Triumph Group

Triumph Group's specialized companies are divided into three unique Business Units: Integrated Systems, Aerospace Structures, and Product Support.

Updated 07/09/2018

Engineering

A highly skilled team professionals paired with our world-class test lab and advanced tooling process

Manufacturing & Assembly

Manufactures, finishes, and assembles components and sub-assemblies from nearly every material used in the industry

Systems

Designs, develops and supports proprietary components, sub-systems and systems

Support

Tailors solutions to best fit any operator or platform by providing rotables and alternate repair solutions to help mitigate cost risks

1

Terry Lim – Regional Director, Business Development Asia
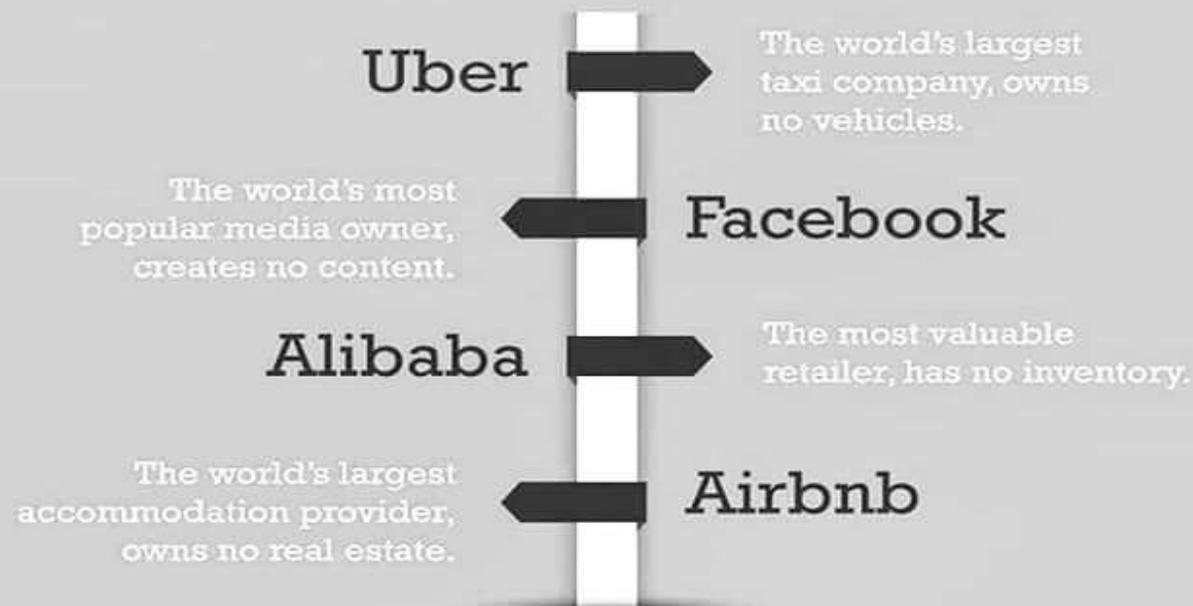Triumph Group Inc. – Triumph Product Support group

Are we ready for Disruption?

Crime prediction software

Your data's has Value!

How Facebook's Trending Topics is like Minority Report

Source/credit: Minority report movie,
https://www.onlinesalesguidetip.com/wp-content/uploads/2015/07/minority-report.jpg-580x270.jpg
https://www.google.com/search?q=minority+report&tbm

Market/Industry Disruption

Uber — The world's largest taxi company, owns no vehicles.

The world's most popular media owner, creates no content. — Facebook

Alibaba — The most valuable retailer, has no inventory.

The world's largest accommodation provider, owns no real estate. — Airbnb

Something interesting is happening.
TOM GOODWIN

wetp@int
creative digital solutions

/WetpaintMENA

High Valuation companies!!!

The four V's of Big Data

Volume
(Scale of Data)

- 6Bil people have Mobile phones (7bil world population)
- Most companies in USA has at least 100 TERABYTES
- Est. 2.5 QUINTILLION BYTES created each day (2.3 Trillion GIGABYTES)
- B787 create half a TERABYTES of data on ave. per flight

Variety
(Different forms of Data)

- Structured or Unstructured
- Tweeters; est.400 mil tweets are send per day by 200mil active monthly users
- Youtubes video; 400Bil+ hrs of video are watch on youtube each months & facebook contents ~30Bil shared
- Fleet of several thousands B737/767/777/787 generate Exabytes & ZettaBytes

Velocity
(Analysis of streaming data)

- Modern cars have close to 100 sensors that monitor items such as Fuel level & Tires Pressure
- Airplanes have sensors that collects data on Altitude, Speed, Stability, Engines performance during flights (to improve aircraft performance and Safety standards)

Veracity
(Uncertainly of Data)

- Accuracy of data in making business decision (fake news?
- Up to 27% respondent in one survey was unsure how much of their data was inaccurate
- Inaccurate or inefficient collection of data can cause aircraft downtime (AOG)

Big Data – making it simple

Get insights from your data with aron

Capture, store, analyze and visualize on a single platform
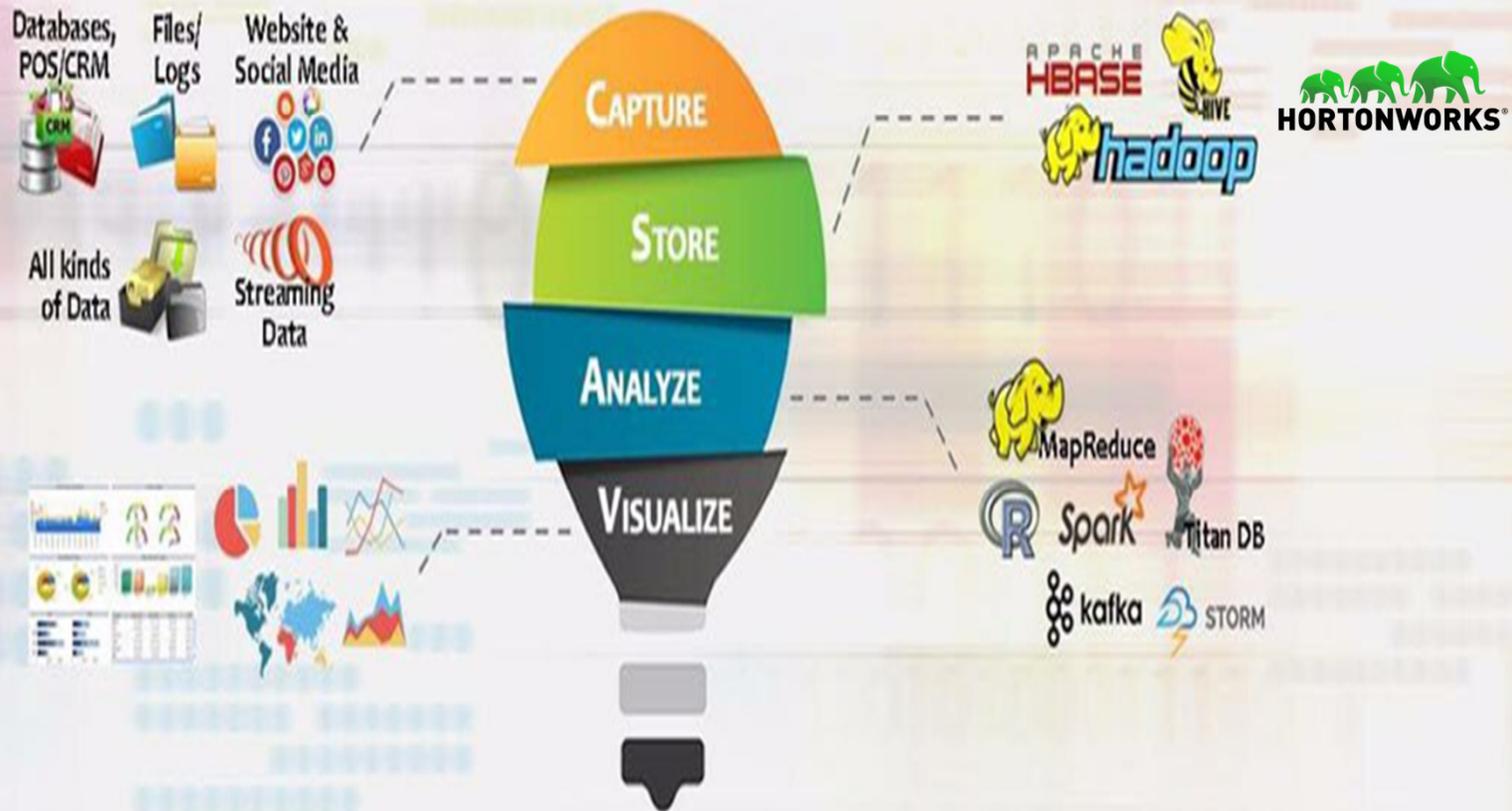
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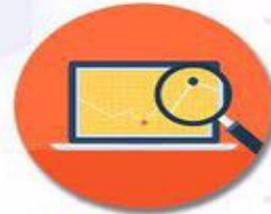
A UNIFIED INTERFACE TO HADOOP

COLLECT **TRANSFORM** **EXPLORE** **ANALYZE** **SHARE**

Get insights from your data with aron
Capture, store, analyze and visualize on a single platform

Retailers
Track inventory
Identify customer traffic patterns
Optimize pricing
Reduce theft

Trucking & Logistics
Real-time engine diagnostics
Calculate shortest path
Reduce vehicle downtime

Financial Services
Targeted marketing
Fraud detection

Social Commerce
Social media analytics
Generate product recommendations
Analyze website user behavior
Target marketing

Manufacturers
Predict machine failure
Reduce defect rate
Identify fraud patterns

Consumer Products
Identify trends
New product feedback

Application for Big Data

Smarter Healthcare

Finance & Banking

Social Media & Marketing

Homeland Security

Telecom & Communications

Trading Analytics

Multi-channel sales & Retail

Aerospace/Aviation & MRO

Fraud & Risk

Why Big data is transforming the Aviation/MRO Industry

"Airbus's latest model, the A350, can transmit around 400,000 parameters per flight – some 60% more than the A380…"

"The older generation A320-family jets provide 400 parameters per flight. According to a 2016 Oliver Wyman MRO Survey, the global fleet of commercial aircraft could generate a massive 98 million terabytes of data per year by 2026"

https://www.wearefinn.com/topics/posts/big-data-two-little-words huge-impact-in-aerospace/

Could operators, MRO able to effectively and efficiently handles these data's and drives business value?

Aircraft Global demand are up, fleet expansion, number of Hubs increasing.

"The pressure is on for aircraft and engine makers to add more sensors to enhance the real-time picture of what's happening with planes in flight….."

Ref/credit: https://www.oliverwyman.com/our-expertise/insights/2018/sep/oliver-wyman transport-and-logistics-2018/a-decade-of-mega-disruption.html
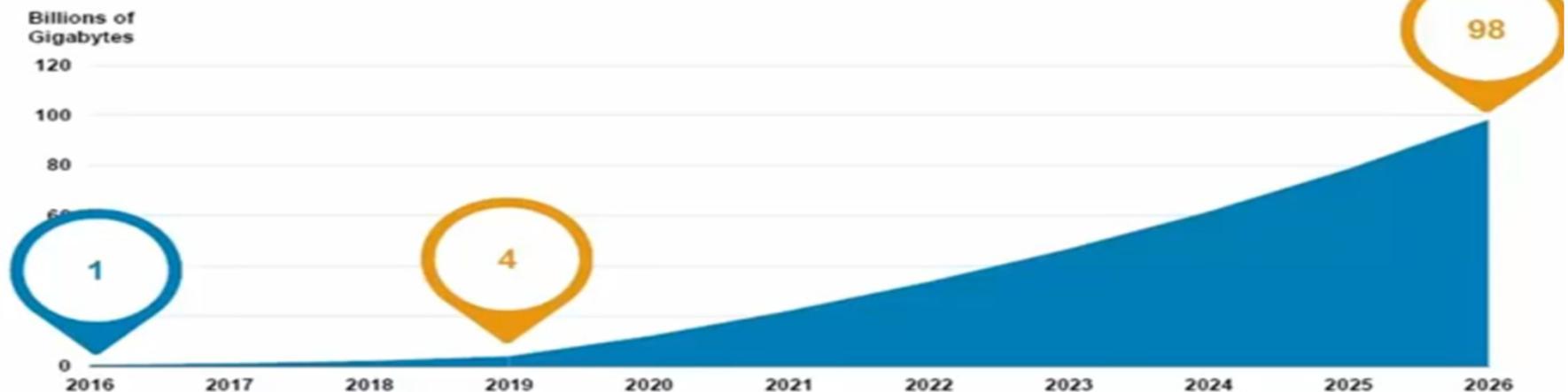
Data's and more Data's

- **Sensors:** collection of data's ie. Speed, Altitude, Position/GPS, pressure, Engines & components performance etc..

- **Performance:** To improve performance of aircrafts, reliability (downtime), raise safety standards

- **Commercial fleet growth** of several thousands B737/767/747/777/787 could generates Exabytes Zettabyte of data

Global fleet will generate 98 Bn Gigabytes of data by 2026

Next generation aircrafts are equipped with new technologies and sensors enabling unprecedented Collection and transmission of data at both the system and part level

Global In-Service Fleet Data Generation per Year by Year

Billions of Gigabytes

Year	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026

Values shown: 2016: 1, 2019: 4, 2026: 98

Source: Oliver Wyman

Predictive Analysis Landscape OEM & MRO

Business Digital Transformation

2015

GE

Digital Collaboration center Teradata Analytics

2016

AIR FRANCE KLM

Prognos

The MRO Lab — Adaptive Innovations

SAFRAN

Analytics Division

2017

Honeywell
- GoDirect services
- Avasio

AIRBUS

Skywise Palantir

BOEING

Analytx

ROLLS ROYCE

R² Data Labs

2018

SAFRAN | **SIA ENGINEERING COMPANY**

SIAEC and Safran to partner on data analytics for aviation industry

United Technologies

UTC Acquires Predictive Analytics Provider **Predikto**

ST Aerospace
A company of ST Engineering

ST Aerospace leverages Big data analytics - predictive maintenance and inventory processes

Impact to Airlines Operations

OPPORTUNITIES?

🌐 Airline Operation Data & Analytics

- Can reduce aircraft downtime, more aircraft availability for passenger service >> higher revenue
- capture airline arrival/Dep, weather conditions, optimize fleet Mgt planning/utilization & crew assignments >> cost savings

🌐 Passenger Services & Analytics

– flying patterns, destinations, spending, bookings/cancellation >>improved customer satisfaction, loyalty & increase revenue

Impact to MRO Industry

OEM & MRO Opportunities

- **Design** - **Collection of Data & Analytics by OEM (Boeing, Airbus etc..)**
  - Adjust to aircraft design, Engine performance (more Fuel efficient, reduce emission & noise) and predict maintenance activities

- **Predictive MRO & Aftermarket-**
  - **Components/Part MRO: Predictive maintenance on components/parts to be replace ahead of time (prevent unscheduled) >> reduce AOG/ground time**
  - **Spares: Airlines usage patterns via MRO predictive analysis >> Efficient supply chain**

Impact to MRO Industry

OEM & MRO Opportunities:

- **Predictive MRO & Aftermarket** -
  - **Airframe & Engine MRO: aircraft maintenance schedule/checks forecast >> increase productivity & efficiency**
  - **Data's & Digitalization would shape the MRO market >> reduce in-shop & hangar time (pressure on labor and costs)**

Impact to MRO Industry

OEM & MRO Opportunities:

🌐 **Aftermarket** -

- OEMs are entering into this segment/market (aftermarket packages with data's analytics) to compete with MROs e.g. PBHr, Pooling/Asset strategy
- OEMs entering into the airline MRO sector as biggest disruptor with digitization Technology (ie. IPs)

Questions:
Will predictive maintenance push
Airlines to OEM aftermarket packages?

Impact to MRO Industry

Smart MRO Hangar of the Future:

PRODUCTION ASSETS

Tool_Chest123
TransporterA45
Tool_Cabinet85C
Parts_TrolleyA12
Mobile_JigB19

Ref: https://www.mro-network.com/emerging-technology/mro-drone-and-ubisense-join-forces-new-smart-hangar-solution

MRO Industry

OEM & MRO Opportunities:

Smart MRO Hanger of the Future:

➤ THAI & Airbus Gears Up for 'Smart' Plane Hangar at,
U-Tapao airport into an expensive smart hangar with the most state-of-the-art technology in Southeast Asia

➤ AAR & Indamar Aviation developing Airframe MRO facility in Nagpur, India

➤ ST Aerospace - adopting advanced technology such as robotics, Augmented Reality/AR, aerial inspection and data connectivity to enhance workplace safety, automated Toolcrips, yield productivity...

Are countries investing in Digital MRO system?

E.g. Singapore holds est.10% of the global MRO market as it invested heavily in digital MRO system
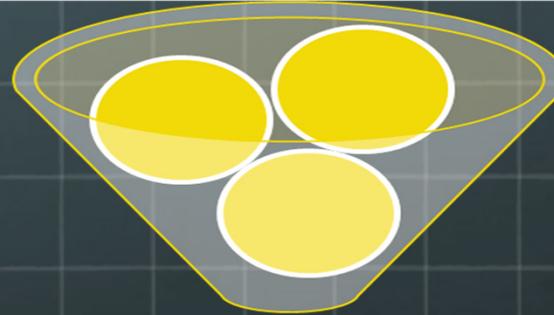
Ref: https://aviationvoice.com/thai-gears-up-for-smart-plane-hangar-2-201607110959/

MRO Industry

- **Smart MRO Hanger of the Future:**

  ➢ **MRO Japan**

那覇空港内で建設中の格納庫

http://www.mrojpn.co.jp/

Technology will improve repair and save time as well as boost efficiency

Future Driven by Big Data!

easyJet signs Skywise Predictive Maintenance agreement with Airbus for its entire fleet

EasyJet Airlines CEO: quote '''ultimately data is a key enabler for us. It is the game changer, capturing and using this data to reduce cost, increase efficiencies, drive revenues and improve experience.''

Wizz Air signs up for AVIATAR
Wizz Air becomes partner for Lufthansa Technik's platform AVIATAR

Scoot partner with Qualtrics, predictive intelligence machine & AI

HNA Group subsidiary Hainan Airlines will become the first airline to use Honeywell's GoDirect Maintenance Service program, which Honeywell has designed to use connectivity and data analytics to improve maintenance operations and reduce equipment downtime

KLM-AirFrance PROGNOS - Predictive Aircraft Maintenance

CEFA Aviation and GE Aviation partner in Flight Analysis and Animation

Air New Zealand partners with JetBlue Technology Ventures in Silicon Valley