

NEXT-GENERATION DATA MODEL



• POSITIONING PAPER

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CONTENTS

A next -generation data model – the foundation for innovation	4
Constant evolution - the new norm	5
New era, old thinking?	6
Start again – new foundations in passenger management technology	7
Next-generation data approach	8
Data design principles embodied in the new approach Holistic data Shared access to data	8 8 8
Next-generation data sets Customer Journey Customer Profile Functional data	9 9 9 9
Customer Journey – the next-generation 'PNR'	9
Customer Profile – customer data and interaction history	10
A combined data source	11
A more accurate picture of market conditions	12
Reliable, real-time availability	13
Summary – and what next?	14

A NEXT-GENERATION DATA MODEL -THE FOUNDATION FOR INNOVATION

In the new era of air travel, data is key. The future of any airline depends on harnessing its data, in real-time, with great accuracy. That means taking a whole new look at how next-generation passenger systems are designed so that airlines can access and interpret the new wealth of information generated within their systems and at all traveler touchpoints. From contact, passport and payment information, to customer preferences for types of services, past experience, spending, loyalty membership data, entitlements, customer service indicators, relationships and a whole lot more masses of information are available to improve the operation and be turned into actionable intelligence. Make better use of this data, and the opportunities for keeping passengers happy and creating more revenue really do begin to broaden. Raise the accuracy and clarity of this data, and the scope for improving decisions and processes that impact the bottom line expands significantly.

But to embark on this new era of air travel, we need to remove the constraints of traditional passenger management systems and build on entirely new foundations. SITA's Horizon is doing just that – by re-engineering the way data is stored, accessed and distributed across the airline enterprise and beyond.

BUT TO EMBARK ON THIS NEW ERA OF AIR TRAVEL, WE NEED TO REMOVE THE CONSTRAINTS OF TRADITIONAL PASSENGER MANAGEMENT SYSTEMS AND BUILD ON ENTIRELY NEW FOUNDATIONS.

CONSTANT EVOLUTION -THE NEW NORM

Passenger and airline expectations about the way air travel is booked and managed are constantly evolving. Passengers now want seamless and personalized service on demand, at any stage of their journey, anywhere and everywhere they travel. Airlines need their IT systems to support not only the ever increasing volume of demand on their systems, but also the heightening sophistication of their customers' requirements. At the same time, airlines want technology to enable them to reach their business goals such as optimizing their multi-channel distribution, delivering personalized services and offers, as well as increasing efficiency through automation.

NEW ERA, OLD THINKING?

In a new era of air travel, the ability to exploit data and business intelligence will be critical to the passenger journey, multi-channel distribution and product and service delivery.

Yet ...at a time when market needs are undergoing rapid change, many airlines operate on IT systems that impose compromises because they are designed for older, outdated modes of distribution and customer service. Up until now, wrapping monolithic legacy systems with flexible middleware solutions has helped extend their lifespan, but still getting to the data you need has been something of a black art. In fact, these creative 'fixes' have brought new problems, such as additional IT complexity, difficulty in meeting evolving demands and data inconsistencies across the multiple layers and systems integrated into the passenger management solution. Ultimately, they increase airline expense and hold back innovation and evolution.

The need to address advances in multi-channel distribution and innovation in airline product and customer service models requires more than a wrapper over the core systems, or recreation of the status quo in new technology. Without a new approach business intelligence can be complex and cost prohibitive. By weaving it into the fabric of the passenger management system it will now be easier to implement and exploit, enabling airlines of all sizes to maximize their use of accurate and complete data, turning it into better service, greater revenues and actionable intelligence.

IN A NEW ERA OF AIR TRAVEL, THE ABILITY TO EXPLOIT DATA AND BUSINESS INTELLIGENCE WILL BE CRITICAL FOR MULTI-CHANNEL DISTRIBUTION AND PRODUCT AND SERVICE DELIVERY THROUGHOUT THE PASSENGER JOURNEY.

START AGAIN - NEW FOUNDATIONS IN PASSENGER MANAGEMENT TECHNOLOGY

For this reason, to meet the demands of a new era in travel, the Horizon passenger management suite is undergoing a major transformation. For SITA, leaving the mainframe behind is not enough. With the redesign of the core of Horizon, it has been necessary to build new foundations in passenger management technology.

The intent is not only to address the needs expressed by airlines today for more channels, more personalization and more precision, but also to be ready to meet demand for new functionality for the foreseeable future, based on a platform designed for ongoing innovation. Using our air transport industry expertise and existing comprehensive and functionally-rich capabilities, SITA is readdressing passenger management while exploiting the latest, well-proven computing capabilities. Carefully evaluated approaches such as grid-computing are being incorporated into a layered architecture to deliver service oriented business processes that can be re-used across the portfolio, based on open standards and modern data structures.



NEXT-GENERATION DATA APPROACH

Data is the lifeblood of airline passenger management and distribution systems. But, due to legacy system design, evolution and associated processing costs, data has often been embedded in individual applications and then duplicated across multiple locations in the environment. This can mean that users are unable to access the full range of data relevant to the situation at hand, or that the data used has expired. Service suffers as a result.

Among the guiding principles of next-generation system development, SITA has adopted a new approach to data modeling to maximize the potential of data and business intelligence. The approach is embraced as a fundamental design principle that impacts the way that all components across the passenger management portfolio interoperate and share information.

DATA DESIGN PRINCIPLES EMBODIED IN THE NEW APPROACH

Single source data

No copies of databases are held in different applications and modules; no caches or stored proxy data (used traditionally to insulate core systems from other high demand applications); and data updates are applied in one place only, such as a single source for schedule, seats and customer trip information. End result? More accurate and up to date information is available to the end user.

THIS HOLISTIC VIEW OF DATA COVERS NOT ONLY CURRENT 'ACTIVE' TRANSACTIONS, BUT ALSO HISTORICAL TRANSACTIONS GIVING A LONG TERM VIEW OF THE CUSTOMER THAT CAN BE USED IN REAL-TIME DURING BUSINESS PROCESSING.

Holistic data

Business functions have seamless access to a 360-degree view of travel products and customers, including current booking data and products sold, personal information, history of interaction and purchases with the airline and overall value as a customer. Furthermore, this holistic view of data covers not only current 'active' transactions, but also historical transactions giving a long term view of the customer that can be used in real-time during business processing. End result? Data is not 'siloed' but can be used in combination appropriate to the business need.

Shared access to data

Data is available in real-time for all touchpoints and processes that require it. End result? Readily available information for passengers, airline personnel and operational systems wherever and whenever it is needed.

The single source, holistic approach enables:

- System-wide consistency and accuracy. For example, it exposes a customer's value and preferences at all points of sale to improve responsiveness and personalized service to keep the customer informed and happy.
- The ability for SITA to work with airline customers to help unlock the value of their data to incorporate it into their business management processes. For example, the airline can use analytics to assess key performance indicators (KPIs) for management reports, or pull the data into customer relationship management (CRM) systems.

Illustrations of how these principles have been applied to the overall system design and within specific business processes follow in the next sections. Achieving 'true data' in practice requires complete data accuracy and consistency to be maintained. This is easily stated, yet challenging to implement in a complex passenger management environment, especially in real time performance-critical functions such as inventory. To address this challenge SITA is leveraging the latest proven technologies such as grid computing, enabling a combination of performance and accuracy that has not been seen before in the industry.



NEXT-GENERATION DATA SETS

Looking at the approach more technically, Horizon's layered architecture holds data in a central repository, separate to, but accessible by, all applications and users that require it. The solution can provide the data necessary to support new services and ongoing innovation. Data sets are categorized as follows:

- **Customer Journey** the next-generation Passenger Name Record (PNR), focused on trip information.
- **Customer Profile** a rich and flexible real-time source of data focused on the customer.
- **Product Data** includes the data typically required to support various functions across the portfolio, such as inventory, seats, schedules, pricing, ticketing and reference data among others.

Such data can provide a wide range of 'knowledge' to the airline ranging from bookings, load factor, passenger forecasts, sales and revenue, fare performance, competitor tactics, channel and point of sale utilization and many other types of intelligence.

CUSTOMER JOURNEY - THE NEXT GENERATION 'PNR'

In legacy systems, the PNR provided a standard for passenger data storage related to an air booking. Everything revolved around the PNR due to its critical data. However, it was only relevant to booking information for a single trip at a time and was not designed to be used in other customer interactions.

In new generation Horizon, Customer Journey provides a master source of data related to the trip but with a much broader scope than its predecessor.

- Like the PNR, the database compiles current flightrelated data that is used as the master record. However, it is available to all channels and business processes, supporting for example flexible searching, check-in and disruption management. Its broad accessibility removes the need for separate systems to use their own snapshot of data, which has then to be periodically re-synchronized with the original source.
- But Customer Journey also maintains a customer's past and future travel data, providing a single, end-to-end view of trip information in an enduring 'live' record that can be used to improve service, and support business analysis and targeted promotions. With this evolution from PNR centricity to customer centricity, processes can now be tailored around a broader view of the customer and can be configured by the airline.
- Unlike the legacy PNR, Customer Journey provides a framework for airline merchandising through the addition of expanded ancillary service links for travel components including airline special fees, hotels, cars, event tickets, trip insurance and other travel related services. Furthermore, the database enables the airline to track passenger interactions such as check-in and upgrades. Customer Journey also stores passenger expenditures, which support processes that help the airline to determine and respond to the customer's value.

CUSTOMER PROFILE - CUSTOMER DATA AND INTERACTION HISTORY

A key limitation of legacy reservation systems is that they make basic information on the customer available to only a limited range of airline users.

In next-generation Horizon, Customer Profile is about putting information into operation. So information held in one central customer database becomes 'operational', meaning:

- Information is provided in real-time to any user and system that has a need for it.
- It can be distributed across the airline enterprise and to any point in the travel process, from travel inspiration to trip completion.
- This information is made available immediately for analysis purposes.

Customer Profile is the foundation for Horizon's customer affinity framework and is designed to offer an easy, quick and secure method for creating, storing and distributing customer data throughout the entire Horizon Passenger Management System, and updating it with external data sources.

IN NEXT-GENERATION HORIZON, CUSTOMER PROFILE IS ABOUT PUTTING INFORMATION INTO OPERATION.

To provide a wealth of information to all touchpoints, Customer Profile stores key operational data on the traveler, such as:

- Contacts
- Passport
- Payment information

But crucially it also stores:

- Customer preferences for types of services.
- Loyalty membership data along with entitlements and customer service indicators.
- Relationship data such as family, online social, corporate and travel agency relationships.
- Links to enable effective exploitation of online social relationships.

It also links with the Horizon Frequent Flyer solution and other external loyalty applications for profiling and customer value indicators maintained in those systems. SITA is developing the solution to record customer interactions at all points in the passenger management process such as notes made during the reservations, check-in and boarding processes that will be maintained separate to the trip record.



A COMBINED DATA SOURCE

Using Customer Profile in conjunction with Customer Journey has far ranging benefits, such as:

- Improved service through consistent customer recognition.
- Increased productivity through fast and flexible customer record search.
- Greater accuracy through pre-populating booking screens .
- Input for automated processes for example by automatically waiving upgrade charges for high value passengers according to airline-defined business rules.
- Revenue opportunities. By understanding customer preferences, service requirements and purchasing patterns, airlines can improve their servicing and upselling and use the valuable data resources for marketing and business intelligence operations.

The illustration below shows the interrelationship of Customer Journey and Customer Profile.



INCREASED VISIBILITY OF REAL-TIME INVENTORY CONDITIONS ALSO ENSURES PRICING DECISIONS ACCURATELY REFLECT THE DEMANDS OF AN INCREASINGLY DYNAMIC COMPETITIVE ENVIRONMENT.

A MORE ACCURATE PICTURE OF MARKET CONDITIONS

Airlines are always looking for ways to maximize bookings and yield. Even small improvements in margin can deliver large benefits to the bottom line. Pricing and availability are developed through the interplay of revenue, inventory and fares management systems that provide inputs to each other to determine the optimal fare products to be offered, and the inventory allocated to those fare products.

Horizon Airfare Insight is SITA's market-leading fares management tool that helps an airline optimize its revenue through its pricing strategy and tactics.

- It combines an airline's own fares information, as well as published or selling fares from industry fare sources and the Internet, into one application, providing a complete picture on the market, including competitor pricing initiatives.
- This allows an airline to understand how fares are working in the market and helps it maintain the desired relationship between competitors' fares and its own.
- The application also monitors fare changes, implements a response process, and includes a facility for management oversight and analysis at any stage.

Whereas inventory and revenue management systems have traditionally based decisions on historic market data, SITA is creating a closer integration between Horizon Airfare Insight and these systems, through which shared use of real-time future pricing data provides a more accurate picture of market conditions. The integrated solution automates the complex process of deriving such data as origin and destination, point of sales, channel and booking class to optimize availability, in real-time, across the airline's entire network. Increased visibility of real-time inventory conditions also ensures pricing decisions accurately reflect the demands of an increasingly dynamic competitive environment.

Increasing data shared between systems has future potential in related areas. For example tightening the integration between the systems mentioned above and revenue accounting and Customer Journey could further improve inventory allocation decisions.

Such an approach would take into account data such as proration rules for a code share itinerary with a partner airline, and the purchaser's loyalty status, calculated lifetime value and purchase history for ancillary services associated with the request. By using this data, these systems could make improved real-time decisions about which specific fare products (including price levels, product bundles and optional itineraries) to make available and offer to a customer through a specific channel at any stage of customer engagement. For example, offering a unique and individualized fare package for a valued customer on a route with lower booked load factor.



RELIABLE, REAL-TIME AVAILABILITY

The growth of online travel agencies and airlines' increasing focus on the direct distribution channel has led to a large rise in availability requests being made on the inventory system. This has been accelerated by the growing use of shopping engines that satisfy the customer's need for choice with multiple responses for each itinerary request.

Furthermore, at a time when airlines are becoming increasingly sophisticated with bundled and unbundled offerings, the airline travel industry is defining open standards for data distribution that will enable product differentiation through all distribution channels, which will also support customer recognition and increased personalization. This development is also certain to place more demand on airline inventory systems through the increased use of direct connect links and real-time polling of airlines for individual customized offers.

Such heavy traffic volume from shopping tools and distribution channels represents a challenge for the traditional mainframe system in terms of processing bandwidth, and an increasing source of cost. A number of approaches have attempted to resolve this problem by using cached availability and off-board revenue management control logic to surround the native inventory. This approach, however, results in additional complexity, cost and service compromises – such as the risk that incorrect availability statuses are presented to the customer at the time of search. These cache failures are difficult to eliminate and result in disappointed customers and lost sales.

In building the next-generation Horizon Inventory, the system was designed to be ultra-scalable in order to handle unprecedented traffic volumes from online shopping tools, providing real-time availability for each request, without caching. This means that:

- The customer receives a consistent experience across all channels, with real-time accuracy and no latency.
- The airline maintains complete revenue management origin and destination controls for any market and distribution channel.

The system is built on a highly reliable infrastructure in an open architecture using an in-memory data grid for extreme performance, effectively bypassing older system limitations. Responses to requests are always based on accurate, revenue-managed and controlled native inventory data rather than cached and periodically synchronized data.



SUMMARY - AND WHAT NEXT?

Embracing the new era of air travel demands new thinking and a completely new approach to passenger management systems. As this paper makes clear, that is precisely why SITA is designing and developing the Horizon passenger management suite, with components in production today or envisioned in SITA's roadmap.

The next-generation data model is among several approaches being incorporated into the design of the new Horizon system. It not only addresses a number of today's needs for improved operation, but also provides the right foundation to enable continuous innovation well into the future. The benefits, as outlined in this paper, are many – including improved customer service, greater efficiency, more upselling, and better precision with pricing and availability decisions.

SITA is using its investment in new IT systems to redefine passenger management, not by copying or wrapping traditional systems and processes, but by combining domain expertise with the latest technology and future oriented design to build a continually evolving solution for a new era in travel.

For more information, please visit www.sita.aero





SITA AT A GLANCE

The air transport industry is the most dynamic and exciting community on earth – and SITA is its heart.

- Our vision is to be the chosen technology partner of the industry, a position we will attain through flawless customer service and a unique portfolio of IT and communications solutions that covers the industry's every need 24/7.
- We are the innovators of the industry. Our experts and developers keep it fuelled with a constant stream of ground-breaking products and solutions. We are the ones who see the potential in the latest technology and put it to work.
- Our customers include airlines, airports, GDSs and governments. We work with around 500 air transport industry members and 2,800 customers in over 200 countries and territories.
- We are open, energetic and committed. We work in collaboration with our partners and customers to ensure we are always delivering the most effective, most efficient solutions.
- We own and operate the world's most extensive communications network. It's the vital asset that keeps the global air transport industry connected.
- We are 100% owned by the air transport industry a unique status that enables us to understand and respond to its needs better than anyone.
- Our annual IT surveys for airlines, airports and passenger self-service are industry-renowned and the only ones of their kind.
- We sponsor .aero, the top-level internet domain reserved exclusively for aviation.
- In 2011, we had consolidated revenues of US\$1.517 billion (€1.09 billion).

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