Network Manager
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EUROCONTROL

2014 Top 5 Safety Priorities

Blind Spot and Sector Coordination

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Top 5

PUTTING IT INTO CONTEXT

- For every 1 million flights in European airspace there are around 150 losses of prescribed separation.
- Each flight receives around 15 executive instructions in the En-Route environment.
- 1 loss of separation per 100,000 instructions.
- Primary contributory factor Pilot 60% ATC 30% Dual 10%
- 1 loss of separation involving ATC factor per 250,000 instructions

INEFFICIENT CONFLICT DETECTION OF THE CLOSEST AIRCRAFT

Losses of Separation in the En-Route environment sometimes involve a controller “blind spot”. These typically involve either a climb and descent clearance given in consideration of another aircraft or a constraint but not taking into account the aircraft in the immediate proximity.

Generic Scenarios from analysed cases

- Attention Grabber e.g. Immediate response to a pilot request;
- Requirement to meet constraints e.g. sector exit levels;
- No conflict detection due to aircraft not following Flight Plan route e.g. Direct routing to Waypoint clearances;
- Solving a potential future conflict and not seeing the resultant immediate conflict;
- Distraction e.g. focussing attention elsewhere .

Outcomes

- Loss of Separation with Executive controller working both aircraft
- Loss of Separation with Executive controller working one aircraft
- Loss of Separation with Executive controller working neither aircraft

Barriers that if available and deployed could

- Prevent the occurrence of a Loss of Separation due to inefficient detection of conflict with the closest aircraft.
- Mitigate the consequences of a Loss of Separation due to inefficient detection of conflict with the closest aircraft.

Prevention Barriers

PB1	Routine Structured Scanning
PB2	Tactically updated Flight Data Display (Direct Waypoint routings)
PB3	Proactive Colleagues (Team Resource Management)
PB4	Short Term Probe (What if)
PB5	Separation Alert Tool (Predictive)
PB6	Defensive Controlling (Keep it simple)
PB7	Data Block Clarity Brightness/Reduction/Dynamics (Unhide)

Mitigation Barriers

MB1	Colleague Warning
MB2	Pilot Alert (including TCAS TA)
MB3	Short Term Conflict Alert
MB4	TCAS RA

Conclusions

- 65% of the actual events involved a controller focussing attention on the resolution of a future potential conflict and not taking into account a closer aircraft and the resultant actual conflict.

This may support the concept of layered filtering. Some aircraft are filtered out as "Job Done". There may also be some lessons with regard to less "aggressive" and more defensive controlling.

- 60% of the actual events involved Flight Data displays that were either not updated or were not capable of being updated to highlight a conflict. 80% of these events also involved an aircraft that was not following its Flight Plan route but was on a direct routing to a Waypoint.

This may indicate a need for ANSPs to focus on providing Flight Data to better support controllers in the detection of potential conflicts.

Conclusions cont'd

- 30% of actual events involved an immediate response to a pilot request for climb or descent.

  This may indicate a need to educate controllers with regard to the limitations of attention and to reinforce scanning techniques.

- 30% of actual events involved a controller focusing attention on a requirement for an aircraft to be at a specific level by the sector boundary.

  This would appear to have a similar root to the first bullet – living in the future.

- 30% of actual events involved a controller having his attention distracted elsewhere and either making a rushed, ill-considered decision or not monitoring his primary display.

- 30% of actual events involved a split of sectors less than 10 minutes beforehand. A further 12% of events occurred during a sector split or handover/takeover.

Barriers strength

- Barrier: Proactive Colleague (TRM) has the potential to prevent all losses of separation. Apart from training, this is a cost free barrier.

This barrier failed in all of the actual events. The traditional recommendation would involve awareness campaigns on vigilance and professional challenge. Without a knowledge of how this is done on a day to day basis, we cannot make any tangible advance.

- Barrier: Pilot query (including TCAS derived information) has the potential to reduce the severity of all loses of separation.

Apart from training, this barrier is cost free.

- Barrier: Short Term Probe (What if) has the potential to be an effective barrier against all but events involving controller distraction, whereby the controller would not consider its use.

This may have prevented over 70% of the actual event studied

Barriers strength cont'd

- Barrier: Updated Flight Data Display (direct to waypoint) could be an effective barrier in all but one situation i.e. controller distraction.

  This may have prevented over 60% of the actual events studied.

- Barrier: TCAS Resolution Advisory also has the potential to mitigate the severity of all loses of separation.

  It resolved or was available to resolve the actual mid-air collision risk in 87.5% of the events.

CONFLICT DETECTION WITH ADJACENT SECTORS

Losses of Separation in the En-Route environment sometimes involve “inadequate coordination” of clearance with an adjacent sector. These often involve either an early transfer of control to or from the neighbouring sector and either a lack of coordination or misunderstood coordination.

Generic Scenarios from actual events

- Incorrect entry into an adjacent sector after correct co-ordination
- Incorrect entry into an adjacent sector after incorrect/incomplete/ misunderstood co-ordination.
- Incorrect entry into an adjacent sector after no co-ordination
- Incorrect entry into an adjacent sector after failure to apply Standing Agreements/Procedures

Barriers - Similar to Barriers identified in Blind spot Study

- Pro active Colleagues (TRM)
- What If/Probe tools
- MTCA / Separation Tools
- Defensive Controlling – Keep it simple
- Airspace Incursion tools

Conclusions

- 68% of actual loss of separation events involved either or both of a failure to correctly apply standard procedures or a failure to coordinate with the relevant sector.
- The Preventative barriers: Predictive Separation Alert Tool and Airspace Intruder Alert have between them the potential prevent all losses of separation of this type.
- The Preventative barrier: Proactive Colleague (TRM) has the potential to prevent the causal chain or to stop the potential conflict early.
- 60% of actual loss of separation events involved an adjacent ACC. Some of them are in the Oceanic environment and most of them indicate areas where communication between ACCs could be improved.
- 50% of actual loss of separation events involved situations in which the executive controller of the sector was only talking to one of the aircraft. Just over a third of these events involved the early transfer of communication of aircraft away from the sector frequency, but an equal number involved the late transfer or call of aircraft coming into the sector.

Conclusions cont'd

- 50% of actual loss of separation events involved the early transfer of traffic within the sector to another sector, and hence losing immediate communication and control of that aircraft. This may be partially due to a "filtering out" methodology employed by controllers. "I'm not going to do anything more with this aircraft so I may as well transfer it to the next frequency, job done".

  It is suggested that ANSPs and controllers need to consider how the early transfer of communication could increase the potential for undesired outcomes and increase the task of recovery.

- 33% of actual loss of separation events involved an incorrect plan and more than half of those events (57%) then involved a failure to monitor the incorrect plan. Once a plan is put into operation there is often a "job done" attitude, which results in a lack of monitoring the plan.

  This was also apparent in the Top 5 "Controller Blind Spots "study. This reinforces the suggestion that an emphasis on Routine Structured Scanning of both radar and flight data would be beneficial.

Conclusions cont'd

- 36% of events occurred when the executive controller of the sector was *not in communication with either aircraft.* It is clearly an undesired state for a loss of separation to occur between two aircraft within a sector, neither of which is in communication with that sector. The majority of these events (64%) involved the early transfer of communication of an aircraft still in that airspace together with an airspace intruder.
- The study identified **40 different contributing factors** that were Causal i.e. part of the factor chain that caused the event. This does not include a myriad of contextual factors.
- Practical application of the *Safety II* approach and *System safety thinking* may provide a greater understanding of these types of events. For example, the actual events studied show little or no evidence of effective controller or pilot/controller Team Resource Management and yet these proactive safety aids must be present when it goes right.

Questions?