Go-arounds

STEADES

In-depth analysis

Agenda

- High-level Analysis Outcomes
- In-depth Analysis
  - Go-around Context
  - Go-around Decision
  - Go-around Execution
  - Go-around Outcome
- Conclusion

High level analysis: Summary

- Contributing factors were Weather (27%), Flight Management (23%) and Other Aircraft (21%)

- Flight Management includes the contributing factors High Energy or Unstable Approach, Manual Handling, Flight Crew Mis-selection

- Air Traffic Management was mentioned in 18% of all go-around events with two key sub-categories Inadequate Separation and ATC Service Standard.

- Findings of this comparison were that the 68% (63) of accidents in 2011 occurred during the phases approach, go-around or landing.

In-depth Analysis: Overview

Data set:

- Random data sample comprising 1050 ASRs
- Q1 2009 to Q4 2011 incl.

The random data sample was built on the assumption that throughout all operators reporting to STEADES a "go-around" is understood as the same type of event

Objective:

Analyze ASRs from STEADES database for go-around related items in the predefined areas:

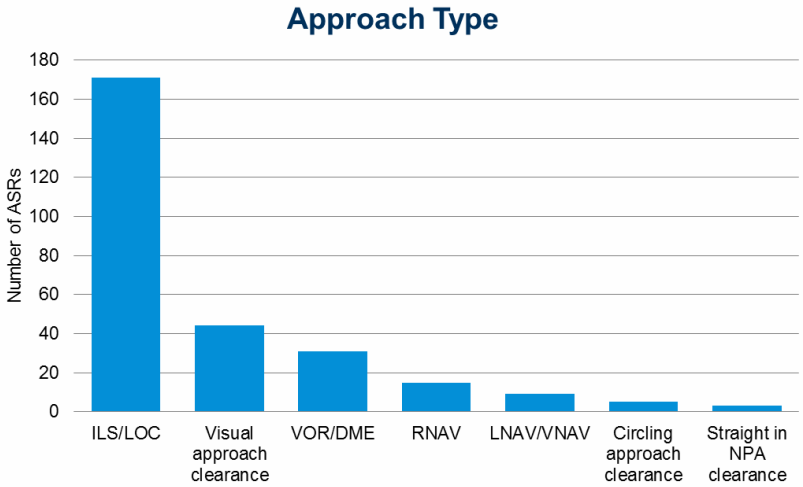
- Context
- Decision
- Execution
- Outcome

In-depth analysis: Limitations

- In-depth analysis includes reading and categorizing each ASR
- Quality, content and information of ASRs vary:
  - Poor narrative 4%
  - Non-english narrative 7%
- Information typically included in ASRs
  - Whether go-around initiated by Flight Crew or ATC
- Due to the limitations some sections of the analysis are based on relatively small proportions of ASRs
- Type of normalization of the random data sample limits regional analysis

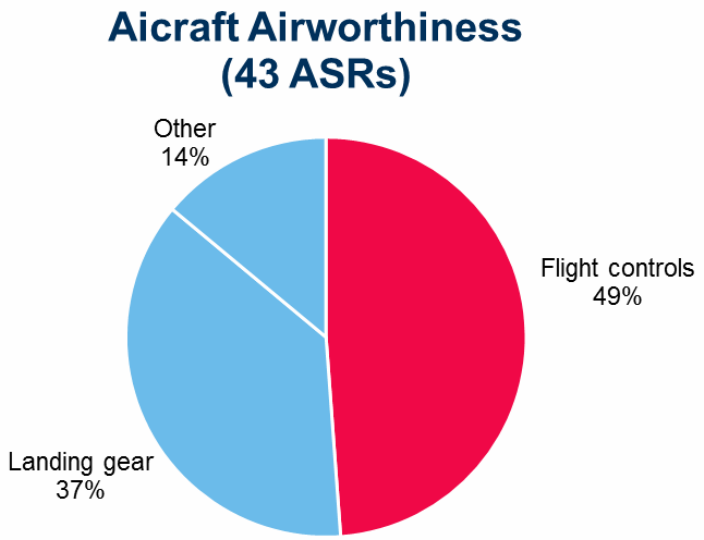
Context: Approach type

- 25% (263 ASRs) of overall dataset contained information regarding approach type
  - 65% of those: ILS/LOC



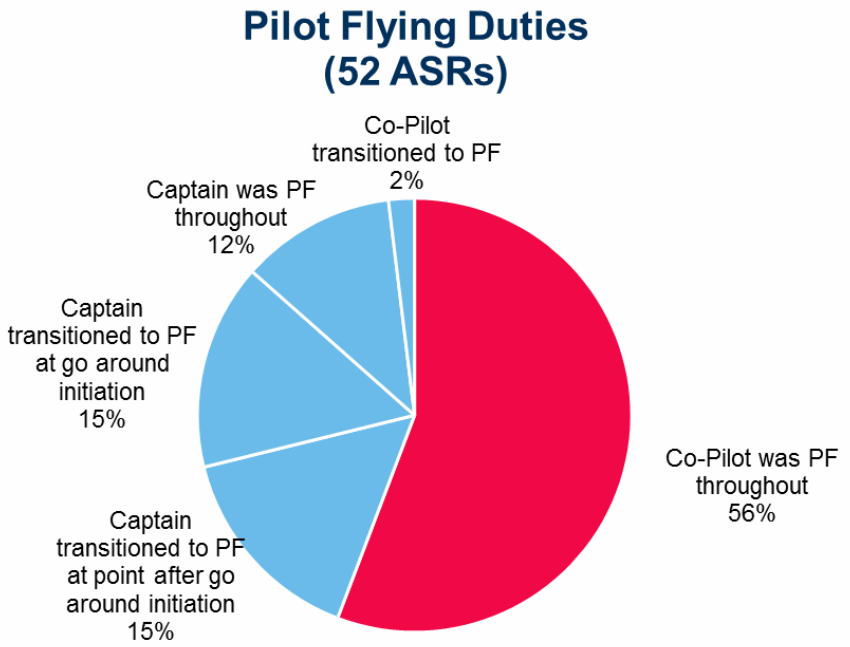
Context: Airworthiness

- 4% (43 ASRs) reported a technical issue as a main contributing factor of go-around
  - Majority of reports noted that flight crew received EICAS/ECAM warning
  - 49% related to flight controls
  - 37% related to landing gear



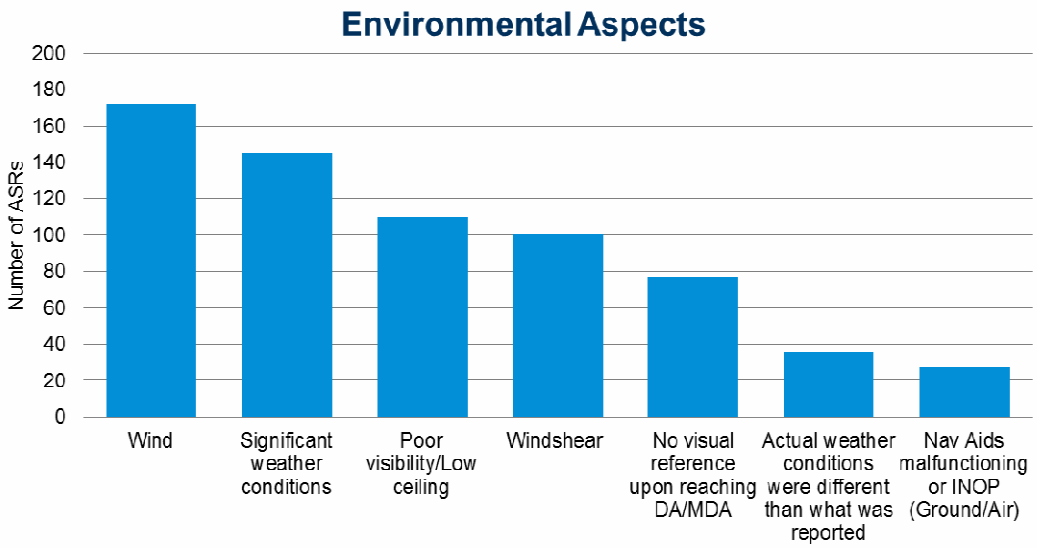
Context: Pilot Flying Duties

- 5% (52 ASRs) of overall dataset contained information regarding pilot flying duties
  - Co-pilot was PF in 56% of those events
  - 15% Captain transitioned to PF at point after go-around initiation
  - 15% Captain transitioned to PF at go-around initiation



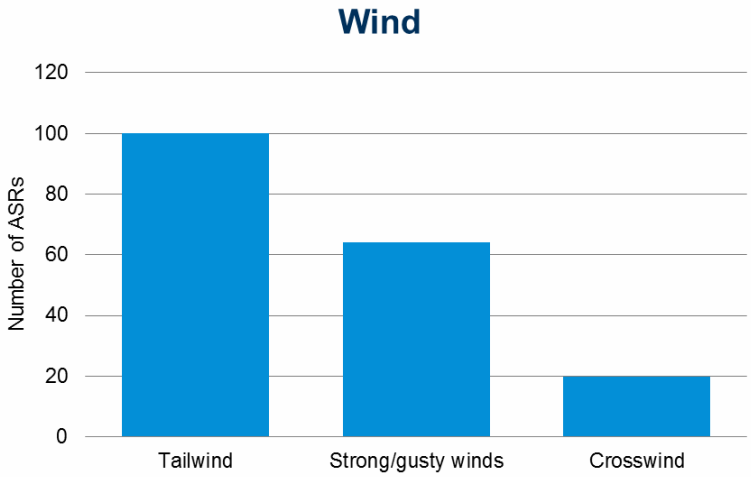
Context: Environmental Aspects

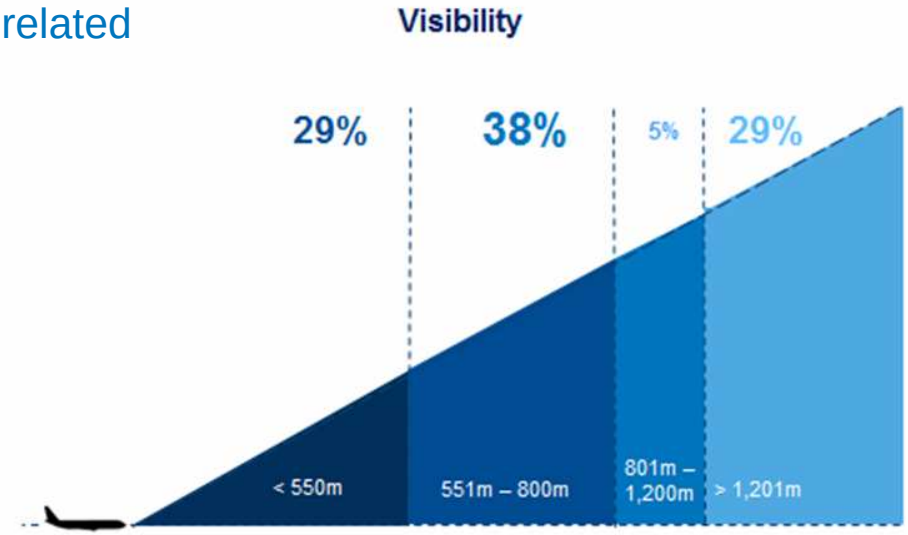
- 39% (412 ASRs) of overall dataset mentioned environmental aspects
  - 42% of those reports noted Wind
  - 35% significant weather conditions
  - 27% poor visibility/low ceiling



Context: Environmental Aspects

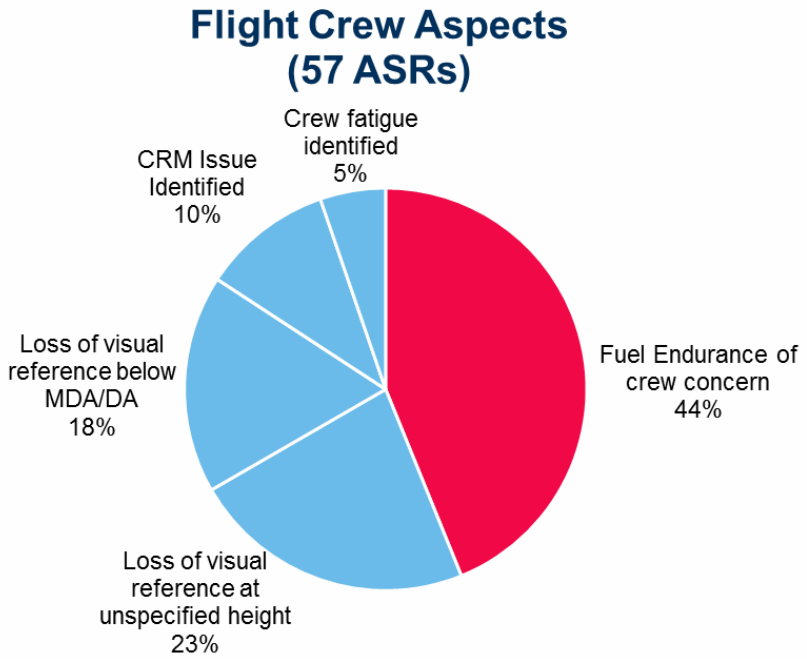
- Wind, visibility and windshear were frequently cited environmental factors in go-around related reports therefore further analyzed





Context: Flight Crew Aspects

- 5% (57 ASRs) of the overall dataset cited flight crew aspects
  - 44% noted fuel endurance c crew concern
  - 23% loss of visual reference unspecified height
  - 18% loss of visual reference below MDA/DA

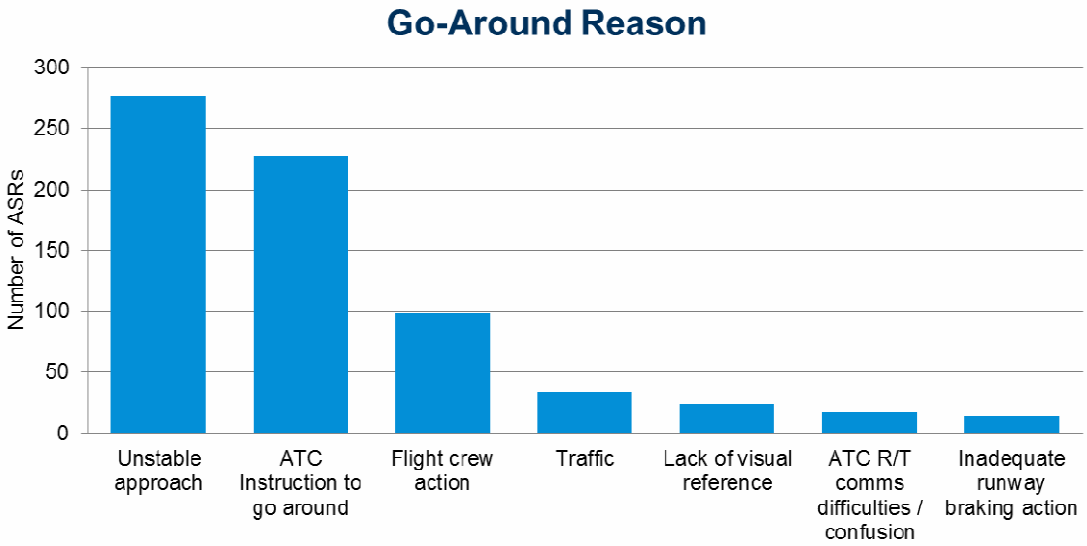


Context: ATC Aspects

- A vast majority of STEADES ASRs are reported by the flight crew. Therefore, the narratives offer only flight crew perspective on go-arounds regarding the context. Further information of ATC related aspects will be covered under the Decision making and Execution part of the analysis.

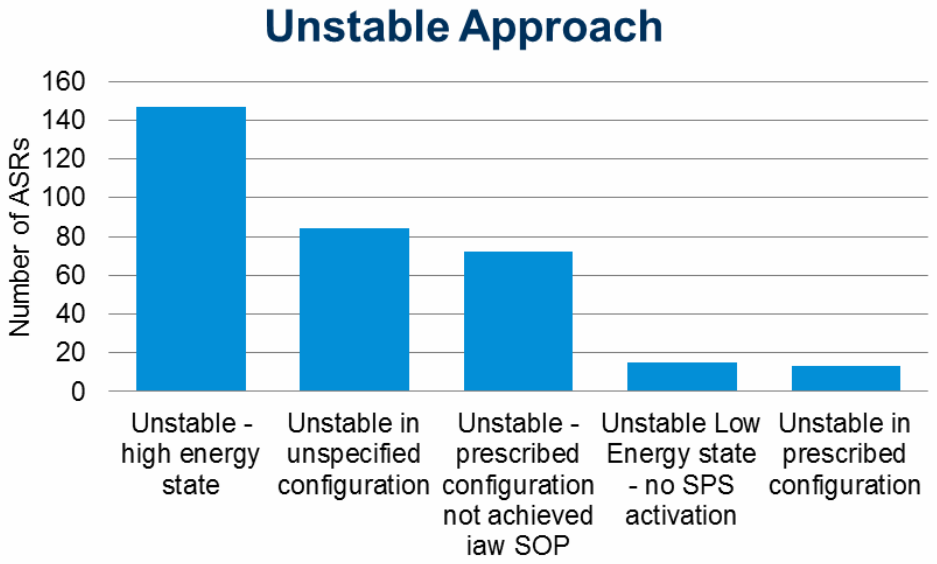
Decision: Reason

- 61% (640 ASRs) of the overall dataset noted a go-around reason
  - 43% of those reports were related to unstable approach
  - 36% reported ATC instruction to go-around
  - 15% Flight crew action

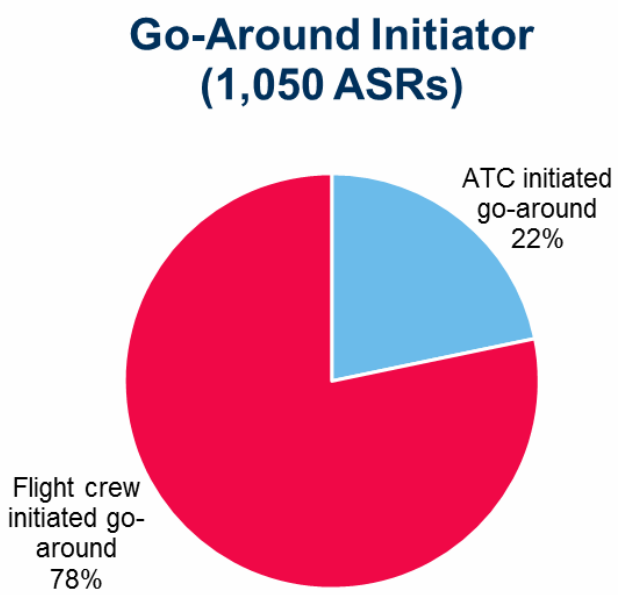


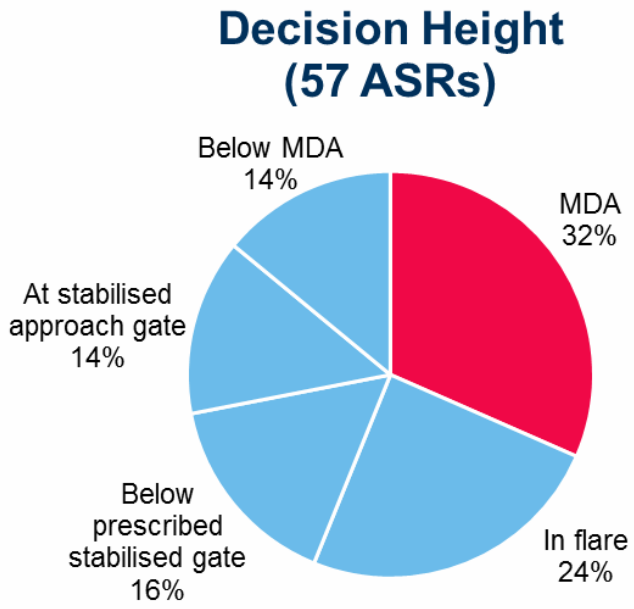
Decision: Reason

- 26% of the entire dataset mentioned unstable approach as a go-around reason
  - Further analysis of the type of unstable approach was conducted

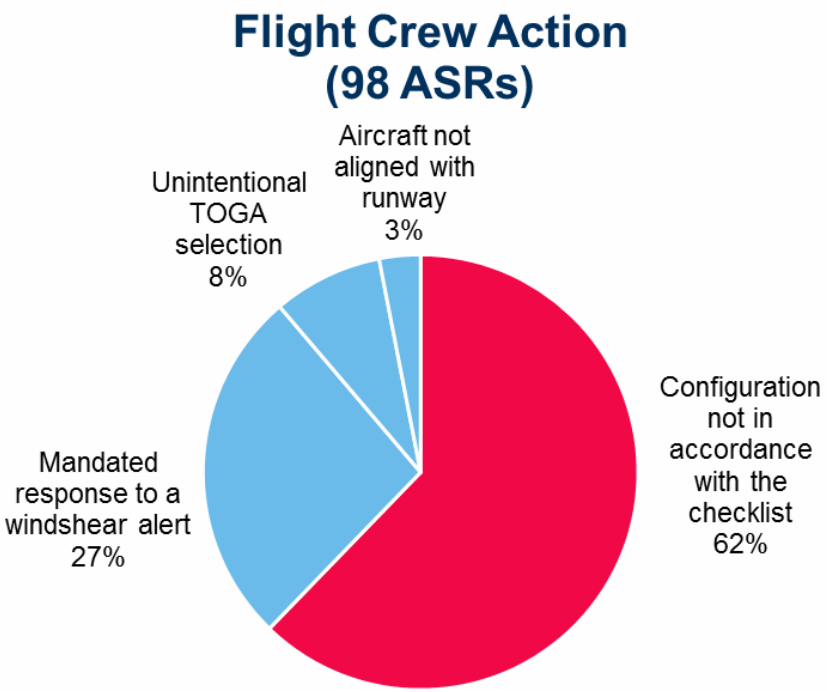


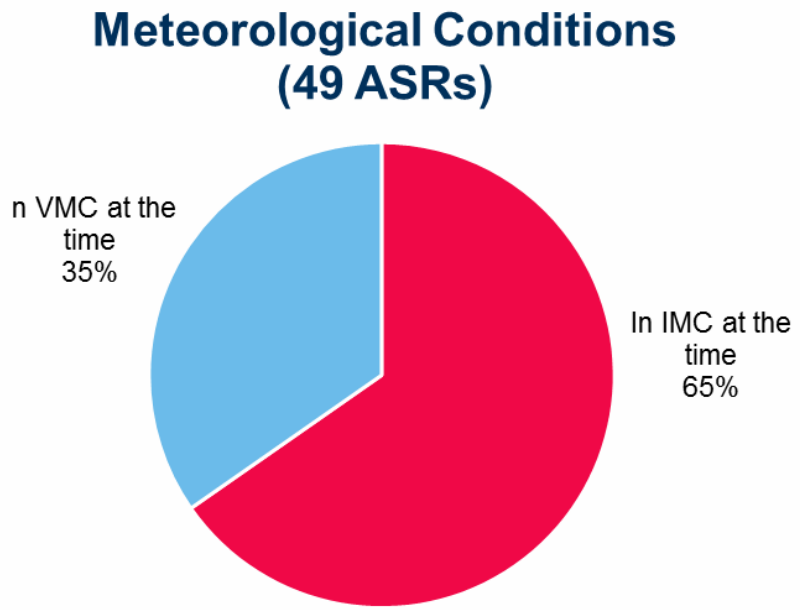
Decision: Initiator and Decision Height





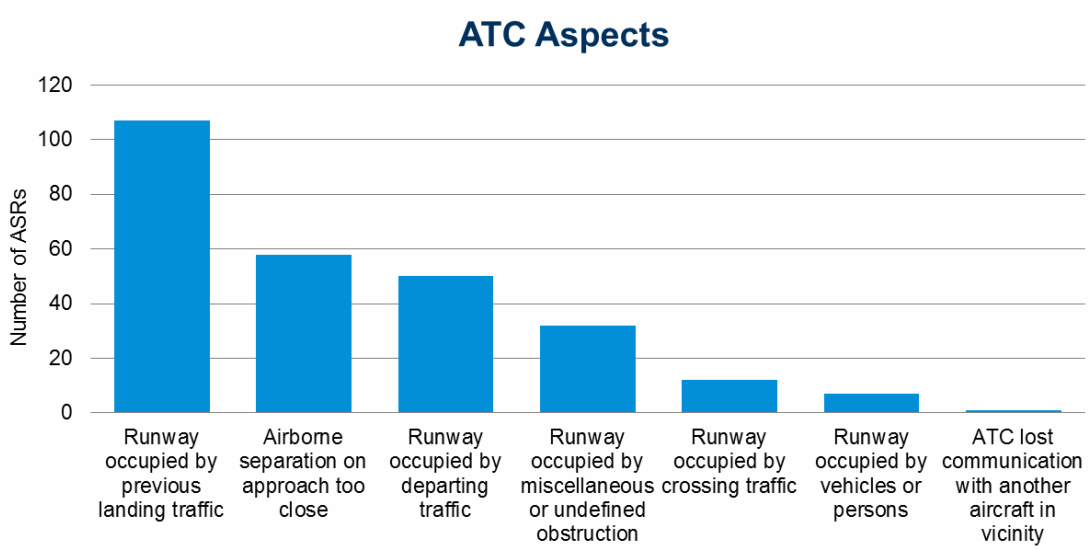
Decision: Flight Crew





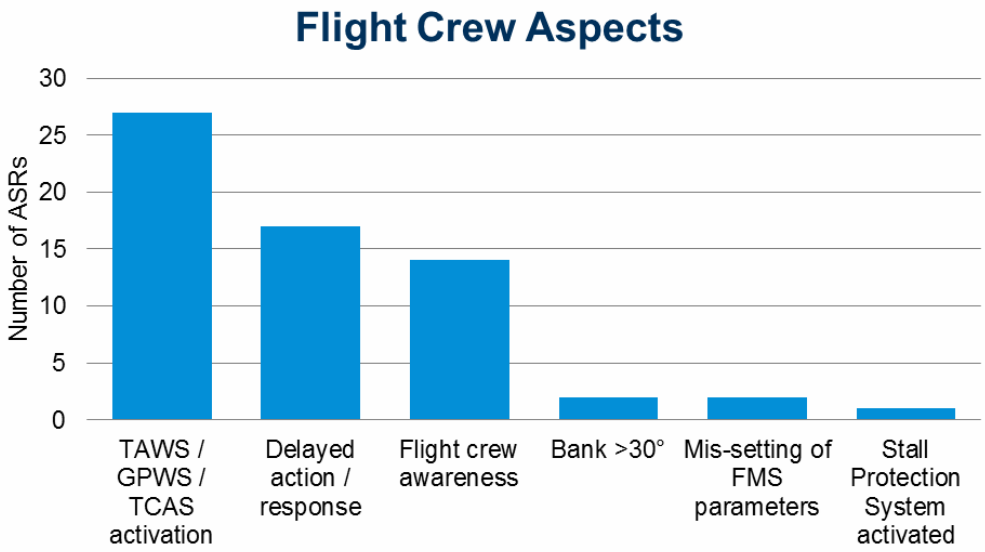
Decision: Air Traffic Control

- 25% (267 ASRs) of the complete dataset reported ATC related decision aspects
  - 40% of those were runway occupied by previous landing traffic
  - 22% airborne separation on approach too close
  - 19% runway occupied by departing traffic



Execution: Flight Crew Aspects

- 5% (57 ASRs) of the entire dataset noted flight crew aspects during the execution of a go-around
  - TAWS/GPWS/TCAS warnings was the biggest category with 47% of those reports
  - 30% delayed action/responses
  - 25% flight crew awareness



Execution: Flight Crew Aspects

- Delayed action/response is further categorized by:
  - Configuration clean up delay
  - Delayed or no response to relevant system status alert
  - Delay in establishing positive climb
  - Abnormal delay in establishing pitch altitude after go-around
  - PF delayed or no response to PM alert
- Flight crew awareness was further categorized by:
  - Autothrottle status awareness
  - Loss of positional awareness
  - Prior awareness of potentially conflicting traffic
  - Autopilot status awareness
  - Elevator/stabilizer trim status awareness

Execution: ATC Aspects

The one sided flight crew perspective on go-around events prevented a detailed analysis of go-around execution aspects related to ATC:

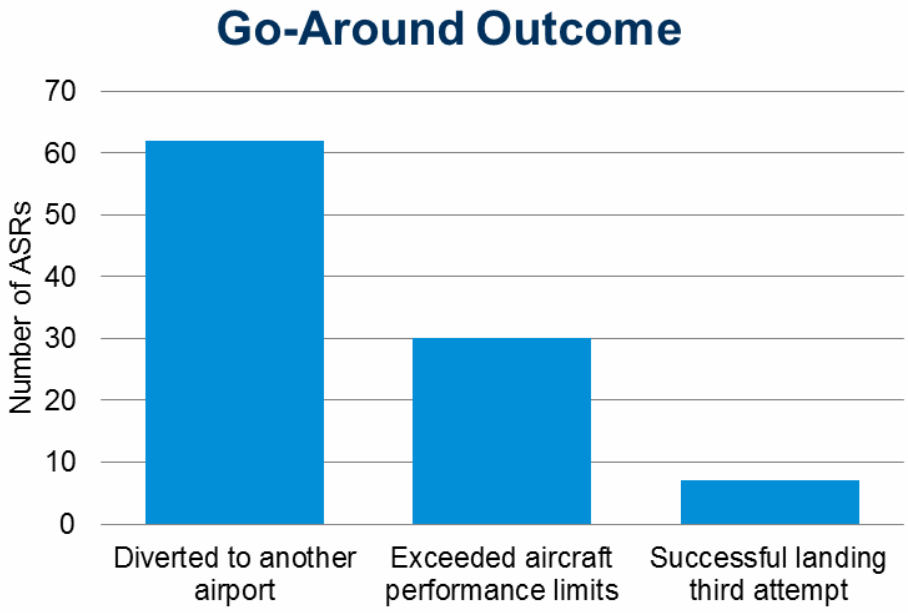
↗9% of the overall dataset contained information related to ATC related execution aspects - 91% of those noted that ATC issued inappropriate instructions

[…] During the approach at 1000 feet, ATC instructed a go-around without any reason. The crew informed ATC of the aircraft fuel state, adding that a go-around would result in an urgency/distress declaration calls. ATC then cleared the aircraft to land. The event was discussed with tower after arrival, and it transpired that ATC had intended to conduct a runway inspection during the approach."

Outcomes: Outcome

- 9% (97 ASRs) of the overall dataset noted a potential hazardous go-around outcome
  - 64% of those noted a diversion to another airport
  - 31% noted exceeded aircraft performance limits

Potential hazardous outcomes can result from multiple attempts for landing. Seven (7) reports mentioned that the flight crew elected to fly two subsequent go-arounds with a successful landing on a third attempt.



Conclusion: Context

- Actual vs. reported wind on final approach is an area of concern
- Fuel endurance after go around is a key issue in minimum fuel operations; ATC to expect/manage multiple simultaneous fuel emergencies during unexpected situations

Conclusion: Decision

- 26% of go around due to un stabilized approach, only ~50% at prescribed gate
- Tendency to continue for landing in VMC
- ATC and Infrastructure capacity issues have an influence on the number of go-arounds

Conclusion: Execution

- Balked landing is an area of concern - tailstrikes
- **31% of go/around exceeded aircraft performance limits….**

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to represent, lead and serve the airline industry