

There are many facets to airlines' operations. If they are mismanaged or not fully understood, they may impact the overall efficiency of airlines' processes. Flight planning and cost management software can provide airlines with the means to evaluate various areas of their organisation, and help better prepare them for disruptions.

# Maximising efficiencies – key cost and operational considerations for airlines

**F**light safety, operational awareness and rapid response to disruptions, are all key elements of an airline's overall efficiency. Informed cost management processes support these elements. Considerations for monitoring airlines' productivity and cost effectiveness are outlined under the International Air Transport Association's (IATA's) Operational Efficiency & Cost Management (OECM) programme. As stated by IATA ([www.iata.org](http://www.iata.org)), the OECM programme is directed at helping airlines to identify cost-efficient solutions and improve operational cost structures. Today this is best achieved via software that combines daily data with historical information, to establish benchmarks and parameters for monitoring performance.

Cost management software can, for example, provide operators with an analysis of all factors in an aircraft-on-ground (AOG) situation, so that they can assess whether it is best to replace the aircraft or cancel the flight. This decision could be based on which scenario will incur the lowest costs, or cause less operational disruption further down the line, depending on airline policy.

"More airlines are driving initiatives that focus on establishing what they call 'a high performance finance organisation,'" says Rene Koark, product manager at Airpas Aviation, a division of Sabre Corporation. "As such, chief financial officers (CFOs), finance directors and heads of controlling (which typically own the cost management software) see a benefit in expanding the role of finance departments so that they can bring added value and insight to an airline's processes. This means effectively eliminating redundant, manual tasks to

improve employee productivity, and empowering the staff by using the time saved to run deeper analysis. Cost management software provides all the tools to facilitate this change." Koark points out that fuel managers, ground operations managers, airport managers and procurement leaders also benefit from key performance indicators (KPIs) derived from this software, especially when overlaid with historical data.

Airlines, whether they are low-cost carriers (LCCs) or full-service providers, are all competing to provide the best service to customers. This includes aligning desirable qualities such as dispatch reliability or on-time performance to set themselves apart from others. This competition has led to a stricter focus on operational efficiencies, which are ever more stringently monitored. Today, the spotlight is on all areas of operations. Airlines want to know how they are managing costs, where they can make fuel savings, and how to further optimise time. Knowing how to get the most out of a fleet and prevent the aircraft from accruing unnecessary costs while on the ground is inherent to the effective scheduling of operations.

Big changes have been underway, and IATA's various initiatives have been grouping industry intelligence. Airlines have different priorities regarding operational and cost management, however, depending on whether they are long- or short-haul, LCC or a full-service provider. Regions of operation will also have an effect, because navigational charges and regulatory requirements all need to be taken into consideration when assessing efficiencies.

Cost is a major factor in managing efficiency. An airline that actively manages its costs is controlling areas of its operation effectively. Key considerations are flight operations and maintenance-based costs. Are handling agents and line maintenance providers providing a consistent service charge? Are on-ground charges during turnaround times varying, and if so how? What slot charges and delays are being experienced? And how does the airline mitigate against (and react in the event of) disruption? Cost will inevitably factor into many day-to-day decisions. Cost management software also needs to identify the types of cost involved in airlines' operations: direct operating costs (DOC); fixed costs and overheads; and variable costs.

## Flight plan & cost indexes

Fuel is a key cost consideration that can save an airline millions of dollars if managed properly. This can be managed by selecting the most cost-effective fuel providers at each airport of operation, and by the cost index (CI) used on each flight's flight management system (FMS) to optimise the aircraft's speed in accordance with the airline's operation.

Fuel consumption can also be managed and optimised by a flight plan (FPL) system that takes into account the cost indexes used by the airline, as well as variables such as weather or airport restrictions.

According to Francois Chazelle, chief commercial officer at Safety Line, for a medium-haul sector the climb phase can expend as much as 30% of trip fuel. For long-haul flights, however, the cruise phase accounts for a higher percentage of

trip fuel. CIs are not directly related to the information that an operations or cost management software will process. They will, however, form a consideration in flight planning software and fuel optimisation programmes, and are a critical consideration when establishing flight profiles.

CIs vary according to an airline's operation. Flight time (and therefore routes and climb/cruise profiles) becomes more time-critical on short- and medium-

haul operations. CIs dictate climb and cruise profiles, influencing fuel consumption, so they need to be considered as part of an airline's cost and operational efficiencies. Chazelle points out that CIs will play a role for long-haul operators. Vertical and lateral optimisations, however, and direct routes provided by a flight planning system, will be a greater concern. "Ultimately, more arbitration is possible for long-haul operations," he adds.

"The CI drives the speed selection during the flight planning process," advises Veronika Podest, product manager at Sabre Airline Solutions. "Higher CIs not only mean that cruise speeds are faster, but also faster climb profiles are chosen during take-off. The difference of the planned time at specific waypoints due to a lower or higher CI may mean that certain navigational restrictions are in effect and need to be avoided, blocking the cheapest route which would have been available a little earlier or later."

"The CI reflects the value an airline gives to time," continues Chazelle. The developer of OptiClimb, Safety Line, has created a solution that provides a trajectory (climb profile) to optimise the importance an operator places on time via its CI. OptiClimb is designed to take into account airline CI strategies. These vary widely from one airline to another, by respecting corresponding climb times and cruise Machs and reducing fuel consumption through trajectory optimisation. They take into account tail number-specific performance, and wind and temperature variations throughout the climb. OptiClimb is used together with a flight planning software to further enhance operational efficiency.

"While some airlines choose fixed CI for a particular route, others vary CI per leg depending on airline policy," Chazelle continues. "This varies depending on whether the aircraft operate between major hubs, where on-time arrival is key; or at smaller airports where there may be a degree of flexibility. It can also vary depending on the turnaround time (TAT) at an airport. If a quick turnaround is needed, the operator will place greater importance on time." OptiClimb provides, for any given flight, the most efficient climb profile for that sector (see *Exploring the benefits of big data analytics in airline operations, Aircraft Commerce, December 2016/January 2017, page 35*). This will vary depending on the aircraft's weight (both payload and modification status) and age, the route (and the weather encountered), the altitude reached on the day and a result of the weather and route profile.

As described in the article noted above, OptiClimb is calibrated to an airline's fleet by taking Quick Access Recorder (QAR) and historical data downloads for a minimum of 200 flights. The raw data from these files establishes basic parameters that reflect an operator's habits and flight patterns, such as typical routes, payloads, flight and block times, and average fuel consumption. This provides a customised benchmark, which is subsequently combined with weather data on the day, to determine the most efficient speeds to perform at given altitudes on a per-flight basis. Once the

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operations department creates the FPL ahead of a flight, OptiClimb extracts details from the FPL, including weight, wind profile and altitude, to determine the most efficient climb and cruise speeds and altitudes to use in accordance with the airline's CI.

If an airline can save fuel every flight during the climb phase, this has significant cost-saving implications across the organisation. Software that allows operators to optimise their FPLs to accommodate the most fuel-efficient climb profile, taking into account a wide range of daily variables, is naturally very attractive to airlines.

Sabre Airline Solutions offers a suite of operations-focused systems, via the Sabre AirCentre. Designed to manage flight schedules, crew rosters, dispatch and in-flight tracking, each module is designed to monitor and enhance overall operational efficiency. "Integrating these systems tightly into what Sabre calls the 'connected airline' gives an airline situational awareness across its organisation, which improves the decision-making process by accounting for all major cost-drivers, not just fuel," says Podest.

For every flight, Sabre AirCentre Flight Plan Manager (FPM) optimises the route and calculates the fuel

requirements, based on dynamic conditions such as weather. It also allows dispatchers to contribute to an airline's total cost management through its delay cost management module, and by considering airspace overflight fees.

"Understanding one's CI is the cornerstone for cost-efficiency on a given FPL, during creation of the overall flight schedule, and while everything is running smoothly," continues Podest. "There are other dynamic costs, such as time delay, that need to be considered when talking about the full potential of cost-efficiency in day-to-day operations. With crew, passengers, planes, air traffic control (ATC)/airport capacity, and weather in the mix, the individual flight's speed is an important lever, but not the only one that can be pulled to keep operational costs under control during minor or major disruptions."

Sabre's customers generally prioritise total savings for a flight, rather than targeting specifics such as the least amount of fuel or shortest journey. "There are other 'hidden' costs," adds Podest, "such as overflight charges for countries, where burning more fuel and taking longer to fly around a high-cost ATC center provides greater total savings than flying more directly." There are far more cost management considerations,

therefore, than just the optimisation of fuel, or the management of CI. As has also been established, however, on-time performance for a flight can be far more important if hubs are involved. "Missed connections cause significant passenger re-accommodation costs, and delayed inbound planes affect the rest of the schedule," says Podest. "In other words, due to the aircraft's minimum ground TAT, the next departing flight may have to be delayed as well. The extended block times of the inbound flight may bring crew into overtime on their next segment, incurring higher-than-standard costs.

These additional costs may be avoided by increasing the flight's speed. Other options at hubs are to activate standby crew or switch crew rosters, or to change the aircraft registration assignment. Cost and operational management software establishes measures to optimise both elements.

## Cost management software

### XLM Aero & KEOPS

Developed by XLM Aero, KEOPS focuses on streamlining costs and efficiencies across four main areas of airline operation. These are:

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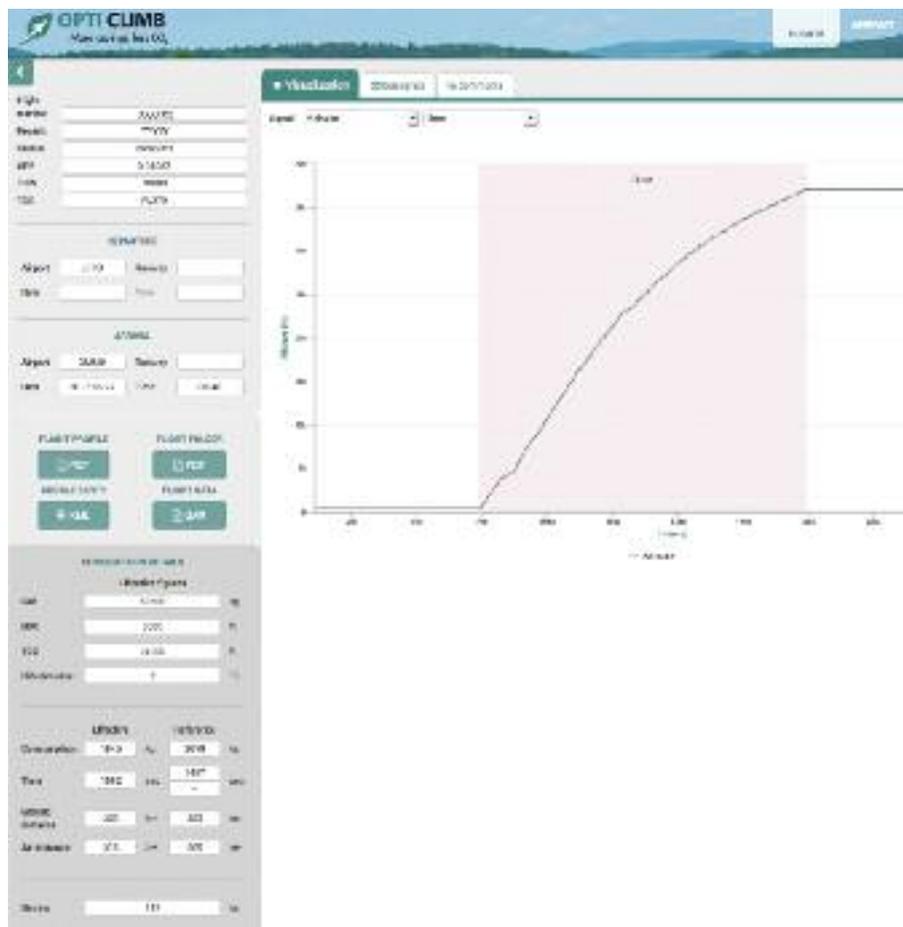
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*Opticlimb provides the most efficient climb profile for a sector, taking into account the aircraft's weight, age, route performed (and the weather encountered), altitude undertaken on the day and a result of the weather, and route profile. It determines the most efficient speeds to perform at given altitudes on a per-flight basis.*

roster. FTLs, that is the maximum time a crew member can fly on any given day, will change subject to the number of sectors they are performing, in addition to the time they started. This therefore needs to be continuously assessed on a flight-by-flight basis.

KEOPS Crew Management (CM) module therefore includes Crew Planning, Crew Legality, Automatic Crew Rostering and Crew E-Borders sub-modules that ensure rosters are kept continuously safe and legal. In addition, a Sign On-Off function allows operators to track actual duty times automatically in real time.

- Operations control

KEOPS Operational Control (OC) is aimed at simplifying operational procedures for airlines, and therefore promoting overall efficiencies. The module comprises different elements including: KEOPS Direct Operating Costs, KEOPS Flight Tracker and KEOPS MVT/LDM Messages.

Ultimately, KEOPS OC is designed to help operations departments make decisions effectively, and gain quick access to vital information in the event of operational disruption. This information includes per flight: tail assignment, flight release, passenger/ freight information, airport/alternate airport details, and crew information and their respective FTLs.

KEOPS OC also provides post-flight analysis, which allows operations departments to track disruptive events, such as flight cancellations and route changes which can provide useful insight into future events. This analysis provides detailed reporting for the carrier, showing on-time performance, delays and cancellations by actual cause, and actual vs planned fuel burn for any given route.

- Cost Control (KEOPS CC)

KEOPS CC is a software engine that calculates costs per flight, based on operational data and applicable tariffs. Tariffs can be set to public or private mode for its customers. This means that if contracts have been negotiated with providers then the cost data can be customised to reflect negotiations specific to the airline's operation. Meanwhile, public tariffs will show what is generally advertised or expected for the airport / handling agent for each flight, which can then be integrated with flight scheduling

- Flight planning

Flight planning and scheduling is optimised via three main modules within KEOPS: KEOPS Flight Scheduling, KEOPS Airport Slots and KEOPS ASM/SSM messages.

KEOPS Flight Scheduling allows flight schedules to be published, from the initial commercial schedule to the final schedule as handling by operations. These can be amended easily if changes occur as a result of aircraft defects or flight cancellations.

Fleet and Airport Management are sub-modules within KEOPS Flight Scheduling that take into account various factors, including: airport restrictions; regional time differences; and local suppliers such as fuel and handling agents. These must all form part of the operational assessment when planning for a flight, and potential for conflict or issues must be highlighted by an operationally-focused software. Failure to take into account airport closing times, or slot requirements for example, can create disruptions if a flight is delayed. In addition, KEOPS' Fleet Management can be used to factor in the aircraft's weight, configuration and any operational restrictions.

Meanwhile, KEOPS Airport Slots combines a database with every airport's historical slot details. This can be integrated with the Flight Scheduling module to provide comprehensive slot information for each flight planned and

scheduled by an airline's operations department. This helps to maximise the efficiency of each flight planned, because it takes into account the individual slot restrictions of each separate airport.

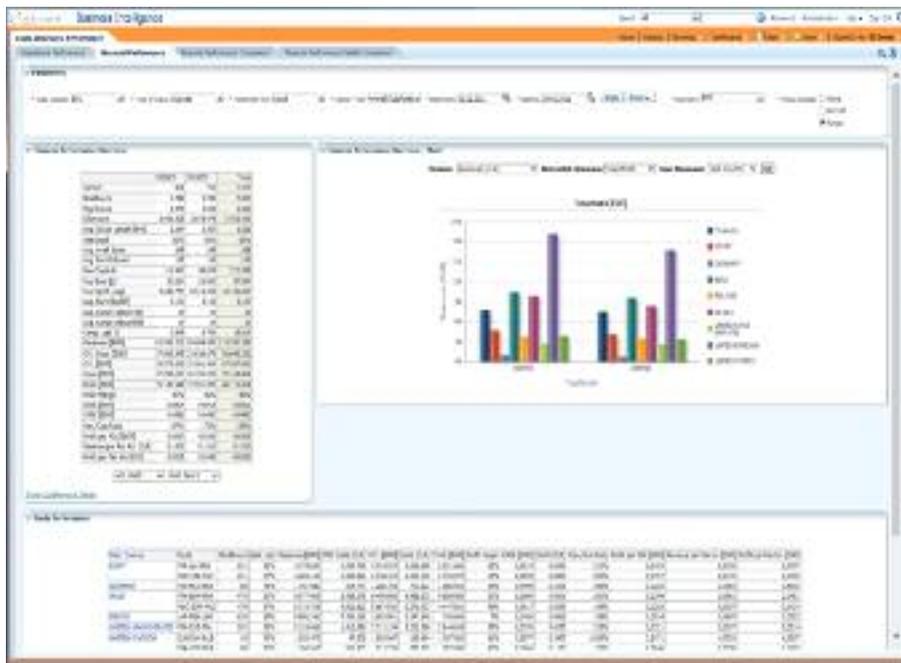
Main hubs, such as Frankfurt Main (FRA) or London Heathrow (LHR) for example, have tight slots in addition to expensive landing and parking fees, to manage the heavy traffic.

Secondary airports are likely to have slightly more relaxed rules surrounding the arrival and departure of aircraft, but these airports may not operate on a 24/7 basis.

Last, KEOPS ASM/SSM Messages provides customers and providers involved in flight management with a portal to send automatic notifications as and when a flight schedule changes. This change could be down to conflicting schedules, new crew changes, or an aircraft going technical, and subsequently needing a replacement aircraft to perform a flight.

- Crew management

Maximising crew productivity is essential for operational efficiency. From a regulatory standpoint, performing legal and safe operations is also the most vital concern for carriers. Flight time limitations (FTLs) therefore need to be stringently monitored, so that an operations department can be automatically notified should a crew member exceed their legal hours on their



and planning tools.

KEOPS started as a tool for charter companies to invoice customers. “KEOPS has been live for 25 years, but during its early stages cost management was not such a priority for commercial airlines,” says Philippe Lakhdar, chief operating officer (COO) at XLM Aero.

Originally, KEOPS was used to calculate DOCs and generate charter quotes, taking into account navigational, airport and catering charges. “IATA’s OECM programme discovered overpayment of DOCs in the order of 2.5% across the industry, equating to potentially millions of dollars per year,” says Lakhdar. This bought a greater focus on cost management. Lakhdar advises that some of XLM Aero’s major carriers can achieve savings in airport and navigation charges of \$6-15 million in one year (over the \$1B total bill) by implementing the KEOPS CC software, whereas smaller operators have seen savings of at least \$1 million. The cost of investing in KEOPS have been recouped in as little as a few weeks.

KEOPS’ customers feed in operational data to the CC software, via a standard interface with its flight planning programme. “They can also pre-schedule flights for forecasting and budgeting purposes,” adds Lakhdar. “Operational data can also be updated via post-flight paperwork (the operations department), via an electronic techlog (ETL), or a standard interface with the flight data repository, depending on the airline’s processes. Costs per flight are therefore re-calculated based on the actual values derived from each flight, to effectively manage accruals.”

Each customer can also alter expenditure tolerances per individual policy. That is, the spending parameters can be set and customised to highlight

when a perceived over-charge or overspend occurs. Fuel indexes are also updated each week so that the carrier can control and monitor the cost of each fuel uplift within its operation.

Ultimately, KEOPS CC:

- Provides accurate forecasts
- Provides a clearer budget (for example if fuel price is increasing)
- Allows an airline to plan for different scenarios
- Accounts for costs relating to aircraft weight
- Helps decision-making
- Cashflow preservation – historic delays in claiming invoice discrepancy are now mitigated by shortening the invoicing process.

“KEOPS CC, when run together with KEOPS OC, can help airlines to know how much a disruption will cost,” says Lakhdar. “This can therefore help the operator to decide whether to cancel a flight, source a replacement aircraft if an AOG situation occurs, or make a diversion. Cost management software allows educated decision-making for operators.”

Moreover, a service level agreement (SLA) management module is being developed within KEOPS. This will allow users to establish and monitor the performance of a supplier (such as a handling agent or line maintenance provider) to assess whether they are under-performing or overcharging. SLA Management is to be released in Q4 2018 or Q1 2019.

## Sabre AirVision Airpas

Sabre AirVision Airpas, is Sabre’s cost-management and route profitability software. It integrates operational and contractual data to give access to accurate

Revenue data can be uploaded to Airpas from various source systems. The reporting tool collects and merges operational flight and passenger data, Airpas-generated variable DOCs, uploaded fixed and indirect costs with revenue data. Postflight profitability results are available the next day and can be calculated on different contribution margin levels.

cost data following a flight (see image, this page).

According to Koark, the solution allows airlines to:

- Increase transparency by centralising costs and contract management across all DOCs;
- Significantly reduce the threat of overspending by checking invoices more effectively, which can save up to 2% in DOC per year;
- Automate invoice checking by processing electronic invoices using industry-standard formats, such as IATA’s IS-XML;
- Speed up month-end closure and financial-planning processes, such as budgeting and forecasting;
- Accelerate route-profitability response times, making them available shortly after the flight event;
- Reach a much higher level of automated financial processes, saving time and resources by up to 35%.

40 airlines use Airpas, including a European flag carrier as part of the SkyTeam alliance, Malaysia Airlines as part of the Oneworld alliance, as well as DHL and Emirates. LCCs such as Ryanair also use the software, in addition to groups such as TUI and Thomas Cook.

Koark explains that airlines are managing DOCs such as airport fees, passenger tax, ground handling, fuel, navigation, catering and crew proceeding costs in Airpas. With indirect and fixed costs, Airpas also provides the functionality to accurately allocate overhead costs for a route profitability evaluation.

Indirect costs are maintained in Airpas for a flexible time period, whether they are monthly lease costs or yearly rental fees. Different criteria are used to specify charging options (per aircraft or per destination). The costs are automatically split, based on these criteria, at the flight sector level.

The overhead costs account for a significant part of an airline’s overall cost and include, among others:

- Aircraft lease costs and depreciation
- Marketing costs
- Technical/engineering costs
- Personnel costs (such as pilot salaries).

Meanwhile, monthly open accruals,

actual, budgeted, and forecasted costs are managed in one single system.

“Parameters can be adjusted to simulate different scenarios, such as changes in aircraft model, flight and route patterns or combinations of different aircraft and route patterns,” says Koark. “The same applies to different cost configurations which can be set to a single supplier basis or an aggregated cost item/group, airport, country or currency level.”

Airpas provides business intelligence (BI) reporting tools to support decision-making in many aspects of financial planning and analysis (see image, page 35). “Results can be screened from different aggregated levels down to detailed figures across routes, airports, aircraft, regions, suppliers or other self-defined criteria,” adds Koark. “Users can design reports by using dashboards, charts, selection tools, drill-downs, and rearranging columns.”

Airpas is provided with a set of standard reports in the form of dashboards, which can be customised per customer preference (see image, page 35).

Revenue data can be uploaded to Airpas from various source systems. “The reporting tool collects and merges operational flight and passenger data, Airpas-generated DOC, uploaded fixed and indirect costs with revenue data,” says Koark. “Post-flight profitability results are available the next day (see image, page 35) and can be calculated on different contribution margin levels.”

The Airpas methodology of combining the detailed contract and rate database with a flight programme also provides a platform for accurate and flexible pre-flight route profitability calculations. Airpas can load and process not only past flight and passenger data, but also future schedule or flight programme data with varying scope. This is from a single ad hoc flight, to a new individual route or full flight schedule. Operational future flight data can be combined with the stored and loaded cost and revenue data.

Koark advises that Airpas can be integrated with other commercial planning solutions, to provide further functionality for users. “Planning and scheduling solutions are heavily dependent on relevant, accurate, up-to-date cost data,” he says. “Without a structured approach, airlines might run their planning processes on outdated, incomplete cost data, leading to inaccurate conclusions and decisions. Moreover, confidentiality concerns can make it difficult to regularly receive data from the finance department.

According to early assessments this approach can result in optimised profitability forecasting, based on more accurate cost data. “This allows airlines to make smarter, faster decisions by

understanding the true cost implications of choices. Moreover, integrating these systems can increase visibility, in addition to a unified view of data across all departments. Feeding operations solutions, such as FPM, with cost information from Airpas also eliminates the need to manually maintain and enter CIs, which leads to downstream efficiencies,” says Koark.

A wealth of additional considerations contributes towards an airline’s efficiency

- too many to include here. Fuel and other DOC management allows savings to be realised via minor operational adjustments. Using software that can create scenarios from which to balance operational decisions makes the decision-making process far easier, and less risky, for airlines. - CLD 

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