MOST WANTED

BALPA

Flight Safety IMPROVEMENTS

November 2020

Introduction

In 2019, BALPA conducted a review of global aviation strategic and safety plans from key regulatory authorities, accident investigation bodies, influential flight safety organisations and member associations. BALPA's own safety plan was alone in featuring "regulatory capture" as a prominent safety issue, that is the problem of the regulator becoming biased towards the financial interest of the industry that it regulates. Otherwise, there was consensus on other key safety issues but slight differences between organisations in terms of emphasis on systemic issues (e.g. effectiveness of safety management) versus type of accident outcome (e.g. controlled flight into terrain).

A consequence of the review was a decision taken by BALPA's Flight Safety Committee to produce a set of desired safety outcomes as a supplement to the safety plan. These outcomes focus on systemic issues and were informed by the review of global safety plans and the safety concerns of BALPA's members. Figure 1 shows the high-level list of topics covered in this document.

The format of stating desired outcomes allows a more ambitious and wide-ranging approach to be taken in terms of the safety improvements BALPA would wish to see. The intention is to keep the document alive and for BALPA to identify actions that it, and its members, can take to contribute to these desired safety outcomes being achieved. This will involve an ongoing programme of promotion and engagement with the membership and other stakeholders. Both the high-level subjects and the associated outcomes and actions will be reviewed 12 months after launch to confirm their ongoing relevance and efficacy.

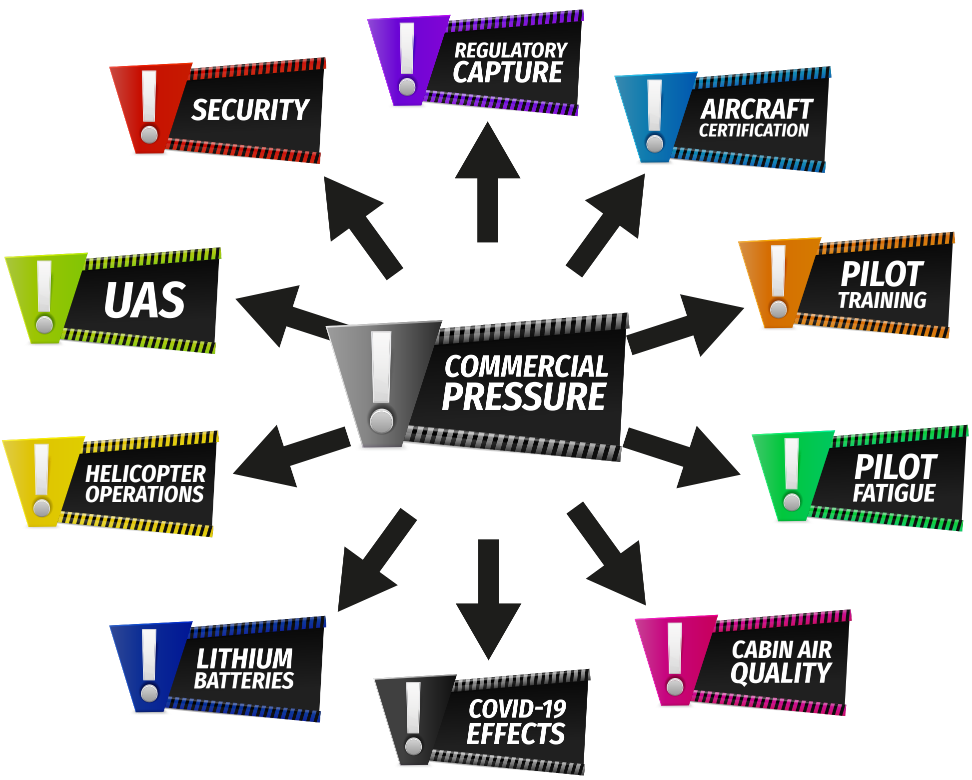


Figure 1: high-level subjects covered

Commercial Pressure

Safety is widely proclaimed to be the top priority for organisations within the aviation industry, but the reality is that commercial pressures threaten such focus and it is business survival that inevitably takes precedence, now more so than ever during the coronavirus pandemic.

Commercial pressure has an impact across the board from decisions taken during aircraft design and certification to the depth and breadth of initial and recurrent training of pilots, how pilots are recruited/contracted and how hard they are made to work on the line, operational decisions taken in cases of aircraft unserviceability and/or during environmental disturbances, and how thoroughly aircraft are maintained.

Commercial pressure also affects the spend on safety improvement activity and even the level of safety oversight provided by the regulator. However, it is often an insidious presence that chips away at an organisation's resilience and can be difficult to spot or measure until something dramatic happens such as an accident.

Commercial pressure has a bearing on most if not all the subject areas in BALPA's Most Wanted, which is why it is placed at the hub.

What does BALPA want?

Strict enforcement by aviation authorities of regulation controls to ensure that commercially driven decisions do not breach safety 'red lines'

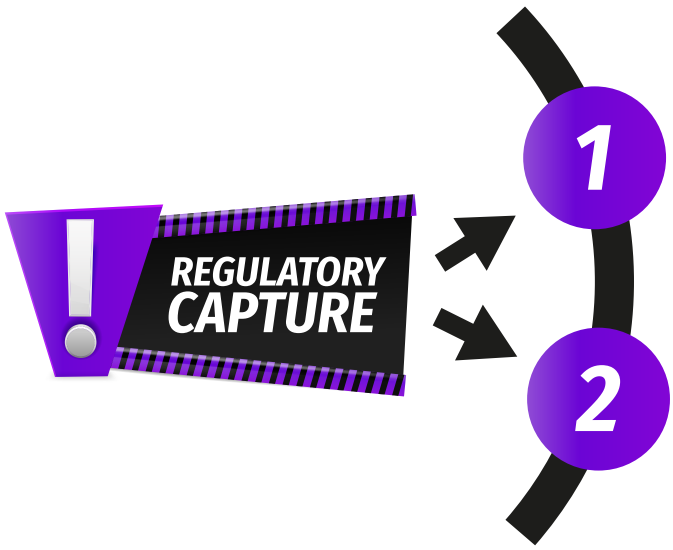
Regulatory Capture

Regulatory capture is said to occur when a body that is established primarily to act in the public interest, instead advances the interests of powerful organisations in the sector that it regulates. It has a clear economic basis because industry has such a large stake in the regulator's activity that there is a substantial motivation to influence it. Regulators can be especially susceptible to capture when part of their remit is to regulate in such a way that permits the reasonable commercial growth of industry. The Boeing 737 MAX fatal accidents are the most tragic recent examples where regulatory capture features prominently.

The ongoing coronavirus pandemic has placed an increased strain on aviation authorities in balancing their enforcement of regulation in the public interest with the need to acknowledge the commercial burden on industry. In the UK, this situation is further complicated by the funding model for the aviation regulator whose costs are met entirely from charges to whom they provide a service or regulate.

From 1st January 2021, the UK CAA will once again have the responsibility for rulemaking in all civil aviation domains. However, as part of the EU (Withdrawal) Act 2018, all existing EU regulations and new regulations that become applicable during the transition period will automatically be incorporated into UK law. Whilst this means that in the short term there are unlikely to be significant changes to the rules affecting UK aviation, it is expected that a review of safety regulation will occur at some point. This would be an opportunity to identify improvements such as strengthening provisions in some areas (e.g. governing pilots' health) and making them more proportional in others. There will also be the need to scrutinise new regulations yet to be fully formulated (e.g. for urban air mobility vehicles).

What does BALPA want?



1. Aviation authorities to implement controls to mitigate the risk of regulatory capture within their organisations

2. DfT/CAA to review the efficacy and relevance of national aviation safely and security regulations following the UK's exit from the EASA system, and to ensure they are fit for purpose

Aircraft Certification

The fatal accidents involving the Boeing 737 MAX have illustrated a significant issue with aircraft certification in general, whereby an aircraft can evolve over a long period of time with incremental modifications such that the latest version bears little resemblance to the original type certificated design. Commercial pressures force manufacturers to modify their aircraft in such a way that they feel and fly similarly to previous variants, thereby minimising the additional flight training costs for their customers that a more substantial modification would require.

However, the aircraft may have changed fundamentally and arguably should require full certification as a new type with a commensurate level of training for pilots. It is also arguable that the delegation of some certification tasks from the regulator to industry, which has increased over the years, has created an environment in which aircraft have been allowed to evolve in such a way.

Similarly, there is the issue of aircraft design changes resulting in unintended consequences such as undesirable handling qualities during certain flight regimes, which are resolved through augmentation of the aircraft's flight control system (including software) rather than a more fundamental aerodynamic re-design. Such an approach arguably results in a more complex system with another set of failure modes to be considered and mitigated, including how the pilot interacts with the aircraft.

What does BALPA want?

Aviation authorities to require that substantial aircraft design changes result in certification as a new type with a commensurate level of training required for pilots

Aviation authorities to require that fundamental flying or handling quality deficiencies are aerodynamically designed out and not masked by flight control system augmentation

Pilot Training

The breadth and depth of flight crew training in complex automated systems has reduced over time such that seemingly straight forward system failures can lead to competent and experienced pilots struggling to cope and quickly losing situational awareness (e.g. fatal accidents involving Air France flight 447 and Lion Air flight 610).

Accurate and timely diagnosis of a problem can be impeded by the multitude of cascading alerts presented to pilots in modern automated flight decks following a system failure, making it difficult for them to prioritise their actions. This is compounded by emergency/QRH procedures that can differ markedly between aircraft sub-types or variants, but which are covered by the same type rating.

These issues are further exacerbated by a general lack of opportunity to practice manual flying of aircraft with various combinations of automated systems disabled. Pilots need to be provided with more effective training to better understand the systems fitted to their aircraft (and differences between aircraft), and to appreciate the implication of various system failures on continued safe flight.

They also need greater opportunity to practice realistic failure scenarios in the simulator on a no-jeopardy basis (ensuring first that the simulator provides an accurate representation of the real aircraft). This necessitates a rationalisation of recurrent training requirements to free up time for this important activity, and acknowledgment that the essential opposing force to the increased training that pilots need is cost.

What does BALPA want?

1. Implementation by ATOs of smarter training to improve pilots' ability to diagnose and manage complex technical failures

2. Implementation by aviation authorities of more thorough type rating training requirements to better educate pilots on differences between aircraft

Pilot Fatigue

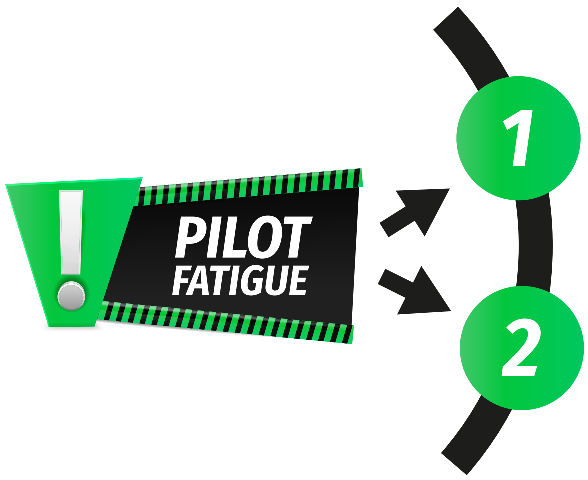
Fatigue has long been a concerning issue for pilots and in the most recent survey of BALPA members it was felt to be the greatest single threat to flight safety. The advent of the more permissive EASA FTL regulations in 2016 has resulted in pilots working longer and harder leading to potentially dangerous levels of fatigue. The potential consequences of pilot fatigue were illustrated in the serious incident at San Francisco in July 2017 during which the flight crew of an Airbus A320 narrowly averted a collision with several aircraft on the ground having incorrectly lined up with the taxiway whilst on the approach. The captain had been awake for more than 19 hours but was still not in breach of the FTL provisions that applied in the state of operator.

There are three fundamental faults with the EASA FTL rule set. First, there is no quantitative definition of how fatigued is too fatigued, just a qualitative expression stating that pilots should not be too fatigued. This would be rather like replacing a speed limit with "not too fast" or a blood alcohol limit with "not too drunk", no one quite knows what these expressions mean. Flights can be bio-mathematically modelled for their fatigue risk and this provides a useful basis for setting a limit.

Second, there is no standardised system of reporting fatigue across airlines, which leads to a situation where reporting data has reduced value.

Third, there is apparently no consideration of the health effects of shift work. Shift work is known to be associated with ill health and pilots experience shift work in its most severe form. Their start times vary and so they are in this sense "shifting shift workers" and additionally the cues to their body clocks are further shifted by time zone crossing and unusual light exposures. The Industrial Injuries Advisory Council has recently recommended that malignant melanoma skin cancer, which is twice as common in aircrew than expected, be included as an industrial injury to aircrew. The excess of this cancer in aircrew was thought to be due to their body clock disruption. Aircrew are entitled under the Civil Aviation Working Time Regulations to rest breaks and to medical examinations. However, there appears to be a culture of disregard for these regulations.

What does BALPA want?



1. Implementation by aviation authorities of a regulated maximum permissible level of fatigue beyond which flights cannot be flown

2. UK aircraft operators to systematically schedule appropriate rest breaks for aircrew as is required by the Civil Aviation Working Time Regulations and aviation authorities to rigorously enforce these regulations

Cabin Air Quality

The air in aircraft cabins is typically supplied from the compressor stage of the jet engine and is then passed into the cabin unfiltered (although it is later filtered when recirculated back into the cabin). Engine oil leaks can find their way into this air supply and contaminate the cabin air. Furthermore, hydraulic oil can find its way into the cabin air supply either through leaks in the un-bunded hydraulic lines that route through the aircraft cabin or through leaks to the outside of the aircraft that then enter the air intakes of the engines or auxiliary power unit. There are currently no design requirements for cabin air filtration systems to be installed (for air as it first enters the air conditioning system) nor for systems to detect contaminated air.

BALPA receives calls from pilots via its 24-hour helpline in the immediate aftermath of air contamination events and at this time they are advised to obtain the engineering report into the occurrence as knowing what the likely contaminant was will inform the health assessment of the pilot. Our pilots have found that their employers are reluctant to provide a full disclosure of the event. Without this information, not only are pilot heath assessments compromised but the wider industry does not have a full understanding of the range and prevalence of these events.

Although aircrew do not seem to have an excess of illness that is reliably associated with oil contamination events, if it were to be the case that oil contamination events cause illness that are similar to those that are otherwise prevalent in the wider population, then the harm of these contamination events would be difficult to detect. However, if there was more open reporting of these events, precautionary heath protection measures could be taken if the contaminant and the severity and frequency of the contamination event were openly understood.

What does BALPA want?

1. Implementation by aviation authorities of requirements for the detection of contaminated cabin air and filtration of the cabin air supply prior to first entering the air conditioning system

2. Aircraft operators to cover both aircraft and health aspects in their investigation of contaminated cabin air events, and to provide full disclosure to the pilots involved

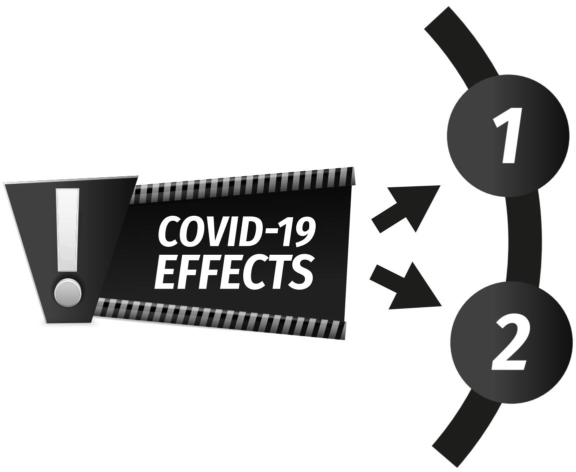
COVID-19 Effects

The coronavirus pandemic has had an unprecedented impact on global aviation, virtually shutting it down for a prolonged period with pilots furloughed and aircraft parked in huge numbers. Flights that have been able to continue, including cargo, medical, repatriation and a relatively small number of passenger flights, have been subjected to enhanced health and safety (H&S) measures and changes to operational procedures. These measures have evolved in parallel with knowledge of the virus and the need to resume operations in a safe and secure way. The ICAO Public Health Corridor and EASA Aviation Health Safety Protocol have provided a framework to facilitate a consistent, global approach to ensuring 'clean' aircraft, airports, crew, passengers and cargo. Strict adherence to these protocols is critical as operations ramp up and eventually return to normal levels.

Despite the damage caused by coronavirus, there is an opportunity for lessons learned and the resulting improved occupational health and safety practices to be applied as part of normal operations beyond the end of the pandemic (e.g. regular deep cleaning of aircraft flight decks, widespread use of HEPA filters, etc.). Such progress needs to be accompanied by more robust enforcement of H&S legislation by regulatory bodies so that the benefits are available to all aviation users. However, there is also the need to ensure that measures that mitigate the transmission of coronavirus do not result in risk transfer such that there is a net increase in overall flight safety risk.

A secondary risk associated with the pandemic stems from restarting our industry. This includes the risk that pilots are returned to flying after a prolonged period in which they have not flown, and that economic pressures see them return with insufficient familiarisation.

What does BALPA want?



1. Consistent and thorough implementation of H&S measures by aircraft operators (in line with ICAO/EASA guidelines) and robust enforcement of H&S legislation by regulatory bodies

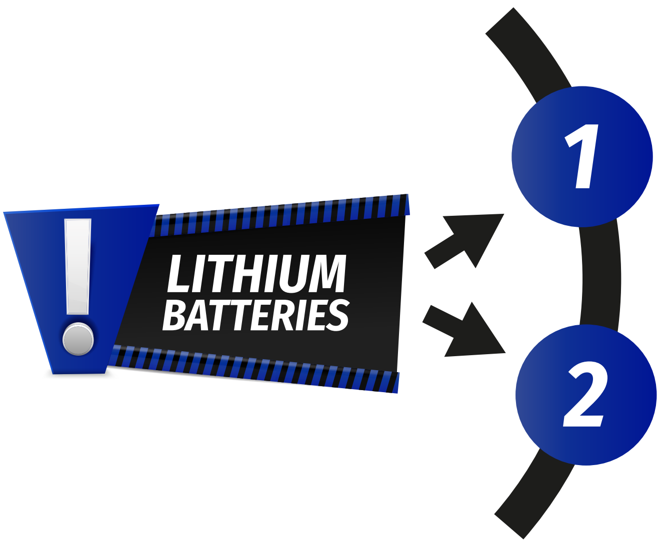
2. Aircraft operators to implement controls to ensure that COVID-19 related mitigations do not result in unintended risk transfer such that overall flight safety risk is increased

Lithium Batteries

Whilst ICAO's Dangerous Goods Regulations and Technical Instructions have become stronger in addressing the risk of a lithium battery induced aircraft fire (e.g. since April 2016 it has been forbidden to carry lithium-ion batteries as cargo on passenger aircraft), there are still areas of risk to be highlighted. For example, undeclared shipments of lithium batteries that may be counterfeit and/or incorrectly packaged. Also, the need to consider the risk associated with late checking-in of cabin baggage (that might contain items with lithium batteries installed, loose batteries or where the baggage itself is lithium-ion powered) at the departure gate, which necessitates its stowage in the aircraft hold without the appropriate level of screening.

The key concern is a thermal runaway in one or more batteries in baggage containing other allowed dangerous goods such as flammable aerosols, which then triggers an uncontrollable fire in the cargo hold. There is a general lack of awareness of these risks, both amongst the travelling public and airport/airline staff. Lithium-metal batteries are more dangerous than lithium-ion batteries for chemical and physical reasons but because they look like regular disposable batteries, they are more likely to be overlooked by airport/airline staff and members of the public.

What does BALPA want?



1. Aircraft operators to ensure that processes exist to ensure that redirected cabin baggage for the hold is assessed for lithium battery fire risk
2. Prohibition of the carriage of portable electronic devices larger than cell phones in checked baggage

Helicopter Operations

Helicopter pilots may face more serious risks to their health and safety compared with their fixed-wing counterparts. In particular:

- Rest and fatigue associated with long periods of standby.
- Cabin air contamination due to engine maintenance procedures, ingress of the jet efflux into the cabin, and cabin heating systems.
- Noise and vibration exposure.
- Unintended consequences of their personal protective equipment, in particular the combination of immersion suit, life jacket, emergency breathing system, helmet and headset can add such weight, contortion and restriction to their spines as to generate musculoskeletal problems as well as temperature regulation problems.

What does BALPA want?

Tangible improvement in the recognition and resolution of occupational health and safety issues affecting helicopter pilots

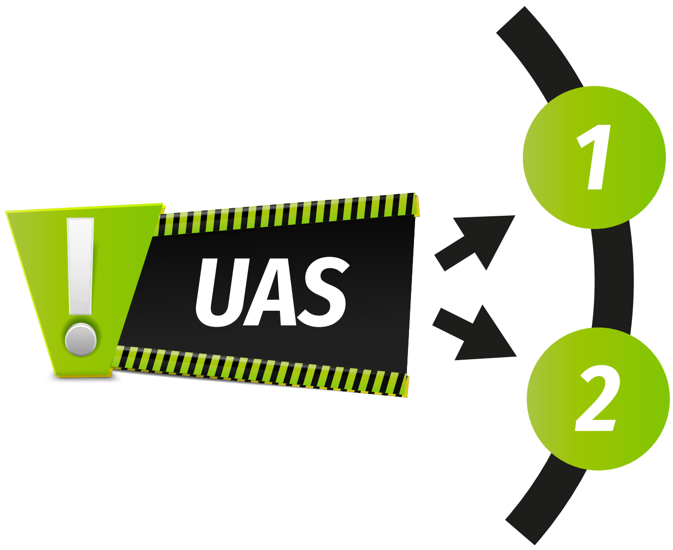
Unmanned Aircraft Systems

Having commissioned research in collaboration with the Department for Transport and Military Aviation Authority into the effects of a mid-air collision between an unmanned and manned aircraft, BALPA is convinced of the potential for UAS to cause significant damage. We are particularly concerned in the case of helicopters, where impact with a main or tail rotor is likely to be catastrophic. Helicopters often operate at low level in the same airspace as UAS, so the risk of collision is elevated. As regards commercial fixed-wing aircraft, the risk of collision due to UAS being illegally operated close to airports has not abated. In addition to the risk of impact with the aircraft fuselage or flight deck windscreens, there is the scenario of multiple UAS being sucked into both engines of a high weight twin-jet shortly after take-off, leading to total engine failure and subsequent hull loss.

There are no wake turbulence separation standards between manned and unmanned aircraft. If a UAS is flown in the vicinity of the wake turbulence from a large aircraft (or the rotor downdraft from a helicopter), this could result in the total loss of control and possible physical destruction of the UAS. There is clearly a significant risk to people and structures on the ground, so it is therefore necessary that effective procedures exist to ensure that UAS and manned aircraft are kept apart, and a prerequisite for this is the establishment of appropriate airborne separation standards.

There also needs to be assurance that a manned aircraft has proven resilience in the event of a non-catastrophic UAS strike that allows the flight crew to make a safe landing. Such assurance will come from further research and implementation of appropriate certification standards akin to those implemented for bird-strikes.

What does BALPA want?



1. Implementation by aviation authorities of certification standards for commercial aircraft resilience to UAS strikes (including ingestion into engines)
2. Implementation by aviation authorities of appropriate separation standards for UAS, including wake turbulence criteria

Security

Cyber Security

The potential scope for cyber security attacks on aviation has widened with the increased connectivity between air and ground-based systems (e.g. controller–pilot data link communications), and greater digitalisation of aviation systems in general including the requirement for internet and wireless connection between various ground centres and aircraft. Industry's focus on dealing with the coronavirus pandemic has arguably left it more vulnerable to an intervention, particularly given that malicious cyber activity levels have not fallen during this time. A EUROCONTROL report on cyber in aviation shows that financial gain and intellectual property theft were the most prominent motivations for attacks in 2019 and airlines were the most targeted of the aviation domains (accounting for 39% of cyber related reports in 2019).

The level of cyber information being shared amongst aviation stakeholders is still relatively low (in comparison with flight safety) but is improving. Efforts to maintain this improvement together with implementation of mitigations concerning people, processes and technology (such as better account management processes, network segmentation, employing Network Intrusion Detection and Prevention Systems, strengthening operating systems and auditing them regularly) are critical in building cyber-resilience for the aviation system.

Conflict Zones

Commercial passenger carrying aircraft too frequently get caught up in conflict zones resulting in the accidental or malicious shooting down of aircraft. The protection of commercial aircraft operating close to conflict zones is paramount and the principal mitigation of this risk is precise and timely international intelligence sharing.

What does BALPA want?

1. Implementation of controls by the aviation industry to ensure the risk to flight safety critical infrastructure and systems from cyber attack is reduced as low as is reasonably practicable

2. Safe flight that avoids conflict zones

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