



BEA
Bureau d'Enquêtes et d'Analyses
pour la sécurité de l'aviation civile

Accident Airbus A320 registered D-AIPX operated by Germanwings on 24 March 2015



- Flight from Barcelona to Düsseldorf
- 144 passengers with 17 different nationalities
- 6 crew members
 - ➔ 2 flight crew
 - ➔ 4 cabin crew
- Preliminary report (May 2015) : The copilot intentionally modified the autopilot instructions to order the aeroplane to descend until it collided with the terrain.

Objectives of the Safety Investigation

- Understand the medical history of the co-pilot
 - ➔ The copilot was suffering from a severe mental disorder

- Understand how a pilot with a mental disorder could be flying as a professional
 - ➔ Worldwide review of the process of medical certification of pilots

- Reduce the risk associated with mentally-ill pilots

General Organisation of the Investigation

Accredited Representatives

BFU (Germany)
 State of Registry and the Operator
 Medical experts

AAIB(UK)
 Aeromedical certification
 Medical experts

CIAIAC (Spain)
 State of departure
 Aeromedical certification

NTSB (USA)
 Aeromedical certification
 Aeromedical expertise

Additional Aeromedical Experts from CAA of

Israel

Canada

Norway

BEA (France)
 State of Occurrence
 Medical experts

Technical Advisers

Germanwings

EASA

DGAC

SNECMA
(CFM)

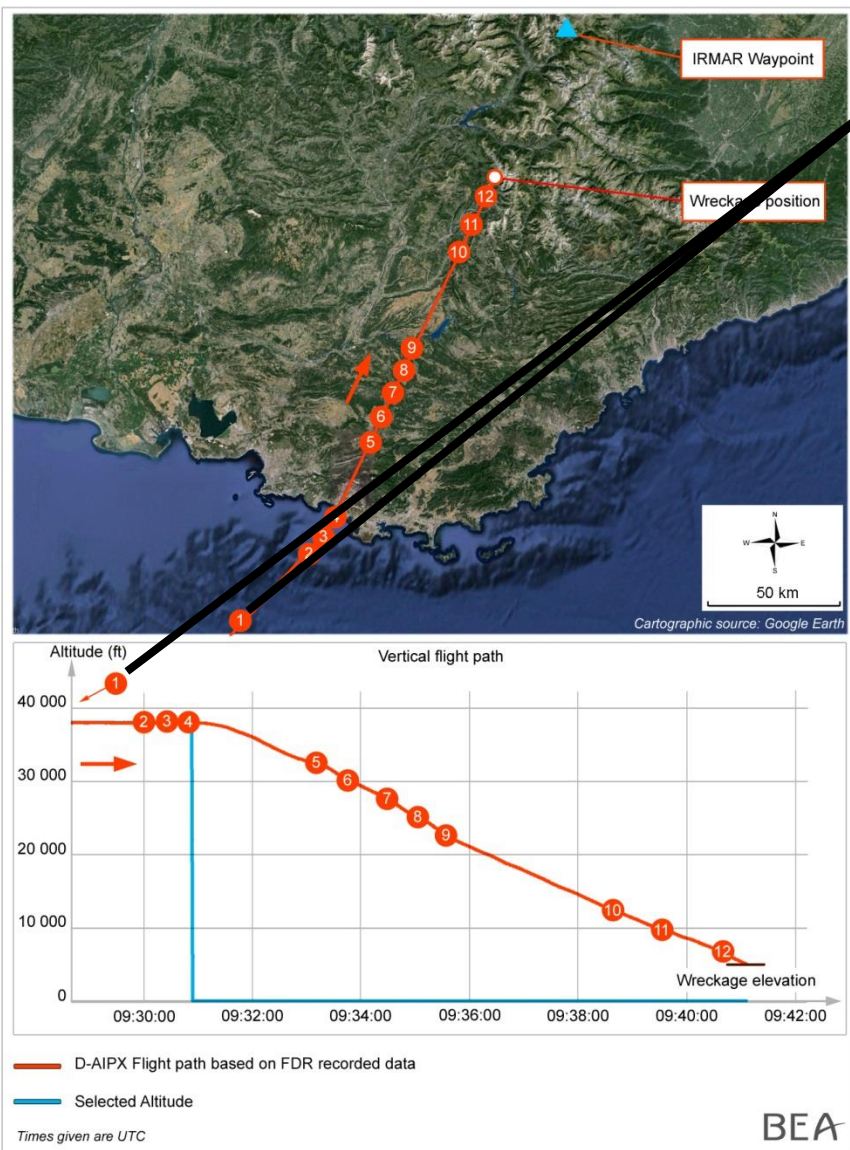
Airbus

Additional Medical certification experts from other sectors

EDF

SNCF

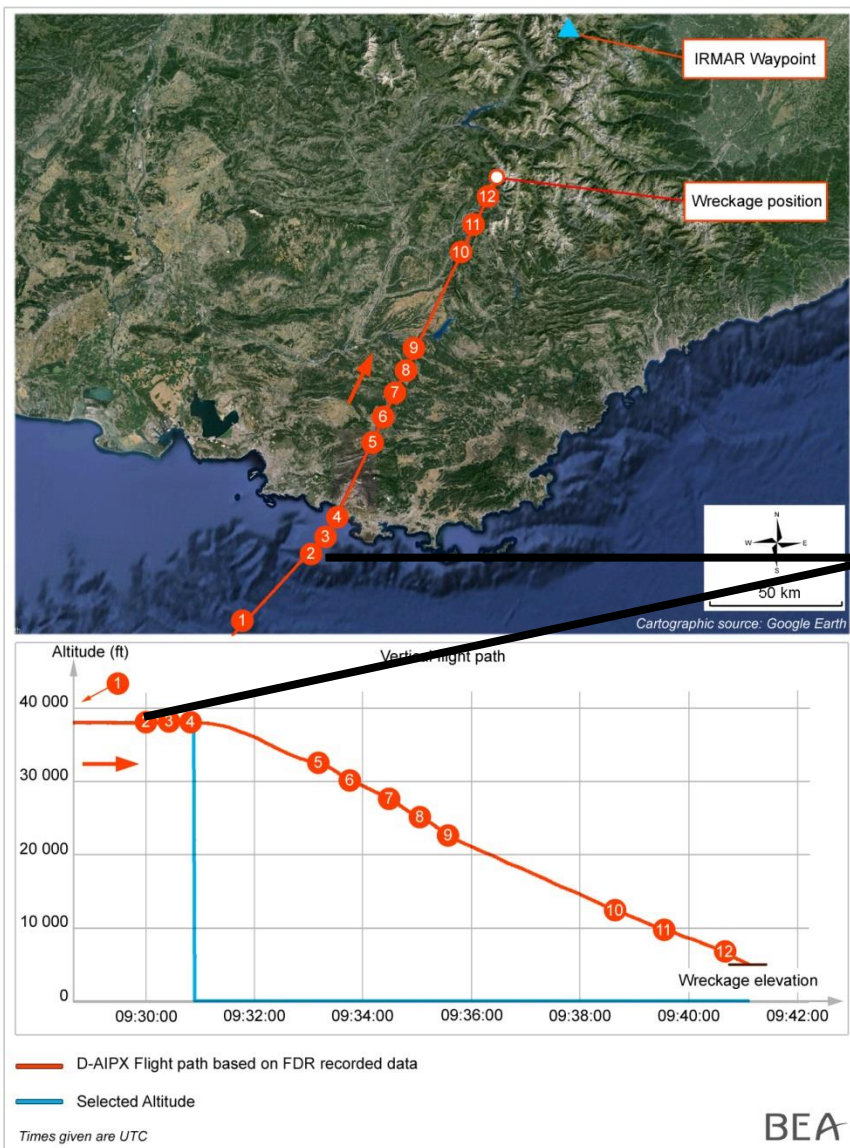
History of Flight



1

At 9 h 27 min 20, the aeroplane levelled off at a cruise altitude of 38,000 ft (FL380). The flight crew was then in contact with the Marseille en-route control centre .

History of Flight



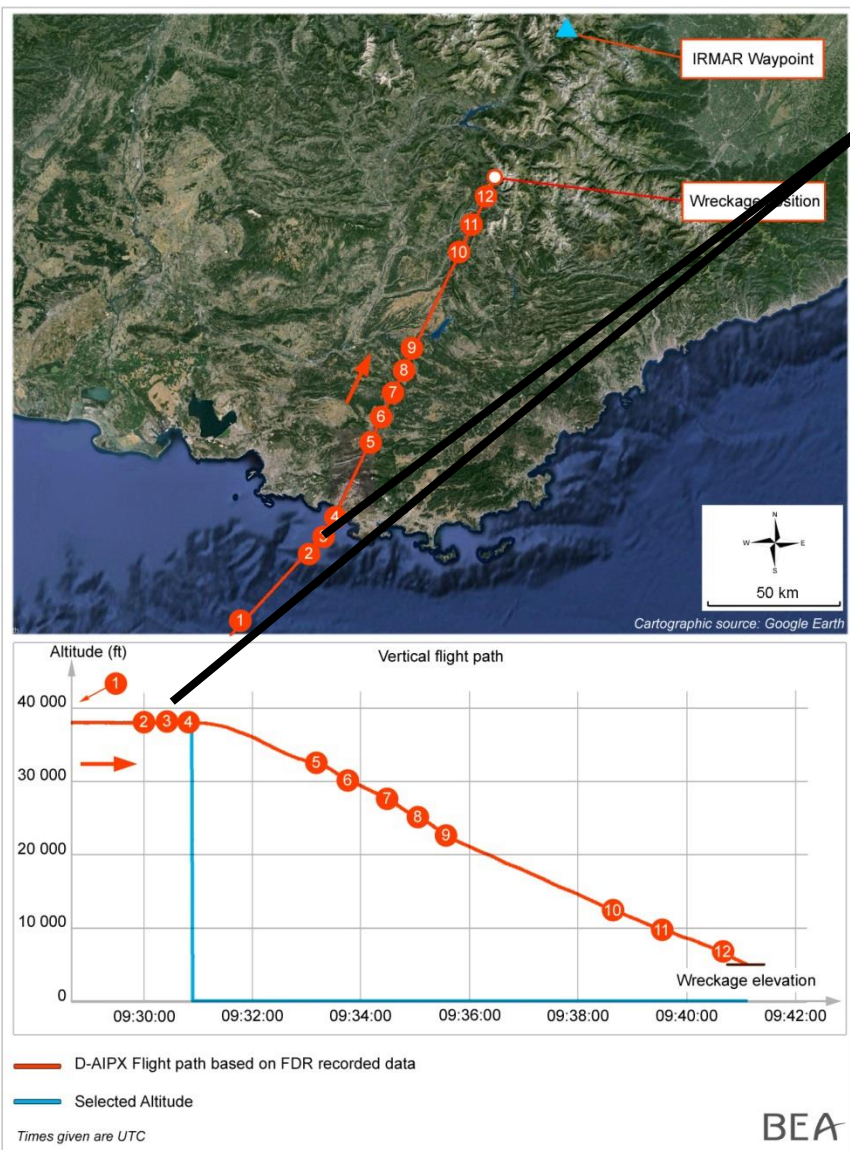
1

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2

At 9 h 30 min 00: last communication between the flight crew and controller was: « *Direct IRMAR Merci Germanwings one eight Golf* ».

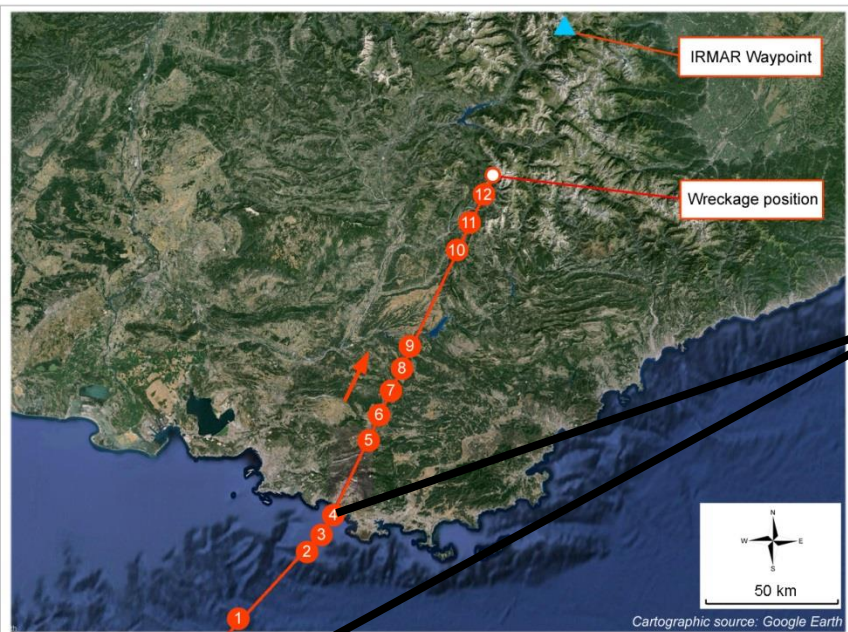
History of Flight



3

At 9 h 30 min 24, the Captain left the cockpit.

History of Flight

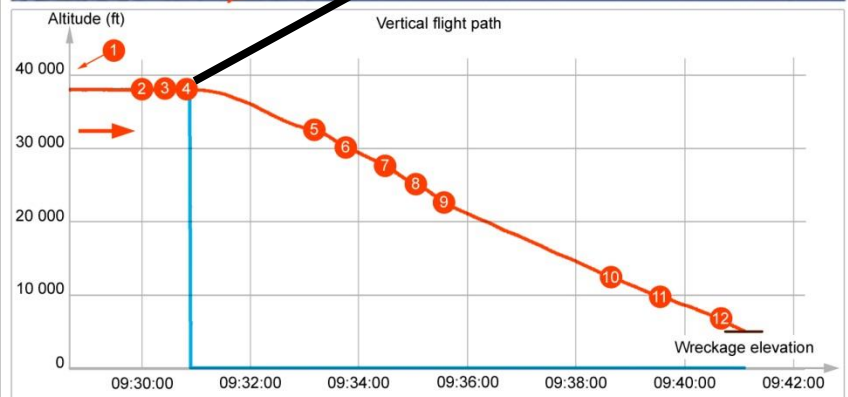


3

At 9 h 30 min 24, the Captain left the cockpit.

4

At 9 h 30 min 53, the co-pilot commanded the auto-pilot to go down to 100 ft.



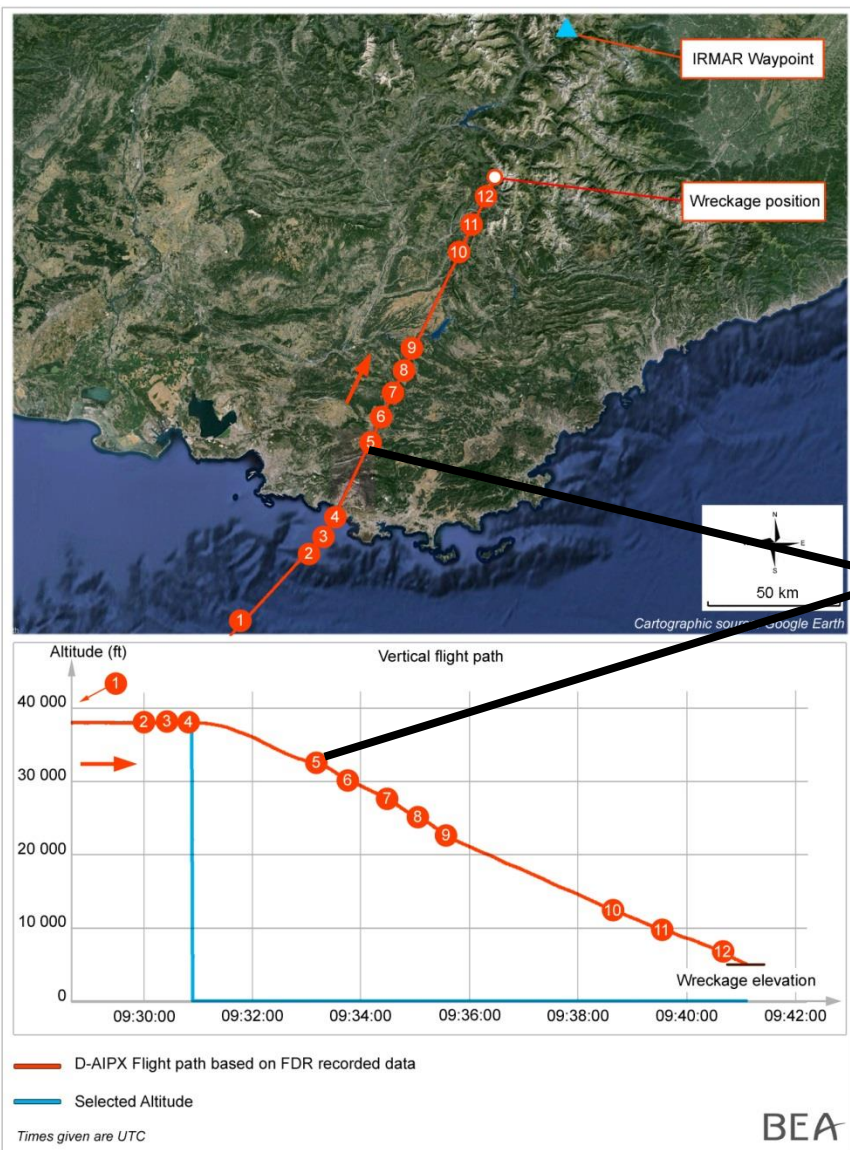
— D-AIPX Flight path based on FDR recorded data

— Selected Altitude

Times given are UTC



History of Flight



3

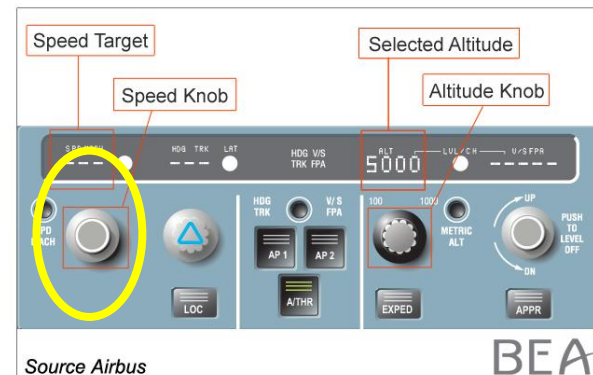
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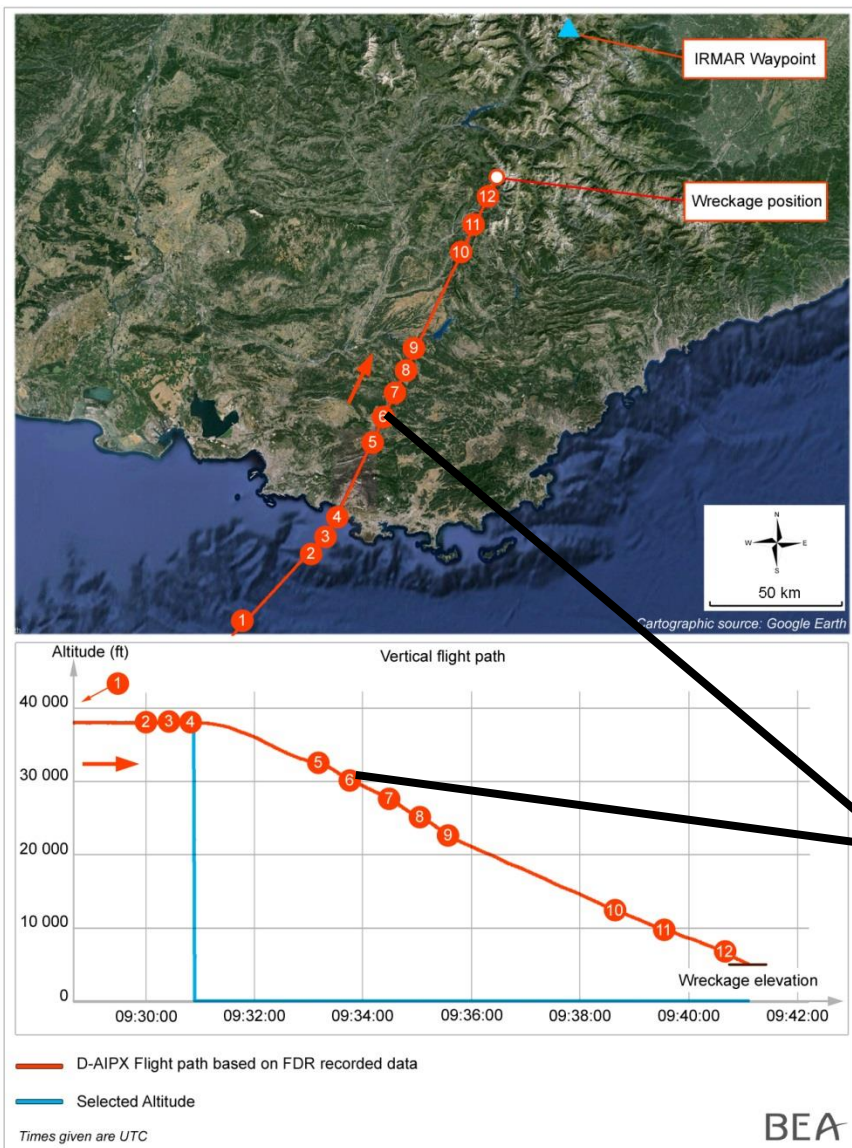
At 9 h 30 min 53, the co-pilot commanded the auto-pilot to go down to 100 ft.

5

At 9 h 33 min 12, the co-pilot commanded the auto-pilot to increase the speed to 308 kt.



History of Flight



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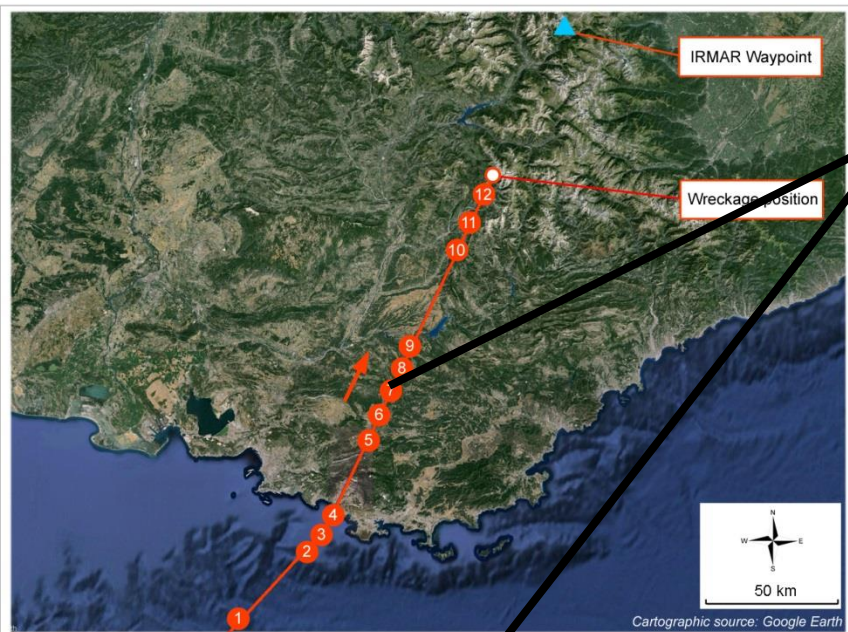
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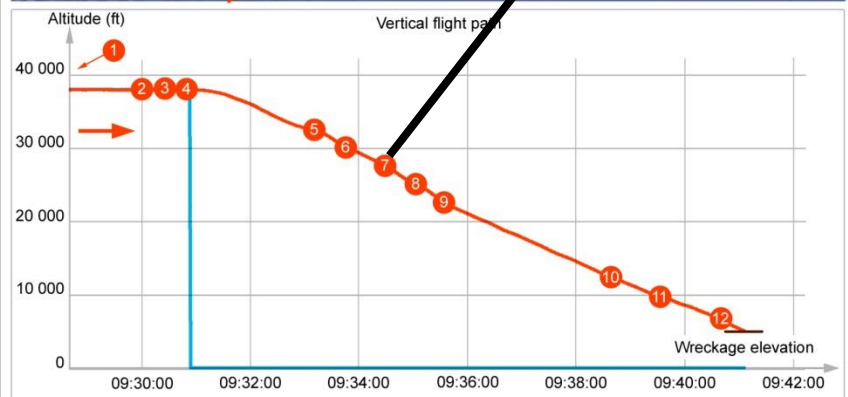
6

At 9 h 33 min 47, the controller asked what cruise level they were cleared for. Aircraft at 30,000 ft. No answer from the co-pilot.

History of Flight



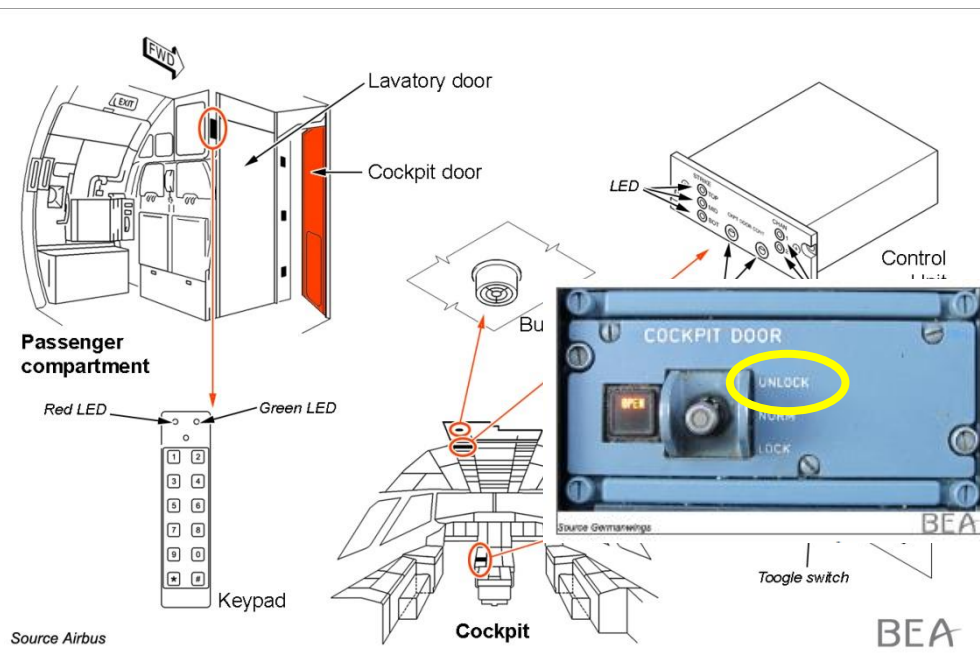
7 At 9 h 34 min 31, the buzzer to request access to the cockpit sounded.



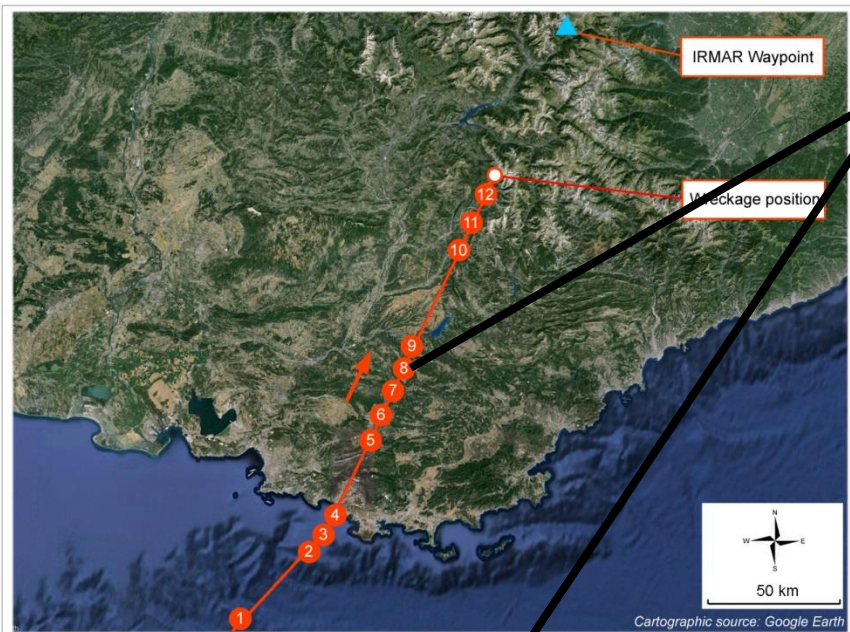
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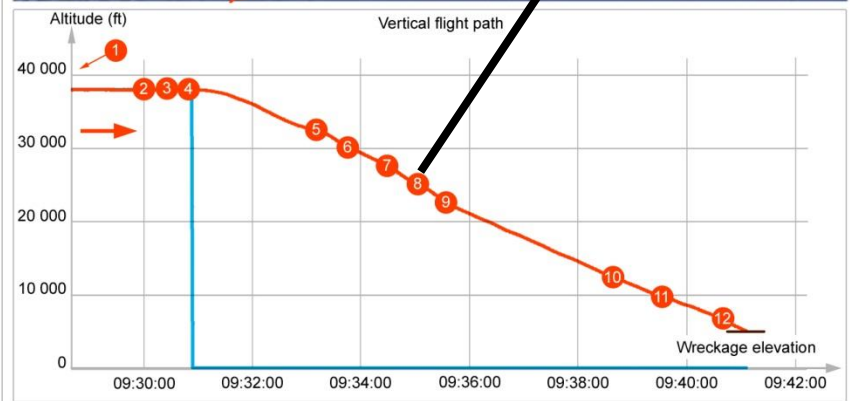


History of Flight



8

At 9 h 35 min 03, the co-pilot commanded the auto-pilot to increase the speed to 350 kt.

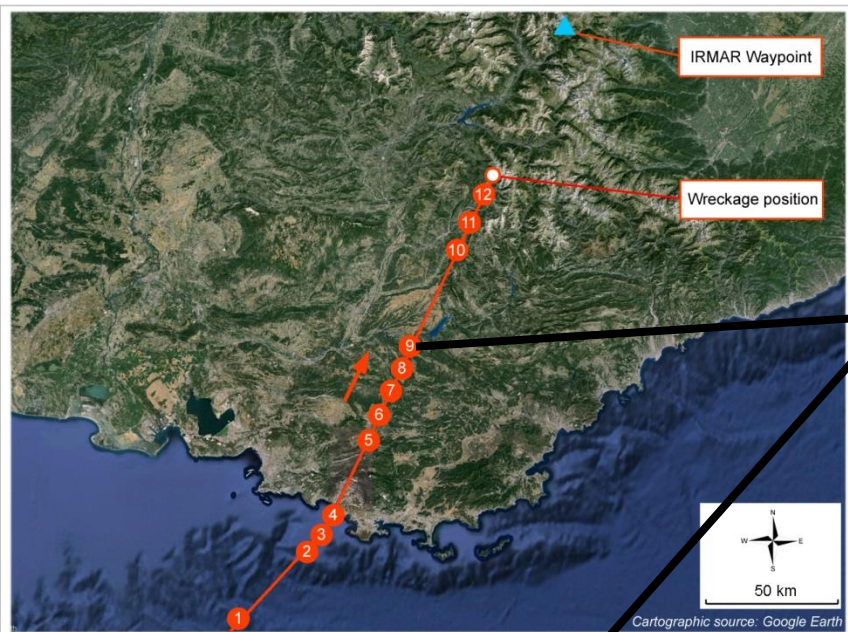


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History of Flight

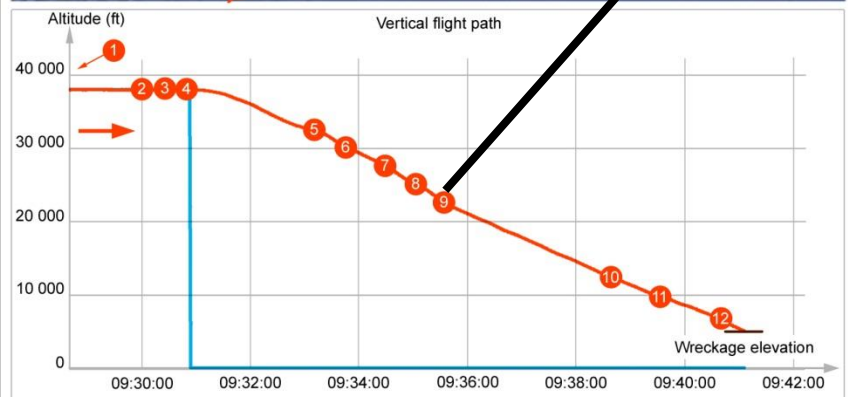


8

At 9 h 35 min 03, the co-pilot commanded the auto-pilot to increase the speed to 350 kt.

9

At 9 h 35 min 32: beginning of noises of a person knocking on the cockpit door. Duration 3 1/2 min.

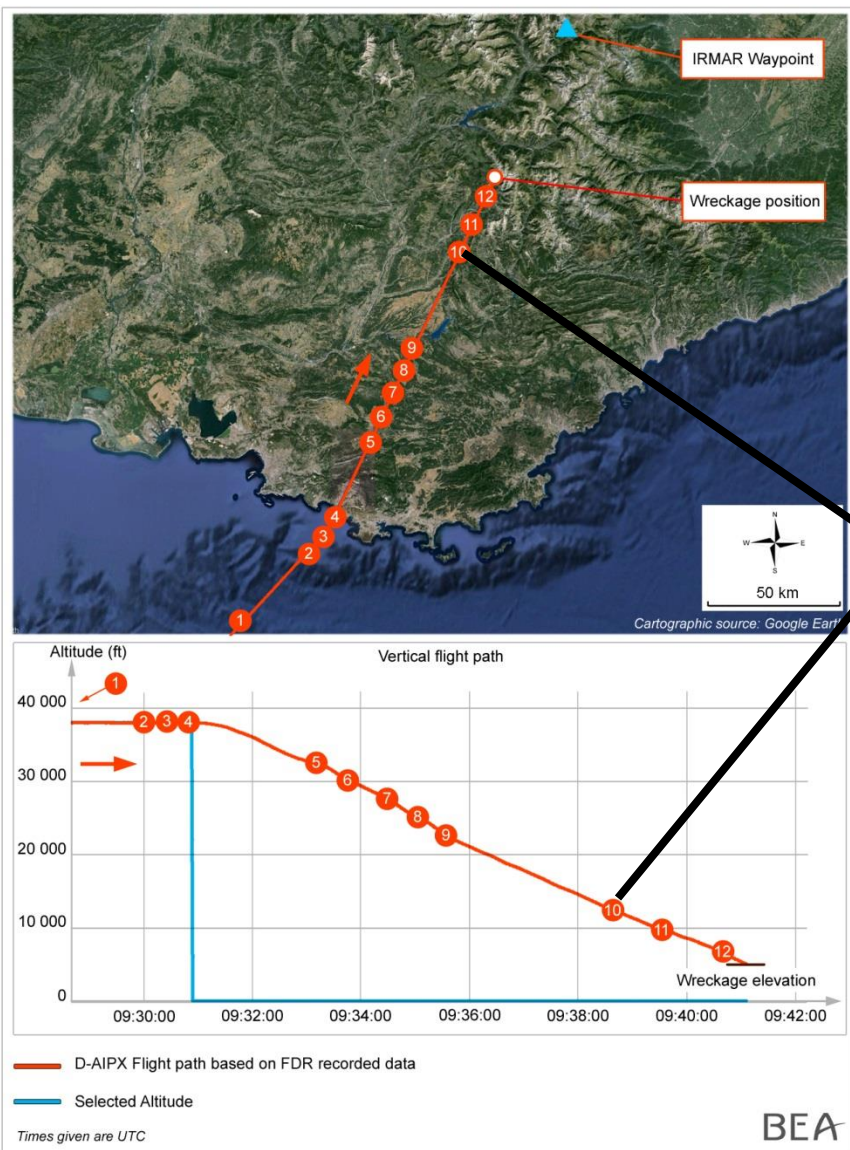


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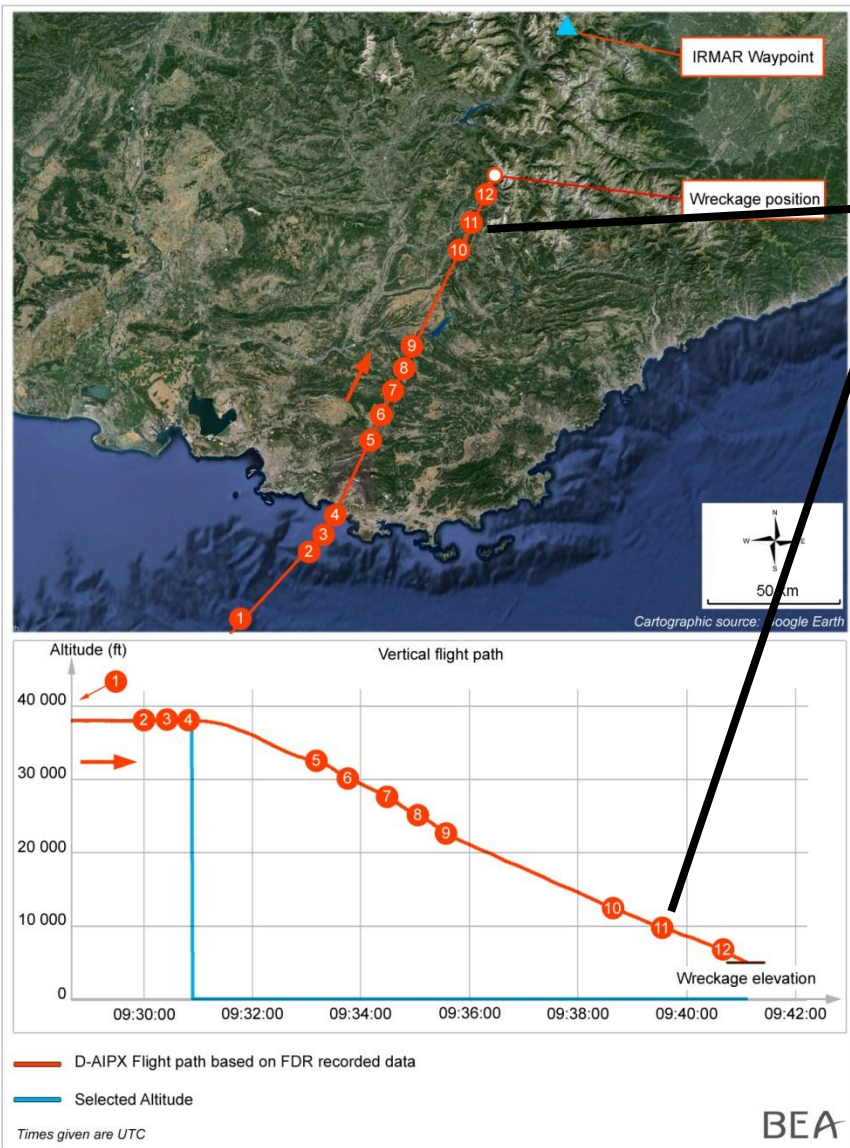
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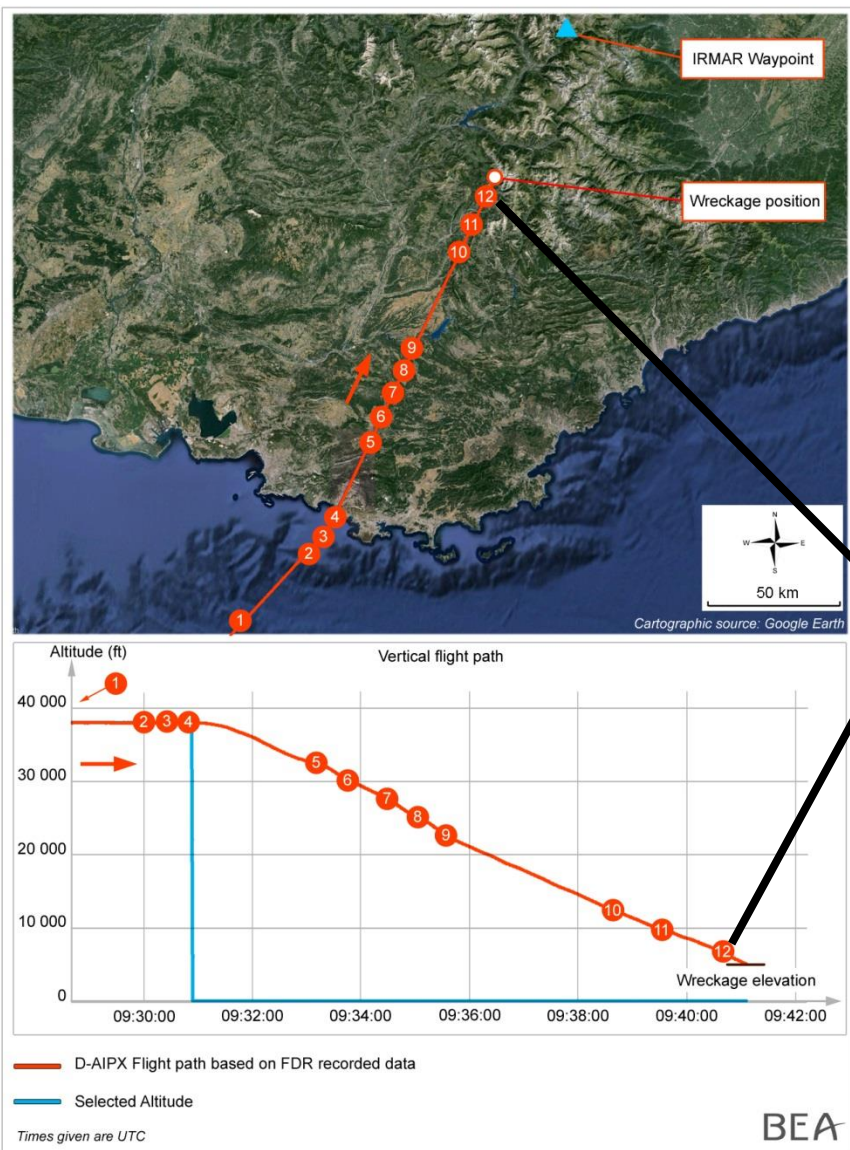
10

At 9 h 38 min 38, a French Air Defence controller tried to contact the flight on 3 occasions. No answer from the co-pilot.

History of Flight



History of Flight



11

At 9 h 39 min 30: first of 5 violent blows on the cockpit door.

12

At 9 h 40 min 41, ground proximity warnings began to sound in the cockpit and 25 seconds later the aircraft collided with the terrain.

Previous Flight

- The co-pilot made altitude selections similar to the ones during the accident flight
- No consequence on the vertical flight path because the autopilot was already engaged in normal descent

Medical Certification Process

Initial Application

- April 2008: application for a medical certificate (professional pilot) at the Lufthansa AeMC
- Fit to fly
- Initial medical certificate issued with no limitation

Medical Certification Process

Initial Application

First Revalidation

- August 2008-July 2009: severe depressive episode without psychotic symptoms
 - January 2009 -July 2009: taking of anti-depressant medication under psychiatric and psychotherapeutic supervision
- April 2009: application for the revalidation of the medical certificate
 - Issuance postponed until further analysis from a specialist
- July 2009: Issuance of a medical certificate with a waiver, stating that it would become invalid if there were a relapse into depression

Medical Certification Process

Initial Application

First Revalidation

Revalidations/Renewals

- Feb. 2010 – July 2014: Fit to fly
 - Medical certificate renewed or revalidated every year, with the same waiver
- Assessment of psychological and psychiatric fitness through observation of behaviour and discussions
 - No visit to specialists

Medical Certification Process

Initial Application

First Revalidation

Revalidations/Renewals

Self-declaration in case of decrease
in medical fitness

- December 2014: consultation for vision problems and sleep disorder
- Feb. 2015 – March 2015: anti-depressant and sleeping-aid medication
- Sick leave certificates:
 - Some forwarded to Germanwings
 - Some not forwarded and during which the co-pilot flew, including the day of the accident

- No self declaration

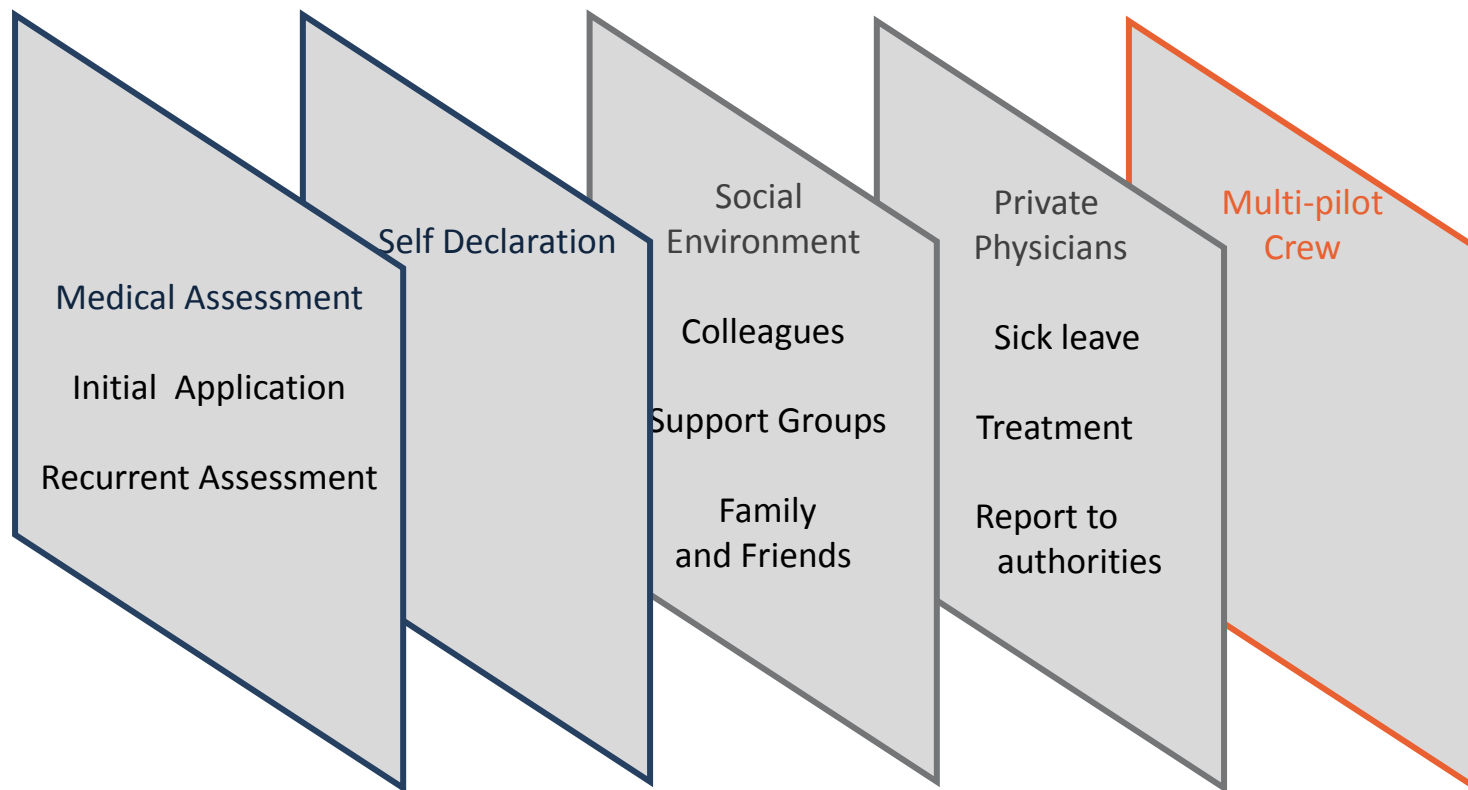
Medical Visits From December 2014

- December 2014: Specialists consulted concluded there was no organic reason for the reported vision problems and sleep disorder
 - 17 Feb. 2015: Private physician referred co-pilot to psychotherapist and psychiatrist for outpatient treatment
 - 24 Feb. 2015: Treating psychiatrist prescribed anti-depressants
 - 10 March 2015: Same private physician referred co-pilot for psychiatric hospital treatment due to a possible psychosis
 - 16 March 2015: Further prescriptions by the treating psychiatrist
 - Visits to other physicians issuing sick leave certificates:
 - No interviews with those physicians were possible during the investigation, so it could not be determined if they considered that this pilot could pose potential risks to public safety
-
- Medical experts concluded that the symptoms developed by the co-pilot were possibly consistent with a psychotic depressive episode

How Did the System Fail In This Case?

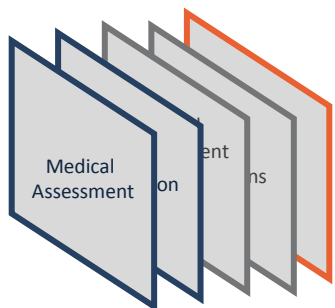
- Self-declaration in case of decrease in medical fitness between two periodic medical evaluations did not occur.
- Private physicians issued sick leave certificates. Authorities and the employer were not aware of the co-pilot situation.

BEA Measures In Place Intended to Ensure Safety



WHAT TO PREVENT:
Pilot with mental disorder being at the controls with the risk of putting the a/c in an unsafe condition

Identified Weaknesses

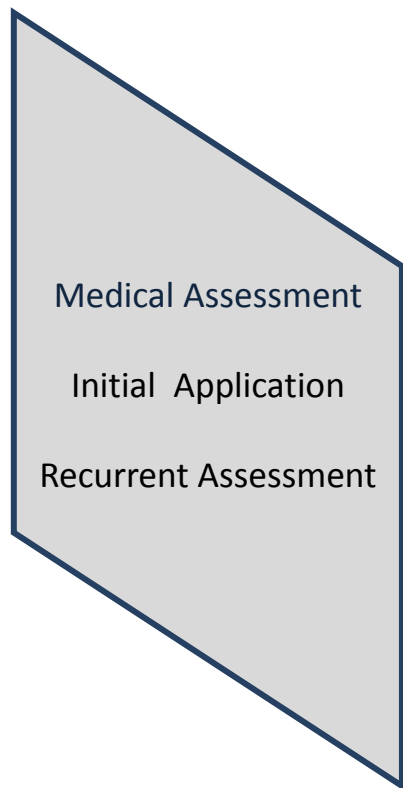
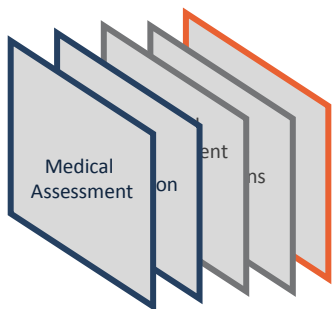


- Worldwide, medical data are strongly protected
- Doctors exposed to sanctions in case of undue disclosure
- Legal provisions to disclose medical info exist in all countries in case of “imminent danger” and/or “threat to public safety”
- Provisions more stringent in some countries



- Balance between medical confidentiality and public safety
 - ➔ Define **clear rules** to **require** health care providers to inform the authorities when a specific patient's health is very likely to impact public safety. The rules must protect the patient, the health care provider and public safety.
 - ➔ Addressed to **World Health Organisation, European Commission, and German BMVI and council of doctors (BÄK)**

Identified Weaknesses

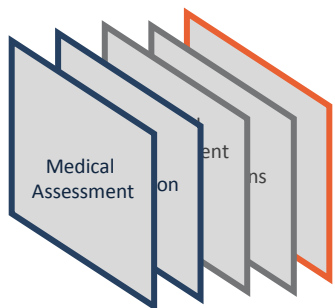


- Psychological assessments of pilots performed through observation of behaviour and discussions
- Same for all pilots, except if AMEs request an expert opinion from a specialist
 - ➔ Routine in-depth psychological testing to detect serious mental illness of **all** pilots not productive nor cost-effective
- EU regulations do not mandate a different process for pilots with a history of mental trouble

- Medical evaluation of pilots with mental health issues
 - ➔ Require **conditions of follow-up** for professional pilots with a history of psychological / psychiatric trouble of any sort: restriction in duration of the certificate, or specific evaluations during revalidation for example.

 - ➔ Addressed to **EASA**

Identified Weaknesses



- Difficulty to self declare for mental disorder issues because of:
 - Altered mental abilities
 - Socio-economic consequences

- Mitigation measures in place in some airlines and other safety-critical industries

- Medication authorized under certain conditions
 - Reduce the risk of pilots flying while depressed without medical supervision or self-medicated
 - Foster self declaration by pilots
 - See practices in Australia, USA, Canada and the UK...

- Anti-depressant medication and flying status

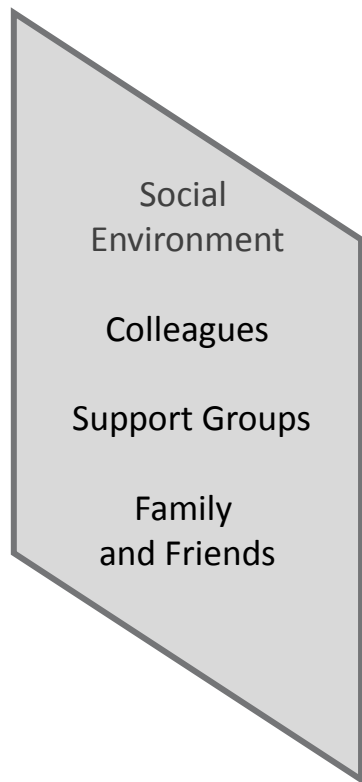
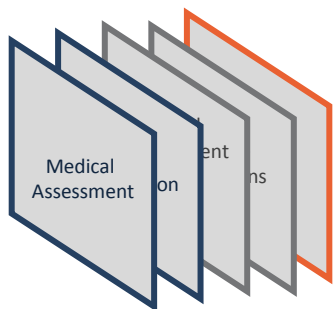
- ➔ European regulations to define modalities which would allow pilots to be declared fit to fly **while taking specific anti-depressant medication under medical supervision.**

- ➔ Addressed to **EASA**

- Mitigation of the consequences of loss of licence
 - ➔ Airlines to **include measures to mitigate socio-economic risks** related to a loss of licence by one of their pilots for medical reasons.

 - ➔ Addressed to **EASA and IATA**

Identified Weaknesses



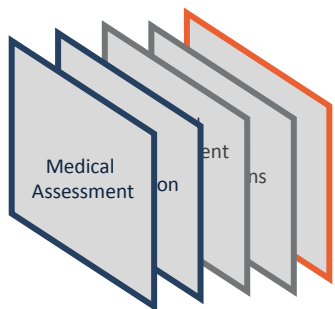
- Peers and social environment can help detect decreases in fitness
- Peer support based on mutual trust and recognition
- Support groups not always available / known
 - ➔ Cultural issues
 - ➔ Constraints due to the size of the airline

- Promotion of pilot support programmes

- ➔ Promote the implementation of peer support groups to provide a process for pilots, their families and peers to report and discuss mental health issues, with the assurance that pilots will be supported, guided, and provided help.

- ➔ Addressed to **EASA**

Identified Weaknesses



- Take control in case of incapacitation
 - ➔ 2nd pilot can be out of the cockpit
 - ➔ Some previous accidents have shown that a pilot could commit suicide even with a 2nd pilot being present

- Locked from the cockpit
- Operation compliant with the current regulation
- Regulation based on security measures:
 - ➔ Fear and probability of unlawful acts and use of aircraft as a weapon
 - ➔ Designed to resist a threat **from outside the cockpit**
- ➔ A door locking system design cannot deal with threats from both inside and outside the cockpit.
 - ➔ Refer to EASA “2-person in the cockpit” rule

Lack of Reporting of In-Flight Mental Incapacitation

- Objectives:

 - Improve the **European knowledge** on the number of incapacitation, especially those related to mental disorders

 - Improve **medical examinations** if need be

- Safety Recommendation on Routine analysis of in-flight incapacitation

 - ➔ Conduct **routine analyses on in-flight incapacitation**

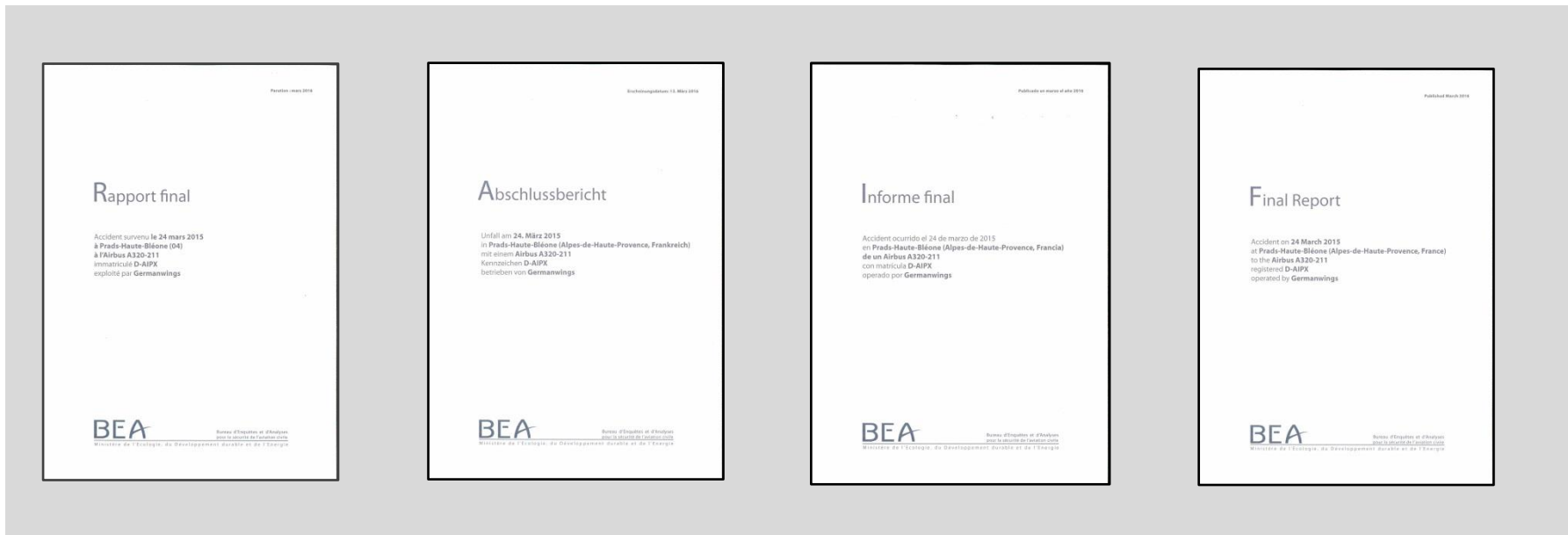
 - ➔ **Encourage data collection** to validate the effectiveness of medical assessment criteria

- Addressed to **EASA**

Eleven Safety Recommendations

Theme	Adressees
Medical evaluation of pilots with mental health issues	EASA
Routine analysis of in-flight incapacitation	EASA (2)
Mitigation of the consequences of loss of licence	EASA and IATA
Anti-depressant medication and flying status	EASA
Balance between medical confidentiality and public safety	WHO, EC in coordination with EU member states, BMVI and BÄK
Promotion of pilot support programmes	EASA

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