

# NDC SOLUTIONS WHITE PAPER

3<sup>RD</sup> EDITION

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

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By Sia Partners



**sia**partners

# CONTENTS

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- 3 EXECUTIVE SUMMARY
- 4 OVERVIEW
- 11 DETAILED SOLUTION ANALYSIS
- 23 APPENDIX 1: METHODOLOGY
- 24 APPENDIX 2: WORKFLOWS
- 26 APPENDIX 3: PRESENTATION OF THE QUESTIONNAIRE

## Executive Summary

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

NDC enables airlines to have better control of their distribution because offers and orders are built in the airline environment. Early benefits of the standard have been to improve the sale of ancillaries in the indirect channel and enable travel agents to access rich content (pictures, videos, etc.). For those travelers who wish to identify themselves, the airline can create personalized offers. As the NDC standard moves forward it opens opportunities, for example enabling airlines to create full dynamic pricing.

A number of IT companies have built solutions to support NDC messages enabling airlines to bring new products and offers into the market.

In 2016, IATA commissioned Sia Partners to carry out a study of the various IT solutions available based on the solutions certified in the NDC Registry. The results of this study formed the first NDC Solutions White Paper. As in 2017, IATA commissioned Sia Partners again in 2018 to update the NDC Solutions White Paper for two main reasons:

- 2018 reflects the steady progress of the NDC adoption, with 65 NDC certified deployments and GDSs becoming Level 3 NDC aggregators;<sup>1</sup>
- IT companies continue to embark on the NDC journey and apply for certification, and it is necessary to include them in the overall analysis of solutions.

The key findings in the NDC Solutions White Paper are that IT providers:

- Have a clear vision of NDC and its main benefits;
- Build solutions designed to reap the primary benefits of NDC;
- Have incorporated in their roadmap a vision of NDC to further facilitate airline distribution transformation;
- Feel there is still a need to further explain the full value and the potential benefits of NDC;
- Think airlines still need support for their transition.

Year after year, we see NDC solutions becoming more sophisticated, taking into account new airline expectations such as personalization and Order Management. The standard also evolves, the latest version (18.x) addresses a number of issues mentioned by carriers and IT providers by providing a more defined structure. Finally, the IT environment is also constantly changing as IT providers show a good understanding of possible challenges such as managing greater volumes of data and the complexity of interline.

This 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, order management, rich media, interline, etc.) within both airline IT and aggregation. The methodology is presented in the Appendix. It consists of an extensive survey that can be used as a helpful 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

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<sup>1</sup> NDC Program Update, IATA, November 2018



## Overview

For the third edition of the NDC study, 25 IT providers were invited to share their feedback on NDC. The information gathered was used to build a comprehensive view of IT solutions provided across the whole distribution chain, from airlines to aggregators to sellers. The study focused on understanding the dynamics and ambitions of all players. The results brought to light the expectations for NDC solutions in the next two to three years.

**The following section presents the scope of companies within the study and details key findings about the strategic understanding of NDC by suppliers.**

## Introduction

NDC (New Distribution Capability) is an XML-based data transmission standard for the travel industry launched by IATA to enable API distribution. As more airlines adopt the standard and IT providers build solutions, IATA is keen to provide transparency and visibility on how solutions from NDC-certified and NDC-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 annual survey and analysis of a selection of the NDC-based IT solutions currently available.

This year the study has gathered 25 participants, including 5 new participants. Sia Partners has interviewed the participants and analyzed their solutions through an in-depth questionnaire (detailed in appendix 3). IT providers were invited to describe their NDC solutions; identify how the solution's features match the NDC reference architecture, NDC principles and business process descriptions; and highlight the company's NDC roadmap. The information gathered in the questionnaires was used to build a comprehensive view of IT solutions provided across the whole distribution chain, from airlines to aggregators to sellers. The study focused on understanding the dynamics and ambitions of all players. The results brought to light the expectations for NDC solutions in the next two to three years that will help airlines to make better decisions for their NDC programs.

## Companies in scope

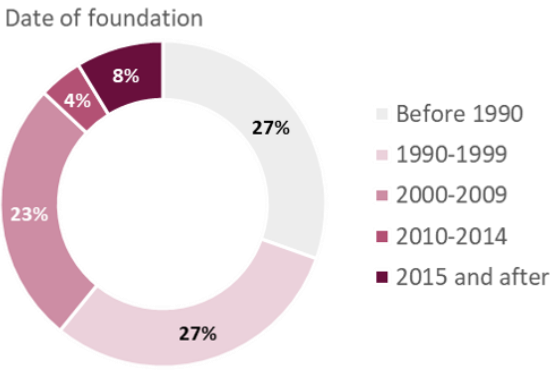
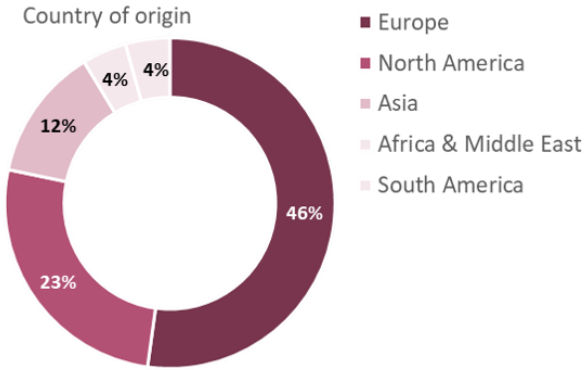
From May to October 2018, the 25 IT providers were surveyed. IT providers have already engaged significant teams to work on NDC solutions, all declaring NDC as a priority topic for their organization. All companies that participated in this study have either obtained a NDC certification or are in the process of acquiring one.



*Surveyed IT suppliers*

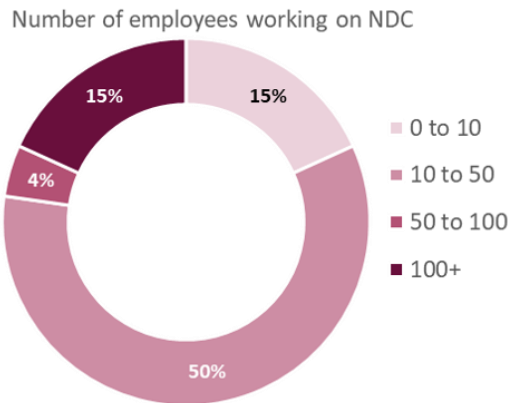
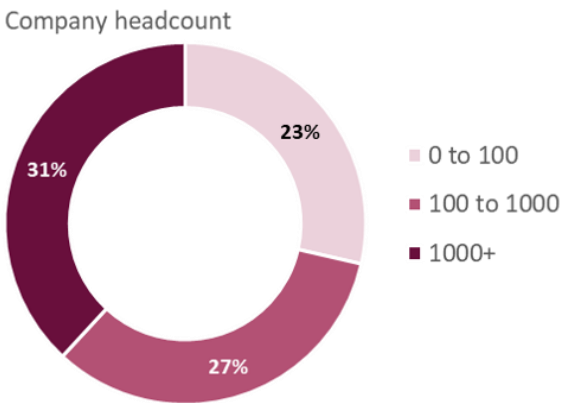
**Contacted IT suppliers are established all over the world**, with a predominance of European, American and Asian companies. The survey scope demonstrates a worldwide engagement for NDC.

**The median age of the companies surveyed is 20 years old.** However, among the 25 IT providers one can find well-established market pioneers alongside promising start-ups.



The diversity of IT suppliers is also shown in the balanced mix of company sizes.

Regardless of company size, most of the IT providers surveyed have engaged significant teams in their NDC programs



### What is new?

- 5 new participants** including the GDS Sabre, newly certified Level 3 NDC Aggregator.
- All new participants were created before 2000** but received their original NDC certification in late 2017 or early 2018.
- All newly certified providers consider NDC as a top priority for their organization**, and 2 out of 5 dedicate almost all their staff to the development of their NDC solutions.

# Strategic understanding of NDC by IT providers

The study aims to understand how the market of IT providers perceives fundamental elements crucial to the success of NDC, the value-added features of NDC and the developments to prioritize in the roadmap. These aspects are key in analyzing the choices made by each IT provider in terms of detailed offering, functional features and time scale.

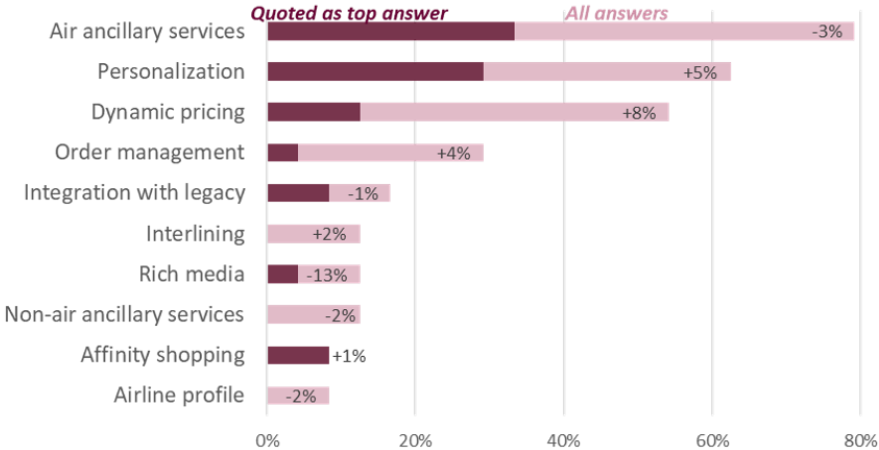
- **Surveyed providers are developing solutions according to new offer capabilities that are essential in bringing value to airlines**

Since last year’s study, the 3 top-priority items for airlines have not changed. When asked which NDC modules and features bring the most value to airlines, 90% of the suppliers surveyed again put offer capability first.

IT providers prioritizing offer capability is consistent with their initial focus on offer management, as shown later in the study. When asked to evaluate the modules that bring the most value to airlines, surveyed providers overlook rich media. Compared to last year, 13% less actors have quoted rich media in the survey. This decline benefits to personalization and dynamic pricing, both modules occupying the second and third places behind air ancillary services. Indeed, personalization and dynamic pricing are key in helping airlines attract customers with tailor-made offers. Finally, interlining is still not considered as a feature bringing value even though some actors are convinced that it could have the potential to.

**The 2018 study underlines that providers increasingly include Order Management in their offer, while there is currently no demand for airline profile.**

*In your opinion, what are the modules and features that bring the most value to airlines?  
(percentages represent the delta compared to last year)*



### A few quotes

“Knowing what to do depending on who asks is for me the most important feature that an airline can put in place nowadays”

“Lots of OTAs don't offer ancillary services and NDC can help a lot”

“In principle it is all around personalization/identification of customer and product/offer differentiation on basis of dynamic, tailor-made offering and pricing”

- **Per IT providers surveyed, airlines are looking for guidelines on how to transition**

IT providers were asked for the most important pain points they encounter when talking about NDC with airlines. Three major points stand out.

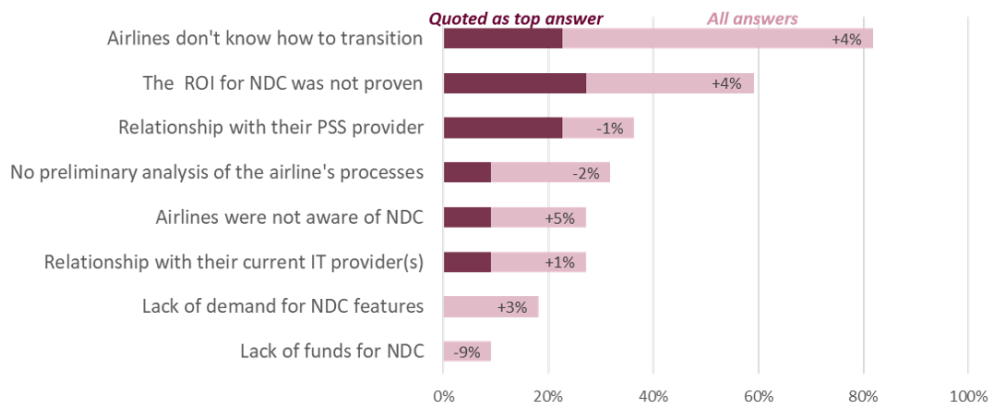
First, IT providers think that airlines don't have a clear view on how to transition and where to transition to as well as how to implement the standard without disrupting their current APIs.

Moreover, per IT providers, airlines seem to lack a full understanding of the real benefits of NDC. IT providers do not think airlines have a clear idea on how NDC can be a real differentiator and what benefits it can bring to distribution. IT providers would like to see more use cases to demonstrate the tangible advantages of NDC.

Third, IT providers noted the airlines' relationships with PSS providers. While the airlines possible resulting dependency on legacy systems may be perceived as incompatibility with the NDC standard, many PSS providers are investing to provide airlines with NDC compatible APIs.

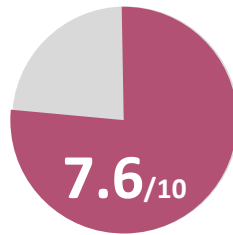
Finally, IT providers do not consider that airlines do not engage the appropriate funds into NDC developments as only around 10% mentioned it as a pain point during the survey.

***What were the most important pain points for airlines when talking with them?***





- **NDC IT Providers Global Satisfaction Index**



Average rating when IT providers were asked to rate how satisfied they are with the NDC Standard

The study shows a high and growing level of satisfaction across suppliers as it gained 0.3 points since last year. Providers were also asked for positive points and areas to improve regarding the NDC initiative, based on their experience with airlines and sellers implementation. Below are the most frequent points quoted by the providers.

#### IT providers' main positive points regarding the NDC initiative

- **Differentiation** – “The realization of NDC is paving the way for true dynamic retail, where airlines fully control creation of the offer that is delivered through an NDC pipe.”
- **Disintermediation** – “NDC opens up a host of features to work directly with the airlines which was never possible before.”
- **Cost efficiency** – “Standard structure of the NDC webservices reduced the cost of maintenance and development.”
- **Agility** – “NDC enables real-time business intelligence and omni-channel retailing strategies. The integration of BI in real time pricing and bundling systems guarantee a consistent user experience and enhanced CRM capabilities.”
- **Innovation** – “NDC API can be built in a way that it easily supports all modern selling platforms, e.g. voice.”
- **Velocity** – “Fast ramp-up phase when starting the first analysis due to the usage of XML and a good documented XML-Schema”
- **Accessibility** – “Common naming and handling of business transactions lead to easier understanding when discussing implementation details and therefore an easier adoption”
- **Durability** – “In a globally connected industry, having a robust standard used consistently is essential, and NDC is achieving this.”

#### IT providers' main areas to improve regarding the NDC initiative

- **Better standardization and scope expansion** – “Define best practices to achieve a standardized handling of the NDC messages”, “To include non-air content like Hotel the standard has to be expanded”, “Align air and non-air standards as airline become retailers for all products”
- **Support and change management** – “NDC Implementation Guide is very easy to understand, but need much more detailing”, “Change management could be better handled (e.g. changing names of schema elements) - moving forward this type of change will make a lot of unnecessary work for NDC Developers on all sides.”
- **Move on from legacy** – “NDC is still influenced by legacy. Eg: Mandatory ATPCO Fare Rules Category, No support for 2 digit booking classes etc.”, “More emphasis on solutions, setups, implementations that follow the vision of NDC, i.e. no ATPCO, no RBDs, product engineering approach, retailing analogy, fully integrated NDC/ONE Order etc.”

- **IT suppliers focus on personalization and merchandizing for the next two to three years**

The roadmap objectives ranking changed again this year as loyalty and RMS integration lost respectively 4 and 3 ranks. This can be explained by the fact that more and more actors have already implemented those features (see detailed analysis further in the report). This is also consistent with the fact that, as presented above, personalization and dynamic pricing (respectively linked to loyalty and RMS) are quoted as features bringing the most value to airlines.

Top priorities in actors' roadmaps include supporting more merchandizing, expand order management functions, and increase connectivity.

**Improving offer creation is still an ongoing effort.** This year again, the study shows the rise of personalization and offer enrichment with merchandizing capabilities considered as a top priority for the coming years. With loyalty and RMS integration, suppliers appear to share a real enthusiasm for these features, as they allow airlines to offer travelers a more tailored experience.

**Many actors also 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.

As actors are becoming more and more mature with their NDC solutions, they shift towards increasing the scope of their customers, therefore working on **improving connectivity** with sellers and aggregators.

Finally, suppliers still consider ONE Order as an important topic for the future of NDC.

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

	Rank 2018	Rank 2017	Rank 2016
Support more merchandizing capabilities (ancillaries, etc.)	1 ▲ (+1)	2	5
Expand order management functions (payment, ticketing, after sales, etc.)	2 ▲ (+3)	5	4
Connectivity (with sellers or aggregators)	3 ▲ (+4)	7	8
One Order	4 ▢ (0)	4	3
Integrate Loyalty (linked to personalization)	5 ▼ (-4)	1	6
Integrate RMS (linked to dynamic pricing)	6 ▼ (-3)	3	1
Migrate to later versions of the NDC standard	7 ▲ (+3)	10	9
Implement Interline	8 ▼ (-2)	6	7
Expand scope of offer (hotels, etc.)	9 ▼ (-1)	8	2
Untie from PSS	10 ▲ (+1)	11	10
Blockchain technology	11 ▲ (+2)	13	-
Artificial Intelligence	12 ▼ (-3)	9	-
Chatbots	13 ▼ (-1)	12	-

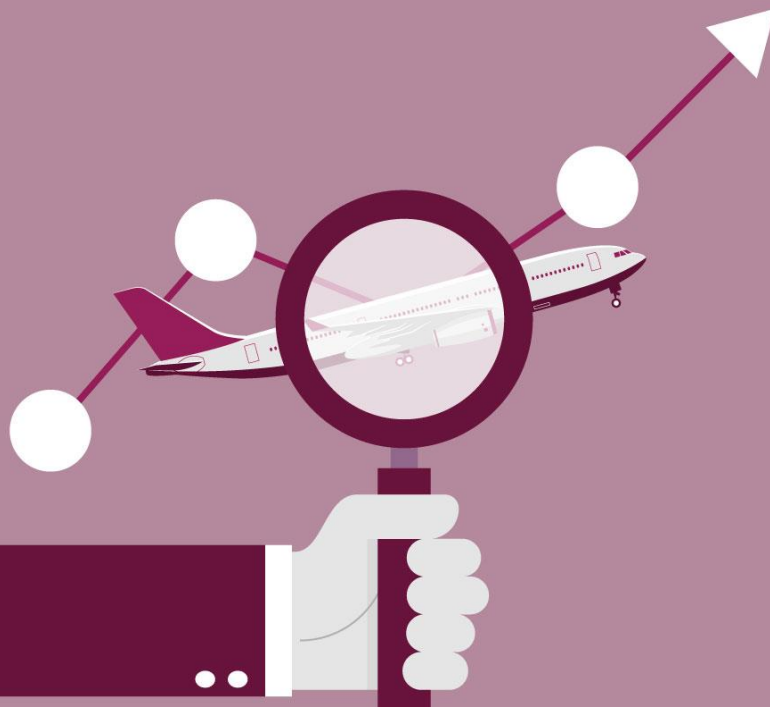


**A few quotes**

“Order Management remains one our primary product investment areas.”

“We support ONE Order natively and can enhance messaging once requested by an airline customer. However, not many are mentally ready...”

“[Support more merchandizing capabilities (ancillaries, etc.)] help airlines to value NDC / ROI.”



## 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. Airlines want 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. The discussion between the airline and IT providers can be along specific functionalities and processes (such as offer construction or order management) as well as advanced functionalities (such as personalization or dynamic pricing). This study assessed the full capabilities and offerings of IT providers including those further downstream, in particular the new aggregation solutions which are being put in place.

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

## IT providers have different value propositions

The scope of the survey allowed the benchmarking of a significant number of solutions. Taking into account the specifics of each solution, major trends are identified 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, there are 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 the PSS</b>, which consist of a NDC platform sitting on top of a PSS. The study showed widely varying numbers of NDC modules included in this layer and levels of reliance towards PSSs. Common characteristics are highlighted in detail below.</li> <li>• <b>Other solutions</b> such as layers sitting on top of the 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 benchmarked as part of this study mainly vary in the following areas:</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 variety of airlines and sellers currently connected.</li> </ul>
76% have IT provider activities	48% offer aggregation platforms
28% of the surveyed providers offer both	

### Highlight of Airline IT solutions and Aggregation solutions

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

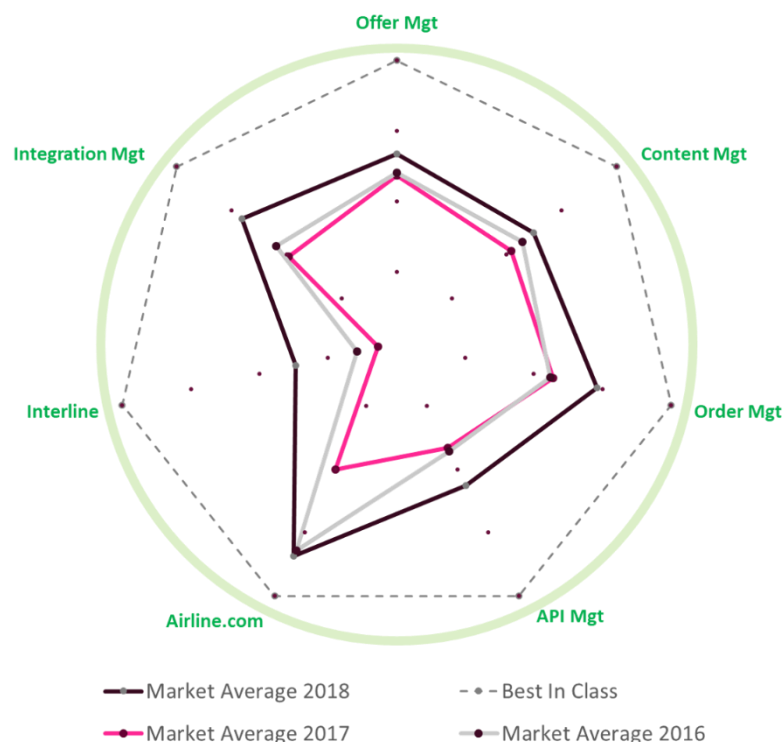
Overview	<p style="text-align: center;"><b>Companies in scope</b></p> <ul style="list-style-type: none"> <li>• 25 companies of various size</li> <li>• worldwide presence</li> </ul>	<p style="text-align: center;"><i>Global coverage score</i></p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr><td style="background-color: #D3D3D3;">low</td></tr> <tr><td style="background-color: #A9A9A9;">medium</td></tr> <tr><td style="background-color: #696969;">high</td></tr> </table>	low	medium	high												
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Detailed analysis	<b>IT Providers</b>	<b>Aggregators</b>															
	<table border="1" style="width: 100%;"> <tr> <td style="background-color: #696969; color: white;">Offer Management</td> <td style="background-color: #696969; color: white;">Content Management</td> <td style="background-color: #696969; color: white;">Order Management</td> </tr> <tr> <td style="background-color: #696969; color: white;">API Management</td> <td style="background-color: #696969; color: white;">Airline.com</td> <td style="background-color: #696969; color: white;">Interline</td> </tr> <tr> <td style="background-color: #696969; color: white;">Integration Management</td> <td></td> <td></td> </tr> </table>	Offer Management	Content Management	Order Management	API Management	Airline.com	Interline	Integration Management			<table border="1" style="width: 100%;"> <tr> <td style="background-color: #696969; color: white;">Offer and Order messages</td> <td style="background-color: #696969; color: white;">Rich media</td> <td style="background-color: #696969; color: white;">Airline Profile</td> </tr> <tr> <td style="background-color: #D3D3D3;">Traffic Volume</td> <td style="background-color: #696969; color: white;">Tools for sellers</td> <td></td> </tr> </table>	Offer and Order messages	Rich media	Airline Profile	Traffic Volume	Tools for sellers	
	Offer Management	Content Management	Order Management														
API Management	Airline.com	Interline															
Integration Management																	
Offer and Order messages	Rich media	Airline Profile															
Traffic Volume	Tools for sellers																
<p style="text-align: center;"><b>Workflows</b></p> <ul style="list-style-type: none"> <li>• 61% average implementation rate of BRD use cases (excluding interline cases which are 31% covered)</li> <li>• 66% for IT providers, and 55% for aggregators</li> </ul>																	

## Detailed solution analysis – IT Providers

Focusing on IT solutions for airlines, the study identified seven key axes along which all solutions were benchmarked. 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?

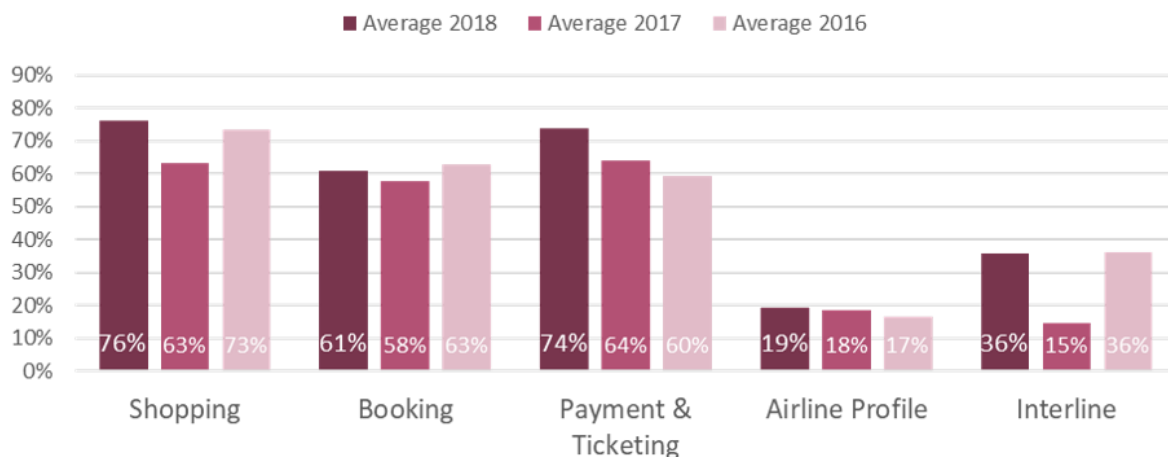
For each axis, a number of major functional areas were identified. For each area, the performance of each solution was checked. This allowed an absolute functional score for each solution to be determined. This benchmark can be seen in the chart below, which displays the average score of the airline IT solutions 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*

As shown in the above chart, after a slight recoil in 2017, the use cases coverage observed in 2018 has caught up with 2016's score in all functional axes and even surpassed it in six of them. Both recurring and new providers play a part in this improvement:

- Providers from last year study, who were mainly focused on improving their existing features, have seemingly increased their messages coverage this year. That rise concerns all domain, airline profile and interline aside.
- Newly certified providers appears to cover an already large amount of messages, even more than recurring providers in some domain.



Average coverage of BRD use cases by IT Providers, by domain

Offer Management

**Well-advanced solutions for each key feature of offer management were found**

**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.
- Among solutions consisting of a NDC platform in addition to a PSS, most solutions were found to still heavily rely on the PSS and add a layer of business logic. Some solutions are able to manage inventory themselves while others operate independently from RBDs (Reservation Booking Designators).
- An increasing number of actors, especially with new providers, offer the capability to build offers independently from existing airline systems (dynamic construction) by relying on proper rule engines, which can be independent from RBDs.

**Air ancillaries are widely supported:**

- All providers covering the offer management module support air ancillaries.
- Seats, meals, bags and Wi-Fi are the most widely supported air ancillaries. Priority boarding, special baggage and change fees are well supported by the suppliers surveyed; some also cover specific needs such as entertainment, and pets on-board.
- Air ancillaries are generally managed via the existing systems (PSS) and are therefore made available for bookings via NDC. Some suppliers also provide specific inventories for air and non-air ancillaries. They use NDC to construct a global enriched offer for airlines.
- The suppliers able to achieve bundling of services can associate ancillaries to a given flight.

**Most providers support non-air ancillaries through external inventories:**

- Non-air ancillaries regroup services that go beyond inflight services, such as: lounge access, travel insurance, wheelchairs, car rental, airport transfer, hotel, duty free, airport parking, and events.
- These ancillaries are not supported equally by all the suppliers surveyed. After lounge access, the most common non-air ancillaries supported are insurance, hotel and airport transfer.
- PSS-native solutions are unable to manage most non-air ancillaries – with the exception of lounge access. Platforms on top of a PSS were found to generally manage non-air ancillaries via access to third party inventory sources and integration of external data in the platform.

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

- Personalization is a key lever of NDC. “Offer request” messages coming from the seller have the option to contain detail on the end-customer (e.g. loyalty number versus anonymous shopping). Depending on what is known about the customer (potentially including frequent traveler detail), the airline would be able to personalize the offer in response. For instance, a discount could be offered or a specific ancillary could be included in the offer.
- Several airline IT providers are already offering some sort of personalization capability. Most of the surveyed providers support loyalty card numbers, and some of them (mostly PSS-native solutions) enable redemption shopping.
- Some “on-top-of-PSS” platforms integrate a personalization engine using several tiers of data; the most common are the customer’s search pattern, loyalty profile and booking history.
- An enabler of personalization is the ability for the merchandizing system to create and manage bundles.

#### **More and more providers are capable of dynamic pricing:**

- Pricing is handled by a majority of IT providers surveyed, even though the level of sophistication differed from one supplier to another. Less actors are still relying on the traditional filed fares and booking classes for pricing. 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 affinity shopping (i.e. shopping by descriptive criteria such as a destination with “sun,” rather than specific locations).
- Dynamic pricing is currently enabled by many suppliers. They are able to incorporate input from airlines by allowing them to enter fares directly into the merchandizing platform. This allows the airline to price any variable or attribute that is available from other IT systems.

#### **A growing number of providers experiment with Affinity Shopping to offer a new travel experience**

- Affinity shopping is a feature that enables shopping based not on a traditional approach of origin/destination and dates, but rather allowing customers to search flights using new personalized criteria. 37% of the surveyed IT providers enable affinity shopping. Common criterion across providers are the traveler’s budget and interests (i.e. events or destination type (beach, city, etc.)). The scope of search criteria differs according to the solution: the date range could be precise or flexible, the location could be made by a selection of airports or left free, etc.
- Providers interviewed, however, tend to agree on the usage of caching and pre-computation techniques to allow for affinity shopping.

## 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 customer, as it describes an offer with visual assets. It is strategic for an airline to leverage NDC capabilities in terms of content display and personalization. Most IT providers surveyed support at least one rich media format such as image or video (to a lesser extent). A majority also cover some personalization features such as support of multi-language.
- More than 63% of surveyed providers integrate rich media in their offer, versus 50% last year.
- The way content is stored and shared can have a significant impact on flexibility and performance. Two main ways to handle content have been identified. The first way is to let the airline index, store and make available the rich content. In this case, the IT provider does not store the content, and NDC messages will carry references (html links) which point to the airline content server. The second way is to manage content outside of the airline's server, instead rich media is uploaded to a distinct CMS (Content Management System). This also enables caching functions.
- Suppliers with advanced CMS that integrate cross-channel capabilities – direct and indirect - and allow multi-device (web and mobile) display.

## Providers have made good progress on Order management

### Order Management coverage is increasing each year

- During the 2018 study, 89% of surveyed providers cover at least Order Creation with their solution. In comparison, they were 76% in 2017 and 70% in 2016.
- Some providers that specialize in offer management are considering partnership with other solutions with a better positioning on order management, to cover NDC end-to-end. .

### 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. The study found the choices made regarding PSS-native or on-top-of-PSS NDC platform can particularly impact order creation capabilities. Most providers having built NDC layers rely on a 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. 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 growing majority support post-booking ancillaries:

- 79% 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 example: 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 are notable: 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.



- 78% of interviewed providers allow the modification of the order.

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

- Order cancellation covers the subsequent use cases related to cancellation and refund. Only a few suppliers have implemented automated cancellation and refund processes based on airline policies. In particular, the cases where an order results from a bundled offer containing non-air ancillaries were studied. Already a small number of providers are 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 an order are designed in such a way that the record of orders are located in the NDC layer. An order moreover implies that the order 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**

- All IT providers benchmarked during the study are able to manage NDC APIs for their client airlines. While most only manage direct connection for now, 79% have already started connecting with aggregators.
- Airline profile has been designed to enable an airline to control the volume of requests it receives via its APIs. Its support largely increased compared to last year as 37% of IT providers now include it in their solution, versus 15% in 2017. It is however not seen as a priority for most of the suppliers, as only two actors placed it in their top 3 when asked what modules would bring the most value to airlines.

Airline.com

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

- 89% (resp. 79%) of the IT providers benchmarked also offer solutions for B2C (resp. B2B) direct channels, on web or mobile.

Interline

#### **Interlining is planned to be integrated by more solutions**

- 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 to ensure part of the service. In such cases the Offer Responsible Airline (ORA), 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.
- Insight from last year's study regarding interline was that it was planned in the roadmap of many providers. This year analysis confirms it with interline-related BRD use cases coverage of actors

interviewed both in 2017 and 2018 increased from 19% to 34%. Newly certified IT providers are slightly behind with an average coverage of 28%.

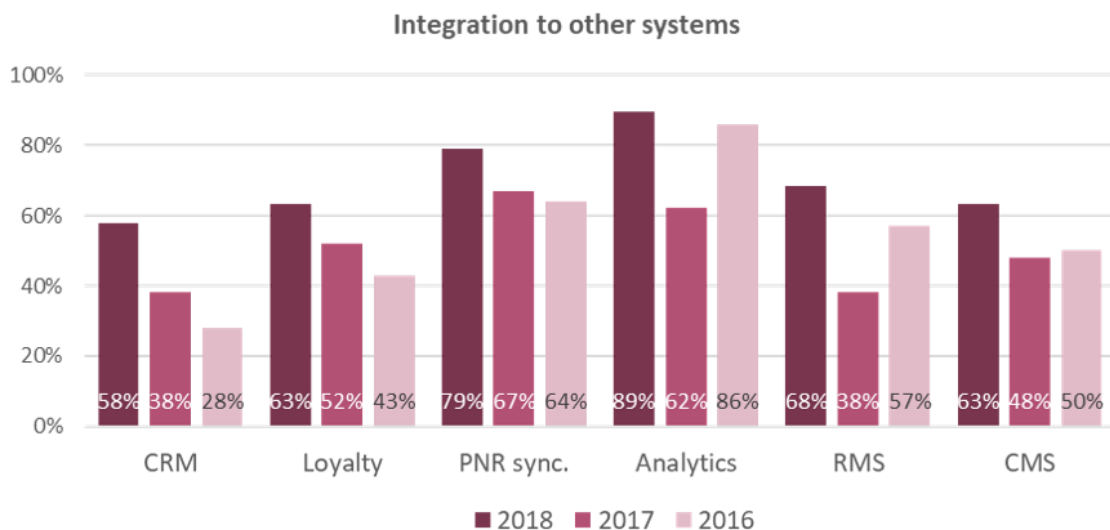
Integration Management

**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.

Providers support for integration was studied along six major axes:

- **58% enable CRM** (Customer Relationship Management) integration, i.e. where the 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.
- **63% enable Loyalty integration**. For instance, the airline loyalty database can be queried to generate personalized offers or trigger specific rules for order management.
- **79% enable PNR synchronization**. This is mostly related to choices made in terms of order repository.
- **89% 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.
- **68% enable RMS integration**. Integration to airline Revenue Management Systems could potentially significantly expand RM possibilities.
- **63% enable CMS integration**. A majority of suppliers already offer proprietary CMS or can connect to airline CMS.



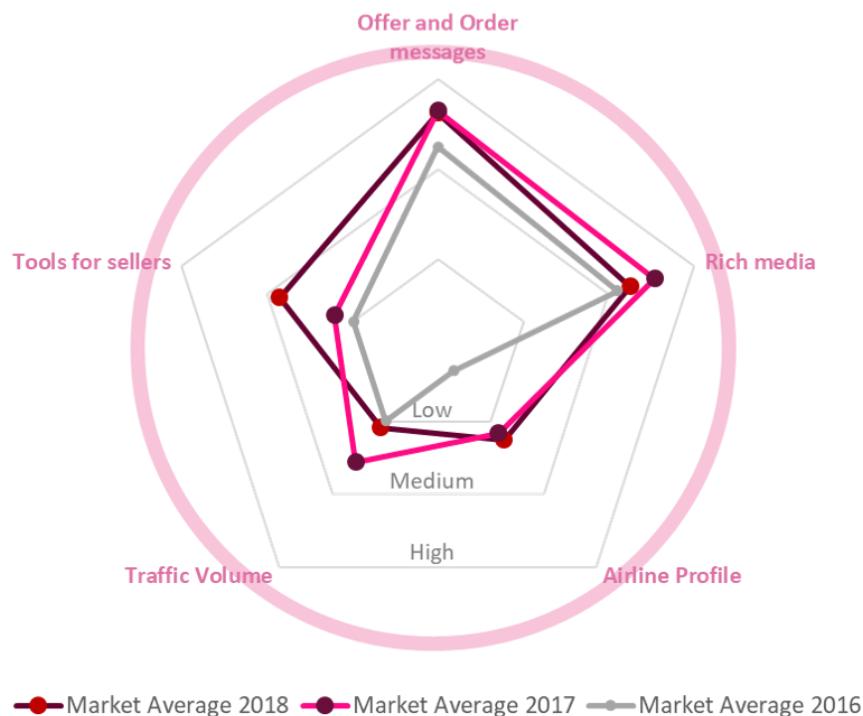
Since 2016, CRM, loyalty and PNR integrations follow a steady increase. Regarding analytics and RMS, after a significant decrease last year, integration has largely progressed, exceeding 2016's results. This increase also concerns CMS integration which gained 15% compared to last year's results.

## Detailed solution analysis – Aggregators

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. The study observed three types of aggregation solutions: big players and GDSs expanding to NDC, new players wanting to develop a new travel experience based on NDC aggregation, and airlines IT providers who see the opportunity to provide tools and services to ease the distribution process (message translation for instance).

Globally, a tendency observed across recent companies is that most of them address a specific market, determined by a geographical zone (Asia vs Europe vs America ...) and/or a specific target type (pure B2C vs pure OTA vs pure TMC...).

Key topics which differentiate the various aggregation solutions can be seen in the chart below, which displays the average score of the aggregation solutions studied:

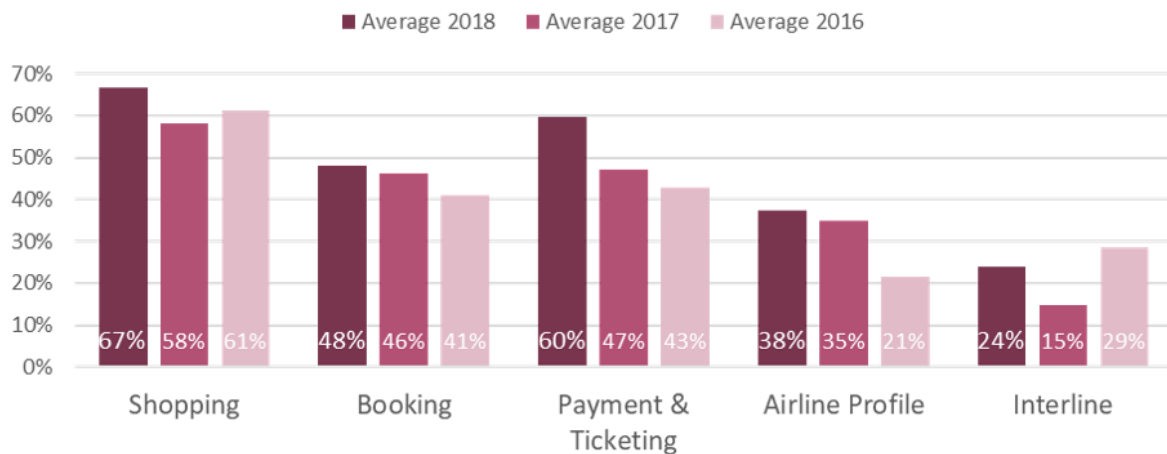


*Market average performances of aggregation solutions along five functional axes*

After a fast progression on each field across aggregators between 2016 and 2017, results from this year's analysis have declined, except for offer and order messages, airline profile, and tools for sellers. However, the analysis shows that aggregators interviewed both in 2017 and 2018 have progressed in some domains: for instance, airline profile coverage increased from 13% to 33% while the average score regarding tools for sellers went from 45% to 60%.

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

- Many providers currently offer aggregation and normalization of mixed NDC and non-NDC messages (proprietary XML, Edifact, teletype) for their customers. The aggregators surveyed are being certified for an increasing number of offer and order messages. Due to the nature of aggregation, managing the various versions of NDC schemas is critical to the relevance and performance of an aggregator. Some aggregators had already set up time limit management in order to ensure reasonable response time to sellers.



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

- Last year, compared to 2016, the coverage of BRD use cases across aggregators had decreased in the shopping and interline domains and increased in others. The analysis of this year's results shows a great progress in all domains with the best scores in three years in all domains, interline aside. For instance, payment & ticketing coverage increased by 13% since last year.
- Globally, coverage of interline and airline profile stays low, both domains being not prioritized by actors, while shopping and payment and ticketing coverage is more widespread.
- When focusing on aggregators interviewed in both 2017 and 2018 studies, mature actors appear to tackle the airline profile and interline use cases with respectively 8% and 16% coverage increase since 2017. Shopping and booking coverage, on the other hand, have remained relatively constant.
- Most of the aggregators surveyed can offer to airlines a quick implementation (around a month). However aggregators suggested they are waiting for a finer standardization of the NDC messages and more sharing of best practices across implementers, to ensure airlines use the same message to handle the same process.

## 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 customer. For aggregators already managing rich content, one of the two following implementations was adopted:
  - 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 (CMS) 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 studied also allowed for the retrieval of content through third party entities.
- Aggregators note that rich content is far from being used at its full potential by most of the airlines, as airlines tend to prioritize their investments on other features. From an aggregator's point of view, rich content and personalization still need to become widespread before being able to provide real disrupting features. Some suppliers indicate that aggregators and distributors need to create the value, and define a market standard for the use of rich media and personalization, by creating enriched customer paths with pilot airlines, which will generate a "positive competition" across airlines to provide these contents.

## IT providers are bypassing the low volume of Airline Profile messages with home-made algorithm filter

- 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.
- While some aggregators declare having the implementation of Airline Profile in their roadmap, many of the providers participating in the study have tried to implement it with their solution. However, most of the times, Airline Profile is not in production. Some actors report that, Airline Profile is not actually used by airlines at this point. As a result, most of them have put in place their own algorithms to filter the airlines route proposals, according to several criteria: price, number of flight legs, flying time, etc.

## 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. In comparing current certified aggregation solutions, four significant metrics were focused on:
  - The number of NDC messages certified by the aggregator: 12 on average
  - The number of airlines already connected to the aggregator via APIs: 5.75 on average
  - The number of sellers already connected to the aggregator: 3.1 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. This year, 41% of the aggregators are supporting the 17.1 or higher and a quarter handles 16.x.
- There are two opposite positions for end distribution that can give clarity to some sellers connectivity:
  - Some aggregators distribute NDC messages to sellers.
  - Some aggregators are the sellers. They are mostly pure-web players and do not distribute their content through a third-party seller.

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

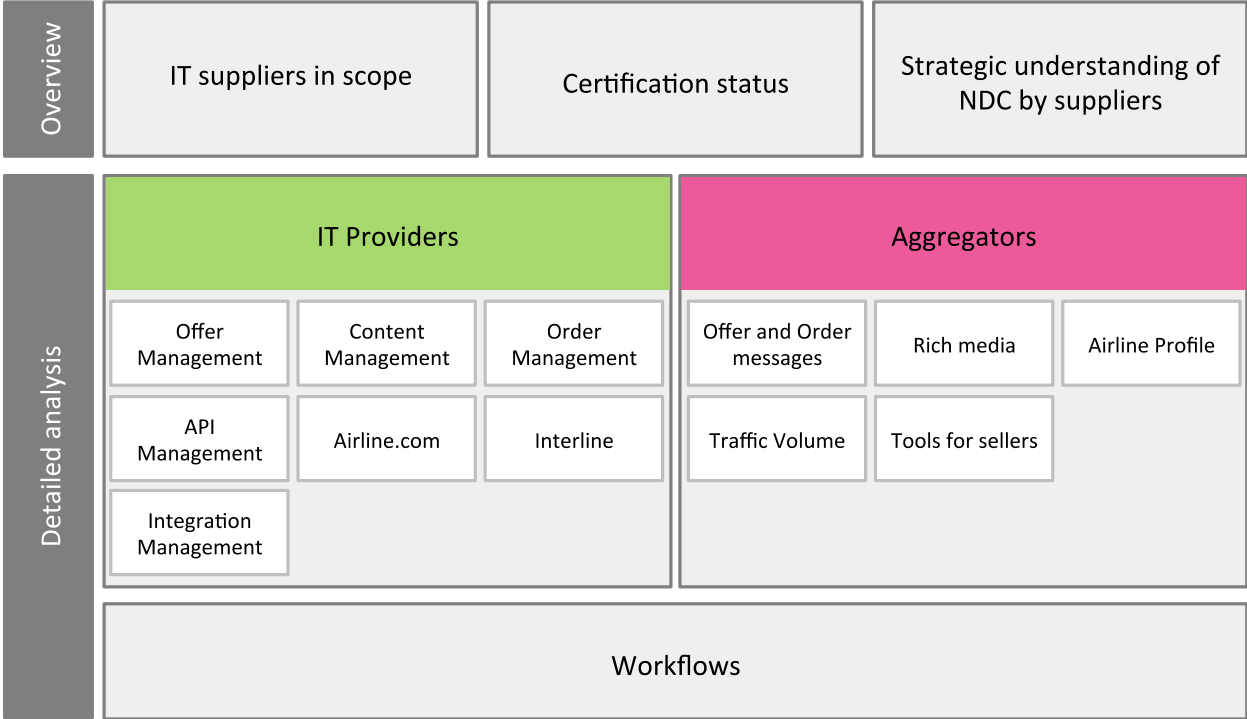
- Major players and solutions providers have identified that the success of NDC depends on three elements: the NDC content quality, the way NDC messages are being exchanged, and the way distribution end points (direct distribution channels and sellers like OTAs) use them. Most of the suppliers agree that they have a role in demonstrating the benefits NDC brings to distribution. Providing tools to integrate NDC at the end distribution level is a way to establish an approach about how the NDC will bring value to airlines (example: provide a UI – user interface).
- Most solutions for sellers 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 used during the study and introduces the analysis framework from which the present white paper is structured.

## Analysis Framework

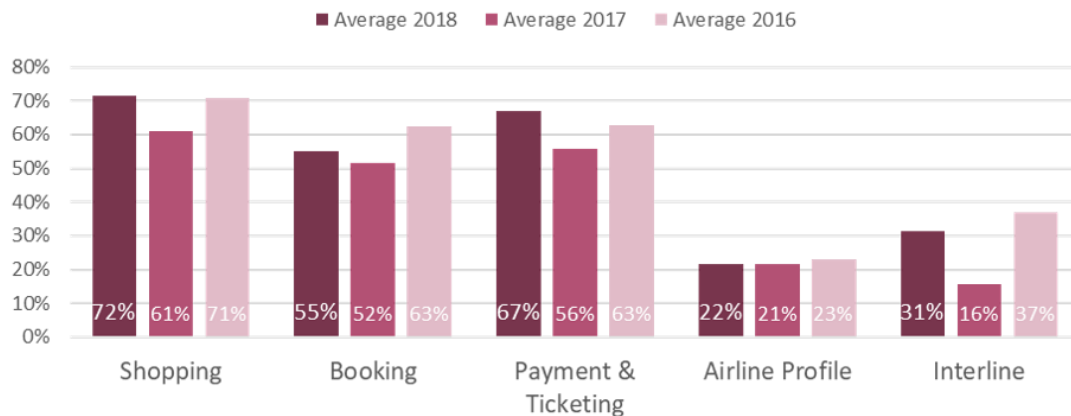
The present document is structured according to the analysis framework built for the survey. It first gives an overview of the IT companies in scope and details their strategic vision of NDC. The detailed functional analysis of all benchmarked solutions then follows, with a distinction between IT solutions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



Analysis framework chart

## Appendix 2: Workflows

In order to assess how engaged the market already is on NDC, the list of BRD use cases covered by each solution was considered. 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 the core to the NDC vision, use cases regarding offer and order management (shopping, booking, payment and ticketing) are implemented far more than airline profile and interline.



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

The following table lists all BRD use cases as of October 2018 and details the average coverage of each use case by the airline IT solutions providers in scope.

<b>Shopping</b>	<b>72%</b>
0: Generic use cases	91%
Shopping Use Case: Direct	96%
Shopping Use Case: Through an Aggregator	87%
Shopping Use Case: Direct AND through Aggregator	87%
1: Shopping via TMC	70%
2: OTA with aggregated and direct connect using shopping basket	70%
3: corporate booking tool	70%
4: meta search engine shopping with Attribute Shopping	61%
5: Leisure travel agency with anonymous affinity shopping	61%
6: Tour operator building dynamic package	52%
7: Through Fare Journeys on interline Marketing carriers	43%
<b>Booking</b>	<b>55%</b>
1: Common create order use case	83%
2: Group booking	35%
3: Booking via TMC	61%
4: Leisure travel agency with anonymous affinity shopping	48%
5: Non flight order (lounge pass, booklet 10 flights)	43%
6: Dynamic bundle	57%
7: change itinerary (re-shop) on an existing order	74%
8: UC with change upgrade	57%
9: Common booking use case – Name change	57%
10: UC with change from anonymous offer to a personalized offer	52%
11: Conditional change due to a qualifying passenger	39%
12: Waitlist	26%
13: Involuntary changes	43%
14: Common booking	74%
15: Metasearch booking	65%
16: Create flight order with instant purchase	70%



<b>Payment &amp; Ticketing</b>	<b>67%</b>
1: Single Airline, Single Passenger, Single Form of Payment	87%
2: Codeshare : airline marketed, OA operated multi PAX, Infant-no seat, FOP gift card/miles, bundled fare with ancillary	61%
3: EMD-5 Issuance – single airline, ancillary only, companions, multiple form of payment	65%
4: refund request	65%
5: change request	78%
6: Void ET/EMD request	52%
7: System cancel request	61%
<b>Airline Profile</b>	<b>22%</b>
1: Airline Profile Receiver receiving new or updated Airline Profile – Push model	17%
2: Airline Profile Receiver Makes RQ – Pull model	26%
<b>Interline</b>	<b>31%</b>
0: Shopping and Order Create – Different marketing carriers – no codeshare	48%
1: Shopping and Order Create – Different marketing carrier – a la carte from POA - no codeshare	39%
2: Shopping and Order Create – Codeshare - Marketing carrier is POA	48%
3: Shopping and Order Create – Cascade to Operating – ORA/POA/Sub-POA	30%
4: Shopping and Order Create – Codeshare partner with AT	35%
5: Shopping – Affinity	30%
6: Shopping - Date Range	48%
7: Shopping and Order Create - Inventory Guarantee Expiration	22%
8: Shopping – Between ORA and POA for air and ancillary services	43%
9: Shopping and Order Create – Frequent Flyer Redemption	26%
10: Order – Voluntary Cancel	48%
11: Order – List View	39%
12: Order – Specific Order View	48%
13: Order - History View	22%
14: Order - Rules Display	43%
15: Shopping and Order Create – ORA marketing carrier to POA operating carrier	52%
16: Shopping and Order Change (add flight)	30%
17: Shopping – Partial match response from POA to ORA	13%
18: Shopping - Customer has higher tier level on POA	13%
0: Interline Flight with Baggage (Resolution 302)	35%
1: Interline Flight with Baggage (DOT/CTA)	26%
2: Interline Flight with Baggage – Waive Resolution 302	26%
3: Interline Flight Shopping with Pre-Order Baggage Allowance Query	26%
4: Post Order Create Baggage Charges	30%
5: Shopping – Resolution 302 with deferral and cascading	22%
6: Interline Flight with Baggage and Stopovers (Resolution 302)	26%
7: Shopping – DOT/CTA Regulations with MSC Deferral	22%
8: Interline flight with baggage. POA agrees that ORA can be baggage determining carrier (302 governed itinerary)	22%
9: Baggage List Request	39%
10: Shopping - Inventory Controlled Bag Type	35%
11: Shopping - Embargo – No Excess Baggage	35%
0: Legacy Interline PNR booked, NDC Interline ancillary shopping	30%
1: Interline NDC order created, NDC Interline ancillary shopping	39%
2: Request a list of services and shop from the list. No pre-existing booking or order	30%
3: Shopping response for inventory controlled ancillaries where the inventory is guaranteed for a specified period of time	26%
4: Shopping for ancillaries on multiple POAs	30%
5: Shopping response for inventory controlled ancillaries where the inventory is not guaranteed	26%
6: Initial POA becomes ORA by cascading to another airline.	17%
7: Non-flight related ancillary shopping where ORA and POA have AT	17%
0: Customer changes all travel dates on all flights - all travel unflown	30%
1: Interline Schedule Change on POA invalidates MCT	22%

## Appendix 3: Presentation of the questionnaire

### Section I - Company profile

N°	Question
<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 (number and list)
<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
<b>1</b>	<b>Overview of the NDC solution(s)</b>
<b>1.0</b>	<b>Overview</b>
	How many distinct NDC solutions are your 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 NDC modules covered by your solution, which ones haven't yet been 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 you NDC solution?

### Section III - Roadmap

<b>N°</b>	<b>Question</b>
<b>1</b>	<b>Your roadmap of NDC developments</b>
<b>1.1</b>	<b>Intended internal implication on NDC matters</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 organization?
	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 to you plan to connect with your interlining module?

## Section IV – IT Architecture

N°	Question
<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?
	Is 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?
	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 traveler 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?
<b>4.2</b>	<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)? Is PNR synchronization 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 currently supported payment forms? (credit card, debit card, pre-paid?)
	Do you have other payment forms in future development?
	How is the accreditation status of a seller or an intermediary checked? How are suspicious transactions prevented?
	How are refund rules managed?
	Is your solution PCI-DSS compliant?
	<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>NDC Aggregation - to be completed only if you provide aggregation solutions based on NDC</b>
<b>5.1</b>	<b>Overview of your aggregation solution</b>
	Do you provide aggregation functions? (NDC only, NDC + other kinds of formats)
	Do you support Airline Profile-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...)
<b>5.2</b>	<b>Order functionalities enabled by your solution</b>
	Does your solution propose post-booking ancillary's features based on NDC?

<b>5.3</b>	<b>Integration</b>
	How many airlines have you already connected to your NDC aggregation solution via APIs?
	How many sellers (distributors such as OTAs or MSE) have your already connected to your NDC aggregation solution?
	On average, how long does it take to integrate a new airline API?
<b>6</b>	<b>Tools for sellers - to be completed if you provide tools for sellers based on NDC messages</b>
<b>6.1</b>	<b>Overview of the NDC tools you provide to sellers</b>
	Do you provide direct connect in NDC and/or NDC connection via aggregators?
	Do you provide a solution based on NDC for Self-booking tools? [If so, please detail]
	Do you provide a solution based on NDC for Travel Management Companies (TMC)? [If so, please detail]
	Do you provide a solution based on NDC for Online Travel Agencies (OTA)? [If so, please detail]
	Do you provide a solution based on NDC for other types of Travel agencies? [If so, please detail]
	Do you provide a solution based on NDC for Meta-search engines (MSE)? [If so, please detail]
<b>6.2</b>	<b>Functional scope</b>
	What scope of NDC messages do(es) your tool(s) support?
	Which functions do you provide for distributors? (shopping, merchandising, rich content, ancillary services, others...)
<b>6.3</b>	<b>Integration</b>
	How many distributors use your NDC solution?
	How many airlines have you integrated in NDC to your solution(s)?
	How many aggregators have you integrated in NDC to your solution(s)?
<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>
	What modules addressing security are part of your solution?

## Section V – 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 Form 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 VI – Additional questions

N°	Question
<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>
	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 that bring the most value to airlines?</b> <i>[3 answers max, to rank from 1 (most valuable) to 3 (less valuable)]</i>
	<b>Answer proposition</b>
	Dynamic pricing
	Air ancillary services
	Non-air ancillary services

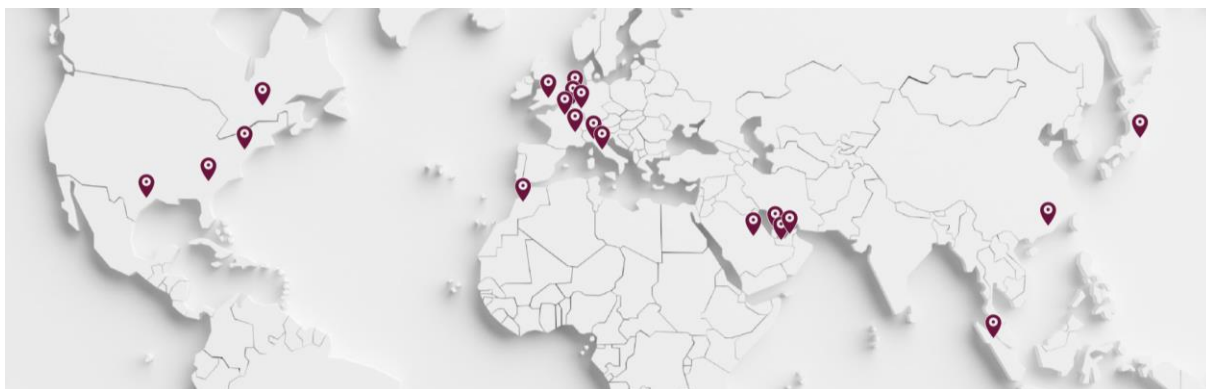
	Rich media
	Airline profile
	Personalization
	Affinity shopping
	Order management
	Interlining
	Integration with legacy
<b>1.3</b>	<b>Question 3. How do the following elements fit in your roadmap for the next 2 to 3 years?</b> <i>[rate each possible answer from 1 (most prioritized) to 10 (least prioritized)]</i>
	<b>Answer proposition</b>
	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
	Blockchain technology
	Artificial Intelligence
	Chatbots
<b>1.4</b>	<b>Question 4. Please provide us with 3 positive points from a standard/technology perspective regarding the NDC initiative.</b>
	<b>Positive point #1</b>
	<b>Positive point #2</b>
	<b>Positive point #3</b>
<b>1.5</b>	<b>Question 5. Please provide us with 3 areas to improve in the NDC initiative.</b>
	<b>Area to improve #1</b>
	<b>Area to improve #2</b>
	<b>Area to improve #3</b>
<b>1.6</b>	<b>Question 6. Please rate how satisfied you are with the NDC technical standard on a scale of 1 to 10 (Criteria being: development to date and current roadmap, e.g. 17.2 and 18.1 schemas).</b>
	<b>Rating:</b> <b>(from 1 = "not satisfied at all" to 10 = "completely satisfied")</b>
	<b>Feel free to add here any comments on your rating:</b>

## ABOUT SIA PARTNERS

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