The Germanwings Accident in a TRIPOD Interpretation

ABSTRACT

The Official Accident Report for the Germanwings Accident cast the blame on the soul of Andreas Lubitz, for not promptly revealing the deterioration of his health condition to his employer, for a second time, just before the accident. Scientific work on the one hand reveals that pilots do not often disclose their health status into a voluntarily basis. On the other hand, how can we handle employees in depression? What might be an effective solution for a better future in Aviation safety?

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There is a dire need for High Risk Entities, like all Aviation Organisations, to establish a continuously adaptive organisation, in means of change relationship, well before an accident occurs; in other words to provide for "an effective learning organisation". Certainly, the Germanwings accident in March 2015 not only puzzled the top management team of the specific Airline, but it also widely raised safety concerns among all other Aviation stakeholders. Truth is that Safety Managers could not have claimed that they were unaware of accidents with immediate cause related to unlawful action of the aircrew in flight, contrary to the public opinion that once again felt the shock and was overwhelmed with despair, after the hearing of the bad news.

Prior Examples of Deliberate Aircrew Action in Aviation History

Even before 2015, Aviation history has had quite a large number of examples regarding deliberate unlawful aircrew action.

1. In 1982, Japan Airlines Flight 350 crashed while on approach to the Tokyo Haneda Airport killing 24 of the 174 people on-board. The official investigation found that the mentally ill Captain had attempted suicide by placing the inboard engines into reverse thrust, while the aircraft was close to runway. His first officer had no time to react before the aircraft stalled and crashed.
2. In 1997, Silkair Flight 185, while on its cruising altitude, suddenly entered into a high sink rate dive. The speed of the dive was so high that the aircraft began to break apart while still in air and finally crashed near

Palembang. The NTSB in USA concluded that deliberate suicide by the Captain was the only reasonable explanation for the accident.

3. Back in 1999 some miles off Nantucket, Massachusetts in the USA, the EgyptAir Flight 990 first officer deliberately crashed the aircraft into the Atlantic Ocean while again; same as Germanwings, the Captain was away from his station.

The genesis of Germanwings Accident

The 150 lives on board Germanwings flight were claimed from a hazard that had appeared earlier in the past, emerged again and was left untreated by the Safety Management Systems of the Aviation Industry. On this occasion, it is evident that previously selected barriers proved themselves incapable of preventing the specific accident from happening. In other words, previous accident investigations had failed to effectively pinpoint and describe in words the causes and preconditions of other similar accidents, in a way that could have led to motivating ideas and barriers that could guarantee safety in the future. Perhaps, if Aviation Organisations had seized the opportunity to react differently, prior to the accident, the Germanwings accident could have only been a nightmare.

Unfortunately, accidents become comprehensible solely with accident investigations, so we rely on the investigation quality to divulge the shortcomings of the operating system, including the report, which needs to qualitatively portray all those essential missing or broken links and preconditions that had led to the accident.

It is the change management theory, which suggests that an aviation accident must be confronted with a re-creation of all business functions with

involvement in the accident sequence or relation to its consequences, Nadler et al (1995). Thus, the Industry itself has to comprehend the results of the investigation and use them to enhance the existing safety management systems. Unfortunately, not much will alter without a transformational change that later on will secure a future successful business continuation.

The history after the official accident report release for the Germanwings Accident will describe several useful data that explain aspects of the accident, but additionally it will record the blame that had been cast on specific individuals. There had been exposed into the synopsis of the report (page 8) the role of the ill-fated first officer whose life had also been claimed. Furthermore, a fraction of the blame had been apportioned to a number of physicians, who had examined the first officer and never reported him, by disregarding his privacy rights and existing legislation for medical confidentiality. Undoubtedly, unknown pilots, colleagues of Andreas Lubitz who flew with him, in the past - and particularly during the last days - should be held responsible, although in a lesser degree, for not reporting any "strange behaviour". Lastly, there had been parts in the official report that implied that Andreas Lubitz's family members could have played a more energetic role into alerting either Aviation Authorities or the Airline itself, by sharing information they presumably had had earlier on for the medical status of a 27 years old professional.

Public Opinion and Aviation Industry should always test the final accident reports for their validity and impact to motivate new ideas so as to promote safety. Unfortunately, there are occasions where accident investigations fail to drive change, for reasons already discussed in change theory.

Reasons for change management not working

Gersick (1991) had first discussed the "punctuated equilibrium paradigm". According to that notion, in business world, relatively long periods of stability (equilibrium) are interrupted by compact periods of qualitative, metamorphic change. Aviation Accidents can change management triggers, providing an opportunity to Aviation Organisations to re-establish a change relationship. Reality is that those accidents do create a disequilibrium, which can only be offset with transformational changes. In occasions, as Gersick (1991) argues, the change process is hindered by the "deep structure itself" inside the organisation, as "deep structure" is consisted of all fundamental choices that govern any entity, which determine the basic activity patterns that maintain its existence. Other impediments related to motivational barriers to change stem from fear of loss or fear of losing control over a new situation. Generally, obligations can also limit change as they are created by the networks of interdependent resource relationships and value commitments generated by an organisation's structure (members) that often prevent it from being able to achieve the required change, Tushman& Romanelli (1985). Truth is that deep structures are highly stable formations because the array of choices made by a working system (organisation) rules out many options that are mutually contingent, proving that "early steps in the decision tree are the most fateful".

Depression and Reliability of Self-Declaration

Depression is one of the most common psychiatric disorders. It is dramatic that at least 10% of the worldwide population, as also stated in the lines of the final

accident report, is going to suffer from this disease, a high percentage indeed for not being taken under serious consideration from HR departments of huge organisations. The reason is evident. Every business entity does expect a percentage of its work force to get sick and is ready to accept a 3-4 weeks recovery period (the normal time required for non-treatment self-healing process).WHO says that nearly 50% of those suffering remain undiagnosed or untreated. Depression treatment in most occasions is very difficult to access, due to the fear of stigma that prevents people from seeking help in order to return into healthy and productive lives. Overall depression is a reality and the leading cause of disability worldwide, which sometimes returns in successive episodes and it can severely disrupt working ability. Therefore, it seems that HR departments need to strategically address the hazard on a permanent basis.

The final accident report for the Germanwings accident discloses that the Airline considered self-declaration as a barrier for mitigating the risk of aircrew deliberate unlawful action that had obviously failed. The question is “Did we have prior evidence for its ineffectiveness?”

Aviation Medicine Advisory Service (AMAS), an international professional organisation, shared its experience that, from 1992 until 1997, there had been around 1200 telephone inquiries to pilots who had been diagnosed as having clinical depression and were taking antidepressant medications. The pilots’ reaction to the AMAS call proved both the existing problem in aviation and their high-level stress for future; 60% of them denied having any kind of treatment, as they wanted to retain their flying ability. A 15% declared that they were taking medication while refusing to inform Aviation Authorities and their employer. Only 25% of them admitted that they would need to stop flying, take their treatment and return to work after they were fit for flight again.

Unfortunately, nothing has been shared about the status, the age and other demographic data of this sample.

Another survey in 2003, with data that was processed by FAA and NTSB, unveiled that from 61 pilot fatalities that occurred in US civil aviation studied accidents, between the years 1990-2001, disqualifying psychological conditions were self-reported in only 7 occasions. Among the remaining pilots, antidepressants were used but not reported in their last aeromedical examinations.

Results from this sample prove that expecting someone to place himself in danger of losing his job security without any positive motivation to do so, is unrealistic. (Only 25% did the right thing in the first instance but we lack data on their status and age and in the second occasion, only 11% had chosen what expected to be the ethical option).

Human behavior and its role into an Accident

"Accidents caused by human errors". How useful such a statement might be for explaining disasters and finally preventing them? Not much as we must accept human fallibility , and phrases like that, do not help. Truth is people err by design, sometimes intentionally, in most others unintentionally. Human beings, before doing anything, first always devise and later act upon a mental plan that they had already designed. To explain the same in theory Albert Bandura who had worked with his Social Cognitive Theory (1977), said that human

functioning could be explained by a triadic interaction of behaviour, personal and environmental factors, often known as reciprocal determinism. Environmental factors represent situational influences and environment in which behaviour is preformed, while personal factors include instincts, drives, traits, and other individual motivational forces. Several constructs underlie the process of learning and behaviour change. In simpler words, any human mental plan requires three questions to be answered prior its commencing.

The Gap Question: Is there a gap between the current situation, and how I would like it to be? In Bandura's terms, the question addresses the term self-control, the ability of an individual to control behaviour.

The Outcome Question (Bandura's outcome expectations): Is there a reason I do something? What is in it for me? Will it be beneficial for me? Is there any reward, or at least recognition, being involved after my action? Will I be disciplined if I do not follow the rules? Is it more fun or pleasant for me to behave differently? On the other hand, is it going to lessen my stress levels take away my fears, or make me happier, in case I act?

The Power Question (Bandura's Self-Efficacy): Do I have the ability to make something really happen? Is it within my power abilities to start it and complete it?

Although Andreas Lubitz received all the primary blame for his role into the Germanwings accident, it must not escape our notice that the onset of his illness had found him ready to satisfactory answer the three essential questions. He deliberately decided - and declared to the Lufthansa AeMC- his admission to hospital for depression treatment on April 9 2009.In return, he experienced a three month waiting period, with all the stress and anxiety feelings that such behaviour brings in and a waiver into his medical certificate. Let us not forget

that no information had been released to him, explaining all his possible future options. It is highly likely that fear of losing his opportunity to fly prompted him to cooperate harmonically once with the Aviation Medical System and to proceed to the declaration of his illness in the first time, back in 2009. Fear did all the work during his first time in trouble, but negative motivation is not always a successful option.

The results of the previous researches prove that Andreas Lubitz had done what was expected of him to do when faced with his dilemmas for the first time. There were plenty of rational explanations to back up his actions of not reporting his illness for a second time. It is questionable though if the overall Safety Management System in place, the one that includes both Regulatory or Advisory Bodies actions, and further down in the hierarchy, which ends up in the premises of the Airline itself, could have thought of a different way of approaching the specific hazard. Surely it seems that there are grounds for further investigating the Germanwings accident by applying an organisational model investigation technique.

TRIPOD Incident& Accident Analysis Methodology

The birth of the "Safety Culture" era - and its dominance over the previous "Socio-technical Period" in accident causation- forever altered the prevailing axioms that drive accident investigation. In Safety Culture Era, it is given that people tend to form teams and share common characteristics that play a substantially important role into the way accidents are created; thus investigation should move down to Organisational issues rather than just apportion blame to certain individuals.

Tripod beta methodology delves into the new advents and fresh tools segment, which aims at pinpointing and analyzing the reasons for failure of a Barrier, via the application of the Human Behaviour model. That is why this Analysis not only looks at what caused the sequence of events in an incident, that is the sequence of events themselves, how the incident happened, but also which Barriers had failed or been missing.

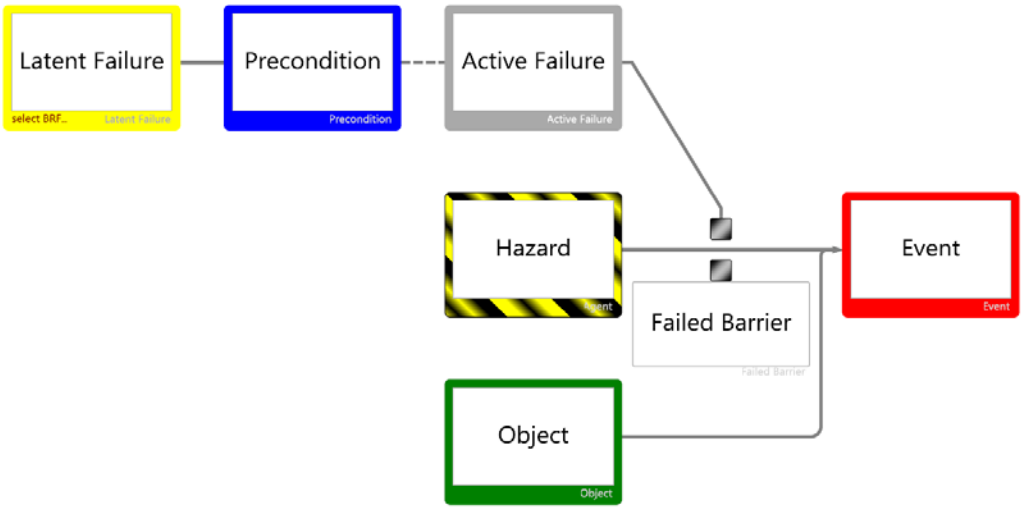
The most important factor under examination is the reason why those Barriers had failed and the reasons that support the non-action or faulty action of the person at the sharp end of the accident.

The construction of a "tree" diagram forms a graph representation of the incident mechanism which describes the events and their relationships. The event in a TRIPOD Beta Diagram is the result of the Hazard acting upon an Object. A Barrier is something that is put in place to prevent the meeting of an object and a hazard.

When such a Barrier fails, a causation path is created to explain how and why this happened. The TRIPOD Beta method presupposes that incidents are caused by human error, which can be prevented by controlling the working Environment. The Causation path displays this by starting with the Active Failure of the Barrier, then it investigates under what Preconditions or in what contextual state this happened and finishes up by identifying the Underlying Causes that had led to the Accident.

By delving into the "Preconditions" World "emitting" after the accident, investigators have the opportunity to broaden their knowledge about the Safety Culture segment of the Organisations involved into it and reliably identify both Behavior Norms and Shared Values that dictate the established patterns of actions which have driven the Causes of Accident.

The aim of TRIPOD Beta is not only to uncover the hidden deficiencies in an Organisation and the Latent Failures or Underlying Causes but also to offer a solid starting point to depict all subsequent changes that need to be infused into existing Organisational Cultures that had suffered by the accident. Those flaws are classified into eleven Basic Risk Factors (BRFs) categories that represent distinctive areas of management activity, where the solution of the problem lies. All the items of the TRIPOD Diagram are shown below:



Benefits from the Application of TRIPOD Methodology

TRIPOD BETA is a technique that depicts into an A3 paper sheet the plot of the accident in TRIPOD terms, using up to five different TRIPODS, clearly showing all barriers that either failed or were never thought to be in place, forming the holes of the Swiss cheese slices. Most importantly, it also includes all preconditions, "the excuses of victims at the sharp end" of the accident and explains the reasons why these holes were made.

Tripod Beta Methodology assists investigators:

- To easily structure an investigation,
- To more effectively brainstorm and share ideas
- To distinguish all relevant facts
- To elaborate on causes and effects
- To alleviate the report writing task
- To increase the quality of corrective actions-recommendations
- Most importantly, to provide the Organisation with the opportunity to create a link between previous Risk Analysis and accident aftermaths that profoundly assist the creation of a Learning Organisation.

The Germanwings Accident

Unfortunately, when TRIPOD Beta methodology is applied, the accident is already a reality and the investigation commences with the analysis of the last TRIPOD, which is always the first to construct and work with.

The Unlawful Interference of a Cockpit Crew member en-route

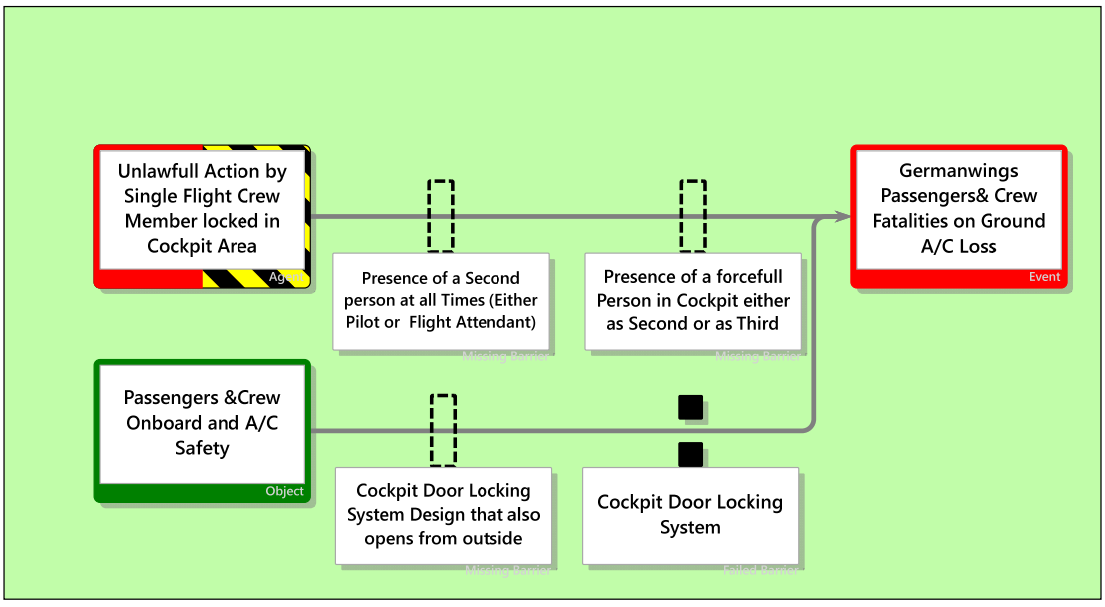


Figure 1: The Fifth TRIPOD

To the devastation of individuals worldwide, on 24 March 2015, a Germanwings Airbus A320, registered D-AIPX, crashed on the French Alps claiming the lives of all 150 souls onboard. Shortly, mass media spread the news that one of the two pilots had locked himself into the cockpit area and deliberately had led the aircraft into a relentless dive to death. As soon as the first officer's decision to lock the door and commit suicide became apparent to the remaining crew, their only chance to avert the accident from happening would have related to their ability to open up the cockpit access door.

In TRIPOD terms, the cockpit door locking system can be seen as a failed barrier but in reality, it operated exactly as it had been designed to. As terrorism is always considered a high-risk event for airlines, it seems that Aviation Industry lacked "triggers" to think differently. For instance, the HELIOS accident did not turn aviation experts' ideas towards the recommendation of a creation of a mechanism which could have opened the door, even without the cooperation of Andreas Lubitz (a missing barrier), an idea that perhaps now deserves a second thought. On the contrary, the notion to always have someone occupying the second pilot's seat, either that person being another authorized pilot or another crew member (missing barrier),had taken only a few days to come in effect, as that had been the primary reaction of regulatory authorities and other AOC holders. It is questionable, though, if with this idea, to always have someone occupying the second pilot's seat in case a pilot needs to be dismissed for a while, the intention had been to deprive someone of his/her suicide thoughts or just to physically repel him. As in the second occasion, alertness and force in excess, from another person (missing barrier) is the prerequisite.

Proceeding into an investigation with a different look

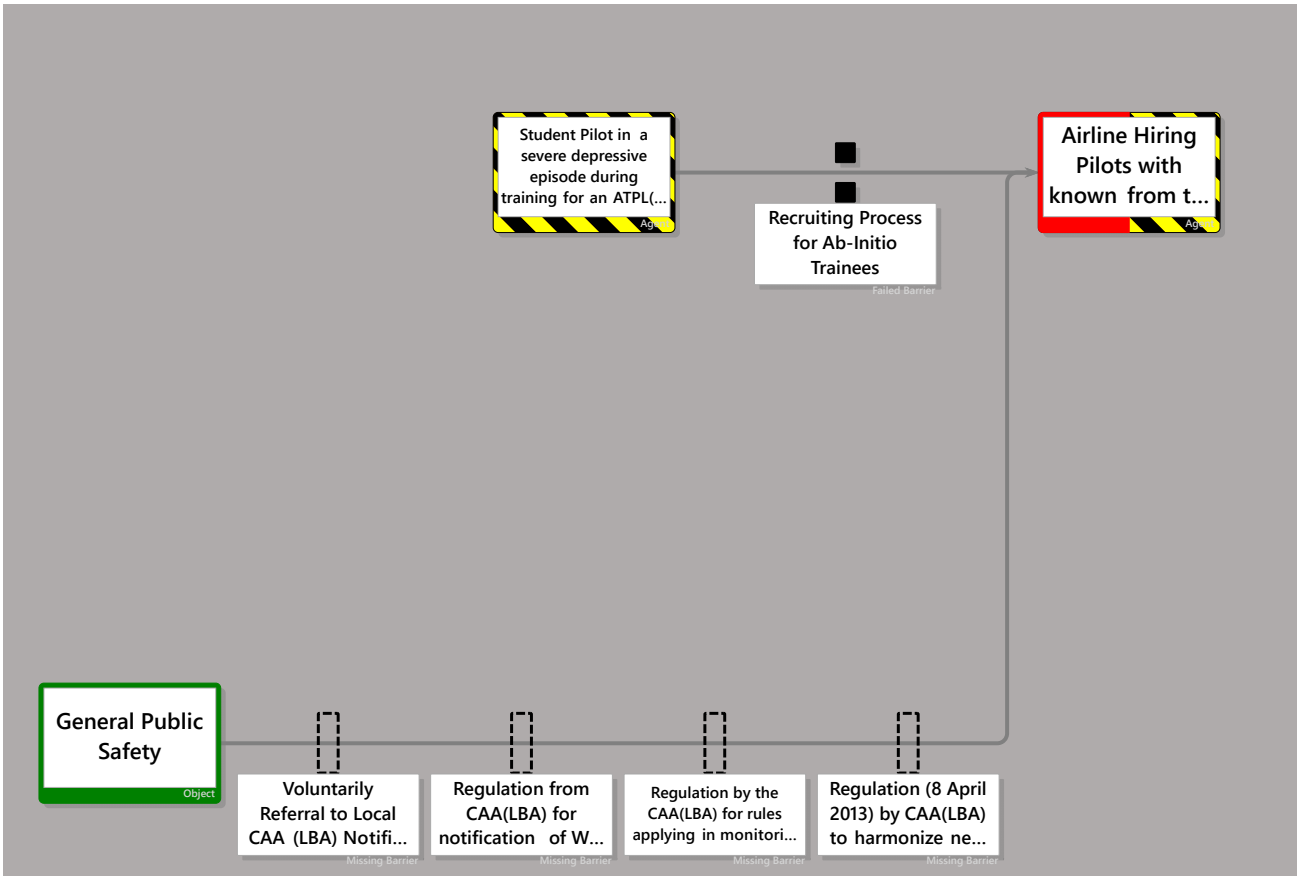


Figure 2: The First TRIPOD

Since we accept that Lubitz, for reasons related to his illness, had closed the door and hindered the rest of the crew from entering the cockpit area during the aircraft's death dive, perhaps we can also realise that all started from a decision of the Airline to hire a pilot who had experienced mental issues in the past (Change Agent). Although it might seem that we are directing the lights towards the airline actions, truth is that it is the investigation model's axioms that drive us to pursue answers that explain all whys. Therefore, our look has to be that of "the useful idiot", asking questions, which at first might seem silly, but then,

they will lead us to find answers that will create new barriers more effective for dealing with similar situations in the future.

The first TRIPOD reveals that the selection process of the airline had failed to pinpoint “a problem” that was awaiting to demonstrate itself in the future (failed barrier). It is evident that not many had wondered about an effective way of handling a pilot with a waiver into his flying licence and possible courses of action to monitor his/her health during the intervals of consecutive official medical examination. It is so common for people to accuse others but Andreas Lubitz is already dead.

So in the occasion that we may turn our mind to think differently, we might ask: “Did anybody ask for a solution for handling such a case at the Competent CAA?”(Missing barrier).The answer quite easily might have been that “there had been no existing legislation at the time for doing so” (Missing barrier).Obviously there are still enough people around us who believe that Aviation is an industry with procedures for all occasions. Unfortunately, no one can assure us that by adding or enforcing existing procedures, we can guarantee compliance and secondly and more importantly, to be in a position to declare, “We had thought in advance of all hazards we are encountering”.

A proof of the argument that “it is impossible to cover all options beforehand” is that when the competent CAA put in place a new regulation for pilots with waivers into their flight licences “ they forgot” to provide guidance for those being already in that status like Andreas Lubitz (Missing barrier). Not to mention that the last chance for avoiding the Germanwings Accident was lost when the competent CAA did not suggest or issue a regulation or any form of guidance (formal or informal) that could have provided ideas on how pilots

belonging to flight crews with limitations in their health could remain in constant health monitoring.

High reliability entities, like Aviation organisations, will never stop pursuing personal accountability as human errors do occur, but before they resort to that they need to have prepared all essential structures and policies and to have fully supported the right mixture of organisational culture type paradigm within the industry.

TRIPOD Beta promotes the healing "the blind eyes" process as during the accident investigation, investigators had already accepted the axiom that no person is evil and everybody wants to go back home after work. It is up to us to accept that people do not just easily break rules or procedures unless they think that this serves their wellbeing. It is up to us to delve into a reality that we could not have thought before an accident, a relentless struggle itself, than to quite easily continue into apportioning blame to any poor human soul.

Questions are still too many and the cardinal factor for them is to address them during the investigation process.

- "How does Aviation Industry feel today that no one had considered, arranged or mandated the pairing of Andreas Lubitz with specific pilots in Command who perhaps could have noticed a change in his behaviour?"
- "How differently could Andreas Lubitz have reacted in case he was given the option to get a compensation package (exemption only for mental health issues) of higher value than to his debt into the Airline for his training?"

- “What could have been done differently so that a mental disorder of an aircrew member (pilot) could have been dealt with beforehand and other courses of action had been in place from earlier on?”

Aviation Accidents are unique opportunities for transformational changes, in Organisations with involvement in a disaster. Opportunities will never rise while prevailing beliefs after the accident cast the blame on the shoulders of a pilot experiencing mental disorder with psychotic symptoms. Contrary to the notion that Authorities and/or the Airliner had exceeded their ideas and their control to prevent the accident from happening, TRIPOD accident analysis is applied to suggest another way of interpreting causality, which moves down to organisational aspects rather than just apportioning blame to certain human beings or even in the organisational structures themselves.

As we cannot easily alter human behaviour, it is always better to orchestrate a system with multiple barriers, within an organisational culture promoting safety and aiming at preventing the accident from occurring, in the first place. In other words, TRIPOD is the essential tool that struggles to alter the way we analyse data that drive our safety decisions.

Germanwings case study presents us with the chance of enhancing our insight and changing our optic in order to unveil hidden deficiencies during an investigation process. This, in turn, will provide us with good possibilities to drive our minds and actions closer to the Murphy Margin area of avoiding disasters, while simultaneously we can selectively step outside known norms of rational thinking.