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Drive Profitability by Optimizing Cabin Seating Configurations



For an airline, the floor space on a commercial aircraft is extremely valuable real estate. With the right mix of cabin classes and seating configurations to meet demand, this real estate can be put to its most productive use. Get it wrong, however, and the results can be hugely detrimental to profitability, leading to unsold seats or potentially turning away higher yield customers. Moreover, too few seats overall can lead to uncompetitive unit costs (CASK), while too many seats (at too tight a pitch) can result in foregone premium revenue and a negative customer experience.

Airlines justifiably spend a great deal of effort on network and fleet planning as well as revenue management to optimize revenue and profitability. This paper advises airlines to carefully review and plan their aircraft cabin configurations as well, to ensure that they are offering the right classes of service and the right number of seats within each class, to maximize profitability and make the most of their capital expenditures on cabin interiors.

Use of Aircraft Cabin Space and Tradeoffs

Space on an aircraft is the basic resource. Every airline uses it differently according to their brand strategy, competitive considerations, the number of cabin products, the selected product specifications (e.g., seat width, pitch, etc.), safety constraints and other factors.

As a result, seating configurations can vary widely on the same aircraft type from one airline to another. We have seen seat counts as low as 212 and as high as 425 on the B777-300ER. Furthermore, it is not unusual to find multiple seating configurations on the same aircraft type (sub-fleets) at certain airlines if the aircraft are used for widely differing missions (e.g., higher density on leisure routes vs. lower density on business-driven routes).



Since total floor space remains constant for any given aircraft type, there are important tradeoffs and opportunity costs associated with the space occupied by every seat in the aircraft. On a long-haul aircraft, the floor area occupied by a single lie-flat Business Class seat could accommodate the equivalent of 3 to 5 or more Economy seats; a single first class "suite" can occupy the equivalent floor area of 5 to 9 or more Economy seats.

Premium seats generate much higher yields, but given the high load factors and spill (turnaway) typically found in Economy, it may be the case that premium class seats generate less revenue per unit of floor space than Economy seats. Any persistently empty seats in premium classes not only represent lost premium revenue, they could also mean an opportunity cost in terms of lost revenue from Economy passengers who are not accommodated as a result of too few available Economy seats (displaced by empty premium seats).

As shown in the following illustrative charts (based on a real world case study), the amount of revenue generated in each cabin is not necessarily proportional to the floor area in each cabin.



Floor Area by Cabin First (F) vs. Business (J) vs. Economy (Y)

Percentage of Revenue vs. Percentage of

Source: ICF Analysis





Source: ICF Analysis

Finally, multiple-configuration sub-fleets can be useful in meeting different demand characteristics in different markets. However, they can also add significant complexity and hidden costs.

In short, there are numerous tradeoffs to consider in determining the service classes to be offered and the number of seats in each cabin class on any given aircraft type. The decision should not be taken lightly.

Evaluating Cabin Configuration Performance and Improvement Opportunities

To ensure that these trade-offs are identified and optimally balanced, airlines should carefully evaluate whether each cabin is carrying its own weight by producing revenues in line with the space occupied and costs incurred.

Relevant questions to be addressed include:

- How is each cabin performing in terms of revenue generated per unit of real estate?
- Are there very high load factors and significant spill in certain cabins while other cabins have lower load factors and consistently unoccupied seats even during peak periods?
- Are the yields in premium cabins sufficient to justify their higher costs considering the greater floor area per seat, higher weight/fuel expenditures, passenger-related costs and capital expenditures?
- Are the airline's premium cabin products contributing to the airline's brand?

A Comprehensive and Data-Driven Approach to Optimizing Configuration

Cabin configuration analysis can be a complex task, which is affected by many interrelated factors including market growth, the airline's evolving network and fleet plans, current and projected passenger loads by cabin, pricing and other issues. Since investments in cabin interiors are usually made for the medium- to long-term, any cabin configuration analysis should be undertaken for at least a five-year timeframe. Trends in demand, onboard loads, spill, revenue, and operating cost by aircraft type and by cabin should be evaluated on a flight-by-flight basis network-wide, comparing results for current configurations against alternative LOPA's (Layout of Passenger Accommodations).

In order to perform the analysis correctly, data and inputs from eight major areas should be collected and evaluated:



Cabin Configuration Optimization Model

Fleet: aircraft types and mission based on range, capacity, cabin products, etc.; planned future capacity growth; introduction of new types

Network: Routes served, frequency, and proposed deployment by aircraft type; planned future capacity growth by route

Demand and yields: Customer demand and yields, both current data and future estimates, in all markets at flight/cabin level; projections of market demand growth

Spill, recapture, new traffic & revenue: Spill estimates by class based on booked and flown traffic data; estimated recapture of spilled traffic in other cabin classes; estimated new traffic in expanded classes; marginal yields for spilled / recaptured / new traffic

Feasible configurations: LOPA's that are feasible for each aircraft type from the engineering standpoint based on safety considerations and product specifications

Capital costs of configuration/reconfiguration: Costs of seat and cabin interior materials procurement and installation; discount rate; depreciation policy

Variable costs of service: Costs of serving passengers in different cabins including crew costs, catering, and premium services such as lounge

Other costs: Fuel consumption associated with the weight of different seating products

Revenue, profitability and NPV for new configurations and/ or reconfigurations should be measured for each alternative LOPA. The analysis should take into consideration all of the factors above, in particular potential revenue loss due to spill if cabin seat capacity is reduced; potential recapture of spilled passengers in other classes; and potential revenue gain if cabin seat capacity is increased (enabling additional recapture of spilled passengers).

It is recommended to evaluate several scenarios, including multiple alternative LOPA's as well as varying projections of market growth, capacity growth, and fares, to assess the sensitivity and ensure the robustness of overall results.

Benefits of Optimizing Cabin Configuration

Making the best use of constrained space on an aircraft, and having the right cabin sizes and seat counts, can make a meaningful improvement in airlines' revenues and unit costs. Cabin configuration optimization can have a huge potential upside: in a recent engagement, ICF helped a respected global hub airline identify more than \$80 million in added contribution per year from reconfiguring several aircraft types in its fleet.



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Source: ICF Analysis



U.S. Airport Privatization 2.0

Is U.S. Airport Privatization Finally Ready to Take Off?



Airport privatization in the U.S. has never really launched. In 1997, following the success of airport privatization in other parts of the world, the U.S. Congress established the Pilot Privatization Program to open a limited test to see how it would work in this country. It has not. Over the past 18 years, only two U.S. airports successfully navigated the privatization program and entered into long-term concessions with private airport operators: Stewart International Airport (SWF) and Jose Munoz International Airport in San Juan, Puerto Rico (SJU). Stewart went private in 1997 but reverted to the public sector in 2003 when it was purchased by the Port Authority of New York and New Jersey. San Juan was privatized in 2013 after a successful tender process. Currently Oaktree Capital and ASUR, a Mexican airport operator, are investing US\$1.4bn in the airport and managing it under a 40-year concession.

However, San Juan was a rather unique situation, one not likely reproducible on the U.S. mainland. The City of Chicago tried twice to privatize Midway Airport (MDW) and failed both times. A few other airports have entertained the idea but never moved forward. The general consensus is that the privatization program airline approval requirements make this an

If the U.S. Airport Improvement Program is eviscerated...U.S. airports will increasingly be squeezed, lack funding and be unable to replace aging infrastructure.

U.S. Airport Privatization 2.0 may represent part of the solution.

unworkable option. So what is the outlook for private sector involvement ("3P" or "PPP") going forward?

The U.S. airport business model and funding of infrastructure is unlike that used by the rest of the world. The building blocks of this structure, Airline Use Agreements, FAA Airport Improvement Program (AIP) grants, Passenger Facility Charges (PFCs), and tax-exempt bond financing define how U.S. airport development has proceeded over the past four decades. However, decades of AIP underfunding have resulted in aging



airport infrastructure and a mounting bill to make needed investments. At this moment, Congress is reconsidering the U.S. airport business model through a possible revamping of the 2015 AIP Reauthorization bill. The proposed new bill would strip Air Traffic Control out of AIP and drastically reduce the AIP funding pool – possibly by more than a third of present levels. If this sort of restructuring happens, U.S. airports will need to consider new approaches to funding and paying for infrastructure — "U.S. Airport Privatization 2.0."

Given the realities of the U.S. market, is there another avenue for private sector participation at U.S. airports? We believe there is. While current U.S. FAA funding restrictions make it extremely difficult to cede control of entire airports, there are growing examples of private sector participation in airports — in the form of partial concessions. Individual terminals have been privately developed and operated. The unit terminal concept applied at New York JFK, Los Angeles and Boston airports saw airlines successfully develop, finance, construct and operate a number of terminals in each of those markets. This has been extended to non-airline tenants at both JFK (T4) and LaGuardia. The LaGuardia Central Terminal redevelopment project, awarded to the Vantage Consortium in June of this year, will result in a US\$3.6bn 3P initiative that is a true Public Private Partnership: partially funded by the private sector (with the balance being funded by the Port Authority), privately constructed and privately operated. Another example of a partial concession is Sanford Orlando Airport (SFB), which has been controlled by a private airport operator under a 40-year terminal management lease with

investment responsibilities. This may well be the future of U.S. Airport Privatization 2.0.

New 3P structures, for example concessioning diverse pieces of airports to the private sector, are starting to emerge. Denver is currently engaging in a tender process to select a private operator with the responsibility to redevelop and operate the Jeppesen Terminal under a long-term lease - with investment responsibilities. The City of Chicago has just issued a Request for Proposals (RfP) for a concession of the retail areas at Midway Airport, under a broad scope that includes a major terminal renovation. And Des Moines International Airport is currently exploring a terminal privatization option.

If U.S. AIP is eviscerated in the manner currently being discussed in Congress — U.S. airports will increasingly be squeezed, lack funding and be unable to replace aging infrastructure needed to meet expected aviation growth. Faced with this challenge, U.S. Airport Privatization 2.0 may represent part of the solution.



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Best Practice in Aircraft Lease-Returns

Part Three of Four



Returning aircraft off lease to lessors is not a new process, yet so many established operators often find it difficult to complete scheduled lease returns on time, in compliance with the lease agreement and within budget, for the simple reason it is not core business for an airline.

In our previous articles of the series, we looked at the demographic trends associated with aircraft leasing; quantified the impact on the airline industry associated with delayed lease returns; and explored how effective negotiation of key clauses is an important step for creating a practical, unambiguous lease agreement. In this third article, we shall now look at applying those agreed-to clauses in an effective manner during the term of the lease, and how that can impact the final redelivery.

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Contract Application

The lease agreement is typically negotiated by commercial, legal and technical input from the airline, but the effect on the organisation is far reaching. Too often, the hard work put into the contract is forgotten and the content of the agreement stays in the cabinet it is filed in, rather than shared around the



business. The lease agreement is a live document that needs to be read, understood and shared with many departments of an airline. Let's take a look at some of these important applications:

Impact on Technical and other departments

Technical Records, Finance, Procurement, Legal, Tax, Sales and Operations are all affected by various elements of the lease, but one department with the highest exposure to lease agreement compliance is Engineering and Maintenance, with the following clauses of the lease all having a potential impact on the conduct of the business:

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- Definitions
- Reserves
- Delivery Procedure
- Reports and Notices
- Delivery Conditions
- Events of Default
- Operation
- Registration
- Maintenance

Records

Cost Compensation

Redelivery Procedure

Redelivery Conditions

Modification/AD Cost Share

Compliance with the agreement during the term plays a significant part in assisting a smooth redelivery. Many lessors perform minimal surveillance during the term of the lease, choosing to invest their resource at the end of the term. Therefore, failure to comply with certain obligations can result in costly rework or compensation at the expiry of the lease. For example, if the flight operations department has requested engineering to install an airline specific modification that falls outside the scope of permitted modifications, the lessor may be unaware of its existence until the redelivery inspection. Once discovered, the lessor may then insist on its removal, with the parts required to return the aircraft to the original condition now having a potential 12-week lead-time or more, being ordered only 3 weeks before scheduled expiry. Such situations are preventable if strict adherence to the contract is followed or, at the least, any deviations from the contract are duly noted and planned for reversal well in advance of redelivery.

The Sales and Operations departments of the airline need to be aware of any provisions or restrictions around sub-leasing. Whilst wet leasing is not normally a problem, as the AOC and maintenance requirements remains the same, damp or dry leasing is a very different issue and lessors permission is normally the best way to proceed.

Maintenance Planning

The planning and scheduling of maintenance checks is driven by a combination of aircraft utilization, flight scheduling and capacity planning, but many airlines are now also considering the end of lease return conditions much earlier in the process,



in order to maximize the benefit of maintenance investment and minimize the effect of "lost" time at redelivery. As the return conditions are typically designed to provide a suitable level of forward clearance, they do not necessarily fit with the next due scheduled check in the specific aircraft maintenance program. Therefore, it is essential to forecast maintenance events, their associated costs and their never exceed dates to compare against the agreed condition at scheduled expiry of the lease in order to understand the impact of those requirements well in advance.

Mitigating the risks can be managed in a number of ways, such as optimization of flight schedules for certain aircraft, assigning a specific aircraft as a "standby" aircraft or, in extreme cases, "parking" certain aircraft or engines for short periods in order to avoid crossing minimum thresholds. These options are, of course, subject to compliance with other terms of the lease that may preclude such activity, such as minimum utilization and discrimination clauses. Therefore, a managed process of lease analysis, maintenance event, cash flow forecasting and flight optimization is required involving personnel from Finance, Engineering & Maintenance and Operations departments to work together on a plan that can potentially save significant sums of money and ensure the scope of each maintenance event is optimized.

Maintenance Reserves

If a lease agreement has a requirement for reserve or supplemental rent payments, it is most likely the lessor will have the right to approve all major event workscopes. With engine shop visits being by far the mostly costly event,



delays caused by failure to receive approval, and therefore subsequently suffering delays in recovering reserve payments may have an effect on the airline's cash-flow, as the payment has effectively been made twice until repayment is received. Therefore, gaining the approval and producing a reserve claim invoice with the correct data for the payable elements only is critical in reducing delays. It is common for lessors to be sent the overall shop visit invoice without removal of any "non-payable" elements, such as shipping and additional customer specific items, resulting in an initial rejection of the claim by the lessor.

Many lease agreements require lessor approval of MRO's used for major events, but this clause is often not known by the individual responsible for service procurement, which has resulted in cases of perfectly serviceable, overhauled landing gears being removed and replaced at redelivery due to them being overhauled by an "unapproved" MRO.

A typical case of such an event occurred when an established airline used to managing a large fleet of aircraft without any input from lessors took on a small fleet of used aircraft from multiple lessors. Approximately 14 aircraft were taken from 6 lessors, with each contract being quite different in terms of reserves versus maintenance contributions. One of the lessons learned was that the purchasing and technical services department needed to be fully briefed on the content of all the leases in the fleet to avoid costly mistakes.

Most leases contain confidential information, but a lease summary document is easy to produce and can serve the purpose perfectly well without releasing sensitive information and removing the need for those not familiar with lease agreements to have to pick out the clauses affecting them. Hard fought commitment letters need to be shared in order to ensure that advantage is taken of any exceptions or additional warranties allowed.

Records

Maintaining aircraft records is a regulatory obligation, but most lease agreements have a more stringent requirement than those of the regulator in order to allow easy transfer between states of registry and to maintain the intrinsic value of the asset. Operators need to make a choice as to how to structure their technical records and make them accessible. Removing a set of records when an aircraft comes up for return can, in fact, remove the traceability of some of the major assemblies from the records system, resulting in future redeliveries being compromised. This is because engine or gear assemblies move around the fleet during the term, gaining utilisation on different aircraft, and then at the first redelivery for the fleet some of the original data is removed and handed to a lessor who takes those records away, thus the history is no longer available to the operator for reference. There are many options to mitigate this by scanning records, through both internal mechanisms and external providers, but the ease of retrieval is the key area to focus upon when making such selections.

Status reports and "dirty fingerprints" (DFP's) are the primary means of auditing the conformity of an aircraft to type design and maintenance compliance, but many airlines do not build DFP files until the redelivery process begins. The absence of one DFP can result in major component replacement or significant access being required to perform an inspection that may have already been complied with, but cannot adequately be proved. The knock-on effect of opening up certain inspection panels can also result in additional findings being raised and further delays being encountered. Therefore, maintaining a records system that





permits easy retrieval of data and carrying out regular compliance checks beyond those required for regulatory purposes is recommended.

The most important aspect of all of the above is communication with your lessor. A regular dialogue will build a good relationship, which leads to trust and understanding. If there is any doubt as to what may or may not be permissible, ask the lessor first, as it is likely that with a reasonable argument you may get a formal agreement to deviate from the terms of the lease if the consequences are understood and documented accordingly.

In our fourth and final article of this series, we shall examine the redelivery process and the need for detailed project management, resource and funds to effect on time and compliant returns.



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Liberalization of US–Mexico Aviation is Long Overdue



It's been 21 years since the signing of the North American Free Trade Agreement (NAFTA), but air service between the US and Mexico remains heavily regulated. That's about to change

Two major events will shake up the US–Mexico air travel market in 2016—an expanded Air Services Agreement ("Open Skies") between the US and Mexico, and anti-trust immunity for SkyTeam members Aeromexico and Delta, whose applications are currently under review. These events will increase competition and have far-reaching implications for airlines from both the US and Mexico.

US-Mexico Market Dynamics

The US–Mexico transborder air traffic market has achieved healthy growth in recent years, recovering from the global financial crisis, thanks to improved economic conditions and robust capacity expansion. Between 2010 and 2014, passengers between the US and Mexico grew 5 percent per year on average.

The US-Mexico market has historically been dominated by US carriers, which have consistently held more than two thirds of





capacity over the last decade. American Airlines (including US Airways) is the leader in the transborder market, with a 24% share of seats as of June 2015. United Airlines and Aeromexico are the second and third largest carriers in the market, with a 20% and 14% share, respectively.

Turbulent market conditions have led to airline bankruptcies on both sides of the border, though the effect has been uneven. In the US, bankruptcies have been followed by



restructuring and mergers, without dramatic reductions in service; in Mexico, the most significant bankruptcy in recent years (Mexicana) resulted in a cessation of operations, and a noticeable decline in Mexico's share of transborder capacity (12 percentage point drop in 2011 following Mexicana's collapse).

Although US carriers dominate the US–Mexico market with a 72% seat share, Mexican carriers have been expanding into transborder markets in recent years. In June 2015, Mexican carriers registered year-over-year seat growth of 49% in the US–Mexico market, compared to 4% growth by US carriers. Mexico's four largest carriers (Aeromexico, Volaris, Interjet, and VivaAerobus) have all contributed to this expansion.



US-Mexico Capacity Share, US vs. Mexican Carriers, (June 2005–June 2015)

Source: OAG Schedules

In the domestic Mexican market, heightened competition has put pressure on yields, which have fallen from 27 US cents per mile to 20 US cents per mile between 2006 and 2014. In search of stronger revenue growth, Mexican carriers are looking to expand their international capacity, particularly in the transborder market, to offset weak domestic routes. Meanwhile, yields on transborder routes have performed well in recent years, increasing from 14 USD cents per mile in 2006 to 18 USD cents per mile in 2014.

The increasing penetration of low cost carrier (LCC) service has been one of the most significant developments in the transborder market in recent years. LCCs have increased their share of the US–Mexico market from just 4 percent in 2009 to 24 percent in 2015. Most growth has been driven by the entry of Mexican LCCs Interjet, Volaris, and VivaAerobus, which currently account for 55% of total US–Mexico LCC capacity. Four US LCCs operate in the transborder market—Southwest, Frontier, Spirit, and jetBlue—with recent growth led by jetBlue and Spirit.



Historical Yields, CY 2006–CY 2014





Source: US–Mexico Yields - US DOT O&D Survey; Domestic Mexico Yields – IATA PaxIS

In general, US LCCs have focused on serving leisure destinations such as Cancun and Puerto Vallarta, while Mexican LCCs serve mostly VFR¹ traffic from destinations such as Guadalajara and Monterrey. In 2016, LCC competition will increase, as Southwest pursues expansion into Mexico from its new hub at Houston Hobby.



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¹Visiting Friends and Relatives

Outlook for the US-Mexico Market

Competition in transborder markets is expected to remain strong in the coming years as Mexican carriers grow international service and as "Open Skies" takes effect. The revised Air Services Agreement will enter into force January 1 2016, and will eliminate current restriction that restrict service to only two airlines from each country in city pairs between the two countries; three airlines from each country are allowed on certain city pairs, including routes to major destinations like Cancun, Guadalajara, Monterrey, Puerto Vallarta and Los Cabos—but not to Mexico City, Mexico's most valuable and sought-after market.

According to the US Department of Transportation, the new agreement will allow for "unlimited market access for US and Mexican air carriers, improved intermodal rights, pricing flexibility, and other important commercial rights." Moreover, the agreement will allow new entrants on all city pairs between the US and Mexico, whereas previously a maximum of two or three carriers from each country was allowed.

As a result of Open Skies, the transborder market will see significant expansion in the coming years, though growth will likely be concentrated in the larger business, ethnic and leisure destinations where the maximum carriers allowed has already been reached. Currently, 66% of US–Mexico city pairs are served by only one carrier, reflecting small market sizes in many VFR routes. Only 10 city pairs are served by three US carriers, and only three city pairs are served by three Mexican carriers. Routes where US carriers have reached their limit

Low Cost Carrier Share of the US-Mexico Market,

June 2005–June 2015



Source: OAG Schedules



Source: OAG Schedules

include Guadalajara, Puerto Vallarta, Cancun, and San Jose del Cabo.

To take advantage of the expanded bilateral, large aircraft orders will support the Mexican carriers' international expansion—All major Mexican carriers will take delivery of aircraft in the coming years.

Major Mexican Carriers – Current Fleet and Orders , As of March 2015

		Aircraft Deliveries				
Carrier	Active Fleet	2015	2016	2017	2018	2019
Aeromexico	127	2	2	4	16	23
Interjet	52	9	8	0	2	4
VivaAerobus	20	10	3	8	9	10
Volaris	51	8	8	4	6	10

Source: OAG Schedules

Another change on the horizon for the US–Mexico air traffic market includes the pending approval of a joint venture between Aeromexico and Delta, which have been codeshare partners since 1994. The two SkyTeam alliance members are seeking anti-trust immunity from the US and Mexican authorities to establish a "metal-neutral" joint venture on US–Mexico routes. Combined, they would represent the largest carrier in the transborder market. According to the carriers' filings, the proposed joint venture would focus on developing Delta's hubs in New York and Los Angeles. Aeromexico's hubs in Mexico City, Monterrey, and Guadalajara will provide Delta access to secondary domestic Mexican cities served from these hubs.

Delta and Aeromexico forecast that up to 14 new routes and up to 39 additional daily departures will be created over the



Delta and Aeromexico Transborder Markets,



next five years as a result of the joint venture. The carriers also plan to up-gauge aircraft on existing US–Mexico routes. The two airlines have highly complementary networks, with overlap on only two city pairs (JFK-MEX and LAX-GDL).

Even with Open Skies, new service at Mexico City—Mexico's most in-demand market—faces another major obstacle: capacity constrained infrastructure at Mexico City International Airport (AICM). Delta, Aeromexico, and other carriers will face significant challenges expanding service at Mexico City due to its saturation. The airport has declared capacity is 61 movements per hour, with up to 40 arrivals (separation of 4 nautical miles).2 According to published airline schedules, the airport already reaches and even exceeds the maximum capacity during most of the day.

AICM is considered saturated from 6am to 9pm. This means that new entrants have to settle for less desirable slots, and that until a new airport is built, congestion at AICM will only get worse. It also means that the intended economic benefits of Open Skies will not be fully realized for many years to come.

Hourly Distribution of Flights at MEX, Fridays, June 2015



In order to reap the full benefits of the new Air Services agreement with the US, the Mexican government must ensure the timely completion of the new Mexico City airport, the first phase of which is planned to open in 2018.



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²Mexican SCT (Secretaria de Comunicaciones y Transportes)

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