Opening Remarks

Houman Goudarzi, Head of BI & Industry Engagement, IATA
Building a Data Science capability in an Aviation company

Eliano Marques, VP Enterprise Analytics, Data Science, Emirates Group
IATA ADS 2019

Building a Data Science capability in aviation
Eliano Marques, VP Data Science, The Emirates Group
Agenda

1. Building a Data Science foundation to deliver
2. Building a Data Science foundation to win
3. Delivering value fast in production
4. Bringing it all together
5. An example use-case
The maturity levels ($A^3$) of Data Science across the Enterprise

**A³utonomous**
- All Business & Digital applications speak “Data Science”
- Execs and Business Leaders driving the agenda of “Data Science”
- Data Science Investment/Revenue no longer have 10 zeros before a number

**A²mbitious**
- Focus on foundation
- Cares less about sexy words and more about production
- Very Business and Processes oriented

**A¹spirational**
- Hire 1 (or a few) Data Scientist and thinks problems are solved
- Does PoC (internal or external) and believes job is done
- Seems to be taken off but runs in circles, churn starts to appear
Background

The Emirates Group

Group CTO

BRINGING DATA TO LIFE

BI
Data Science
Analytics Support

New Capability within the group
Building a Data Science foundation to deliver

- **Modeling**
- **Domain Knowledge**
- **Business Acumen**
- **Insight/Action**
- **Innovation**
- **Return On Investment**
Building a Data Science foundation to deliver
Building the foundation to win
Building the foundation - People

Recruit well & with standards

Organise to grow and win

Invest in training paths

<table>
<thead>
<tr>
<th>Level 1 - DS (Foundation)</th>
<th>Consulting Track</th>
<th>Data Science Technology Track</th>
<th>Data Science Track</th>
<th>Executive Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>DS110</td>
<td>A.BB101A</td>
<td>A.BB120A</td>
<td>A.BB130A</td>
<td>A.BB140</td>
</tr>
<tr>
<td>Level 2 - SD (Intermediate)</td>
<td>DS210</td>
<td>DS220</td>
<td>DS230</td>
<td>DS240</td>
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<tr>
<td>Assessment 2</td>
<td>A.BB210A</td>
<td>A.BB220A</td>
<td>A.BB230A</td>
<td>A.BB240</td>
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<tr>
<td>Level 3 - Team Lead (Advanced)</td>
<td>DS310</td>
<td>DS320</td>
<td>DS330</td>
<td>DS340</td>
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<tr>
<td>Assessment 2</td>
<td>A.BB310A</td>
<td>A.BB320A</td>
<td>A.BB330A</td>
<td>A.BB340</td>
</tr>
<tr>
<td>Level 6 - VP+ (Director)</td>
<td>DS410</td>
<td>DS420</td>
<td>DS430</td>
<td>DS440</td>
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<tr>
<td>Assessment 4</td>
<td>A.BB410A</td>
<td>A.BB420A</td>
<td>A.BB430A</td>
<td>A.BB440</td>
</tr>
</tbody>
</table>
Building the foundation - Processes

Data Ingestion
End-to-end platform building
Recruitment
Features Store

End-to-end use-case delivery
Career Paths/Training curriculum
Model Lifecycle
Common Libraries
Building the foundation - Tech

Key capabilities and tools to take into account:

- Cloud & Auto-Scale compute

End Consumers:
- Business Apps
- Operations
- Enterprise Data Warehouse
- Data Science Apps

Data Science Platform Environments:
- Explore Env.
- Scoring Env.

Support Environment:
- Support Code Repository
- Support Artefacts Storage
- Support User Interface
- Support RDS Storage
- Support CI/CD
Building the foundation - Automation

• Automation on top of well designed process reduces time to act from months to day
• Key focused areas to automate are Analytics Platform, Data Ingestion, Integration of outcomes
Delivering value fast in production
Delivering value fast in production - Demand

<table>
<thead>
<tr>
<th>General Aviation Departments</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Commercial</strong></td>
</tr>
<tr>
<td>• Commercial Operations</td>
</tr>
<tr>
<td>• Sales</td>
</tr>
<tr>
<td>• Revenue Optimisation</td>
</tr>
<tr>
<td>• Retail &amp; Contact Centres</td>
</tr>
<tr>
<td>• Loyalty Program</td>
</tr>
</tbody>
</table>

- Periodically collect and review demand
- Prioritise demand against a standard business & technical complexity matrix
- “Accepted” demand delivered through agile with clear timelines and path-to-production
- Each demand item requires buy-in and support from key stakeholders within business, primarily to drive change around adoption & integration

Aligned with each business unit

Portfolio Mgmt. + DS Team Leads
Delivering value fast in production - Services

- Demand Management
- Use-case validation
- Use-case monitoring
- Self-service usage of DS outputs
- Use-case exploration
- Use-case deployment
- Self-service use-case exploration
- Recruitment on behalf
Delivering value fast in production - Agile

- Automation on top of well designed process reduces time to act from months to day
- Key focused areas to automate are Analytics Platform, Data Ingestion, Integration of outcomes

### Example: Use-case exploration

- Business and data workshops
- Data exploration
- Experiment development
- Experiment testing
- Experiment results

### Example: Use-case deployment

- Release planning
- Create project backlog
- Production deployment
- Governance, maintenance & training
Delivering value fast in production - Production

| Define and build the to-be process that embeds the DS outcome | Build standard integration patterns to automate and accelerate rollouts | Automate deployment of the DS artefacts with clear business release input strategy | Build competition for production |

Value to the Enterprise is one use-case are running in production
Bringing all together

• Foundation + Delivery together enables definition of **Velocity**

<table>
<thead>
<tr>
<th>Date</th>
<th>Scrum Team 1 (DS TL 1)</th>
<th>Scrum Team 2 (DS TL 2)</th>
<th>Scrum Team 3 (DS TL 3)</th>
<th>Scrum Team 4 (DS TL 4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>01-Mar</td>
<td>Explore &amp; Validation (10x scrum)</td>
<td>Explore &amp; Validation (10x scrum)</td>
<td>Explore &amp; Validation (10x scrum)</td>
<td>Explore &amp; Validation (10x scrum)</td>
</tr>
<tr>
<td></td>
<td>SD5, DS5</td>
<td>SD5, DS5</td>
<td>SD5, DS5</td>
<td>SD5, DS5</td>
</tr>
<tr>
<td></td>
<td>Display (50% scrum)</td>
<td>Display (50% scrum)</td>
<td>Display (50% scrum)</td>
<td>Display (50% scrum)</td>
</tr>
<tr>
<td></td>
<td>20% DS = Pooled Engineers</td>
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</table>

**Example backlog of use-cases:**

- **Customer**
  - Next best action
  - Loyalty program
  - Customer experience

- **Operations**
  - Meals, Duty Free optimisation
  - Baggage handling optimisation
  - Repeat defect of assets parts

- **Shared services / Others**
  - Finance – Agents risk of default
  - HR – Employee Attrition
Deep dive into a use-case - Meals

**Business problem:**
- To meet Pax meals first choice
- To reduce food wastage and as a result reduce cost
- To optimize supply chain via better estimation of uplift requirements

<table>
<thead>
<tr>
<th>Challenges</th>
<th>Solution</th>
<th>Outcomes</th>
</tr>
</thead>
</table>
| • Data availability, quality & integration
  • Complexity of changing as-is process involving multiple stakeholders, e.g. catering, suppliers, operations, delivery, finance, ...
  • On Demand Service               | • Predict the demand of main course meal type by flight
  • Ability to provide short-term (t-4 hours) and long-term (t-72 hours) predictions
  • Self-adjusting to new menus and/or recent consumption | • Improved % of Pax meeting their meals first choice
• Saved on fuel & supply chain
• Automated/Simplified            |
Deep dive into a use-case - Meals

**Business problem:**
- To meet Pax meals first choice
- To reduce food wastage and as a result reduce cost
- To optimize supply chain via better estimation of uplift requirements

**Source Data**
- Consumption
  - Pax
  - Flights
  - Cuisines
  - Time
  - Operations

**Data Pipelines**
- Data Pipelines
- Cloud Storage
  - DS Platform
  - DS Scoring Pipeline
  - DS Services

**Operations**
- Operations
- Caterers
- On-demand
- Catering ERP

**Flight**
- Caterers
- Catering ERP
Bigger Data

Charles Girard, Customer Data Officer, Air France KLM
BIGGER DATA

CHARLES GIRARD
CUSTOMER DATA OFFICER
116 COUNTRIES
101.4 MILLION PASSENGERS
314 DESTINATIONS
33 MILLION FOLLOWERS ON SOCIAL MEDIA
548 AIRCRAFT OPERATED
BIG DATA
Data Lake
Value Creation
THE REALITY
Data swamp
GDPR / Privacy
THE SOLUTION
Pain but successful
WHAT WE ACHIEVED

WITHIN AF & KL
360° View
Customer Journey

JOURNEY STAGE
- BOOKING
- PREPARATION
- AIRPORT
- FLIGHT
- ARRIVAL AIRPORT

CUSTOMER EXPERIENCE
- Web search
  - Booking created
- Check in
- Boarding
- Flight departed
- Flight arrived
- Rate the fight

CUSTOMER CONTEXT
- PNR1 CUSTOMER CONTEXT
  - Business/leisure motive
  - Corporate flag
  - Specificities
  - Free & paid services...
- PNR2 CUSTOMER CONTEXT
- PNR3 CUSTOMER CONTEXT

CUSTOMER RECOMMENDATIONS
- Destination
- Paid bag
- Paid upgrade
- Paid seat
- Paid meal
- Paid lounge
IS IT ENOUGH?
Standard : IATA ID
LET'S DREAM

BEFORE

BOOKING

APIS

LOYALTY

CHECK-IN

AFTER

IATA ID

BOOKING

APIS

LOYALTY

CHECK-IN
BENEFITS

Seamless journey
Hassle free preparation
Better insights
Investment rationalization
Improved personalisation relevancy
Leveraging value creation
LET’S SHAPE THE NEW REALITY
How a leading airport has built a wide spectrum of data (AI/data science/BI) capabilities

Sjoerd Blüm, CIO, Amsterdam Airport Schiphol
Networking Break
IATA AVIATION DATA SYMPOSIUM

ATHENS, GREECE  25 – 27 JUNE 2019

DATA SCIENCE & TECHNOLOGY
Introduction

Marie Masserey, Head, Industry Architecture, IATA
How can airlines derive value from data

Moderator: Marie Masserey, Head, Industry Architecture, IATA
Soumit Nandi, MD, Customer Technology Platforms, United Airlines
Dave Weghorst, Business Consultant, Delta Air Lines
Andrew Webster, Digital Business Transformation Manager - Shop Order Pay, IAG
Opening Remarks

Soumit Nandi, MD, Customer Technology Platforms, United Airlines
Key drivers

- Customer centricity
- Retail transformation
- Operational transparency
- Privacy, trust and data ownership
- Technological evolution
Business Architecture

• Intelligent customer channels
• Retail business architecture
  • Customer
  • Storefront
  • Partnership framework
• Transparency end-to-end
  • Operational data exchange
  • Customer transparency
  • Journey management
• Airport as a key logistical hub
• Aircraft operation
Enabling capabilities

- Shared semantics
- Events as triggers for automation
- Identification and identity management
- Location, addressing and discovery
- Distributed data processing
Guiding Principles

- Address industry-wide needs
- Embody diverse perspectives
- Leverage proprietary knowledge
- Consider various legal or regulatory requirements
- Aim for simplicity
- Serve as building blocks for innovations
- Drive interoperability and scalability
- Enable streamlining of development and implementation
- Enable cost reduction and control
- Enable new opportunities
How can airlines derive value from data

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Uncovering value from data

Soumit Nandi
Managing Director – Customer Technology Platforms

@soumit
Tackle tougher problems
Make smarter decisions
Tell better stories
When do we swap a flight?

How can we improve connections?

How do we keep customers informed?
Delayed due to severe weather conditions in our route network (Estimated Departure 1 Hour 30 Minutes Late)

We’re sorry for the delay. The airport has reduced the number of planes allowed to arrive per hour into Guatemala because of ash emitting from Volcano Fuego, impacting your flight. We will provide an update at 10:50am, however your delay may be extended. We appreciate your patience.
Leveraging data is critical to customer centricity.
The Data Revolution
- Deriving Value from Data

IATA Aviation Data Symposium
26th June 2019
The Data Revolution

There has been a step change in:

- Ability to handle and store lots more data
- The accessibility of analytical techniques
- The focus of how we use and create value from our data – *Embedded Analytics*
Big Data: Finally data takes centre stage!

- Data is vital! Everything else starts with the data!
- We must collect and protect our data
- Use new data sources, create data sources
- Flexibility, connectivity at a low cost
- Speed to market – approach turned on its head
Data skills are essential…

- This is becoming far more accessible, tools are amazing … but it is not easy!
- **Skills are vital and in short supply.**
- Big data not as friendly as the Data Warehouse!
- Integration lies with the analyst - Data skills key
- Data is vital – creating interesting data features
- Domain understanding is key in the data phase
- However … the stats/models are far more accessible to most, in some areas (e.g. Deep Learning) domain expertise less important.
We need to put our data to work –

Owning and managing its use from end-to-end

**Collect**
- Collect all types of data structured and unstructured
- Include all open sources of data
- Leverage a single platform with a common application layer
- Write once and deploy anywhere

**Connect**
- Locating, cataloguing and masking data
- Integrate fluid data sets
- Deliver built-in compliance and privacy by design
- Leverage advanced machine learning capabilities
- Creating speed and agility

**Create**
- Deliver descriptive, prescriptive and predictive insights across all types of data
- Empower all your teams and their unique use cases
- Enable advanced analytics and data science methods
As ever the most important part is getting Business Value from all this!

- Increase value by embedding analytics within our Business Processes
- Challenge for the business: Focus on the real questions and desired outcomes not data
- Challenge for the analysts: Not only reframing the business problem but deliver products
Fares Monitor

**Question**: Can we quickly identify fares that may be incorrect?

**Desired Outcome**: Fares are corrected as quickly as possible

**Benefit**: Fares in the market are as we planned

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**Diagram Description**:
- **Tickets (Stream)**
- **Apache Spark**
- **Anomaly Detection**
- **Alerts**

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**Additional Text**:

*Simple, focused, beneficial, big data, right time, embedded*
What has been done? Baggage

Real/Near Real time data being combined to enhance Business Processes

Can we give early warning to Baggage Hall of arriving flights with delays in removing bags?
Big Data: To recap…

- Data is vital! Everything else starts with the data!
- We must collect and protect our data

**Industry Standards help us achieve this along with common data definitions from the AIDM**

- Flexibility, connectivity at a low cost
- Speed to market – approach turned on its head
How can airlines derive value from data

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ATSB and Passenger Standards Governance

Single combined Passenger Services and Tariffs Conference

Steering Group

Plan Board
- Scheduling (SSIM)
- Coding
- Interline

Shop-Order Board
- Ticketing
- Reservations
- Offer and Order Management
- (NDC, ONE Order)
- Intermodal
- Tariffs and Currency

Travel Board
- Baggage
- Passenger Experience
- BCBP
- Airport Handling
- Common Use Facilitation
- Intermodal

Pay-Account Board
- Reporting (DISH)
- Fraud
- Payment

Architecture & Technology Strategy Board
- Data Exchange
- Interoperability
- AIDM
- Architecture
- Data Security

ATSB and Passenger Standards Governance
Networking Lunch

IBM
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