Approach and Landing Go-Around (ALG) Joint Safety Analysis and Implementation Team (JSAIT)

Final Report
Analysis and Recommendations
December 1, 2022

Approach and Landing Go-Around (ALG) Joint Safety Analysis and Implementation Team (JSAIT) Final Report

Provided to the Commercial Aviation Safety Team

from

The Approach and Landing Go-Around Joint Safety Analysis and Implementation Team

December 1, 2022

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OVERVIEW

The approach and landing phases of flight present the most critical stages of a pilot's workload. Accident and incident investigations have shown in some situations, executing a go-around could have prevented accidents or other undesired outcomes. In some cases, the go-around maneuver itself has contributed to aircraft limitation exceedances or other undesired states. Therefore, the safety community has an interest in monitoring such cases and implementing mitigations to reduce the tendency to continue an approach warranting a go-around and to stay within the desired performance criteria when executing a go-around. Go-arounds, as with other flight maneuvers, are not without risks—the nature of the go-around maneuver introduces dynamic and varying conditions that are challenging, and its execution in some events has led to undesired aircraft states. This has been an area of focus across the industry for several years. Historically, go-around rates from unstable approaches (UA) have been low with only a marginal recent increase; therefore, they remain an area of focus for the Commercial Aviation Safety Team (CAST). Considering progress made by the Aviation Safety Information Analysis and Sharing (ASIAS) program in fusing data from multiple sources, CAST desired to see if additional insight could be gained into this issue. CAST chartered the ALG JSAIT to conduct a study and analysis of go-around-related event reports to address two primary research questions:

> Question 1: Why are go-arounds infrequent in the National Airspace System (NAS), even in cases where conditions indicate that based on established guidance, the execution of a go-around should have been warranted?
>
> Question 2: Why do some go-arounds result in undesired aircraft states?

ANALYSIS AND INTERVENTION PROCESS

The ALG JSAIT members consisted of air carrier pilots, safety analysts, industry and labor association representatives, and original equipment manufacturers (OEM), as well as Federal Aviation Administration (FAA) air traffic controllers and analysts.

The ALG JSAIT used an initial dataset of reports from mandatory and voluntary safety reporting programs, specifically Flight Operational Quality Assurance (FOQA) and Aviation Safety Action Programs (ASAP) from ASIAS-participating Title 14, Code of Federal Regulations (14 CFR) part 121 air carriers and general aviation (GA) operators, to identify go-around events occurring from January 2015 to December 2018.

The ASIAS fusion process allowed the ALG JSAIT to match FOQA profile–identified go-around events with their respective ASAP reports, Air Traffic Safety Action Program (ATSAP) reports, and archived weather, airport, and ambient lighting conditions data to overcome the challenges and limitations of studying these data sources independently. In other words, by joining the multiple data sources described above, the ASIAS fusion process created a complete flight story for examining aggregate data trends and conducting detailed event analyses to identify and gain new insights into the underlying factors influencing go-around-related aeronautical decision making and outcomes. Fusion allowed the team to know the weather, time of day, and—if the controller filed a report—the flightcrew's interactions with air traffic control (ATC) during each go-around event, including its precursors and the flightcrew's execution of the maneuver.

FINDINGS

The ALG JSAIT found overall 97 percent of approaches in the NAS are stable. When go-arounds are initiated from anywhere other than the missed approach point, they typically have more exceedances. This reinforced the previous CAST knowledge identifying the need to emphasize training go-around maneuvers at the missed approach point and from unexpected scenarios. The group noted high-altitude go-arounds (initiated at an altitude of 3,000 feet(ft) above ground level or higher) often produce undesired aircraft states. High-altitude go-arounds where pilots are assigned a lower altitude to maintain from the go-around versus a climb (opposite of their expectations) were especially problematic because of the aircraft energy state the pilots manage within a very limited time. Approximately 70 percent of go-arounds were pilot-initiated, and roughly one-third of those were because of UAs. The other 30 percent of go-arounds were ATC-initiated, with "runway occupied" as the leading factor, followed by "traffic proximity." Overall, the group found a UA results in a go-around 3 percent of the time and an egregious UA results in a go-around 16 percent of the time.

The ALG JSAIT determined pilot-controller communications can influence the execution of go-arounds. For example, the ALG JSAIT found although pilots thoroughly brief the published missed approach procedures for their expected approach, ATC rarely, if ever, instructs pilots to fly the published missed approach procedure during actual go-arounds or missed approaches (whether pilot- or ATC-initiated). Instead, ATC instructs pilots, via radar vectors, to fly locally established and unpublished go-around and missed approach procedures. ASIAS fusion data (for example, FOQA data matched with ASAP reports and ATC tapes) used in the ALG JSAIT study showed this element creates challenges for flightcrews to manage the aircraft energy state over a very short time, which contributes to undesirable go-around outcomes.

The ALG JSAIT acknowledges the efforts that have been underway in Government and industry on go-around training, flightcrew procedures, and OEM guidance on discontinued approaches and automation management. The study concluded there was insufficient data to propose broad recommendations beyond what already exists in the CAST safety portfolio concerning go-arounds—other than the most significant variation of go-around compliance across the air carriers themselves, requiring additional research to understand whether training, cultural differences, or other causal factors exist. In addition, the ALG JSAIT determined that exploring pilot-controller communication/terminology on go-arounds may help improve go-around execution and performance. The safety recommendations described in the Safety Enhancements section below are based on these findings.

ALG JSAIT TOOLKIT

Based on its findings, the ALG JSAIT created the ALG JSAIT toolkit consisting of a go-around decision map and accompanying narrative to analyze the decision-making process of pilots considering a go-around. The ALG JSAIT concluded the best approach is to allow each air carrier to evaluate its specific go-around training and procedures augmented by the ALG JSAIT toolkit. Operators are in the best position to associate their operational data with the ALG JSAIT toolkit to evaluate their procedures/training and gain additional insight into their operations. ASIAS members can augment their analysis with enhanced UA metrics being developed by ASIAS. The new metrics will indicate the altitudes at which each criterion monitored for UA state is satisfied, which might provide further insight into the pilot's

perceptions of risk associated with different parameters. The ALG JSAIT Go-Around Decision Map and its accompanying ALG JSAIT Go-Around Decision Map Narrative are provided at the end of this document.

The ALG JSAIT recommends air carriers and other implementers also consider the following recommendations as they carry out the actions in the safety enhancements (SE) described below to improve go-around compliance, performance, and outcomes:

- Define and set safe margins for go-around points throughout an approach appropriate to their operational and risk assessment policies.
- Share best practices and results from the operators' go-around studies with the air carrier community to improve aviation safety in the NAS.
- Focus on manual flying proficiency.
- Clarify landing decision criteria and authority.
- Enhance automated systems knowledge.
- Train flightpath monitoring.

STANDARD PROBLEM STATEMENTS AND INTERVENTION STRATEGIES

Because of the lack of contextual details available in the event set, the ALG JSAIT did not perform event sequences or identify and score Standard Problem Statements (SPS) or Intervention Strategies (IS) according to the normal JSAIT processes.

SAFETY ENHANCEMENTS

The ALG JSAIT determined two SEs should be proposed from the group's findings:

SE	OBJECTIVE
SE 236 Improving Pilot Go-Around Decision Making and Outcomes	• Air carriers should evaluate their standard operating procedures (SOP), policies, and training curriculums using the ALG JSAIT toolkit (ALG JSAIT Go-Around Decision Map and its accompanying narrative) to identify areas for improving pilots' decision making and to mitigate the risk of undesired aircraft states during go-arounds. • Air carriers should evaluate their SOPs, policies, and training curriculums in reference to FAA Safety Alert for Operators (SAFO) 15004, Scenario-Based Go-Around Training, to identify areas for improving pilots' go-around-related aeronautical decision making and to mitigate the risk of undesired aircraft states during go-arounds. • Air carriers should revise their SOPs, policies, and training curriculums following their findings from Actions 1 and 2 to improve their pilots' decision-making guidance and to mitigate the occurrence of undesired aircraft states during go-arounds.
SE 237 Improving Pilot-Controller Communications Within the Constructs of Go-Arounds	• Establish a collaborative working group to identify changes to phraseology, procedures, aeronautical information services, and related technologies that will improve pilot-controller communications, flightcrew expectations, and aeronautical decision making. • Implement changes identified in Action 1 to improve go-around-related pilot-controller communications, procedures, flightcrew expectations, and aeronautical decision making.

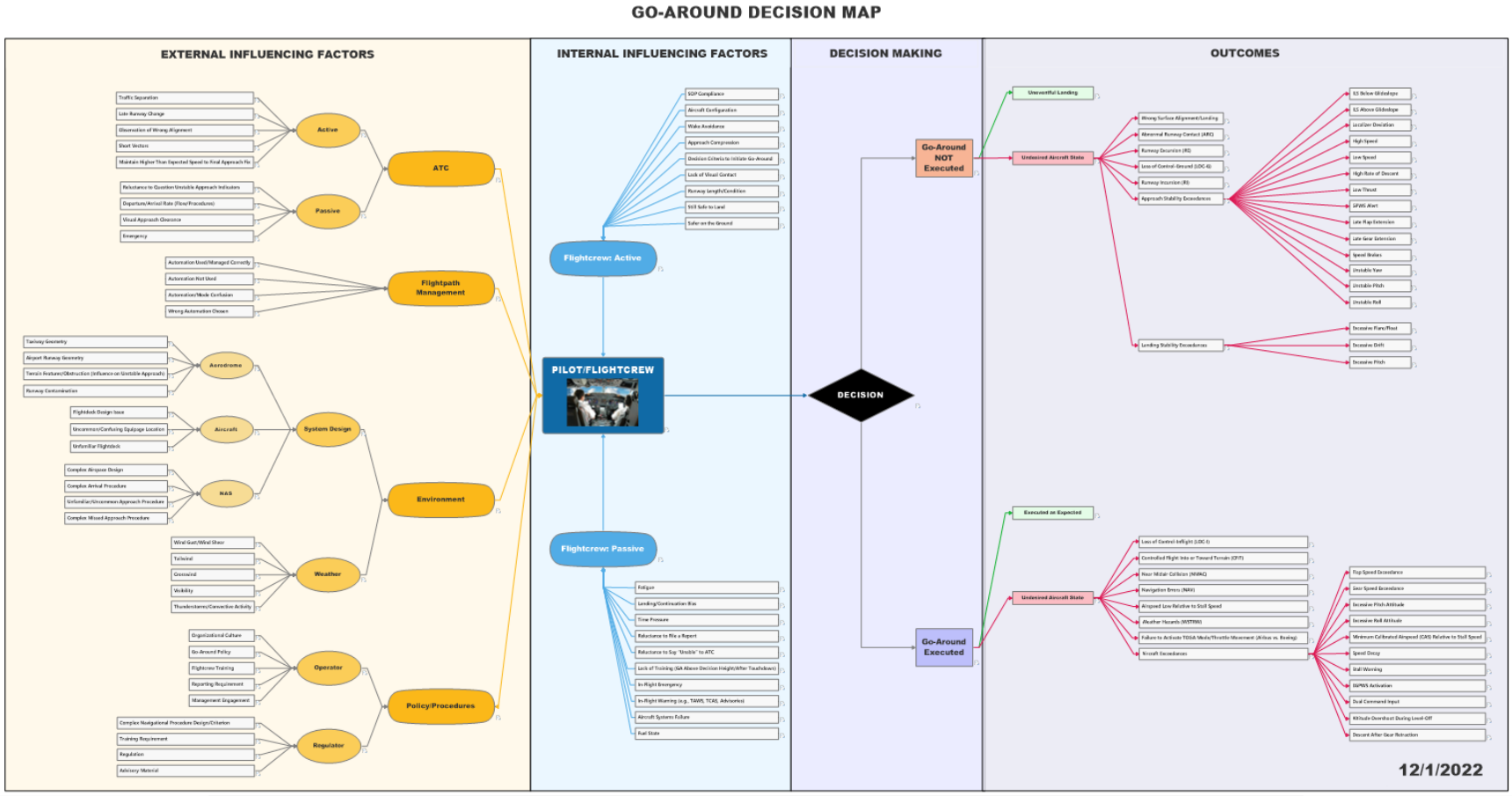
CONCLUSION AND RECOMMENDATIONS

The ALG JSAIT recommended, and CAST adopted, two SEs that focus on mitigating undesired aircraft states associated with go-around decision making and execution. CAST recommends the implementation of the two SEs outlined below:

- SE 236, Improving Pilot Go-Around Decision Making and Outcomes, and
- SE 237, Improving Pilot-Controller Communications Within the Constructs of Go-Arounds.

APPENDIX A. ALG JSAIT GO-AROUND DECISION MAP

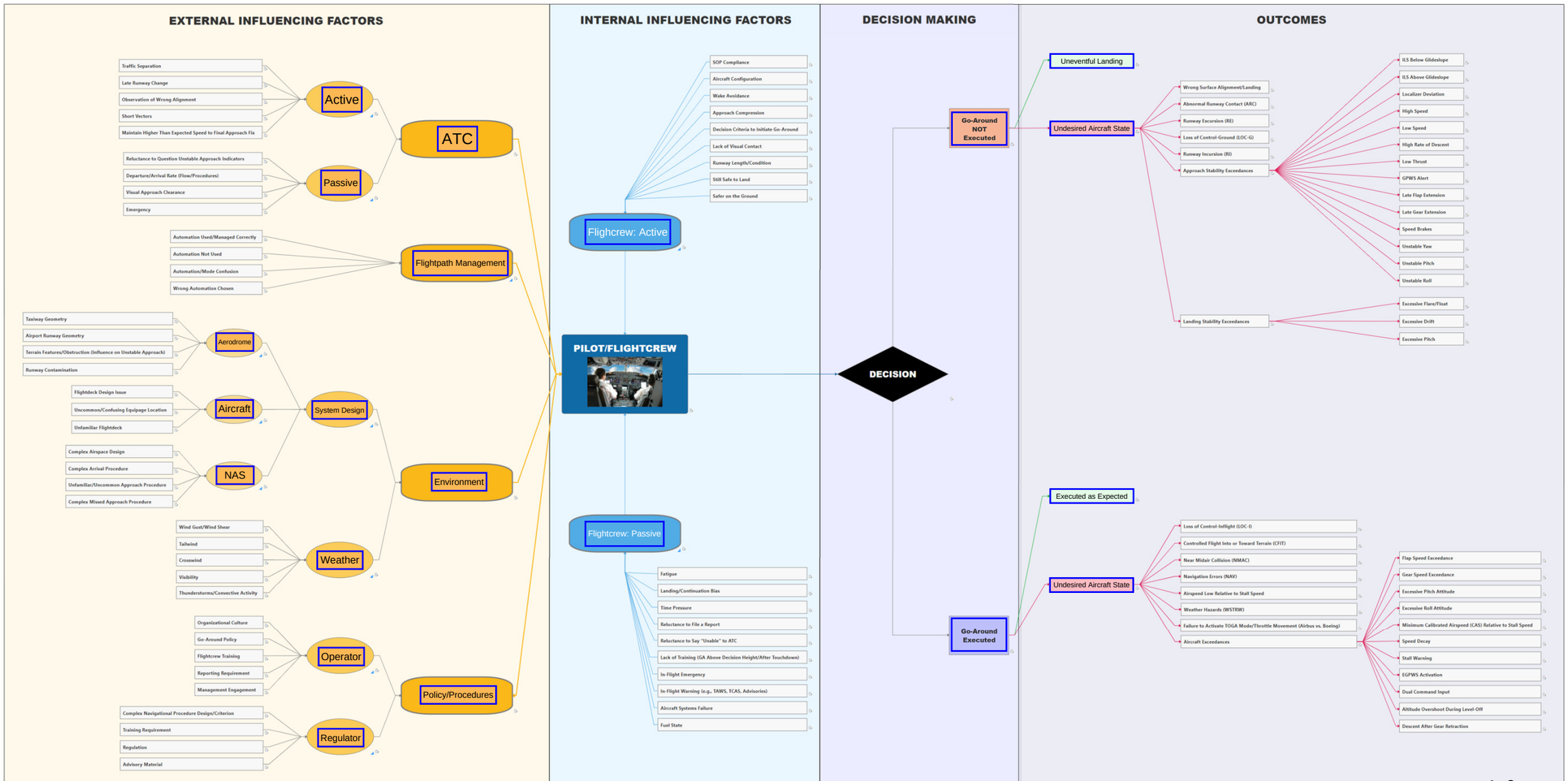
The ALG JSAIT Go-Around Decision Map is shown in its entirety below. The interactive web version of the map at ALG JSAIT Go-Around Decision map includes all the information in the narrative. The interactive PDF version of the map that follows this page is for use with its accompanying narrative, which is in Appendix B to this report.



Go-Around Decision Map

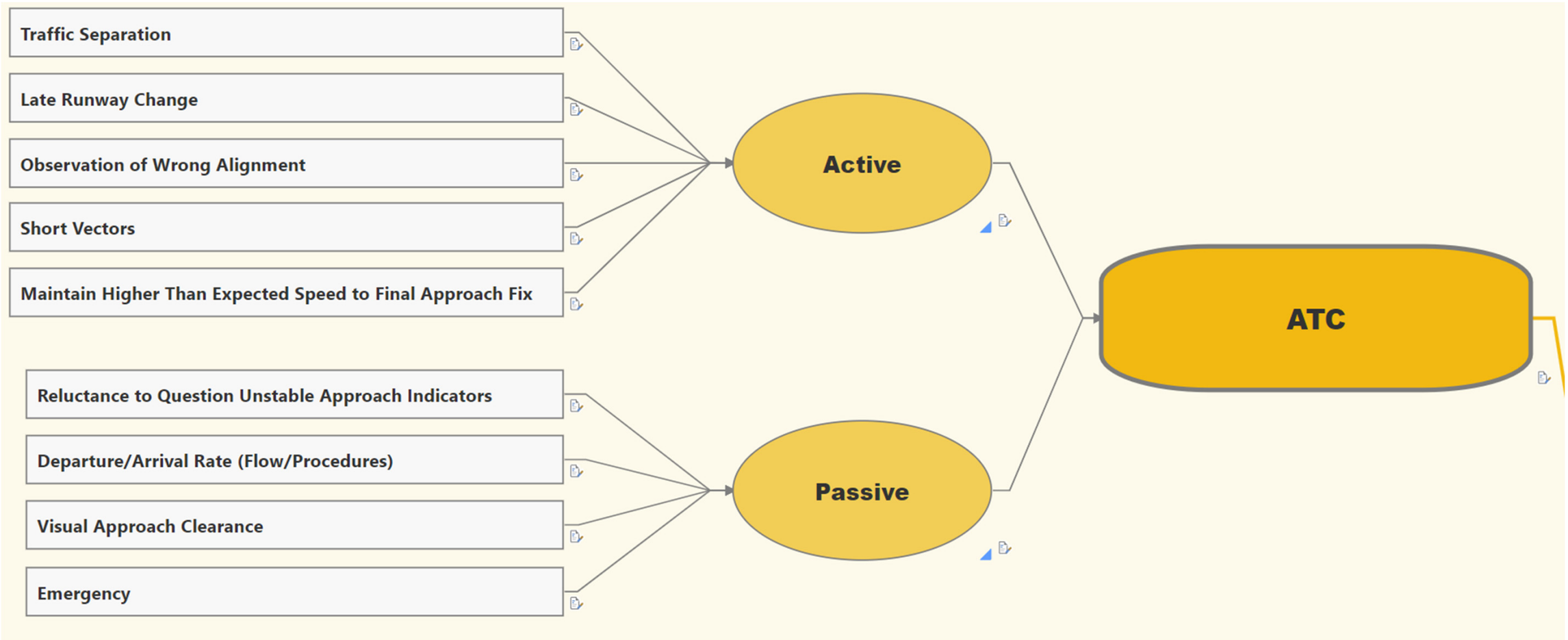
CLICK ON THE BOXES FOR A LARGER VIEW

GO-AROUND DECISION MAP



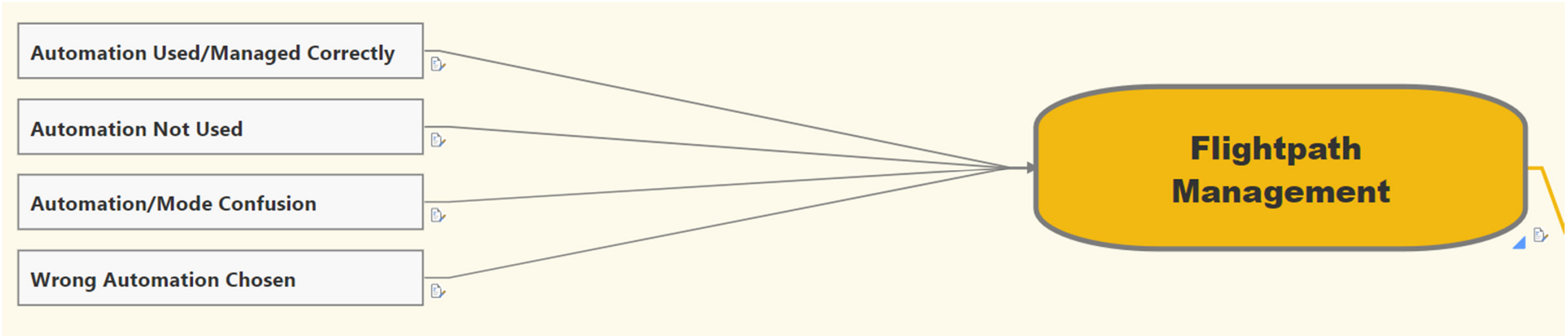
Go-Around Decision Map

EXTERNAL INFLUENCES FACTORS



Go-Around Decision Map

EXTERNAL INFLUENCES FACTORS



Go-Around Decision Map

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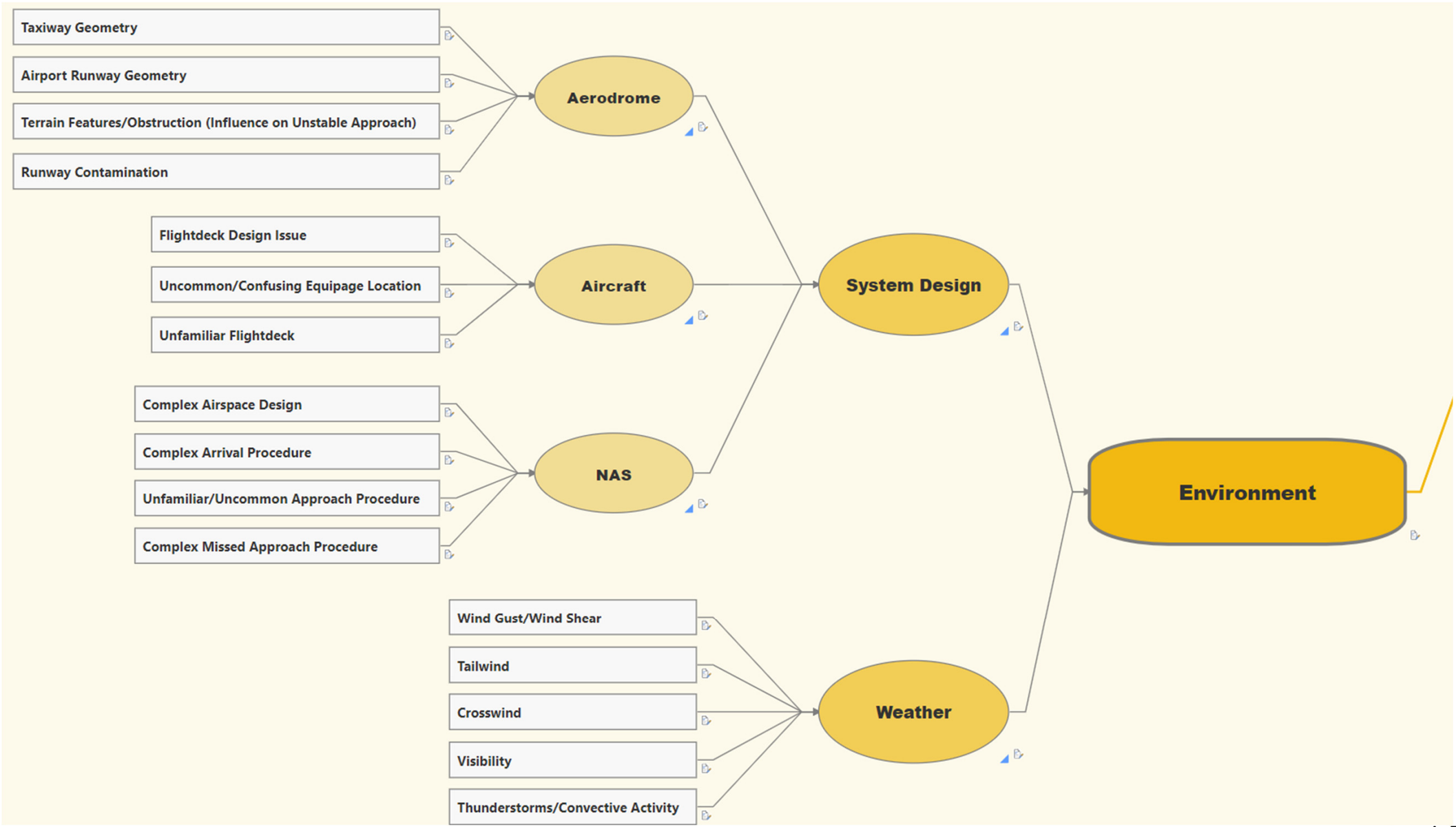

Go-Around Decision Map

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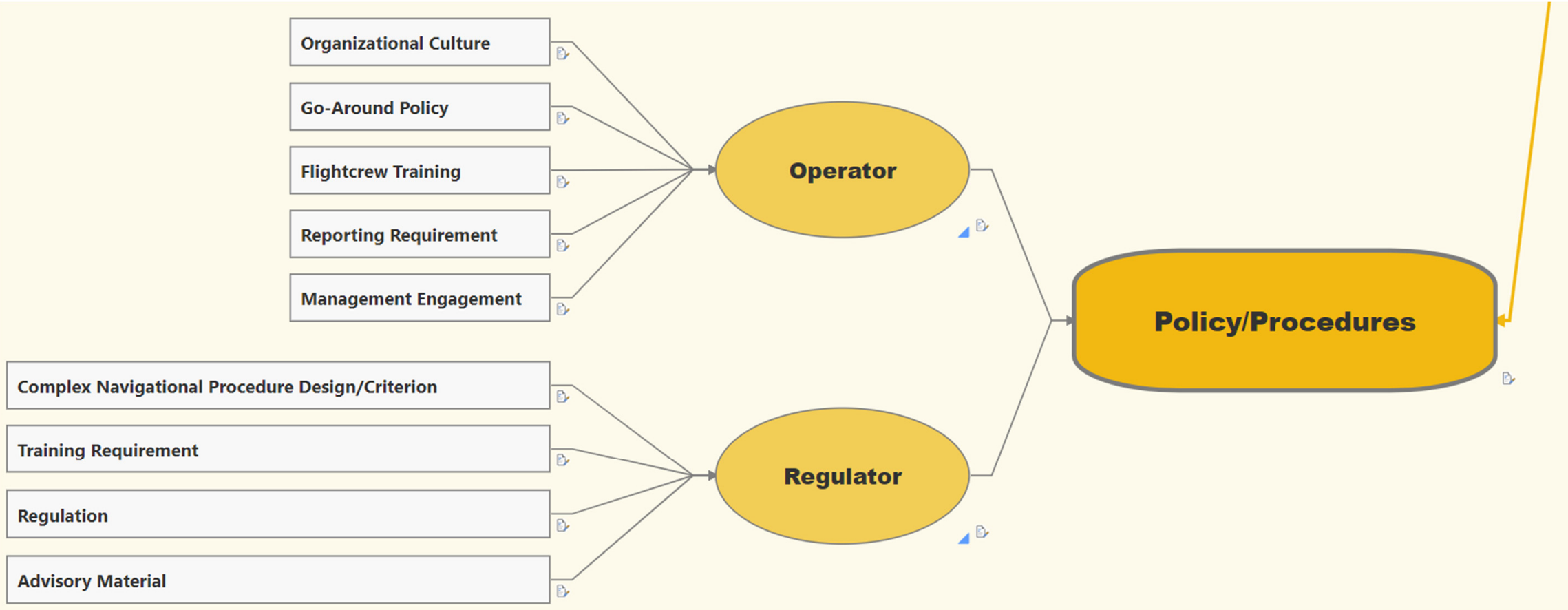
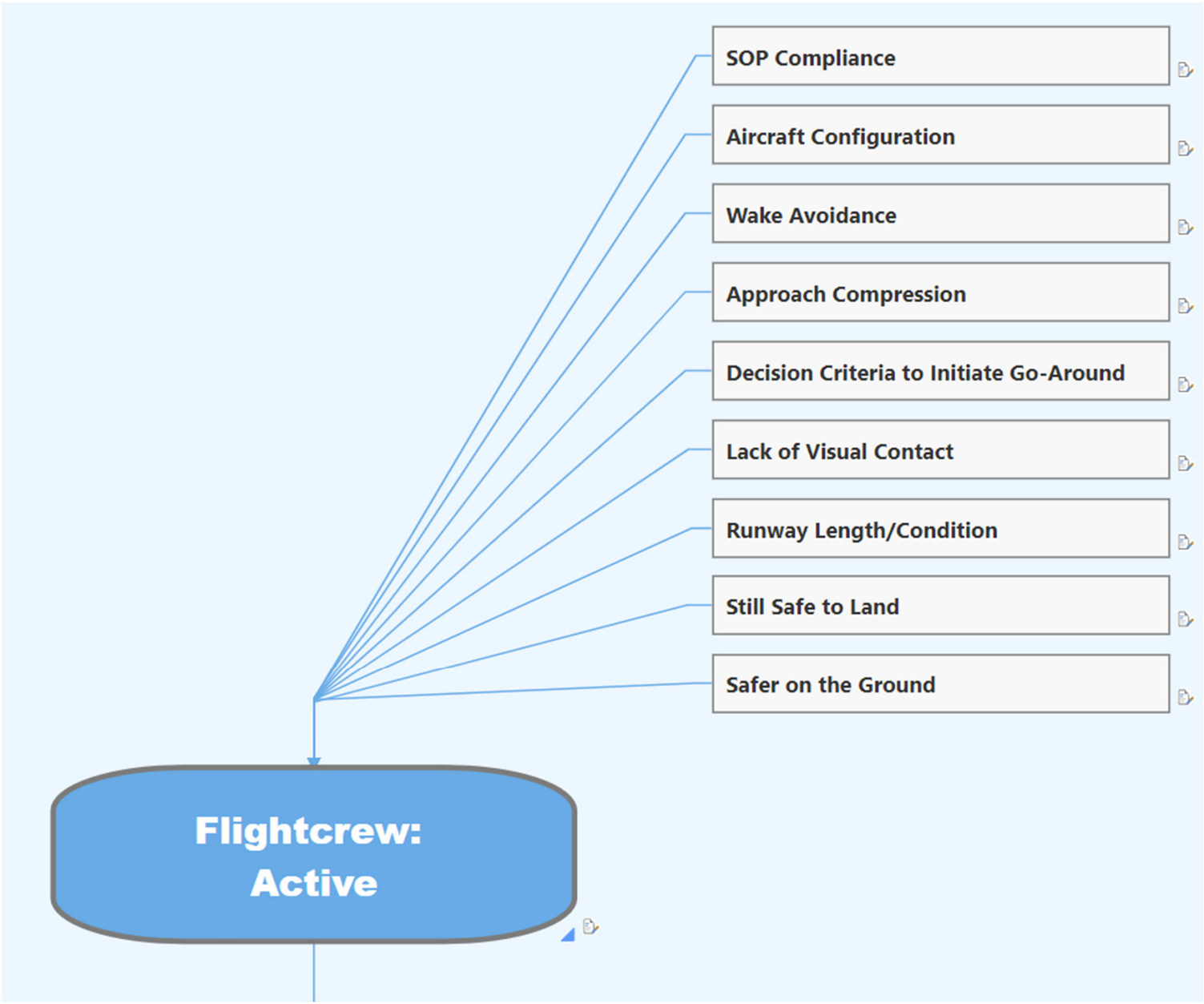


Go-Around Decision Map

INTERNAL INFLUENCES FACTORS



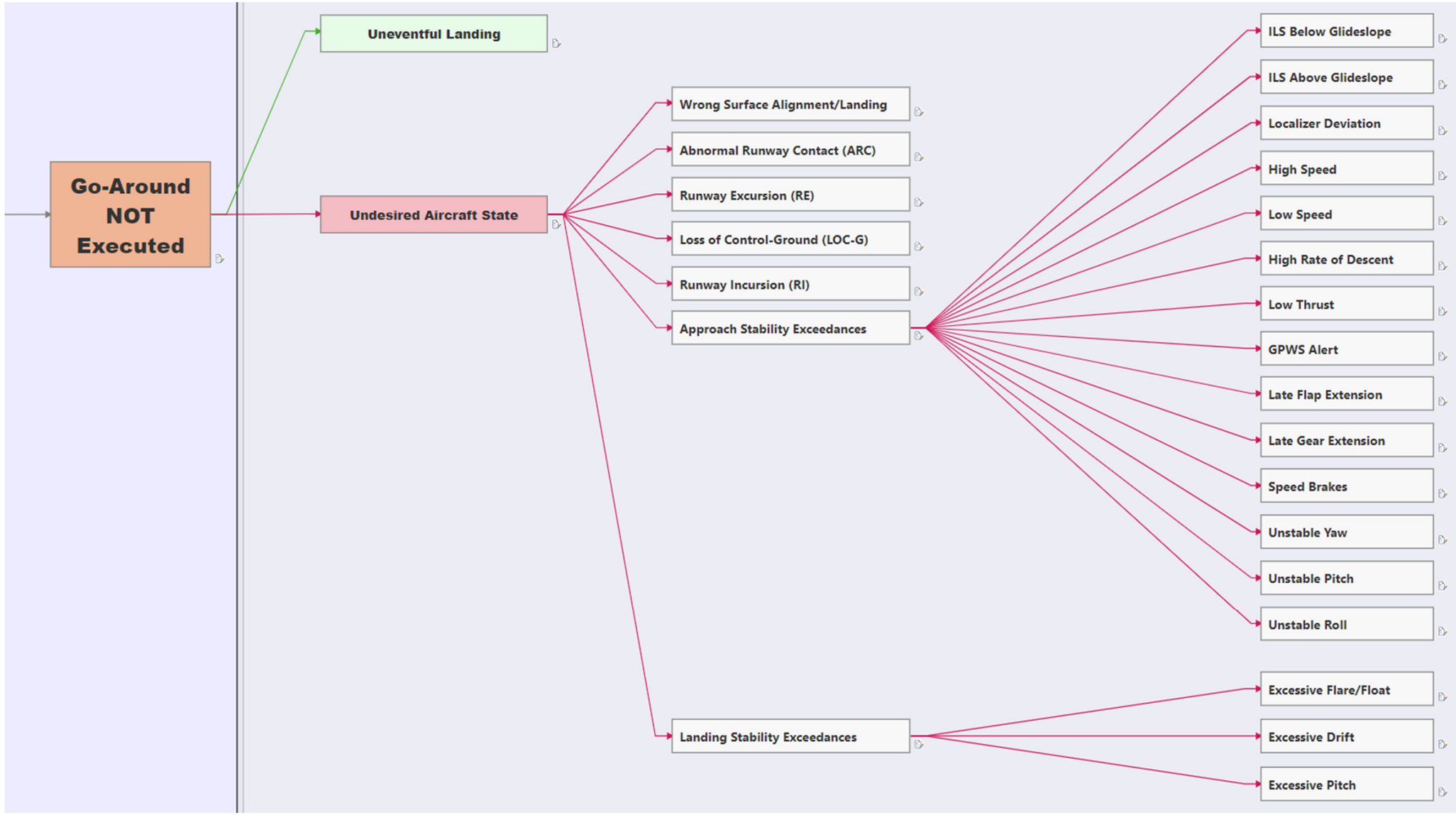
Go-Around Decision Map

INTERNAL INFLUENCES FACTORS

Go-Around Decision Map

DECISION MAKING

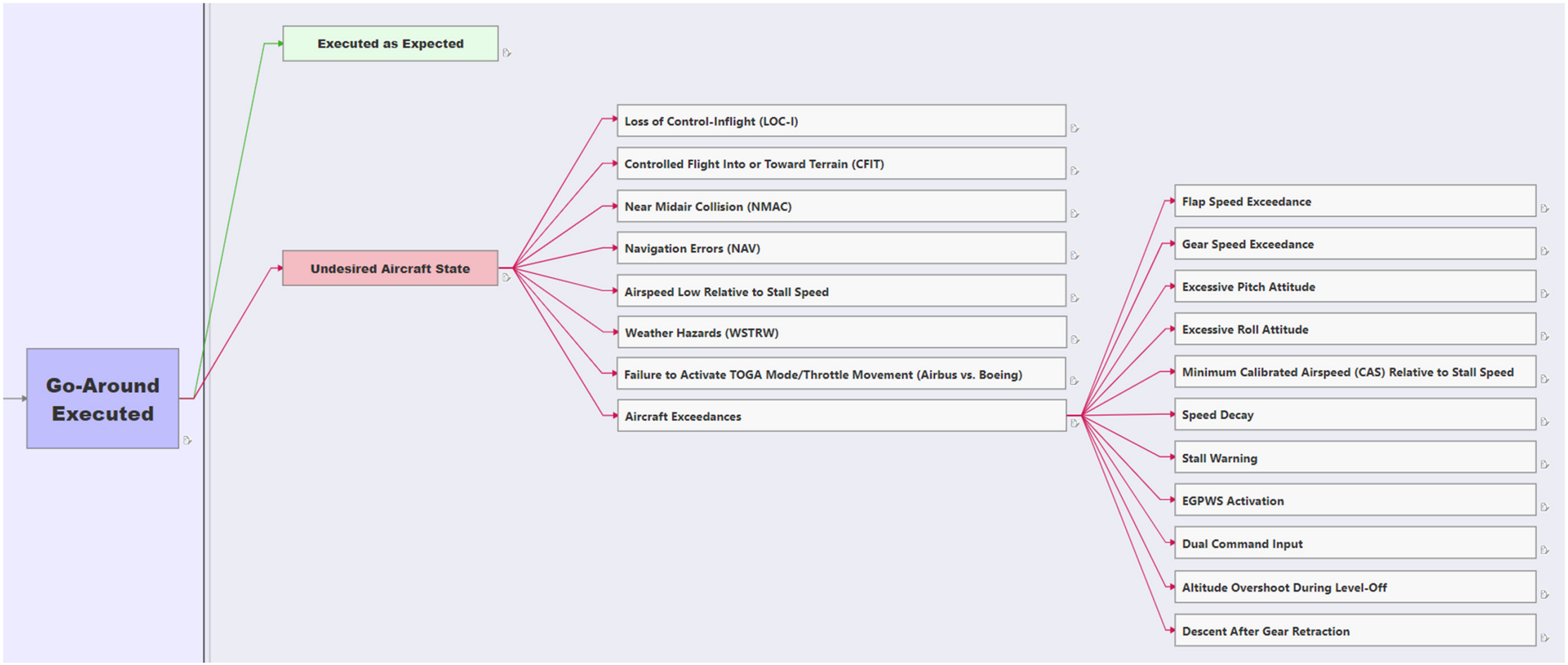
OUTCOMES



Go-Around Decision Map

DECISION MAKING

OUTCOMES



Go-Around Decision Map

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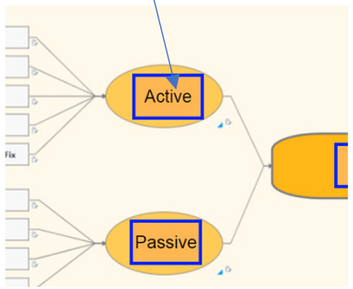

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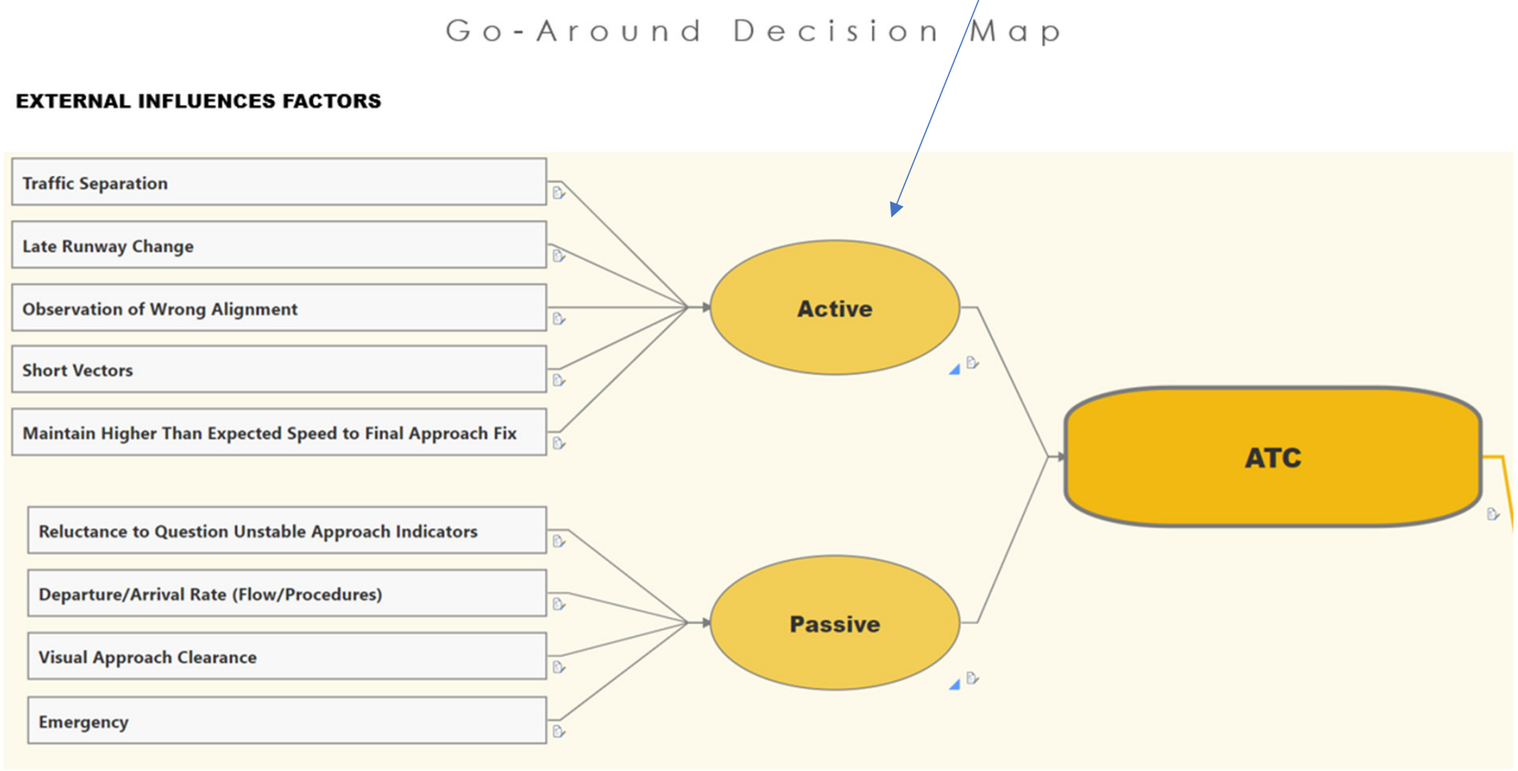

APPENDIX B. ALG JSAIT GO-AROUND DECISION MAP NARRATIVE

The ALG JSAIT Go-Around Decision Map (Appendix A) contents are explained and defined in the following narrative.

I. INFLUENCING FACTORS

A. ATC

Air Traffic Control (ATC), Air Navigation Service Provider

1. ACTIVE

Factors directly introduced by and/or controllable by the flightcrew.

- Traffic Separation: ATC separation procedures on approach to maximize the arrival rate, reducing delays to inbound aircraft. Flightcrews may experience higher approach speeds, time pressure to clear the runway, and an increased risk of go-arounds if preceding traffic has not cleared the runway.
- Late Runway Change: ATC initiates a runway change within 5 miles of the final approach fix (FAF). Flightcrews may experience high flightdeck workload and distractions when reprogramming the flight management computer (FMC) and briefing the approach to the new runway.
- Observation of Wrong Alignment: Radar and visual ATC monitoring may detect aircraft approaching the wrong runway or a taxiway.
- Short Vectors: ATC issues short vectors that have an aircraft join the final approach course near the FAF. Flightcrews may experience challenges managing the energy state of the aircraft, leading to an unstable approach (UA).
- Maintain Higher Than Expected Speed to the FAF: ATC may require higher than normal speeds on approach to maximize the arrival rate, reducing delays to inbound aircraft. Flightcrews may experience challenges meeting stable approach criteria.

2. PASSIVE

Factors introduced that are uncontrollable by the flightcrew, or a person is unaware that a latent human factor is present (for example, fatigue).

- Reluctance to Question Unstable Approach Indicators: Overreliance on flightcrew to correct a UA, even if cues indicate the approach may be unstable.
- Departure/Arrival Rate (Flow/Procedures): Sustaining high departure/arrival rates introduces ATC time pressure and requires minimum spacing/higher approach speeds/close-in vectors on approach, increasing the likelihood of a go-around.
- Visual Approach Clearance: ATC issues a visual approach, which changes the flightcrew dynamics in managing aircraft energy state and establishing/maintaining stable approach criteria. Flightcrews may accept clearance to expedite arrival by reducing required separation.

- Emergency: ATC may issue instructions in response to a facility/aircraft emergency, which introduces unplanned factors that flightcrews must accommodate, creating last-minute changes to planned protocols.

B. Flightpath Management

"Automation" includes autopilot, autothrust, and flight management systems (FMS).

1. Automation Used/Managed Correctly

Flightdeck automation used in accordance with company policy/training.

2. Automation Not Used

Flightcrew elects not to use flightdeck automation.

3. Automation/Mode Confusion

Flightcrew confusion over a flightdeck automation function or how a function responds to flightcrew input.

4. Wrong Automation Chosen

Flightcrew chooses a flightdeck automation function that is inappropriate for the given situation.

C. Environment

Factors related to the states and circumstances that influence flight operations and air traffic management, including air traffic and aerodrome infrastructure, airspace factors, weather, and the like.

1. System Design

Factors related to the infrastructure features of the environment setting, such as airport or aircraft design, navigational coverage, or characteristics of a system.

- Aerodrome: Factors related to the presence of constructed tangible and intangible objects in the airport environment (for example, buildings, terminals, pavement, runways, taxiways, fixes, traffic pattern, and operational runway configuration changes), specifically excluding aircraft and ATC equipment.
- Taxiway Geometry: Taxiway design that may contribute to missed runway exits or inadvertent runway entry, leading to conflict with arriving aircraft.
- Airport Runway Geometry: Runway layouts that may cause flightcrew misidentification on approach (misalignment) or at intersecting runways.
- Terrain Features/Obstruction (Influences on an Unstable Approach): Natural features and man-made structures that may cause airspeed fluctuations/turbulence during approach and landing, leading to a UA.
- Runway Contamination: Ice, slush, snow, and standing water on a runway that may cause increased stopping distance, leading to conflict with arriving aircraft.
- Aircraft: Factors that involve aircraft and aircraft systems.

- Flightdeck Design Issue: Factors related to flightdeck ergonomics that influence the flightcrew's ability to process information and actions.
- Uncommon/Confusing Equipage Location: Physical layout of flight controls, instruments, avionics, buttons/switches, or space constraints that may contribute to erroneous selection or inadvertent activation of an incorrect/undesired function.
- Unfamiliar Flightdeck: Issues arising from the flightcrew's lack of familiarity/recent experience/knowledge of a flightdeck.
- National Airspace System (NAS): Factors pertaining to the specific dimensions and/or boundaries of the airspace through which aircraft traverse. The NAS consists of the overall environment for the safe operation of aircraft that are subject to the Federal Aviation Administration's (FAA) jurisdiction. It includes air navigation facilities, equipment, and services; airports or landing areas; aeronautical charts, information, and services; rules, regulations, and procedures; technical information; and manpower and material. The NAS also includes system components used by the U.S. Department of Defense (DOD).
- Complex Airspace Design: Airspace designed to protect aircraft from terrain, obstacles, or adjacent/underlying airports/special use airspace that may contribute to a high aircraft energy state because of late descent, short vectors, or minimum aircraft separation.
- Complex Arrival Procedure: Airspace arrival procedures that involve multiple waypoint altitude/airspeed crossing restrictions, runway-dependent transitions, complicated navigational procedures, or late "as assigned by ATC" instructions that may affect flightcrew planning and contribute to confusion/distraction, resulting in a UA.
- Unfamiliar/Uncommon Approach Procedure: Factors that may lead to flightcrew confusion/distraction and result in a UA, such as an approach type rarely flown by flightcrews, a common procedure with unusual factors, or an infrequently used approach to an airport.
- Complex Missed Approach Procedure: A missed approach procedure with complicated factors, including low-altitude level-off, multiple or immediate turns, or other factors that increase flightcrew workload and may result in navigational errors and/or undesired aircraft states. The complexity of the procedure can add to pilot workload at a critical stage.

2. WEATHER

Factors related to the environmental conditions, weather, or other phenomena.

- Wind Gust/Wind Shear: Airspeed/flightpath fluctuation may result in difficulty meeting stable approach criteria.
- Tailwind: Increased potential for a high aircraft energy state, difficulty meeting stable approach criteria, and risk of runway overrun.

- Crosswind: Increased potential for abnormal runway contact (ARC), risk of runway excursion (RE), and the aircraft encroaching the protected airspace of parallel runways during approach and go around.
- Visibility: Restricted visibility during approach may cause misidentification of runways/taxiways (misalignment). Transition from instrument to visual cues may lead to the aircraft becoming unstable late in the approach. Transition from visual to instrument conditions during a go-around can increase the risk for spatial disorientation.
- Thunderstorms/Convective Activity: Associated gusty winds and/or turbulence may make meeting stable approach criteria difficult. Deviating around storm cells on or near the approach course may place the aircraft in an unusual position or energy state. The flightcrew may decide not to execute a go-around because of cells near the departure end of the runway or rapidly approaching the airport.

D. Policy/Procedures

Factors related to an Air Operator Certificate (AOC) holder's organizational oversight, support, and monitoring of organization programs, policies, and personnel.

1. Operator

Factors related to an AOC holder's organizational culture, go-around policy, training, and reporting requirements.

- Organizational Culture: Organizational culture includes standard operating procedures (SOP), pressures, or demands from the company to perform or meet operational goals and timelines, as well as organizational structures and policies affecting the working environment and safety practices.
- Go-Around Policy: Go-around policies and procedures set forth by the company/organization that set/influence a pilot's actions.
- Flightcrew Training: Factors related to an operator's training program that influence the flightcrew's behavior/actions.
- Reporting Requirement: Factors related to an operator's reporting requirements for go-arounds, or lack of reporting requirements, and how those factors impact and influence the flightcrew's behavior/actions.
- Management Engagement: Factors related to management promotion, oversight, and support (or lack thereof) of an operator's safety program, related policies and procedures, and safety data monitoring to support operational/training enhancements based on observed performance.

2. Regulator

National civil aviation oversight bodies.

- Complex Navigational Procedure Design/Criterion: Policies and procedures for development/redesign of navigational procedures and complexity of airspace/procedures contributing to flightcrew operational performance.

- Training Requirement: Regulatory training requirements and their influence on an operator's policy and training programs for flightcrews.
- Regulation: Regulations and their influence on aircraft systems design and operational requirements, as well as the impact those regulations have on flightcrew performance and decision making.
- Advisory Material: Effectiveness of advisory material (or other similar documents issued by regulators/operators) in relaying critical information to flightcrews.

E. Pilot/Flightcrew

Factors related to pilots, flight engineers, or flight navigators assigned to duty in an aircraft during flight.

1. Active

Factors directly introduced and/or controlled by the flightcrew.

- SOP Compliance: Flightcrew compliance with operator SOPs. Noncompliance may be influenced by cultural factors, experience, inadequate training, or disregard.
- Aircraft Configuration: The flightcrew's incorrect or late configuration of aircraft flight control surfaces.
- Wake Avoidance: Maneuvers performed by flightcrews to avoid wake turbulence from a preceding aircraft, which may create challenges in meeting stable approach criteria. Factors may include flying above glideslope or a lateral offset from the approach course. Flying above glideslope may place the aircraft in a high energy state (if excessively high) or increase the risk of a long landing/risk of a runway overrun.
- Approach Compression: High aircraft arrival rates may result in ATC assigning higher airspeeds to the FAF and/or applying minimum possible in-trail spacing on final to accept the maximum possible number of aircraft. Higher airspeed to the FAF may make meeting stable approach criteria difficult, and minimum spacing increases the chances of a go-around if a preceding aircraft has not cleared the runway.
- Decision Criteria To Initiate a Go-Around: Factors influencing the flightcrew's formulation and execution of a decision. These factors include regulations, SOPs, flightcrew training, and stable approach criteria.
- Lack of Visual Contact: Flightcrew is unable to make or maintain visual contact with runway/airport environment or preceding aircraft.
- Runway Length/Condition: Runway length/condition influencing the flightcrew's decision to continue landing or to execute a go-around. The flightcrew may be more likely to continue an approach to a long/dry runway and to perform a go-around to a short/contaminated runway.
- Still Safe to Land: Factors influencing the decision to continue landing despite exceeding stable approach criteria or failing to comply with SOPs, such as the

flightcrew's prior general experience, familiarity with the airport, or experience with the aircraft type.

- Safer on the Ground: Factors influencing the flightcrew to conclude a continuation to landing is safer than a go-around, despite the knowledge that the SOP would require a go-around in that situation. Some factors may include aircraft fuel state, weather on the go-around track or rapidly approaching the airport, or proximity to traffic on intersecting/parallel runways.

2. Passive

Factors introduced that are uncontrollable by the flightcrew, or a person is unaware that a latent human factor is present (for example, fatigue).

- Fatigue: Factors related to mental and physical fatigue that lead to diminished productivity, alertness, or efficiency.
- Landing/Continuation Bias: A general mindset that a landing is the outcome of an approach despite the presence of adverse conditions that may make a go-around a safer outcome.
- Time Pressure: Operational or personal factors that introduce a rushed mindset. These may include operational schedule, mental fatigue influenced by a long workday or a long flight, weather, aerodrome restrictions (such as an operational or nighttime curfew), flightcrew connections, duty time limits, or personal commitments.
- Reluctance To File a Report: Flightcrew reluctance to report a go-around regardless of operator requirements. Factors may include complex/time consuming reporting systems, the belief that a go-around report may negatively impact the flightcrew, or a general reluctance to filing reports because of a lack of perceived risk/significance of an event.
- Reluctance To Say "Unable" to ATC: Factors influencing the flightcrew to accommodate ATC instructions, even when doing so creates high/unmanageable flightcrew workload or leads to exceeding stable approach criteria.
- Lack of Training (General Aviation (GA) Above Decision Height/After Touchdown): Lack of adequate go-around scenario-based training for flightcrews, including the frequency of/lack of training on executing a go-around from other than the missed approach point.
- In-Flight Emergency: An emergency that influences the flightcrew's decision process to continue to land irrespective of compliance to stable approach criteria.
- In-Flight Warning (For Example, Terrain Awareness and Warning System (TAWS), Traffic Alert and Collision Avoidance System (TCAS), or Advisories): A caution or warning generated by any aircraft system or other equipage that influences the flightcrew's decision process or planned actions for landing/executing a go-around.
- Aircraft Systems Failure: A failure of any aircraft system or component that changes the flightcrew's decision to land/execute a go-around.

- Fuel State: Minimum or emergency fuel state or any situation in which the flightcrew believes there may be inadequate fuel to accommodate a go-around.

II. DECISION MAKING

A. Go-Around NOT Executed

Factors related to UAs during which the flightcrew decided not to initiate a go-around before touchdown.

1. Uneventful Landing

The flightcrew continues the approach to a normal landing as defined by regulation, SOP, landing stability criteria, or any other requirement.

2. Undesired Aircraft State

An undesired aircraft attitude, energy state (high or low), and/or configuration—whether resulting from an external force or flightcrew action/inaction—that places the aircraft outside of the expected operational envelope, compromising safety.

- Wrong Surface Alignment/Landing: An occurrence in which an aircraft is lined up with the incorrect landing surface (runway or taxiway).
- Abnormal Runway Contact (ARC): As defined by the Commercial Aviation Safety Team (CAST) International Civil Aviation Organization (ICAO) Common Taxonomy Team (CICTT), any landing or takeoff involving abnormal runway or landing surface contact. Includes hard/heavy/bounced landings, long/fast landings, off-center landings, crabbed landings, nosewheel-first touchdowns, tail strikes, wingtip/nacelle strikes, or touchdown off the runway surface (also known as an undershoot).

  NOTE

  o Long/fast landings may be associated with the Landing Stability Exceedance, Excessive Flare/Float (see below).

  o Off-center landings and crabbed landings may be associated with the Landing Stability Exceedance, Excessive Drift (see below).

  o Nosewheel-first touchdowns and tail strikes may be associated with the Landing Stability Exceedance, Excessive Pitch (see below).

- Runway Excursion (RE): As defined by CICTT, a veer off or overrun off the runway surface.
  - o Overrun: an RE during which the aircraft departs the end of a runway.
  - o Veer Off: an RE during which the aircraft departs the side of a runway during landing, including intentional maneuvers to avoid an overrun.

  NOTE

  o Overruns may be associated with the Landing Stability Exceedance, Excessive Flare/Float (see below).

- Veer offs may be associated with the Landing Stability Exceedance, Excessive Drift (see below).

- Loss of Control-Ground (LOC–G): As defined by CICTT, loss of aircraft control while the aircraft is on the ground.
- Runway Incursion (RI): As defined by CICTT, any occurrence at an aerodrome involving the incorrect presence of an aircraft, vehicle, or person on the protected area of a surface designated for the landing and takeoff of aircraft.
- Approach Stability Exceedances: These definitions are from the Aviation Safety Information Analysis and Sharing (ASIAS) Approach and Landing Accident Reduction (ALAR) (Unstable Approach) dashboard, available at the ASIAS Portal.
  - Instrument Landing System (ILS) Above Glideslope: more than one dot high for 5 seconds (s);
  - ILS Below Glideslope: more than one dot low for 5 s;
  - Localizer Deviation: more than one dot left or right for 5 s;
  - High Speed: greater than reference landing speed (Vref) + 20 knots (kn) for 3 s;
  - Low Speed: less than Vref for 3 s;
  - High Rate of Descent: greater than 1,000 feet (ft) per minute for 3 s;
  - Low Thrust: N1 35 percent for 5 s; N1 less than fifth percentile by fleet type;
  - Ground Proximity Warning System (GPWS) Alert: any GPWS alert;
  - Late Flap Extension: any flap movement more than 2 degrees;
  - Late Gear Extension: any gear movement;
  - Speed Brakes: any deployment of speed brakes;
  - Unstable Yaw: standard deviation in yaw rate greater than 1.25;
  - Unstable Pitch: pitch greater than 15 degrees for 3 s; standard deviation in pitch rate greater than 1.25; or
  - Unstable Roll: roll greater than 40 degrees for 3 s; standard deviation in roll rate greater than 3.5.
- Landing Stability Exceedances—
  - Excessive Flare/Float: Landing flare or float conditions that lead to landing beyond the touchdown zone, defined as a point 500–3,000 ft beyond the runway threshold not to exceed the first one-third of the runway (Advisory Circular (AC) 91–79A, Mitigating the Risks of a Runway Overrun Upon Landing). Excessive flare/float events are associated with an increased risk of RE and ARC.
  - Excessive Drift: An aircraft flightpath during landing that causes the aircraft to diverge from the runway centerline or heading to the extent that it is at an increased risk of ARC or an RE.

- Excessive Pitch: Aircraft pitch attitudes during landing that put the aircraft at an increased risk of a tail strike, nosewheel-first touchdown, or other ARC.

B. Go-Around Executed

Factors related to go-arounds executed by the flightcrew upon deciding not to continue an approach, or not to continue landing, usually followed by procedures to conduct another approach or divert to another airport.

1. Executed as Expected

The flightcrew executes a go-around in a situation as required by a regulation, SOP, stable approach criteria, or any other requirement.

2. Undesired Aircraft State

An undesired aircraft attitude, energy state (high or low), and/or configuration—whether resulting from an external force or flightcrew action/inaction—that places the aircraft outside of the expected operational envelope, compromising safety.

- Loss of Control-Inflight (LOC–I): As defined by CICTT, loss of aircraft control, or deviation from intended flightpath, while in flight. LOC–I is an extreme manifestation of a deviation from intended flightpath. The phrase "loss of control" may cover only some of the cases during which an unintended deviation occurred.
- Controlled Flight Into or Toward Terrain (CFIT): As defined by CICTT, in-flight collision or near collision with terrain, water, or obstacle without indication of loss of control.
- Near Midair Collision (NMAC): As defined by CICTT, air proximity issues, TCAS/airborne collision avoidance system (ACAS) alerts, loss of separation, and near collisions between aircraft in flight.
- Navigation Errors (NAV): As defined by CICTT, occurrences involving the incorrect navigation of the aircraft on the ground or in the air. Includes lateral navigation errors caused by using the improper navigational aid (NAVAID) or improperly programming aircraft navigation systems and deviating from ATC clearances or published procedures (standard instrument departure/departure procedures (SID/DP), Standard Terminal Arrival Route (STAR), approach procedures, or charted visual procedures).
- Airspeed Low Relative to Stall Speed: Airspeed less than 1.3 of the stall speed for a given aircraft configuration.
- Weather Hazards (WSTRW): As defined by CICTT, flight into wind shear or thunderstorm.
- Failure To Activate Takeoff/Go-around (TOGA) Mode/Throttle Movement (Airbus vs. The Boeing Company (Boeing)): Failure to press the go-around button in Boeing aircraft or failure to move thrust levers to TOGA detent in Airbus aircraft.
- Aircraft Exceedances—
    - Flap Speed Exceedance: maximum flap extended speed (Vfe) for the aircraft and flap setting;

- Gear Speed Exceedance: maximum airspeed for operating with landing gear extended (Vle)/maximum airspeed for extending or retracting the landing gear (Vlo) for the aircraft;
- Excessive Pitch Attitude: pitch exceeding +15 degrees;
- Excessive Roll Attitude: bank angle exceeding 40 degrees;
- Minimum Calibrated Airspeed (CAS) Relative to Stall Speed: aircraft specific depending on configuration and load factor;
- Speed Decay: aircraft specific;
- Stall Warning: stall warning activation, including momentary;
- Enhanced Ground Proximity Warning System (EGPWS) Activation: all EGPWS cautions/warnings, including momentary;
- Dual-Command Input: simultaneous inputs to both sidestick controllers (Airbus specific);
- Altitude Overshoot During Level-Off: altitude overshoot exceeding 200 ft; or
- Descent After Gear Retraction: any rate of descent detected after gear retraction.