings, in recent years the FAA has progressively moved to a “systems approach” to product certification, whereby the constituent systems of a larger, complex product (like an airliner) are independently evaluated, based on standardized procedures, to show compliance with governing specifications.¹⁰

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In May 2017, the FAA released its Product Certification Guide - Third Edition, advancing a philosophy of consistency in application of regulatory procedures to “increase the compliance maturity level of Applicants from one which depends on the FAA for significant support in satisfying the requirements to an Applicant . . . capable of performing the compliance with minimum input from the FAA”.¹¹

A “systems approach” to aircraft certification calls for a mathematical, analytical quantitative process for reliability assessment to demonstrate compliance. The process shall be applied to each aircraft system. One such procedure, generically known as hazard analysis, is applied by Boeing engineers throughout the certification process. Failure Mode, Effect and Criticality Analysis (“FMECA”) was originally developed in the 1950s by the Grumman Aircraft Corporation and refined during the Apollo program in the 1960s. FMECA became mandatory for aircraft certification in the 1980s and now stands as a common component of a hazard analysis protocol.¹²

In its most basic form, the FMECA is a two-step process beginning with a schematic diagram of the system to be evaluated, followed by identification of potential failure modes and effects, known as Failure Mode and Effects Analysis (“FMEA”). Following this, FMECA, often computerized, involves assignment of a level of criticality for each failure mode (i.e. assessment of the severity of the effects), and a statistical likelihood for said failure to occur in the life of the system. The levels of severity, are as follows:

- CATASTROPHIC - Death, system or aircraft loss, permanent total disability
- HAZARDOUS - Severe injury or major aircraft or system damage
- MAJOR - Minor injury or minor aircraft or system damage
- MINOR - Less than minor injury or aircraft or system damage 1
- NO SAFETY EFFECT

For probability, the following criteria are applied:

- PROBABLE - Likely to occur in lifetime of each system ($> 1E-5$)
- REMOTE - Possible for each item, several for system ($< 1E-5$)
- EXTREMELY REMOTE - Unlikely for item, may occur few in system ($< 1E-7$)
- EXTREMELY IMPROBABLE - so unlikely, not expected in system ($< 1E-9$)

The results of the FMECA, and the severity of potential failure modes are applied to a safety risk matrix dictating, among other things, whether redundancy of a given system is required to comply with the mandated maximum tolerable probability. Other parts of a hazard analysis, like a Fault Tree Analysis (“FTA”) is an engineering process that takes into account connectivity between various systems, and their respective failure modes. In certain instances, there can be a subjective component to the failure mode (i.e. consideration of crewmembers following training on a given procedure, which would not affect the probability, but would mitigate the severity effects), underscoring the need for the engineer’s familiarity with the system and its operation. The FAA must, therefore, approve test plans and failure analyses. The GAO, in the bellwether 1993 report, acknowledged FAA engineers were often insufficiently trained and unfamiliar with various systems, when compared to manufacturer DERs, leading to DERs conducting, and even approving, test plans and critical failure analyses.¹³

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It went on to conclude such increasing delegation and reducing supervision actually weakens regulatory safeguards.¹⁴ Against this backdrop of increasing independence and delegation of critical tasks for sophisticated manufacturers, serving an apparent goal of both the industry and the FAA, we return to the development of the 737MAX.

737MAX

Boeing engineers initially devised MCAS to activate in a high-speed environment in where the airframe sustains G-forces in excess of those encountered in normal operations. At higher speeds, movements of control surfaces generate a more pronounced effect, and so the first iteration of MCAS permitted only .6 degrees of authority to move the horizontal stabilizer. This was deemed sufficient to address the control feel issues at high speed, theoretically reducing the likelihood of the pilot manually flying the airplane into an aerodynamic stall.

An aerodynamic stall occurs when airflow over the wings becomes detached and turbulent and therefore no longer able to generate lift. Angle-of-attack (“AOA”) refers to the pitch of the airplane relative to its forward movement through the air and the horizontal axis. As AOA increases, an airplane nears the “critical AOA”, when the wings will cease to produce lift, and stall, unless AOA decreases. An aerodynamic stall creates an extremely dangerous situation in an airliner, and Boeing 737s are presently equipped with two AOA sensors, or “vaness”, to assist the flight control computer and pilots in managing the airplane’s energy state. The severity of an aerodynamic stall, along with its comparatively high likelihood versus more complex failures, requires a heightened level of redundancy to reduce the likelihood of occurrence.

MCAS, envisioned to mitigate the nose-up tendency of the 737MAX in an aggressive, highspeed, hand-flown turn at high AOA, took into account feedback from just one AOA vane at a time, automatically switching from the left to the right sensor as a function of the direction of the turn. As first designed, if several conditions were met, including indication of a high AOA, the flight control computer would command activation of MCAS. Boeing engineers believed this solved the control feel issue and conducted a FMECA of MCAS, and reported the findings to the FAA.

The Seattle Times reviewed the System Safety Analysis form pertaining to MCAS, submitted to the FAA.¹⁵ It found Boeing evaluated the failure mode of an inadvertent activation of MCAS, commanding nose-down pitch trim, even if the pilot was actively pulling back on the control column (i.e. desiring nose-up). As part of the analysis, Boeing used an FAA-approved assumption that pilots would recognize an uncommanded trim input and carry out a prescribed procedure within three seconds of its onset. The anticipated crew response to the failure mode, as envisioned by Boeing in the FMECA, was within three seconds, pilots would engage two pedestal switches to cut-out the electric trim system, a standard response to a so-called “runaway stabilizer,” for which all 737 pilots have been trained since the 1960s. After cutting out electric trim, manual trim inputs are made using a control wheel mounted between the pilots. This would permanently inhibit MCAS, and pilots would either apply manual trim or follow additional checklists for a jammed stabilizer.

Air transport-rated pilots must demonstrate competence in these procedures before earning a type rating for a given aircraft. Because an uncommanded MCAS activation would present in a similar fashion to a runaway stabilizer, Boeing concluded no additional training would be necessary. Applying these assumptions in the FMECA, Boeing

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engineers classified the MCAS failure modes as “Major” and calculated a tolerable probability of occurrence at less than 1 in 223 trillion flight hours¹⁶, which would not, according to the safety risk matrix, require multiple redundancy for the system. With such a remote likelihood of failure, the reliance on a single AOA vane was hence technically acceptable. The FAA, for its part, approved the hazard analysis for MCAS.

As development of the type progressed, Boeing test pilots encountered a troubling pattern. The same control feel issues were also identified in low-speed regimes of flight, more consistent with the type of maneuvering common in congested airspace after take-off or before landing. At low speeds, the .6 degrees of nose-down trim authority was insufficient to compensate for the loss of control feel. Boeing engineers modified MCAS to allow a command of up to 2.5 degrees of nose-down trim, the full travel of the 737MAX horizontal stabilizer. This did not change the classification of the MCAS failure mode, nor did it alter the quantitative incidence of failure.

For these reasons, and because Boeing engineers determined there was no greater risk than what was found previously, there was no subsequent hazard analysis, and the FAA was not provided with any documentation of this change.

The Crashes

On October 2, 2018, a three-month-old Lion Air 737MAX8, registered PK-LQP, departed Jakarta shortly after 6:00 a.m. as flight JT610, carrying 181 passengers and 8 crewmembers on a domestic flight to Pangkal Pinang. Three minutes into the flight, the crew reported controllability issues and requested a return to Jakarta. In the following ten minutes, radar returns show fluctuating altitude and airspeed, but a general trend of descent until the aircraft crashed into the ocean at 6:33 a.m., leaving no survivors.

Review of logbooks identified a faulty angle-of-attack sensor on PK-LQP had been replaced at Bali two days before the crash. In fact, the night before, on October 28, the crew of the aircraft reported similar control problems, and properly conducted a runaway stabilizer procedure at the suggestion of a jump-seating pilot. Control was regained, and after arrival in Jakarta, a 20-degree variance was found between the indications of the left and right AOA sensors. It remains unclear what steps mechanics took to correct this disagreement before the accident flight and which troubleshooting process they conducted to conclude that replacing one AOA sensor was a sufficient rectification of the defect.

Post-crash investigation showed MCAS engaged more than twenty times on the accident flight, with the pilots inhibiting it each time, but failing to follow the runaway stabilizer procedure to permanently inhibit MCAS. Each successive activation of MCAS caused overall nose-down trim to increase, and the aircraft crashed with full nose-down trim - 2.5 degrees - applied at the moment of impact.

Questions arose as to the architecture of MCAS, specifically for its reliance on data from only one AOA sensor, without redundancy. This, in theory, could cause a “garbage in, garbage out” scenario whereby the flight control computer acts on faulty data fed to it from a defective sensor. The result, attributable to a lack of redundancy, could be an unwanted activation of MCAS with nose-down trim inputs from a single point of failure, when all other factors, including visual cues to the pilot, indicate controlled flight.

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On November 6, 2018, Boeing released an Airworthiness Directive pertaining to the 737MAX emphasizing the runway stabilizer procedure to arrest continued unwanted nose-down trim inputs based on the flight control computer's response to bad data. It also recommended airlines to organize additional pilot training on the runway stabilizer procedure and role of MCAS. Finally, Boeing announced it would develop and implement a software update for MCAS to improve redundancy, specifically addressing the possibility of a defective AOA sensor. Certification and service entry of the software update was planned for April 2019.

737MAX service continued uneventfully until the morning of March 10, 2019, when a five month-old 737MAX8 operated by Ethiopian Airlines, registered ET-AVJ, crashed six minutes after departure from Addis Ababa, Ethiopia en route to Nairobi, Kenya. There were no survivors among the 149 passengers and 8 crew of flight ET302.

Airspeed and altitude data from ET302 showed unusual fluctuations commencing during climb after takeoff, when the airplane ordinarily operates in manual flight, without autopilot. Presumably because of the training received in the wake of the JT610 crash, the captain commenced the runaway stabilizer checklist and switched off electric trim. At the same time, consistent with the procedure, the first officer, in the right seat, began to turn the manual control wheel in an attempt to trim the stabilizer back to nose-up. Unfortunately, he rolled the wheel in the wrong direction, applying more nose-down trim.

About ninety seconds after initiating runaway stabilizer procedures, the captain of ET302 reversed course and switched electric stabilizer trim back on. MCAS re-engaged, and despite temporarily inhibiting for several cycles, the cumulative effect of the system's activation was full nose-down trim, 2.5 degrees. This proved unrecoverable, and the airplane crashed several minutes later.

Where do we stand today?

Within a few days of the crashes, aviation regulators, including the FAA, grounded the worldwide 737MAX fleet, despite assurances from Boeing and other operators of the variant's fundamental safety. As of the date of this publication, the 737MAX remains grounded, with Boeing working to certify and implement its software update, along with revisions to pilot training. The Inspector General of the United States Department of Transportation also launched an audit of the 737MAX certification process. Boeing officials, FAA representatives and other interested parties have been called to publicly testify in hearings before Congress on multiple occasions.

Intense scrutiny remains directed at FAA and Boeing as the latter finalizes its solutions, planned for flight tests starting in October. Reportedly, Boeing's fix involves a software update comparing data from both AOA vanes simultaneously, inhibiting MCAS and alerting pilots of a disagreement between the sensors. Boeing expresses confidence this systems architecture would have prevented both the Lion Air and Ethiopian crashes.

A similar system to MCAS is already installed on both the 737NG and 737MAX using double-redundant logic. This function, known as "speed trim", automatically adjusts pitch trim in manual flight, without the pilot's input. Speed trim compares readings from both AOA sensors, inhibiting the system when flight control computers identify a disagreement between the two sources. Another Boeing product, the KC-46 tanker, based on the 767-200ER, has MCAS, albeit with a slightly different function. On the KC-46, MCAS features a full-time, dual-channel AOA input, also disabling with a sen-

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sor disagreement. Already, aviation regulators around the world are reconsidering the level of deference traditionally afforded to FAA type certification, shifting to a more cautious approach best characterized as, “trust, but verify.”

For instance, the European Aviation Safety Agency (“EASA”), insists it will individually test and approve any changes to the 737MAX proposed by Boeing, regardless of the FAA’s imprimatur.¹⁷ Moreover, Mr Patrick Ky; Executive Director of EASA suggests the FAA’s position of leadership in the “hierarchy or relationship between different authorities” is substantially compromised after revelations emerging in the wake of the 737MAX grounding.¹⁸ The EASA Director also stated a preference for a triple AOA sensor feature for the revised MCAS.

Furthermore, even in Europe delegation of certification tasks is possible, but to designers only if they achieve this privilege having demonstrated sufficient independence from the design and compliance verification teams. Furthermore, in 2008, the EU Legislator²³, enshrined into legislation the principle of “independence” for Qualified Entities, which can support authorities when the latter need additional resources.

This “crisis of trust” is not limited to regulators.¹⁹ Several current and former airline pilots, many of whom are fiercely brand-loyal due to the manufacturer’s long time perception of building “pilot-friendly” airplanes, testified at Congressional hearings in June that the 737MAX incidents have shaken their confidence in Boeing.²⁰ In particular, aviation icon Chesley “Sully” Sullenberger, of “Miracle on the Hudson” fame, called the 737MAX design “fatally flawed” and cautioned that even the most well-trained flight crew could fall victim to task saturation during an emergency situation.²¹

Where are we going from here?

The forthcoming certification of the MCAS fix and the eventual reintroduction of the 737MAX into passenger service will be a watershed moment in the realm of aviation regulation, with the credibility of the FAA and Boeing, erstwhile global leaders, hanging in the balance.

As is remarkably common in aviation, the spirit of cooperation often prevails. In late June 2019, representatives of the FAA, EASA, the National Civil Aviation Agency of Brazil (“ANAC”) and Transport Canada Civil Aviation (“TCCA”), agreed in principle to collaborate in recertification of the 737MAX.²² With the notable exception of the Civil Aviation Administration of China (“CAAC”), these regulators oversee the production of virtually all civil aeroplanes used by commercial air transport. The initial objective is to begin coordinating certification standards among worldwide agencies, with the long-term goal of creating a harmonised regulatory scheme. Secondary benefits of enhanced cooperation are sharing of technical resources and expertise to bolster the shared purpose of ever-increasing safety in the worldwide civil aviation system, while guarantying absence of conflict of interest when oversight tasks are delegated. While the 737MAX saga has been profoundly tragic and deeply disturbing, early indications suggest it has set in motion substantial changes to oversight of aircraft certification, with the prospect of a new, international standard for more controlled delegation of oversight privileges from government authorities to manufacturers or qualified entities. It is, therefore, one of the most significant aviation regulatory events in a generation, and its impact will resonate throughout the industry for years to come, contributing to a safer air transportation system, notwithstanding the limited resources available to authorities.

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⁴ "Boeing Launches 737 New Engine Family with Commitments for 496 Airplanes from Five Airlines ." *PRNewswire*, August 30, 2011. Available at: <https://boeing.mediaroom.com/2011-08-30Boeing-Launches-737-New-Engine-Family-with-Commitments-for-496-Airplanes-from-Five-Airlines>

⁵ FAR Part 21.93

⁶ FAA Aircraft Certification Service (AIR). Available at: https://www.faa.gov/about/office_org/headquarters_offices/avs/offices/air/

⁷ FAA Aircraft Certification. Available at: https://www.faa.gov/aircraft/air_cert/

⁸ "New FAA Approach Needed to Meet Challenges of Advanced Technology RCED-93-155": Published: Sep 16, 1993. Publicly Released: Sep 30, 1993. ("GAO Report") at 4. Available at: <https://www.gao.gov/assets/160/153711.pdf>.

⁹ *Id.*

¹⁰ FAA Product Certification Guide, Third Edition - May 2017, at i.

¹¹ *Id.* at ii. (emphasis added)

¹² Chen, et al. "Status of FMECA Research and Engineering Application." 2012 Prognostics & System Health Management Conference, Beijing. Available at: <https://ieeexplore.ieee.org/stamp/stamp.jsp?arnumber=6228914>

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¹⁴ *Id.*

¹⁵ Gates, Dominic. "The inside story of MCAS: How Boeing's 737 MAX system gained power and lost safeguards." *Seattle Times*, June 22, 2019. Available at: <https://www.seattletimes.com/seattlenews/times-watchdog/the-inside-story-of-mcas-how-boeings-737-max-system-gained-power-and-lostsafeguards/>

¹⁶ *Id.*

¹⁷ Gates, Dominic. "European regulator plans its own test flights of Boeing 737 MAX in sign of rift with FAA." *Seattle Times*, September 10, 2019. Available at: <https://www.seattletimes.com/business/boeing-aerospace/european-regulator-plans-its-own-test-flightsof-boeing-737-max-in-sign-of-differences-with-faa/>

¹⁸ *Id.*

¹⁹ Schaefer, David. "Pilots Criticize Boeing, Saying 737 Max 'Should Never Have Been Approved'." *NPR*, June 19, 2019. Available at: <https://www.npr.org/2019/06/19/734248714/pilotscriticize-boeing-saying-737-max-should-never-have-been-approved>

²⁰ *Id.*

²¹ *Id.*

²² Levin, Alan. "Aircraft regulators will join forces to restore Boeing 737 Max to service." *Los Angeles Times*, June 28, 2019. Available at: <https://www.latimes.com/business/la-fi-boeing-737-max20190628-story.html>

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²³Annex V to EU Regulation 216/2008, now replaced by Annex VI to new EASA Basic Regulation (EU) 2018/1139.

²⁴As recognised by the 40th Session of the General Assembly of the International Civil Aviation Organisation (ICAO) which endorsed the Global Aviation Safety Oversight System (GASOS) to make more efficient use of the resources available to regulators.



Beyond the Milan and the Germanwings Accidents: How transport industry can mitigate the safety hazard related to psychopathology¹

*Paola Tomasello**

Abstract

In the light of recent transport incidents and accidents, this paper proposes to include the study of mental health as a new topic for Human Factors in transport. A comparison between the Germanwings flight and the Milan bus critical events is carried out. The comparison demonstrates that the social dangerousness, potentially linked to a psychopathological condition, of the so-called “insider threats” (namely people employed in the transport organization and willing to harm it from the inside) can be considered as a new safety hazard for the transport industry. Recognizing the existence of such hazard questions the current human factors approach, traditionally studying the human operators as if they simply were “cognitive envelopes” and disregarding any topic related to mental health’s influences on human performance. The implicit assumption considers such “cognitive envelope” as an object, always and by definition placed in healthy people, neither suffering from any temporary or permanent psychopathological condition nor taking any medication for treating those conditions. Such approach has not only produced stigmas towards mental illness but has also left uncovered some holes in the transport organizations’ barriers against critical events. The recent European Regulation 1042/2018 is mentioned as a first attempt for building proper barriers against the safety hazard related to the social dangerousness linked to mental illness of insider threats in the aviation domain and establishes mandatory requirements for psychological assessment, monitoring and support programs. The author hopes that this direction will be followed up by other transport fields, to be specified both at regulation and at praxis level.

Mental health: the forgotten topic for Human Factors in transport

The Human Factors for transport safety have been focused on the specific and specialist branches pertinent to each of the four interfaces of the central liveware (the human) with the other components of a safety-critical system (software, hardware, environment and the other livewares)^{1,2}.

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¹Psychopathology and mental illness are used as synonyms in this paper.

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In this framework, all interactions have to be explored starting from the central human component (Figure 1). Therefore, any interaction represented in the model is considered as a “human possibility”, while any mismatch between the central LIVEWARE and any other component is considered as always leading to a source of human error³.

Traditionally, topics of scientific investigation related to the central liveware dimension were: error, performance, cognitive processes and communication with others. The assumption here is that the central liveware always deals with the cognitive processes of a “mentally health” person, namely a person neither suffering from any temporary or permanent psychopathological condition nor taking any medication for treating that.

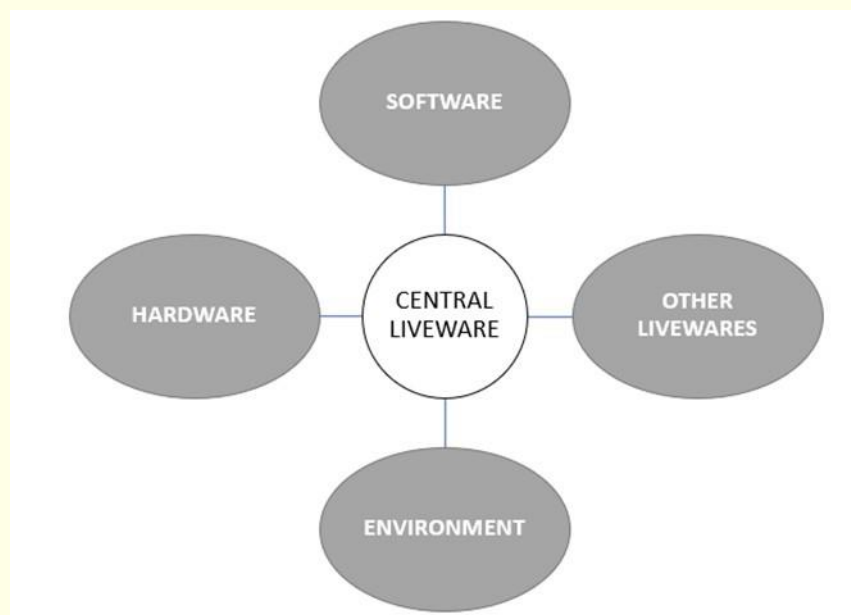


Figure 1 - Components of a safety-critical system²

However, recent events such as the Milan bus incident and the Germanwings flight accident demonstrate that transport industry can no longer pretend that mental health and psychopathology are not part of the key human factors to address for maintaining safety⁴, and must start to address the issues related to the social dangerousness potentially linked to an adverse mental state⁵.

A socially dangerous individual is defined as having the potential to commit an offense⁶. Within an organization, a socially dangerous individual may become an “insider threat”. An insider threat is an individual who is employed by an agency and has legitimate access to facilities, sensitive information, organizational data, information systems and other equipment and abuses of these permissions to harm the organization. At psychopathological level, insider threats may mainly show antisocial behavior, that may be linked to bipolar disorders and/or borderline, antisocial and narcissistic personality traits⁷.

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Four reasons why the Milan and the Germanwings accidents are similar

On the 20th March, in the countryside nearby Milan (Italy), a bus driver, Ouseynou Sy, hijacked the bus he was driving, with two groups of young students onboard⁸. He poured gasoline over inside the bus and ordered the teachers to tie the students' wrists with zip ties for electricians, while screaming nobody would get out of there alive. Sy has been holding all passengers hostage for 40 minutes, until the Italian Police intervened. Thanks to this prompt intervention, luckily all the passengers survived the dramatic misadventure and nobody was severely injured. But it will take time for all of them to manage the post-traumatic stress effects.

After being arrested, Sy declared he wanted to protest against the dramatic deaths of migrants in the Mediterranean Sea. The Italian Public Prosecutor stated that his action cannot be categorised under the radicalised context of the organised Islamic terrorism, but it rather appears as an individual criminal initiative⁸.

Someone may have recalled the Germanwings flight 9525 accident, occurred on the 24 March 2015: in that dramatic event, the plane, carrying young people, vacationers and others and flying from Barcelona to Düsseldorf, crashed in the foothills of the French Alps, after an eight-minute descent from 38,000 feet. Everyone on-board sadly died. Safety investigation results showed that the co-pilot, Andreas Lubitz, deliberately caused the plane crash by inputting into the Flight Management system the collision course towards the hills⁹.

Without prejudice to the differences, four analogies between the two events may be identified: on duty crime execution; lack of organizational controls for mental fitness for duty; premeditation; lack of mental health support programmes.

They are all described as follows.

- **On duty crime execution:** in the framework of the story of Andreas Lubitz, it is possible to trace back the indicators of a kind of hostility towards Lufthansa (owner of Germanwings), likely due to the concern that they would not renew his pilot license⁹. On the other hand, it is still not clear why Sy decided to commit the sabotage while on duty, namely if there are any links between the protest and the willingness to strike back at Autoguidovie, the bus transport company where he was employed as bus driver. Nevertheless, both Lubitz and Sy represent a threat coming from the inside of the transport organization and call for a more detailed reflection of the current approaches to transport safety. Such approaches traditionally set up mitigation measures for hazards related to external killers: but what if the killer is already inside the cockpit?
- **Lack of organizational controls of mental fitness-for-duty:** there was evidence that Lubitz had undergone psychiatric treatment in specialised centres in the past and that his employer was aware of that⁹. Similarly, the Milan incident investigations revealed that Sy's history includes two criminal records. Similarly, the Milan incident investigations revealed that Sy's history includes two criminal records. The first dates back to 2007 and relates to the suspension of the driving license due to drink-driving; the second dates back to 2011 and is related to sexual abuse of children⁸. How was it possible for Sy and Lubitz to

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get and keep the driving license despite a certified psychopathological condition, on one hand, and criminal records, on the other hand?

- Premeditation:** Sy had been planning the kidnapping for a while and “wanted the whole world talking about this story”⁸. Lubitz several times before the crash said his name would have been remembered worldwide⁹. In this light, both Sy’s and Lubitz’s actions can only have been deliberate and the two accidents could be seen as a result of an intentional violation of safety rules and procedures, conceived to cause harm¹⁰ and potentially linked to the presence of a mental illness condition. It is out of the scope of this paper to attribute a psychopathological diagnosis to Lubitz and Sy; nevertheless it could be worthwhile taking their stories as a starting point to understand how it could be possible to mitigate the risk of transport incidents or accidents associated to a social dangerousness condition derived from a psychopathological disease in the front line staff. In this light, is it possible to predict the social dangerousness level of a person suffering from psychopathology? In fact, despite the motivations were different (related to socio-political issues for Sy; to corporate policy issues for Lubitz), in both cases there still is a dysfunctional relationship between the anger (not unlawful and unacceptable as such) and its transformation into hostility in the form of crime planning and on-duty execution (definitely illegal and unacceptable). The emotional expression and regulation lays at the borders between mental health and psychopathology: what is pathological is not the emotion as such, but some dysfunctional ways of reacting to it.
- Lack of support from the working environment:** there is evidence that neither Sy nor Lubitz used any informal peer support or formal peer support program. According to the official Report of the Germanwings accident⁹ p.91, “no record was found that Andreas Lubitz sought any support from peers, for instance through the Mayday foundation or the Anti-Skid programme, although they are available to Germanwings pilots. It could not be determined clearly why he did not use any of these programs. His lack of confidence or knowledge of how they worked, along with his probable fear of losing his privileges to fly” as well as of the stigma for seeking mental health assistance, “may have prevented him from using these programs”. Peer support programs are available in many transport organizations, especially in aviation. They are designed and implemented by trained peers to detect and manage high stress and psychological discomfort. But what if stigma is attached to mental illness and any self-disclosure may become a bridge towards the loss of support and recognition by colleagues?

The lack of organizational controls for mental fitness for duty and the lack of mental health support programmes within the working environment represented, in these cases, specific holes within the transport organisation’s barriers to protect the safety of passengers.

*AVIATION***Stigmas**

In the opinion of who writes this article, these holes have been generated, among the other factors, by the following false assumptions on mental illness:

- No mental disorder can affect a front-line transport operator. As a consequence, any kind of psychological discomfort, from the least to the most severe, has the potential to be considered “nonstandard” thus being object of shame and guilt;
- Mental illness is always linked to abnormal behaviour. As a consequence, all mental disorders are assumed to be easy to detect in the working environment;
- All mental disorders are assumed to be dangerous for transport safety and therefore leading to loss of license;
- People suffering from a certain mental illness are assumed to be always able to recognize their discomfort, seek for help and self-declare their decreased mental fitness, in the same way as one would do for decreased physical fitness.

Scientifically speaking, none of these assumptions is true¹¹. Nevertheless, they still convey stigmas and deeply influence the definition of safety requirements, working practices and organizational processes. In fact:

- there are currently no communication and training campaigns to modify the trivialization attitudes and stigma towards psychopathology within the transport community;
- the topics related to mental health and psychopathology are not included in the curricula for transport professionals;
- target training courses concerning mental health and safety are missing in the standard programmes of Human Factors and Safety courses for safety professional profiles in transport organizations;
- no standards for the assessment of the mental fitness for duty are available when people with a history of psychopathology are concerned;
- reinstatement and reorientation career paths, including socio-economic mitigation measures to be followed after loss of license due to psychopathological issues, are missing as well.

This explains why people experiencing a psychological discomfort may tend to hide it, due to the concern of being object of shame and lose the privileges of their license; at the same time, it also explains why organizations have being tended to consider the relationship between mental health and safety as a “non-problem”, due to the assumption that mental illness cannot belong by definition to any front-line professional profile.



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Are all mental illness conditions a threat for loss of license?

It cannot be assumed that all mental disorders are hazardous for transport safety and lead to loss of license¹².

First of all, people suffering from serious mental illness (psychotic spectrum) generally present discernible symptoms, as for instance hallucinations, delirium and extreme social withdrawn, that would hardly escape the attention of a professional certifying officer and, as a consequence, hardly obtain a pilot-license. For this reason, what is worst from a psychopathological point of view cannot be considered as the most hazardous for safety.

On the other hand, all the mental illness conditions belonging to the so-called nevrotic spectrum are generally recognized by the person suffering from them, who generally seek for help. These conditions are not featured by abnormal behavior and are usually not dangerous for transport safety. Instead, they can be temporary and recover after a proper treatment.

On the contrary, all the mental disorders belonging to the so-called borderline spectrum¹², namely at the borders between mental health and serious mental illness, may result invisible to poor structured psychodiagnostics monitoring protocols, in terms of tools and frequency of administration. This happens because people suffering from this syndromes: i) keep maintaining unaffected one or more relevant areas of everyday life, as for instance the care of themselves and the working area; ii) either do not recognize their own disease as a symptom (and, as a consequence, do not communicate it as such) or consider it as acceptable, if not even just, and, as a consequence, keep hiding it until they have the possibility to publicly show its effects (this is probably the case of Sy and Lubitz). Indeed a certain impulsiveness and the proneness to hazardous behaviours, as well as a kind of tendency to hostility, are typically present in the mental disorders belonging to the borderline spectrum. These disorders are the most hazardous for safety: on one hand, neither immediately visible nor disclosed by the person suffering from it; on the other hand, at high risk of damaging behaviours.

So, the matter at stake is not the presence of a mental illness condition as such, but the level of social dangerousness associated to that condition and the risk related to the lack of self-declaration of decreased mental fitness (Figure 2).

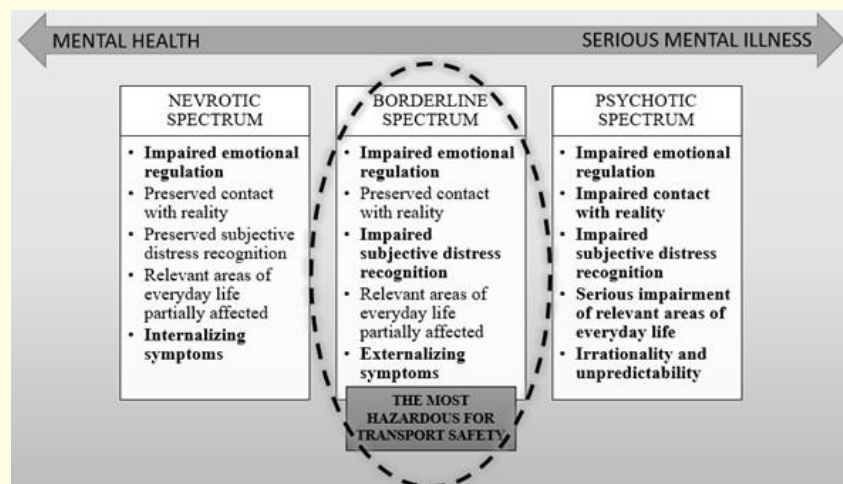


Figure 2 - Psychopathology and safety

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Andreas Lubitz was aware of his mental fitness decrease [9]. However, he did not seek any advice from the Aeromedical centre, nor did he inform his employer. The reliability of self-declaration of decreased fitness is weakened when a mental disorder pertaining to the borderline spectrum is concerned. This is the reason why the mental decreased fitness should not be treated with the same organizational controls that are used for the physical decreased fitness (for example, the obligation of self-declaration of decreased medical fitness when occurring in-between two medical examinations).

The European Regulation 1042/2018 and the new era of Human Factors

So, what controls can transport organization build against the hazard related to social dangerousness of insider threats? The question is not trivial if we consider that incidents/accidents due to insider threats are not “typical” incidents and accidents, because they break the natural assumption that drivers would do their best to ensure passengers’ safety and also break up the natural relationship of mutual trust between passengers and drivers.

Mitigation measures should be built above all against the safety hazard related to the lack of self-declaration of decreased mental fitness. Some suggestions may include (but are not limited to):

- the restructuring of the medical evaluation process for the release of the medical fitness certificate, when front-line operators, with a history of psychopathology of any kind, are concerned;
- the implementation of socio-economic mitigation measures for the financial risk related to the loss of license for medical reasons;
- the routine analysis of mental incapacitation events on duty, in order to identify areas of medical risk related to mental disorders;
- the implementation of psychological assessment and support protocols including care and career guidance;
- the implementation of support programmes to report and discuss personal and mental health issues within a just-culture oriented work environment.

The recent European Regulation 1042/2018 [12] establishes the requirements to mitigate the safety hazard related to social dangerousness due to mental illness of the flight and cabin crew members: psychodiagnostics assessment protocols and psychological support programs will be mandatory for airline companies soon. The Regulation broadens the scope Human Factors by including the need to address the mental health of the liveware dimension, thus delivering a message in which the safety of aviation operations corresponds to the health of professionals in charge of generating it.

The author hopes that this direction will be followed up by the definition of standard psychological assessment and monitoring programmes, and also taken onboard in other transport fields.

Keywords – Human Factors, Transport, Mental health, Psychopathology, Safety, Insider threat.

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Looking Further Into the Specific Case of the Public Direct Procurement by European Space Agency

*Sara Dalledonne**

As a peculiar example of ‘deviations’ from the common regulatory patterns of Procurement, ESA Direct Procurement is a significant achievement in the European Space industry. Thus, how does the European Space Agency discipline its Public Procurement Program, especially in relation to Procurement regulatory framework and Procurement policy at the crossroads between political mandate and industrial realities? With the intention to elaborate on that, to being with, I will give figures to the objective and peculiarities of ESA comprehending, among the other, its legal basis regulations and general principles; and the Industrial Policy of the ESA and the role played by Geographical Distribution. In addition, the ESA Procurement cycle from the Planning and Preparatory Phase to the Closure of the contract until the control of the execution of the contracts and the Debriefing of Unsuccessful tenders. I will underline the challenge pursued by the ESA programs, in particular, in relation to characteristics which cost and versatility. Finally, Review Procedure in the frame of the Agency’s Procurement cycle will be taken into analysis.

Introduction

With the purpose of fulfilling their institutional mission, International Organizations (hereinafter, IO) have a high dependence from third parties, private or public, with which they enter into contracts. The multiplication of the functions of the IO, often simultaneously to the development of their administrative bodies, the political and economic interests underlying the financing States and, finally, the impact of the economic crisis, have increased the number of resources employed through the contracts and, at the same time, have led to the emergence of disciplining administrative procedures aimed at regulating the Public Procurement activities of the IO. Consequently, during the last century, a legal framework of soft and hard law has been developed to find the right grade of balance between IO and private parties’ interests. Thus, the emerging set of rules is the direct consequence of an evolutionary process started with a non-proceduralized modality of administrative action and resulting in a more dependable process embedding both the unilateral exercises of authority already developed and a rather undiscovered contractual activity addressed to the private entities.

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Broadly speaking, various organizations carry out different types of procurement as the result of a nexus between the kind of IO on the matter, on the one hand, and the volume of the mandate pursued with the contract and the rules establishing its principles and governing its procedure, on the other. The result is differentiation in implications concerning the existence of Procurement, the volume, the nature and the structure of the administration in charge of its management. This is especially, but not only, related to the membership¹ which is highly important in relation to the nature of the rules applicable and their specific contents. One of the most fascinating cases between a transversal variety of large IOs with greater Procurement volumes and often with a developed apparatus is provided by the European Space Agency (ESA). It is a peculiar example of 'deviations' from the common regulatory patterns of Procurement which is crucial in the view of comprehending the differences in the dynamics and interests underlying the different types of Procurement.

Just as a preliminary remark, in the last four decades, Europe has reached a significant space power with an effective pooling of budgetary, scientific and industrial resources. This was achieved through the successful international collaboration with an ever-growing of member states and several associated and cooperating states through the development of an autonomous and intergovernmental platform that is the European Space Agency. The collaboration with the EU was probably slowed by the institutional divergences connected with the supranational and intergovernmental nature. The Framework Agreement between the European Community and the European Space Agency, Official Journal of the EU (OJ) L 261, 6/8/2004, was a momentous achievement with the goal of developing the overall European Space Policy by establishing a framework able to provide a basis for efficient and mutually beneficial collaboration with appropriate operational arrangements².

Objective and specificity of ESA Procurement

The ESA is, in substance, an IO with a single main goal which is the successful exploration of space. This specific mission is prioritized over all the other activities. In accordance with that and with the features of the space market in mind, the principal object of the ESA Procurement is to avail of it as a significant instrument of industrial policy. The correlated aspiration is the development of a space industry in the European area that is able to satisfy the necessities of the ESA's space programs. Even though the various political interests of the Member states that need to be balanced and the casual observer in the process, the outcome is an organization capable of creating a framework where the setting up of the space programs are in a highly dynamic fashion. The market for the space industry itself is importantly shaped by Public Procurement rules. They assure competitiveness in the global market and improves and guarantees the sustainability of the European space industry. Given the total budget of ESA of 5.72 Billion in 2019 which is for the 90 % spent in procurement, it is clear that this activity is much more central than in any other IOs.

LEGAL BASIS ESA PROCUREMENT FRAMEWORK

The ESA's Public Procurement system is a “self-standing regime³” that means it is not associated with any legal structure or with the EU's legal framework on Public Procurement⁴. ESA's Procurement rules and principles are mainly laid out in the **ESA Convention**, in its **Annex V**, in the **ESA Procurement Regulations** (ESA/REG/001 rev. 5) and their **Annexes** (implementing instructions) aiming to regulate the procurement for the execution of the European Space Agency (ESA) activities and programmes. The intention was to set up a modern-day Procurement Agency able to comply with the nowadays necessity which Transparency, Fairness, Equitable treatment, and better Cost Control.

Fundamental is mentioning the purpose expressed in the Article II of the ESA Convention “*to provide for and to promote, for exclusively peaceful purposes, cooperation among European States in space research and technology and their space applications, with a view to their being used for scientific purposes and for operational space applications systems*”. These objectives are explicitly stated in Article VII of the ESA Convention saying “*The industrial policy which the Agency is to elaborate and apply shall be designed in particular to (...) improve the worldwide competitiveness of European Industry by maintaining and developing space technology and by encouraging the rationalization and development of an industrial structure appropriate to market requirements (...)*”. They are translated into different activities and will be analyzed partly among the article.

Procurement is mentioned in the Convention not in its own right, but just as an auxiliary ESA tool for effectively carrying out Industrial Policy. This competence is viewed in the context of the agency's main goals enunciated in Article II and specified in Article VII, paragraph 1, when is expressed that “*The industrial policy which the Agency is to elaborate and apply shall be designed in particular to (...) (d) exploit the advantages of free competitive bidding in all cases, except where this would be incompatible with other defined objectives of industrial policy.*”

Following the ESA Convention, the “Industrial Policy” area is dealt with in the **Annex V**. It gives shape to the relationship between the executive branch and the legislative branch of ESA and “subjects Procurement actions above certain threshold values to prior approval”. Meanwhile the former is headed by the Director General, the latter is formed by the Council and its subsidiaries such as the Industrial Policy Committee (IPC). The Annex elaborates on the implementation of the Industrial Policy specifying that it is to be overseen by the Council and, in Article III, that “The Director General shall, at an early stage in the contract action and before invitations to tender are sent out, submit for the approval of the Council his proposal on the Procurement policy to be followed.” Furthermore, Article II (3) outlines the discretionary competence of the Director General to order cost and rates audits and audits to determine the company's compliance with the nationality requirements. In addition, it contains numerous provisions on the option of the domestic preference principle and on the *juste retour*. The former can be derogated both by the ESA's main decision-making body (the Council) and by a second modality of exception embed in the ESA Contracts Regulation which is based on “no other way of satisfying the requirements or where unacceptable delay or cost would result from not doing so”. Meanwhile, Article IV defines the State's overall return coefficient.

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In addition, to implement the procurement principles outlined in Article VII of its Convention and its Annex V, **ESA Contracts Regulations** have been adopted in 1982 for the execution of its procurements. It established a certain number of procurement techniques and practices and considered an acceptable standard embedding basic international Public Procurement principles. Such techniques and mechanism were internationally recognized and comprehended, just to mention some, frame contracts, two-stage Procurements, calls for opportunities; best practices, co-funding, EMITS, EFIS.

ESA Contracts Regulations grew by the necessity to accommodate certain programs' specificities, the development of the industrial environment; the evolution of information technologies and facilitate the collaboration with European Institutions, Grants, Galileo, GMES and so on.

At the international level, the evolution of the regulatory framework in International Public Procurement Rules has been achieved through National authorities, IOs, and the EU. It has happened outside the ESA environment, especially through the Agreement on Government Procurement (GPA) by the World Trade Organization (WTO), the Public Sector Directive 2014/24/EC by the European Union (EU) and the Model Law on Procurement of Goods, Construction and Services by the United Nations Commission on International Trade Law (UNCITRAL), OECD Council's recommendation of October 2008. Simultaneously, inside the ESA, it has been verified the implementation of new procurement techniques in the ESA context on an ad hoc basis. Both in and out developments have brought to the necessity of real incorporation of those understanding. Council adopted in December 2008 the "**Procurement Regulations**" (ESA/REG/001) and their Annexes with the objective, first and foremost, of elaborate on the regulation for the execution of the ESA Procurement activities and programmes as demanded by the ESA Industrial Policy, modernize and promote further self-assurance in the procurement process and enable the right grade of cooperation between ESA and external partners such as the EU. The Procurement Regulations embed VII Parts and six Annexes which shall cover the internal instructions necessary for their implementation. Among these Implementing Instructions, very important to mention are the General Conditions of Tender for ESA Contracts; the Tender Evaluation Manual; the Procurement Review procedure. To comply with the necessities of the contemporaneous panorama and to establish a modern Procurement Agency, the ESA/REG/001 has arrived in July 2019 to revision five.

Furthermore, the General Clauses and Conditions for ESA Contract and the Industrial Policy Committee (IPC)⁵ Terms of reference are other instruments of implementation of the ESA Convention.

GENERAL PRINCIPLES OF THE ESA PROCUREMENT APPROACH

The ESA Convention with its Annex and the ESA Regulations are the core documents giving shape to the rules governing ESA Procurements and laying out both the principles and the practical sequence of actions for the ESA Procurement process. Going further, it is the Procurement Regulations that establish some fundamental principles already proper of the International Public Procurement and add some principles proper of this specific organization.

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Frames as rules of interpretation, Article 10 of the Procurement Regulations sums up the general principles of ESA Procurement which, in particular, the value of transparency and fair and equitable treatment of all economic operators, the improvement of worldwide competitiveness of the European industry by maintaining and developing space technology (competition), the cost-effectiveness of national space programmes, (economy and efficiency of the Agency's resources), the equitable participation of Member States in the financial contributions and the endorsement of genuine competition with grant preference to Member States' industry; the exploitation of free competitive bidding in every case, except where there is incompatibility with the other targets set in the industrial policy. Even though it has been repeatedly indicated that there is no hierarchy between those objectives the reason being that the ESA Convention does not prioritize any of the above objectives, special mention needs to be guaranteed at the free competitive bidding principle. Free competition is "an all-encompassing ideal type for a procurement system and for market functioning in general and as such leaves little room for any other policy objectives"⁶. Furthermore, intending to assure the fairness of competition, especially between Prime Contractors and Subcontractors, the Agency has implemented measures such as the "Best practices For the Selection of Subcontractors by Prime Contractors in the frame of ESA's Major Procurements" and the "ESA Industrial Ombudsman". In relation to the former, it can be applied in the frame of any competition and not only to the Major Procurements (such as space or ground segment) independently from its nature or magnitude if so required and adequate for achieving the principle of fairness of competition. The latter is in charge of monitoring the application of prevailing principles such as transparency, impartiality and non-discrimination in the ESA Procurements. In addition, the ESA Industrial Ombudsman can be contacted with three different situations which the Best Practices for the selection of subcontractors by Prime Contractors in the frame of ESA 's Major Procurements; the Contractual matters between economic operators; and the Review procedure defined in the ESA Procurement Regulations elaborating on the free competition principle. As a consequence, it has the preference for the applicability to ESA contracts of the general clauses and conditions with the exception where these conditions are explicitly waived. Besides, the predilection of placing contracts at fixed prices or the conversion of a ceiling price into a fixed price in the shorter time possible when the first option is not possible. If the latter is still impracticable, the contract can be placed on a cost-reimbursement basis. Just as a specification, the contracts incorporating the last two price modalities are subject to cost-control measures.

INDUSTRIAL POLICY OF THE ESA AND ROLE PLAYED BY GEOGRAPHICAL DISTRIBUTION

The specificity of ESA's set up as an IO is due to the specificities of the space market. The predominance of ESA as a customer of space goods and services implies its dependency on Public Procurement as an essential part of the governments' instrument in order to promote key industries. It is an important structural factor in the space industry landscape. Therefore, it can be used to greater effect as policy tools. As mentioned before, extracts from ESA Convention relating to **Industrial Policy** is the Article VII of the ESA Convention which includes in the principal goal of ESA Procurements the one "to increase the competitiveness of European industry on the international market". The whole ESA Procurement approach aims at "developing the capacity of European industry to enable it to react to the market demands in the most efficient and the most economical way".

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Broadly speaking, the ESA Procurement is an industry-driven and oriented process. In more details, the design of a specific procurement system takes into account the elements relating to the nature of the space industry and the space market. Differentiating from other procurement situations, every divergence from accepted industrial and competition policy it may require must be sufficiently justified by sound economic reasoning and proportionate.

Even though the ESA Convention does not contain a definition of the term “industrial policy”, it has always embedded industrial policy as a fundamental part of its mission declaring so in its Convention, several ESA Council resolutions, specified rules for the optional programs and, moreover, the Implementing Instructions by the Director General to the Procurement Regulations, the General Clauses and Conditions, Corporate Policy and several internal documents.

The ESA Procurement system has been a cornerstone of its industrial policy: first and foremost, ESA’s industrial policy is designed to allow the agency to develop a space industry in Europe and carry out its scientific agenda. The IO on the matter is an intergovernmental research organization where, as a based structured, the Council (delegate bodies) gives mandate to Director General and, subsequently, each member state contributes to costs of activities and programmes in accordance with a scale adopted by Council.

On the premise that the ESA Programmes are characterized by the bipartition in mandatory and optional activities, as a specification, on the one hand, the base package of mandatory programs (which includes space science programs and the general budget) is funded with financial contributions of all the Member States sized proportionally to their Gross National Product and, in addition, with voluntary contributions. On the other hand, some optional programs may be carried out by individual countries⁷. Given this approach, the ESA has found the manner to guarantee the willingness of member states to contribute to the financial viability not only by relying on the obvious rationale of being able to undertake more ambitious projects in space but also ensuring to the member states something in return for their contributions. In correlation to that, ESA Convention at Article VII states that “*to ensure that all Member States participate in an equitable manner, with regard to their financial contribution, in implementing the European space program and in the associated development of space technology*”. In particular, the Agency tries to answer this problem with a significant measure of the ESA complex Industrial Policy mentioned in its Conventions which is the set of rules relating to the geographical return principle⁸. It can appear as a modality through which international competition is distorted.

The **geographical return principle**, also called “fair return” or “geographical distribution”, is a constantly evolving mechanism which plays a key role in the intergovernmental setup of the ESA, in ESA Industrial Policy and therefore in ESA Procurement. Regarding the differences with the EU Procurement rules which applicable to a certain extent when the activities are funded by EU, a status quo was defined in Article 5.3 of the Agreement Framework saying that “*the European Community shall not be bound to apply the rule of geographic distribution contained in the ESA Convention*”.

In the case of ESA Procurement rules, the superior objective of having adequate and guaranteed funds to support space missions has led the Agency to create a detailed technical system which measure and control the financing-return ratio⁹.

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In this regards, the central element of this system is the feature of nationality: as a rule, “the Agency shall, for the execution of its programs, grant preference to the fullest extent possible to the industry in all Member States, which shall be given the maximum opportunity to participate in the work of technological interest undertaken for the Agency”¹⁰. Through this mechanism, member states link their funds to a certain return in terms of awarding procurement to domestic companies. The principle on the matter represents a peculiar tool for goals such as European integration and national investments. Meanwhile Article IV of Annex V¹¹ contains the specific elements of the equitable participation of States according to the geographical distribution; Articles V and VI elaborate on the procedural issues. The assurance that the procurement decision will take into consideration the nationality of the companies in the right manner is guaranteed through a two-step process which includes an ex-ante registration process and an ex-post check on the nationality requirement.¹² Among this bipartite process and following the criteria laid down in the ESA Convention, it may be requested audits in the case of incertitude related the nationality declared by the company. Finally, the examination of the legal bases of the industrial return system as it operates at the ESA shows as it is a crucial feature helping to assure the ESA's successful functioning. Even though the jeopardy of undesirable implications is visible and should lead to the constant development of both this principle and its implications.

THE REQUIREMENTS TO PARTICIPATE

Another further perspective under which this topic needs to be analyzed is the **requirements to participate in ESA Procurement**. First and foremost, as a fundamental rule, ESA Procurements is open to all economic operators of the Member States or the Associated Member States involved in the concerned programs. Bidders from the non-participating Member States are allowed to bid only in a restricted number of cases and exclusively if registered in the ESA List of Potential Suppliers. Then, as already mentioned, even though competition is the rules, restriction of economic operators allowed to present an offer can be based on exceptions depends on the nature of the procurement or on specific reasons. In a limited number of programs, it is applied an even more limited rule of participation which is the case where potential bidders are invited by the Invitation to Tender (ITT) or Request for Quotation (RFQ). It has the intention of verifying the precondition of whether the correlated National Authority is able to financially support the activity in question before preparing an offer. Besides, as broadly explained above, in the hypothesis of Major Procurements, namely satellites or launchers, the industrial policy and geographical return mechanism “limit in practice the procurement of some key activities to economic operators of these States and in some cases even to one of them only¹³”. In other cases, limitations can be the consequence of “ESA approved policies setting specific measures for the development of a level playing field for equipment suppliers or from measures in support of SME and R&D entities¹⁴”. All the detailed information related to the rules of participation applicable to a specific procurement are included in the Invitations to Tender (ITT) and between them also the specification regarding the case of exclusion from consideration by ESA. With the purpose of avoiding the related effort and cost that the preparation and submission of an offer required, it is essential that Potential bidders carefully check and observe these rules and request clarification in case of doubts.

ESA Procurement Cycle and the Debriefing of Unsuccessful tenders

As defined in the Convention and the Procurement Regulations, the ESA has designed a **Procurement cycle**, ensuring the top-grade compromise between the objectives of technical excellence, economy, and industrial policy. Detailed information related to the phases of the procurement process is available in Annex III of the Procurement Regulations and, especially, the Tender Evaluation Manual. It is an operation aim to the activities to be procured and performed by technical initiating services supported by other Agency services, in particular, the Procurement Department. Looking at the technical side, the key person in ESA's Procurement procedure is the figure of the initiator¹⁵ who has the responsibility, and the budget, to handle the Procurement(s). The activities to be procured are part of a planned range of activities for a general budget program, or an optional program.

The implementation of the normal method of procurement for the placing of contracts is a competitive procedure conducted in complete fairness and with offers which will be evaluated with the greatest care and total impartiality. The classical competitive tendering constituted by the Invitation to Tender (ITT) can be waived giving way to the Request for Quotation (RFQ) process. In any case, the former provides the possibility to restrict the number of economic operators to at least three, and if not, the restriction should be justified. Thus, ESA applies in its ITTs different methods which are, as the most commonly utilized in practice, the open competitive tender, the most appreciable, the restricted competitive tender (or negotiated procedure)¹⁶ and the non-competitive tender. Furthermore, the functional view of the procurement cycle comprehends a practical sequence of actions which in a chronological view is constituted by the Planning and Preparatory Phase; the Initiation Phase; preparation of the Invitation to Tender (ITT) or Request for Quotation (RFQ); distribution of ITTs/ or RFQs; the Tendering Phase including the Preparation and Submission of an Offer; the Admission and Evaluation of Offers; the Award and Placing of Contracts; and, finally, the Debriefing of unsuccessful Tenderers. It is governed by the provisions of the ESA Tender Evaluation Manual.

RELATED ASPECTS OF THE CONTRACTS PHASE

Going into details, different are the **types of contracts** placed by the Agency. They can commonly be classified according to factors such as economic and technical importance, nature, type of price, but because the borderline between important purchase orders and small contracts is often challenging to define accurately, the procedure that should be applied is decided in a close collaboration between the Procurement services and local Purchase Offices in ESA establishments. ESA places a wide range of contracts: study contracts, research and development contracts, supply contracts for hardware and software, maintenance contracts, operations contracts, Maintenance and Operations (M&O) contracts, technical assistance contracts and so on. Furthermore, on the premise that the object of the contract is often demanding high-technology and long-time-period major development contracts, the Agency has established in the cycle a “phased contracting approach” including a Feasibility Study (Phase A) and a the Study Phase (Phase B1). In addition, the Annex II (“Classification of prices”) related to the General Clauses and Conditions for ESA Contracts” and Annex I, “Determination of Industrial Rates and Cost Control”, depicts the multitude of contract price types (fixed-price contracts; ceiling price contracts to be converted into fixed-price contracts; cost reimbursement contracts) and contract types used by the Agency.

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In the case the Agency is likely to have an important and continuous amount of business and, thus, a plurality of analogous procurements placed with the same company or group of companies, ESA has developed an alternative procurement approach named “frame contract” which is a global agreement with a company or group of companies on the largest possible set of standard contract terms, management and financial conditions the reason being reducing formality and procedure between them.

In relation to the area of the **General Terms and Conditions**, organizations such as ESA where it performs an institutional public interest function or technical activities with contracts with a high sensitiveness and complexity of the goods, services and work, uses an approach that can be described as strict: “the determination of the content of all the main contractual clauses is deferred to the organization, and participation in the bidding requires express or de facto acceptance of the contractual conditions set out in the call for tenders¹⁷”. In details, the ESA determines a body of specific provisions concerning copyright and establishes special conditions in order to identify the applicable law which are the result of a joint determination by the parties. ESA contracts usually utilize the applicable law of the country in which the supplier is incorporated established and, accordingly, the applicable substantive law is as a matter of fact decided by the supplier, to the extent that it is in nexus with the country in which the company is established. Moreover, the ESA in the majority of the cases incorporates in the contracts a specific clause for which the law of the state of the private contractor is applicable. The role of the state law is residual in relation to those aspects or clauses not covered in the contract or ambiguous and needed of interpretation. It is always subject to the laws that protect the prerogatives of the IO.

Furthermore, the procurement process does not end when the contract has been signed by both parties, but it is subject to a number of controls and monitoring techniques of the execution of the contracts in full compliance with its agreed terms (technical specifications, time schedule, price, etc.) and the closure of the contract. More into the details, once a complete and clear contractual baseline has been achieved, any change of that need to be subject to a formal change procedure, the modalities of which are defined in the contract.

The Project Controllers of the ESA organization and a qualified Project Controllers both in-house and for the work subcontracted to other companies (highly recommended) have the responsibility to check that the time schedules and economic progress established to meet the project control requirements. The ESA’s contracts may comprehend a “Penalty Clause¹⁸” or “Delivery Incentive Provisions” for contracts concerning major projects. In the case of applicable penalties, advance notice of a potential delivery slippage should properly be given to the Agency representatives, the reason being initiate the related discussions. Moreover, in relation to the aspect of the arbitration, the general terms and conditions of the ESA illustrate the coexistence of rules from different levels of government: “[I]f no other arbitration is foreseen in the Contract, any disputes arising out of the Contract shall be finally settled in accordance with the Rules of Arbitration of the International Chamber of Commerce (ICC) by one or more arbitrators appointed in conformity with those rules. Conduct of such proceedings shall be in accordance with the ICC rules in force at the time arbitration is requested by either of the Parties. The enforcement of the award shall be governed by the rules of procedures in force in the state/country in which it is to be executed¹⁹”.

DEBRIEFING OF UNSUCCESSFUL TENDERS

The last phase of the ESA Procurement Cycle is the “**Debriefing of Unsuccessful tenders**”. On the premise that in procurement procedure the number of losers is almost invariably higher than the winners and that ESA space industry has a high degree of dependence from the other institution supplier pairings, it is of prime importance for both ESA and supplier to keep relations intact after a negative procurement decision. Thus, ESA has a system whereby, normally, any unsuccessful tenderer is informed by written notification immediately after the decision of awarding a contract has been taken (signature of COA2)²⁰. In case of doubt concerning the success of the final round of negotiation, the Agency can delay the notification, thus avoiding long periods of uncertainty for tenderers. The notification contains their non-selection with a summary report of the findings of the TEB. Furthermore, subsequent to the notification, unsuccessful tenders may request an oral debriefing through video conference or a meeting with the Contract Officer²¹. The totality of the information collected during this phase will result helpful in the goal of ameliorating the quality of their tendering, especially if newcomers, and to identify the required improvements necessary in subsequent tenders to the Agency²². In this overall process, the unsuccessful Tenderers will obtain through the notification and the debriefing, information confined to the merits and shortcomings of the tender in question (regarding also the evaluation of each criterion of the ITT and RFQ) and not on the quality of the other tenders²³.

CHALLENGE PURSUED BY THE ESA PROGRAM

A constant concern in ESA Public Procurement program is the **challenge of keeping schedule and cost**. A significant risk in ESA Programmes is related to the management risk and the fulfillment of a fair distribution of margins through the industrial chain. The ESA action is generally based on four pillars which are (i) Increasing early technological investments, especially in innovative areas (ensure that innovative SME's, non-Primes, independent suppliers can contribute in early Phases to critical technology areas); (ii) Improving Project Reviews Processes; (iii) Fostering project management capacities and tools; and (iv) Optimizing industrial consortium building. On the other hand, another significant challenge that ESA needs to face is related to the features of agility and versatility. It is now clear that procurement represents the channel for ESA to implement mandate from member States. It is a combination of multidisciplinary skills that broadly surpasses the concept of process. At the crossroads between the political mandate and industrial realities, ESA Procurement aims at being a flexible tool, integrating more realities than the ESA one only. To conclude, ESA Procurement is in a constant state of evolution and is and has been subject to different developments. The implementations of the crucial round of updates were started from the Ministerial Council in The Hague at 2008. The key measures in the reform were the optimization of the existing system with the purpose to improve the functioning of procurement in accordance with the ESA necessity and a rapprochement to internationally accepted Procurement practice.

In particular, among the other, the measures concerning the former include the reduction in size of the Core Team, to be specified in the Procurement Proposal and to be voted by the IPC; the increase of competition at all levels; a balanced participation of economic actors through the use of the C1-C4 clauses; the introduction of Product Policy and Product catalogue to increase reusability an interoperability,

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lower cost and risk; the introduction of Product Policy and Product catalogue to increase reusability and interoperability, lower cost and risk; the better cost control through risk management and the implementation of variable profit schemes; the increase of dependability of the ESA as a customer; the update of document relevant to Procurement which Procurement Regulations, tender evaluation manual, general clauses and conditions, best practices. Furthermore, during the successive years, a number of measures seem to indicate that the ESA was trying the rapprochement actively seeking to bring its Procurement system in line with the international and European Procurement practices; as an example, the possibility for procedural review procedure against Procurement decisions.

ESA Procurement Review Program

In addition, like any IO, the Agency, under the terms of Article XV of the ESA Convention and its Annex I, benefits from what is commonly referred to under international public law as Privileges and Immunities and more particularly, under Article IV of its Annex I, of immunity from jurisdiction and execution. For a long time, the ESA Procurement decision was immune to the possibility of appeal and, thus, final. Since the Agency spends the large majority of its annual budget through procurement, Member States decided in 2008 that the Agency's Procurement Regulations should be provided with a review procedure ensuring compliance with the right of an effective remedy and fair hearing under its Convention and Annexes, especially in the field of Industrial Policy. In 2010, ESA set up an independent and impartial administrative body and a three-level review system, which in some respects is analogous to that of the UN but aims more to protect the rights of the private subject and is more articulated and structured. With the object of providing tenderers with an adequate opportunity and effective procedure for review, the procedure was aligned on the internationally recognized Public Procurement practices and principles which are the WTO GPA and UNCITRAL Model Law on Public Procurement. The ESA Review Procedure may appear as a reminiscence of recognized practice of national and international Public Procurement known as "Right to Review", "Challenge Procedure", "Remedies" or "Protest Procedures."

This procedure was established by the Council upon recommendation of IPC and AFC in the Agency's Procurement Regulations ESA/REG/001, rev. 4, and its Annexes, namely Annex V and, Annex VI. Its last version is embedded in the Procurement Regulations ESA/REG/001, rev. 5²⁴. The Review Procedure in the frame of the Agency's Procurement cycle comprehends three incremental steps consisting in the Review by the Head of the Procurement Department (Art. 51 Proc. Reg.), Independent review by the Industrial Ombudsman for ESA (Art. 53 Proc. Reg.) and Independent Procurement Review Board (Art. 55 Proc. Reg.). The first of the three-tier mechanism with which the review starts are the submission of a claim to the Head of the Agency's Procurement Department and correlated decision related to the claim and the corrective measures. Where the Head of the Procurement Department does not make a decision, or the claimant disagrees with the decision, he can then challenge it and require an Independent review by the Industrial Ombudsman for ESA.

This body is composed of a member and her alternate, who are appointed every three years by the Council upon a proposal from the Director-General and must meet the requirements of independence and competence.

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The Ombudsman has the main function of making recommendations: after completing the necessary consultations and investigations, she forwards the recommendation to the head of the Procurement division and notifies the vendor. The head of the Procurement division then issues a written decision which is notified to the claimant and the Agency's Industrial Ombudsman. Finally, the third stage of the re-view occurs when the claimant decides to bring the matter before the Independent Procurement Review Board. The Board is constituted by four members proposed by Industry, Member States, Industrial Policy Committee Chair and ESA Director General and nominated by the Council of ESA. They are usually expert external the IO who have proven legal and practical experience in Public Procurement. They must meet detailed requirements of independence and operate with complete autonomy, without accepting instructions from anyone and without taking part in any other activities involving ESA. At the same time, however, they are financially compensated by the Agency for their activities. The procedure conducted by the Board allows the parties to be heard before a decision is made. The head of the Procurement division, the Industrial Ombudsman and the Board can also propose to the Director General interim measures to suspend the procedure. The final decision of the Board shall be final and binding and shall grant compensation for damages incurred due to a procedural breach of the Procurement Regulations by the Agency. The basic principles of this procedure are laid out in Article 55 of the Procurement Regulations and aim to ensure an effective, objective, and public possibility for review.

Thus, the ESA approach resolves problematic aspects related to “the requirements of independence of the review bodies, both from the administration and the states; the powers of the body with competence to pronounce the final decision include the possibility of granting interim measures and ordering compensation for damages; and economic operators participating in the tender procedure are accorded procedural guarantees²⁵”. This three-steps mechanism seems to create a hybridization between an administrative body and a judicial method: on the one hand, it saves the IO the costs of establishing a court, and, on the other hand, it provides to private subjects a more impressive mechanism which is capable of protecting their interests especially in comparison with those provided by other organizations higher-level bodies.

To sum up, the solutions adopted by the ESA, and the EU institutions, appear to be, among the different points of view, the most effective: here, the bodies deciding on complaints is composed of members who are appointed with a guarantee of independence and ample powers such as ordering compensation for damages, cancelling the award and ordering a revision of the procedure. Since 2010, four are the “ESA-Procurement Review Board Decision in Case”.

Conclusion

To conclude, the ESA Procurement rules result and adequate package to deal with the Industrial Policy, especially the considerations related to fair return principle, and the basic principles applicable in the space sector such transparency and equal treatment as determined in the ESA Convention. It is satisfactory for the main space projects that ESA is carrying out²⁶. From my point of view, the main area of debate concerns the relationship between ESA and EU: even though the two European bodies have a completely different background, they result to have complementary objectives and a common constitutional status which have the effect of bringing them in a closer working relationship.

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A perfect illustration of cooperation between them was undoubtedly the Galileo program matching the monetary funds and expertise and technological capability of both institutions. It becomes evident the necessity of creating a permanent partnership between the EU and ESA which is beneficial to both parties restricting the diversification of the participants in the joint space programs.

Firstly, on the premise that ESA is not a party to the WTO, the GPA may be an achievable escape to the conflict of ESA and EU Procurement procedures, particularly when the Member States are parties and therefore not allowing room for its rules to be applied in the joint large scale projects. A solution would be the join of ESA to the WTO becoming consequently a party to the GPA and making these rules applicable to ESA Procurement. With this option, the basic principles provided would bring a balance with the principle of fair return by leading to a genuine competition and participation of more tenders. Furthermore, the Seventh Framework Programme (FP7) “encouraged the development of new concepts in space transportation and space technologies and aimed to reduce the vulnerability of space-based systems and services²⁷”. The program promoted the working relationship with the ESA and other European entities but did not manage to provide with sufficient solutions of harmonization in the procurement sector. Taking into account the factual increase in the number of the large joint projects and building on the partial successes of the Seventh Framework Programme (FP7), aspiration of the new Framework Programme “Horizon 2020” is instead the achievement of a consensus on the industrial sector of legal basis for a coherent Procurement approach which will conduct to an innovative and competitive European space industry. Due to the financial flexibility and also encouraged by the advantages provided in the innovation areas of science and space exploration, several are the instruments that have been proposed for commercializing space sector (in particular, the Pre-commercial procurement). The entirety of the actions on the matter are supported by the research activities of the ESA, aiming at enlarging complementarity and improve coordination among these two actors. Where the traditional approaches are not sufficient to reach the aims, other instruments that aim to harmonize the divergence of ESA and EU Procurement rules in fields of industrial research are “joint initiatives”, “transnational consortia”, and “international cooperation”.

¹C. Archer, *International Organizations*, Psychology Press, 2001, p. 38 et seq.

²E. Sadeh, *Space strategy in the 21st century, Theory and Policy*, Routledge, 2013, p 13

³S. Kahn, *Advanced Technology Projects and International Procurement: The Case of the European Space Agency*, 12 Public Procurement Law Review 1993, p.13

⁴S. Arrowsmith, *The law of Public and utilities Procurement*, 359 Sweet and Maxwell, 2d ed., 2005.

⁵Following the - ESA, *Rules of Procedure of the IPC* (ESA 1660)

⁶M. Faix, *A Coherent European Procurement Law and Policy for the Space Sector: Towards a Third Way*, 2001, p. 53

⁷Hobe, S., Hofmannova, M., Wouters, J., *A coherent European Procurement law and policy for the space-sector, Towards a third way, Cologne Studies in International and European Law*, vol.22, Berlin 2011, p.10

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⁸On step back, focusing on the functioning, effects and the merits of the *juste retour* system, after examining the method of computing the return coefficient and its target values, the attention turns to the methods that guarantee that these targets are met which are diverse and can be preventive or corrective in nature: fair return or fair contribution; proactive monitoring of industrial return; inclusion of corrective measures from the outset; phased Procurement approach in long duration programmes; corrective measures after interim review; flexibility on the science programme; placing contracts by direct negotiating; subsequent adjustment on contributions.

⁹Smith, L.J., Baumann, I., *Contracting for space, Contract Practice in the European Space Sector*, p.89

¹⁰Industrial Policy and geographical distribution: https://www.esa.int/About_Us/Business_with_ESA/How_to_do/Industrial_policy_and_geographical_distribution

¹¹Furthermore, Article IV, Paragraph 2 and 3, ESA Convention elaborates on the ideal distribution of contracts placed by the Agency should have as an outcome an overall return coefficient of 1 in all Member States

¹²E. Morlino, *Procurement by International Organizations: A Global Administrative Law Perspective*, Cambridge University Press, 2018, p. 134

¹³See https://m.Esa.int/About_Us/Business_with_ESA/How_to_do/How_to_participate_in_ESA_Procurements

¹⁴See https://m.Esa.int/About_Us/Business_with_ESA/How_to_do/How_to_participate_in_ESA_Procurements

¹⁵It is nominated by his hierarchical superior (Director, Head of Department, Head of Division or Head of Section).

¹⁶The use of negotiated procedures in large-scale projects is justified by the situation of the European Space Industry and the very few transnational European groups active in the space sector.

¹⁷E. Morlino, *Procurement by International Organizations: A Global Administrative Law Perspective*, Cambridge University Press, 2018, p. 218

¹⁸ESA, Regulations of the European Space Agency, Clause 7 [ref. GT&CC]

¹⁹ESA, Regulations of the European Space Agency, para. 35.2 [ref. GT&CC]

²⁰It will receive it by the time the contract has been signed with the selected contractor.

²¹To avoid uncontrolled and/or endless discussion and/or arguments on the content of internal evaluation reports, the Agency do not provide written debriefs on the evaluation of offers. In addition, also the responsible Technical Officer in the debrief will be involved if appropriate, and he/she is.

²²In particular, it may prevent firms from losing evaluation marks through unnecessary and formal non-compliance's.

²³It is only authorized to debrief individual tenderers on their own offer and not to comment on the contents of other bids.

²⁴https://esamultimedia.esa.int/docs/LEX-L/Contracts/ESA-REG-001_rev5_EN.pdf

²⁵E. Morlino, *Procurement by International Organizations: A Global Administrative Law Perspective*, Cambridge University Press, 2018, p. 339

²⁶In particular, GMES and Galileo joint programmes.

²⁷See https://ec.europa.eu/growth/sectors/space/research/fp7_en



Implementing Regulation 2019/947/EU on the Rules and Procedures for Drones

*Anna Masutti**

*Francesco Mascolo***

The European Commission has recently adopted Implementing Regulation 2019/947/EU (hereinafter "Drone OPS Regulation") which will apply from 1st July 2020. It introduces new common EU technical standards and related administrative procedures for the operation of unmanned aircraft.

The original legal basis for the Drone OPS Regulation is Regulation 2018/1139/EU, adopted by the European Parliament and the Council on 4th July 2018, which defines common rules on the use of drones to allow their free circulation in the European common aviation area and establishes a European Union Aviation Safety Agency (also known as "New EASA Basic Regulation" or NBR). Specifically, article 57 of NBR authorises the European Commission to adopt implementing acts regarding rules and procedures for the operation of unmanned aircrafts.

The regulatory framework provides an operational-centric approach instead of an aircraft-centric one. In this direction, Drone OPS Regulation establishes different rules and procedures according to the nature and risk of unmanned aircraft operation, adapted to the operational characteristics of UAS concerned and to the characteristics of the area of operations (such as the population density, surface characteristics, the presence of buildings, and so on).

In addition, Drone OPS Regulation places drone operations into three main risk categories:

- 'Open', that prevents the lowest risk and does not need prior authorisation before operating the drone;
- 'Specific', that presents a higher risk and requires authorisation to operate the drone;
- 'Certified', that involves drones which could cause major risks and requires airworthiness certificate with the same requirements for manned aircraft.

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MISCELLANEOUS MATERIAL OF INTEREST

The new Implementing Regulation 2019/947 aim is to create a level playing field for all EU drone operators.

The Drone OPS Regulation, being an instrument adopted in an area of shared competence between the European Union and the Member States, automatically removes the rights previously enjoyed by the Member State to legislate in the matter. Therefore, national rules which conflicts with the Drone OPS Regulation will cease to be applicable from 1 July 2020.

However, there are some exceptions to this rule such as the domestic laws adopted based on Member State competences on the field of military and defence. The same issue could arise whether within the same national law, some provisions are incompatible with EU law, but others are not.

In this context, Member States would repeal domestic provisions that are incompatible with Drone OPS Regulation before it becomes applicable. However, this is highly unlikely to happen in all Member States.

Therefore, national regulators on aviation - which are bound to uphold EU law and set aside national legislation that is incompatible with it - should promptly perform a country-by-country analysis in order to clarify the UAS operators wishing to fly in several countries on what rules are applicable.



Workshop on the EU GNSS programmes (GALILEO/ EGNOS) within Transport and Research Policies

Air Law and European Transport Law Courses, prof. Anna Masutti
Speaker: Ugo Celestino
*Policy Officer at Applications- Security Int. Unit of
EU Satellite Navigation Programmes European Commission
Brussels, Belgium*

*Francesca Melega**

The poster features the Alma Mater Studiorum University of Bologna logo on the left. The text on the left side includes: 'ALMA MATER STUDIORUM UNIVERSITA' DI BOLOGNA DIPARTIMENTO DI SCIENZE GIURIDICHE', 'Diritto Aeronautico and European Transport Law Prof. Anna Masutti', 'Ugo Celestino Policy Officer at Applications-Security Int. Unit of EU Satellite Navigation Programmes European Commission Brussels, Belgium', and the event details: '23 October 2019 h. 16:00 Classroom I BELMELORO First Floor Via Beniamino Andreatta 8 - Bologna'. On the right side, the title 'The EU GNSS programmes within transport and research policies' is written in a large, white, serif font against a dark brown background. Below the title is a photograph of an airplane on a runway at sunset.

The purpose of this workshop is to bring to the students' attention the European Union's Global Satellite Navigation System (GNSS) programmes through the speech and experience of Ugo Celestino, Policy Officer at Applications-Security-International Unit of EU Satellite Navigation Programmes, European Commission.

The workshop focuses on the decision taken by EU to create an independent GNSS, the positive impact that R&D in satellite navigation brings in different sectors of economy and the prospects for the future, passing through the relation with the EU law-making. Additionally, Ugo Celestino points out the opportunity for students to play an active role in the European Institutions by taking part in projects like the Blue book traineeship.

* Student attending the Air Law and European Transport Law Courses

After the presentation of a brief history of the programmes and the developments of the independent EU GNSS (the only one civilian and under civilian control), Ugo Celestino describes the key features of the EU GNSS programmes (GALILEO/EGNOS).

Galileo is the European GNSS with a worldwide coverage; it refers to a constellation of 26 satellites in the sky, plus control centres from Earth and it provides signals from space that transmit positioning and timing data to Galileo receivers. The receivers then use this data to determine location. Instead, EGNOS is a regional satellite-based augmentation systems (SBAS) which uses GPS and Galileo signal to provide an improved signal.

EGNSS requires R&D for itself and to enable modernization, digitalization of many transports and other activities. The proposal of R&D programme (Horizon Europe) for the next seven years is to mobilize up to 100 billion euros for research and development in any field, such as space, which is a new frontier to develop business. This is proved by looking at the market acceptance and the share of the sectoral economy, that is supported and enabled by the usage of the GNSS technology. Particularly, EGNSS supports and will support both EU transport and non-transport policies, like, for the latest, agriculture and geolocation. In the aviation sector over 300 airports around Europe have a landing procedure based on EGNOS, in order to reduce delays, accidents and cancellation of flights. These public utility benefits have a positive impact on the economy.

Attention should also be drawn to the question of law-making. From Galileo and EGNOS point of view is necessary, in order to make impact on EU law-making, to demonstrate strong technical arguments, providing clear benefits for citizens and companies.

In law making, consultations with stakeholders and people of the industry are necessary, in order to be sure that the future regulation will be capable to develop the market. In particular, the proposal for 'space regulation' submitted in June 2018 establishes the Space programme of the Union and the European Union Agency for the Space Programme and commits an increasing budget to space.

In conclusion, Ugo Celestino makes some final considerations. EGNSS is a watershed initiative: for the first time EU created, owns and manages an infrastructure (usually owned by States). This experience suggests that it would be possible to avoid a useless duplication of costs if some infrastructures and services were managed by unique European programmes. Additionally, the satellite navigation programme enables Europe to stay at the forefront of space-faring nations and the success of Galileo will lead to the development of other space programmes.

<http://www.aviationspacejournal.com/wp-content/uploads/2019/10/The-EU-GNSS-programmes-within-transport-and-research-policies-1.pdf>



Workshop on the Role of the In - House Lawyer within the Air Transport Companies

Air Law and European Transport Law Courses, prof. Anna Masutti

Speaker: Pietro Caldaroni
Coordinatore Relazioni Istituzionali Alitalia

*Roberto Lippolis and Francesco Matteo Bagnato**

 **ALMA MATER STUDIORUM UNIVERSITA'
DI BOLOGNA**
DIPARTIMENTO DI SCIENZE GIURIDICHE

Corso di Diritto Aeronautico
Prof.ssa Anna Masutti

Pietro Caldaroni
Coordinatore Relazioni Istituzionali
Alitalia

28 Ottobre 2019
Ore 13:45

AULA I BELMEORO
Piano Primo
Via Beniamino Andreatta 8 - Bologna

**Il giurista d'impresa
nel trasporto aereo**



<http://www.aviationspacejournal.com/>

The purpose of this seminar is to analyze and understand the role of the corporate lawyer in an airline, through the speech and experience of Pietro Calderoni - Institutional Relations Coordinator - at Alitalia - Società Aerea Italiana S.P.A under extraordinary administration.

*Students at the University of Bologna attending the Air Law and European Transport Law Courses

MISCELLANEOUS MATERIAL OF INTEREST

The seminar focuses on three crucial points:

- Managing relations with regulators;
- Lobbying;
- The crisis of an airline.

First and foremost, Pietro Caldaroni explains what indispensable capacities the corporate lawyer must own to operate within an airline, from having a solid legal training together with managerial skills and a careful knowledge of the business. For the jurist it is fundamental to be aware of international rules, EU law (above all Reg. CE No. 10088/2008 on the provision of air services in the EU), the Italian Navigation Code and ENAC Circulars and Regulations.

At the same time, it is essential to conduct continuous regulatory monitoring to assess the applicability of the rules to air transport and, in general, the impact of regulations on the operations of the company.

At a later stage, the ability of a lawyer to act for the benefit of his company was analysed. The lawyer today must also consider himself an "interest bearer", through activities aimed at influencing the legislator and the regulators.

The latter often need to be guided in particularly complex matters such as those related to air transport. In such circumstances the stakeholder seeks to understand the impacts that a given rule may have on the business of the company, incorporate the demands of the corporate areas and then summarize them so that they can be brought to the attention of the institutional stakeholders.

In conclusion Pietro Caldaroni explains the main factors of crisis of an airline and the Alitalia's experience.

Air transport is a highly competitive business, which has become difficult to manage following the liberalization that began in the 1970s in the USA and in Europe in the late 1980s and early 2000s. There has been a strong increase in competition, mainly by "low cost" carriers, which have gained a significant market share at the expense of the so-called legacy carriers.

To all of this it should be added the elements that influence the market such as economic crises, volatility of the price of oil, exchange rates and socio-political events.

The only solution to tackle the countless, and sometimes unpredictable, crisis factors is to do a review in the integration between vectors.



Workshop: Ryanair, An In - House Perspective?

Air Law and European Transport Law Courses, Prof. Anna Masutti

Speaker: Matthew Krasa
Head of Public Affairs at Ryanair

The flyer is divided into two main sections. The left section is white with a blue border and contains the following text: the Alma Mater Studiorum logo, the university name 'ALMA MATER STUDIORUM UNIVERSITA' DI BOLOGNA', the department 'DIPARTIMENTO DI SCIENZE GIURIDICHE', the course title 'Diritto Aeronautico - Air Law and European Transport Law' by Prof. Anna Masutti, the speaker's name 'Matthew Krasa' and title 'Head Of Public Affairs at Ryanair', the date and time '11 November 2019 h. 13:45', and the location 'Classroom I BELMELORO First Floor Via Beniamino Andreatta 8 - Bologna'. The right section is dark blue with the title 'Ryanair An in-house perspective?' in white, and a photograph of a Ryanair aircraft on a tarmac.

<http://www.aviationspacejournal.com/>



EALA– EUROPEAN AIR LAW ASSOCIATION

31 st Annual Conference

Paris | Friday 8 th November 2019

The European Air Law Association (EALA) invites you to its 31th Annual Conference in Paris on 8th November 2019, starting with the usual drinks and dinner at 7:30 pm on 7th November at Restaurant Maison Blanche. The conference itself is held at Cercle National des Armées.

<http://eala.aero/#home>

<http://eala.aero/wp-content/uploads/2019/10/EALA-Program-nov19-v3.pdf>



EASA- High Level Conference - ADW 2019

”Scaling Drones Operations”

5-6 December - Amsterdam

Speaker: Professor Masutti within the Panel n. 2

Senior Partner at LS Lexjus Sinacta Law Firm, Italy and tenured Professor of Air Law and European Transport Law at the University of Bologna, Italy

Location:

RAI Amsterdam – Europaplein 24 – 1078 GZ Amsterdam –The Netherlands

<https://www.amsterdamdroneweek.com/highlevelconference>

The next **High Level Conference on Drones 2019** will focus on the topic "Scaling drone operations" and will bring together regulatory bodies and industry experts from all over the world to discuss the development of a common European market for drones.

5 December: Scaling drone operations

Panel 1: Implementing common European rules for drones operations:
Are we on track?

Panel 2: How to address societal concerns?

Panel 3: Preparing for the future: How to deal with more complex operations?

6 December: U-SPACE and UAS Airspace integrations

Panel 4: What are the regulatory challenges and operational opportunities around U-space?

Panel 5: What is the technical maturity of U-space solutions based on SJU's projects?

Panel 6: How does EASA's opinion on U-space enables airspace integration?
Afternoon Technical sessions: ask the EASA drones experts

PAST EVENTS

**12 TH Annual Mc Gill Conference on
International Aviation Liability, Insurance & Finance**

Montreal 18 - 19 October 2019

Panel Member: Professor Anna Masutti

Senior Partner at LS Lexjus Sinacta Law Firm, Italy and tenured Professor of
Air Law and European Transport Law at the University of Bologna, Italy

<https://www.mcgill.ca/iasl/iali/iali2019>

<https://www.mcgill.ca/iasl/iali/iali2019/programme>

LIABILITY ISSUES ARISING FROM DRONE DISRUPTION OF AIR TRAVEL

- *Changes in regulations for both commercial and recreational operators for US/ Canada/EU*
- *Drone safety at airports and heliports*
- *The use of UAVs over international waters*
- *Privacy compliance and management following UAV data collection*
- *UAV IoT operations and associated risks (for example at interconnected airports, disaster relief)*
- *UAVs and cybersecurity*
Insurance coverage and contract issues for customers considering adopting their own UAV technology or engaging a third-party UAV provider