NDC Adoption Unveiled

A Practical Guide for Online Travel and Corporate Agencies

Part 1

Mike King
Director, Strategic Relationships

DATAART

Mitch Gross
Head of Growth

CORNERSTONE INFORMATION SYSTEMS

Airline retailing is undergoing a transformation with the introduction of the New Distribution Capability (NDC). NDC is revolutionizing the way airlines distribute their services by enabling more personalized and differentiated offerings directly to travel agencies and, ultimately, the travelers they serve.

While NDC provides new possibilities and various opportunities for TMCs, OBTs and OTAs, it necessitates investment in technology and process adoption to ensure a seamless client experience. And there are many unanswered questions around servicing NDC transactions after the order is taken.

To equip our distribution and technology partners with practical, actionable information about NDC, the DataArt Travel R&D team and Cornerstone's travel experts analyzed NDC adoption processes and defined NDC's record structure and its implications on post-ticketing operations.

This is part one of a two-part series. It focuses on an overview of NDC, the definition of different distribution models and solution architecture for the NDC journey. Part two will focus on how the NDC record differs from the traditional EDIFACT PNR, and the operational capabilities of NDC through various channels.

NDC is moving fast, with almost daily changes and enhancements. And every operating environment is different, so the specifics will vary from operation to operation. This paper is a snapshot representing our assessment at this point in time, and is meant to provide a useful foundation for planning and execution. As a result, we cannot guarantee the absolute accuracy of the information. Users should think of this as a springboard to specific planning, which should include directly validating the information as it applies to each specific context.

We are pleased to share our insights and recommendations for your NDC journey in our NDC White Paper.

Please contact us to set up a discussion on planning your successful NDC roadmap.

Contents

1. The Objective of This White Paper

This white paper represents the collective understanding of DataArt and Cornerstone on the ever-evolving landscape of NDC. DataArt's Travel R&D team and Cornerstone are constantly observing the latest developments related to NDC and are working closely with our clients to develop and deploy effective NDC solutions.

This is the first of a two-part series. The key topics for this white paper include:

A: An overview of NDC and some of the challenges to adopt NDC for TMCs, OBTs and OTAs

B: An indicative technology framework for operating in a hybrid environment for processing and servicing both legacy EDIFACT bookings and new NDC bookings

C: Indicative scenarios of NDC adoption across different channels, including GDSs, aggregators, and direct airline connections

D: A high-level overview of the servicing impact of NDC for indirect distributors

E: Some recommendations to Start or Enhance NDC Adoption.

Part two will dive into the post-order servicing of NDC transactions.

2. About NDC

2.1. What is NDC?

New Distribution Capability (NDC) is an initiative launched by the International Air Transport Association (IATA) to develop a new XML-based data transmission standard for airline distribution and communication. By establishing a direct link between airlines and travel agencies as well as other distribution channels, NDC is designed to offer customers a more effective and customized travel experience.

NDC enables airlines to offer differentiated products and services across multiple channels, such as real-time seat upgrades and dynamic pricing.

NDC has been steadily adopted by a significant number of airlines, but this adoption has been slow due to various challenges, including technical complexities, the pandemic travel slow down and ever-changing travel industry priorities.

- As of today, more than 65 airlines are NDC-certified, representing more than half of IATA passenger volume. (Source: IATA)

- Based on BTN's TMC Reboot Survey, "Only about 31% of TMCs are fully prepared to support increased buyer demand and airline requirements for NDC content. Another 44% would be ready at some point in 2023. Still, one in four said it would take longer to be NDC-ready."

- Based on 2022 Phocuswright Research "Only 7% of travel agency employees are familiar with NDC and using it; 18% are familiar with NDC, but their agency doesn't have NDC content yet, and 76% are not familiar with NDC

Despite technical challenges, which will be discussed in detail later in the article, many airlines and travel agencies are investing in new technologies and processes to support its implementation. Some airlines have already launched their own NDC-enabled booking systems, while others are working with third-party vendors to integrate NDC into their existing systems.
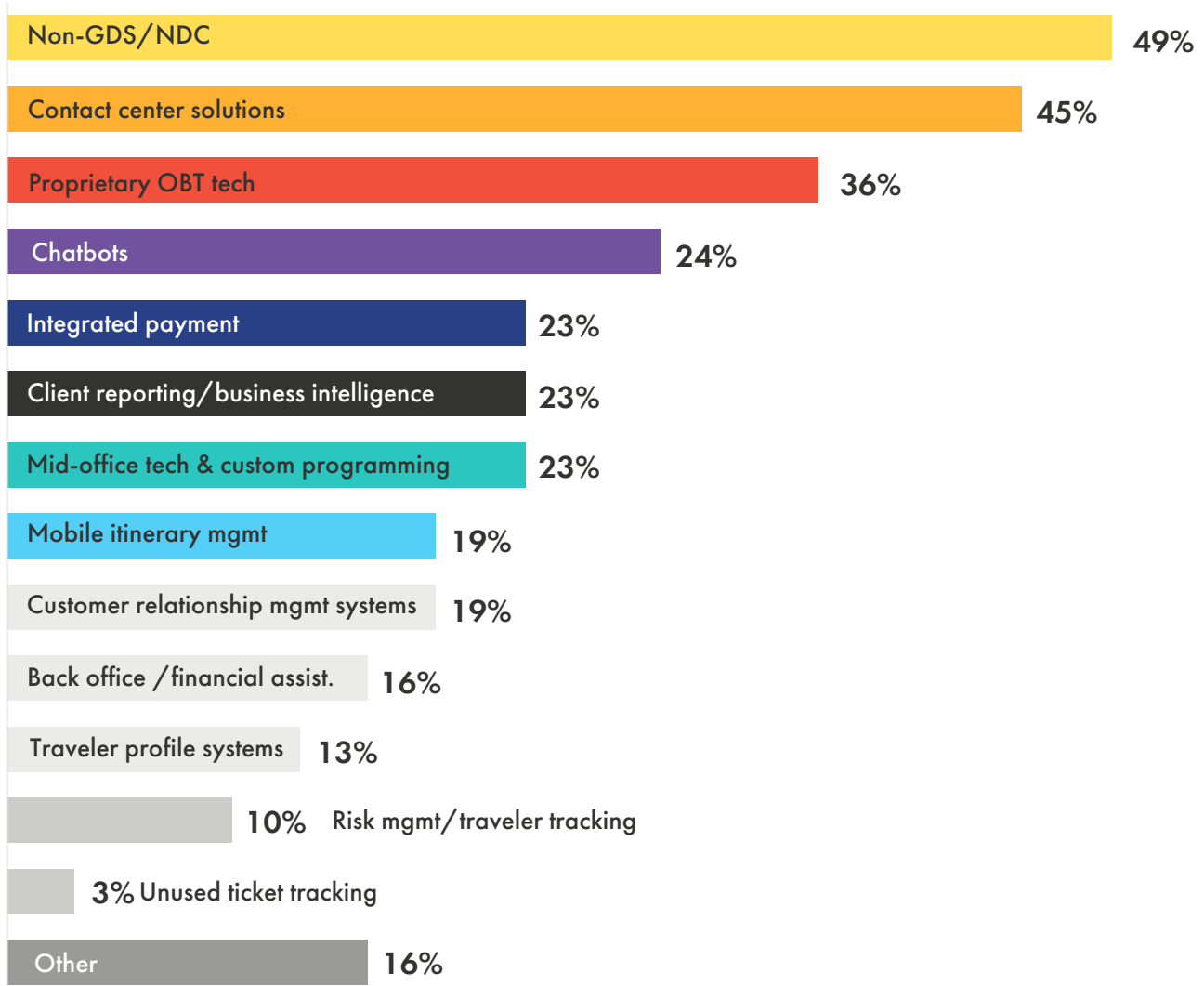
Global Distribution Systems (GDSs), including Amadeus, Sabre, and Travelport, are gradually accepting NDC and have begun building solutions and necessary infrastructures that support the new protocol and facilitate the adoption of NDC by their agency partners.

Even though NDC is being prioritized as the top TMC investment area in 2023, NDC poses unique servicing challenges for distributors, especially Travel Management Companies (TMCs) with complex data and services. "According to Business Travel News, the top tech investment of TMCs for the next 12 months is NDC."

TMSs'2023 Investment Areas

BTN asked 32 TMCs of varying sizes and specialties where they would focus investments in 2023. They were able to choose their top three. Here's what they said:

Category	Percentage
Non-GDS/NDC	49%
Contact center solutions	45%
Proprietary OBT tech	36%
Chatbots	24%
Integrated payment	23%
Client reporting/business intelligence	23%
Mid-office tech & custom programming	23%
Mobile itinerary mgmt	19%
Customer relationship mgmt systems	19%
Back office /financial assist.	16%
Traveler profile systems	13%
Risk mgmt/traveler tracking	10%
Unused ticket tracking	3%
Other	16%

2.2. NDC Benefits for Airlines and Travel Agents

Following are some of the key business drivers for airlines, TMCs and OTAs to adopt NDC.

Benefits for Airlines	Benefits for TMCs and OTAs
• Greater control: NDC provides airlines with much greater control over the content. • Cost savings: Airlines can reduce their distribution costs by communicating directly with travel agents and other distribution channels. • Improved efficiency: NDC enables real-time communication between airlines and travel agents, potentially streamlining the booking process and reducing the likelihood of discrepancies. • Innovation: NDC fosters innovation by providing more opportunities for airlines to bring new products and services to the market. These can be developed, tested and deployed faster and with much lower cost. • Customer Insights: NDC will bring new customer data & information to airlines during shopping and booking that they did not have before, permitting them to generate new insights and tailor new products & experiences. • Personalization: NDC enables airlines to offer personalized travel options to consumers that leads to increased customer loyalty.	• Inventory access: NDC provides OTAs and TMCs with improved access to airline inventory, including real-time availability and pricing for flights and seats. • Personalization: NDC enables travel agencies, OTAs, and TMCs to offer their client more personalized travel options, especially if the loyalty status is made available by the airline. • Ancillary revenues: Subject to new commercial terms and incentives being established, NDC provides travel agencies, OTAs, and TMCs an opportunity to retail ancillary services and potentially fare bundles for their clients.

2.3. Known Challenges with NDC Adoption

Of course, as with the implementation of any new developing technology there might be challenges and limitations related to technology adoption. NDC also poses some unique challenges.

The Offer and Order aspects of NDC were more fully developed than post-Order servicing. Many of the servicing use cases are still being defined and addressed by all the players: airlines, GDSs, TMCs and OTAs. This is especially problematic for TMCs. Where many OTAs pass servicing issues to the airlines for resolution, TMCs tend to address them in-house. And they have the added complexities related to travel policy management.

 The table below outlines some of the known challenges a travel distributor may face when adopting NDC for their business.

Business Context
Missing content that is withheld from the GDS.
Missing fields or data in the booking record.
Can not combine traditional and NDC content in a single PNR in most cases.
Focus on the pre-booking area of offer and order, with little to no definition of servicing and delivery, increases servicing costs and impacts customer experience.
GDS, aggregators, mid-office systems and other automation providers are still developing their NDC capabilities, slowing planning and implementation.
Many workflow processes.
Content is available via multiple sources, requiring business rules to pick the best customer and financial option.
How to mark up/down fares in NDC.
Most agencies search based on schedule, with most agents have moved away using cryptic commands to find availability for a route before pricing. Those who do NDC brings back pricing, scheduling, and availability at once. This impacts many detailed use cases, such as how to book an oversold flight.
GDS incentives are reduced or eliminated for NDC bookings and additional fees may be applied, impacting profitability.

Tech Context
Coding to more than one API and keeping systems updated as standards evolve.
Many TMCs and OTAs have very complicated sets of scripts and business rules that have evolved over time. All these need to be reviewed, adapted where necessary and tested. This needs to be repeated when APIs or data in the record changes.
Bringing NDC-content support for projects becomes not only implementing Just Another One Protocol but requires one-by-one adoption of each airline's NDC content.
Servicing and exchanging an order, especially one that blends GDS and NDC content.
How to deduplicate offers between ATPCO and NDC content and show best offers.
NDC was developed primarily for unmanaged travel, so many of the complex requirements related to policy, preferred suppliers and other managed travel areas of focus are not addressed.
Challenges with applying rules such as minimum connect time. GDS search optimization tools must integrate with NDC, and not all do a good job yet.
The "Traveler profile" commonly used for GDS EDIFACT bookings is currently only integrated into NDC record when a GDS is the aggregator or the Desktop Aggregator tools.
Functionality beyond the basic flow of NDC content by GDS is pretty straightforward; going beyond that could be, for the moment, quite tricky (blocking seats, extra luggage, reserving transfers, etc....).

Being aware of those challenges and their applicability to the company may ease the way for NDC adoption. Even though some of the challenges outlined could not be fully resolved, there are still possibilities to find the most appropriate solution to help transform the business to work with NDC. For example, the problem of content duplication may have several solutions, among them: system configuration to avoid duplication, deduplication based on ranks, and a rule engine for deduplication.

2.5. Known NDC Limitations

Despite the progress being made so far, the technology is not yet mature; there is still plenty of work to do to make it efficient, stable and clear for every party involved. For those willing to start NDC adoption now, it is important to know its current challenges and limitations to be more prepared for unexpected issues and associated risks.

Here are some of the known current NDC limitations:

- **Lack of Standardization.** Significant progress was made last year in establishing NDC as a standard and common technology. However, there are still some discrepancies that might require additional efforts to adopt NDC.
- **Specifics of the Airlines.** Different airlines have different levels of NDC-standard support or GDS/Aggregator support. Additionally, different NDC schema versions are used, which adds complexity to aggregating and normalizing content. It might require extra effort to plug additional airlines into the NDC environment as a result of these discrepancies.
- **Content Availability**. The availability of NDC content for each airline might differ and requires a thorough understanding of the requirements to incorporate them into your business.
- **Technical Limitations**. It is also essential to understand that there may be different levels of limitations depending on the content provider you choose. For example, various aggregators might give you different capabilities to work with NDC content, similar to the GDS.

- **Lack of Familiar Features.** As with every new technology, NDC is disruptive. Some features might be left behind when switching from traditional PNR-centric bookings to a new Offer – Order model.
- **NDC test (sandbox) environments might be unstable**. It is not uncommon to face unstable and unreliable behavior of test environments as the technology is not yet mature and NDC content providers are still working on functionality.
- **Fare Markup and Markdown.** NDC can lead to different prices for the same product across various channels, creating difficulties for companies that may need to adjust their pricing strategies for each booking channel. Airlines have more control over the pricing and distribution of their products, including personalized offers and ancillary services, which can make it difficult to determine the appropriate pricing for the overall booking. TMCs and OTAs will need to develop more sophisticated pricing strategies to remain competitive.
- **Exchanges and Refunds.** The current processes and standards for these transactions are not yet fully developed. This can lead to inconsistencies in how these transactions are handled by different airlines and travel agents, making it difficult for consumers to understand their options and for travel agents to manage these transactions efficiently.

- **Mixed Content-Source Bookings.** Despite efforts in the industry to create a mechanism to support several booking sources and a combination of traditional EDIFACT PNRs and new NDC bookings as one trip record, there are still gaps and a lack of standardization. This could lead to a need to develop separate solutions to ensure consistency across different content sources and bookings. Additionally, when NDC and non-NDC flights have to be booked on separate records, it can impact policy approvals that are based on total trip cost.

- **Limited Adoption.** More airlines and distributors are expending effort to distribute NDC content which is helping to speed adoption, but there is still much work ahead.
- **Implementation Costs**. Cost is one of the most important topics to consider. With the current level of maturity of NDC technology, implementation costs are high and difficult to forecast accurately. Factors that can impact NDC implementation cost include current technology infrastructure, level of customization, and extent of integration within the broader tech stack.

3. Scenarios for NDC Adoption

3.1. Airline Flight Distribution Model

The following flight distribution models might be considered from the Travel Management Company (TMC), Online Booking Tool (OBT), or Online Travel Agency (OTA) point of view.
For simplicity, we draw these models from the point of view of a particular TMC/OTA perspective which receives the content of two airlines either via a particular GDS or aggregator or directly from airlines. Of course, companies may elect to connect to more than one GDS, several independent aggregators or choose to establish directly connectivity to a wide or preferred selection of airlines. The model can be extended to full sets of airline and GDS relationships for each entity.

3.1.1. Traditional Flight Distribution through EDIFACT

This is the current implementation state for most of our existing clients. Traditional usage of GDS content, with no NDC content.

A model where a company or an agency gets flight information about flights using traditional GDS EDIFACT standards.

| Airline 1 ✈ | → | GDS 1 | → | OTA/TMC |

Airline 2 ✈ → GDS 1
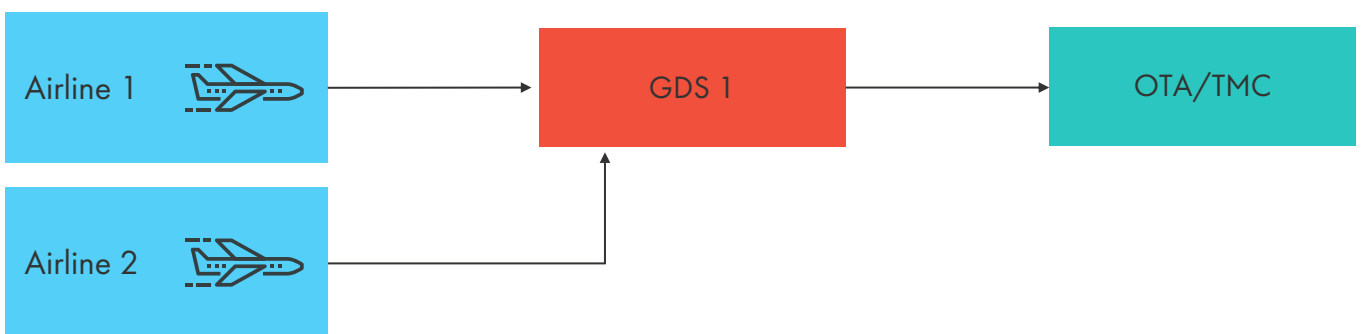
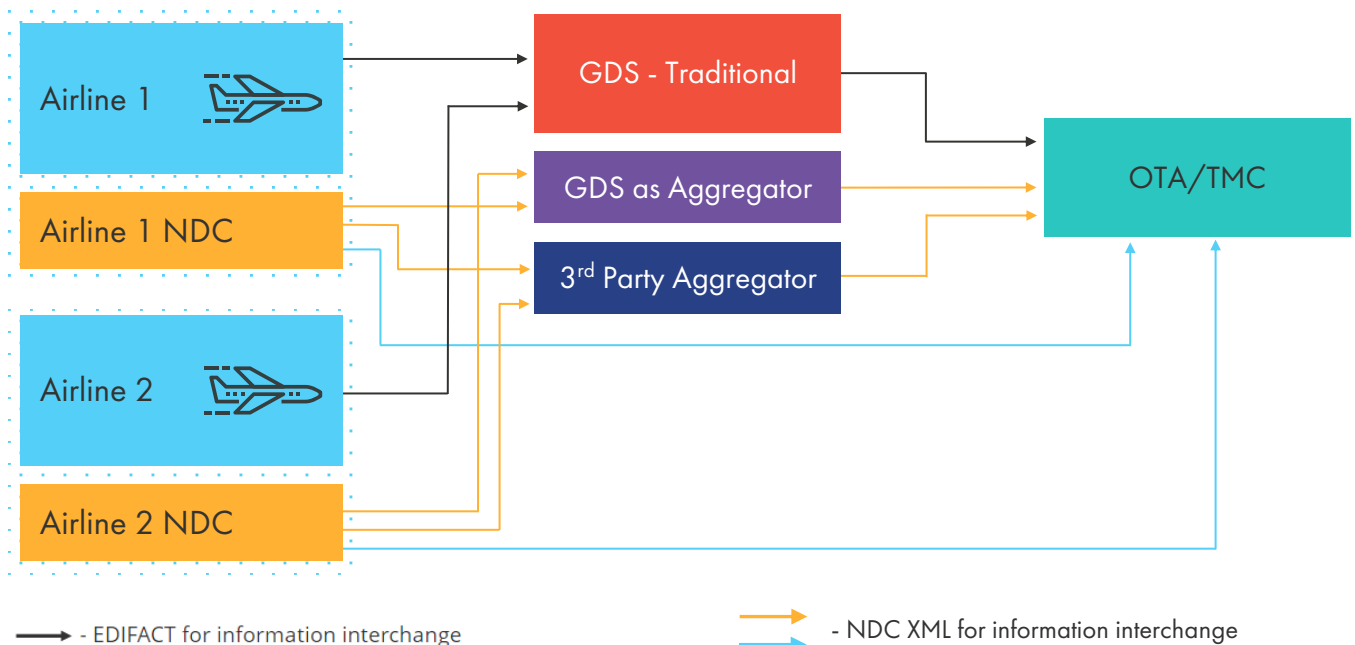→ - EDIFACT for information interchange

3.1.2. Mixed Flight Distribution

PNR Centric, EDIFACT + NDC. This state implies mixed usage of traditional standards for information interchange about flights and NDC usage. In this model a company or an agency is configured to receive flight information from both EDIFACT and NDC standards from a GDS, or NDC only from an Aggregator, or directly from an airline.

Two sub-states are possible here:
- **PNR Centric, Transition to NDC.** For TMC and OTA companies, which are working with the SOAP and REST API and would like to start supporting NDC content with minimum transition effort. Slight changes in business logic and processes will be necessary. This state might be an intermediate step before going to the following states.
- **Order Centric, Different Sources**. Mostly for TMC and OTA companies which are focused on flexible merchandising and personalization, wide coverage of search options and different fares. This state extends the business logic of a company to work with the different sources of NDC and still support traditional content for wide coverage.

This state will be valid as long as technology providers support traditional channels along with moving toward NDC. There are predictions that traditional ways of flight information interchange will be fully replaced by NDC over the next ten years. If that proves to be true, this is the most practical scenario for most distributors.

- EDIFACT for information interchange

- NDC XML for information interchange

3.1.3. NDC Flight Distribution via GDS or an Aggregator or Directly from the Airline.

Order Centric. NDC only. This model shows pure flight information interchange using NDC standards only.

With the current maturity of NDC adoption among industry nowadays, it is possible to define three sub-states. Changes necessary to move to these states vary based on the current state and other dependencies of each particular company.

- **GDS NDC.** For the companies who are already connected to a GDS as well as companies who choose a GDS as the system to work with NDC content.

- **Airline NDC or via aggregators**. This state is focused on the consumption of NDC content from airlines either directly or using aggregators. Potential option for companies that are mostly focused on a specific airline that requests extended functionality which might not be available through a GDS.

- **Different/mixed sources**. In order to satisfy a wide range of requests, the company connects to different NDC content sources for the best coverage.

→ - NDC XML for information interchange
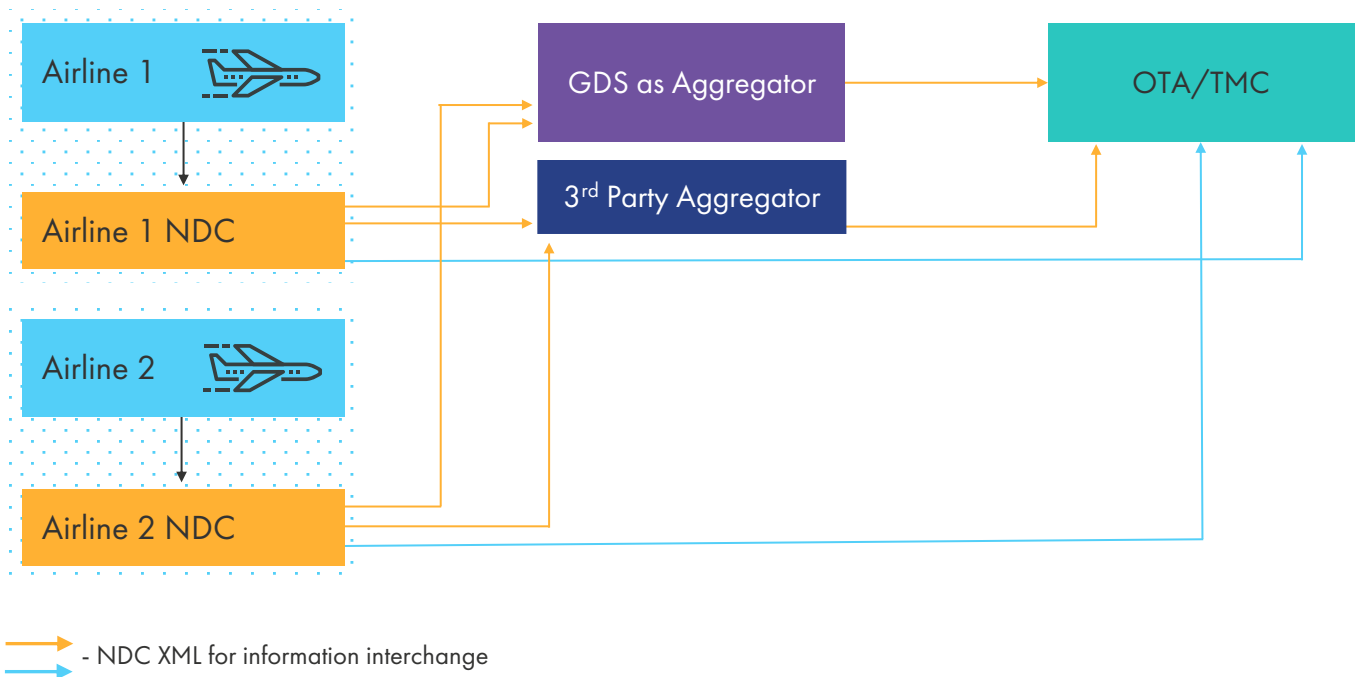
As of today, there are three ways for an OTA or TMC to access NDC content:
- Via connectivity with GDS acting as an aggregator/consolidator
- Via GDS independent Aggregators
- Directly via Airlines' NDC API

Each approach has its own pros and cons, and the choice should be made based on the unique needs and characteristics of the particular company.

NDC content via	Pros	Cons
GDS as Aggregator	• It is possible to utilize the existing connections to GDSs. • The approach does not require additional IT expertise for the company. • Fewer changes to business logic for companies already connected to GDS. • As GDS integrate NDC into their operations, it becomes a critical aspect of their operations, improving the NDC experience for their partner companies. • NDC is now becoming a focus for strategic investment by GDS. This will drive innovation and pace. GDS is responsible for establishing new NDC connectivity with airlines and integrating within their services. • Saves time and resources for developing multiple integrations for companies who are willing to consume NDC content by using only the GDS NDC API. • More likely to preserve current economics.	• Currently GDSs are limited in the number of NDC capabilities covered. • The number of connected airlines is currently limited and the pace of adoption within the GDS is slow. • NDC test environments are not stable enough. • Evolving distribution/revenue cost models. • Lack of clarity of GDS's plans regarding NDC. • Development timing and quality risks. • Exposed to content differences, surcharges, fees. • Potential lack of personalization and advanced merchandising features.
3rd Party Aggregator	• Using a single API on an aggregator can save time and resources for developing multiple integrations to airlines, unless multiple aggregators are required. • Currently contains more connected airlines than GDS. Aggregator is responsible for 1-to-many connectivity with airlines and continued airline growth. • Depending on the aggregator, can offer more NDC functionality. • Existing connections to aggregators, if any, can be leveraged.	• Additional development of mid-/back-office is usually required. • Potential for increased distribution costs in comparison to direct connection to each carrier. • Additional efforts are required for adoption. • May require additional development for POS / UX environment to consume and display aggregated shopping content. • Requires a non-GDS infrastructure or, at minimum, significant passive segment fees.

| NDC content via	Pros	Cons
From an Airline	• Direct relationship with an airline can potentially lead to better pricing and offers. • Real-time / best connectivity and access to live inventory/availability. • Practically any airline with direct NDC APIs can be chosen. • Wider support of airline NDC capabilities. • More control over integrations. • Existing connections to the airlines, if any, can be leveraged. • Potential for lowest cost of distribution with commercial models evolving to incentivize direct connectivity.	• May require significant business flow changes • Requires significant investment and development as well as IT efforts to adapt • OTA/TMC is responsible for connectivity with each airline. • Maintenance of multiple integrations with poor standardization between airlines. • Responsible for consumption, consolidation and display of shopping results within POS / UX environment. • It may take time to have all the necessary agreements in place. • Requires a non-GDS infrastructure or, at minimum, significant passive segment fees.

3.2. Example of Related Company Solution Architecture

One of the most common scenarios we are currently seeing is a shift to the Mixed Flight Distribution model, 3.1.2 above. This is when the company works with NDC content based on the current technologies, for example, existing connection to GDS.

The example below describes the transformation from a PNR-centric architecture to a typical architecture of the Mixed Flight Distribution solution, which allows the company to start consuming NDC content with minimal changes to business logic and existing connections to GDS.

Picture 1 – Initial PNR-centric and intermediate architectures.
a) Existing state, which corresponds to 3.1.1. Traditional Flight Distribution through EDIFACT described above.
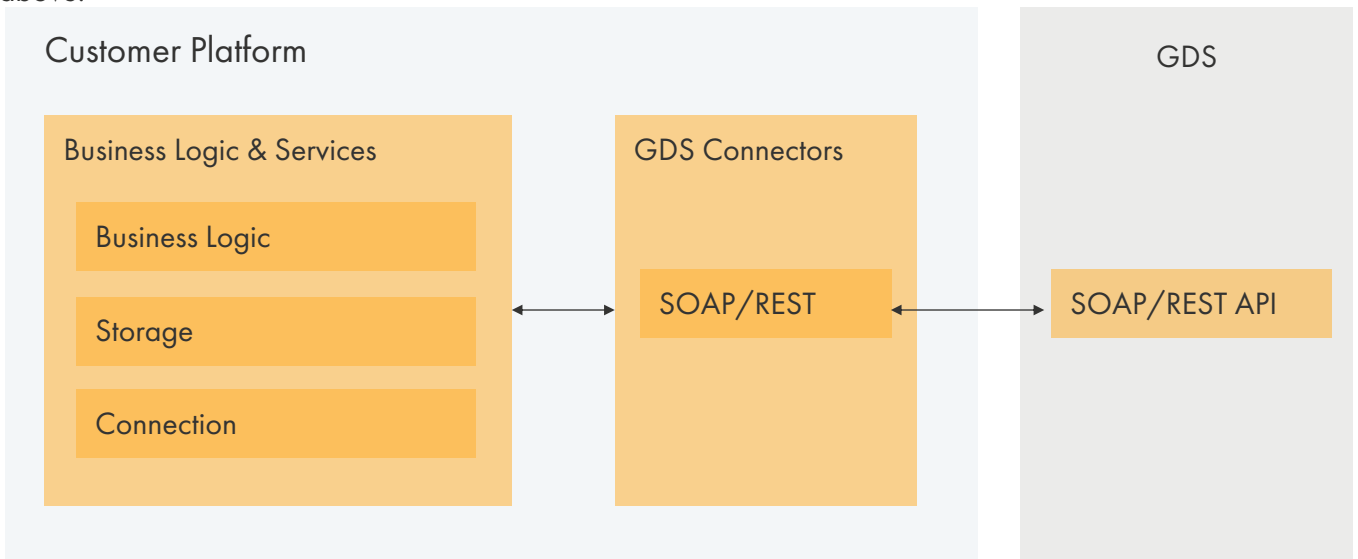

b) Transition state which corresponds to 3.1.2 Mixed Flight Distribution described above.
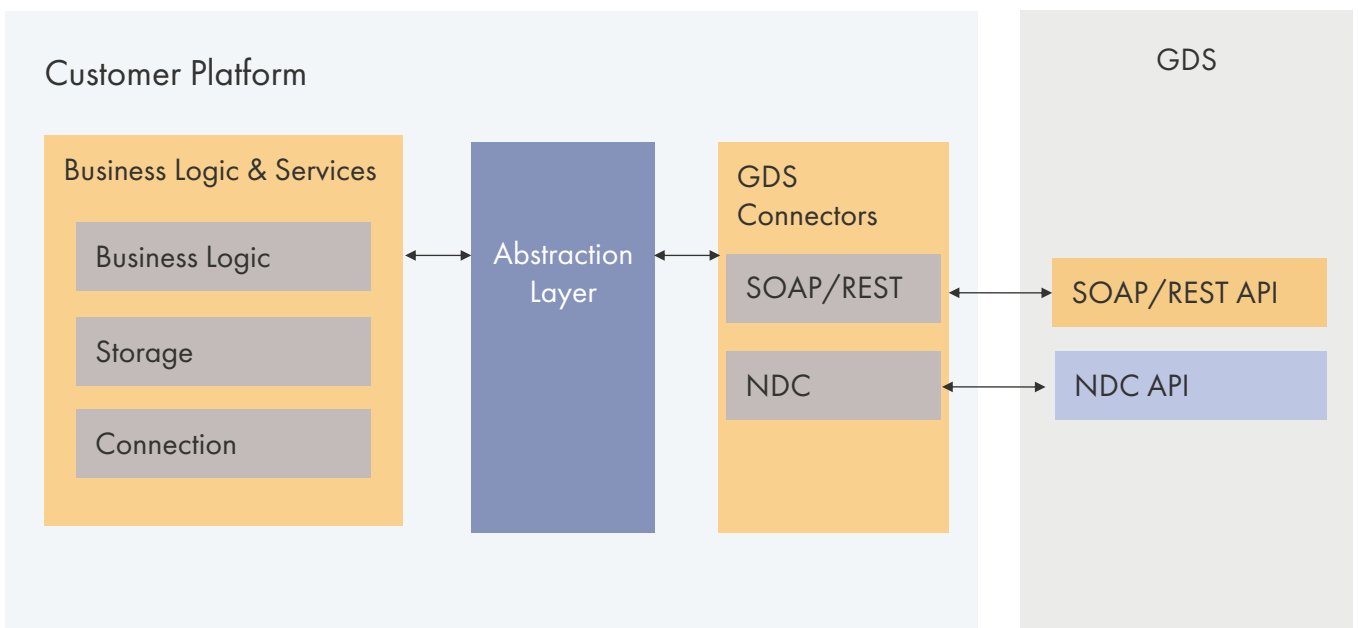
According to research conducted by DataArt, the following changes might be necessary for this stage:

1. Minimal to moderate changes to the current business logic and workflows are necessary.

2. Consider implementation of additional services to cover Profiles, Documents, Remarks and Post-Booking functionality.

3. Storage services are to be extended to contain Traveler Profile and extended PNRs and Order information.

4. Extension of connection services and logic to support NDC services are required.

5. Implementation of an abstraction layer to support multi-protocols, mapping of NDC content, carrier-specific mappings, tracking of PNR and schedule changes.

6. Support of NDC content inside of GDS Connectors on the client's side and/or implementation of an NDC connector there.

A detailed example of transition NDC architecture for NDC consumption via a GDS.
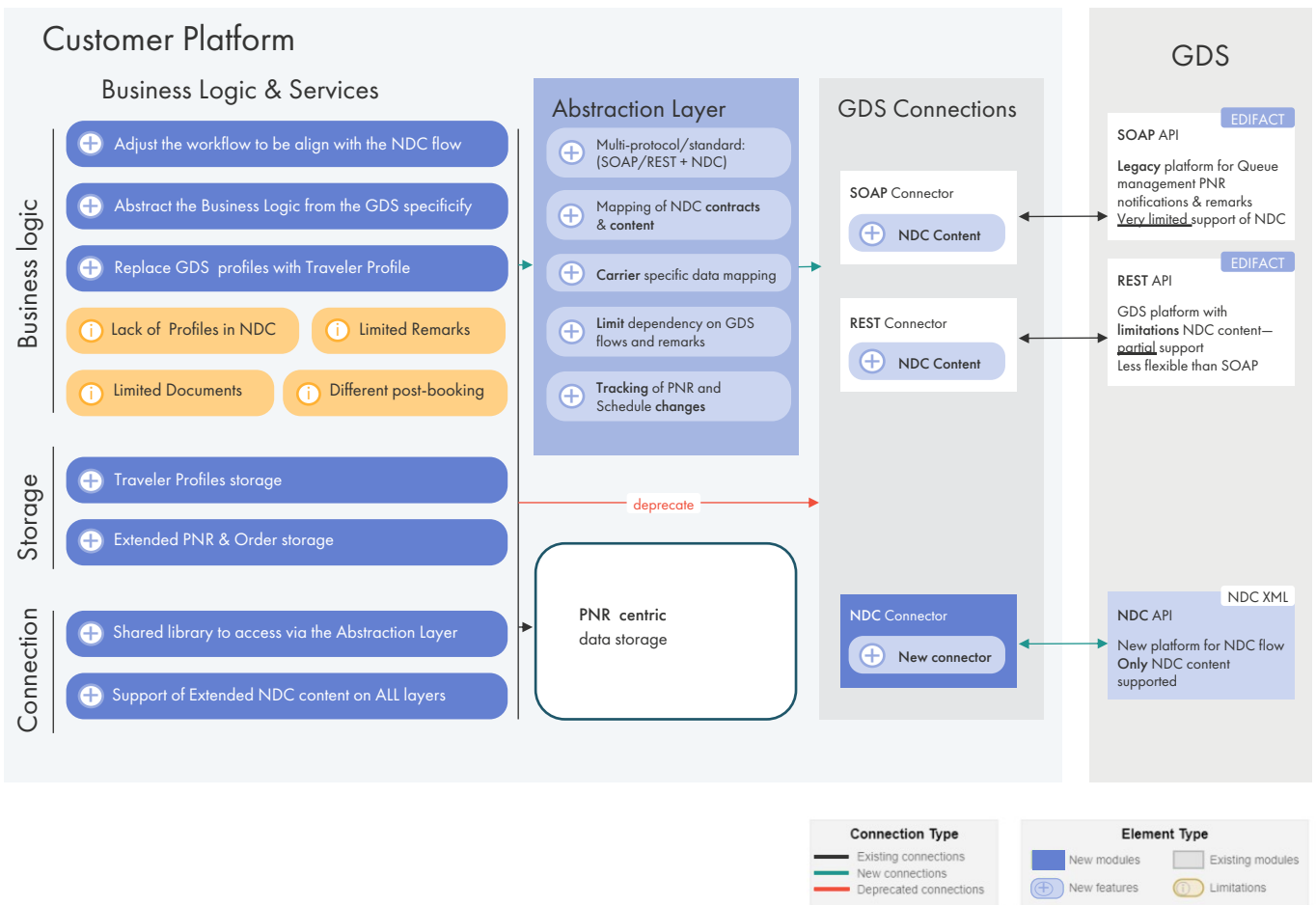
3.3. Recommendations to Start or Enhance NDC Adoption

Thoroughly aligning your NDC adoption journey with the realities of your business will help you with your transition to NDC. The following typical steps might help to start with the NDC journey and implementation:

1. Understand the current state of things

1. What I have at the moment?
2. How my business solves the client's problems?
3. What are the structure of the business?

2. Define the impact and opportunities of NDC for your business and prioritize its use cases

1. What is the possible impact of NDC to the business?
2. Are there any opportunities and benefits NDC could bring?
3. Which part of the business might be affected by NDC limitations?

3. Assess the current and future supply chain and create a business case for change

1. What are the key airline retailing strategies?
2. Which NDC content providers should I use?
3. What are the benefits and ROI for NDC migration?

4. Prepare project elements and define NDC adoption and change management plan

1. Which components should be changed?
2. Is every stakeholder is on the same level of understanding on importance of change?
3. Do we have a clear project plan of NDC adoption?

5. Execute the plan and monitor

1. Are we ready to start?
2. Are we going according to the plan?
3. Have we achieved the goal?

4. Summary

As a groundbreaking initiative, NDC has the potential to transform the digital distribution for air travel – or to be an additional burden to an already-strained system.

By boosting the customer experience and bringing innovation to the airline distribution models, NDC provides a variety of advantages to airlines, travel agents, and other travel industry players. But it also poses significant financial, operational and customer experience challenges to TMCs, OTAs and OBTs and other travel distributors.

Distributors can capitalize on industry momentum shifts, gain competitive advantage and mitigate their risk by carefully setting their strategies and preparing for potential changes.

In this era of industry innovations, knowledge is power. DataArt's Travel R&D team and Cornerstone are constantly observing the latest developments related to NDC and are working closely with our clients to develop and deploy effective NDC solutions. We hope this information is useful as you refine your plans regarding NDC and any aspect of travel distribution.

Having a reliable and knowledgeable technology partner can help streamline the process of NDC adoption and effectively manage the necessary technological updates. We are standing by and ready to help.

5. About DataArt

DataArt is a global software engineering firm that takes a uniquely human approach to solving problems.
We integrate our engineering excellence with deeply human values that drive our business and our approach to relationships: curiosity, empathy, trust, honesty and intuition. These qualities help us deliver high-value, high-quality solutions that our clients depend on and lifetime partnerships they believe in.

6. About Cornerstone

Cornerstone Information Systems is a leading provider of innovative automation for travel and expense technology solutions. With over 30 years of experience, we specialize in helping clients streamline their travel operations and procurement programs by increasing efficiency and providing data for quality decisions while delivering exceptional service. We are consultative in our approach and committed to staying at the forefront of technology and industry knowledge while evolving our solutions to meet the changing needs of our customers and industry.

Please reach out to DataArt at travel.market.team@dataart.com or Cornerstone at sales@ciswired.com if you would like to discuss your specific case.

Mike King	Mitch Gross
Director, Strategic Relationships, DATAART	Head of Growth, CORNERSTONE
LinkedIn	LinkedIn