Safety Management Summit
SMS - Brazil 2019

Panorama of Prevention and Investigation of Aeronautical Accidents

AERONAUTICAL ACCIDENT INVESTIGATION AND PREVENTION CENTER - CENIPA

Col Andre Luiz MOTA - Head of Investigation Subdivision

DECEA Departamento de Controle do Espaço Aéreo

ANAC AGÊNCIA NACIONAL DE AVIAÇÃO CIVIL

SCRIPT

- **CENIPA**
- **TOOLS AVAILABLE ON THE INTERNET**
- **GENERAL DATA**
- **COMMERCIAL AIR TRANSPORT - AIRLINE**
- **COMMERCIAL AIR TRANSPORT - AIR TAXI**
- **NON-COMMERCIAL AIR TRANSPORT – BUSINESS / PLEASURE**
- **NON-COMMERCIAL AIR TRANSPORT – TRAINING / INSTRUCTIONAL**
- **SPECIALISED OPERATIONS - AGRICULTURAL**

SCRIPT

- **CENIPA**
- TOOLS AVAILABLE ON THE INTERNET
- GENERAL DATA
- COMMERCIAL AIR TRANSPORT - AIRLINE
- COMMERCIAL AIR TRANSPORT - AIR TAXI
- NON-COMMERCIAL AIR TRANSPORT – BUSINESS / PLEASURE
- NON-COMMERCIAL AIR TRANSPORT – TRAINING / INSTRUCTIONAL
- SPECIALISED OPERATIONS - AGRICULTURAL

Safety Management Summit
SMS - Brazil 2019

Departamento de Controle do Espaço Aéreo

ANAC AGÊNCIA NACIONAL DE AVIAÇÃO CIVIL

http://www.cenipa.aer.mil.br

Investigation

Accidents, Serious Incidents and Incidents.

Prevention

Safety Recommendations, Balloon, Wildlife, Laser Beam, Reports.

Training

Investigation and Prevention.

Mission

Promote the prevention of aeronautical accidents, preserving human and material resources, aiming at the progress of Brazilian aviation.

Assignments

Plan, manage, control and execute activities related to the aeronautical accidents prevention and investigation within the SIPAER.

SCRIPT

- CENIPA
- **TOOLS AVAILABLE ON THE INTERNET**
- GENERAL DATA
- COMMERCIAL AIR TRANSPORT - AIRLINE
- COMMERCIAL AIR TRANSPORT - AIR TAXI
- NON-COMMERCIAL AIR TRANSPORT – BUSINESS / PLEASURE
- NON-COMMERCIAL AIR TRANSPORT – TRAINING / INSTRUCTIONAL
- SPECIALISED OPERATIONS - AGRICULTURAL

Força Aérea Brasileira

Centro de Investigação e Prevenção de Acidentes Aeronáuticos

COMANDO DA AERONÁUTICA

EM DESTAQUE

CONTATOS DE SOBREAVISO PARA COMUNICAÇÃO DE OCORRÊNCIAS AERONÁUTICAS - 24 HORAS

PRINCIPAL

- Capacitação
- Certificação
- Investigações
- Prevenção de acidentes
- CNPAA
- Legislação

CENIPA - Página inicial

Não seguro | www2.fab.mil.br/cenipa/

BRASIL

ACESSIBILIDADE ALTO CONTRASTE MAPA DO SITE MAIL

Força Aérea Brasileira

Centro de Investigação e Prevenção de Acidentes Aeronáuticos

COMANDO DA AERONÁUTICA

Pesquisar...

PAINEL SIPAER | NOTIFICAR OCORRÊNCIA | INVESTIGAÇÃO | PREVENÇÃO | FALE CONOSCO

- Relatórios finais
- Recomendações

MENU

EM DESTAQUE

CONTATOS DE SOBREAVISO PARA COMUNICAÇÃO DE OCORRÊNCIAS AERONÁUTICAS - 24 HORAS

sistema.cenipa.aer.mil.br/cenipa/paginas/relatorios/relatorios.php

Digite aqui para pesquisar

20:54
23/11/2019

CENIPA - Página inicial

Não seguro | www2.fab.mil.br/cenipa/

BRASIL

ACESSIBILIDADE ALTO CONTRASTE MAPA DO SITE MAIL

Força Aérea Brasileira

Centro de Investigação e Prevenção de Acidentes Aeronáuticos

COMANDO DA AERONÁUTICA

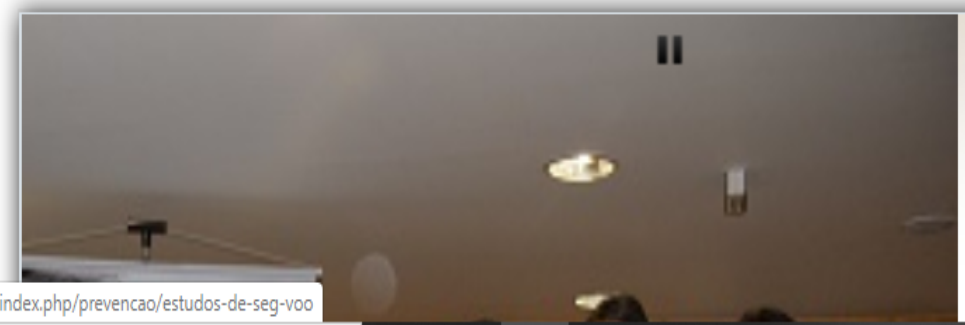
Pesquisar...

PAINEL SIPAER | NOTIFICAR OCORRÊNCIA | INVESTIGAÇÃO | PREVENÇÃO | FALE CONOSCO

- Estudos de Seg. Voo
- Risco de fauna
- Raio laser
- Risco baloeiro
- Divop
- RCSV
- CNPAA
- PPAA

EM DESTAQUE

CONTATOS DE SOBREAVISO PARA COMUNICAÇÃO DE OCORRÊNCIA AERONÁU



www2.fab.mil.br/cenipa/index.php/prevencao/estudos-de-seg-voo

Digite aqui para pesquisar

21:00
23/11/2019

CENIPA - Página inicial

Não seguro | www2.fab.mil.br/cenipa/

BRASIL

ACESSIBILIDADE ALTO CONTRASTE MAPA DO SITE MAIL

Força Aérea Brasileira

Centro de Investigação e Prevenção de Acidentes Aeronáuticos

COMANDO DA AERONÁUTICA

Pesquisar...

PAINEL SIPAER | NOTIFICAR OCORRÊNCIA | INVESTIGAÇÃO | PREVENÇÃO | FALE CONOSCO

MENU

EM DESTAQUE

CONTATOS DE SOBREAVISO PARA COMUNICAÇÃO DE OCORRÊNCIAS AERONÁUTICAS - 24 HORAS

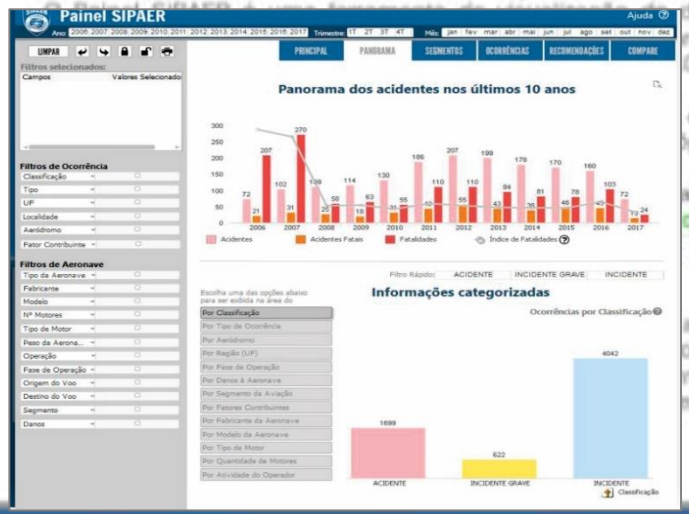
painelsipaer.cenipa.aer.mil.br

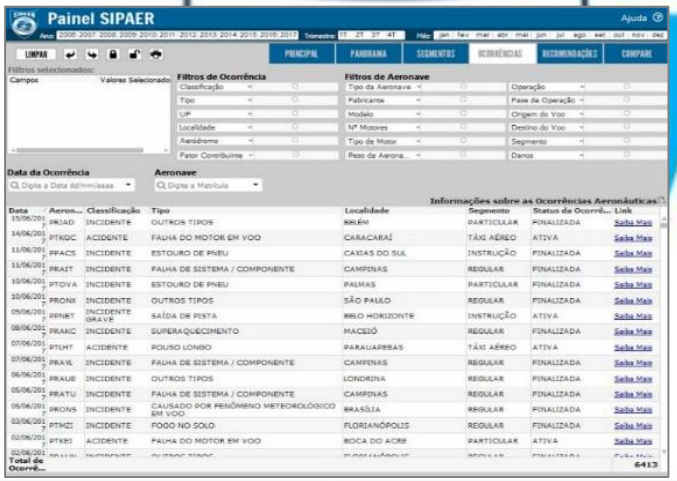
Digite aqui para pesquisar

21:07
23/11/2019

PAINEL SIPAER

Ocorrências Aeronáuticas na Aviação Civil Brasileira





EXPLORAR

VISUALIZAR DADOS

Aplique filtros de pesquisa e visualize graficamente os dados das ocorrências aeronáuticas dos últimos 10 anos. Além disso, é possível acordo aviação SIPAER os da

BUSCAR OCORRÊNCIA

Nesta área, você poderá consultar uma listagem com as ocorrências aeronáuticas da aviação civil brasileira. Essa de apoio de tada para ique aqui

RECOMENDAÇÕES

Nesta área, são exibidas as recomendações de segurança emitidas em ocorrências da aviação civil brasileira dos últimos 10 anos. filtros de podem formato visualize

COMPARAR CENÁRIOS

A comparação de cenários pode ser interessante para entender o comportamento dos dados em diferentes cenários da aviação. ros de ferentes ra tirar Clique

Dados e

Desenv Infraestr

| CENIPA

áuticos

71615-600

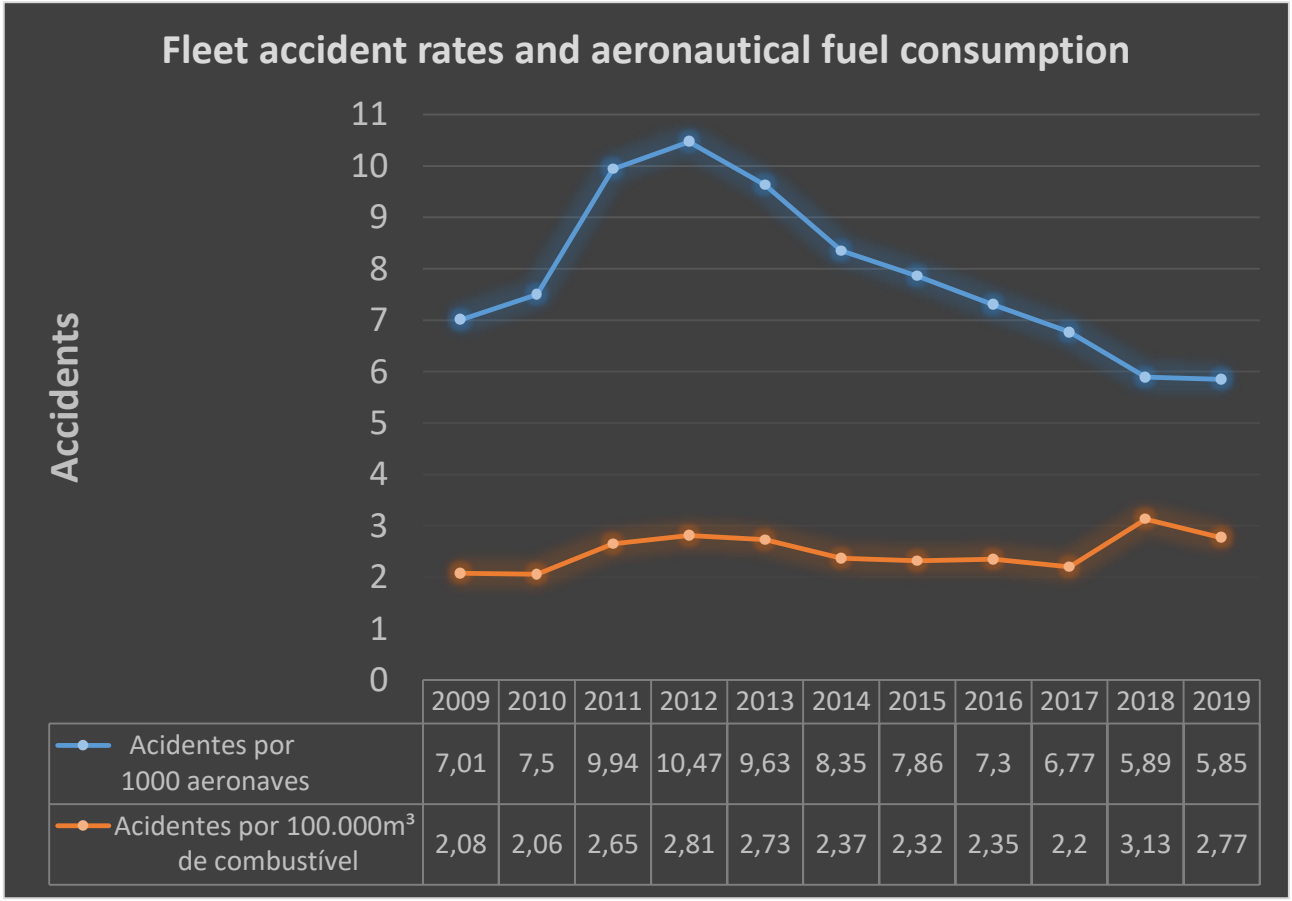
SCRIPT

- CENIPA
- TOOLS AVAILABLE ON THE INTERNET
- **GENERAL DATA**
- COMMERCIAL AIR TRANSPORT - AIRLINE
- COMMERCIAL AIR TRANSPORT - AIR TAXI
- NON-COMMERCIAL AIR TRANSPORT – BUSINESS / PLEASURE
- NON-COMMERCIAL AIR TRANSPORT – TRAINING / INSTRUCTIONAL
- SPECIALISED OPERATIONS - AGRICULTURAL

GENERAL DATA

Average aeronautical fuel consumption in the last 10 years:

- **72,036m³ of aviation gasoline per year**
- **5,571,539 m³ of aviation kerosene per year**



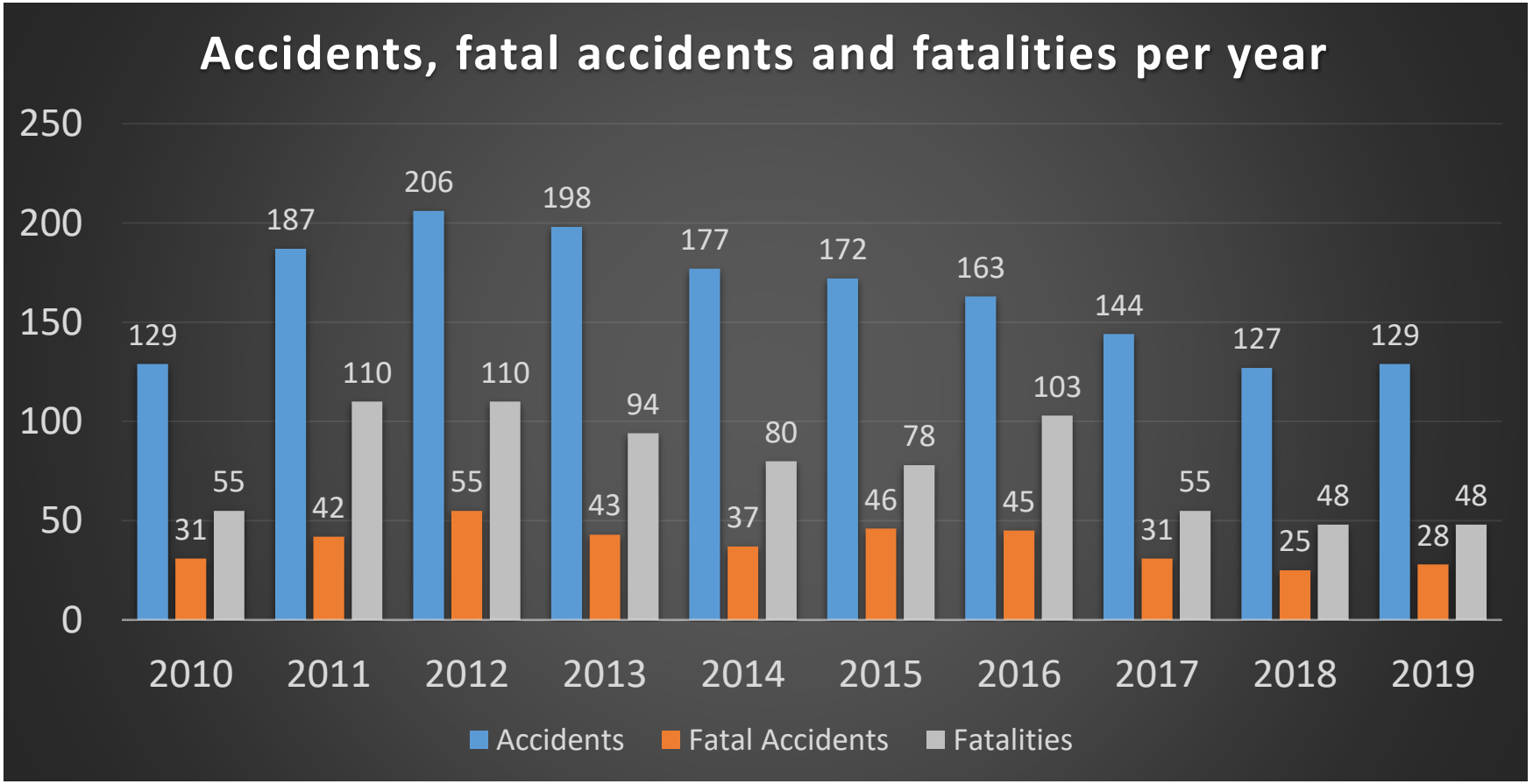
	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Acidentes por 1000 aeronaves	7,01	7,5	9,94	10,47	9,63	8,35	7,86	7,3	6,77	5,89	5,85
Acidentes por 100.000m³ de combustível	2,08	2,06	2,65	2,81	2,73	2,37	2,32	2,35	2,2	3,13	2,77

Fuel Tank Capacity

- **Boeing 737 – 26 m³**
- **Cessna 208 – 1,2 m³**

Sources: CENIPA, ANP, ANAC.

GENERAL DATA



Source: CENIPA.

Safety Management Summit SMS - Brazil 2019

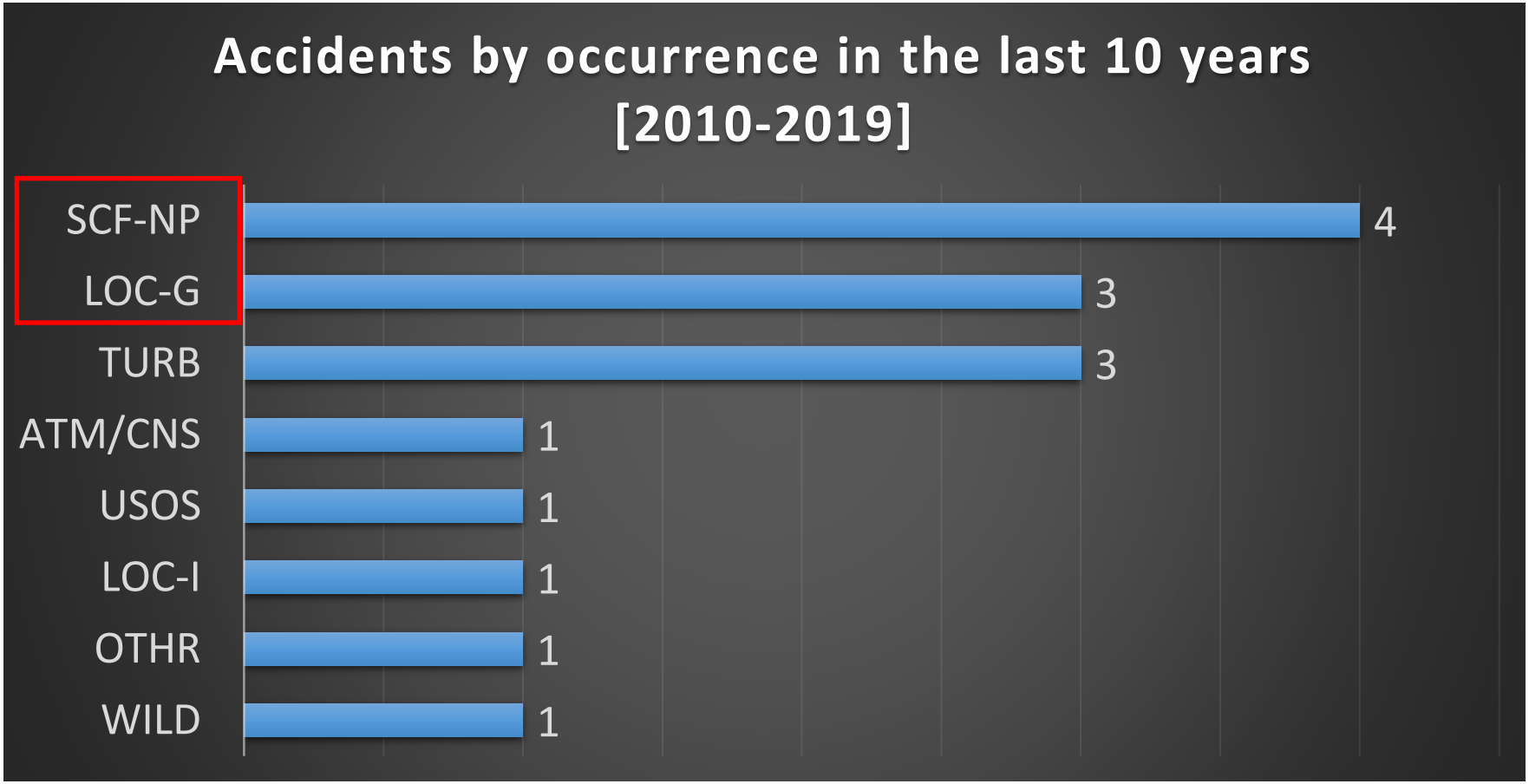
Departamento de Controle do Espaço Aéreo

ANAC AGÊNCIA NACIONAL DE AVIAÇÃO CIVIL

SCRIPT

- CENIPA
- TOOLS AVAILABLE ON THE INTERNET
- GENERAL DATA
- COMMERCIAL AIR TRANSPORT - AIRLINE
- COMMERCIAL AIR TRANSPORT - AIR TAXI
- NON-COMMERCIAL AIR TRANSPORT – BUSINESS / PLEASURE
- NON-COMMERCIAL AIR TRANSPORT – TRAINING / INSTRUCTIONAL
- SPECIALISED OPERATIONS - AGRICULTURAL

AIRLINE



Source: CENIPA.

AERONAUTICAL ACCIDENT

ATR 72-212
PR-TTI
21FEV2011

HISTORY OF THE OCCURRENCE

- **The aircraft departed from SBBE on an IFR flight plan, destined for SBHT.**
- **The approach for landing in SBHT was visual and stabilized. The touchdown on the runway was smooth, with gradual deceleration, in which only the "ground idle" was utilized.**
- **After the "70kt" callout, a strong noise was heard, and the left main gear collapsed, with the aircraft veering off to the left. The aircraft exited the runway and came to a stop in a grass area.**
- **There were 46 passengers and 4 crew members on board. One of the passengers suffered minor injuries.**
- **There was no damage to third parties.**


22/02/2011

ANALYSIS

- During the PR-TTI landing roll, the left main landing gear collapsed, as a result of the fracture of the AFT PIVOT PIN (D61000 SN 25). According to the aircraft manual, the entire landing gear must be overhauled after every eight-year period or 18,000 cycles.
- The operator sent this assembly to be overhauled at a maintenance company on 27 February 2009. This one outsourced some of the services for other three subcontracted companies, on account of not possessing technical capability and suitable machinery for the tasks of reconditioning the AFT PIVOT PIN (D61000 E1 SN 25).
- The maintenance company's Inspection Procedures Manual (MPI), accepted by the CAA, prescribed that any work done by an organization not homologated by the CAA had to be inspected by the Technical Manager (RPQS) or another person designated by him/her, as to the adequacy of the implementation of the service to the standards and approved procedures, among others.

ANALYSIS

- **The maintenance company had a structured technical library with all the necessary up-to-date manuals for the inspection in question. Nevertheless, the company chose to prepare a Portuguese translation of the list of the tasks prescribed in the manufacturers' manuals, which were originally written in English.**
- **Not all tasks were accurately translated and, particularly, did not address important information that could jeopardize flight safety if not complied with, for example, information on the process of machining of the pin in question.**
- **During the investigation, it was found that, despite being a workshop structured to perform machining services and other types of repairs, two of the subcontracted companies neither possessed nor made use of the aircraft manuals when doing the services discussed in this report. Thus, it failed to comply with the established parameters and limits when machining the AFT PIVOT PIN (D61000 E1 SN 25).**

ANALYSIS

- **According to the pin maintenance manual there was no plan for any type of machining in the pin section transition region. The resulting inadequate machining finish in the region served as a facilitator for the onset of the fatigue process in the pins.**
- **Despite the prescriptions contained in the maintenance company's MPI, there was no participation and/or supervision by any of its professionals. This fact, jeopardized the safety of the flight.**
- **In the case of the outsourced companies, the required methods, techniques and parameters were not observed for the reasons previously commented, namely: lack of manuals, as well as lack of skill and knowledge in relation to the characteristics of the maintenance of certified aeronautical products.**

ANALYSIS

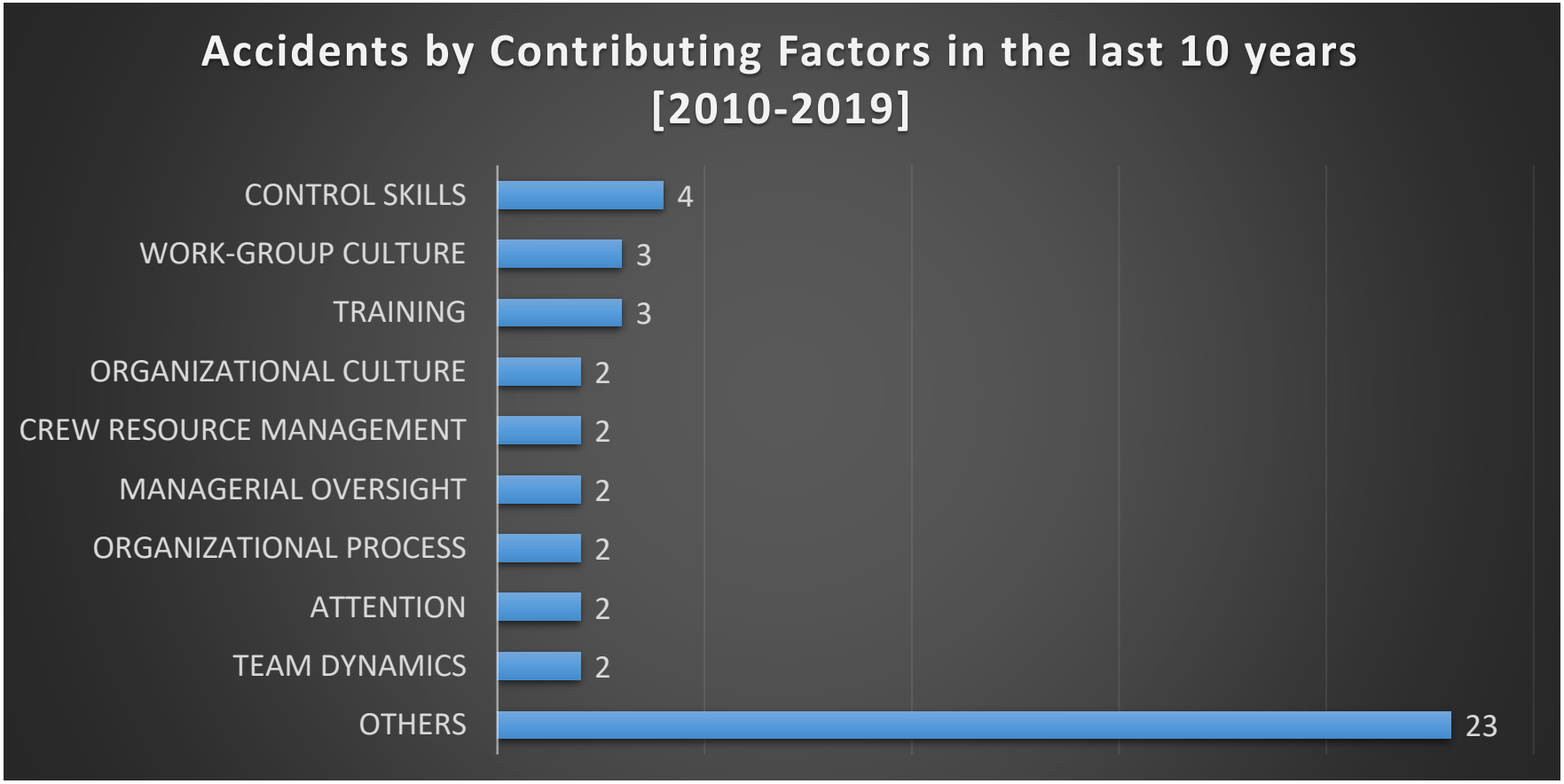
- **The last point* in the chain of events leading to the accident (*active failure) was the nonuse of the manufacturer's manuals in some stages of the overhaul of the LEFT MAIN LANDING GEAR ASSEMBLY (PN D23189000-19 SN MN170), in particular in the services performed in the AFT PIVOT PIN (D 61000 E1 SN 25). However, before this active failure, a series of actions had functioned as latent conditions.**

- **Summing up what has been discussed so far, the landing gear was one of the items that underwent maintenance by a subcontractor. The maintenance company that performed the service in the accident aircraft, although homologated by the Civil Aviation Authority, did not possess technical capability to carry out all the phases of the landing gear overhaul service, and this led it to subcontracting other ones. The conclusion is that the maintenance work was not done properly, definitely contributing to the aeronautical accident.**

CONCLUSION – CONTRIBUTING FACTORS

- **Capacitation – a contributor.**
- **Organizational Process – a contributor.**
- **Aircraft Maintenance – a contributor.**

CONTRIBUTING FACTORS

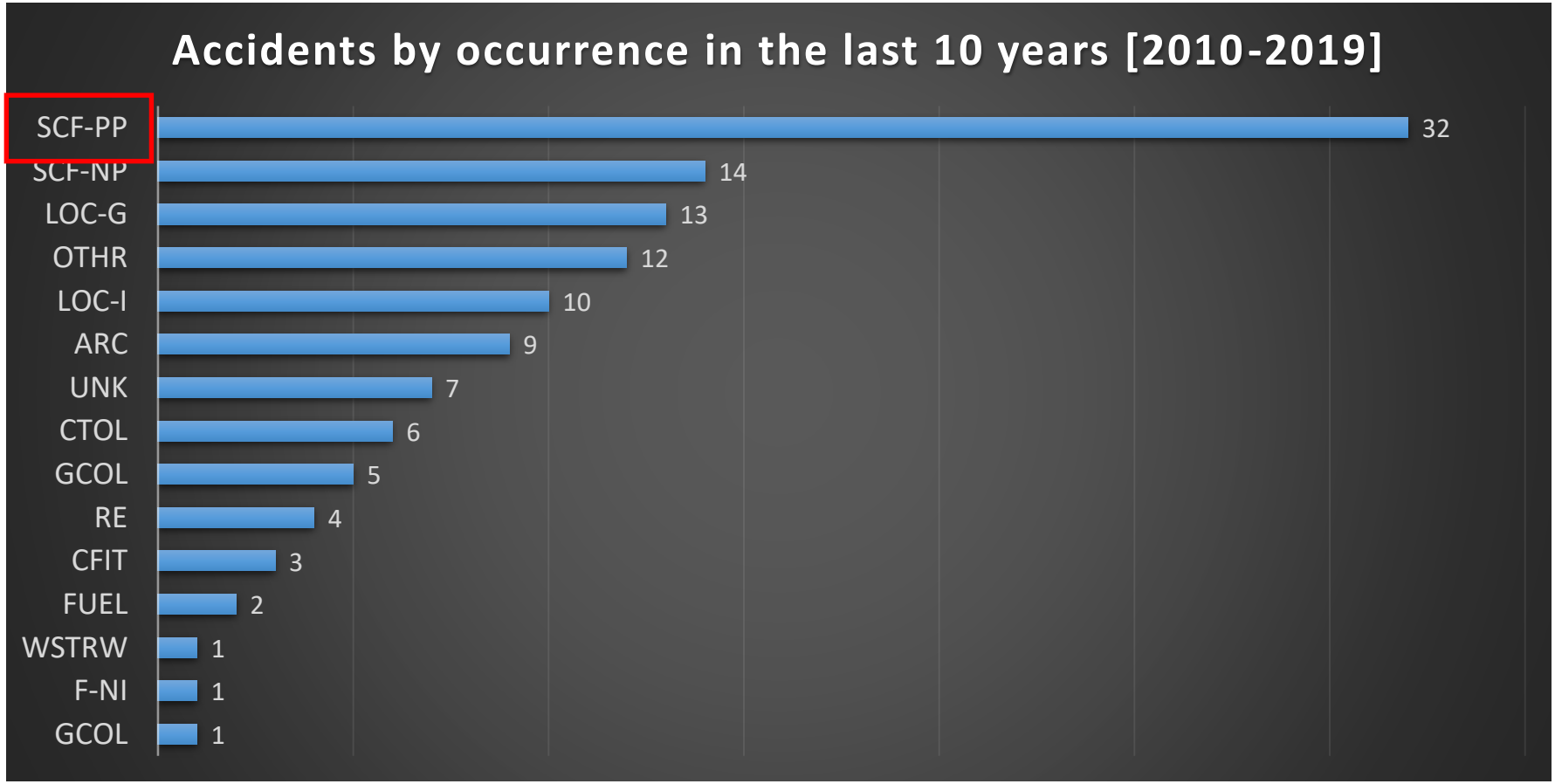


Source: CENIPA.

SCRIPT

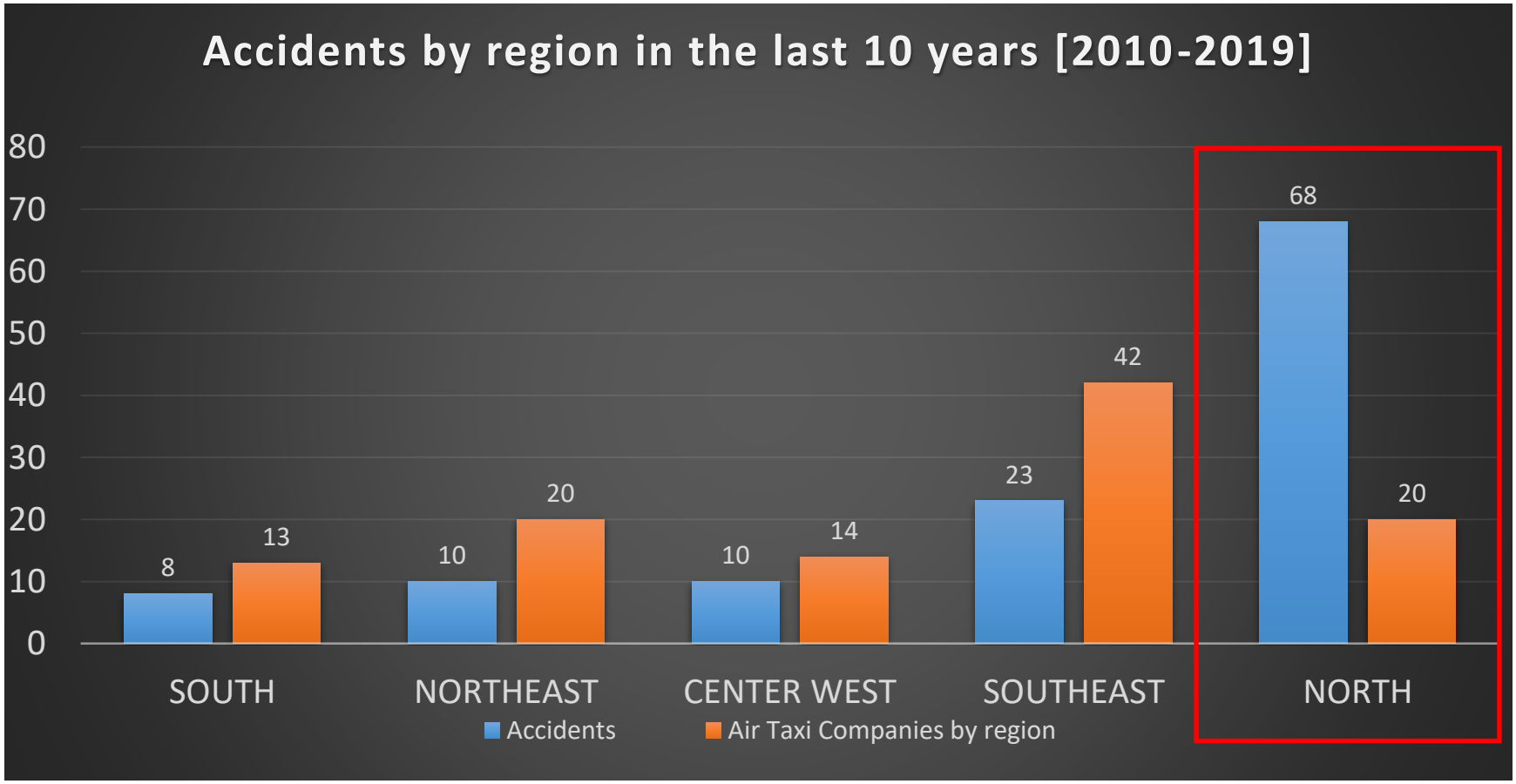
- CENIPA
- TOOLS AVAILABLE ON THE INTERNET
- GENERAL DATA
- COMMERCIAL AIR TRANSPORT - AIRLINE
- COMMERCIAL AIR TRANSPORT - AIR TAXI
- NON-COMMERCIAL AIR TRANSPORT – BUSINESS / PLEASURE
- NON-COMMERCIAL AIR TRANSPORT – TRAINING / INSTRUCTIONAL
- SPECIALISED OPERATIONS - AGRICULTURAL

AIR TAXI



Source: CENIPA.

AIR TAXI



Source: CENIPA.

AERONAUTICAL ACCIDENT

HISTORY OF THE OCCURRENCE

- The aircraft took off from Alberto Alcolumbre International Airport – AP (SBMQ), to the Monte Dourado Aerodrome - PA (SBMD), at 1010 (UTC), in order to transport cargo and personnel, with two pilots and three passengers on board.
- During take-off, while the plane was cruising at approximately 1,800 feet altitude, there was a sudden loss of power with subsequent engine shutdown.
- According to the statements made, there was an attempt to turn on the engine again, without success.
- Faced with this condition, the aircraft was conducted to make a forced landing on an unprepared area, about 3NM from threshold 08 of SBMQ.
- After touching the ground, the plane traveled about 100 meters to the full stop and had the nose gear separated on that route.
- The aircraft had substantial damage. The pilot, the co-pilot and two passengers were unharmed. One passenger suffered minor injuries

ANALYSIS

- According to the report presented by DCTA to the investigators, the high working pressure of the fuel in the transfer tube caused a displacement from its housing, since the latch plate that was supposed to hold it and to avoid its movement was deformed.
- Thus, the instant the seal ring approached the entrance of the body of that injector nozzle, a fuel leak occurred, since that seat had a conical shape.
- As the pressure in the power line decreases, the engine nozzles cease to function, resulting in loss of power.
- The displacement of the transfer tube was possible because the igniter cable wire, at the 4 o'clock position, had been anchored on its latch plate. When the wire was pulled too far, it lifted and deformed this plate.
- As a result, the fuel transfer tube has been free to move from its correct working position.

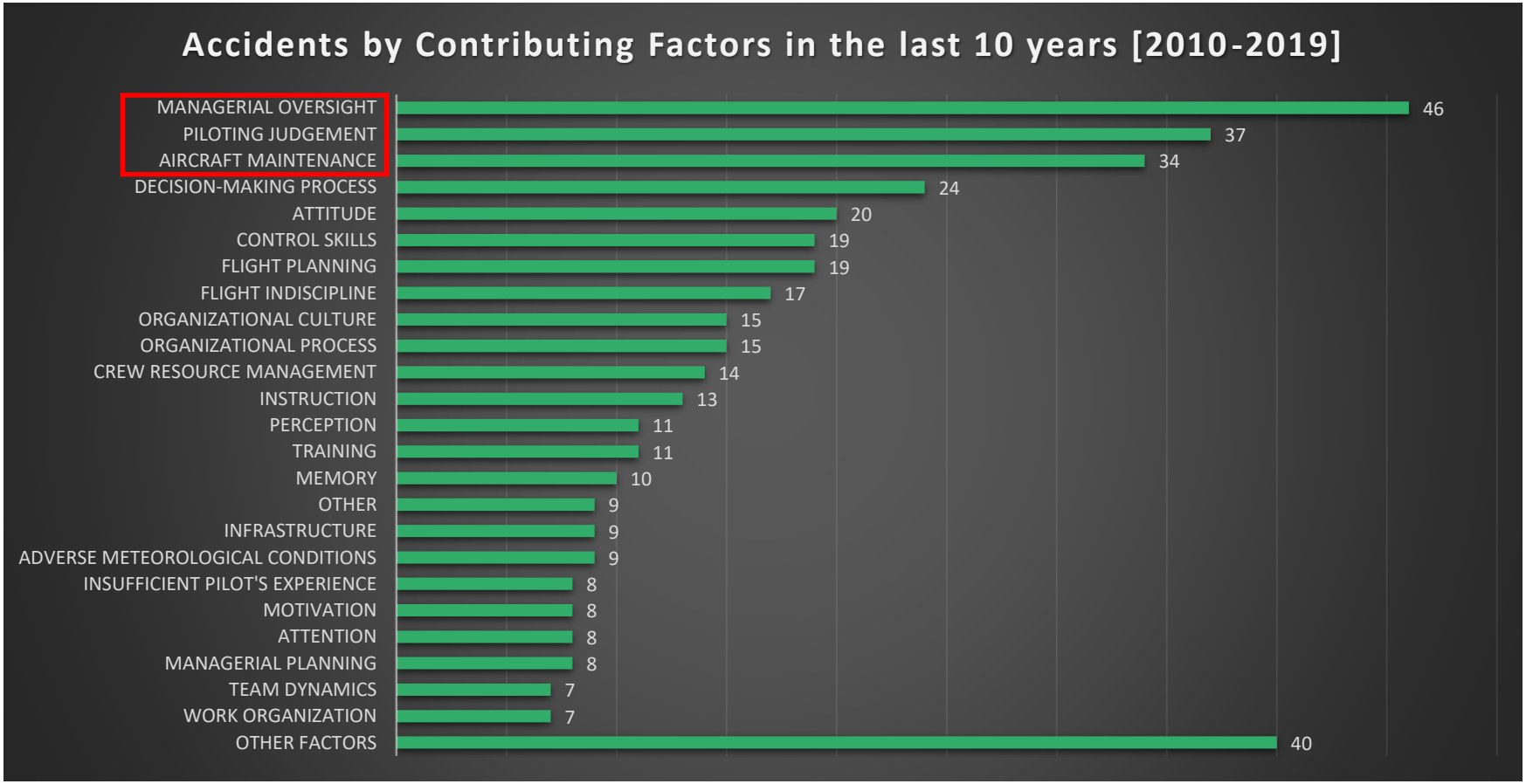
ANALYSIS

- In the documentation of the aircraft was recorded, in 03ABR2016, some maintenance interventions, among which the engine compressor washing.
- According to the PWC Maintenance Manual, in order to perform this task, the technicians would have to remove the igniter from the 4 o'clock position. After the compressor wash has been completed, the igniter should be reinstalled and safety wired according to the procedures described in the PWC Maintenance Manual.
- Thus, the deformation of the latch plate of the transfer tubes, which allowed its displacement, probably occurred during the execution of this safety wired.It was characterized the inadequacy of maintenance services performed on the aircraft as a contributing factor to the failure of the PR-CRF engine.
- In addition, failure to identify this wrong procedure indicated that the managerial supervision of the implementation activities in the technical area was not adequate.

CONCLUSION – CONTRIBUTING FACTORS

- **Aircraft Maintenance – a contributor.**
- **Managerial oversight – a contributor.**

AIR TAXI

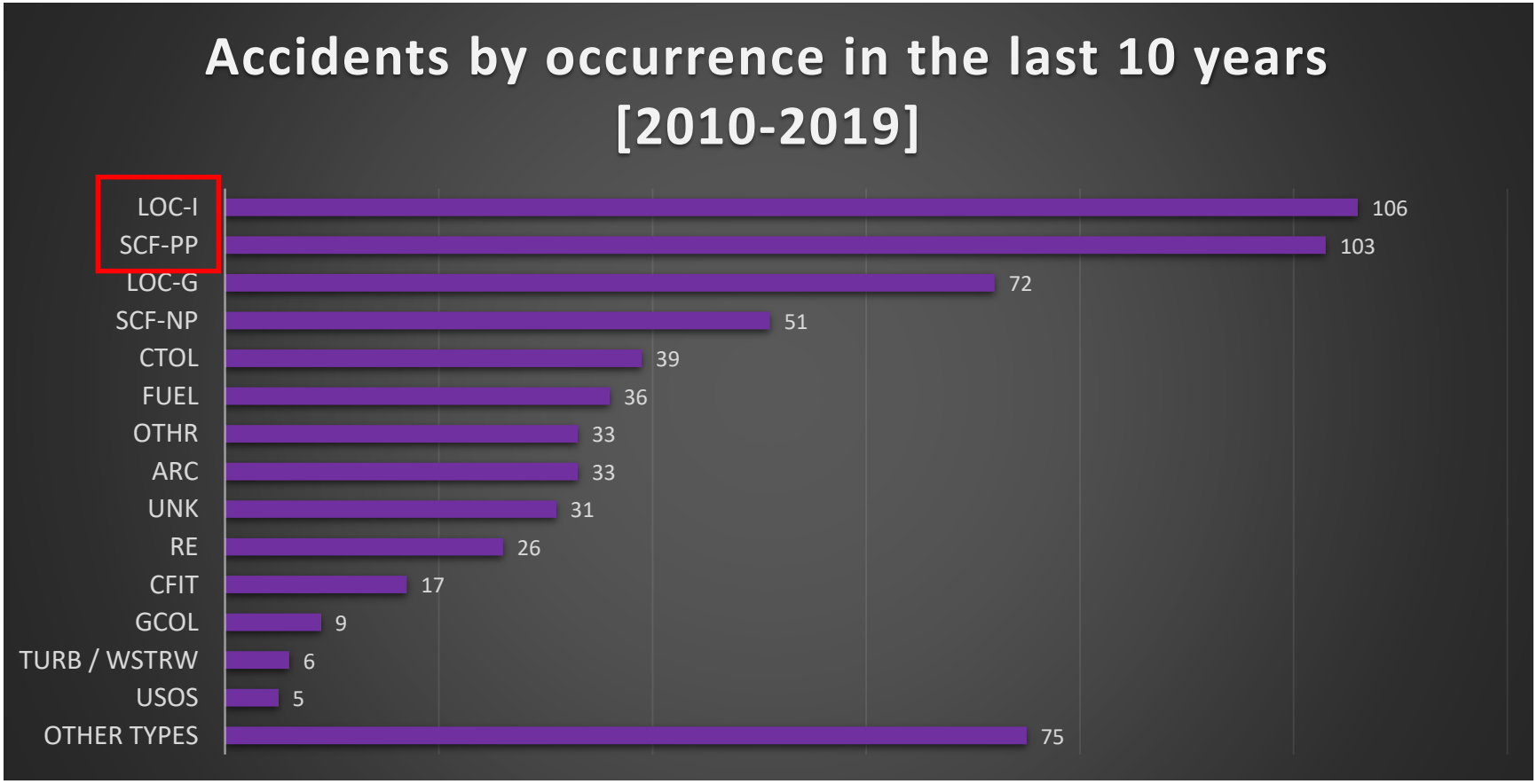


Source: CENIPA.

SCRIPT

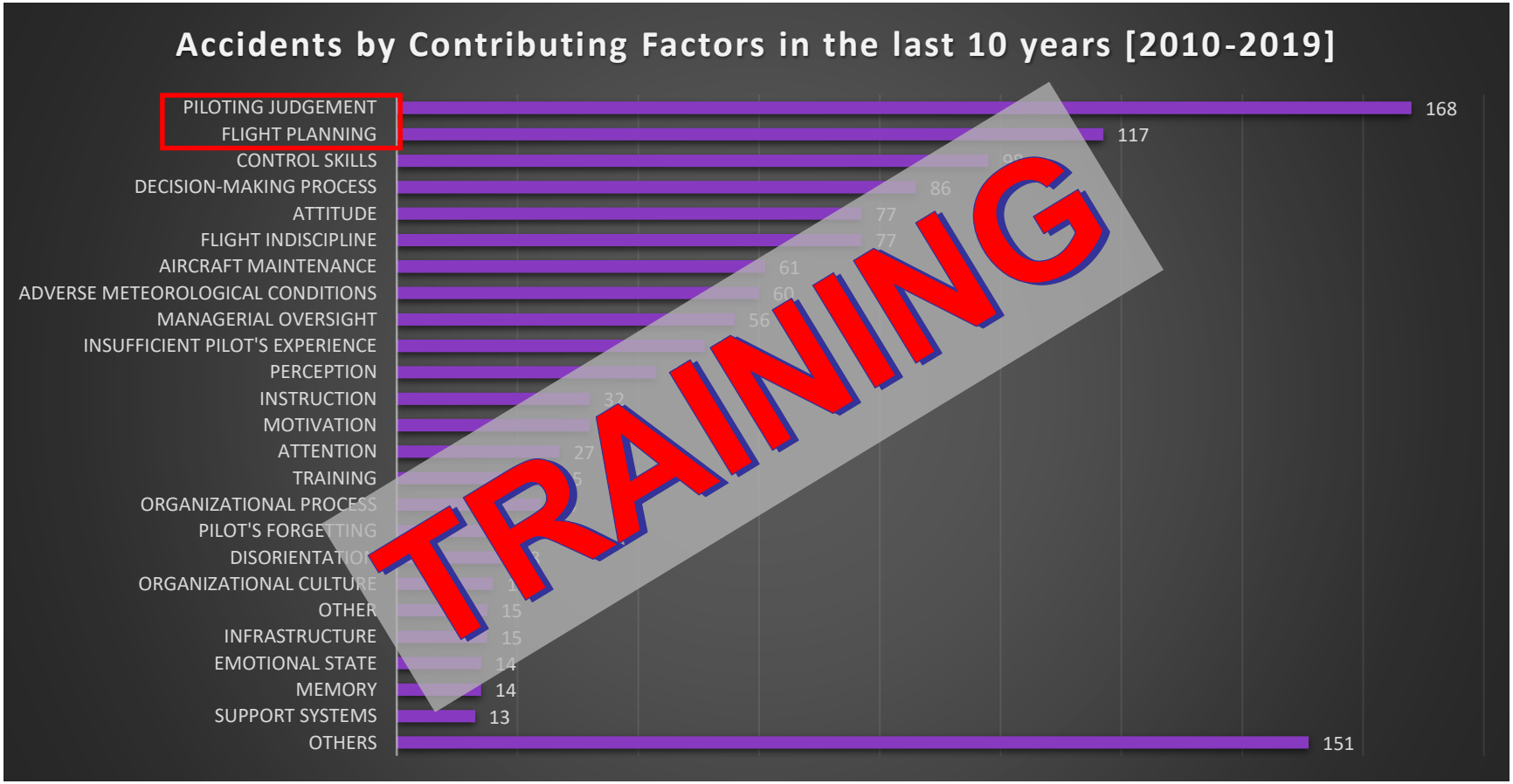
- CENIPA
- TOOLS AVAILABLE ON THE INTERNET
- GENERAL DATA
- COMMERCIAL AIR TRANSPORT - AIRLINE
- COMMERCIAL AIR TRANSPORT - AIR TAXI
- NON-COMMERCIAL AIR TRANSPORT – BUSINESS / PLEASURE
- NON-COMMERCIAL AIR TRANSPORT – TRAINING / INSTRUCTIONAL
- SPECIALISED OPERATIONS - AGRICULTURAL

BUSINESS / PLEASURE



Source: CENIPA.

BUSINESS / PLEASURE

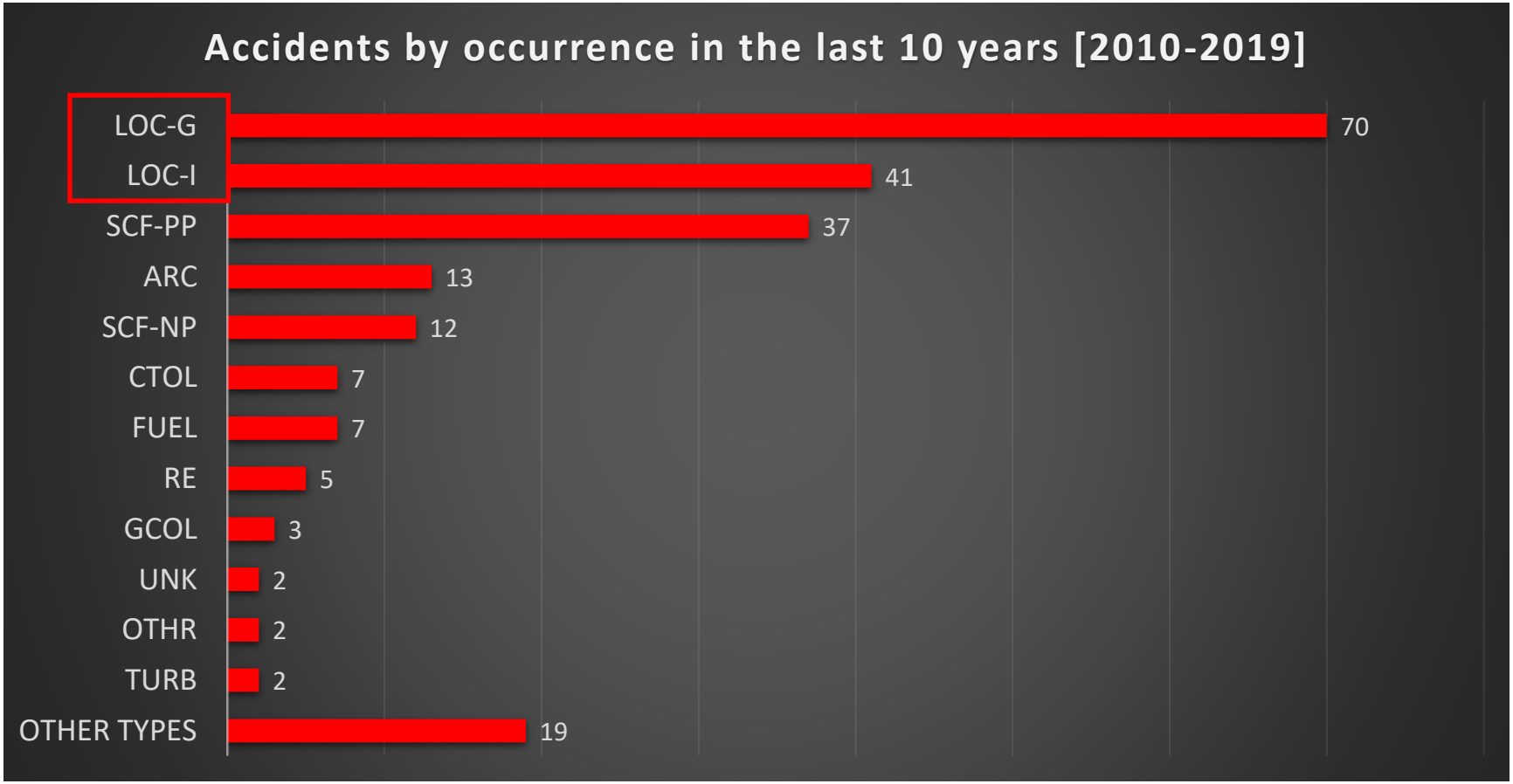


Source: CENIPA.

SCRIPT

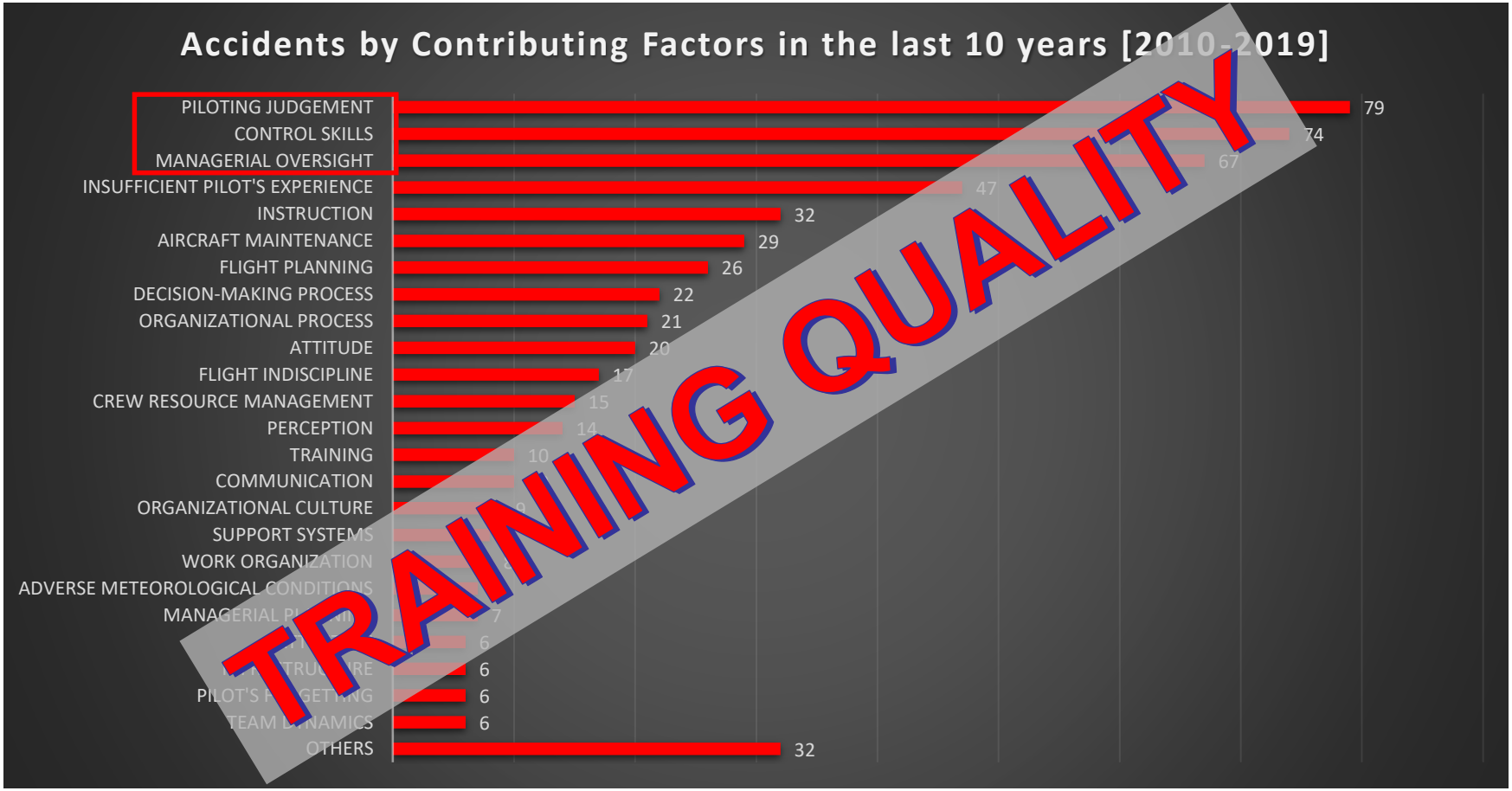
- CENIPA
- TOOLS AVAILABLE ON THE INTERNET
- GENERAL DATA
- COMMERCIAL AIR TRANSPORT - AIRLINE
- COMMERCIAL AIR TRANSPORT - AIR TAXI
- NON-COMMERCIAL AIR TRANSPORT – BUSINESS / PLEASURE
- **NON-COMMERCIAL AIR TRANSPORT – TRAINING / INSTRUCTIONAL**
- SPECIALISED OPERATIONS - AGRICULTURAL

TRAINING / INSTRUCTIONAL



Source: CENIPA.

TRAINING / INSTRUCTIONAL

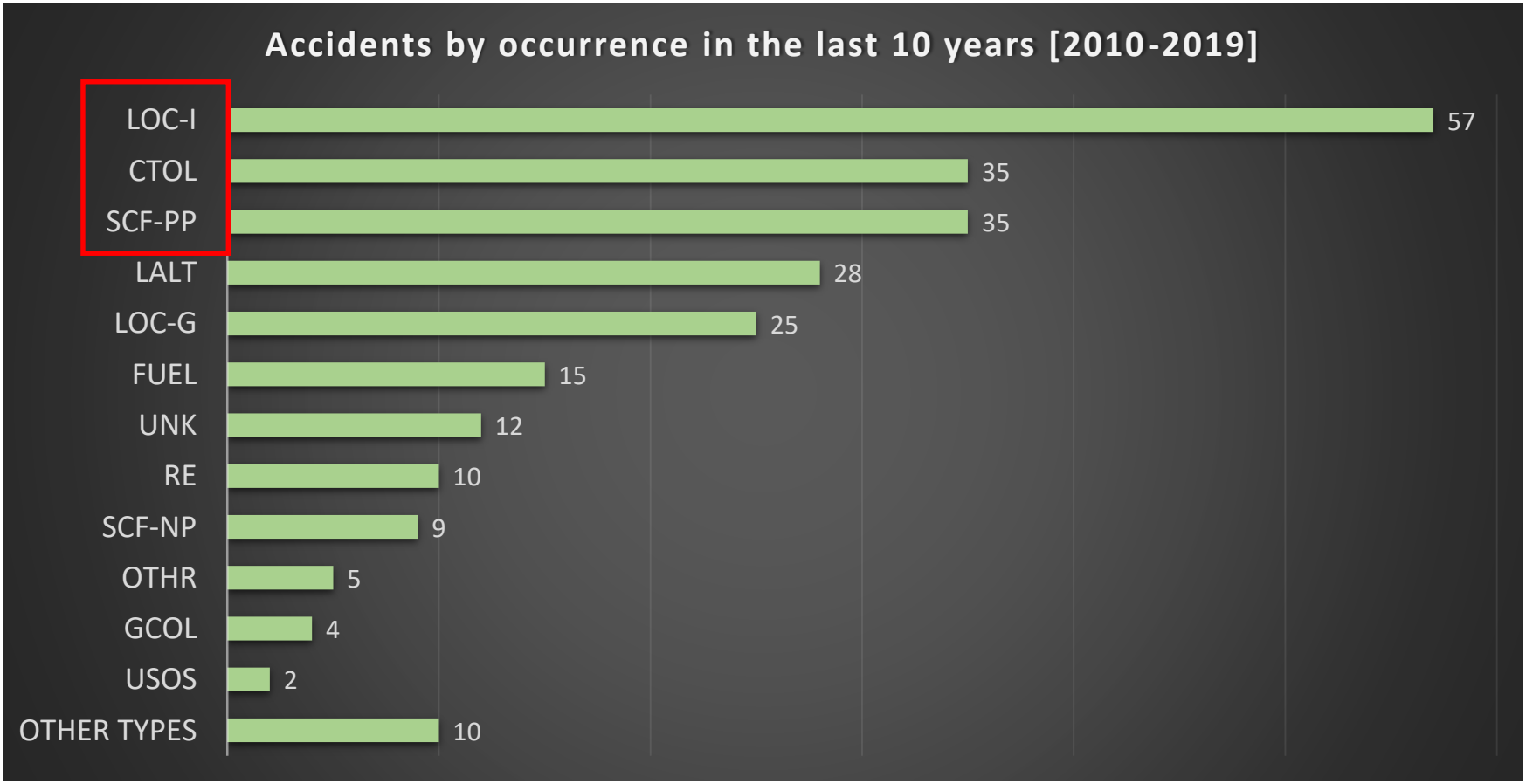


Source: CENIPA.

SCRIPT

- CENIPA
- TOOLS AVAILABLE ON THE INTERNET
- GENERAL DATA
- COMMERCIAL AIR TRANSPORT - AIRLINE
- COMMERCIAL AIR TRANSPORT - AIR TAXI
- NON-COMMERCIAL AIR TRANSPORT – BUSINESS / PLEASURE
- NON-COMMERCIAL AIR TRANSPORT – TRAINING / INSTRUCTIONAL
- **SPECIALISED OPERATIONS - AGRICULTURAL**

AGRICULTURAL

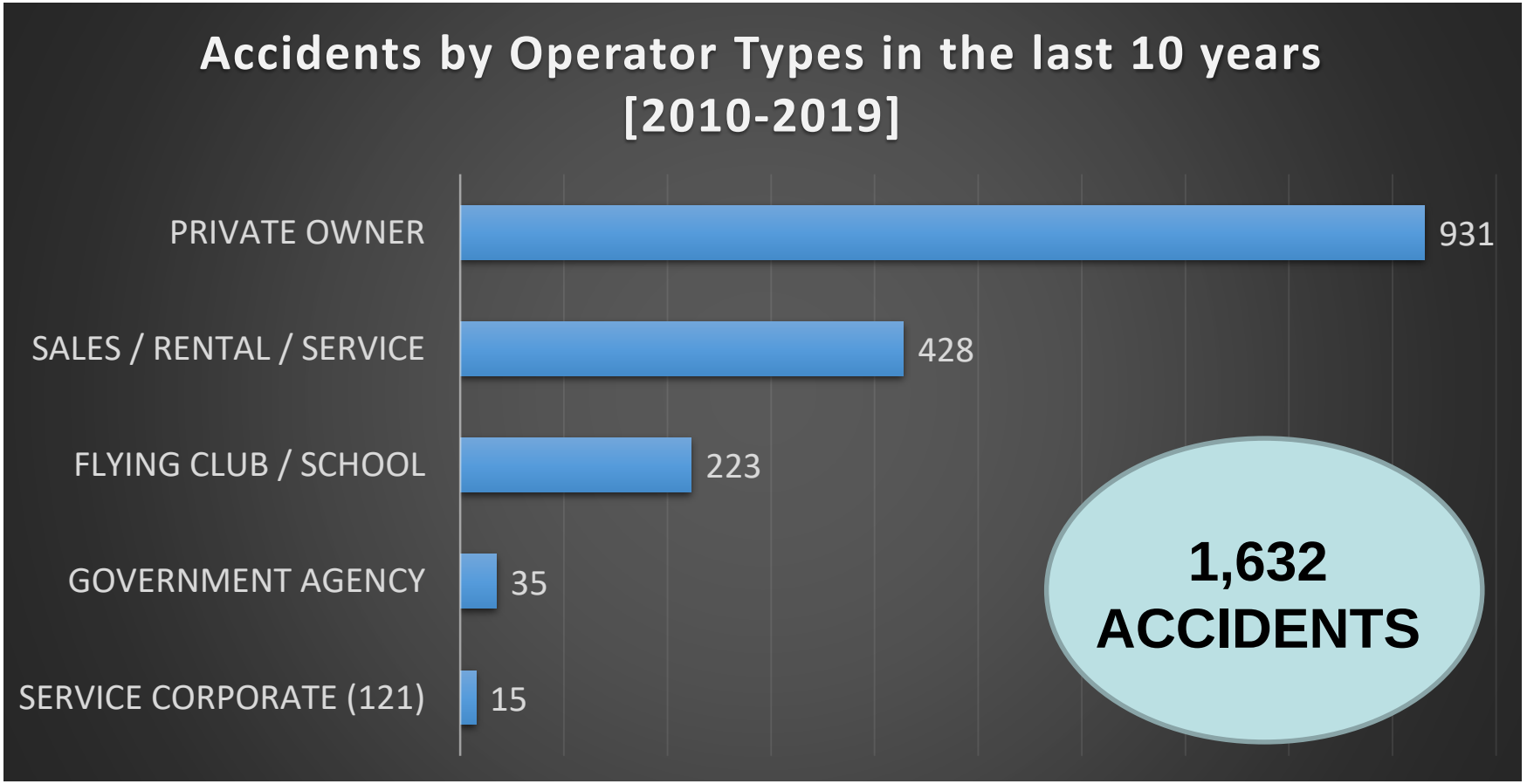


Source: CENIPA.

AGRICULTURAL

Source: CENIPA.

OPERATOR TYPES



Source: CENIPA.

Preventing aeronautical accidents is everyone's responsibility.

BE CONSERVATIVE, FLY SAFE.

CONTACTS

SHIS QI 05, ÁREA ESPECIAL 12
LAGO SUL - BRASÍLIA

+55 61 3364-8834

motaalm@fab.mil.br