Use of “Big Data” in ICAO and the United Nations

ICAO HQ, Montréal

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Overview

- Reflections on Big Data
- Big Data and the UN
- Big Data and Aviation
- ICAO's engagement
- Way Forward

"Big data are a source of information and intelligence that have been gathered from a recorded action or from a combination of records"

- **Records of Supermarket purchases (Walmart tracts > 1 mil. Transactions/hour)**
- **Road tolls, train, ship, aeroplane, mobile tracking devices, navigation systems**
- **Telephone operators and satellite sensors and electronic images**
- **Credit and debit payments, trading and settlement platforms**

The list seems endless as more and more information becomes public and digital

SOUTHWEST

- Analysis of sensor data to identify patterns indicating potential malfunction or safety issue;
- Enables to make reparations without interrupting flights or putting passengers at risk.

BOEING

- Perform ASBU analysis for operational efficiency
- Improve performance and customer experience

KAYAK

- Creation of a predictive model for users of flight price fluctuation within the upcoming week;
- Tracking of flights improve the algorithm.

UNION PACIFIC

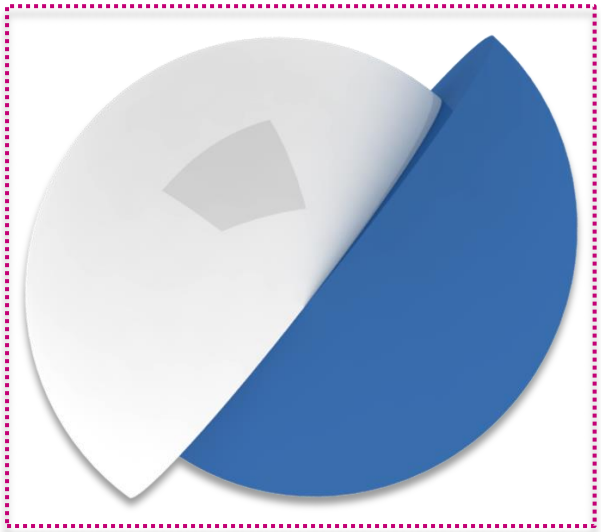
- Prediction of potential derailment days;
- Derailment reduced by 75%.

AIRBUS

- Optimize fleet management and operations
- Enhance operational efficiency

Factors Facilitating advance in Big Data

Reduced costs of data collections, storage and processing	New sources of data & Improved access to existing data	Broad spectrum of utility for already collected data	Creative and powerful new methods to exploit Big Data



Advantages

- Significant increase in scope and coverage
- Significant decrease in costs
- Improving accuracy , transparencies and timeliness
- Leapfrog to more efficient technology for countries without proper statistical programs
- More cost effective and productive technology

Challenges

- Methodologies and Definitions to match that of official statistics
- Perceptional differences
- Public Private partnerships
- Capacity Building

Big Data & the United Nations

- A transformative tool for official statistics;
- Potential to improve accuracy and reducing costs for official statistics;
- UN Global Working Group to:

*"provide a strategic vision, direction, and a global programme on big data for **official statistics**, to promote practical use of sources of Big data for official statistics, while finding solutions to their challenges, and to promote capacity building and sharing of experiences in this respect."*

ITU International Telecommunication Union	Use of mobile data by ITU – population displaced by epidemics and natural disasters
OECD BETTER POLICIES FOR BETTER LIVES	Geospatial and web data for OECD statistics – transport studies , environmental indicators, economic studies, and governance indicators
UNIVERSAL POSTAL UNION	End to end predictability for international e-commerce
THE WORLD BANK	Developmental indicators
eurostat	Integration of big data into EU official statistics
UNIDO UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION	Industrial statistics; employment index
EUROPEAN CENTRAL BANK EUROSYSTEM	Macroeconomic now casting
Food and Agriculture Organization of the United Nations	Remoting sensing for agricultural statistics and forecasting

UN Global Working Group (GWG) on Big Data for Official Statistics :

GWG Task Teams

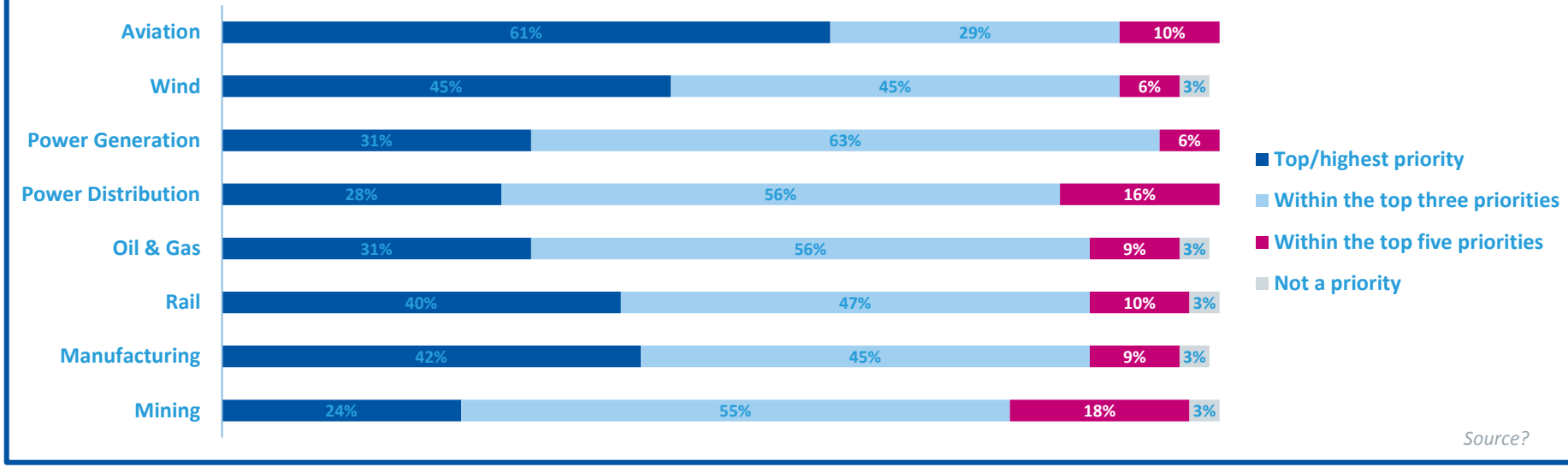
1. Advocacy and Communications
2. Linking Big Data and SDGs
3. Access and Partnerships
4. Training, Skills, and Capacity Building
5. Cross-Cutting Issues
6. Mobile Phone Data
7. Satellite Imagery
8. Social Media Data

ICAO is a member of GWG Task Teams

The report of the global working group (GWG) on Big Data for official statistics was prepared in accordance with Economic and Social Council decision 2015/216 and past practices.

From Accenture study, big data Analytics has become the highest priority for aviation industry:

Data Analytics Priorities in Industry - Accenture Study

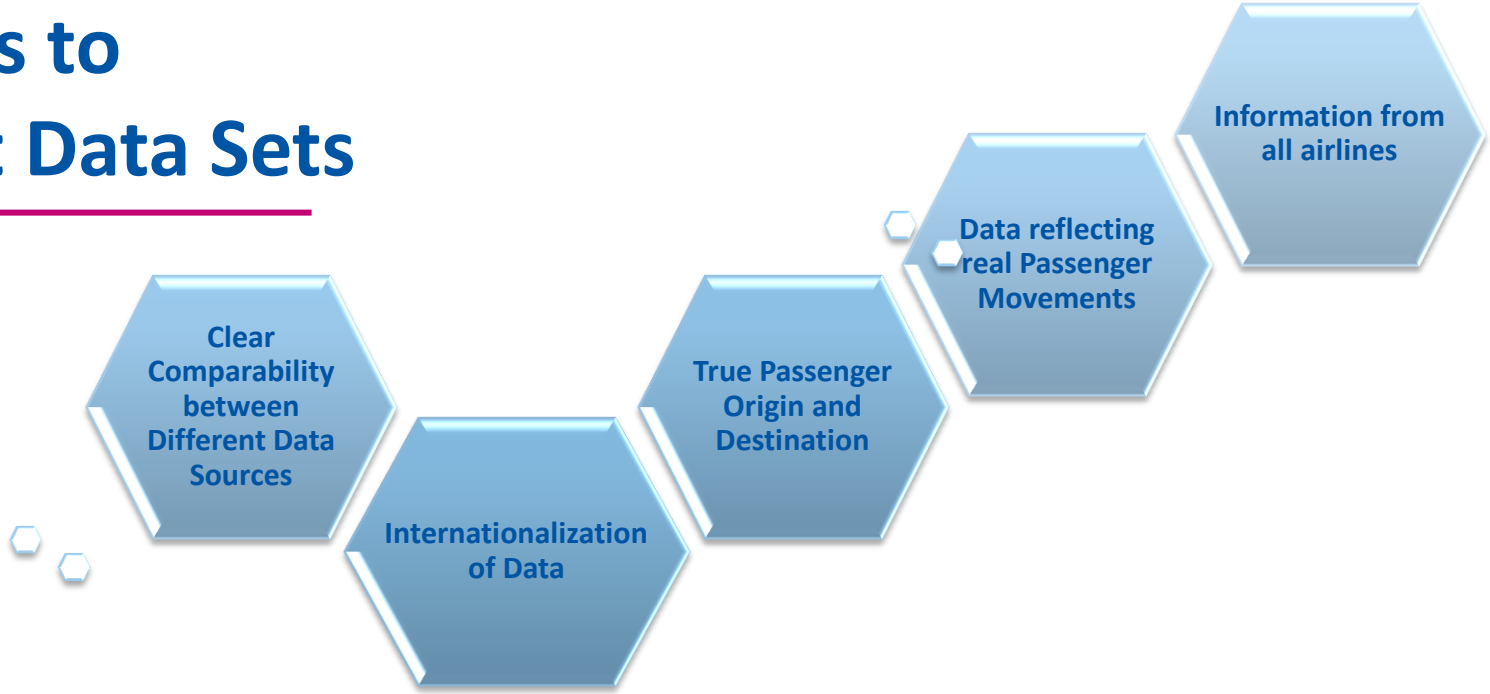


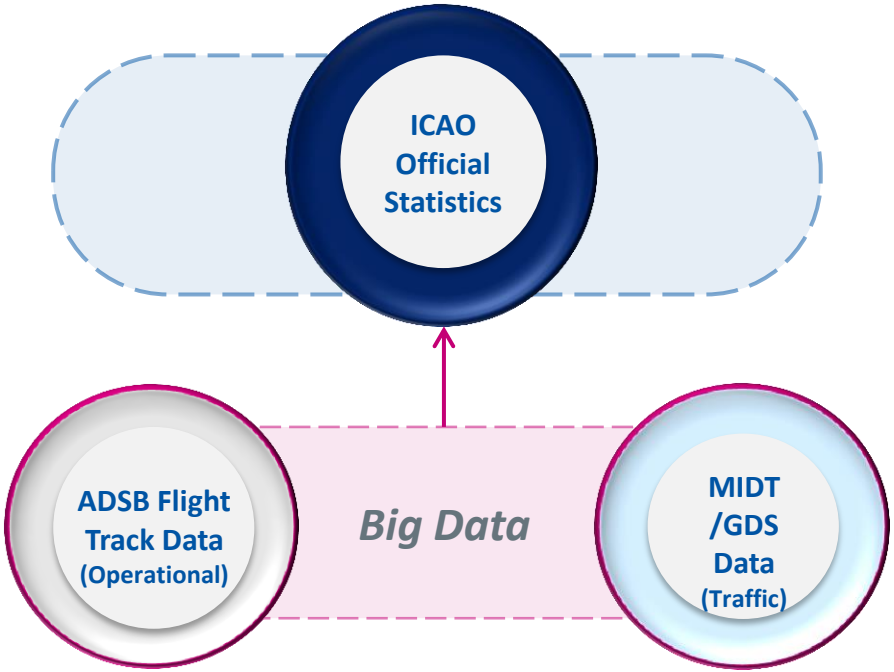
Source?

Big Data & Aviation

- 33 million flights per year
- 3.3 billion passengers per Year
- 3927 Airports worldwide with scheduled services in 2014
- 191 contracting States
- 1400 scheduled commercial airlines
- 54495 city pairs
- 173 ANSP

Benefits to Current Data Sets



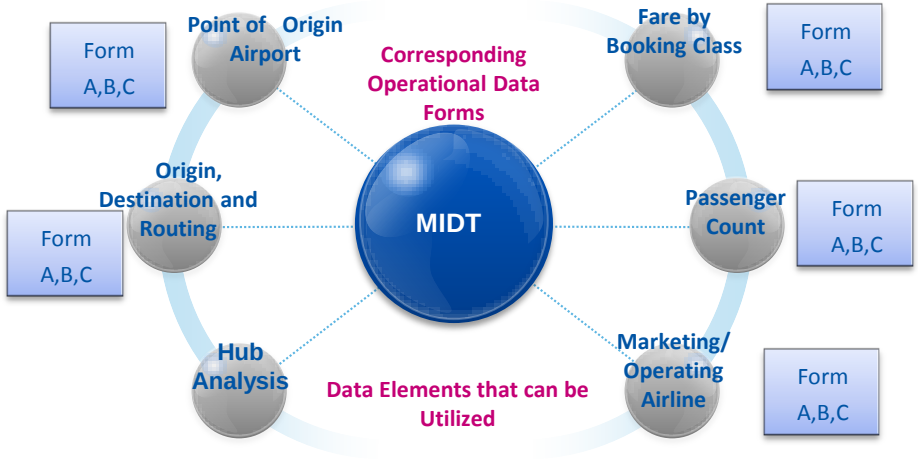


For the first time an opportunity exists to gain insights from the big data that cannot be done using localized data sets at low cost and high efficiency :

- Informed policy making
- Implementation
- Meet Strategic objectives
- Give States what is needed
- Improve coverage to nearly 100%
- Reduce costs

MIDT Data

- Marketing Information Data Transfer (MIDT) are the bookings made in the global distribution systems(GDS) covering 3.3 billion passengers with the ability to see their true Origin/Destination



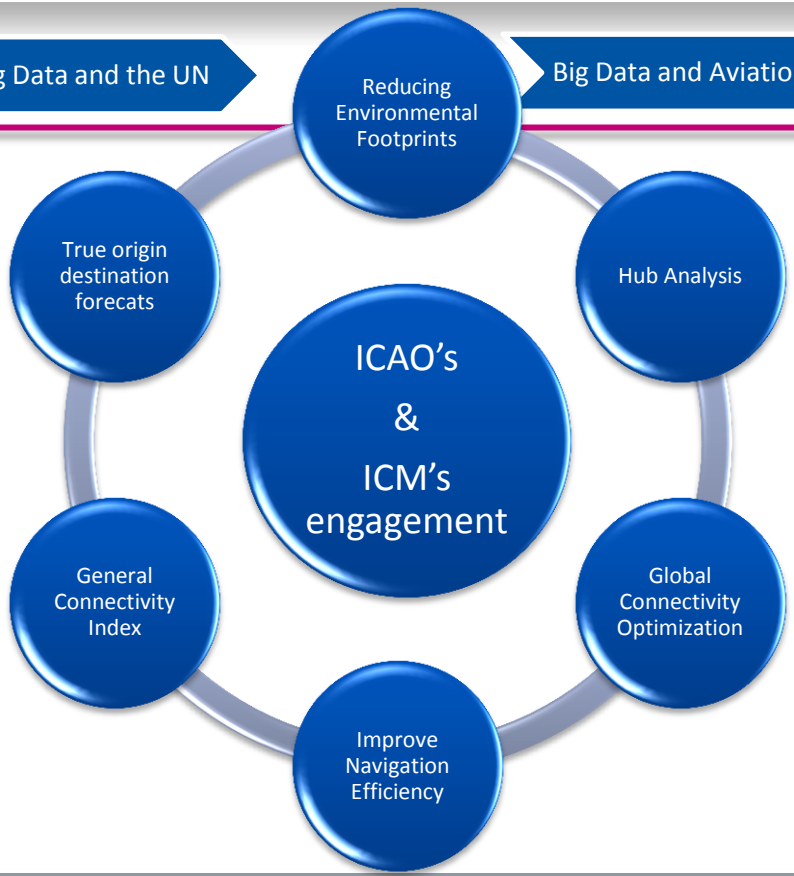
- Partnership with OAG and Interdisciplinary Center for Mathematical and Computational Modelling (ICM)
  - Detailed MIDT data
  - True OD and pricing at a granular level updated daily

- ICM ranked 6th in Europe and 16th in the world in Webometrics Top 2015 R&D Institutes rankings

ICM Aviation Background

Airline operations and analysis DSS System	Cause-incident safety occurrence drill-down chain concept	Sonic Cruiser vs Dreamliner PAX choice model	Airport seasonal wind rouse	Airport accessibility with airport catchment coverage area	SID/STAR flight profiles performanc e evaluation	Resilience of airport resources operational planning

Air Transport Diagnostics Project Purpose



Using latest technologies, ICM and ICAO are working on Air Transport Diagnostics Project.

Air Transport Diagnostics Project is focused on global optimization and it could be potentially positioned in the area of interest for wide spectrum of entities :

- Central and Regional Governmental Institutions
- Airlines, Airports, ANSPs *
- Environmental Agencies
- Aircraft Manufactures *
- Other aviation services and equipment providers *

ADS-B for ASBU analysis

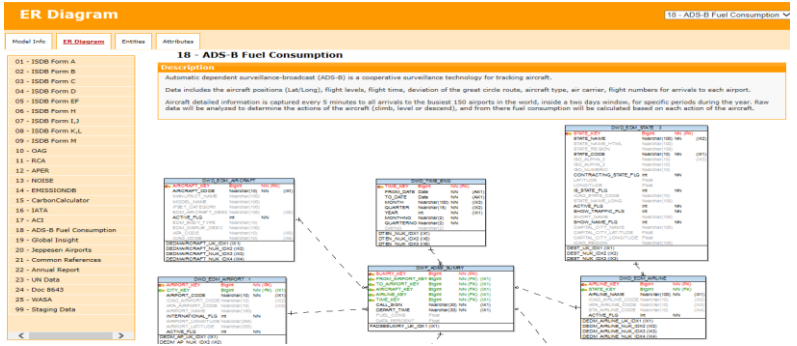
ADS-B data is crucial to monitor the ASBU implementation and efficiency

Pre implementation: provide customized analysis to respond to the need of States and for the MDWG-ASBUs
Example: provide average route distance vs. great circle distance

During implementation: measure the pace of implementation and monitor operational improvements

Post implementation
- measure the benefits: reduce time, reduction of fuel consumed

Presentation and briefings to the MDWG-ASBUs



ADS-B fuel consumption integration in EDM

http://intranet.icao.lan/ICT/infrastructure/EDM/HTML/ADS-B_data_and_Fuel_consumption/MImage.html#ERD_18

http://www.icao.int/sustainability/Pages/ASBU-Implementation.aspx

Future Developments

These main reasons lead ICAO to engage in …

Future Developments

Work With UN GWG Task Forces

Modernize Data Collection & Analysis Program

Work on Big Data Projects in line with other UN agencies

Collaboration with Statistical Offices and Member States

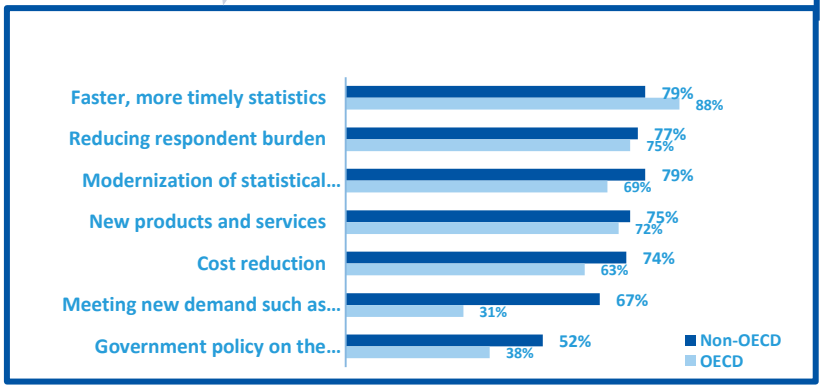
Capacity Building and Assistance to Member States

Incorporation of Big Data in official statistics program

Bringing substantive benefits to ICAO and its Member States

These main reasons lead ICAO to engage in …

Main Reasons & Benefits of Using Big Data



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THANK YOU