ENHANCING AVIATION INDUSTRY EXPERIENCE USING IOT

IoT Slam, April 22, 2016

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Imagination at work

Collaborative Problem Solving

- Aviation Industry – Very Infrastructure cost intensive:
  - Aircrafts
  - Jet Engines
  - Airports (Buildings & Ground Assets)
- Room for improvement in Operational Efficiencies in Aviation both in aircrafts and airports (where passengers intersect with airlines)
- Complex eco-system (city, airport, airline, passenger, service providers, regulatory landscape)

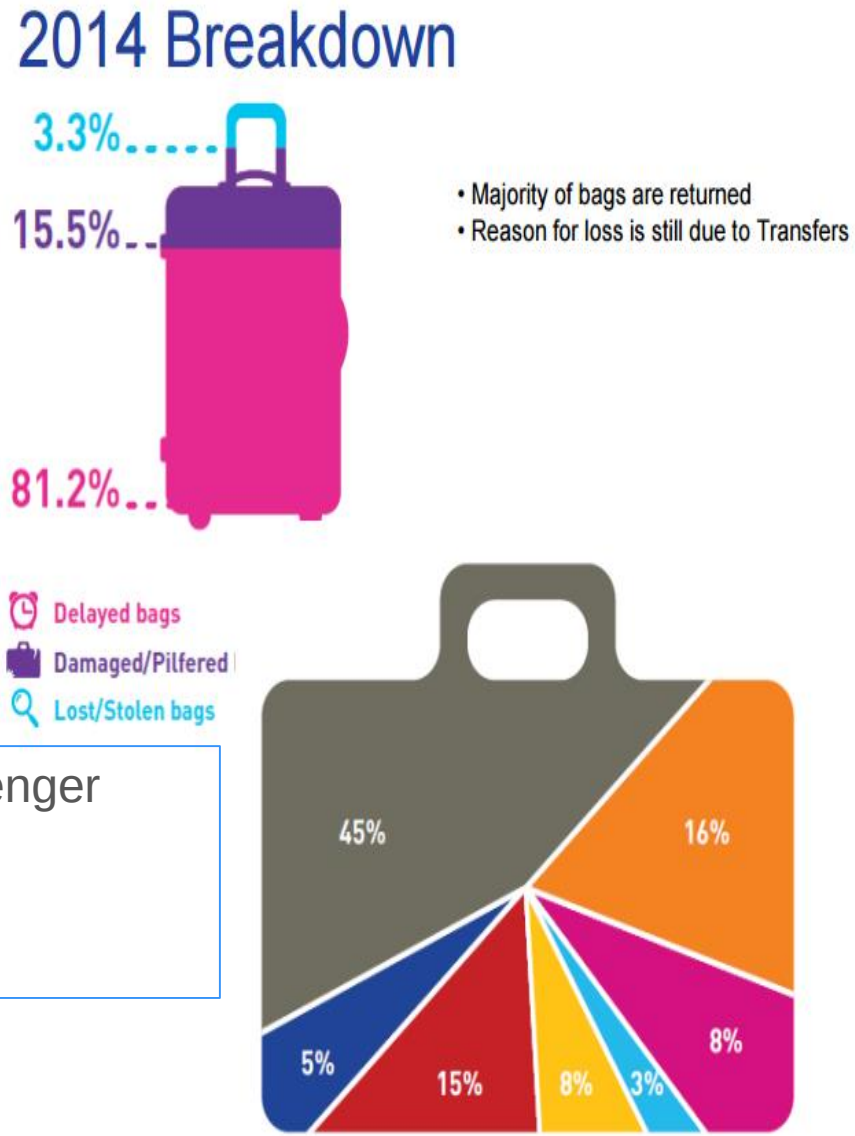
Opportunities to Improve Baggage Handling

Delays (81.2%)

Damage(15.5%)

Theft (3.3%)

45% delays due to transfer related issues



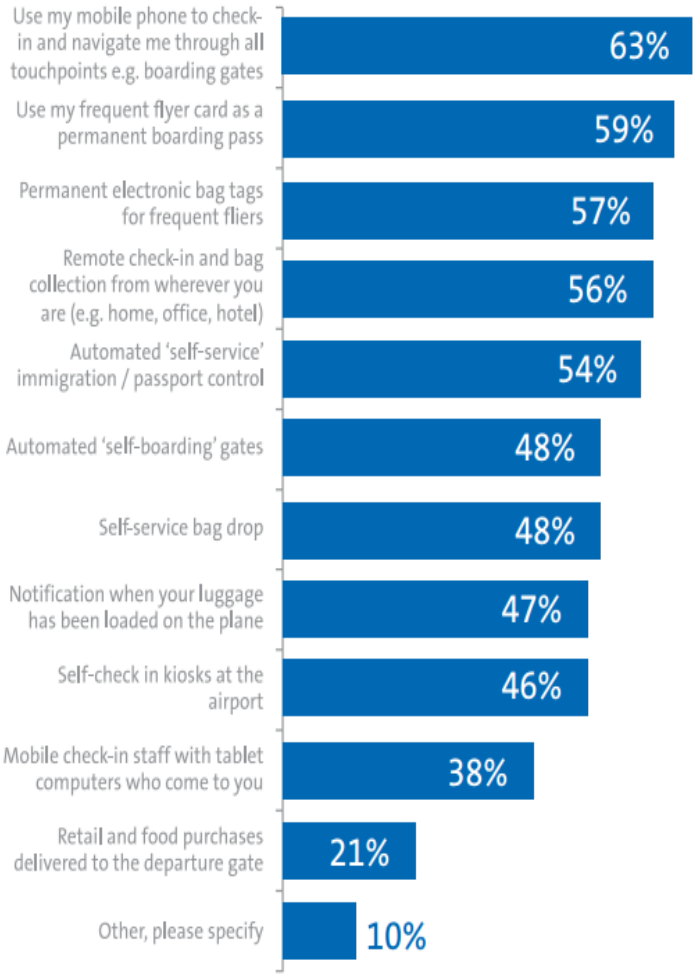
Aviation Industry Avg Passenger operating cost=$216
Cost to repatriate a delayed bag=$100

Business Viewpoint / Vision

- A recent Amadeus Study highlights that airline passengers expect significant improvement in their experience around the airport. Note that baggage is a recurrent theme.
- In response to such customer needs, the regulatory bodies such as IATA have proposed the Res 753 (Fig 4). We envision such a solution for the airlines and airports to help meet this requirement.
- It will improve the passenger experience as well. All the bag related elements of the below survey, can be accomplished by this solution namely:
  - Used of a permanent / reusable bag tag
  - Remote bag check or bag drop (expanded services)
  - Self-service bag drop
  - Passenger notification of status of the bag

Business Value:

- Reduce by 1% or more, the $2b/yr loss due to baggage exceptions



Developments that Airline Passenger Want in Next 5 Years[4] (Amadeus Study)

Role of the EcoSystem - IIC

www.iiconsortium.org/test-beds.htm

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Testbeds are a major focus and activity of the Industrial Internet Consortium and its members. The Testbed Working Group accelerat
and serves as the advisory body for testbed proposal activities for our members. It is the centralized group which collects testbed ide
members with systematic yet flexible guidance for new testbed proposals. Our testbeds are where the innovation and opportunities
applications, new products, new services, new processes – can be initiated, thought through, and rigorously tested to ascertain their
Learn more about testbeds in general and specific testbeds below.

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Industrial Internet Consortium (IIC), a not-for-profit group of public and private institutions that focuses on:

Best practices, reference architectures, case studies

Developing use cases and test beds

"The rise in the Internet of Things (IoT) will see traditional manufacturing companies emerge as **credible** software vendors in the future", according to Gartner.

Founding members:

at&t GE intel CISCO IBM

Other Members: Boeing, Oracle, M2MI

INTERNET OF THINGS/M2M

Oracle, GE team up to digitally connect global industrial internet

M2M 16:11, April 22 2016

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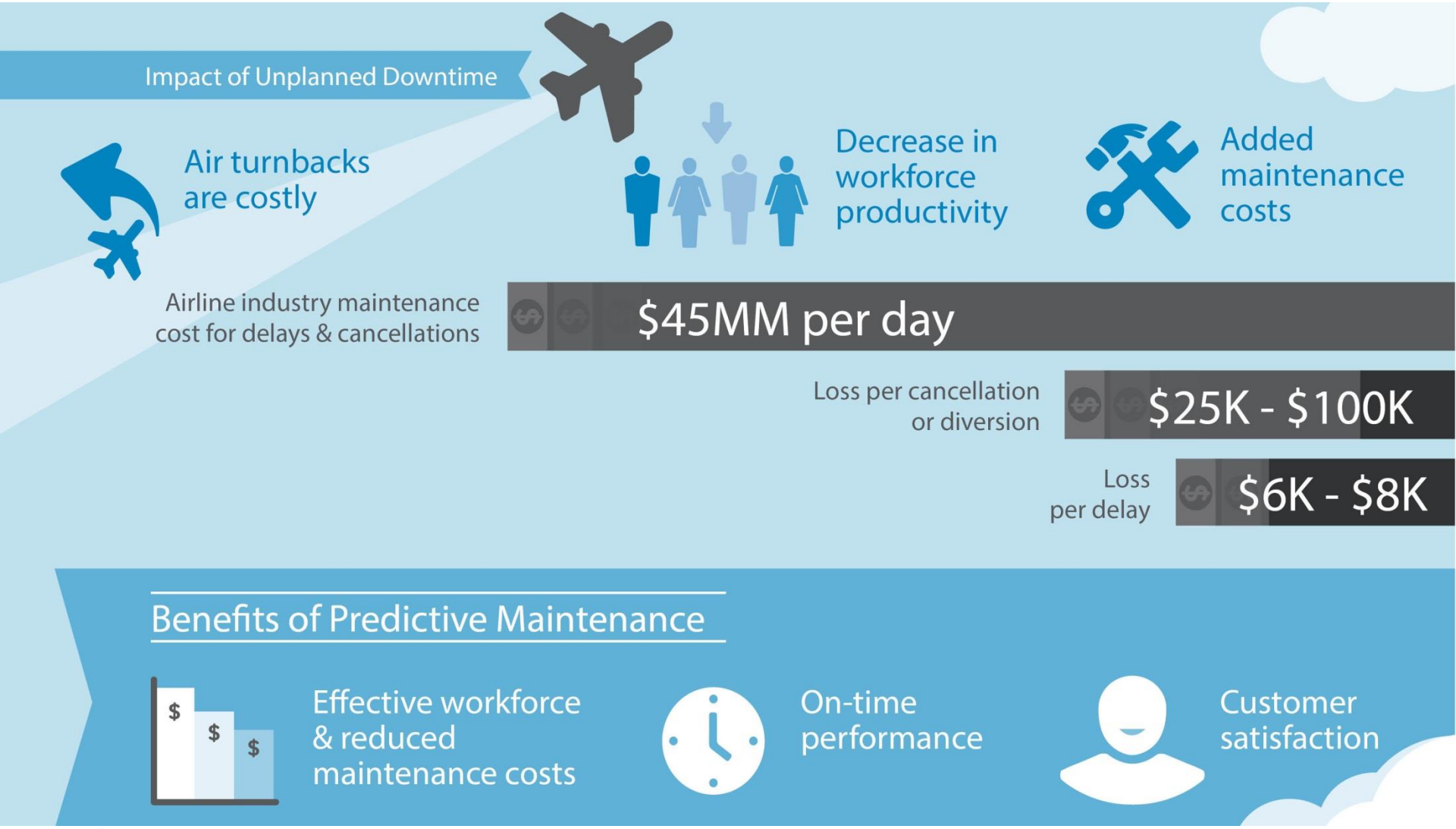
News: GE Digital and Oracle will develop and integrate complementary solutions across their product portfolios.

General Electric (GE) and Oracle are to join forces on a new platform which aims to help companies digitally connect industrial assets globally.

Aviation Business productivity



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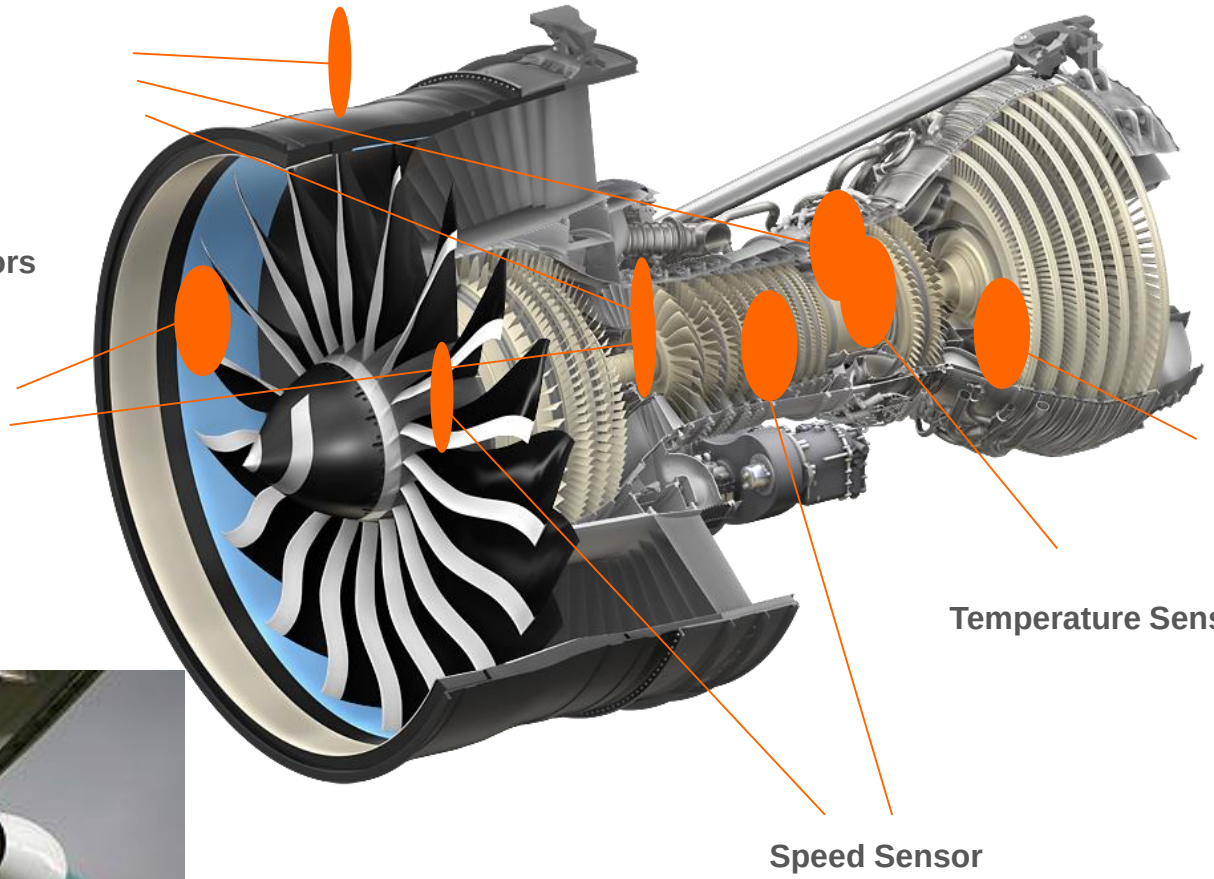
Airplanes are Talking (we're listening!)

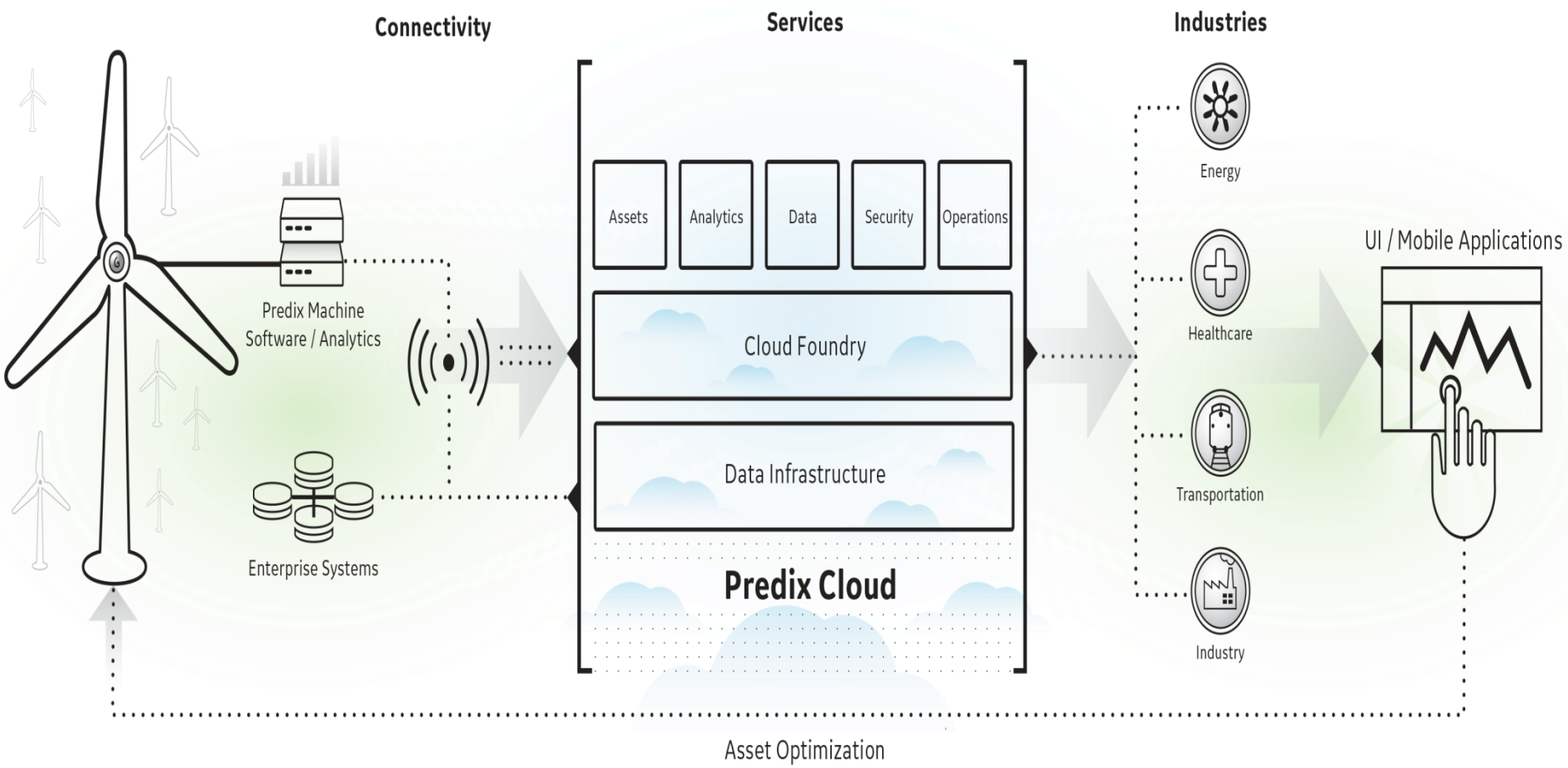
Today - Jet Engine Sensors



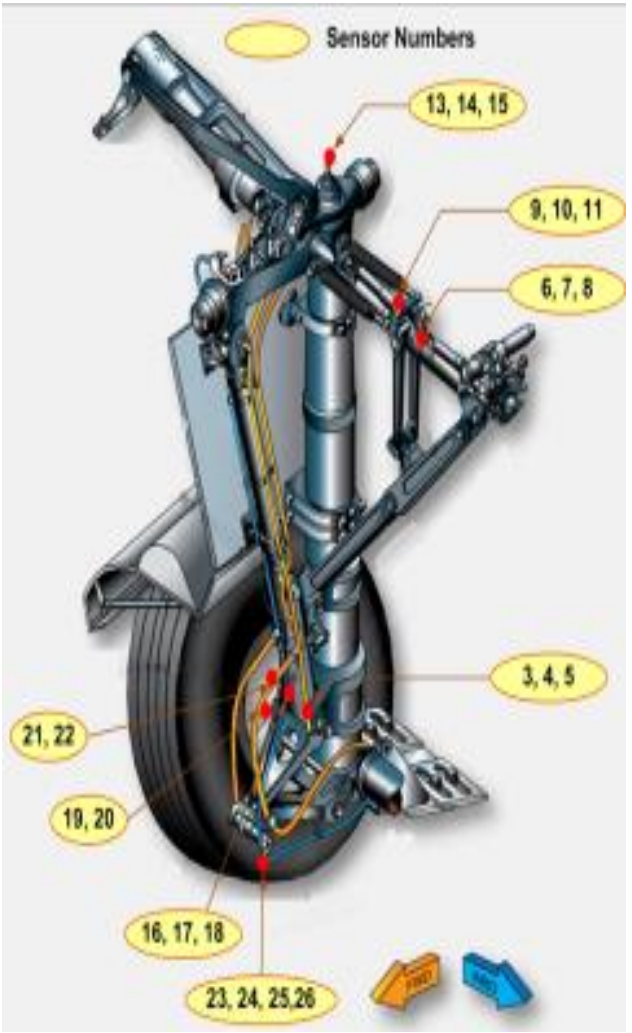
GE90X in Cathay Pacific

* Simplified view of some of the sensors

How to Monitor Asset (Things) Performance? High Level View

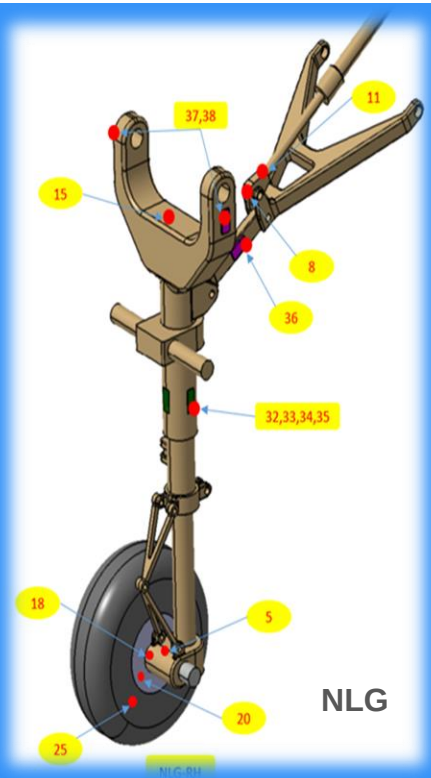


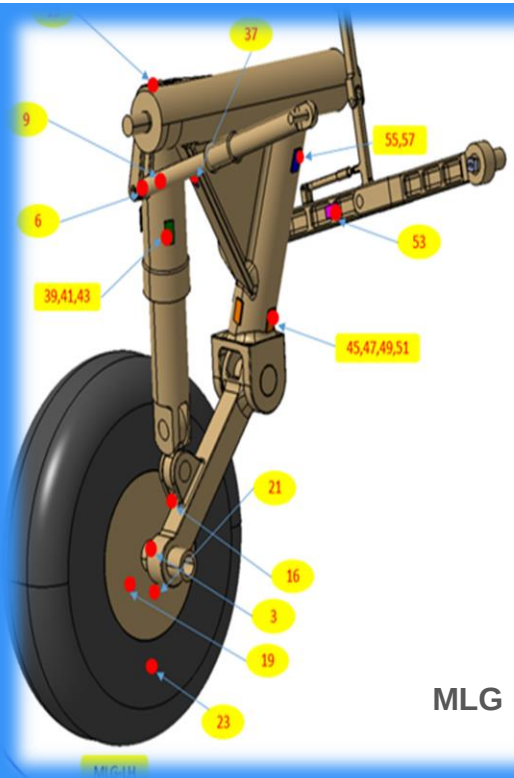
Landing Gear and Sensors

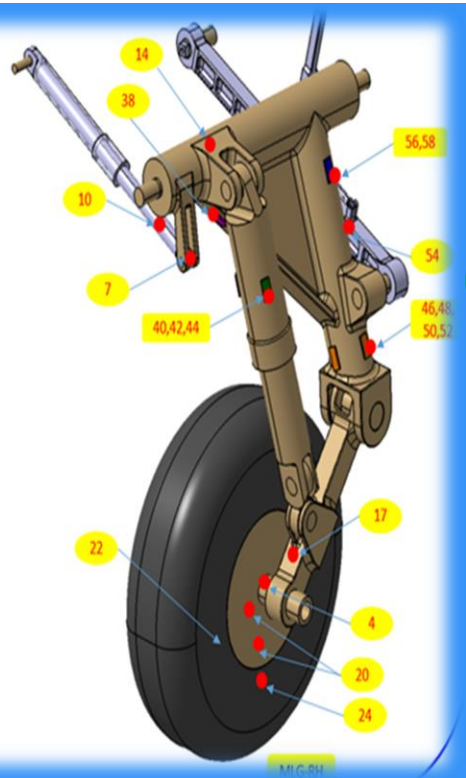


Graphic Provided by Infosys

Digital Twin – Aircraft Landing Gear







1. **Failure Mode Analysis**
2. **Sensor Identification & Networking**
3. **Diagnostics & Prognostics**

Sensing ex: **Tire pressure, Drag, Side & Vertical Load, Brake Temperature, Brake pressure**

Graphic Provided by Infosys

Baggage Related Satisfaction

Out of 2/3 of passengers who check baggage for their flight, 52 percent indicate they had to wait 15 minutes or longer to receive their baggage, among whom satisfaction is 711, compared with 751 among those who experience a shorter wait time.

The above data implies that other expanded services can be sold to passengers around baggage, provided it reduces/eliminates wait and has lower delays/damages to the bags.

http://www.jdpower.com/sites/default/files/2015057%20NA%20Airline_%20(FINAL).pdf

How Airline Baggage Handling Systems Work?

A baggage-handling system has three main jobs:

- Move bags from the check-in area to the departure gate
- Move bags from one gate to another during transfers
- Move bags from the arrival gate to the baggage-claim area

The measure of a successful baggage-handling system is simple: Can the bags move from point to point as fast as the travelers can?

If the bags move slower, you'll have frustrated travelers waiting for bags, or bags failing to make connecting flights on time.

If the bags move too fast, you might have bags making connecting flights that passengers miss (is that important?)

Airlines mishandled 21.8 million bags, or 6.96 per 1,000 passengers in 2013, according to SITA, an aviation communications and technology company that tracks baggage performance each year.

http://science.howstuffworks.com/transport/flight/modern/baggage-handling.htm

Erosion of the Passenger Experience

07:28

1937 BUR to EWR

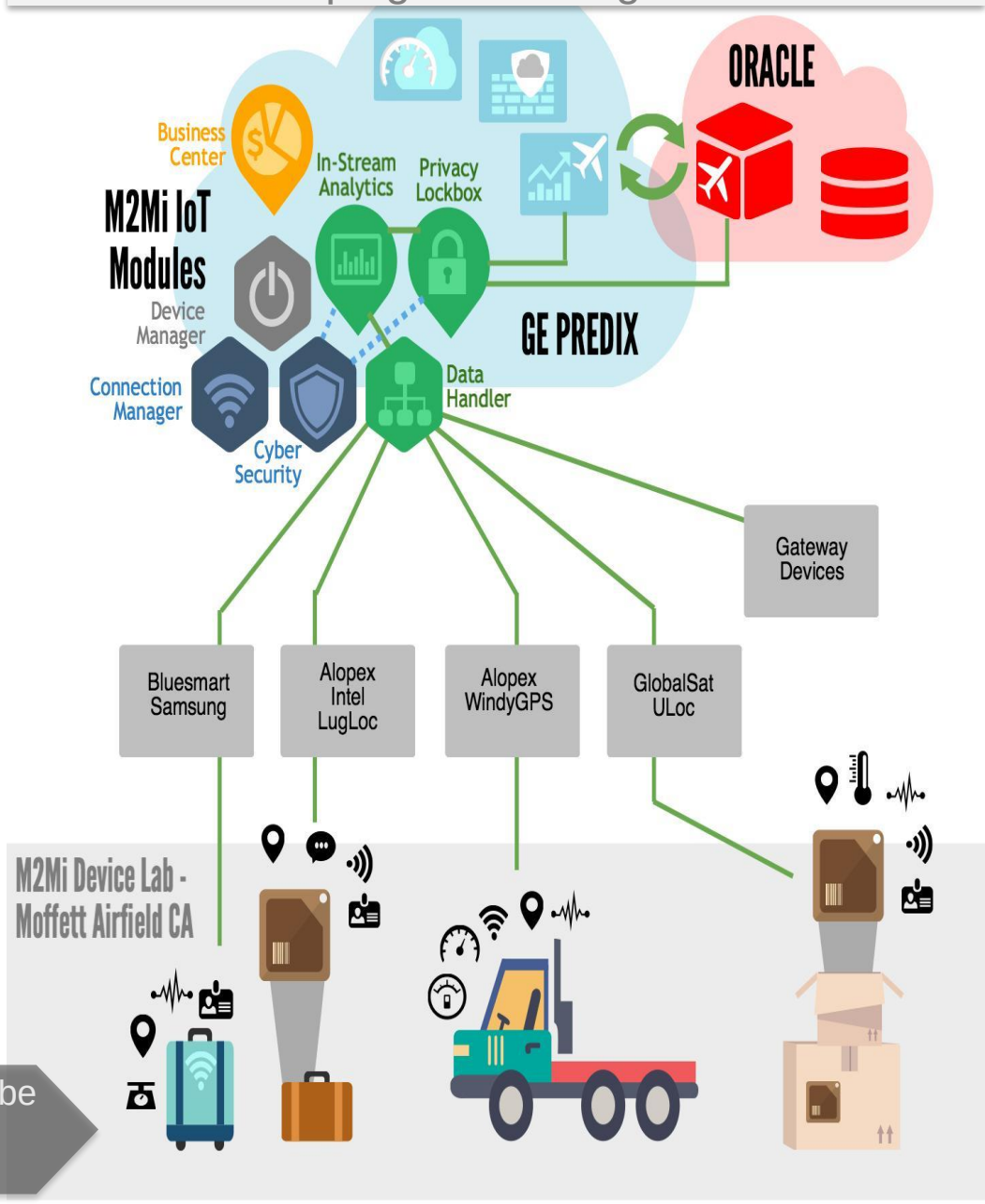
05:18

2015 **LAX to EWR**

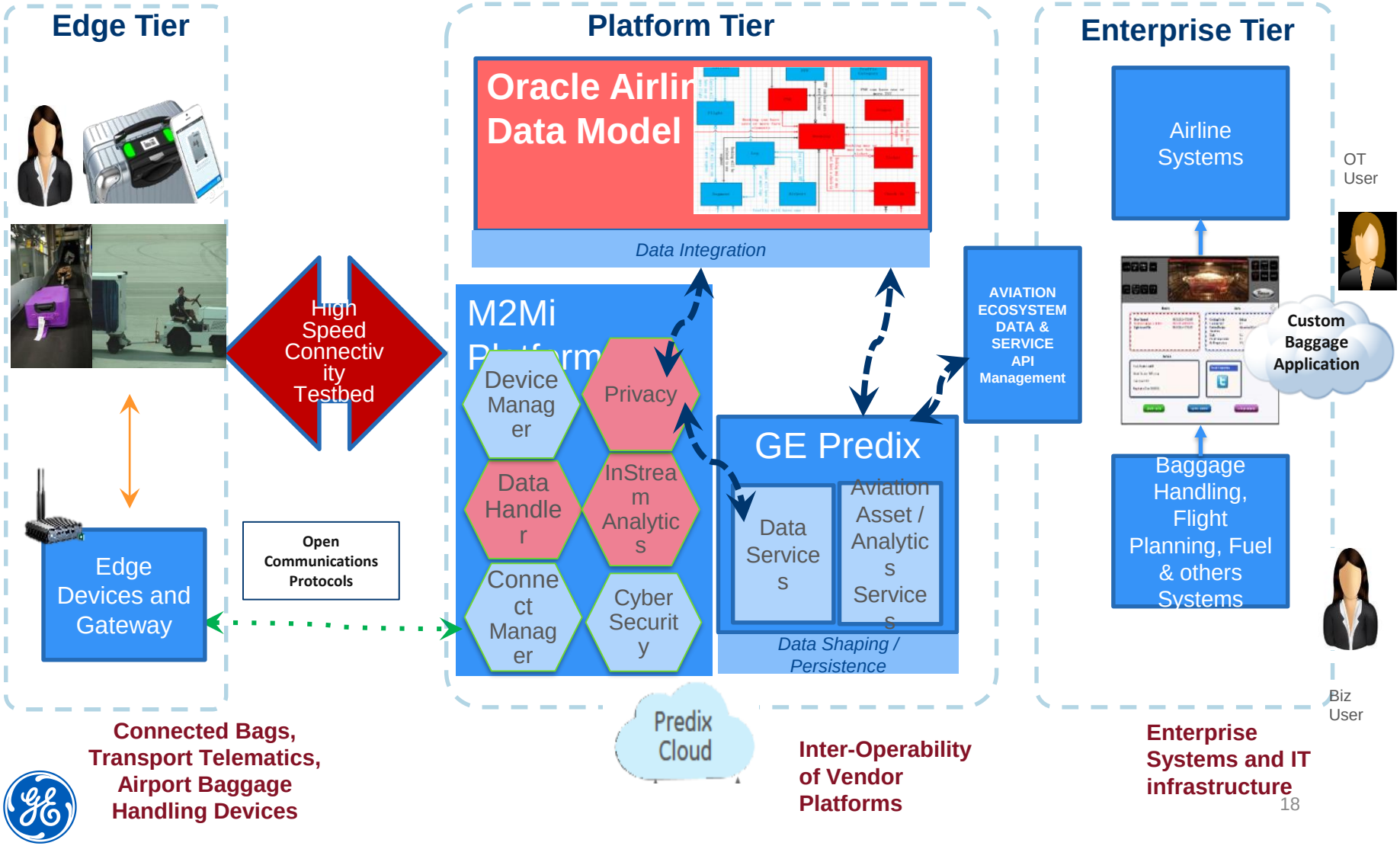
Door-to-Door trip time may actually be more today than in **1937**.

Testbed: Functional View

A Solution with an Altitude!



Smart Airline Baggage Management - Platform Architecture



Wrap Up

Airline industry – challenges and passenger experience

Collaborative problem solving

Smart Baggage Management

Future State – Intelligent Airports

Q&A

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Thank You!