

# NDC SOLUTIONS WHITE PAPER

Results of the study on IT solutions built around the NDC standard

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By Sia Partners



**sia**partners

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## Executive Summary

New Distribution Capability (NDC) is a key transformation project to modernize airline distribution. It started with the foundation standard approved in October 2012 by the International Air Transport Association (IATA), the US DOT approval in August 2014 and with IATA delivering the first set of official standards in September 2015.

A number of IT companies have built solutions to process NDC. Those solutions are available to airlines and enable them to bring new products and offers into the market.

NDC enables airlines to take back control of distribution. The offers and orders are built in the airline environment. The first added value is the facilitation of ancillary sales in the indirect channel. It also enables travel agents to access to rich content (pictures, videos, etc). As the airline identifies who the traveller is for those travelers who wish identify themselves, it can also personalize offers. Finally, NDC also opens opportunities for full dynamic pricing.

IATA has commissioned Sia Partners to carry out a study of the different IT solutions available based on the certification registry as of August 2016.

The key finding from the SIA report is that IT providers have a clear vision of NDC and its main benefits. IT companies have built solutions designed to reap the full benefits of NDC. They have incorporated in their roadmap a vision to even further facilitate airline distribution transformation, including expanding the scope of offer management, integration with loyalty databases, etc.

The IT environment is constantly evolving. IT providers show a good understanding of possible challenges such as managing greater volumes of data, the complexity to process interline, etc.

The airline industry is now in a position to fully implement NDC: the standard is getting mature, multiple players offer relevant solutions and there is a mix of legacy IT companies and start-ups.

The report presents aggregated findings. Each IT company remains anonymous. In order to fully benefit from this report, IATA recommends that airlines focus on the core findings and on the methodology. Core findings will bring a valuable understanding of how IT providers have implemented NDC (offer management, rich media, interline, etc.) both on the airline IT side and on the aggregation side. The methodology is presented in the Appendix. It consists of an extensive survey that can be used as a possible starting point in the dialogue between an airline and an IT company.

We hope you enjoy the reading and welcome your feedback and comments.

IATA NDC team



## Overview

The 22 IT suppliers that took part in this study were surveyed following a proven methodology. The information gathered allowed us to build a comprehensive vision of the market of IT solutions providers across the whole distribution chain, from airlines to aggregators and sellers. We notably focused on understanding the dynamics and ambitions of all players. This allowed for an articulated vision of the NDC solutions expected in the next two to three years.

**The following section presents the scope of companies we reached out to, highlights the main facts regarding the NDC certification process and details key findings about the strategic understanding of NDC by suppliers.**

## Introduction

NDC (New Distribution Capability) is a new XML-based data transmission standard for the travel industry launched by IATA. NDC has a strong awareness across the value chain and, as more and more airlines adopt the standard and IT vendors build solutions, IATA is keen to provide transparency and visibility on how solutions from NDC-certified and -capable suppliers actually comply with the vision of NDC described in resolution 787. As part of its initiative to support adoption of NDC, IATA selected Sia Partners to carry out an analysis of a selection of NDC-based IT solutions currently available.

From June to September 2016, Sia Partners was able to benchmark 22 IT suppliers. Through interviews and in-depth questionnaires (see appendix 3), they were invited to describe their NDC solutions, identify how their features match the NDC reference architecture, NDC principles and business process descriptions, and highlight their NDC roadmap. The information we gathered allowed us to build a comprehensive vision of the market of IT solutions providers across the whole distribution chain, from airlines to aggregators and sellers. We also focused on understanding the dynamics and ambitions of all players, which allowed for an articulated vision of NDC solutions expected in the coming years. We hope this will help airlines make better decisions for their NDC programs.

## Companies in scope

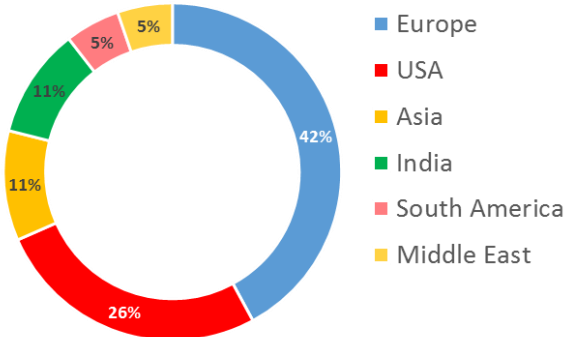
We surveyed 22 IT suppliers of various sizes. Most have already engaged significant teams to work on NDC solutions. All companies that participated in our study have either obtained a NDC certification or are in the process of acquiring one.



*Surveyed IT suppliers*

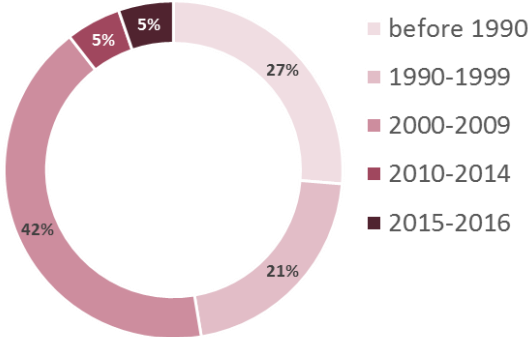
**We reached out to a group of IT suppliers established all over the world.** The survey scope itself demonstrates the worldwide engagement for NDC.

Country of origin



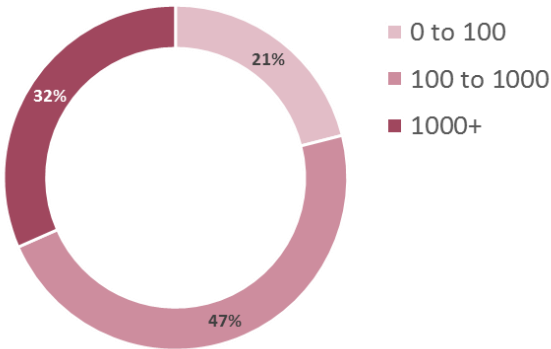
**The median age of the companies we surveyed is 16 years old.** However, among the 22 suppliers one can find well-established market pioneers alongside promising start-ups.

Date of foundation



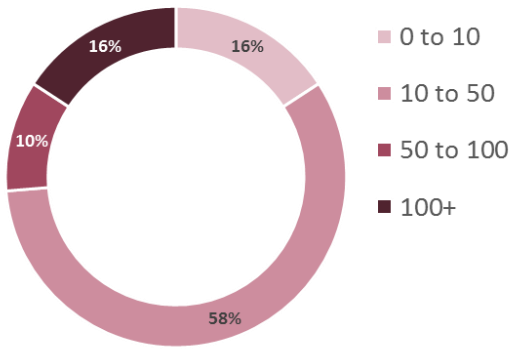
**The diversity of IT suppliers is also shown in the balanced mix of companies from various sizes.**

Company headcount



**Regardless of company sizes, most of the suppliers we surveyed have engaged significant teams in their NDC programs**

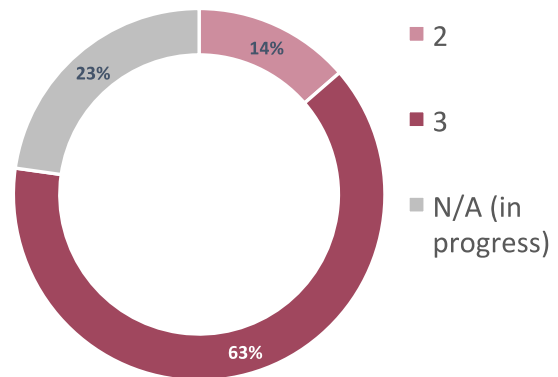
Number of employees working on NDC



## Certification status

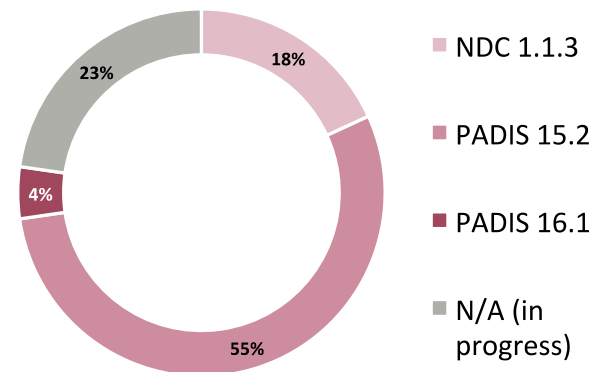
**63% of the suppliers surveyed had a Level 3 certification.** Whereas a Level 2 certification essentially covers NDC messages related to offer management, Level 3 certification covers both offer and order management.

Certification level of surveyed providers



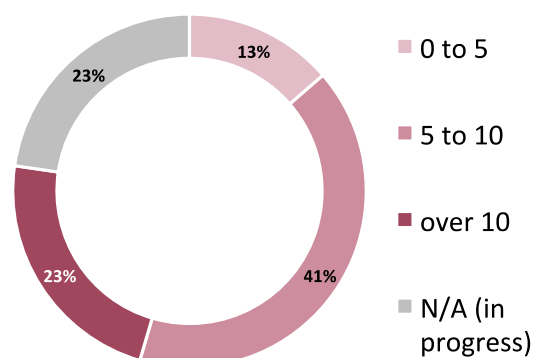
**59% of suppliers already managed to get their messages certified in a PADIS 15.2 or higher version of the standard.** IATA regularly improves the structure of standardized NDC messages as part of the feedback gathered from early adopters and industry forums. The ability of suppliers to support the latest versions of the NDC standard is key to connectivity. It also enables better performance and efficiency of airlines' IT solutions, aggregators and solutions for sellers.

Version of certified messages



**Only 23% of suppliers have certified more than 10 individual NDC messages.** The ability to process specific messages is crucial to the functional scope as specific messages enable certain process steps in the offer and order flows.

Number of messages certified



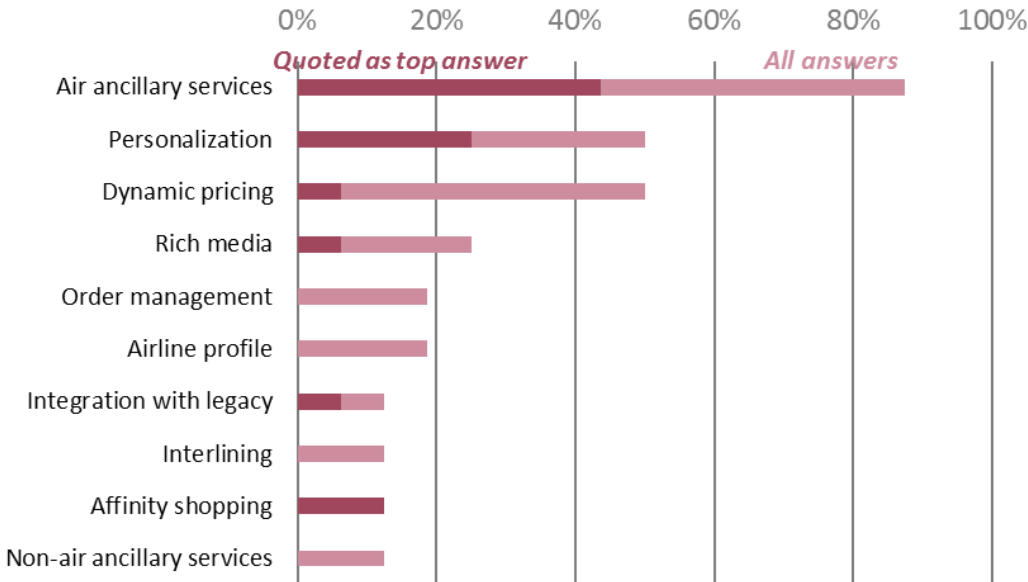
# Strategic understanding of NDC by IT suppliers

We set out to discover how the market of IT solutions suppliers perceives fundamental elements such as: those crucial to the success of NDC, value-added features of NDC and features to prioritize in the roadmap of developments. We believe these were key in order to analyse the choices made by each solutions provider in terms of detailed offering, functional features and time scale.

- **Surveyed providers are convinced that new offer capabilities are essential to bringing value to airlines, and are developing solutions accordingly**

When asked which NDC modules bring the most value to airlines, 90% of the suppliers surveyed put the offer capability first. This is coherent with their initial focus on offer management, as shown by our study. Surveyed providers already offer solutions that go **far beyond air ancillaries**. **Some of them include offer personalization, affinity shopping, rich media and/or dynamic pricing.**

*In your opinion, what are the modules that bring the most value to airlines?*



While rich media and air ancillaries are crucial to differentiate an airline's offer, personalization is key to help airlines attract end customers with tailor-made offers. Affinity shopping focuses around end customers' needs and finds the best corresponding products and services.



### Some quotes

- "With NDC, airlines become the unique source of offer"
- "Most airlines favor simpler types of dynamic pricing"
- "Order management is the only way to get proper BI (Business Intelligence) to enable personalization"
- "Interlining is where NDC is most needed and has the biggest impact"



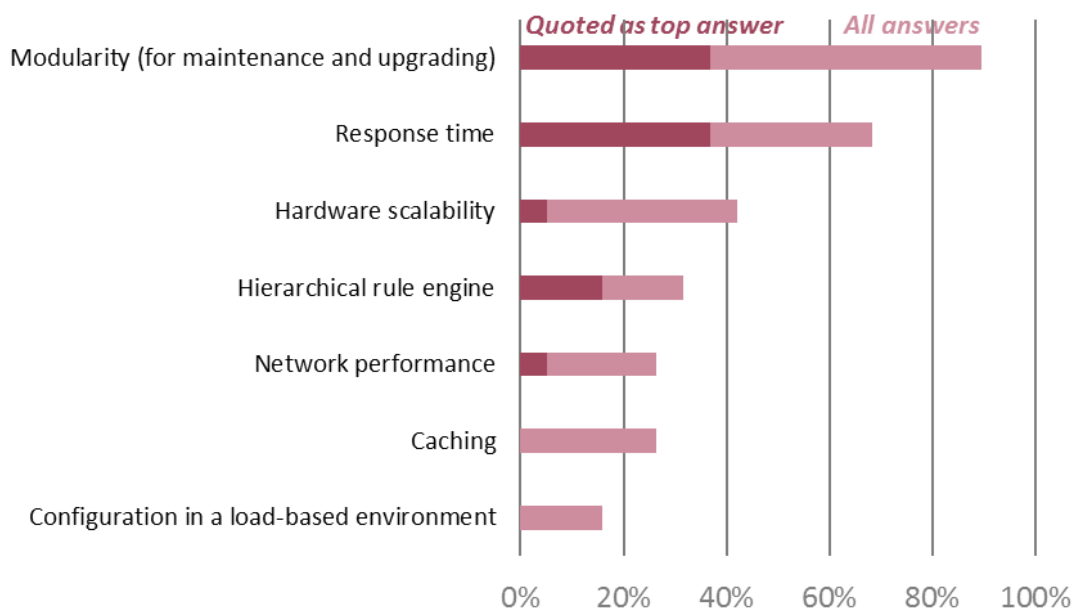
- **Overall performance is a challenge that some providers are already tackling**

**NDC solutions must be capable of supporting high volumes of messages.** Keeping in mind the high volume of NDC messages to be sent throughout the distribution chain, 61% of suppliers see mitigation measures such as hardware scalability and caching as the main key to performance.

**Network performance is crucial to achieving the NDC vision.** The suppliers we interviewed acknowledge that network performance will be an important lever for overall performance. Some are considering providing industry-wide tools to ensure it.

**Modularity enables better upgrading and maintenance.** Modularity is a key principle of NDC. It allows "best-of-breed" strategies and supports performance by easing the upgrade of each module and reducing maintenance strain.

*In your opinion, what are the main levers of performance for your solution?*



**Some quotes**

"Most airlines getting started with NDC underestimate the number of requests the customers will be sending"

"We have built a solution that can cope with any volume of NDC messages"

"Network performance is going to be a very significant factor in the success of NDC and One Order"

- **IT suppliers have set ambitious roadmaps for the next two to three years**

**Improving offer creation is an ongoing effort.** Respondents told us that improving the offer by enabling dynamic pricing was their top priority. We found that, for most merchandising platforms, pricing relies heavily on the PSS, instead of being a module of its own capable of dynamic pricing.

**The majority plan to expand order management.** Suppliers have put order management (booking, payment, ticketing, etc.) in their top priorities, bringing extra value now that the offer component is more mature. Suppliers are furthermore getting prepared for ONE Order.

*How do the following elements fit in your roadmap for the next two to three years?*

**Roadmap objectives, by order of priority**

- 1 Dynamic Pricing / RMS
- 2 Expand scope of offer (hotels, etc.)
- 3 ONE Order
- 4 Expand order management functions
- 5 Support more merchandizing capabilities (ancillaries, etc.)
- 6 Integrate Loyalty
- 7 Implement Interline
- 8 Connectivity
- 9 Migrate to later versions of the NDC standard
- 10 Untie from PSS



**Some quotes**

"NDC is important for the capability it can bring in terms of merchandising"

"The vision of NDC which is about offers created more or less in real time is potentially a real challenge for Revenue Management systems"

"Order management remains one of our primary product investment areas and will stay so with ONE Order"



## Detailed solution analysis

For airlines interested in an NDC transformation program, it is crucial to assess the ability of suppliers to provide them with the appropriate IT solutions. Over time, airlines have built sophisticated IT architectures and they need to understand what the market can offer regarding their specific constraints. They are also eager to know if solutions currently available can concretely help them reach the benefits NDC can offer. This discussion is to be made along specific functionalities and processes (such as offer construction or order management) as well as advanced functionalities (such as personalization or dynamic pricing). We also assessed the capabilities and offerings further downstream, in particular the aggregation solutions which are being put in place.

**This section reflects the key findings on critical topics that were identified during the survey.**

## IT Suppliers have different value propositions

The scope of the survey allowed us to benchmark a significant number of solutions. Taking into account the specifics of each solution, we identified major trends as well as highly differentiating topics.

IT Providers	Aggregators
<p>Most suppliers that participated in this study offer IT solutions catered for airlines.</p> <p>Among them we found 3 main categories of solutions ;</p> <ul style="list-style-type: none"> <li>• <b>PSS native distribution platforms</b>, which consist of NDC within the PSS</li> <li>• <b>Distribution platforms on top of PSS</b>, which consist of a NDC platform sitting on top of a PSS. We saw widely varying numbers of NDC modules included in this layer and levels of reliance towards PSS. We were however able to highlight common characteristics detailed further below.</li> <li>• <b>Other solutions</b> such as layers sitting on top of PSS and only performing message translation.</li> </ul>	<p>Aggregators play a key role in the NDC environment by distributing sellers shopping requests to multiple airlines and aggregating the subsequent responses.</p> <p>The aggregation solutions we benchmarked as part of this study mainly vary along the following:</p> <ul style="list-style-type: none"> <li>• <b>The messages they can handle</b> i.e. the functional scope</li> <li>• <b>Management of rich content</b></li> <li>• <b>The current level of connectivity</b> i.e. the number and diversity of airlines already connected upstream and the volume and repartition of sellers downstream</li> </ul>
76 % have IT providers activities	48 % offer aggregation platforms
24 % of the surveyed providers offer both	

### Highlight of Airline IT solutions and Aggregation solutions

The table below provides each of the detailed components of the different solutions that will be analyzed in greater detail in the rest of this section.

Overview	<p><b>IT suppliers in scope</b></p> <ul style="list-style-type: none"> <li>• 22 companies</li> <li>• of various sizes</li> <li>• with a worldwide presence</li> </ul>	<p><b>Certification status</b></p> <ul style="list-style-type: none"> <li>• Capable, certified or in progress</li> <li>• 63% Level 3</li> <li>• 20% PADIS 16.2</li> </ul>	<p><b>Strategic understanding of NDC by suppliers</b></p>														
Detailed analysis	<p><b>IT Providers</b></p> <table border="1" style="width: 100%;"> <tr> <td style="background-color: #d3d3d3;">Offer Management</td> <td style="background-color: #d3d3d3;">Content Management</td> <td style="background-color: #d3d3d3;">Order Management</td> </tr> <tr> <td style="background-color: #d3d3d3;">API Management</td> <td style="background-color: #808080; color: white;">Airline.com</td> <td style="background-color: #d3d3d3;">Interline</td> </tr> <tr> <td style="background-color: #d3d3d3;">Integration Management</td> <td colspan="2" style="text-align: center;"> <p><i>Global coverage score</i></p> <div style="display: flex; justify-content: space-around;"> <span style="border: 1px solid #ccc; padding: 2px;">low</span> <span style="border: 1px solid #ccc; padding: 2px;">medium</span> <span style="border: 1px solid #ccc; padding: 2px;">high</span> </div> </td> </tr> </table>	Offer Management	Content Management	Order Management	API Management	Airline.com	Interline	Integration Management	<p><i>Global coverage score</i></p> <div style="display: flex; justify-content: space-around;"> <span style="border: 1px solid #ccc; padding: 2px;">low</span> <span style="border: 1px solid #ccc; padding: 2px;">medium</span> <span style="border: 1px solid #ccc; padding: 2px;">high</span> </div>		<p><b>Aggregators</b></p> <table border="1" style="width: 100%;"> <tr> <td style="background-color: #d3d3d3;">Offer and Order messages</td> <td style="background-color: #d3d3d3;">Rich media</td> <td style="background-color: #d3d3d3;">Airline Profile</td> </tr> <tr> <td style="background-color: #d3d3d3;">Traffic Volume</td> <td colspan="2" style="background-color: #d3d3d3;">Tools for sellers</td> </tr> </table>	Offer and Order messages	Rich media	Airline Profile	Traffic Volume	Tools for sellers	
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Offer and Order messages	Rich media	Airline Profile															
Traffic Volume	Tools for sellers																
<p><b>Workflows</b></p> <ul style="list-style-type: none"> <li>• 45% average implementation rate of BRD use cases (IT providers and aggregators)</li> <li>• 60% for IT providers, with a common core of half the use cases covered by over 70% of them</li> </ul>																	

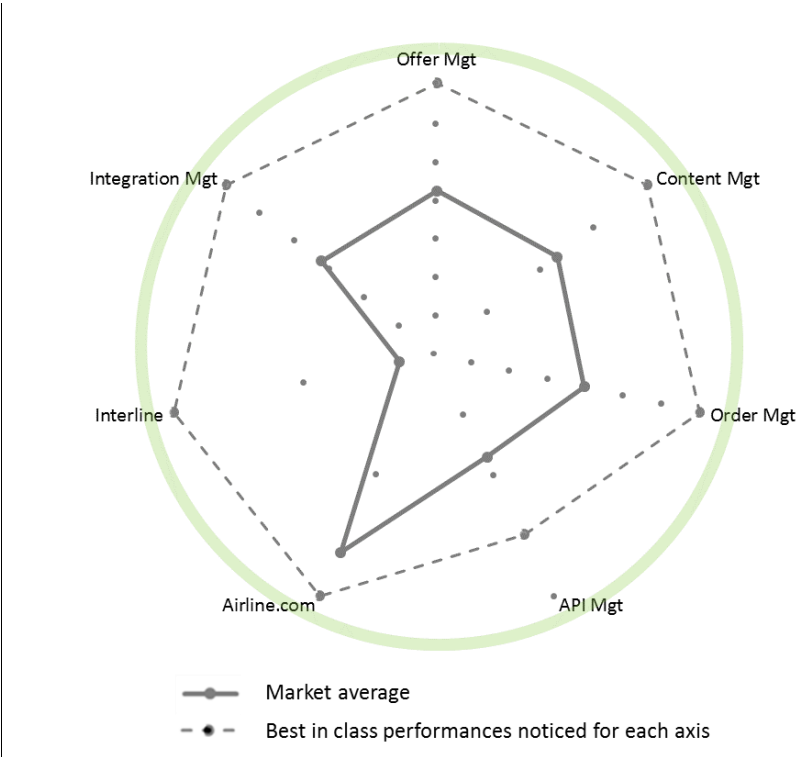


## Detailed solution analysis – IT Providers

Focusing on IT solutions for airlines, we have identified seven key axes along which we benchmarked all solutions. These functional axes are:

- **Offer Management:** to what extent does the solution allow the airline to create and manage its offers and which capabilities does it enable, in terms of scope and sophistication of offers?
- **Content Management:** how is rich media managed?
- **Order Management:** to what extent does the solution allow the airline to create and manage NDC orders? With what flexibility and control?
- **API Management:** does the solution include an API for the airline to exchange NDC messages with external partners downstream – namely aggregators and sellers?
- **Airline.com:** does the solution include managing a web or mobile portal to have direct distribution of NDC offers?
- **Interline:** is Interline supported or facilitated by the solution?
- **Integration Management:** to what extent does the solution integrate with other airline IT modules? Can it exchange valuable data to key airline systems?

For each axis, we identified a number of major functional bricks. For each brick, we checked the performance of each solution. This allowed us to determine an absolute functional score for each solution. This benchmark can be synthesized in the chart below, which displays the average score of the airline IT solutions we studied. The chart also shows an envelope consisting of the top score reached on each individual axis.



*Market average and best in class performances of airline IT solutions along seven functional axes*

**We found NDC solutions for airlines to be of widely unequal maturity, with some players already showcasing key advanced value-added features in their solutions.**

**IT providers have tackled the new offer logic with three main implementation patterns:**

- PSS-native solutions use a proper business logic, allowing them to make use of PSS information such as inventory to create NDC offers. This approach has the benefit of avoiding the generation of additional "macro" records on top of PSS records. It thus limits risk of desynchronization or the need for complex messaging between the NDC system and the PSS. It also makes it easier to maintain a consistent offering between all distribution channels.
- Among solutions consisting of a NDC platform in addition to a PSS, we found that most solutions still heavily rely on PSS and add a layer of business logic. The resulting merchandizing module is more or less dependent on the PSS. Some are able to manage inventory themselves while some operate independently from RBDs (Reservation Booking Designator).
- A few suppliers are already able to build offers independently from existing airline systems (dynamic construction) by relying on proper rule engines, which can be independent from RBDs.
- A key consideration when making an offer is the ability to manage the validity of this offer over time. Offer Management requires storing of offers for the amount of time requested by the airline. Some suppliers offer the possibility to do that. The management of time limits also varies between suppliers, with some letting the airline condition time limits to fare rules and proprietary business rules.

**Air ancillaries are widely supported but the scope differs from one provider to another:**

- Air ancillaries include: seat, extra bags, Wi-Fi, meals, change fees, etc. These are well supported by the suppliers we surveyed. However, the scope of such services varies from one supplier to another. Some would only handle bags and seat selection. Air ancillaries are generally managed via the existing systems (PSS) and are therefore made available for bookings via NDC. The suppliers able to achieve bundling of services can moreover associate ancillaries to a given flight.

**Most providers support non-air ancillaries:**

- Non-air ancillaries regroup services that go beyond inflight services, such as: travel insurance, car rental, airport transfer, hotel, lounge access, special services (wheelchairs, etc.), duty free, etc. These ancillaries are not supported equally by all the suppliers we surveyed, even though car rental, hotel and insurance are covered most of the time. PSS-native solutions are unable to manage most non-air ancillaries – with the exception of lounge access. We found that platforms on top of a PSS generally manage to access third party inventory sources and integrate data in the platform.

**Some providers have already developed personalization engines:**

- Personalization is a key lever of NDC. "offer request" messages going from the seller could contain detail on the end-customer or not (e.g. anonymous shopping). Depending on what is known about the customer (potentially including frequent traveler detail), the airline would be able to personalize its offer. For instance, it could offer a discount or adding a specific ancillary in the offer.
- Some airline IT suppliers are already offering some sort of personalization capability. One such supplier has integrated a personalization engine to its on-top-of-PSS platform which combines four tiers of data: the customer search pattern, his loyalty profile, his travel history and segmentation from third party sources (such as demographics). Another has integrated a computation engine into its PSS, which attributes a value to each customer based on the information available on his/her profile. This value is kept available for any post-booking operation.
- An enabler of personalization is the ability for the merchandizing system to create and manage bundles.

### **Some providers are capable of dynamic pricing:**

- Although we found that pricing was handled by a majority of the IT providers we audited, we found that the level of complexity differed dramatically from one supplier to another, with only a few already offering true dynamic pricing. Most of the time, pricing is performed by relying on the traditional filed fares and booking classes. Some providers have restricted price optimization to ancillary pricing, which is done in their merchandizing engine. One supplier has chosen to implement two pricing engines: one for real-time pricing while the second one handles pre-computed pricing for specific uses such as inspirational pricing.
- Dynamic pricing is currently enabled by a few suppliers. They are able to combine input from airlines (by allowing them to enter fares directly into the merchandizing platform) to any variable or attribute that the airlines make available to map from other IT systems.

### **A small number of providers enable Affinity shopping:**

- Affinity shopping is a feature which enables use cases such as inspirational shopping and allows end customers to search flights using search criteria which differ from the traditional departure and airports. Only a few IT providers enable affinity shopping to date. Their solutions differ on the scope of search criteria (date range, multi-airport, destination type, budget, attribute-based, etc.). Providers we interviewed, however, tend to agree on the usage of caching and pre-computation techniques to allow for affinity shopping.

Content  
Management

### **Rich media CMS balance content ownership and system performance**

- Rich media is one of the most tangible benefits of NDC in the eyes of the end customer, as it describes an offer with visual assets. It is hence strategic for an airline to leverage NDC capabilities in terms of content display and personalization. We found that most IT providers support at least one rich format such as image and video (to a lesser extent). A majority also covers some personalization features such as support of multi-language.
- We also need to consider the way the content is stored and shared. We have identified two main choices that have significant impact on flexibility and performance. Some airline IT providers do not handle the storage of rich media. It is up to the airline to index, store and make the rich content available. In this case, NDC messages will carry references (html links) which point to the airline content server. Some suppliers, on the other hand, manage content for airlines. Airlines upload media to a distinct CMS. This enables caching functions.
- We found suppliers with advanced CMS which integrate cross-channel capabilities – direct and indirect - and allow multi-device (web and mobile) display.

Order  
Management

### **Providers are less advanced on Order management**

#### **Order creation capabilities are impacted by the level of dependence towards PSS:**

- Within the NDC architecture, the order management modules allow airlines to manage the various steps of the life of an order, from creation to modification, cancellation and payment. We particularly found the choices made regarding PSS-native or on-top-of-PSS NDC platform also impact order creation capabilities. Most providers having built NDC layers rely on a “super PNR (Passenger Name Record)” system where orders are technically created and stored within the NDC layer and attached to the related airline records with PSS synchronization. Orders should be created by reference only (i.e. an order can only be created following a NDC shopping response). Some providers do offer this capability. On the other hand, NDC-native PSS solutions contain order creation capabilities to manage airline records without the need of PSS synchronization.

- Some solutions include a passenger identification module which allows airlines to link each order to a customer, and each customer to all the bookings and orders s/he made.

#### **A minority supports post-booking ancillaries:**

- 43% of providers surveyed allow ancillaries to be added to an order after its initial creation in the airline systems. This includes air and non-air ancillaries (for instance meal preference, car rental etc.)

#### **The main concern in “order change” is the authentication of third parties:**

- Once an order has been created in the Order Management module and the underlying items have been updated in the airline IT systems, the airline expects to be able to manage and process order modifications. These modifications can originate from the airline itself or be requested from the seller using NDC messages. Two considerations have retained our attention: security measures and the ability to directly issue notifications to third parties such as sellers. One concern is to ensure the seller or the intermediary asking for an order modification is legitimate. Some providers have already implemented access rights checking.

#### **A small number of providers have already automated Order cancellation:**

- Order cancellation covers the subsequent use cases related to cancellation and refund. We found that only few suppliers have implemented automated cancellation and refund processes based on airline policies. In particular, we studied the cases where an order results from a bundled offer containing non-air ancillaries. Already a small number of providers were able to automate refund of non-air ancillaries. Some providers have equipped their order management module with extensive rules that can for instance manage the choice of forms of payment for refund (original form, credit, voucher, etc.)

#### **Payment relies on existing airline capabilities:**

- Payment mainly relates to the supported forms of payment and the issuing of invoices and receipts. Currently, most providers principally rely on the existing airline capabilities and broadly accept connections with the airlines’ preferred payment gateway providers.

#### **Storing orders in a NDC platform requires synchronization:**

- Order storage is a critical issue for airlines as it impacts the way information is secured and made available to the rest of airline IT systems. Solutions based on a “super PNR” are designed in such a way that the record of orders are located in the NDC layer. A “super PNR” moreover implies that the super PNR database must stay synchronized with the host and the various external systems potentially used to book non-air components which may raise performance issues.

### API Management

#### **Most providers already manage some NDC APIs for airlines**

- 93% of the IT solutions providers we benchmarked during the study are able to manage NDC APIs for their client airlines. While most only manage direct connect for now, some have already started connecting with aggregators.
- Airline profile, which has been designed to enable an airline to control the volume of requests it receives via its APIs, is rarely supported by IT providers, but some intend to develop such management functionalities in a near future. We explore this topic further in this document.



### They also offer solutions for direct channels (airline web site and mobile)

- More than half of the IT providers we benchmarked also offer solutions for direct channels, be it on web or mobile, B2B or B2C.

### Only few solutions include interlining part

- NDC Interline covers cases in which an airline is unable to fully answer a shopping request and has another airline participate (POA) in the offer by ensuring part of the service. In such cases the offer Responsible Airline, which received the initial booking requests, consults other airlines via NDC messages. NDC BRDs cover the various use cases related to all steps of booking and order management.
- So far Interline has not been the focus of IT providers, as they first worked on standard offer and order management (Interline schema were only recently made available).

### Integrating NDC solutions to various existing airline systems is a shared effort, which will unlock major value creation further down the road

The NDC reference architecture proposed by IATA is based on the benefits of modularity. Modularity allows airlines to adopt best-of-breed strategies by choosing solutions which best cater to their needs on each functional topic, depending on their constraints. The value of a solution therefore is driven by its ability to integrate in the pre-existing airline IT environment as well as to enable further modifications by ensuring connectivity with other modules. In this regard, PSS-native solutions could appear attractive as they are fully integrated to existing PSS and merchandizing legacy solutions.

We studied how providers support integration along six major axes:

- 29% enable CRM (Customer Relationship Management) integration, i.e. which solution can be linked to a CRM solution, or hosts one natively. This promises to be a significant lever and requirement in order to develop advanced personalization features.
- 43% enable Loyalty integration. For instance, the airline loyalty database can be queried to generate personalized offers or trigger specific rules for order management. One supplier has developed a rule engine which makes use of a “customer score” calculated based on CRM and Loyalty information.
- 64% enable PNR synchronization. This is mostly related to choices made in terms of order repository (see above).
- 86% enable Analytics integration. Most providers offer some level of monitoring specific to their NDC solution. A minority proposes analytics or intelligence tools to help airlines improve their operations and fine-tune their offer and order management rules. One notable example issues analytics on an airline’s NDC offer requests.
- 57% enable RMS integration. Integration to airline Revenue Management Systems could potentially significantly expand RM possibilities.
- 50% enable CMS integration. A majority of suppliers already offers proprietary CMS or can connect to airline CMS.

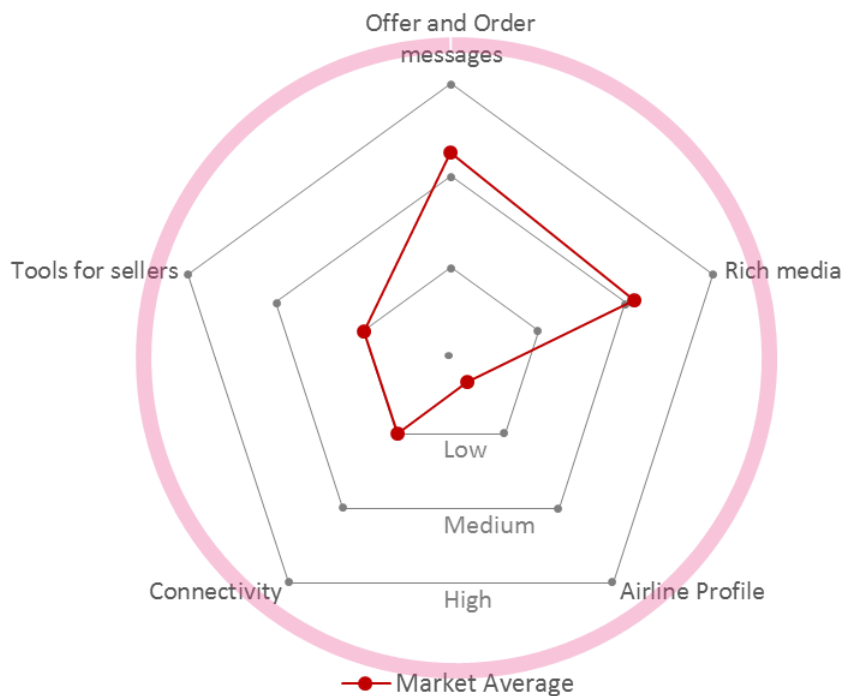


## Detailed solution analysis – Aggregators

Key topics differentiate the various aggregation solutions we came across:

- Offer and order messages
- Rich media
- Airline Profile
- Traffic volume
- Tools for sellers

This can be synthesized in the chart below, which displays the average score of the aggregation solutions we studied



Offer and Order messages

**The level of effort to develop proper NDC aggregation capability can be measured with the number of NDC messages handled.**

- In the NDC environment, aggregators play the key role of distributing sellers' shopping requests to multiple airlines, aggregating the responses and sending them to the sellers. During our benchmark, we were presented with several aggregation solutions. Some were from GDSs expanding to NDC. We also heard from new players who either intend to act as NDC aggregators themselves or provide tools and services to ease the distribution process (message translation for instance).

- Many providers currently offer aggregation and normalization of mixed NDC and non-NDC messages (proprietary XML, Edifact, teletype) for their customers. Most, however, have started working on proper NDC aggregation. They are in that regard getting certified for an increasing number of offer and order messages. Due to the nature of aggregation, managing the various version of NDC schemas is critical to the relevance and performance of an aggregator. We found some aggregators had already set up time limit management in order to ensure reasonable response time to sellers.

Rich media

### **Rich media is managed by aggregators following two different implementations**

- As a major value-added component of offers, rich media has to be successfully carried through the aggregation process so that the seller is able to display such rich media to the end customer. For aggregators already managing rich content, we found that aggregators adopted one of the two following behaviors:
  - Aggregate messages from airlines and preserve the hyperlink that points to the airline's proprietary rich media server. This means the aggregator is not responsible for making sure messages point towards rich media coherent enough to be displayed by the seller.
  - Manage a content management system and embed links to this CMS when returning aggregated messages to the sellers. This approach has the benefit of harmonizing content and caters to airlines that still do not have proper rich messages. It implies the aggregator has to retrieve content from airlines either by retrieving content via NDC schemas (FileRetrieve) or asking airlines to upload content on the CMS themselves. Some solutions we studied also allowed for the retrieval of content through third party entities.

Airline Profile

### **IT providers are waiting for volumes to increase before they launch the implementation of an Airline Profile-based aggregation**

- Airline Profile is a lever, which should eventually optimize the volume of NDC messages exchanged between all parties. An airline would list all the request details for which it wants to be able to produce an offer. By making all such profiles available to aggregators and sellers, each specific request could only be sent and distributed to airlines declaring their interest for that request. Airline Profile is expected to be embraced by aggregators and taken into account in their business rules. We however only heard a handful of aggregators with Airline Profile-enabled solutions, as most of them first wait for the volume of NDC messages to increase.

Traffic Volume

### **Traffic volume widely varies between market players, along four specific components**

- Beyond intrinsic capabilities of an aggregator lies its ability to connect airlines and sellers. Comparing current aggregation solutions, we focused on four significant metrics:
  - The number of NDC messages certified by the aggregator: 6,8 on average.
  - The number of airlines already connected to the aggregator via APIs: 1,8 on average.
  - The number of sellers already connected to the aggregator: 13 on average.
  - The latest version supported by the aggregator, which may limit the number of airlines and sellers that can potentially connect, or impose to translate messages from one version to another.

## **Some are offering tools intended for sellers (for example, allowing OTAs to send and consume NDC messages)**

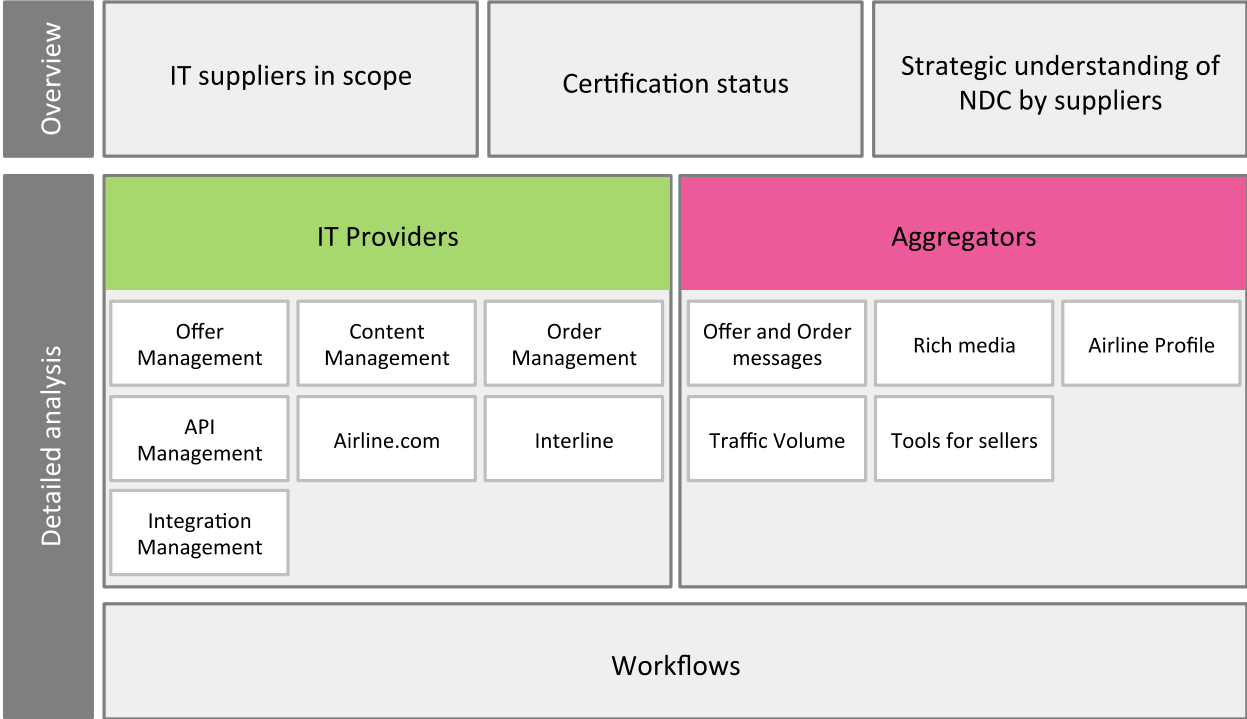
- Major players and solutions providers have identified that the success of NDC depends on the quality of three elements: the sources of NDC content i.e. the airlines, the vehicle i.e. NDC messages being exchanged, and the end points i.e. the distribution endpoints such as sellers like OTAs and direct distribution channels (airline.com, mobile app). We saw how IT providers are providing solutions for airlines to be NDC-enabled and for aggregators to carry along NDC messages. The suppliers we interviewed have also described tools they are developing in order to cater to the sellers (OTAs).
- Most solutions focus on message translation for the moment. These perform two-way translation between proprietary formats to NDC at a given schema version. The issue of version down/upgrading is critical to ensure proper communication on indirect channels.

# Appendix 1: Methodology

The following section briefly presents the methodology we used during our study and introduces the analysis framework from which the present white paper is structured.

## Analysis Framework

The present document is structured according to the analysis framework we built for our survey. It first gives an overview of the companies in scope and details their strategic vision of NDC. The detailed functional analysis of all benchmarked solutions then follows, with a distinction between IT solutions for airlines and aggregation solutions.



Analysis framework chart

## Appendix 2: Workflows

In order to assess how engaged the market already is on NDC, we considered the list of BRD use cases covered by each solution (including interlining whose schemas have been made available recently). It appears that, despite the vast array of topics involved, a large portion of use cases has already been implemented by a majority of suppliers. Moreover, each use case is covered by at least one supplier. As they are core to the NDC vision, use cases regarding offer and order management (shopping, booking, payment and ticketing) are implemented far more than others.



*Average coverage of BRD use cases by suppliers, by domain*

The following table lists all BRD use cases as of October 2016 and shows the average coverage of each use case by the airline IT solutions providers in scope.

<b>Shopping</b>	
0: Generic use cases	100%
Shopping Use Case: Direct	92%
Shopping Use Case: Through an Aggregator	85%
Shopping Use Case: Direct AND through Aggregator	77%
1: Shopping via TMC	69%
2: OTA with aggregated and direct connect using shopping basket	54%
3: corporate booking tool	69%
4: meta search engine shopping with Attribute Shopping	69%
5: Leisure travel agency with anonymous affinity shopping	62%
6: Tour operator building dynamic package	54%
7: Through Fare Journeys on interline Marketing carriers	46%
<b>Booking</b>	
1: Common create order use case	92%
2: Group booking	38%
3: Booking via TMC	69%
4: Leisure travel agency with anonymous affinity shopping	62%
5: Non flight order (lounge pass, booklet 10 flights)	54%
6: Dynamic bundle	77%
7: change itinerary (re-shop) on an existing order	69%
8: UC with change upgrade	54%
9: Common booking use case – Name change	54%
10: UC with change from anonymous offer to a personalized offer	62%
11: Conditional change due to a qualifying passenger	54%
12: Waitlist	46%
13: Involuntary changes	46%
14: Common booking	85%
15: Metasearch booking	69%
16: Create flight order with instant purchase	69%

<b>Payment and ticketing</b>	
1: Single Airline, Single Passenger, Single Form of Payment	85%
2: Codeshare : airline marketed, OA operated multi PAX, infant-no seat, FOP gift card/miles, bundled fare with ancillary	69%
3: EMD-S issuance – single airline, ancillary only, companions, multiple form of payment	69%
4: refund request	46%
5: change request	62%
6: Void ET/EMD request	54%
7: System cancel request	54%
<b>Airline Profile</b>	
1: Airline Profile Receiver receiving new or updated Airline Profile – Push model	23%
2: Airline Profile Receiver Makes RQ – Pull model	23%
<b>Interline</b>	
0: Shopping and Order Create – Different marketing carriers – no codeshare	62%
1: Shopping and Order Create – Different marketing carrier – a la carte from POA - no codeshare	46%
2: Shopping and Order Create – Codeshare - Marketing carrier is POA	46%
3: Shopping and Order Create – Cascade to Operating – ORA/POA/Sub-POA	46%
4: Shopping and Order Create – Codeshare partner with ATI	46%
5: Shopping – Affinity	38%
6: Shopping - Date Range	54%
7: Shopping and Order Create - Inventory Guarantee Expiration	38%
8: Shopping – Between ORA and POA for air and ancillary services	54%
9: Shopping and Order Create – Frequent Flyer Redemption	38%
10: Order – Voluntary Cancel	46%
11: Order – List View	46%
12: Order – Specific Order View	46%
13: Order - History View	31%
14: Order - Rules Display	38%
15: Shopping and Order Create – ORA marketing carrier to POA operating carrier	54%
16: Shopping and Order Change (add flight)	54%
17: Shopping – Partial match response from POA to ORA	23%
18: Shopping - Customer has higher tier level on POA	23%
0: Interline Flight with Baggage (Resolution 302)	23%
1: Interline Flight with Baggage (DoT/CTA)	23%
2: Interline Flight with Baggage – Waive Resolution 302	15%
3: Interline Flight Shopping with Pre-Order Baggage Allowance Query	31%
4: Post Order Create Baggage Charges	46%
5: Shopping – Resolution 302 with deferral and cascading	23%
6: Interline Flight with Baggage and Stopovers (Resolution 302)	23%
7: Shopping – DOT/CTA Regulations with MSC Deferral	23%
8: Interline flight with baggage. POA agrees that ORA can be baggage determining carrier (302 governed itinerary)	15%
9: Baggage List Request	38%
10: Shopping - Inventory Controlled Bag Type	31%
11: Shopping - Embargo – No Excess Baggage	31%
0: Legacy interline PNR booked, NDC interline ancillary shopping	46%
1: Interline NDC order created, NDC interline ancillary shopping	46%
2: Request a list of services and shop from the list. No pre-existing booking or order	46%
3: Shopping response for inventory controlled ancillaries where the inventory is guaranteed for a specified period of time	31%
4: Shopping for ancillaries on multiple POAs	38%
5: Shopping response for inventory controlled ancillaries where the inventory is not guaranteed	31%
6: Initial POA becomes ORA by cascading to another airline.	23%
7: Non-flight related ancillary shopping where ORA and POA have ATI	23%
0: Customer changes all travel dates on all flights - all travel unflown	38%
1: Interline Schedule Change on POA Invalidates MCT	31%

## Appendix 3: Presentation of the questionnaire

### Section I - Company profile

N°	Question	Answer
<b>1</b>	<b>Company identity</b>	
<b>1.1</b>	<b>Legal identity</b>	
	Company Name	
	Founded in	
	Head Office address	
	Countries with offices	
<b>1.2</b>	<b>Company activities</b>	
	Company Type	
	Main activities	
	Number of employees	
	Number of countries with operations	
	Global revenues (please precise year)	
	Main references in airline industry	
	Main references in other industries	
<b>2</b>	<b>Strategic positioning</b>	
	How would you describe your current positioning?	
	How would you describe the positioning you intend to achieve within the next few years?	
	Is your company part of IATA's Strategic Partnership?	



## Section II - Global overview regarding NDC

N°	Question	Answer
<b>1</b>	<b>Overview of the NDC solution(s)</b>	
<b>1.0</b>	<b>Overview</b>	
	How many distinct NDC solutions are you offering?	
	What are the types of clients addressed by your solutions?	
	What is the value chain coverage of your solutions ?	
<b>1.1</b>	<b>Solution 1</b>	
	Name of your solution	
	Is your NDC solution currently in production? For which airlines?	
	What is the NDC functional scope currently covered by your solution?	
	Among all the NDC modules covered by your solution, which ones are not yet in production?	
<b>1.2</b>	<b>[if needed, feel free to add any section so as to list all of your NDC solutions]</b>	
<b>2</b>	<b>Value proposition and product differentiation of the solutions around NDC</b>	
<b>2.0</b>	<b>Overview of all your NDC solutions</b>	
	Value proposition of your NDC solutions portfolio (main benefits to customers / stakeholders)	
	Product differentiation of your NDC solutions portfolio	
	For a case-study client, what is the expected delay of implementation?	
	Does your solution require some legacy modules to be changed to your own legacy solutions?	
	What are the main challenges you have faced during the implementation of your NDC solution?	
	When you pitch your solutions to airlines: what are the perceived pain points for the airlines? What are the questions that airlines don't ask you or don't ask you enough which would help you to go further with your NDC solution?	

## Section III - Roadmap

N°	Question	Answer
<b>1</b>	<b>Your roadmap of NDC developments</b>	
<b>1.1</b>	<b>Roadmap overview</b>	
	Please describe here your intended roadmap of NDC developments	
<b>1.2</b>	<b>Intended internal implication on NDC matters</b>	
	Is NDC a priority topic within your organisation?	
	How many people are currently working on NDC solutions within your company? (<10, between 10 and 50, between 50 and 100, +100 )	
	How many people do you plan on having working on NDC solutions within your company in the next year? In the next 2 years? (0%-50%, 50%-100%,100%-200%, >200% )	
<b>1.3</b>	<b>Adoption overview</b>	
	What are the current percentages from your NDC solution versus overall booking?	
	What are the forecast percentages from your NDC solution versus overall booking in the next 2-3 years?	
	How many airlines do you plan to connect with your interlining module ?	

## Section IV - NDC Standard

N°	Question	Answer
<b>1</b>	<b>Certification level</b>	
<b>1.1</b>	<b>Certification status</b>	
	Certification/registration type	XML-capable / NDC Capable / In progress
	Level (if applicable)	1 / 2 / 3 / Not applicable
	Original certification or registration date	
	NDC Deployment partners	[Name] : [Company type] ; [Name] : [Company type] ; etc
	Renewal date	
<b>2</b>	<b>Supported NDC version</b>	
<b>2.1</b>	<b>Detail of supported NDC Schemas versions</b>	
	NDC Schemas version(s) supported	Ex : NDC 1.X, PADIS 15.2, PADIS 16.1
<b>3</b>	<b>NDC Scope</b>	
<b>3.1</b>	<b>Functions using certified messages</b>	
	What are the functional modules for which you have certified messages (as listed in 4.1) ?	Ex : shopping, booking, servicing, etc
<b>4</b>	<b>Certified NDC messages</b>	
<b>4.1</b>	<b>List of certified messages</b>	
	<b>Message name</b>	<b>Schema Version</b>
	<b>Certification date</b>	
	Ex: AirShoppingRQ	Ex: PADIS Publication 15.2
	[please add lines to list all certified messages]	

## Section V - IT Architecture

N°	Question	Answer
<b>1</b>	<b>IT Architecture overview</b>	
<b>1.1</b>	<b>Mapping with the IATA NDC Reference architecture framework</b>	
	List of the modules covered by your solutions (please, use the IATA NDC reference architecture)	
<b>1.2</b>	<b>Key principles of the IT architecture</b>	
	Please detail the key principles for the high-level architecture of all your IT solutions	
<b>2</b>	<b>Architecture modularity</b>	
<b>2.1</b>	<b>Modularity</b>	
	List of NDC functional modules which can be implemented independently	
<b>4</b>	<b>Detailed IT architecture - Focus by functions and by new NDC retailing modules</b>	
<b>4.1</b>	<b>Offer management</b>	
	<b>General offer management principles</b>	
	What are the main principles guiding the offer management module?	
	<b>Shopping</b>	
	Is affinity shopping supported? With which search criteria?	
	Is attribute shopping supported? With which search criteria?	
	Are non-flight shopping supported (ex: lounge access subscription)?	
	<b>Offer construction</b>	
	How are offer construction rules managed? Is there a rule engine?	
	Have you implemented new construction rules or is it based on RBD?	
	How is the offer management module linked to PSS? Do you rely on the PSS inventory to build the offers?	
	How is promotion supported? (discount shopping? redemption shopping?)	
	Does offer management take into account Corporate Travel specificities?	
	How are the various time limits implemented? (booking time limit, ticket time limit implemented, offer time limit?)	
	How is ancillary shopping managed? Types of ancillary services supported (internal and external ancillary services)?	

	What types of air related ancillary services are supported?	
	What types of non-air related ancillary services are supported?	
	<b>Personalization</b>	
	Does the system enable personalized offers?	
	How is customer information used?	
	How is loyalty managed? (redemption shopping? frequent traveller data?)	
	<b>Pricing</b>	
	How is pricing managed? What are the pricing functionalities enabled by your solution?	
	Do you rely on ATPCO for pricing?	
	Is dynamic pricing supported? Do dynamic pricing functionalities depend on distribution channels?	
	How is ancillary pricing managed?	
	<b>Rich Media</b>	
	How is rich media managed?	
	What kind of rich media is supported?	
	Do you use a CMS? Is it shared across all channels?	
	Is it multi-lingual?	
	<b>Revenue Management</b>	
	How is revenue management connected to the offer management?	
	Do you provide a revenue management module or do you rely on an existing one?	
4.2	<b>Order Management</b>	
	<b>General order management principles</b>	

What are the main principles guiding the Order Management module?	
<b>Order creation</b>	
How is the order management module linked to PSS? Do you rely on the PSS to create the order?	
What are the links between an order and the PNR(s)? Super PNR? Are PNR synchronisation supported in the order management?	
Is passenger identification supported?	
<b>Modification</b>	
How is order modification managed?	
Do you support post-booking ancillaries?	
<b>Cancellation</b>	
How is order cancellation managed?	
<b>Notification</b>	
How are order changes notified?	
<b>Payment</b>	
How is payment managed?	
What are the supported payment forms? (credit card, debit card, pre-paid?)	
How is the accreditation status of a seller or an intermediary checked? How are suspicious transactions prevented?	
How are refund rules managed?	
<b>Ticketing</b>	
How is ticketing implemented?	
<b>DCS</b>	

	What are the links between order management and the DCS?	
	<b>Revenue accounting</b>	
	What are the links between order management and revenue accounting?	
<b>4.3</b>	<b>Integration Layer</b>	
	How is the integration layer managed?	
	What are the external modules connected to your NDC solution? (PSS list, DCS list, external sources for ancillary services ...)	
<b>4.4</b>	<b>CRM</b>	
	How is CRM data used in the offer and order Management modules?	
<b>4.5</b>	<b>Airline Control on NDC modules</b>	
	Is administration of NDC modules independent of legacy systems or setup in legacy?	
	How are modules administered (for instance CMS ?)	
<b>4.6</b>	<b>Analytics</b>	
	What are the available reporting tools? How do your modules integrate with legacy analytics tools?	
<b>4.7</b>	<b>API Management</b>	
	Is the NDC API connected to aggregators?	
	Is Direct Connect supported?	
	Is web and mobile airline.com supported?	
<b>4.8</b>	<b>Airline Profile</b>	
	How are Airline profile details stored and managed? Are they updated based on other information such as Inventory status?	
	What are the criteria listed in a typical Airline Profile Response?	
<b>4.9</b>	<b>Interline</b>	
	Does the system allow for shop requests to be made from ORA to POA for flight? Ancillaries (bundled or à la carte)? What info is included in the request?	
	How are rules for connections between flights from ORA and POAs managed?	
	Can Airline Profile be used to select potential POAs?	

	If you are not using NDC interlining, how will you present offers/orders which include interline content?	
	How many airlines do you plan to connect with your interlining module?	
<b>5</b>	<b>Aggregation - to be completed only if you provide aggregation solutions</b>	
	Do you provide aggregation functions? (NDC only, NDC + other kinds of formats)	
	Do you support AirlineProfile-based aggregation?	
	What is the scope of NDC messages that you support as an aggregator?	
	Which functions do you provide for distributors after aggregating all these flows? (shopping, merchandising, rich content, ancillary services, others...)	
	How many airlines have you integrated in NDC?	
	How many distributors use your NDC solution?	
<b>6</b>	<b>Distribution - to be completed if you provide solutions for distributors</b>	
	Do you provide direct connect in NDC and/or NDC connection via aggregators?	
	What scope of NDC messages do you support?	
	Which functions do you provide for distributors? (shopping, merchandising, rich content, ancillary services, others...)	
	How many airlines have you integrated in NDC?	
	How many aggregators have you integrated in NDC?	
	How many distributors use your NDC solution?	
<b>7</b>	<b>Special considerations</b>	
<b>7.1</b>	<b>Performance</b>	
	Please provide any information you would like to share relative to your solutions' performances	
<b>7.2</b>	<b>Mobile aspects</b>	
	Please provide any information you would like to share relative to mobile connectivity	
<b>7.3</b>	<b>Security</b>	
	Please provide any information you would like to share relative to compliance with security frameworks and PCI compliance	

## Section VI – Workflows



N°	Question	Answer
<b>0</b>	<b>Coverage of business use cases described in the Business Requirements Documents</b>	
<b>0.1</b>	<b>Shopping use cases</b>	
	0: Generic use cases	YES/NO
	Shopping Use Case: Direct	YES/NO
	Shopping Use Case: Through an Aggregator	YES/NO
	Shopping Use Case: Direct AND through Aggregator	YES/NO
	1: Shopping via TMC	YES/NO
	2: OTA with aggregated and direct connect using shopping basket	YES/NO
	3: corporate booking tool	YES/NO
	4: meta search engine shopping with Attribute Shopping	YES/NO
	5: Leisure travel agency with anonymous affinity shopping	YES/NO
	6: Tour operator building dynamic package	YES/NO
	7: Through Fare Journeys on interline Marketing carriers	YES/NO
<b>0.2</b>	<b>NDC order management – Booking use cases</b>	
	1: Common create order use case	YES/NO
	2: Group booking	YES/NO
	3: Booking via TMC	YES/NO
	4: Leisure travel agency with anonymous affinity shopping	YES/NO
	5: Non flight order (lounge pass, booklet 10 flights)	YES/NO
	6: Dynamic bundle	YES/NO
	7: change itinerary (re-shop) on an existing order	YES/NO
	8: UC with change upgrade	YES/NO
	9: Common booking use case – Name change	YES/NO
	10: UC with change from anonymous offer to a personalized offer	YES/NO
	11: Conditional change due to a qualifying passenger	YES/NO
	12: Waitlist	YES/NO

	13: Involuntary changes	YES/NO
	14: Common booking	YES/NO
	15: Metasearch booking	YES/NO
	16: Create flight order with instant purchase	YES/NO
<b>0.3</b>	<b>NDC order management – Payment and ticketing use cases</b>	
	1: Single Airline, Single Passenger, Single From of Payment	YES/NO
	2: Codeshare : airline marketed, OA operated multi PAX, infant-no seat, FOP gift card/miles, bundled fare with ancillary	YES/NO
	3: EMD-S issuance – single airline, ancillary only, companions, multiple form of payment	YES/NO
	4: refund request	YES/NO
	5: change request	YES/NO
	6: Void ET/EMD request	YES/NO
	7: System cancel request	YES/NO
<b>0.4</b>	<b>Airline Profile use cases</b>	
	1: Airline Profile Receiver receiving new or updated Airline Profile – Push model	YES/NO
	2: Airline Profile Receiver Makes RQ – Pull model	YES/NO
<b>0.5</b>	<b>Interline – Flights Shopping and Order management use cases</b>	
	0: Shopping and Order Create – Different marketing carriers – no codeshare	YES/NO
	1: Shopping and Order Create – Different marketing carrier – a la carte from POA - no codeshare	YES/NO
	2: Shopping and Order Create – Codeshare - Marketing carrier is POA	YES/NO
	3: Shopping and Order Create – Cascade to Operating – ORA/POA/Sub-POA	YES/NO
	4: Shopping and Order Create – Codeshare partner with ATI	YES/NO
	5: Shopping – Affinity	YES/NO
	6: Shopping - Date Range	YES/NO
	7: Shopping and Order Create - Inventory Guarantee Expiration	YES/NO

	8: Shopping – Between ORA and POA for air and ancillary services	YES/NO
	9: Shopping and Order Create – Frequent Flyer Redemption	YES/NO
	10: Order – Voluntary Cancel	YES/NO
	11: Order – List View	YES/NO
	12: Order – Specific Order View	YES/NO
	13: Order - History View	YES/NO
	14: Order - Rules Display	YES/NO
	15: Shopping and Order Create – ORA marketing carrier to POA operating carrier	YES/NO
	16: Shopping and Order Change (add flight)	YES/NO
	17: Shopping – Partial match response from POA to ORA	YES/NO
	18: Shopping - Customer has higher tier level on POA	YES/NO
<b>0.6</b>	<b>Interline – Baggage Shopping and Order management use cases</b>	
	0: Interline Flight with Baggage (Resolution 302)	YES/NO
	1: Interline Flight with Baggage (DoT/CTA)	YES/NO
	2: Interline Flight with Baggage – Waive Resolution 302	YES/NO
	3: Interline Flight Shopping with Pre-Order Baggage Allowance Query	YES/NO
	4: Post Order Create Baggage Charges	YES/NO
	5: Shopping – Resolution 302 with deferral and cascading	YES/NO
	6: Interline Flight with Baggage and Stopovers (Resolution 302)	YES/NO
	7: Shopping – DOT/CTA Regulations with MSC Deferral	YES/NO
	8: Interline flight with baggage. POA agrees that ORA can be baggage determining carrier (302 governed itinerary)	YES/NO
	9: Baggage List Request	YES/NO
	10: Shopping - Inventory Controlled Bag Type	YES/NO
	11: Shopping - Embargo – No Excess Baggage	YES/NO

<b>0.7</b>	<b>Interline – Ancillary Shopping use cases</b>	
	0: Legacy interline PNR booked, NDC interline ancillary shopping	YES/NO
	1: Interline NDC order created, NDC interline ancillary shopping	YES/NO
	2: Request a list of services and shop from the list. No pre-existing booking or order	YES/NO
	3: Shopping response for inventory controlled ancillaries where the inventory is guaranteed for a specified period of time	YES/NO
	4: Shopping for ancillaries on multiple POAs	YES/NO
	5: Shopping response for inventory controlled ancillaries where the inventory is not guaranteed	YES/NO
	6: Initial POA becomes ORA by cascading to another airline.	YES/NO
	7: Non-flight related ancillary shopping where ORA and POA have ATI	YES/NO
<b>0.8</b>	<b>Interline – Order servicing use cases</b>	
	0: Customer changes all travel dates on all flights - all travel unflown	YES/NO
	1: Interline Schedule Change on POA Invalidates MCT	YES/NO
<b>1</b>	<b>Detailed use case - [Title here]</b>	
<b>1.1</b>	<b>General description</b>	
	Business use case description	
<b>2</b>	<b>[feel free to add any additional section so as to detail all your business use cases]</b>	

## Section VII - Closed questions

N°	Question	Answer	
<b>1</b>	<b>Closed questions</b>		
<b>1.1</b>	<b>Question 1. What were the most important pain points for airlines when talking with them?</b> <i>[3 answers max, to rank from 1 (most important) to 3 (less important)]</i>		
	<b>Answer proposition</b>	<b>Rank</b>	<b>Comment</b>
	Airlines were not aware of NDC		
	The business case for NDC was not made / ROI not proven		
	No preliminary analysis of the airline's processes (RM, Pricing, etc;)		
	Airlines do not have a clear view on how to transition		
	Lack of demand for NDC features		
	Lack of funds for NDC		
	Relationship with their PSS provider		
	Relationship with their current IT provider(s)		
<b>1.2</b>	<b>Question 2. What are in your opinion the 3 modules taht bring the most vlaue to airlines?</b> <i>[3 answers max, to rank from 1 (most valuable) to 3 (less valuable)]</i>		
	<b>Answer proposition</b>	<b>Rank</b>	<b>Comment</b>
	Dynamic pricing		
	Air ancillary services		
	Non-air ancillary services		
	Rich media		
	Airline profile		
	Personalization		
	Affinity shopping		
	Order management		
	Interlining		
	Integration with legacy		
<b>1.3</b>	<b>Question 3. What are in your opinion the 3 main levers of performance for your solution?</b> <i>[3 answers max, to rank from 1 (most important) to 3 (less important)]</i>		

	Answer proposition	Rank	Comment
	Modularity (for maintenance and upgrading)		
	Hardware scalability		
	Network performance		
	Response time		
	Caching		
	Hierarchical rule engine		
	Configuration in a load-based environment		
	Disaster recovery plan		
1.4	<b>Question 4. What are in your opinion the 3 main levers for the security of your solution?</b> <i>[3 answers max, to rank from 1 to 3]</i>		
	Answer proposition	Yes/No	Comment
	Network firewall		
	Encryption of data at rest or in transit [please specify data encryption standard in comment box if known]		
	Tokenization (replacing some data with a surrogate value, or token)		
	Vulnerability Management Program		
	Other [please specify in comment box]		
1.5	<b>Question 4. How do the following elements fit in your roadmap for the next 2 to 3 years?</b> <i>[rate each possible answer from 1 (most prioritized) to 10 (least prioritized)]</i>		
	Answer proposition	Place in roadmap	Comment
	Integrate RMS (linked to dynamic pricing)		
	Integrate Loyalty (linked to personalization)		
	Expand scope of offer (hotels,etc.)		
	Expand order management functions (payment, ticketing, after sales, etc.)		
	One Order		
	Support more merchandizing capabilities (ancillaries, etc.)		
	Implement Interline		

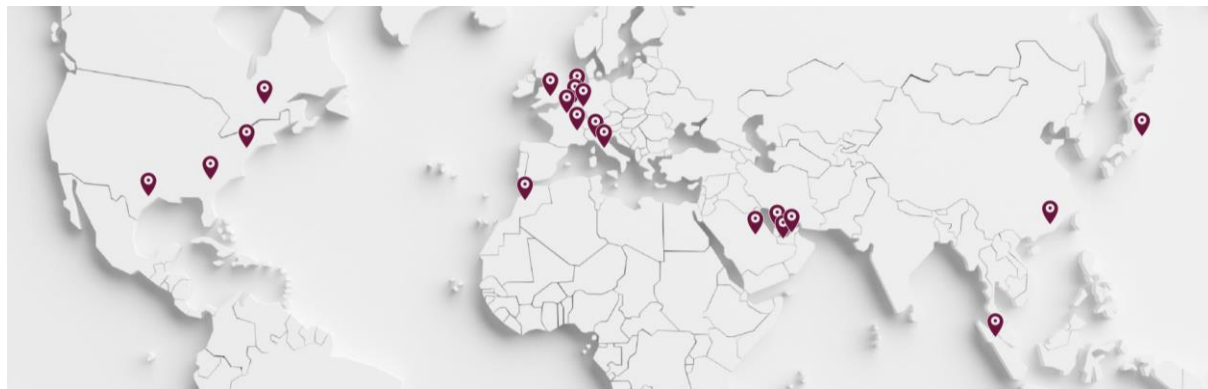
Connectivity (with sellers or aggregators)		
Migrate to later versions of the NDC standard		
Untie from PSS		

## ABOUT SIA PARTNERS

Founded in 1999, Sia Partners is an independent global management consulting firm with over 850 consultants and an annual turnover of USD 155 million. The Group has 20 offices in 15 countries, including the U.S., its second biggest market. Sia Partners is renowned for its sharp expertise in the Energy, Banking, Insurance, Telecoms and Transportation sectors.

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