



Network Manager
nominated by
the European Commission



TCAS RA not followed

Tzvetomir BLAJEV
Stan DROZDOWSKI



EUROCONTROL

European Organisation for the Safety of Air Navigation

- Civil-military intergovernmental organisation
- 41 Member States
- 2 Comprehensive Agreement States



TCAS II

- Tracks other transponder equipped aircraft issuing Resolution Advisories if there is a risk of collision
- Implementation driven by mid-air collisions



- “Last resort” safety net against mid-air or near mid-air collisions

Reducing airborne conflict risk

- TCAS estimated to reduce the risk of mid-air collisions by a factor of about 5
- The better the level of pilot compliance with RAs the greater the reduction in risk
- Reasons behind non-compliance must be understood and addressed

RA Not Followed: Real-life example

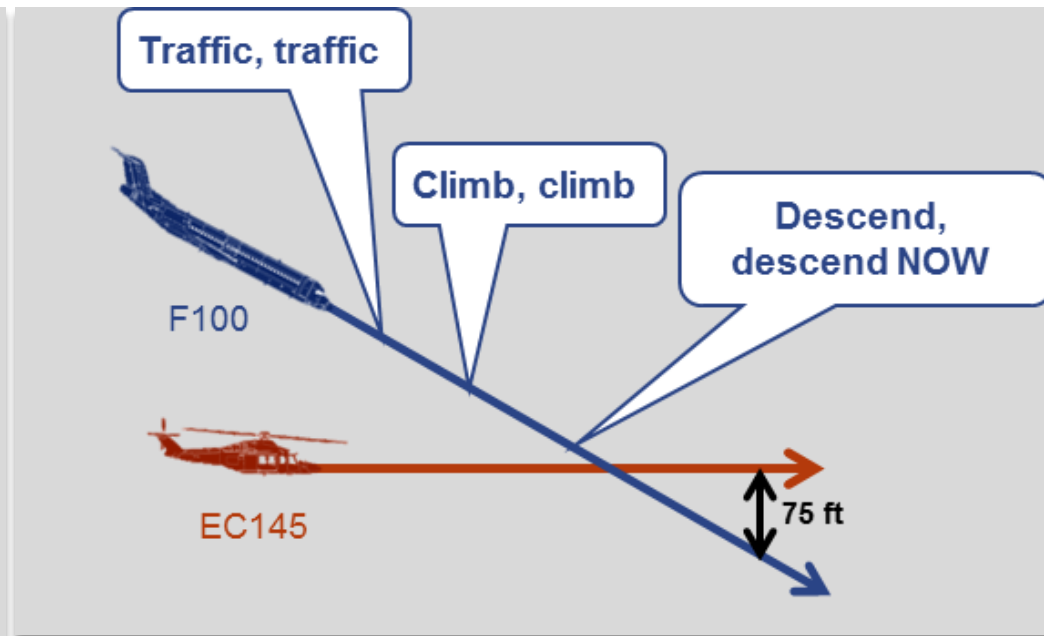
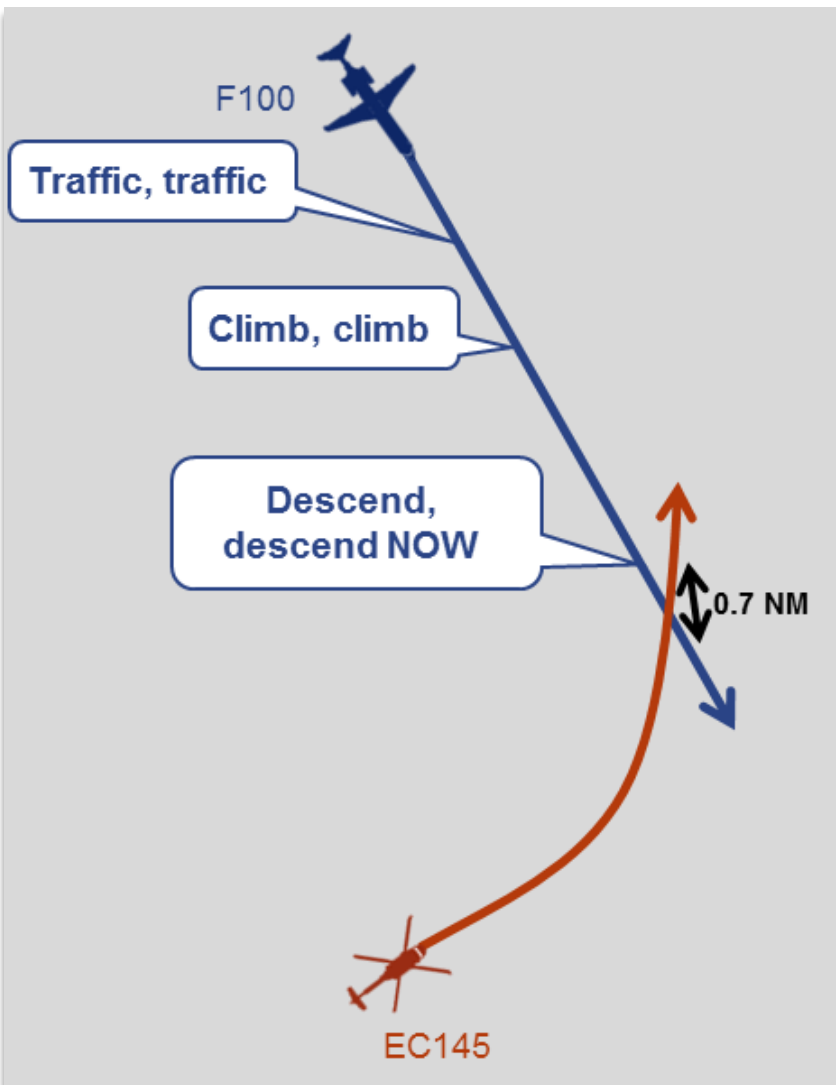


Fokker F100, passenger jet, equipped (as required) with TCAS II, IFR, on final approach to its destination



Eurocopter EC145 helicopter, equipped with TAS, VFR, crossing the approach path

RA Not Followed: Real-life example



RAs ignored by the F100 crew

TCAS RA Not Followed

One of Network Manager Top 5 safety priorities

- Critical element of airborne conflict risk

Operational Safety Study published on 1 Sept. 2017

- Knowledge management process of collecting information, defining scenarios, analysing barriers and documenting conclusions for the Network partners

A survey with pilots performed at the end of 2016

- By IATA and the Network Manager
- To help characterise the risk
- As it is difficult to construct scenarios only from investigation reports

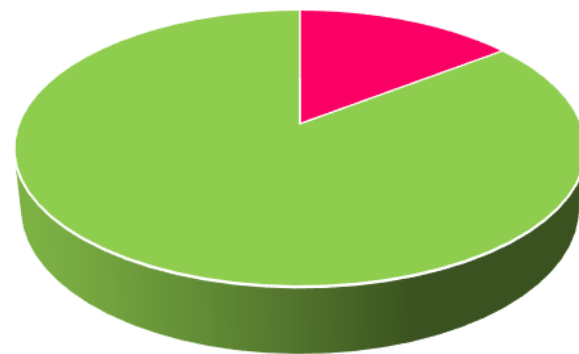
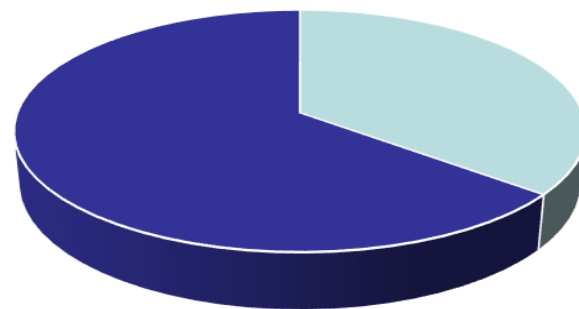
The Survey

- 3800 Pilots from 95 countries participated
- Questions grouped in 5 Sections:
 1. Recalling a TCAS RA - 3 questions
 2. TCAS RA followed - 19 questions
 3. TCAS RA not followed - 21 questions
 4. Demographics - 6 questions
 5. TCAS training - 6 questions
- Selected results presented hereafter

TCAS RA Experience

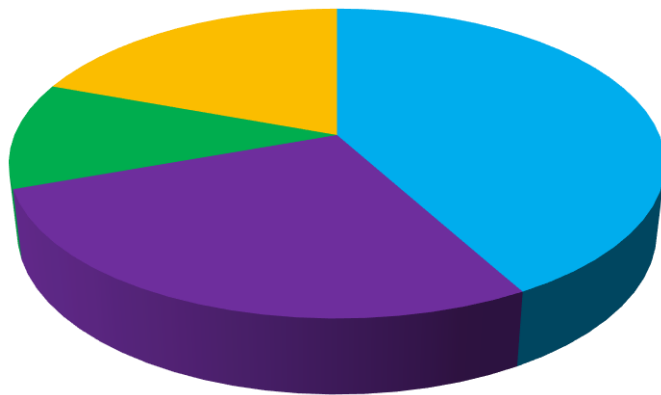
37% of respondents experienced an RA in the last 5 years

15% of them did not follow the RA



Aircraft Type

RA possible to follow and followed



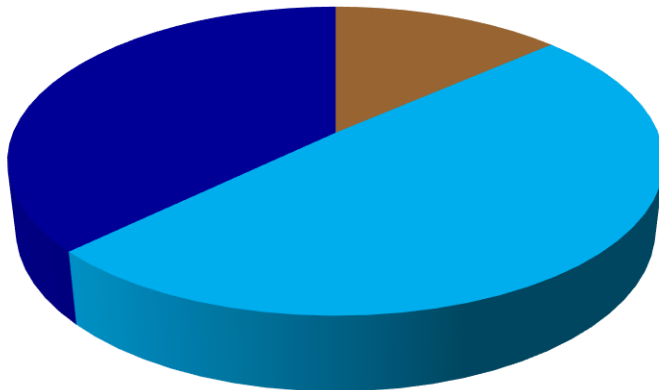
RA not possible to follow or RA not precisely followed



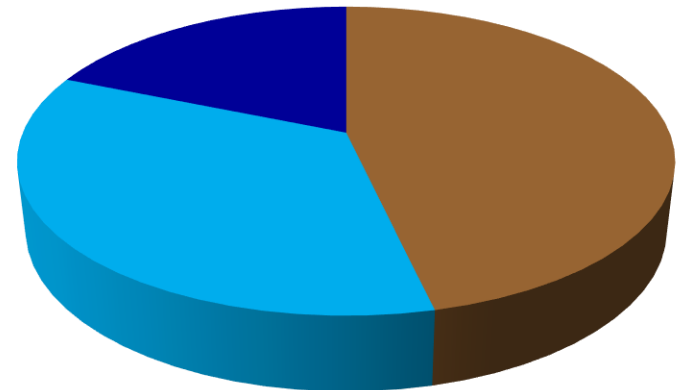
42%	Airbus	33%
28%	Boeing	22%
11%	Embraer	16%
19%	Other	29%

At What Level?

RA possible to follow and followed

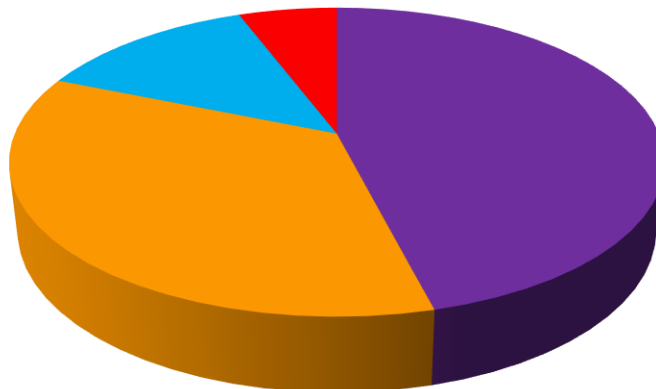


RA not possible to follow or RA not precisely followed



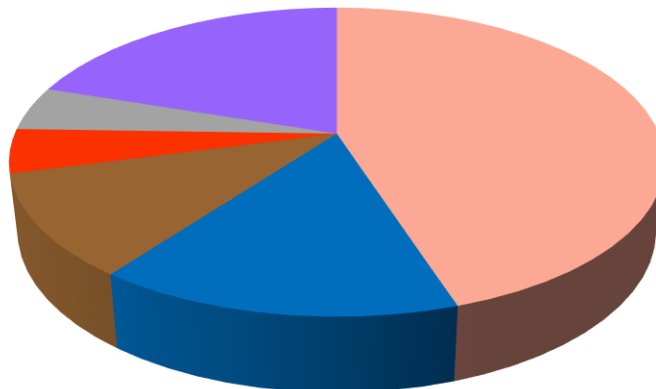
37%	FL200 and above	19%
49%	3000 ft AGL – FL200	35%
14%	Below 3000 ft AGL	46%

Not following RA – action



46%	No manoeuvre (response)
35%	Less than the required vertical RA rate
13%	More than the required RA vertical rate
6%	In opposite sense to the RA

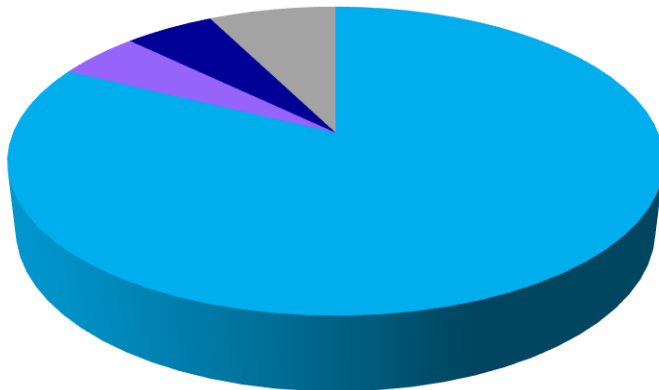
Survey: Top reason not to follow RAs



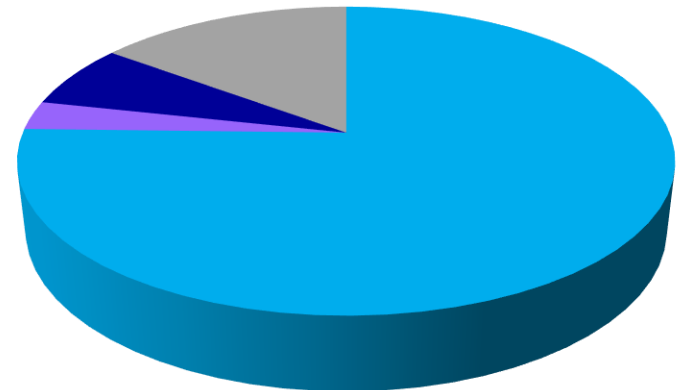
45%	Visual acquisition/avoidance
15%	Short duration RA
11%	Proximity to the ground
5%	Parallel approach
5%	Not trusting TCAS system
19%	Other (14)

Operator type

RA possible to follow and followed



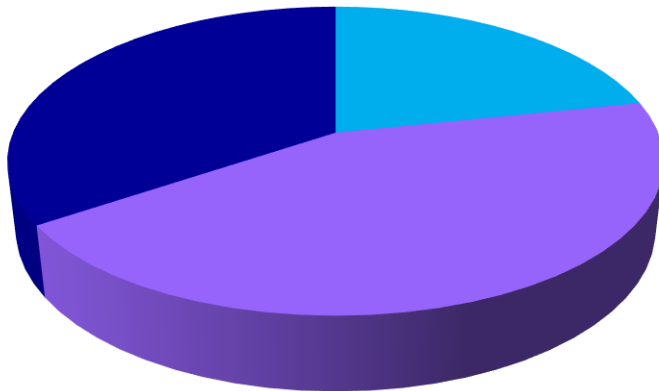
RA not possible to follow or RA not precisely followed



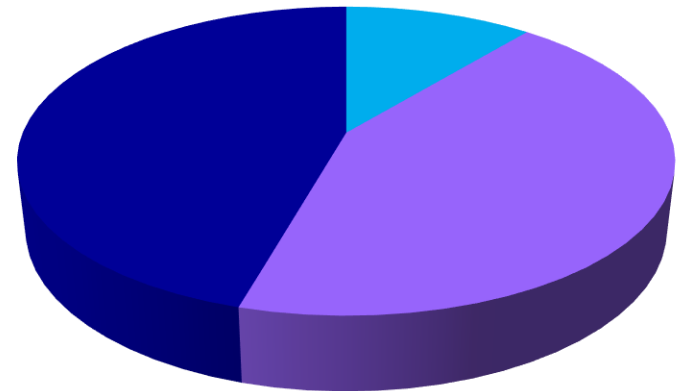
82%	Scheduled (passenger)	75%
5%	Charter (passenger)	3%
5%	Cargo	7%
8%	Other	15%

RA display

RA possible to follow and followed



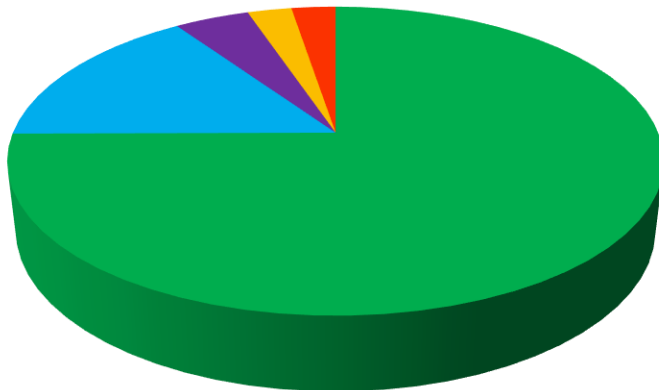
RA not possible to follow or RA not precisely followed



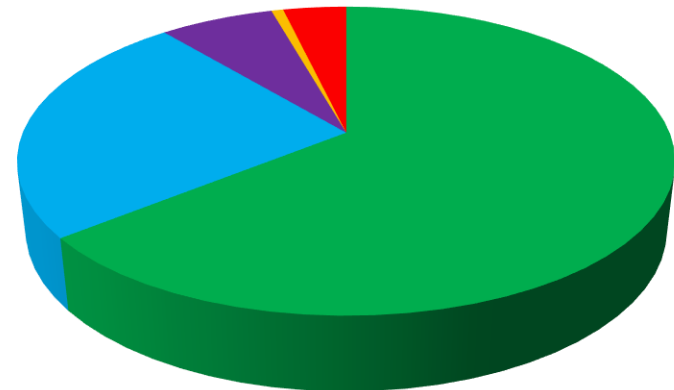
22%	Altitude indicators	11%
44%	Vertical speed indicators	43%
34%	Both	46%

Recent TCAS Training

RA possible to follow and followed



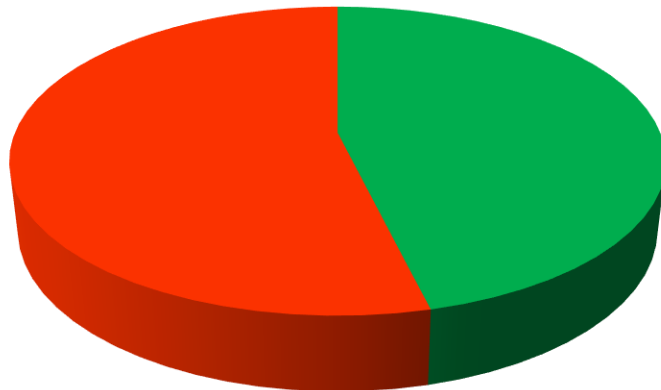
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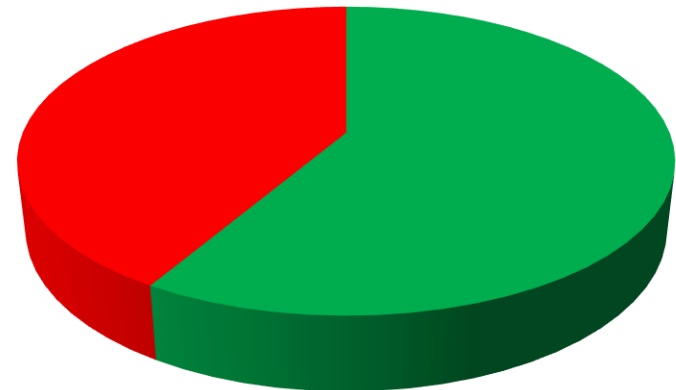
75%	0-6 months	64%
15%	7-12 months	24%
4%	1 to 2 years	7%
3%	2 to 5 years	1%
3%	Over 5 years/never	4%

Pre-warning about RA exercise

RA possible to follow and followed



RA not possible to follow or RA not precisely followed



46%	Yes	58%
54%	No	42%

Conclusions

- The results of the study are derived from an online survey carried out by IATA that elicited 3800 responses from pilots in 90 countries.
- Only 3 barriers identified to prevent TCAS RAs from not being followed correctly. All of these barriers are only effective for a small number of generic scenarios.
- However, since one type of scenario is prevalent in the actual operation i.e. TCAS not followed due visual acquisition; training and promotion of expected pilot response could be effective.
- Only one barrier to mitigate the impact of pilots not following TCAS RAs correctly - Autopilot/Flight Director capability to fly the RA.

Conclusions (cntd)

- According to the Pilot Survey
 - around 36% of pilots reported experiencing at least one TCAS RA situation within the 5 year period covered by the survey.
 - around 15% of the pilots that reported encountering at least one TCAS RA within the 5 year period covered by the survey, reported not following an RA for various reasons.
 - a decision not to follow an RA due to visual acquisition of the apparent intruder accounts for more than 70% of all RAs not followed without a valid reason.
 - neither having a Traffic Advisory (TA) prior to the RA, nor the type of RA was reported to make any significant difference to the likelihood of an RA being followed.
- The percentage of TCAS RAs that are not followed is likely to be around 11%.

Study Recommendations

- IATA, Pilot Associations, Aircraft Operators and Regulators to review the findings of this study and consider undertaking operational safety analysis and improvement activities for “TCAS RA Not Followed”.
- IATA, Pilot Associations, Aircraft Operators and Regulators consider actions to support an increased active use of FDM in the monitoring of TCAS RA compliance and the provision of feedback to training organisations and flight crew involved.

Study Recommendations (cntd)

- European ANSPs and the EUROCONTROL Safety Improvement Sub-Group (SISG) to monitor occurrences involving “TCAS RA Not Followed” to determine changes in frequency and severity.
- All European stakeholders to monitor and support the development of tools and procedures that may assist in the prevention and/or mitigation of TCAS not followed events.
- All European stakeholders to **promote and emphasise the requirement and importance of following TCAS RA commands despite an apparent intruder being visually identified and monitored** (subject to the overriding safety of the aircraft).