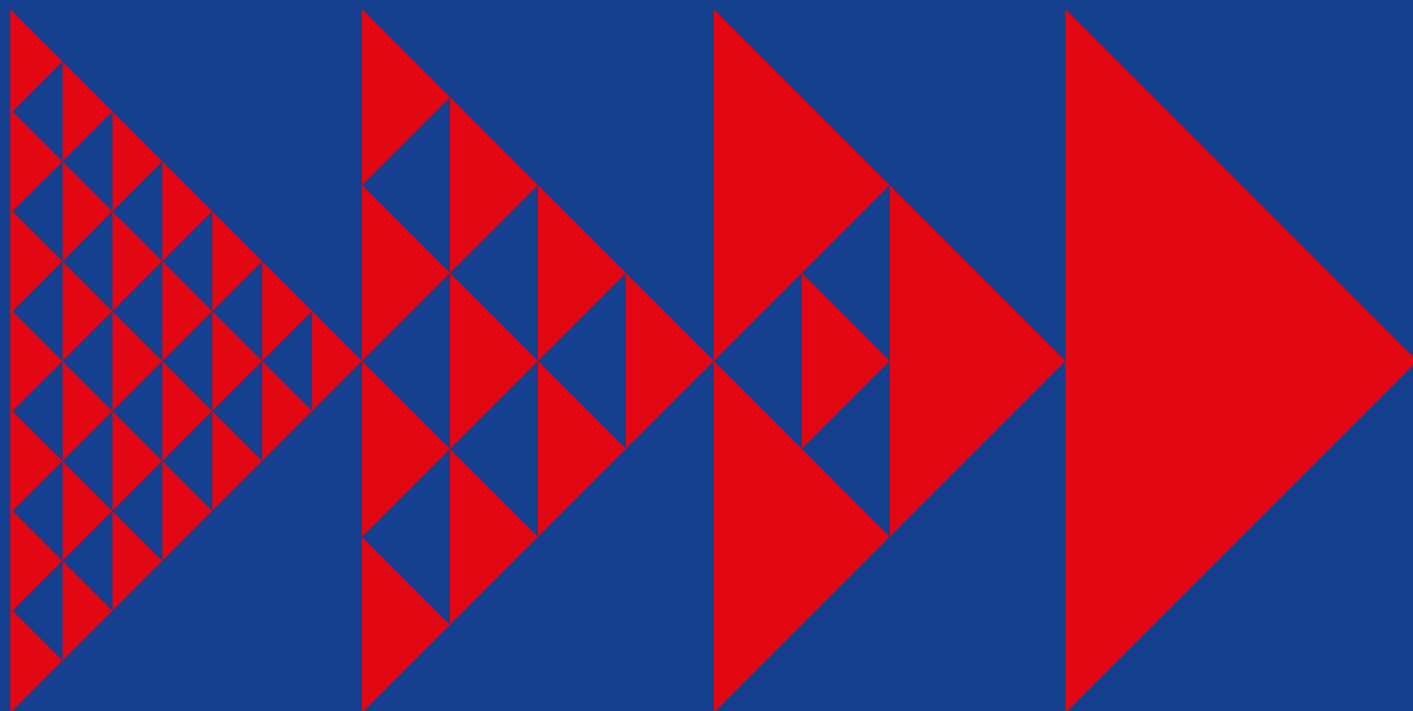# Airline Industry Retailing (AIR)
Think Tank

FOREWORD

Eric Leopold

Director Transformation
Financial and Distribution Services
IATA

Today… a seamless shopping customer service experience has become the Holy Grail.

IATA forecasts that the air travel industry will double in size and reach about eight billion travelers by 2035. It took 100 years for air travel to reach four billion passengers flown per year, and it will take less than 20 years to add another four billion. This trend of democratization of travel is fascinating but it is also facing major challenges in a world that focuses on digital transformation, environment, security, data privacy and much more. In such a fast-moving environment, airlines don't have a choice anymore, they have to adapt to passengers' rising expectations if they want to remain relevant.

So, in this context, the question is: what does a customer really want in 2020? Real-time information, personalized offers, seamless shopping experiences, data control, one-click payment? Yes, they actually want it all. The world has gone digital and there's no going back. Customers want control and they want it at their fingertips. But the challenge is not only on the technology side. It's also a radical change of mindset. In decades past, our industry has focused on processes. Today, the focus switched to customers and a seamless shopping customer service experience has become the Holy Grail.

We live in an "experience economy", and with this in mind, this year's AIR Think Tank focused on three industry pain points impacting customers. First, how to offer a seamless rebooking at the time of disruption, thanks to an automated re-accommodation facility shared with non-airline travel providers using modified enhanced NDC standards. Second, how to ensure customers can access relevant and accurate offers in real-time, regardless of the volume of shopping requests. Third, how customers can centralize their contact information and travel preferences through a data standard, where the customer can decide which travel supplier to share their information with in one-click.

Every year, we try to push the limits within the current airline digital retailing world and this year again, I look forward to fruitful and inspiring discussions around these new ideas.

As always, I would like to especially thank the AIR Think Tank team who dedicate time and energy to tackle new challenges facing our industry with a customer-focused mindset.

Sincerely yours,

Executive Summary

Retail continues to be a hot topic for aviation. Airlines are increasingly aware of the importance of transforming existing distribution and payment processes into a digital retailing environment.
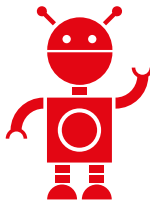
The AIR Think Tank, launched in 2018, is led by a group of retail-minded individuals that are keen to transform the aviation industry into retailers.

The team includes airlines, strategic partners, supporting organizations and IATA. This year, the team developed the following ideas:

1 - Project Lemonade

2 - Project Robot

3 - Project TrulyMe

Each of the three ideas will be elaborated in this industry White Paper. In addition, the team built proof of concepts for each idea, that will be presented at the IATA AIR Symposium in October 2019.

**Overview of
the content**

Section 1:
AIR Overview
background, vision,
scope, etc.

Section 2:
AIR Think Tank
vision, scope,
structure and
members

Section 3:
2019 New Ideas
introduces the three
new ideas

Section 4:
Conclusion
outlines the next
steps and conclusion

AIR Overview

Background

The world is going digital as are airlines' passengers. Customers are getting more demanding and major digital players like Amazon and Google, which are dominating the relationship with digital customers, have raised their expectations with personalized offers, real-time information and frictionless transactions. At the same time, legacy network carriers must deal with complex business processes which make it challenging to positively address those expectations and are facing competition from low-cost carriers which operate in simpler, interactive ways.

Airlines' future performance depends on how quickly they can transform their legacy processes into digital retailing business processes, dedicated to fulfilling their customers' digital needs and offering them a seamless travel experience.

Definition of retailing in aviation

Retailing is the activity of distributing and selling goods or services to the final customer. In the specific case of the airline industry, it covers the shop, order and pay processes. It enables airlines to provide the right product or service to the customer, delivered through airlines' direct and indirect channels, at the right time, through an easy to understand and customer-friendly process.

Successful retailing requires airlines to know and understand their customers better, to be able to provide personalized offers that meet their needs.

Vision and horizon

The AIR portfolio will enhance airline distribution and payment capabilities to support:

- Product flexibility (merchandizing, non-air)

- Consistency across channels (no technical limitations)

- Consent on forms of payment (from customers) and remittance (from agents) and their costs

This vision falls into horizon 2, where disruption takes place from current processes (i.e. horizon 1), with roadmaps in place but not visionary (i.e. horizon 3).

Portfolio

In 2015, IATA presented its vision to enable consumers to "shop-order-pay" for air products across all channels. Since then, IATA, with its members and partners, has been the initiator of many projects, actions and events aimed at helping the airline industry build stronger airline industry retailing processes.

The objective of the AIR portfolio is to consolidate all those activities under a unique name to strongly communicate IATA's retailing vision. AIR will become a reference providing the big picture of the industry roadmap towards retailing. It is also a catalyst for innovation and speed. Industry stakeholders will refer to the AIR portfolio to support their investment and implementation decisions.

Scope

The AIR portfolio is currently composed of four areas and a set of activities:

Personalized Offers Dynamic Offers	**Enhanced Distribution** New Distribution Capability
CUSTOMERS	
Seamless Payment IATA Coin, Easy Pay, IATA Pay	**Simple Fulfilment** ONE Order

See iata.org/air for more information on the different activities.

AIR Overview

Activities

AIR Business Travel Summit

A unique event offering the opportunity to get the latest insights from the industry value chain while they articulate their NDC roadmaps to adoption.

AIR Hackathons

Round-the-clock experiences gathering developers from across the globe to work on innovative solutions enhancing airline retailing.

AIR Symposium

A major event addressing in depth the topics of distribution and payment from a customer perspective.

AIR Think Tank

A platform for ideation comprised of key stakeholders across the industry.

AIR Webinars

A series of workshops contributing to build the AIR innovation profile and ensure consistency across all AIR-related activities among key industry stakeholders.

AIR Tech Zone

A community portal for developers covering different industry initiatives and a one-stop-shop for accessing resources, documentation and implementation guidance.

AIR Think Tank

Vision

The AIR Think Tank aims to guide the industry to transform into true retailers. The AIR Think Tank team aims to achieve this through an ideation cycle where the team brainstorms potential ideas that can help materialize the vision and articulate the ideas throughout the year.

Scope

The scope is currently focused on airline retailing and distribution.

Members

The AIR Think Tank is composed of IATA airlines, strategic partners and supporting organizations. It is open to all. The team, including IATA, consists of a maximum of 30 members.

Structure

The AIR Think Tank kicks off each year in January. There are four face-to-face meetings that run from January until the delivery at the IATA AIR Symposium in October.

In 2019, the first meeting was held in Sunnyvale California, hosted by Plug and Play (a major incubator in Silicon Valley), where the team spent two days being pitched by startups (sourced by Plug and Play) followed by a day of brainstorming/ideation. Idea themes were selected and subgroups for each were created.

During the next meeting in Seattle, hosted by Amazon/AWS, the subgroups narrowed the themes into one idea per subgroup and started work on articulating the ideas.

The following meetings in Singapore, hosted by Accenture and Athens, hosted by JR Technologies, was where the teams completed the content of this White Paper and the proof of concepts presented at the 2019 AIR Symposium.

Output

The output of each yearly Think Tank is an industry White Paper and proof of concepts for each idea. The aim is to turn these into IATA projects that could lead to the creation of industry standards and mass adoption.
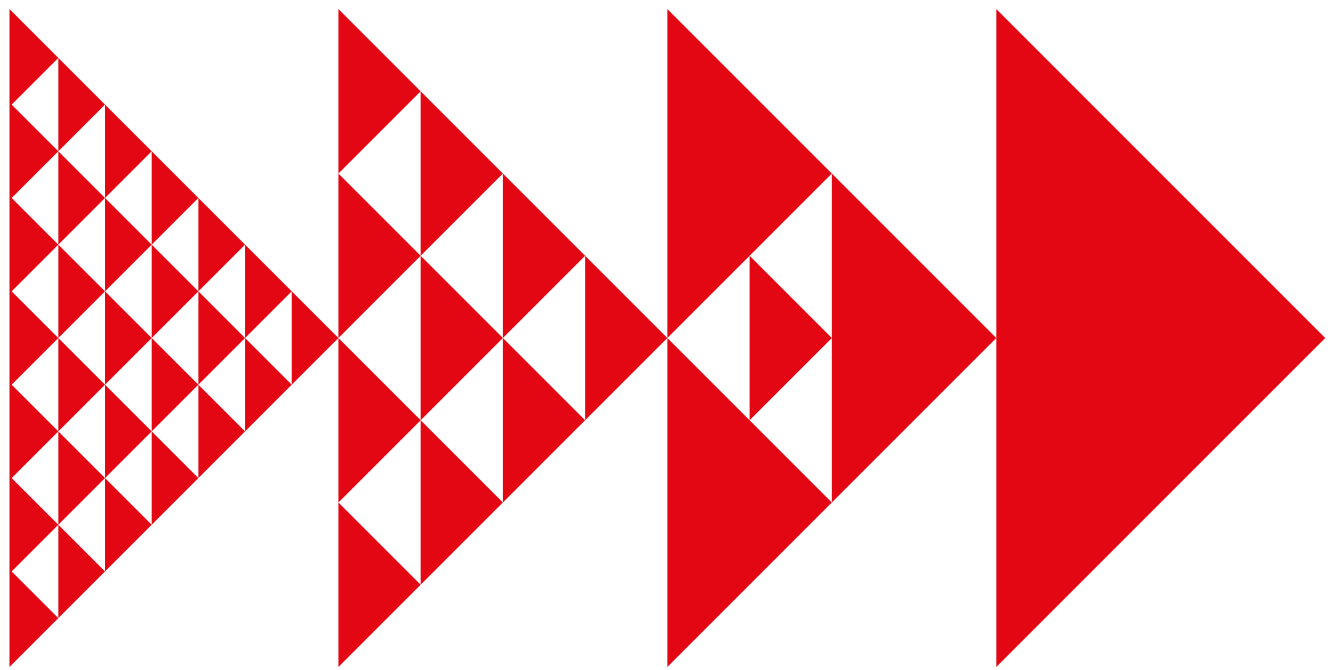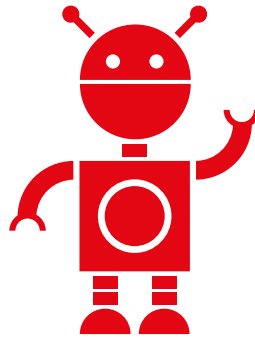
2019 New Ideas

1 - Project Lemonade

2 - Project Robot

3 - Project TrulyMe

2019 New Ideas
1 - Project Lemonade

Vision

Passenger re-routing in disruption is a promise from IATA member airlines to customers and fundamental to the IATA interline system. Through IATA standards, IATA member airlines agree to provide passengers onward travel in the event of an interruption to a confirmed itinerary. However, current processes are constrained.

Project Lemonade seeks to extend the industry capability around re-accommodation of passengers in irregular operations to utilise real-time request and response processes, to allow:

- All stakeholders interacting with the customer to have access to real-time information

- Sellers with the ability to provide options and information directly to customers

- Re-routing available on a broader range of operators, covering all services and ancillary products

- New operating carriers with dynamic control of the conditions under which they accept disrupted passengers

Current Situation

All airlines face disruptions in their flight network, which create flight delays and cancellations. Customers consistently identify irregular operations as an area where airlines need to provide a better customer experience. Results from the 2019 IATA Global Passenger Survey show satisfaction with particular aspects of handling their last disruption (flight re-booking, clear communications and compensation) is low with only around one third of passengers satisfied with re-booking the flight and clear communications. In many situations, re-routing is slow, and customers do not have a choice or access to accurate and timely information.

Internal considerations within each airline

Today, most airlines have developed automated or semi-automated procedures to use customer and operational data sets to determine re-routing options for different customers following a disruption. Customer data includes the original itinerary, number of bags, frequent flyer program (FFP) tier, etc. However, the airline still has limited data that can be used to determine the best re-routing following a disruption, and so involving the customer (and seller) directly is critical.

How re-routing works today

IATA reservation standards allow one airline (acting as a booking source) to obtain seats from another airline. These standards typically use teletype or EDIFACT messages. These standards are used in re-routing situations, but critically the airline initiating the request is not able to identify that the request relates to an irregular operation. Once a reservation is held, tickets are re-issued following industry standards. This involves the airline processing the re-routing taking control of impacted electronic ticketing coupons and reissuing these coupons across new flights. Under IATA standards, the customer is not charged an additional fare for the re-routing, and the new operating carrier is only entitled to the revenue that would have accrued to the original operating airline or airlines.

The use of these processes in irregular operations also requires an interline agreement, and reservation and electronic ticketing capability between the airlines. Airlines hosted on major PSS platforms typically have access to this capability.

Airlines not hosted on the same PSS platforms, and other providers such as low costs carriers and ground transport providers, are often not included

2019 New Ideas
1 - Project Lemonade

in the possible re-routing solutions. Traditional IATA reservation and ticketing standards do not support the re-routing of ancillary products or other services, which occurs under bilateral agreements - if at all.

Customer experience
Leveraging all new communication touchpoints, customers are informed about the re-routing solution and receive necessary information and documents either by paper or on their mobile phone. This, however, relies on the airline that is processing the re-routing having the customer's contact details. This is not always the case, as many travel agents do not transmit customer contact details to participating carriers for commercial reasons. This issue was addressed with changes to IATA Resolution 830d which took effect on 1 June 2019, but still remains an important issue.

The customer is typically presented with only one option for re-routing, because of the real-time process demanding to book confirmed seats. However, if the customer is not satisfied with it, then he/she will ask the airline or the travel agent for another solution. The change of booking is then often handled manually at a desk or on self-service specific tools, where customer needs can be considered and fulfilled.

Some customers directly ask their travel agent, their travel management company or a travel assistance provider (if they are available 24/7) for solutions. Existing standards and processes do not make the interaction between airline and sellers easy during irregular operations, and in many circumstances each party does not have access to the information they need to provide a seamless experience for the customer.

Interline billing and financial processes
Currently, IATA standards allow a new operating carrier to bill the value that would have accrued to the original operating carrier following an involuntary reroute. This is regardless of the cabin of service provided, or the demand profile of the flight. This leads to situations where the new operating carrier may be disadvantaged for carrying the disrupted guest, while the airline that has caused the disruption is not financially impacted.

The current standards reference the original fare on the original ticket. This creates significant volume rejections and disputes, especially when fare information is masked, such as when inclusive tour or package fares have been ticketed.

Case for Change/ Recommendations

Stakeholders interacting with customers do not have access to real-time information they need to provide a seamless customer experience
Today's processes rely on the existing distribution environment, centered around passenger name records (PNRs) and electronic tickets. Even if airlines and sellers would agree to exchange real-time information to better serve customers, most of the time this is not easy due to limitations in current processes. This problem even occurs within individual airlines, where some teams may have access to information on one record and other teams have information on other records.

Sellers are not involved, and information is not shared in real-time
Many customers use a travel agent to purchase air travel and rely on their agent for post-sale servicing. This is especially important for corporate customers, who often use Travel Management Companies (TMC). These travel agents are often in closer contact with customers and are in a stronger position to propose new and quicker rerouting solutions to a customer. TMC's may also manage travel policies on behalf of corporate customers. Some policies could allow an extra cost to be incurred to re-route a passenger.

[1]For more information see AIR Think Tank 2018 Project Panini.

Modern customers expect to be recognised, provided with relevant information only and to be served in their channel of choice. Apart from airlines, players across the value chain have invested in this approach and have built customer experiences that are meeting these customer expectations. This results in the fact that some customers value their travel agent's or TMC experience and expect them to be able to assist in case of disruptions as well. With the rise of personalization and digitalization at Travel Agents (OTA's) and TMCs, the data and capabilities increase to equally serve travelers in such situations. Not all sellers may have an appetite to take responsibility for disruptions, but others will.

In the current NDC environment, airlines communicate to sellers around planned schedule changes. Currently, there is no requirement for an airline to notify the seller if disruptions happen within the operational window. Most airlines still do; however, this is not standard practice. Traditionally, the seller will receive a PNR update through the GDS queue system, indicating a flight has been changed or cancelled. If applicable, an alternative flight that has been offered by the airline might be confirmed in that PNR as an alternative. The travel agent or the seller would know they need to query the airline or visit the airlines website to find policy exceptions that can be applied.

In order to leverage the seller's capabilities and duty of care responsibilities, it would be valuable to involve sellers in disruption scenarios. Moreover, emerging technologies, such as NDC, also make it a lot more feasible to share data with sellers to provide an equal opportunity to service mutual customers.

In large scale disruptions (such as weather events, or industrial actions), airlines communicate commercial policies to travel agents, allowing agents to process changes within set parameters and under specified conditions. Generally, the policy would indicate if an agent could rebook the traveler to another flight, which booking/cabin classes maybe used, what time ranges are accepted and if a full refund is allowed in case no suitable alternative can be found. Additionally, the waiver code to be applied in ticket reissue will be communicated here, as well as potential airline specific requirements, such as an other service information (OSI) into the PNR.

In principle, the airline is still accountable to re-accommodate the customers in case of disruption. But with the hybrid approach to leave the choice with the traveler whether the airline or the seller is requested to assist, will allow for a collaborative and customer-centric approach.

Existing processes do not support ancillaries
Optional services requests such as extra bags, etc, are not always automatically transferred to the new airline. This can make the transfer cumbersome for both customer and receiving airline. Legal accountability (for example to make bags reach final destination) is also transferred with the passenger at this moment. For these reasons, in certain cases, the receiving airline is simply refusing to accept some of the disrupted customers or asks them to pay again for the ancillary service they do not see in the systems.

New processes could clarify the various ancillaries and services due to customers, making transfer smooth and transparent. It will also make it easier for the receiving airline to accept the risk of new customers, because it is sure to get its detailed expenses covered by the disrupted airline.

New operators have limited commercial control when accepting re-routed passengers
Under current industry standards, a new operating carrier is entitled to bill only the fare that the original operating carrier has accepted, which could be very low. The new operating carrier should receive revenue from commensurate with the inventory they made available, and the actual cabin of service offered.

2019 New Ideas
1 - Project Lemonade

Solution/Benefits

The proposed solution involves exploring the use of NDC and ONE Order request and response messages to obtain inventory from new operating carriers or suppliers, a process termed "disruption offers", and a new flow that would allow a seller to also become more involved in the re-routing process. This would be complemented by explorations into changes to industry standards to automate communication around commercial policies.

Disruption offers
The concept of disruption offers allows the disrupting airline to make a shopping request to other airlines (or other transport operators), clearly indicating that the request related to a re-routing following a disruption. The responding airline may then return a disruption offer response, including conditions (such as the time limit during which the offer remains open), and the settlement value on which interline billing would occur. This request and response process may allow the requesting airline to provide the face value of the ticket (for the responding airline to simply confirm) or may allow the responding airline to propose their desired settlement value for carrying the re-routed passenger.

The disruption offer process would allow all flights and ancillary services to be requested. This process would use existing industry standards offer and order management processes and could occur both at the time that the airline is determining the options it has available, and also if the customer (or seller) requested further alternatives.

Involvement of customer and seller
The new process still assumes that an airline will be primarily responsible for direct customer contact in the operational window. Moreover, following a disruption, the airline would determine one optimal re-routing option, book it, and present it to the customer. Following offer and order management processes, this would notify the seller in real-time as a change to the customer's order.

As a default, the airline would directly contact every customer. In accordance with the principals described in Project TrulyMe, the customers communication preferences should be referenced and respected by all parties, including the seller.

Either the customer, or the seller, could request alternative options from the airline to find a re-routing

solution that meets the customer's needs and would be provided at no additional cost to the customer. Alternatively, the seller may also present the customer with more options independently of the airline, which may include options with a change or cost.

A seller needs to be able to answer the following questions to assist customers:

• Why is my customer's flight cancelled/disrupted?

• What was my customer's originally scheduled flight?

• What does the airline propose instead?

• What's the range that I can use to search for my customer's optimal alternative?

• Can I refund this ticket in full and expand options for my customer to shop other airlines?

Provided the above real-time data exchange is in place and the customer does elect the seller as their preferred channel of service, the seller must notify the airline that the disruption situation has been resolved.

Consider the following scenario with two different customers
A flight from New York to London arrived one hour late due to weather issues. Two different passengers on this flight have onward connections from London and will be re-routed by the airline.

Under existing processes, the airline will only use existing information on each customer to make a re-routing, and new operating carriers will have no commercial control, and no knowledge of ancillary products. Sellers are not involved, and it is difficult for the customer to request alternative options.

Under the new process, the airline will still make a re-routing decision. However, the customer and seller will be fully involved, the new operating carrier will be in commercial control and ancillaries will be taken care of. See the two scenarios following the "Next Steps" section.

Next Steps

The industry needs to open a discussion on the following topics:

- Which airlines are heavily impacted by this issue, and willing to address this issue?

- Are airlines and travel agent willing to review responsibilities around customer interactions within the operational window?

- Are airlines willing to expand re-routing onto low cost carriers and other modes of transport?

From a technical capability perspective, the industry solution around using NDC and ONE Order messages to fulfil this solution will be discussed within the Offer and Order Groups under the Shop Order Standards Board of the Passenger Standards Conference.

More fundamentally, changes to the framework of interline agreements is being explored by the Interline Group, under the Plan Standards Board of the Passenger Services Conference. Changes to the framework of Irregular Operations (such as the concept of new operating carrier receiving the original fare) would require changes to IATA Resolution 735d, which would require further discussion within impacted groups and will be overseen by the Steering Group of the Passenger Standards Conference.

Other investigation is currently underway around neutral settlement values for involuntary rerouted coupons at industry level under the Financial Services Development Working Group of the Financial Advisory Council.

2019 New Ideas
1 - Project Lemonade

Mr. Green's scenario

The airline knows: Connecting to Mumbai in business class (Gold FFP member). Booking made directly through the airline.

The airline doesn't know: Mr. Green's business meeting is not until tomorrow evening.

Re-routing option booked by the airline: Connecting flight later today on the same airline, but downgrade to economy.

Contact with customer: Airline initiates contact.
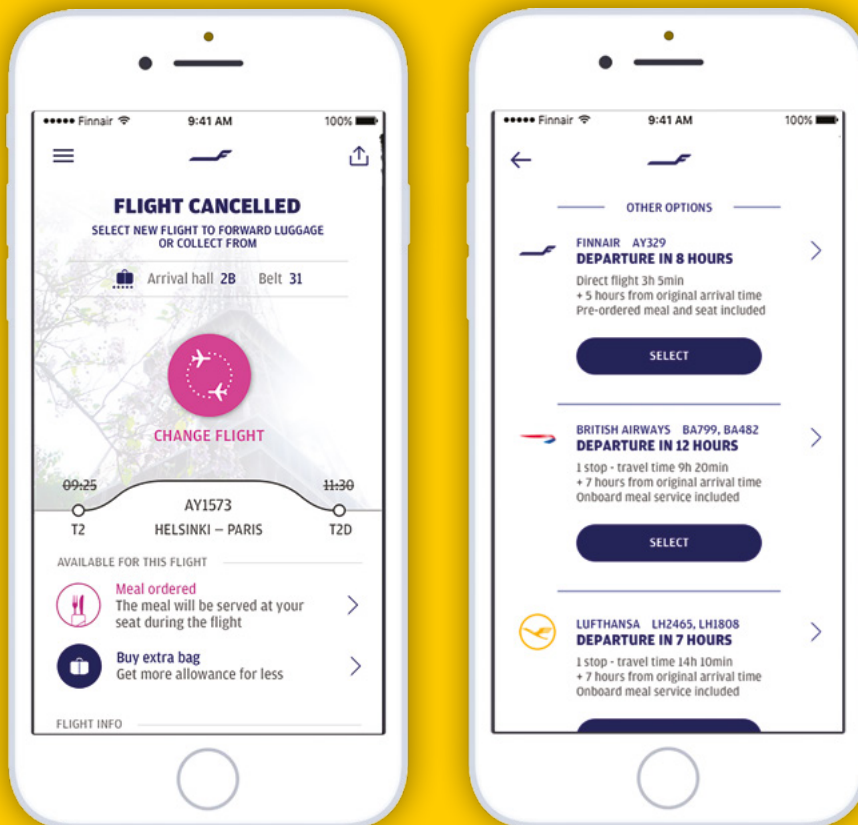
Response: Mr. Green requests an alternative option from the airline. The airline proposes business class the next day with hotel accommodation tonight.

**Outcome:** Customer has preferred travel arrangement.

Mrs. Brown's scenario

The airline knows: Connecting to Helsinki in business class. Booking made by a global travel agent. Since all data is available in real-time to both airline and seller, no agreement is required and both can handle disruptions based on the customer's preferred method.

The airline doesn't know: Mrs. Brown has an important medical appointment tomorrow morning.

Re-routing option booked by the airline: Connecting flight tomorrow on the same airline with hotel accommodation tonight. Notified to seller by order change process.

**Contact with customer:** Travel agent initiates contact.
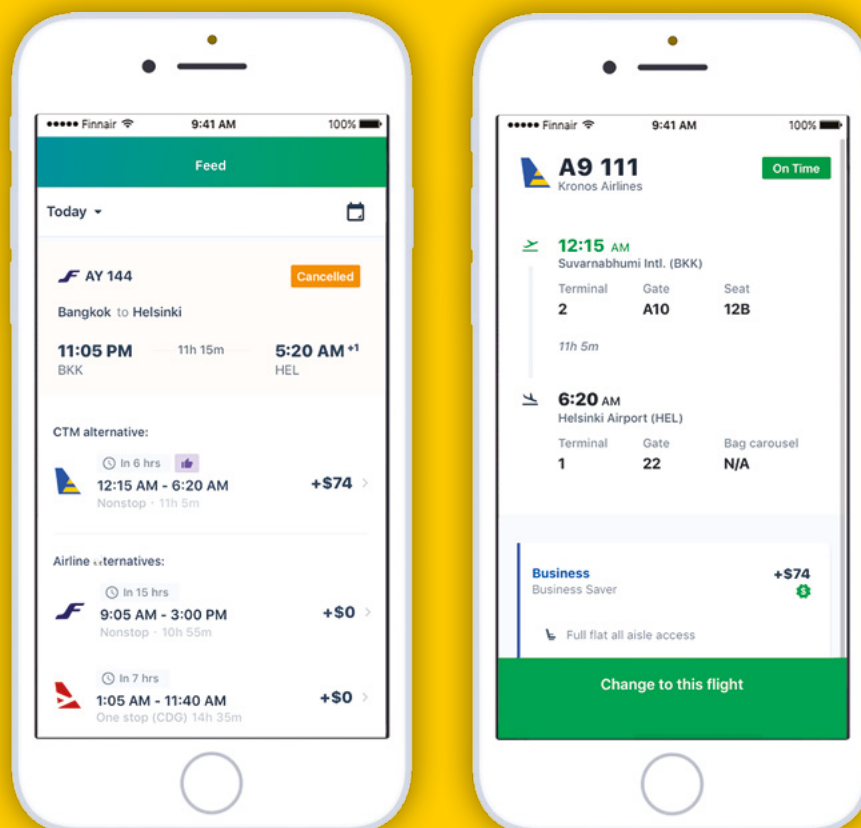
Response: Mrs. Brown requests an alternative option through the TA independent of the airline. A new alternative is at an additional cost, to be covered by travel insurance.

Outcome: Seller notifies airline. Seller and airline have full information. Customer has preferred travel arrangement.

2019 New Ideas
2 - Project Robot
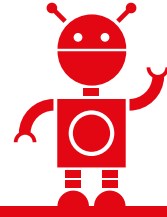
Vision

Project Robot aims to alleviate some of the challenges of high look-to-book ratios by decoupling the offer request from the offer creation.

High volumes of NDC shopping requests, both now and especially in a world of full NDC adoption, load airline systems and create significant costs which become uneconomical in case of very high look-to-book ratios. Some cases of excessive look-to-book volumes, caused by robotic screen scraping, can be addressed upfront through brute-force technical mechanisms. However, there remains a bulk of legitimate NDC shopping requests that airlines need to respond to.

Project Robot aims to help airlines to cope with the incoming volume of NDC shopping requests, alleviating processing costs and optimizing the accuracy of offers.

This will be achieved by decoupling the offer request from the offer creation.

Current Situation

In today's world, increased customer shopping, data scraping, and other issues have led to an ever-increasing volume of transactions.

Much of this volume is driven by fragmentation of channels and the inconsistency of offers available. Furthermore, the drive for customers to find the best or cheapest option derived from the belief that there may be a better price or product being offered through a different channel. Either intentionally or by mistake, this leads the customers to repeat the same search on many different websites.

This has led to high look-to-book ratios – originating from both direct and indirect channels.

Today, the impact on airline systems is mitigated because the airfare shopping load is distributed across several intermediaries (GDS, OTAs, and MSEs) who have their own shopping engines. However, in these cases, the airline does not have full control of the offer that is presented to a potential customer. With the evolution from simple 'fare' shopping to NDC personalized offers directly controlled by the airline, not only does this increase in complexity but the offer requests are channeled directly to airlines.

The solution of simple caching typically used in most shopping engines is limited, prevents the airlines from making personalized offers and does not reflect the airlines' revenue management policies. This issue of channel fragmentation is one that carriers acknowledge and that is something that NDC itself looks to help them solve.

In turn, for airlines and sellers these increased and low-quality shopping requests prevent them from focusing on offers that are truly relevant to the consumer. This also leads to scalability challenges and higher costs, affecting the customer experience with poor quality offers and slow response times.

IATA's 2019 White Paper on NDC scalability found that:

- Current distribution trends show that look-to-book ratios in the leisure segment (through OTAs or MSEs) are extremely high. Far from the 100- to 300- to-1 observed with airlines' own websites, the look-to-book ratios for OTAs or MSEs are in the best case 1,000-to-1 but more commonly above 10,000-to-1.

- An average look-to-book ratio in the range of 5,000- to 10,000-to-1 should be achievable with experience and adequate monitoring and containment measures.

Case for Change

Project Robot uses machine learning (ML) on top of a carrier's existing offer functionality to determine offer expiry time limits which can then be used in shopping responses.

The NDC AirShopping Response [1] (AirShoppingRS) provides for data elements that allow a carrier to set:

- Offer expiry time limits

- Inventory guarantee time limits

- Price guarantee time limits

Since NDC is in its relative infancy, most carriers have not used these elements yet. However, the intention of the Project Robot proof of concept (PoC) is to demonstrate how setting these elements (particularly the offer expiry time limit) has the potential to avoid unnecessary offer computation over time.

While NDC was designed to allow a high-level of personalization, a large volume of 'low personalized/neutral requests' sharing a very similar pattern where the offer creation can be simplified is anticipated. Therefore, one of the strategies is to carve out 'non personalized requests' and to handle them differently.

The second assumption is that even for repeated requests (same travel dates, same itinerary, neutral persona, same point of sale) the offer may be highly variable as the flights get full or revenue management adjusts to demand. So, while a specific offer may be valid for two similar requests separated by another (30 minutes), one may only be valid for milliseconds which is a variability that no current cache solution can reflect.

Certain assumptions were made for the PoC:

- Only non-personalized requests, which is the most common case (at least today) for online leisure

- Identical shopping requests (city-pair, dates, point of sales, cabin) are repeated frequently enough to allow the airline to reuse an existing offer for another identical request without recalculating the request

- Potential massive shopping volumes in NDC aren't an impediment to mass adoption

- Offer caching surfaces a delicate arbitrage between response time and accuracy

However, the request repetition pattern is so variable (route, date, time of the day, etc…) that the offer validity can only be set by using ML to analyze the flow of incoming requests and responses. Figure 1 provides a visualization of the shopping requests for one of the datasets we used in the study with 56% of requests occurring in highlighted the red rectangle.

Figure 1 - Density of Shopping Requests

Density of requests

Density of requests (zoomed in)
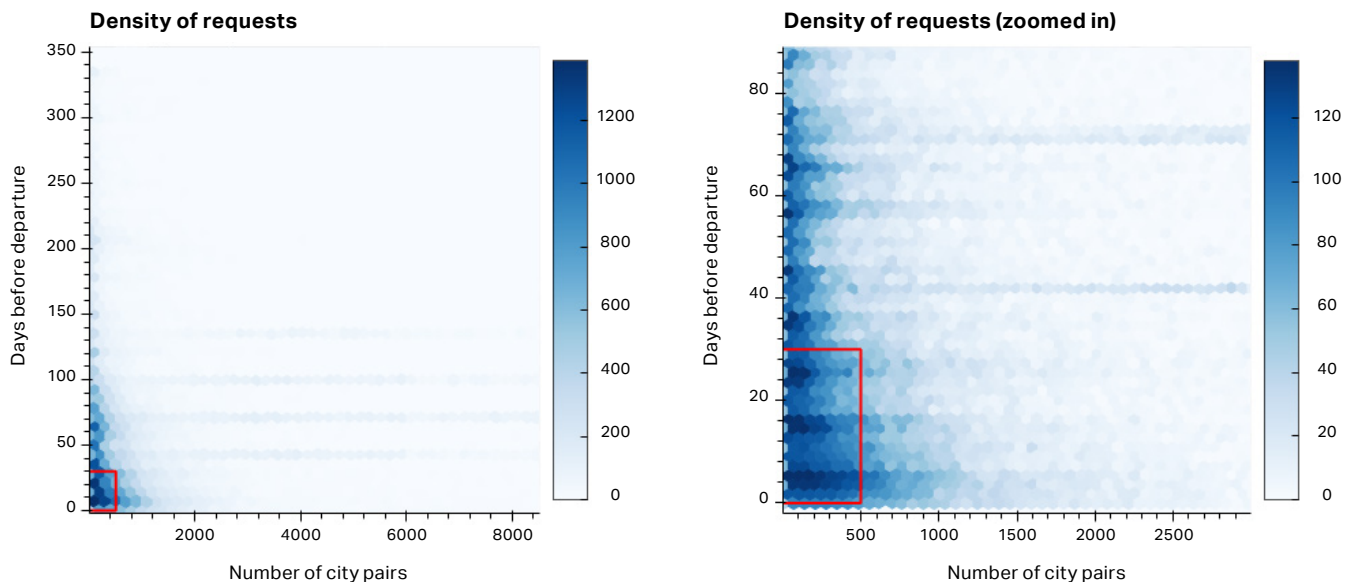
2019 New Ideas
2 - Project Robot
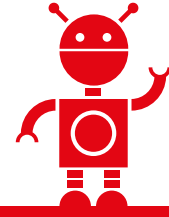
Solution

The outline steps followed in this PoC were:

- Source anonymized shopping and offer data

- Build models to explore inferring time limits from that data set

- Create an offer store from the original data set with time limits informed by the ML models

- Evaluate the ability of the offer store, with time limits, to provide responses as opposed to the need to always recalculate the full offer from scratch

- Analyze the data to determine the effectiveness of the ML models and the offer store in reducing the impact of shopping volumes along with improvements in processing and response times

For each shopping request, if a valid one is available in the 'offer store' it is taken from there, otherwise it is recalculated by the shopping engine.

The ML model adjusted the time-limit according to either the frequency of identical requests or the frequency of identical requests triggering identical responses. Two different data science teams developed models exploring the data in different ways while one team looked at visualizing the patterns that could be observed from the data.

No feed-back loop from orders success/failure was implemented in the PoC.

Two separate teams explored the potential of ML models, following the PoC approach, with the following findings:

Team 1
This was viewed as a classification problem (categories: no cache, or different durations of cache). The comparison between two offers is based only on the response content. The classification approach utilized Support Vector Machines (SVMs) based on a composite kernel consisting of both the Gaussian and Dynamic Time Warping (DWT) kernels. The accuracy of this approach looked good but was working on a limited number of data points, so there is a risk of overfitting.

Team 2
This was viewed as a regression problem (estimate how long an offer is valid).

The comparison between two offers is based on identical requests and then similar responses. Experiments were tried using three different algorithms:

- Ridge regression – very poor

- Random forest – ok

- Neural network – good

The general conclusions across both teams were that despite a small data-set with bias, hidden states and anonymized data reducing the number of available features (airport codes, currencies, airline code), there is a correlation between features and a smooth target variable distribution.

The developed analysis and visualization process for the PoC shows patterns, trends, and enable these initial conclusions:

- Very concentrated shopping pattern

- Figure 3 highlights the high frequency of repeated anonymized requests with 67% of requests for 1 passenger in economy and 50.5% of requests for 1 passenger round trip in economy

Figure 2 - PoC Architecture
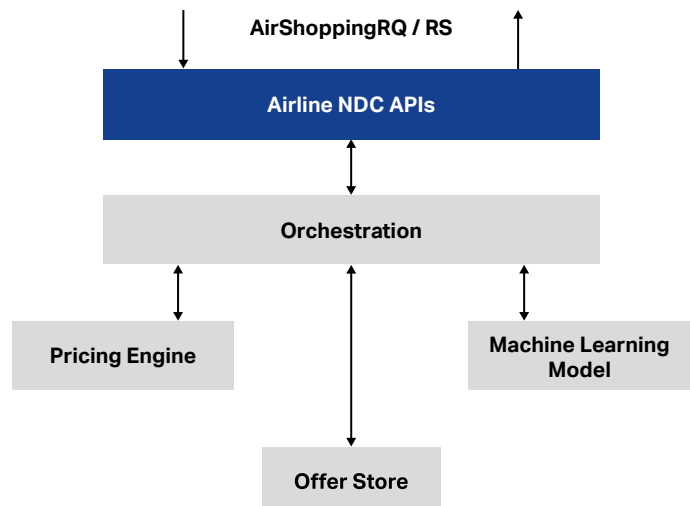
- ~90% of shopping requests hit the same ~10% of city pairs illustrated in Figure 4 with 93.67% of requests hitting the top 100 city pairs

- The analysis is limited by (a) the size of the sample, (b) the fact that data is made anonymous (obfuscated), and (c) it only represents flight offers and not true NDC bundles which could be constructed from a wide range of available products and not just limited to flight or flight + ancillary

- In the case of this dataset, the originator (a meta-search) may be performing some basic caching on their side which hides some of the patterns

- This makes the data good enough to identify trends but insufficient to use ML techniques to model time limits

Despite the limitations, it demonstrates that on the identical shopping requests the approach of calculating a time limit for an offer could work and avoid unnecessary re-computation, which was the original hypothesis.
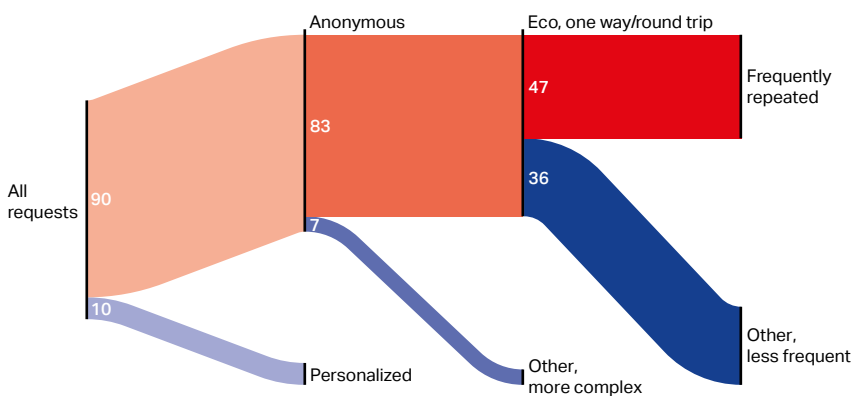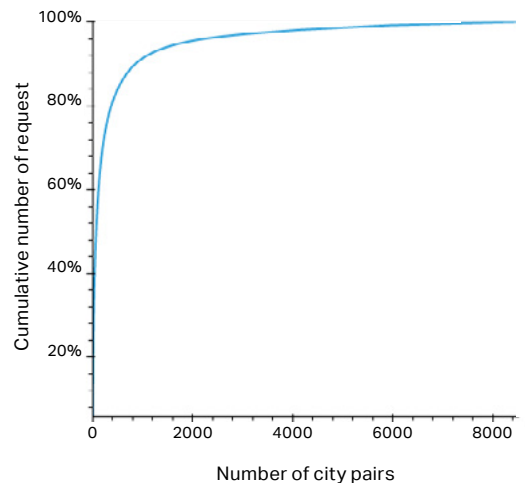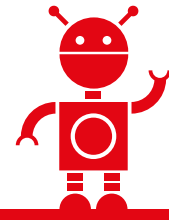
Figure 3 - Frequency of Requests

Figure 4 - Requests Vs City Pairs

2019 New Ideas
2 - Project Robot

Benefits

Airlines
A reduction in the impact of look-to-book ratios for the airlines with a highly reduced load on airlines' systems.

Consumers
Faster, more consistent offers from sellers – whether direct from an airline or through a third party potentially inducing consumer shopping behavior change (limiting the number of visited websites).

Third-party sellers
Faster, more consistent and more relevant offers minimizing the need to shop multiple sources and avoiding the need to build inaccurate caches on their side.

Environment
Elimination of unnecessary processing will help to reduce the energy consumption required by the industry and potentially have a small, but positive, impact on reducing our overall carbon footprint.

On a larger, full-scale application, the ML models could easily be improved by considering the following areas:

- Opportunities most prevalent from an individual airline where more finite intelligence can be applied

- Routes, seasonality, city pairs, etc.

- Identifying target booking dates where the most heat is (i.e., storing offers 330 days out vs 21 days or less)

- Feeding the model with additional information such as events capturing changes in availability

- Streaming data

- Feedback loop - learning from orders process

- Rejected orders within the generated time limits

- Separation of force book logic and exclusion from data set

An end-state solution will consist of an offer store containing offers with time limits (expiration time and date), a ML model used to determine those time limits and orchestration to choreograph the interaction between those pieces and an existing pricing engine. This could be provided as part of an offer management system or implemented as an additional module.

The orchestration layer would determine of a shopping request (all

or part) can be fulfilled by content in the offer store (matching the

parameters if the request with an active time limit/time stamp) and use that information to build the required response. If no valid offers are available, then they will be sourced from the pricing engine, passed through the ML model to set appropriate time limits, persisted in the offer store and returned in the shopping response. The process might also require a task to run against the offer store to tidy up old offers when they have expired.

End-state architecture
The offer store could be much more granular. Not just storing entire result sets but individual products/bundles that expire at a different rate than the whole result set. For example, in a grid view of search results restricted economy could have a much lower "offer expiry time limit" than a flexible economy on the same flight. See Figure 5.

Figure 5 - End-State Architecture
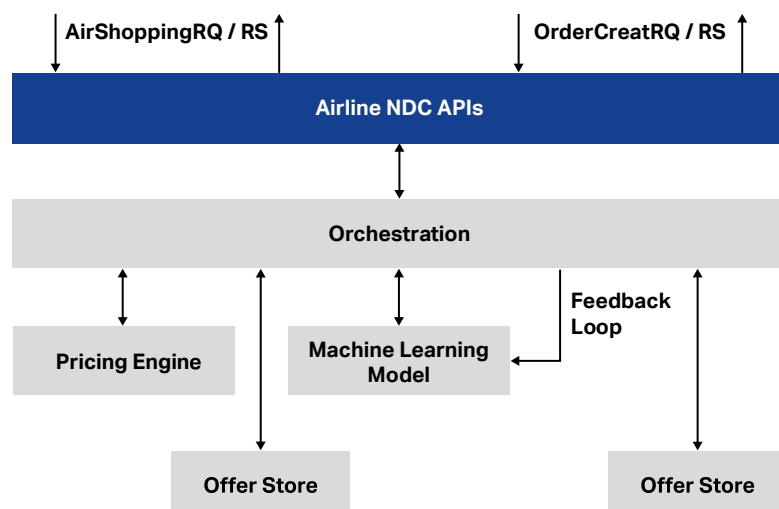
Next Steps

The conclusion is to satisfy the desire to avoid unnecessarily taxing our pricing and offer providers, servers and services by applying intelligence and technology demonstrated here by airlines and/or aggregators. Also, employing fine grained rule sets that satisfy revenue management teams by keeping the right offers timely and appropriate for each airline choosing to implement this type of offer orchestration and machine learning.

The potential next steps for this initiative would ideally look at how to move beyond generating offers for just a flight to look at the implications and approaches of generating offers for bundles that are assembled from well-defined products. This could be looked at in two stages:

Phase I:

- Assemble bundles that consist of more than only the base flight.
- Add additional products that aren't handled by current offer mechanisms.

Phase II:

- Break the shopping process for base flight into more granular pieces.
- A fully flexible flight always has access to the full inventory of a cabin for several months – the price is relatively stable and may only change every few months. Generate once for that piece - store for as long as possible and assemble into a bundled offer when required.
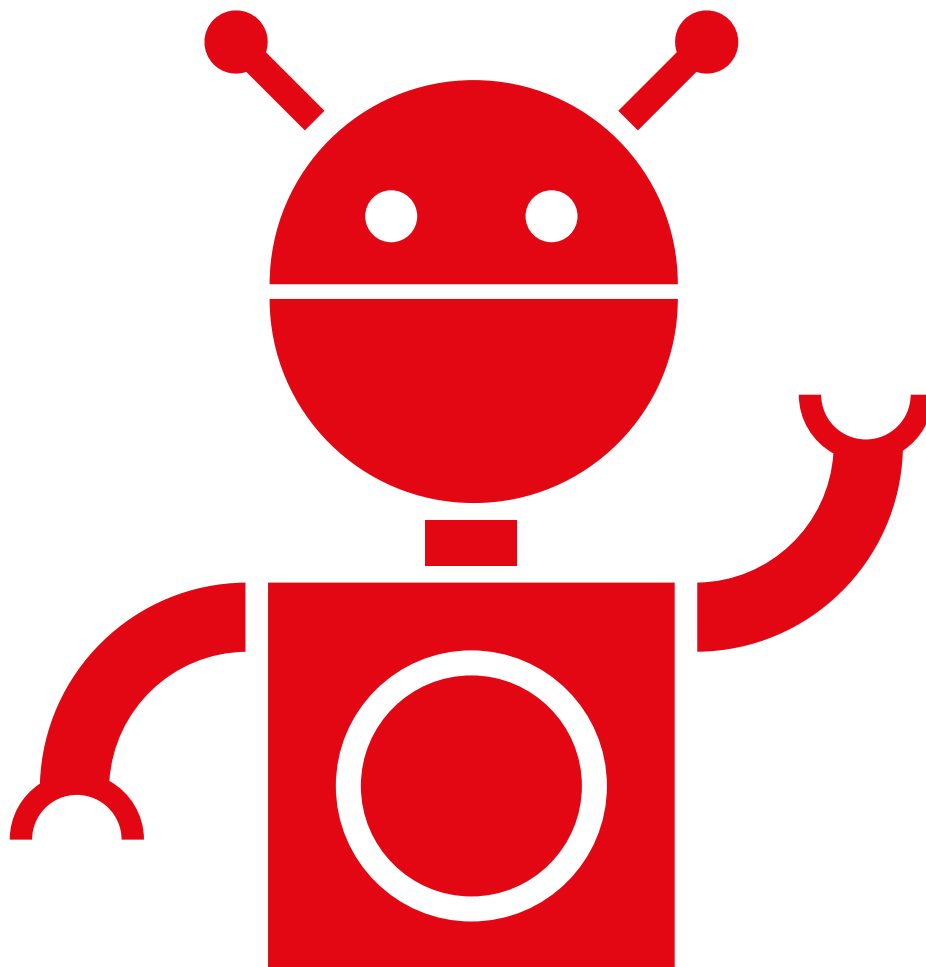
2019 New Ideas
3 - Project TrulyMe

Vision

TrulyMe allows travelers to share their contact information and travel preferences with any travel distributor or travel supplier with one-click. The traveler's entire journey is laid out in one easy to access location, regardless of whether they booked with a travel agency or directly with an airline or hotel. If there is a change to their trip, updates and changes are easy to access in one centralized place. All these benefits are made possible with distributed ledger technology, ensuring that the traveler remains in charge of their personal data and who it gets shared with.

Current Situation

Today, paper-based agendas have been replaced with cloud-hosted calendars; airline tickets are electronic; boarding passes are in digital wallets on mobile devices; various travel authorization schemas like eTA or ESTA are available exclusively online; and governments are working to move our passports to mobile devices in the form of Digital Travel Credentials.

Despite the ever-increasing focus on innovating customer experience and personalization, many unresolved pain points and inefficiencies remain in the travel and hospitality space since the ecosystem has historically been managed independently by each supplier.

Project TrulyMe aims to address three main issues limiting the current paradigm.

1 – Know your customer

For every new journey, a traveler often must repeatedly complete forms when making reservations and checking-in, even though this relatively static profile information could be provided to all parties concerned in the journey in a more seamless and effortless manner. TrulyMe will need to build on top of emerging standards supporting self-sovereign identity such as Decentralized Identifiers (DIDs) - a new type of identifier for verifiable, decentralized digital identity developed by W3C.

2 – Know the context

A typical retailing data strategy is to aggregate data across multiple consumers and develop targeting models based on buying and behavior-based segments. For individual known consumers, firms apply these models to make personalized offers. However, this still relies on second guessing traveler preference and understanding the purpose of a trip - which may vary significantly trip to trip. Another issue is that the customer should have full control over their data and how it is used, including choice about what is revealed to airlines, hotels, transfer companies or other suppliers.

3 – Interoperability problem

A travel ecosystem or platform becomes valuable when more entities participate and deliver value enhancing capabilities and offerings. However, because of barriers including systems integration, complexity in travel distribution and incentive alignment, many entities such as start-ups, innovators and cross vertical software platforms have limited to no access to the travel ecosystem. As a result, not only does the travel ecosystem fail to leverage otherwise relevant and valuable capabilities, but also creates fragmented customer experiences. In short, while almost every individual aspect of journey information is digital, there is no convenient way for the traveler to link and manage all aspects of a journey together.

The traveler is the one who owns their itinerary, represented as a logical grouping of smart objects. The traveler is the only one to permit sharing of information among the service providers who may not even know about each other. For example, the traveler can permit sharing of hotel preferences with a hotel that the airline selected in an irregular operations situation.
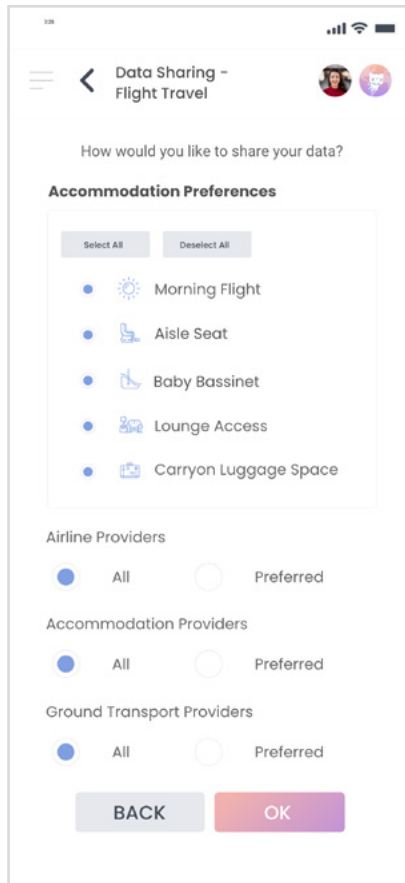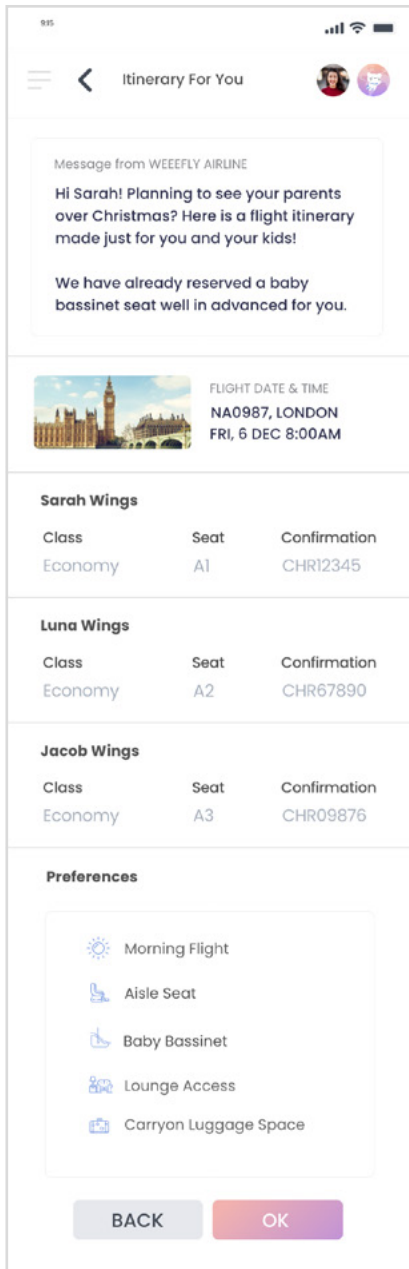
Case for Change

Project TrulyMe solves this by introducing smart travel objects that enable customers to create, control and share personal data and reduce friction in the digital travel experience.

Rather than operating in a 'data economy' – where actors attempt to 'own' as much of the customer's data as possible for monetization purposes, we propose a distributed data concept where each participant in the eco-system can access data when there is a legitimate interest to do so, and when the traveler has permitted the sharing of that data for a particular purpose and period of time.

Individual smart travel objects can represent journey elements such as a flight or hotel stay as well as information about the traveler and traveler preferences. The traveler can group smart objects into a connected itinerary representing a journey (such as a family vacation or business trip) making sure that the information shared with suppliers (such as preferences) is relevant to the journey and even permit various service providers to access the context of the overall trip.

Smart objects representing journey elements can be created by each travel service provider and shared with the traveler, and other travel service providers in the itinerary upon booking if the traveler has permitted this data sharing. Unlike today's static itineraries, with smart objects, the traveler can see the service status in real time and use the smart object to interact with the service provider. Examples including, selecting a seat or changing the services they purchase mid-journey.

2019 New Ideas
3 - Project TrulyMe

Other smart travel objects can represent personal data, such as passport details, forms of payment and loyalty cards. Each smart object can be fully controlled by the traveler either directly or through their (AI) application.

Journey preferences can be used to facilitate offer search as well as subsequent changes during the journey. All the while, the customer always remains in full control over sharing of such data and retains full visibility over what provider accessed what specific piece(s) of information. With information available on demand, with high granularity and in real time, service providers can reduce the burden of storing sensitive data or worrying about storing data that may not even be relevant for providing the service.

This model allows travelers to not only share data such as preference information with suppliers (as they remain in control of that information), but the supplier is always guaranteed that the information accurately reflects the traveler's current preferences.
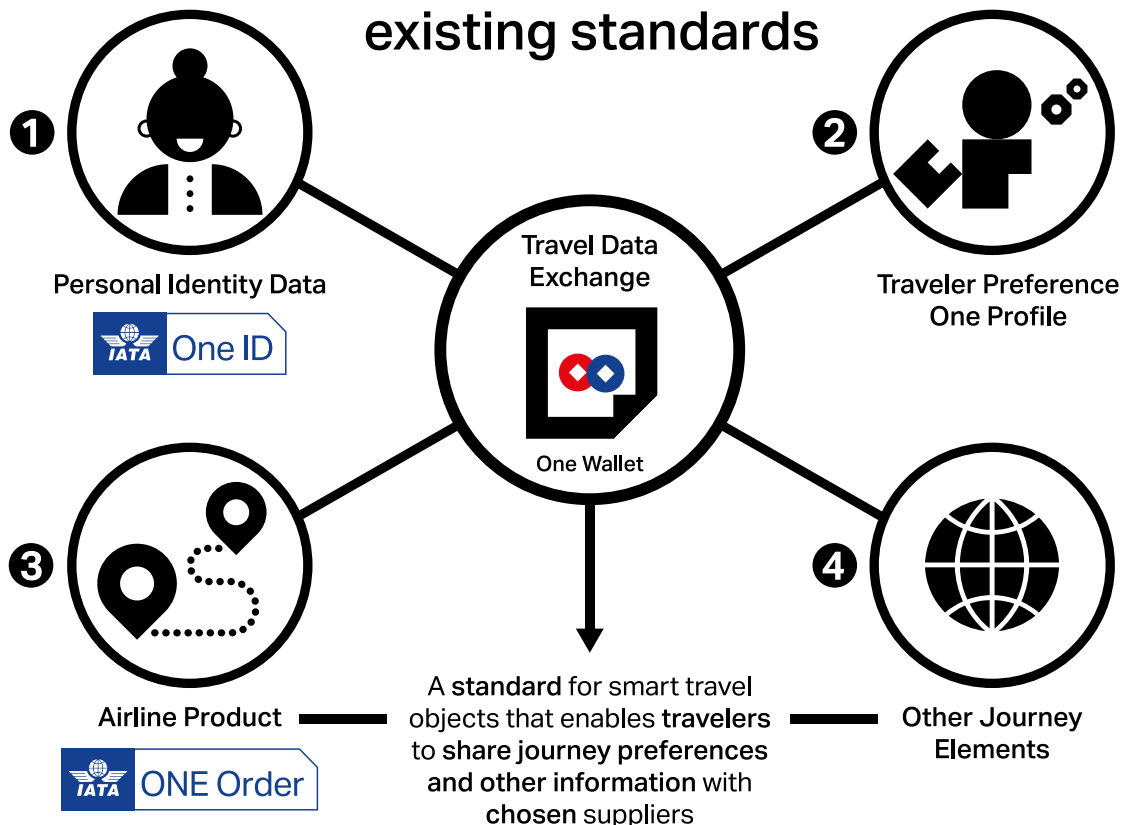
This ability to act on accurate customer information without having the issues (both legal and technical) of managing individual customer data is beneficial for both the supplier and the traveler.

Suppliers do not have to manage preference data or perform Identity Resolution to ensure they are interacting with the correct individual. The data is owned and managed by the traveler themselves.

Customers who choose to receive (opt in) options/products based on accurate and up to date information and preferences will enable suppliers to meet their requirements without the need to manage customer data.

The ability to automatically and securely share limited information (based on customer preferences) during disruptive events with the various suppliers in the eco-system, including suppliers not known or involved at the start of the journey (not part of original order) enables smoother customer re-accommodation.

Aligns with existing standards

① **Personal Identity Data**
IATA One ID

② **Traveler Preference One Profile**

Travel Data Exchange
One Wallet

③ **Airline Product**
IATA ONE Order

④ **Other Journey Elements**

A **standard** for smart travel objects that enables **travelers** to **share journey preferences and other information** with **chosen** suppliers

Solution

Based on the data sharing concepts discussed in "Industry Direction for Open APIs - A Discussion" (IATA 2017) and using models built from definitions within "IATA Airline Industry Data Model", this document describes a set of "smart travel objects" which are self-contained travel artifacts with defined data, privacy, shareability, privilege, allowed interactions and lifecycle attributes.

Smart objects

Using Privacy by Design principles, the smart travel objects are encrypted, owned and managed by the traveler. The data within the objects is granular by nature and can be shared with other actors within the eco-system under the control of the traveler.

The data is classified into four types:

1 – Transactional

Data relevant to the current journey/interaction with suppliers, such as bookings/orders.

2 – PII

Personally Identifiable Information (PII), including digital identity, contact details and forms of payment.
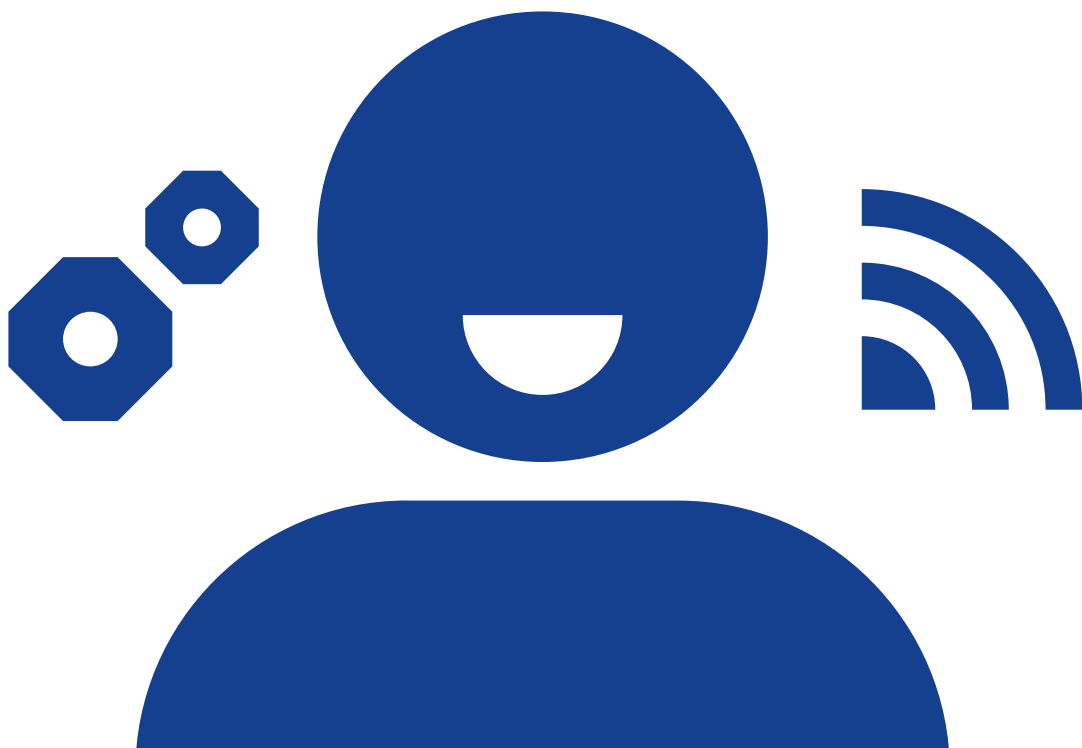
3 – Preferences

Information defining a traveler's normal travel preferences that rarely or never change between trips, e.g. vegetarian, non-smoker, prefers public transport.

4 – Personas

A container for different "views" of the same traveler, containing preferences, PII etc. that might vary trip to trip, possibly due to the purpose of travel, e.g. use taxis on business trips, window seats on leisure - aisle seats on business, etc.

The customer's preferences and rules are codified into the smart travel object, but the processor which implements the rules (runs the code) is contained within the cloud agent and mobile/edge client.

The smart objects themselves may be multiple per customer and will reside in a digital wallet with data both on the cloud and the edge device, such as a customer's synchronized mobile device.
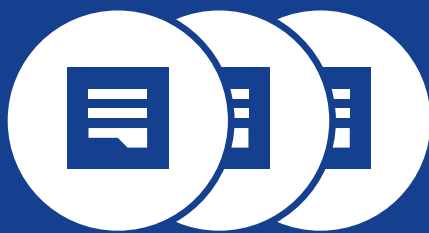
2019 New Ideas
3 - Project TrulyMe

Smart travel objects vs Traditional schemas-based XML objects

Individual traveler control of their data. Data exists only in smart objects. The smart object is the single source of truth.	Retailers, suppliers and partners all have copies of the data. Multiple sync strategies and complex update models. Data may be out of date and attracts legal liabilities.
Built-in intelligence - controlled by the traveler. Determines which parties can access what data and when - at a level of granularity that makes sense to the traveler.	All or nothing exchange of large XML document (or non-schema compliant subsets). All or nothing "share [all data] with selected partners", that people will increasingly reject, or will run afoul of data protection laws.
Fine grained interfaces which focus on answering specific questions, with exact use cases, e.g. "smoker?" "business travel?"	Course grained API, large messages to retrieve and update potentially enormous XML entities/documents with thousands of elements and attributes per message.
Easier interoperability - smart travel objects are self-defining. Easier for developers from cross vertical tech companies and startups to understand and interact with, without having to understand full schema or all related travel processes.	All or nothing approach to data mapping - each interoperable party has to be aware of entire schema, and all possible mechanisms to achieve any end result. Significant overhead of travel data model knowledge required before even small problems can be solved.

Smart Travel Object

Data elements
- Identity, private key(s)
- Relationships
- FOPs

Preferences
- Services
- Seats, meals, etc.

Process
- What to do when?

Time to live
- Per elements, object

Rules
- What to share with whom?

Distributed ledger

The distributed ledger component exists to provide identity without disclosure. It acts as the identity and ownership validation mechanism, for both travelers and travel providers. It also allows travel providers to locate the smart object and wallet (in either the cloud agent or mobile/edge client). The ledger contains public keys, addresses of agents/wallets, and potentially digitally signed one-way hashes of key data elements within the smart object. The hashes would allow for external validation of key elements such as booking references or passport number, without storing or exposing those details.

Travel providers will be able to verify a traveler's identity and locate wallets using the distributed ledger, and then query those objects over a "peer to peer" network - by which we mean, communication is direct from travel provider to the traveler wallet / smart travel object without going via a third party. The smart travel object (or wallet or cloud agent) will also be able to validate the identity (and classification and other attributes) of the travel providers using the same distributed ledger.

TrulyMe Conceptual Architecture
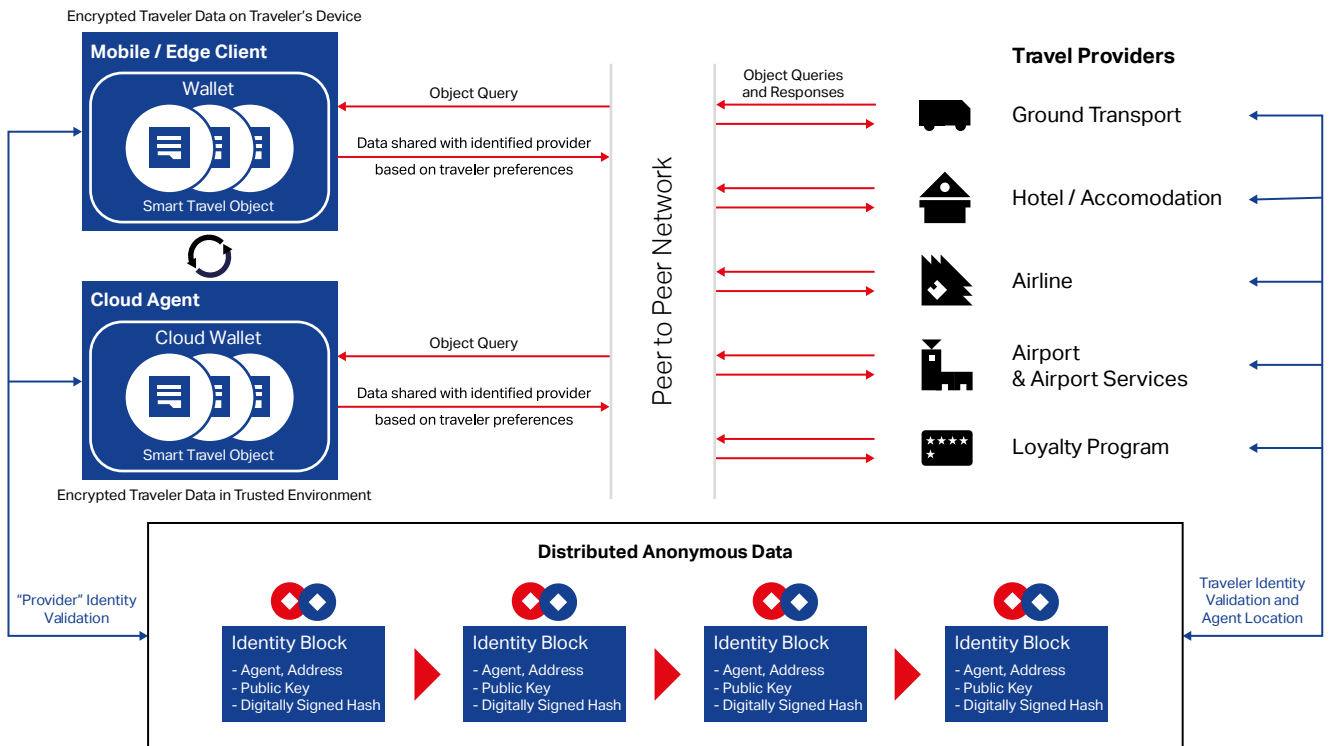
Note: While mobile device in customer control provides the best physical security - it is difficult for consumers to entirely trust mobile devices (e.g., cannot reasonably inspect all source code, any app potentially compromises the entire device). A cloud wallet requires a third-party to be trusted, but that third-party has legal obligations (e.g. GDPR) - so there are legal remedies for breach. Cloud has the advantage of being available to enforce customer preferences in real time, even if the customer's mobile device is switched off (on-board in-flight, asleep, etc.). Potential replication between wallets is also shown.

2019 New Ideas
3 - Project TrulyMe

Alignment with other IATA projects

Where possible, the TrulyMe concept builds on existing industry digitalization programs and associated standards.

- **One ID and Personally Identifiable Data:** One ID envisages a streamlined, friction-free process allowing travelers to assert their identity at every touchpoint in the end-to-end passenger process, online or in person, using their biometrics, while maintaining the privacy of personal data. Our project leverages the capability to carry digital travel credentials in the passengers' wallet.

- **ONE Order:** ONE Order provides a standard way to describe the services the passenger ordered. Our project leverages those data definitions to make real time service delivery status available in the passenger's wallet.

- **Open Air and Airline Industry Data Model (AIDM):** While TrulyMe relies on a distributed ledger to identify and locate end-points, the data exchange itself is peer-to-peer. It builds on data definitions stored in the AIDM, API Best Practices defined by the Open Air project as well as new API standards such as flight status APIs being developed by the Travel Communication project.

Next Steps

The Think Tank developed a travel industry specific use case for the implementation of technologies allowing travelers to better control information that they wish to share related to their journey and travel preferences allowing service providers to interact with this information and travelers in real-time.

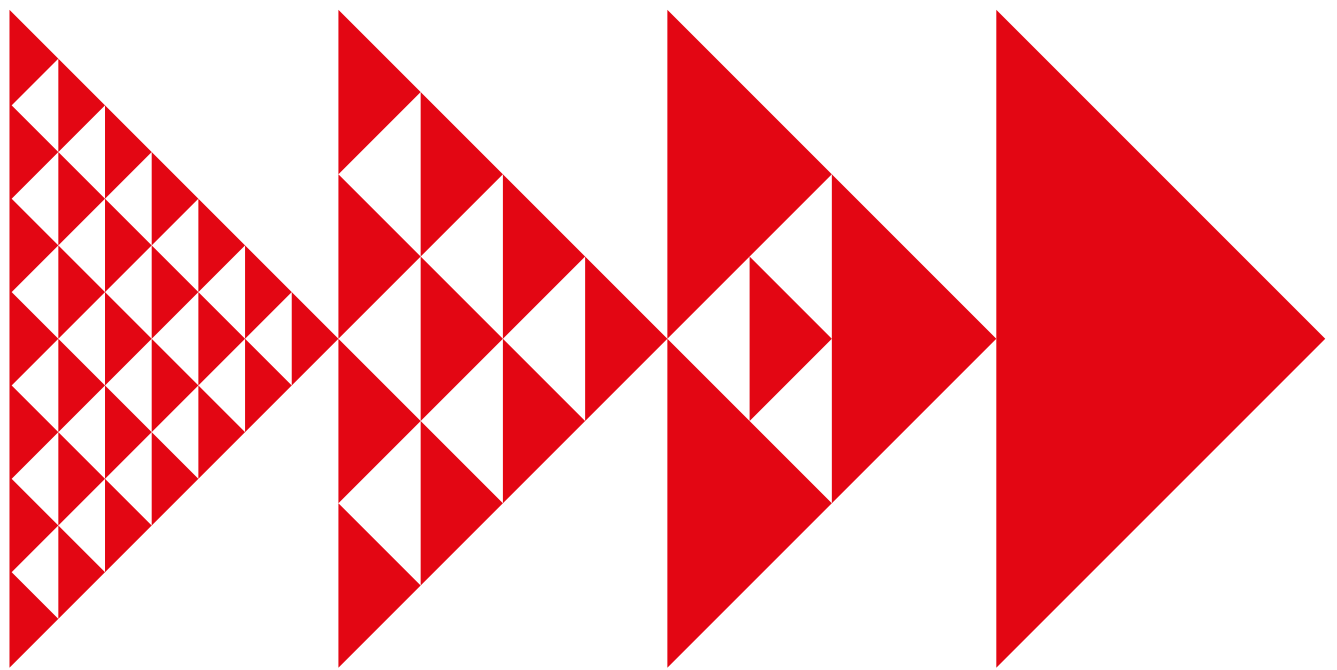To progress this idea in the industry, we have identified the following steps:

1. Identify a small team of parties willing to build and trial a small -scale version of the target solution using open standards and open software.

2. Engage with third party standards organizations focusing on self-sovereign identity and secure wallets and champion business requirements discovered in development and testing of the trial solution.

3. Refine the architecture and engage with industry standards development groups to enhance industry standards as needed.

Conclusion

IATA realizes the importance of the industry becoming more like retailers and moving towards digitalization. Through programs like the AIR Think Tank, IATA and participating organizations are leading and supporting the industry in the path towards the future. With a focus on innovation with speed, our industry needs to move full speed forward.

The airlines and other stakeholders participating in the Think Tank are also leaders and fully onboard with the shared vision. It is important that more airlines join the effort, either through the Think Tank, or other similar exercises and processes to ensure we move forward together.

In 2019, the AIR Think Tank will build off the great momentum initiated in 2018. IATA encourages more airlines and partners to get involved in 2020 and help us drive these ideas into initiatives and potential projects.

Partnering for success

A special thank you to the 2019 AIR Think Tank members.

Airlines

AIRFRANCE KLM GROUP

ETIHAD

FINNAIR

IAG INTERNATIONAL AIRLINES GROUP

JAPAN AIRLINES

LUFTHANSA GROUP

TURKISH AIRLINES

UNITED

Partners

accenture

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AMADEUS

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OpenJaw
A TravelSky Company

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ARC

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Expedia