PA-RAST · WORKING ANALYSIS

Eighteen barriers. How many are working at your aerodrome?

Four runway collisions — Lima SPJC, New York John F. Kennedy KJFK, Rio de Janeiro Galeão SBGL, New York LaGuardia KLGA. Not four distant events — one set of defences that exists at every aerodrome in this region.

Prepared for PA-RAST/71 · São Paulo, 17–20 August 2026

EVIDENTIARY STATUS

Three final reports.

One preliminary report (KLGA) with no probable cause and no adopted contributing factors.

All KLGA entries are observed fact, not investigation findings.

SCOPE

The four occurrences

Lima

SPJC · 18 Nov 2022

AIRCRAFT

Airbus A320neo CC-BHB

Takeoff roll, runway 16L

CONFLICTING TRAFFIC

ARFF vehicle Rescue R3

Response-time drill

ACCIDENT

2 firefighters fatally injured, 1 seriously injured

CIAA Peru · FINAL

New York

KJFK · 13 Jan 2023

AIRCRAFT

Boeing 777-200 AAL106

Crossed runway 4L without clearance

CONFLICTING TRAFFIC

Boeing 737-900 DAL1943

Takeoff roll, rejected at 105 kt

SERIOUS INCIDENT

No injuries, no damage

NTSB AIR-24-01 · FINAL

Rio de Janeiro

SBGL · 12 Feb 2025

AIRCRAFT

Boeing 737-8 PS-GPP

Takeoff roll, runway 10

CONFLICTING TRAFFIC

Runway lighting maintenance vehicle

Authorized on the runway

SERIOUS INCIDENT

2 minor injuries

CENIPA IG-029/2025 · FINAL

New York

KLGA · 22 Mar 2026

AIRCRAFT

Bombardier CRJ-900 C-GNJZ

Landing, runway 4

CONFLICTING TRAFFIC

ARFF vehicle Rescue 35 “Truck 1”

Emergency response crossing

ACCIDENT

2 flight crew fatally injured, 6 serious

NTSB DCA26MA161 · PRELIMINARY

3 of 4 involved an ARFF or runway maintenance vehicle — routine, authorized activity that takes place at every aerodrome represented in this room. Selection is purposive, not a sample; no frequency or rate conclusion is available from this set.

BARRIER ANALYSIS · LAYERS 1–4

Getting onto the runway

		BARRIER	SPJC	KJFK	SBGL	KLGA
1 PLAN AND PREPARE	1	Joint planning and risk assessment of non-routine runway activity	FAILED	—	not examined	not examined
	2	Training, familiarization and competence	FAILED	HELD	not examined	not examined
	3	Handover and briefing of pending runway occupancy	FAILED	—	FAILED	—
2 AUTHORIZE	4	Explicit, correct clearance for runway entry	FAILED	FAILED	FAILED	FAILED
	5	Phraseology, addressing, readback and hearback	FAILED	HELD	not examined	FAILED
	6	Clearance timing discipline	—	FAILED	not examined	FAILED
3 CONTROL TOWER DETECTION	7	Controller visual scan and heads-up capacity	DEGRADED	FAILED	FAILED	DEGRADED
	8	Runway occupancy memory aid	not examined	—	FAILED	not examined
	9	Supervision and tower-team cross-monitoring	FAILED	FAILED	FAILED	DEGRADED
4 FRONT-LINE SELF-CHECK	10	Position awareness and runway-entry crosscheck	FAILED	FAILED	—	FAILED
	11	Sterile flight deck / sterile control room	—	FAILED	FAILED	not examined

FAILED · DEFEATED · DEGRADED · HELD · DISPUTED · not examined

“not examined” is an unknown, not a pass.

BARRIER ANALYSIS · LAYERS 5–7

Catching it once it has happened

		BARRIER	SPJC	KJFK	SBGL	KLGA
5 AUTOMATED SAFETY NET	12	Surface surveillance conflict alert to ATC	not examined	HELD	not examined	FAILED
	13	Direct warning to the intruder (stop bar, REL, ARIWS)	DEFEATED	FAILED	not examined	DEFEATED
	14	Conspicuity and detectability	FAILED	DISPUTED	not examined	FAILED
6 RECOVERY	15	Error detected in time	FAILED	HELD	HELD	HELD
	16	Cancellation decided and issued	—	HELD	FAILED	HELD
	17	Cancellation received and acted upon	—	HELD	—	FAILED
7 LAST RESORT	18	See-and-avoid / evasive action	FAILED	FAILED	FAILED	FAILED

4 of 4

Clearance integrity failed in every occurrence — twice through no clearance, twice through a conflicting one.

4 of 4

The control tower detection layer failed or was degraded in every occurrence.

1 of 4

Surface surveillance alerting held once. That occurrence is the only one in which no collision took place.

LAYER 6 IN DETAIL

The recovery layer breaks one link further along each time

		DETECT	DECIDE AND ISSUE	RECOGNIZE AND ACT	BREAK POINT
SPJC	The error was never detected. Cone removal was authorized without recognizing it released the only vehicular route onto the runway.	FAILED	never engaged	never engaged	**Never detected**
SBGL	The controller recalled the vehicle on the runway and did not revoke the takeoff clearance. CENIPA found revocation within seconds would have permitted a low-speed rejected takeoff.	HELD	FAILED	never engaged	**Decision**
KLGA	Two stop instructions were issued, 12 and 4 seconds before impact, with real stopping margin. One crewmember heard the first call but did not know it was for them. The vehicle accelerated through both.	HELD	HELD	NOT RECOGNIZED	**Recognition**
KJFK	Surveillance alerted at 20:44:42; the clearance was cancelled 5 seconds later; the crew rejected the takeoff from 105 kt and stopped 500 ft short.	HELD	HELD	HELD	**Full recovery**

Detection succeeded in three of four occurrences. In two of those three, the system still could not convert detection into a stopped vehicle or a rejected takeoff. At KLGA the transmissions were made and were audible; what is established is that one crewmember did not recognize the first call as addressed to his vehicle.

THE GOVERNING FINDING

Outcome tracks recovery, not how the conflict began

	RECOVERY SUCCEEDED	RECOVERY FAILED
Conflict from unauthorized entry	**KJFK** Serious incident No injuries, no damage	**SPJC** Accident **2 fatalities**
Conflict from erroneous clearance	No example in this set of a system recovering from its own erroneous clearance.	**SBGL · KLGA** Serious incident, 2 minor injuries **Accident, 2 fatalities**

Read down the columns, not across the rows. Whether the conflict began with an unauthorized entry or an erroneous clearance did not determine severity. Whether the system could recover did. Within the failed-recovery column, severity varied by impact geometry and energy, not by any further barrier.

WHY KJFK RECOVERED

Recovery is a targeting problem, not a speed problem

KJFK

Addressed the conforming party

The takeoff clearance of Delta 1943 was cancelled — an aircraft on the controller's frequency, expecting his transmissions, with 2,700 ft of runway and full braking authority.

The ground controller separately and deliberately chose not to transmit to American 106, judging that broadcasting its call sign might cause it to stop on the runway.

The instruction reached a recipient able to act on it, and the failure mode of a misread instruction was benign.

KLGA

Addressed the intruder

The stop instruction went to the vehicle — over the link with the weakest addressing discipline, and to the recipient least equipped to parse an unprefixed urgent call.

The first call was not prefixed with a call sign and followed immediately after a taxi instruction to a different aircraft. The turret operator did not know it was for them.

Stopping late would have placed the vehicle on the runway. The failure mode of a misread instruction was not benign.

Where a choice exists, the recovery instruction should go to the party with the most reliable communication link and the most benign failure mode if the instruction is misread.

Analytical synthesis by the Secretariat. This comparison is not stated in any of the four investigation reports.

MAPPING

GAPPRI coverage, ordered by recovery stage

Detection

WELL COVERED

ANSP32 ANSP33 ANSP27 ANSP29 ANSP30 ADR31 R&D1 R&D8

Surveillance, vehicle tracking, runway occupancy memory aids, sight lines and controller heads-up time.

Decision

THINLY COVERED

ANSP14 ANSP11

No recommendation addresses controller decision-making under time pressure once an error is self-detected — the SBGL failure mode.

Delivery

NOT ASSEMBLED

ADR24 REG6 ANSP15(c) ANSP12 ADR27(b)

4-4-Safety phraseology. Unique vehicle call signs, message length in critical stages, radio-failure phraseology.

Delivery-independent

STRONGEST CHANNEL

AO22 AO23

Do not cross an illuminated red stop bar or runway status light, even with an ATC clearance — challenge the clearance instead. Needs no radio message to arrive.

PROPOSED GAP FOR PA-RAST CONSIDERATION

GAPPRI gives aircraft operators an absolute rule through AO22 and AO23. No numbered aerodrome-operator recommendation appears to state the driver-facing equivalent. At KLGA the runway entrance lights were illuminated while the vehicle was stationary, and the vehicle crossed.

THE UNCOMFORTABLE PART

Now score your own aerodrome

1	**Plan and prepare** Failed wherever it was examined.	?
2	**Authorize** Clearance integrity failed in all four.	?
3	**Control tower detection** Failed or degraded in all four.	?
4	**Front-line self-check** Failed wherever it applied.	?
5	**Automated safety net** Held once. Lit red lights were crossed twice.	?
6	**Recovery** Detection succeeded three times. Recovery succeeded once.	?
7	**Last resort** Failed in all four. It always does.	?

AT YOUR AERODROME

How many of these can you answer with data rather than assumption?

None of the four investigation teams had to guess. They had recorders, surveillance replay and interviews — after the collision.

An assumption is not an assessment.

THE BLIND SPOT

We cannot see the barriers we do not measure

THE GAPPRI IMPLEMENTATION TRACKER

The instrument already exists. It is not a report to ICAO. It is a mirror for the responder.

It returns a barrier-by-barrier picture of the defences at your own aerodrome, against the same recommendations mapped in this analysis.

It is the only structured way to answer the question on the previous slide before an occurrence answers it for you.

PAN-AMERICAN RESPONSE

7 of 49

Responses received against those invited. The low return is not a scoring problem to be tidied up before the real analysis begins. It is the finding.

THE QUESTION THIS RAISES

Where no runway safety team is meeting, there is no forum in which the aerodrome operator, the ANSP, the operators, ARFF and the regulator look at the runway together — and therefore nobody positioned to complete the tracker at all.

Is the low response a reporting problem, or a structural one?

Response figures to be confirmed by the Secretariat before circulation. The link between non-response and the absence of a functioning runway safety team is posed here as a question; it is a hypothesis, not an evidenced finding.

WHERE THIS WORK LIVES

The assessment is local. The pattern is regional.

Local runway safety team

OWNS THE ASSESSMENT

Aerodrome operator, ANSP, aircraft operators, ARFF and the regulator, looking at one runway together. Every one of the eighteen barriers has an owner in that room.

›

The State

AGGREGATES AND DE-IDENTIFIES

Local pictures become a State picture. Nothing that leaves this stage is attributable to an individual aerodrome or operator.

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PA-RAST

BUILDS THE REGIONAL RISK PICTURE

Aggregated, de-identified trends reveal which barriers are systematically weak — and return as regional priorities, guidance and safety enhancements.

THE GAP IS ALREADY DOCUMENTED

In the approved Runway Safety Team Implementation Project charter, PA-RAST appears once — as a source of data input. It holds no seat on the Project Board and has no channel to receive what runway safety teams produce. Runway safety team findings therefore do not reach the group responsible for runway incursion and runway excursion risk in this region.

A CHANGE IS NEEDED

A working paper to the ESC/41 on the integration of runway safety team activities into the PA-RAST work programme is in preparation. This analysis is the safety case for it.

WHAT THIS ANALYSIS CANNOT CLAIM

KLGA has no probable cause and no adopted contributing factors. Every entry is observed fact from the preliminary report.

Four occurrences, purposively selected. No frequency, rate or regional trend conclusion is available.

Cells marked “not examined” are unknowns, not passes. SPJC and SBGL surveillance equipage is not established.

The KLGA flight crew’s recovery options are unknown; CVR content is not released.

No ICAO Doc 9870 severity classification is assigned in any of the four reports.

Proposed next steps

1 Take the eighteen barriers to your runway safety team

The matrix is an agenda. Ask which of the eighteen your team can evidence, and which it is assuming.

2 Complete the GAPPRI implementation tracker

It returns your own barrier picture. States without a functioning runway safety team are encouraged to raise that with the Secretariat.

3 Let PA-RAST build the pattern

Aggregated, de-identified returns are what make regionally weak barriers visible. No single aerodrome can see this alone.

4 Confirm the driver-facing gap and revisit KLGA

Verify the proposed stop bar recommendation gap, and re-score layers 1 to 3 and 6 once adopted findings are available.

Four investigations found these barriers after the collision. The tracker and your runway safety team are how you find them before one.

Sources: CIAA Peru Informe Final ACCID-008-2022 · NTSB AIR-24-01 (DCA23LA125) · CENIPA IG-029/CENIPA/2025 · NTSB DCA26MA161 preliminary report · EUROCONTROL / Flight Safety Foundation GAPPRI.