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NO COUNTRY LEFT BEHIND

Digital Transformation
Time for Aviation 4.0

Marco Merens
Chief Implementation Support
Air Navigation Bureau
ICAO

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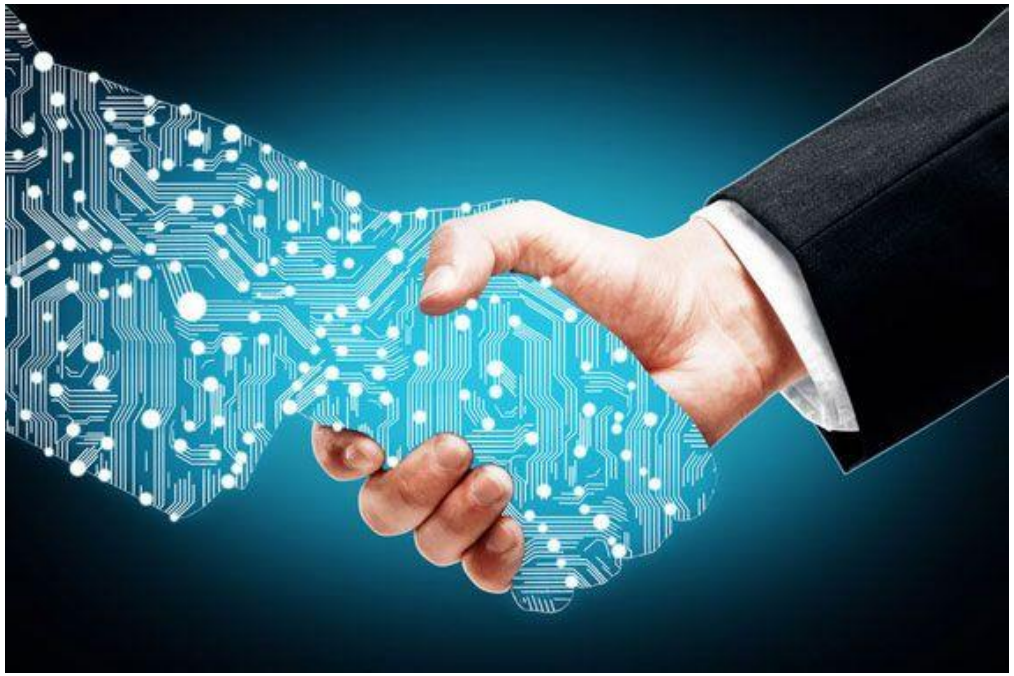
What is Web 4.0

Web 4.0 is also known as symbiotic web.

The dream behind the symbiotic web is interaction between humans and machines in symbiosis.

Everything is Digital. No Paper. Automation is the norm. Constant drive for efficiency.



What do we need for Aviation 4.0?

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Digital Transformation in Aviation

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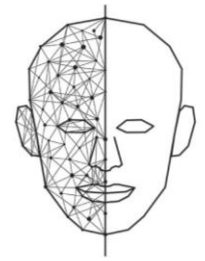
BLOCKCHAIN

DIGITAL IDENTITY



ARTIFICIAL intelligence

IOT Internet of Things

Big Data

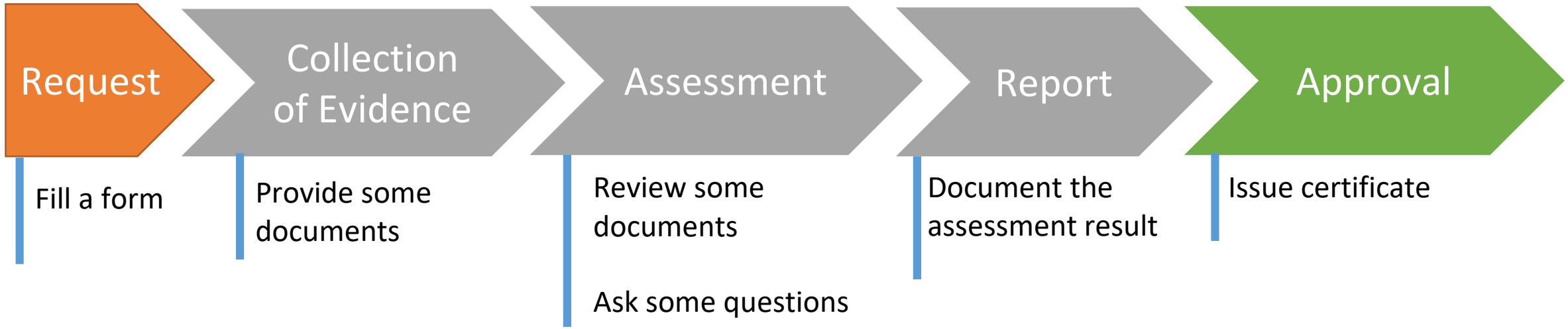
CLOUD TECHNOLOGY

Aviation and Certification

- Aviation is primarily a compliance-based industry
- Certification is the corner-stone of the aviation system
- During certification, compliance to requirements is demonstrated to a certifying authority
- If satisfactory evidence is provided, a certificate is delivered
- Certificates generally need to be renewed

Certification Process

Simplified



Signing

Request

- Fill a WORD/PDF Form
- Send by email
- Print and send by mail

Sign

Collection of Evidence

- Send PDF Documents by email
- Send printed copies by mail and file
- Provide access to binders on-site

File

Identify

Assessment

- Print Documents
- Read documents printed or online
- Read documents onsite

Authenticate

Report

- Write a report with findings
- Send report in PDF
- Print and mail
- File

File

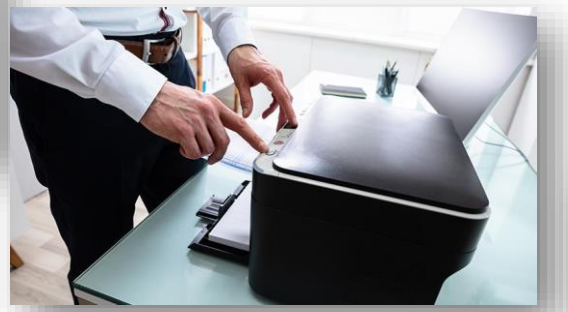
Approval

- Write Certificate or Letter
- Sign letter
- Send by mail
- Send by email

Sign

Signing Ceremony

Write



Print

Sign

Scan

PDF

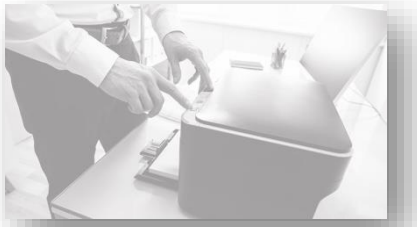
Signed

Send

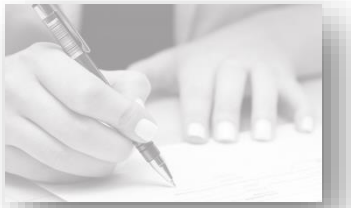
What if …

- Working from home does not provide printer / scanner
- Author and Signer are physically distanced

Signing Digitally

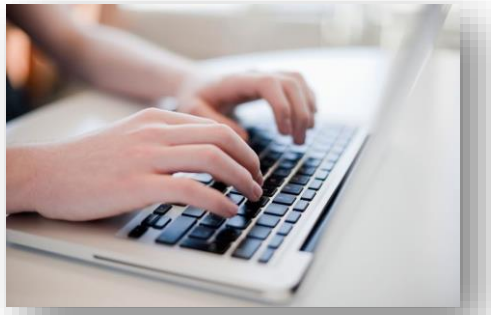


Print



Sign

Scan



Write

Transfer

PDF

Sign

PDF

Signed

Send

AI and Verification

- Verification generally consists of checking the content of a document against another source
- It often involves looking at an image or listening to speech
- Artificial Intelligence is a program designed to categorize and associate text, speech and images
- AI can be used to analyse and verify images

Example: Checking Airworthiness Certificate

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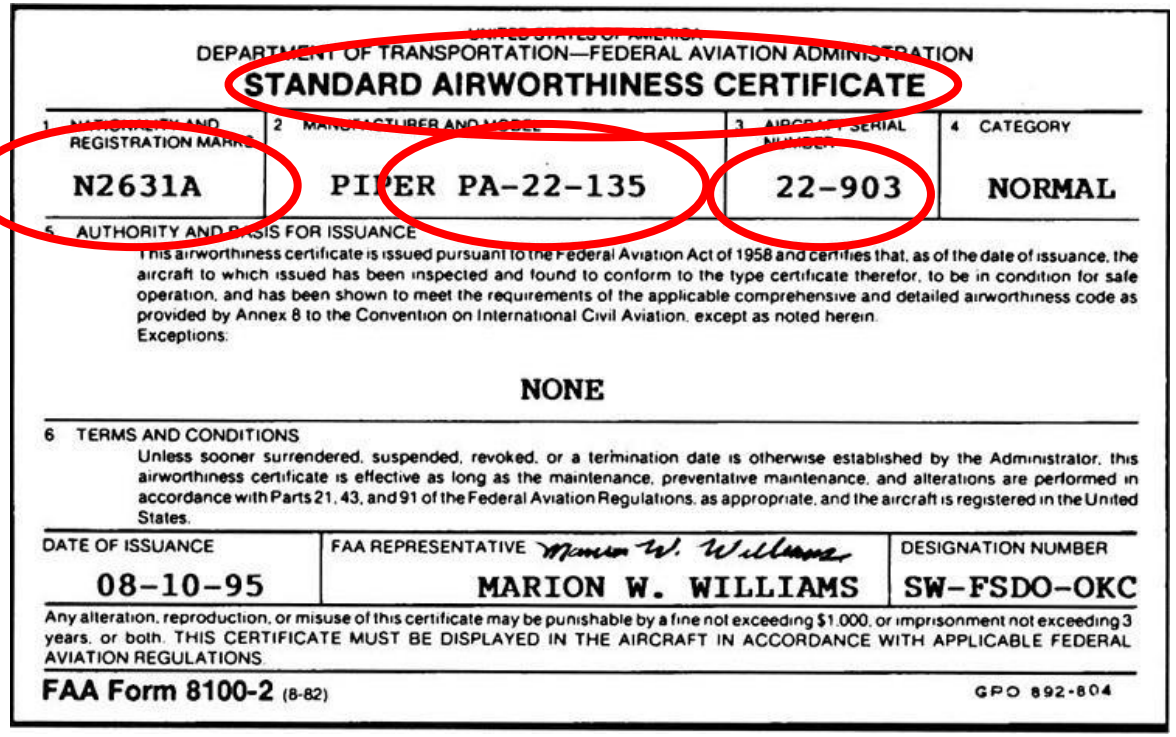

DEPARTMENT OF TRANSPORTATION—FEDERAL AVIATION ADMINISTRATION

STANDARD AIRWORTHINESS CERTIFICATE

1 NATIONALITY AND REGISTRATION MARK	2 MANUFACTURER AND MODEL	3 AIRCRAFT SERIAL NUMBER	4 CATEGORY
N2631A	PIPER PA-22-135	22-903	NORMAL

5 AUTHORITY AND BASIS FOR ISSUANCE

This airworthiness certificate is issued pursuant to the Federal Aviation Act of 1958 and certifies that, as of the date of issuance, the aircraft to which issued has been inspected and found to conform to the type certificate therefor, to be in condition for safe operation, and has been shown to meet the requirements of the applicable comprehensive and detailed airworthiness code as provided by Annex 8 to the Convention on International Civil Aviation, except as noted herein.

Exceptions:

NONE

6 TERMS AND CONDITIONS

Unless sooner surrendered, suspended, revoked, or a termination date is otherwise established by the Administrator, this airworthiness certificate is effective as long as the maintenance, preventative maintenance, and alterations are performed in accordance with Parts 21, 43, and 91 of the Federal Aviation Regulations, as appropriate, and the aircraft is registered in the United States.

DATE OF ISSUANCE	FAA REPRESENTATIVE	DESIGNATION NUMBER
08-10-95	MARION W. WILLIAMS	SW-FSDO-OKC

Any alteration, reproduction, or misuse of this certificate may be punishable by a fine not exceeding $1,000, or imprisonment not exceeding 3 years, or both. THIS CERTIFICATE MUST BE DISPLAYED IN THE AIRCRAFT IN ACCORDANCE WITH APPLICABLE FEDERAL AVIATION REGULATIONS.

FAA Form 8100-2 (8-82) GPO 892-804

Tesseract OCR

AI Model

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STANDARD AmwonmlNEss CERTIFICAYE
N2631A 91m: **PA—227135 22403** Mom).

Request

What is this supposed to be:

- An airworthiness certificate
- For a Piper PA – 22 – 135
- Registered N2631A
- Serial 22-903

90%

Traditional Program

OCR = Optical Character Recognition

AI for Monitoring and Reporting

OpenCV

YOLO

AI Model

- Reporting and monitoring is a key activity in assessing the continued validity of a certificate
- Sensor devices (cameras, microphones, satellites etc.) can be used to collect raw data
- AI models can use such raw data to identify, categorize, count and report on objects detected

13 Ground Equipment
4 Persons

Identification

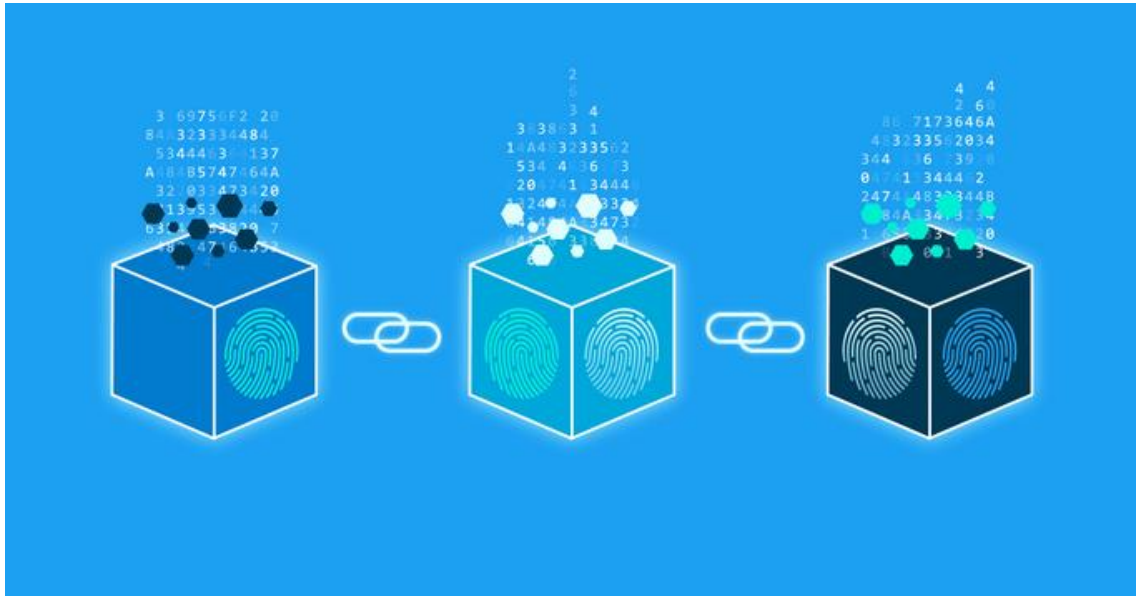
- **Identification** is central to the certification process
- Every certified entity is assigned a **unique** identifier issued by a **system** (national, regional or global)
- All documentation is **traced** and **tracked** against this number
- It allows the link between the **physical asset and the digital twin**
- **Digital Object Architecture (DOA)** should be set up to define the digital objects

How to make sure …

- Digital twin is up-to-date
- The changes are correct
- Digital twin is not corrupted

Block Chain

- Traditionally, all data is stored in a file or database and updated as required
- Block chain, in simplified terms, is a list (ledger) tracing all changes (transactions) made to a data element (block)
- Data is encrypted at all times and past changes are immutable
- Changes to blocks are automatically checked and validated by algorithms (smart contracts)



Block chains can be used to manage certificates and licenses

Challenges and Opportunities

- Digital transformation is strongly based on IT technologies which are not available equally around the world
- New skills are needed for all staff
- Cyber security is key

- Modernization of IT infrastructure
- Gain efficiency
- Engage with customers using modern communication tools

Becoming fully digital will impact everybody

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Montréal

Western and Central African (WACAF) Office
Dakar

European and North Atlantic (EUR/NAT) Office
Paris

Middle East (MID) Office
Cairo

Eastern and Southern African (ESAF) Office
Nairobi

Asia and Pacific (APAC) Sub-office
Beijing

Asia and Pacific (APAC) Office
Bangkok

THANK YOU