European Aviation Maintenance Training Committee

Training for the Future in Aviation

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EAMTC President

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Market

Takeaways

Source: Airbus GMF

Passenger Traffic 2019-2042 CAGR	**3.6%**
Freight Traffic 2019-2042 CAGR	**3.2%**
Fleet in service **beginning of 2020**	**22,880** aircraft
Fleet in service in 2042	**46,560** aircraft
New deliveries 2023-2042	**40,850** aircraft

Airbus Global Market Forecast 2023

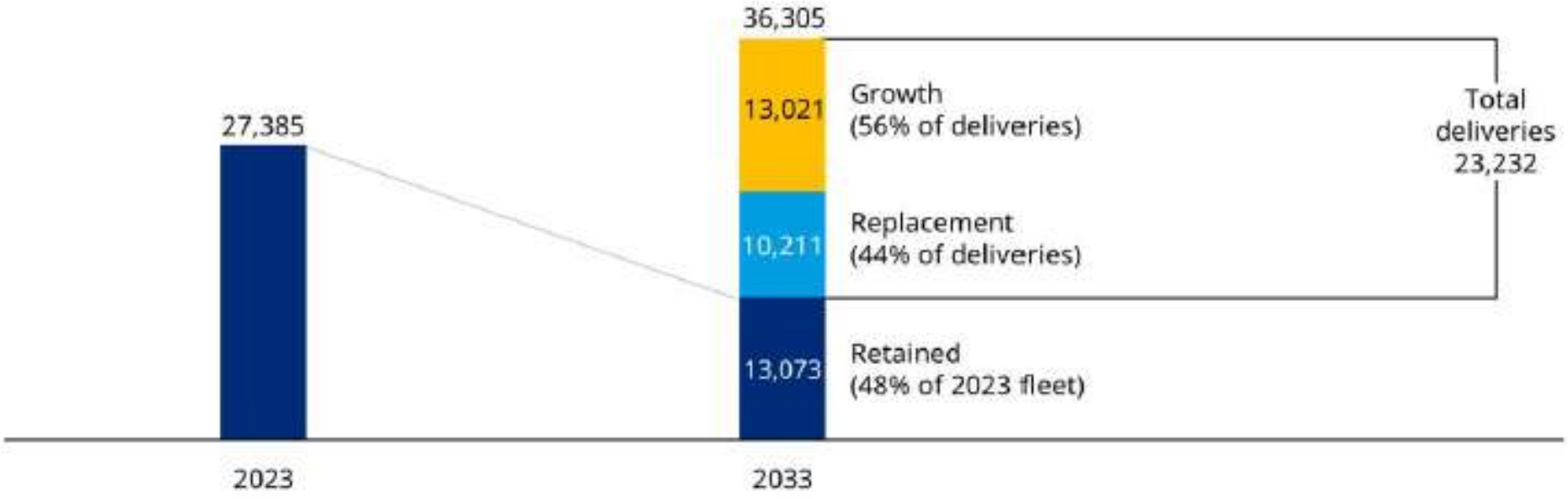
AIRBUS

Market

BOEING
Commercial Market Outlook
2023–2042
42,595
Global Deliveries
1,810
Regional Jet
32,420
Single Aisle
7,440
Wide Body
925
Freighter
Africa
1,025 Deliveries
2042 Total Fleet: 1,555
Traffic Growth: 7.4%
ADD
CPT
China
8,560 Deliveries
2042 Total Fleet: 9,590
Traffic Growth: 11.4%
CAN
PEK
Eurasia
9,645 Deliveries
2042 Total Fleet: 10,640
Traffic Growth: 4.6%
AMS
IST
Latin America
2,105 Deliveries
2042 Total Fleet: 2,895
Traffic Growth: 5.5%
GRU
PTY
Middle East
3,025 Deliveries
2042 Total Fleet: 3,360
Traffic Growth: 6.0%
DXB
RUH
North America
9,250 Deliveries
2042 Total Fleet: 10,710
Traffic Growth: 3.8%
LAX
YYZ
Northeast Asia
1,350 Deliveries
2042 Total Fleet: 1,675
Traffic Growth: 5.9%
ICN
NRT
Oceania
705 Deliveries
2042 Total Fleet: 815
Traffic Growth: 5.3%
AKL
SYD
South Asia
2,705 Deliveries
2042 Total Fleet: 2,610
Traffic Growth: 8.1%
BOM
DEL
Southeast Asia
4,225 Deliveries
2042 Total Fleet: 4,725
Traffic Growth: 9.5%
BKK
SIN
3.5%
Fleet Growth
48,575
2042 Fleet
6.1%
Traffic Growth
2.6%
GDP Growth
2.3 M
New Personnel

Fleet Development

Exhibit 15: Fleet replacement versus growth, 2022–2033

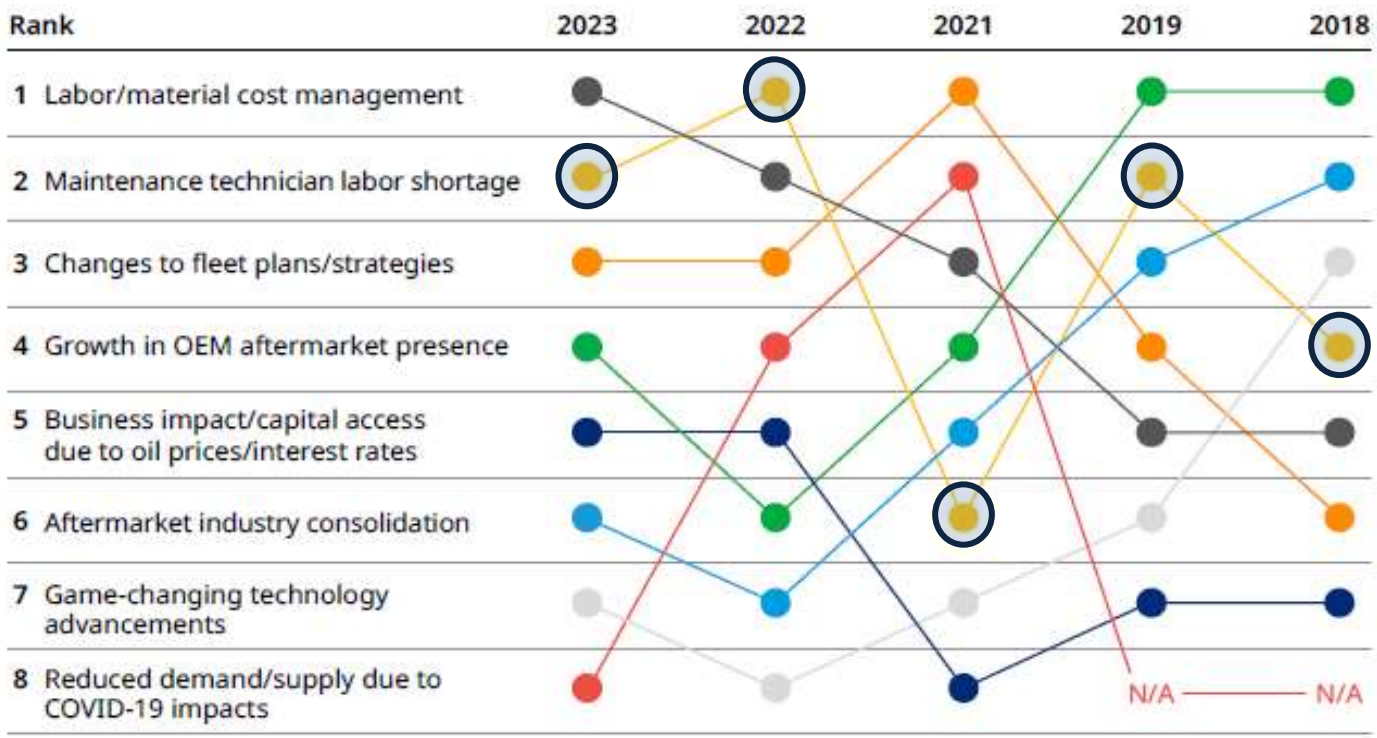


Source: Oliver Wyman analysis

Situation

Exhibit 2: Top disruptors, 2018–2023

As ranked by survey respondents



Note: No ranking available for 2020
Source: Oliver Wyman 2023 MRO Survey

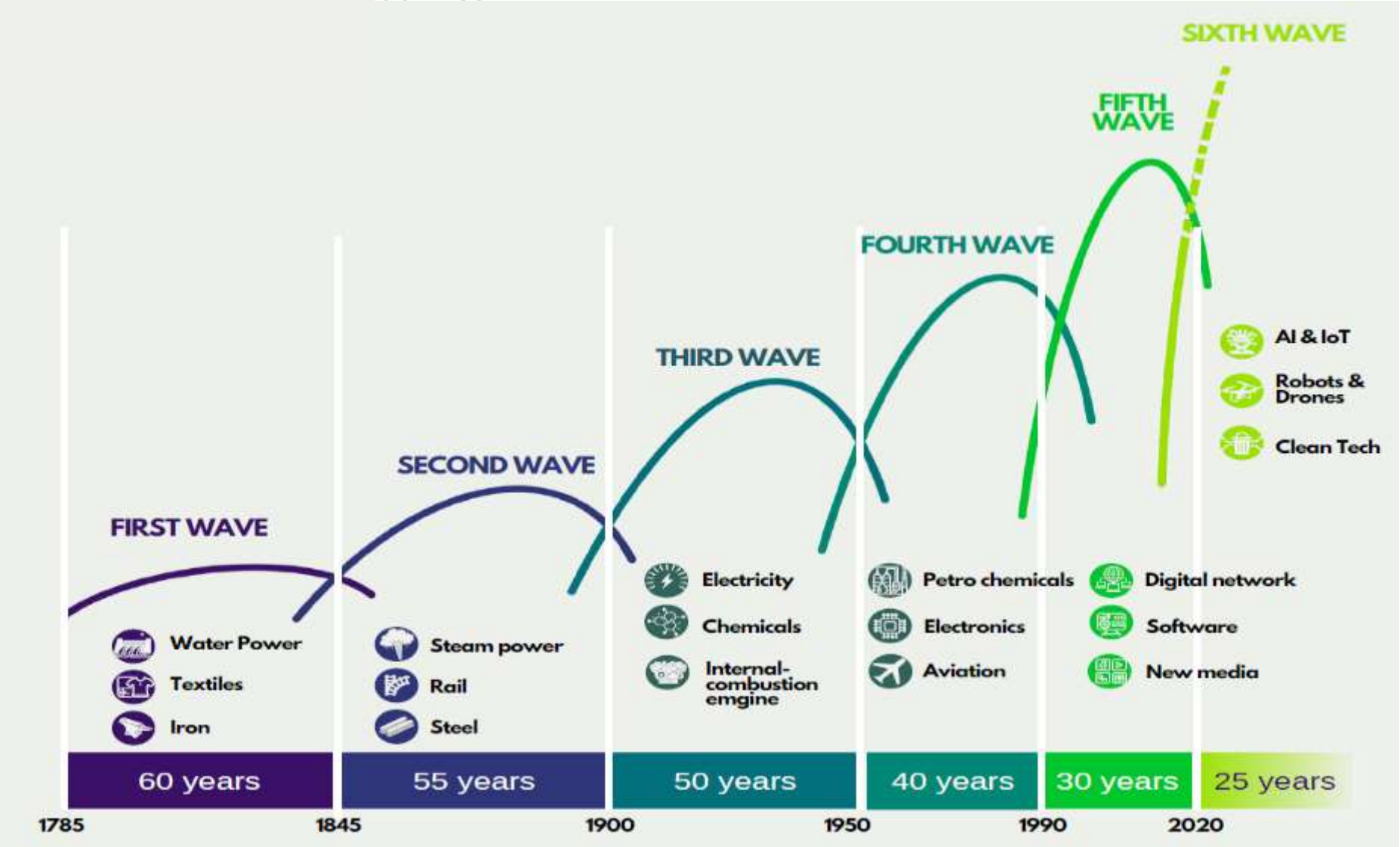
IATP Statement

By 2042,
the aviation industry must not only retain its current engineers
but also recruit an additional 700,000 engineers

to ensure smooth operations

Changes driven by Technology

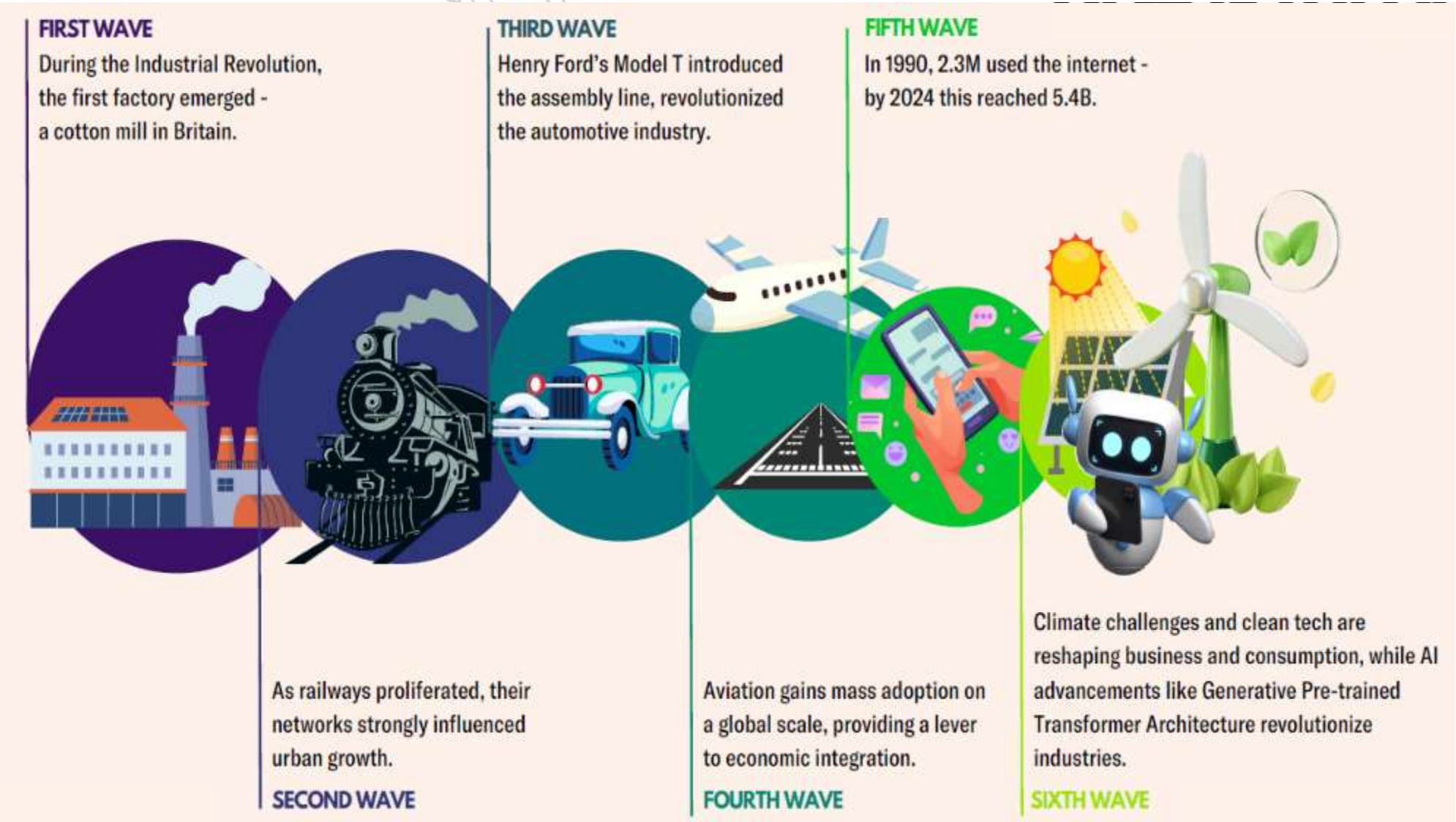
Waves of innovation



Sources:
Edelston Institute &
Visual Capitalist

Changes driven by Technology

Key Break-throughs



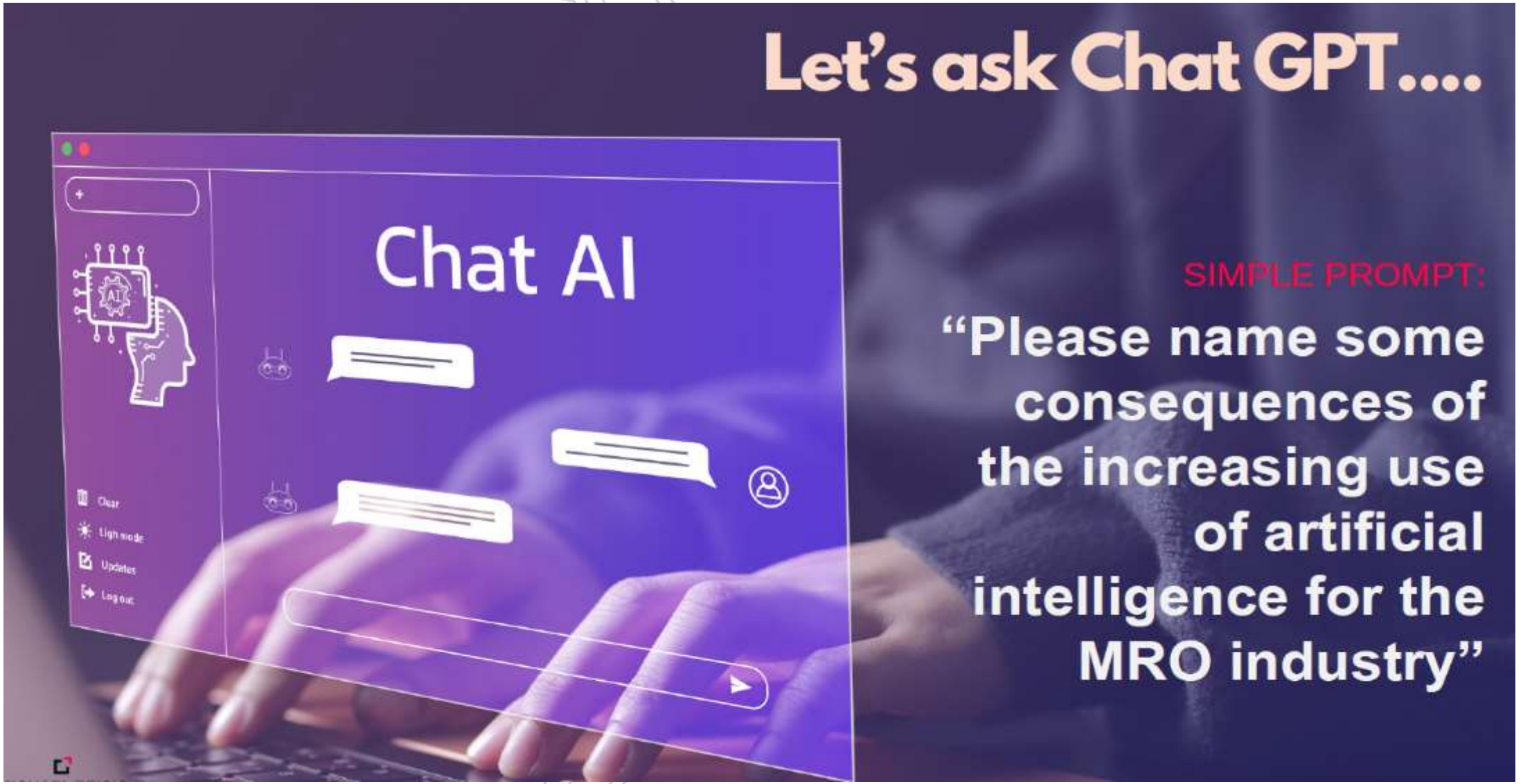
Sources: based on Visual Capitalist

Effects

Impact on MRO industry

Just to name a few…

Involve AI


Let's ask Chat GPT....
Chat AI
SIMPLE PROMPT:
"Please name some consequences of the increasing use of artificial intelligence for the MRO industry"

Predictions

Predictions

World Economic Forum 2023

AI Effects

… on **Skills / Competence**

Requirement of

- aircraft maintenance personnel

AI Effects

… on skill / competence requirement of aircraft **Maintenance Personnel**:

- **Advanced Technical Training**:
  - Need for advanced training in AI and machine learning technologies used in predictive maintenance and diagnostic tools.

- **Understanding of AI-Driven Tools**:
  - Proficiency in using AI-driven maintenance tools and software that predict and diagnose aircraft issues.

- **Data Interpretation**
  - Skills in analysing and interpreting data from AI systems to identify maintenance needs and potential failures.

AI Effects

… on skill / competence requirement of aircraft **Maintenance Personnel**:

- **Software and Hardware Integration**:
  - Knowledge of integrating AI software with existing aircraft systems and ensuring compatibility.

- **Cybersecurity Protocols**:
  - Familiarity with cybersecurity measures to protect AI maintenance systems and data.

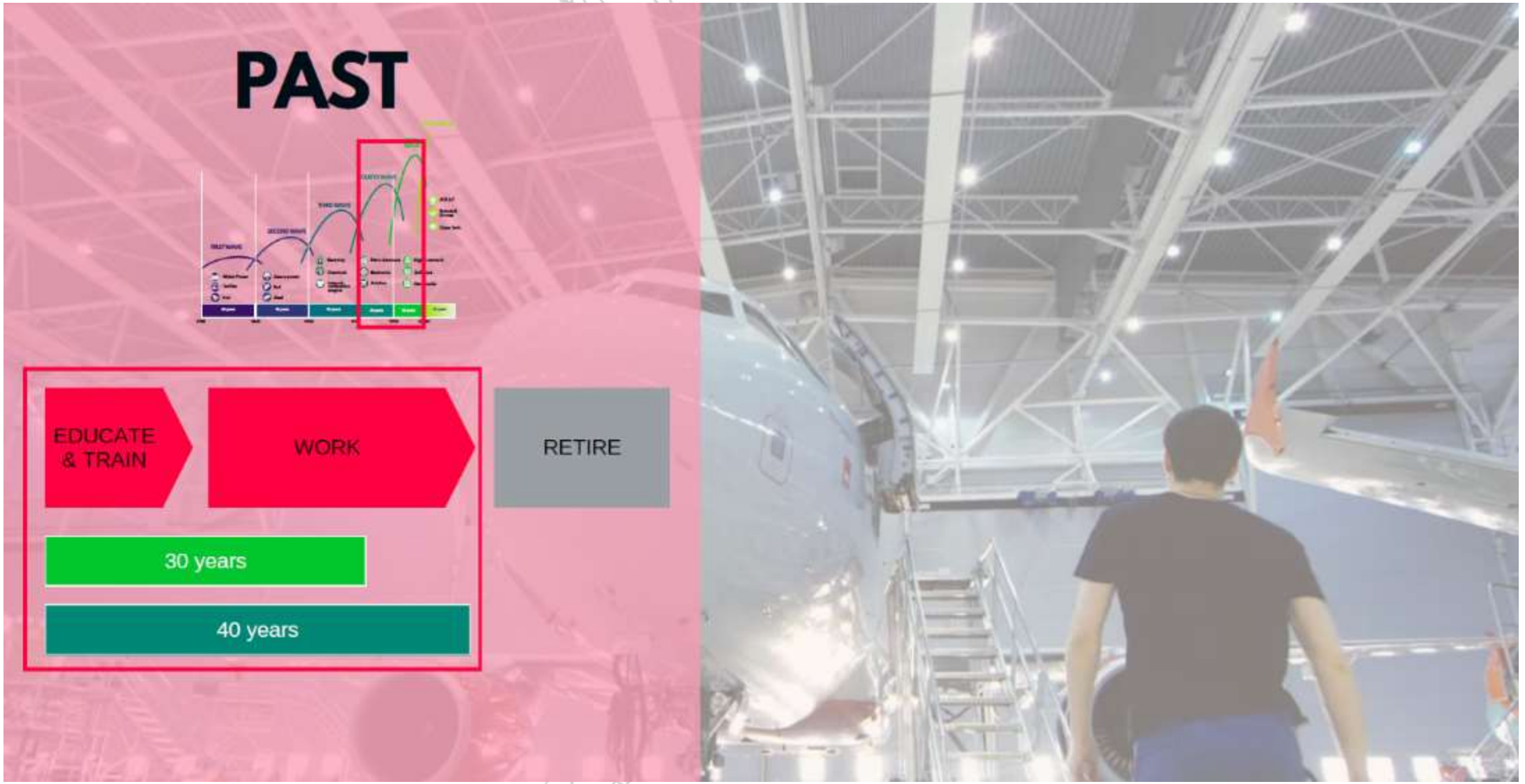
AI Effects

… on skill / competence requirement of aircraft **Maintenance Personnel**:

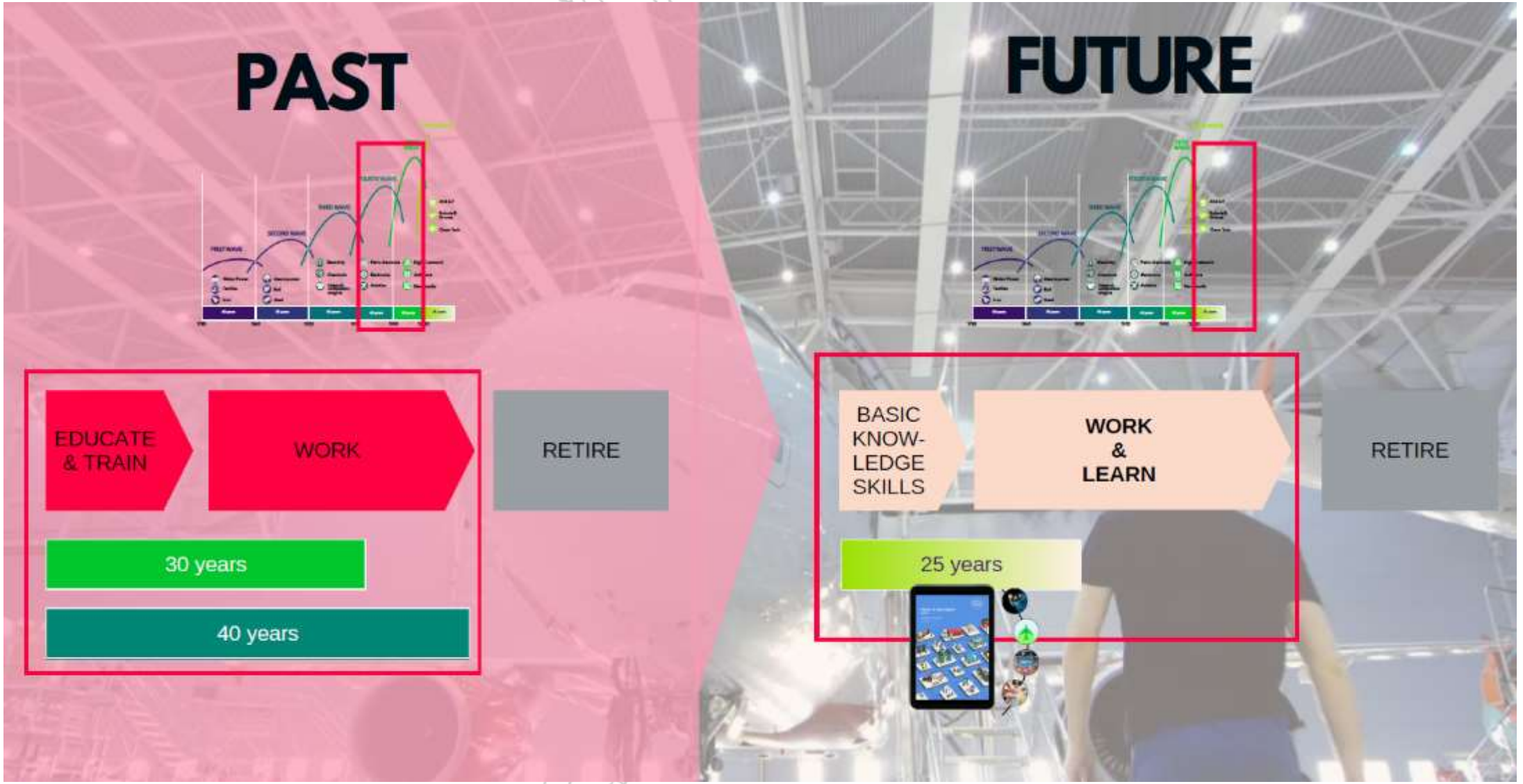
- **Adaptability**:
  - Ability to adapt to new AI technologies and tools as they evolve, requiring continuous learning and flexibility.

- **Collaboration**:
  - Enhanced collaboration skills to work alongside AI specialists and engineers in maintaining and upgrading AI systems in aircraft.

Profession History



Professional Way Forward



A New Learner Generation

- More and more the behavior of the so-called **Gen-Z** is visible, when carrying out apprentice-ships.

- This behavior change can be seen as disadvantage or advantage, nevertheless it is a fact we have to deal with

- What we see is that the "conventional educations" clearly contradict with the expectations the Gen-Z has, when it comes to education.

(picture taken/copied from the internet)

Gen-Z

Let's describe them briefly, they (found on tech guru on the internet)

- … spend up to 7 ½ hours with socializing (per day)
- … prefer to work on multi-screens (up to 5 screens)
- … are entrepreneurs and prefer an independent working environment.
- … have a college education (50%) and they prefer live-long learning
- … are philanthropes – 93% chose the company they work for because of the social impact of the company.
- … are digital natives, e.g. spend an average of 15.4 hours a week with their smart-phones
- … are interactive – 34% are most interested in improving their people management skills.
- … **like Tech** – 65% believe that technology makes them feel that everything is possible

New Learning in Aviation

We need to progress to Competency-based Training and Assessment!

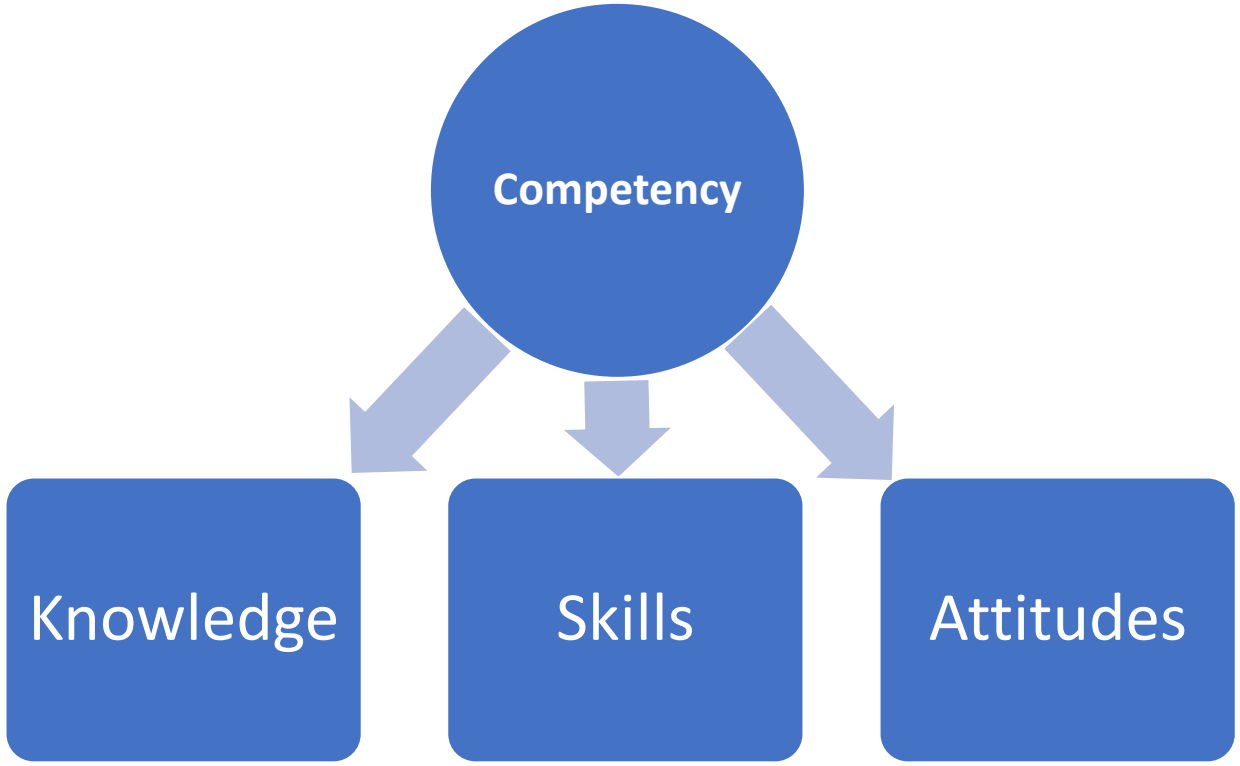
- Shift from quantity to quality
  - The students and organizational needs are central, not the training hours
  - Students learning techniques are broader than the old content-oriented methods
- Recognition of new teaching technologies
  - VR / AR / E-Learning
- Framework of generic skills don’t need to be demonstrated repeatedly within subsequent aircraft type ratings
- Flexibility to anticipate faster on changing circumstances and technologies (Lifelong Learning)
- Ability to cross-train from other industries with complementary competencies easier
- Cost reduction
  - prior learning and previously developed competencies count
    → expedites the training path of the learner (self-paced learning)

How to implement Competency-based Training and Assessment?

Industry, e.g. MRO defines target competency

- Knowledge, skills and attitude
- Content-parts can be extracted from Part-66

Start with the defined Competency and define needed KSA



Top-down development

Below standard	According to standard	Above standard
	Description of observable behaviour when according to standard	*Description of observable behaviour when above standard*

1. Defined Competence
2. Formative and finals Assessements with OB's
3. Rubrics
4. KSA
5. Learning activities (tasks, lessons, cases, projects, tests)

Task Categories – OBs MATRIX

Key Points:

- Each Task category emphasizes different competences.
- Within each category, select tasks using the defined selection criteria.
- Selecting suitable types of tasks is the key to effectively train and assess applicable competences as per the ACM (Adapted Competency Model).

	TASK CATEGORIES					
COMPETENCIES	**SGH**	**R/I**	**T/S**	**[illegible]**	**MEL**	**INSP**
Procedures (PRO)	1.1-1.5	1.1-1.5	1.1, 1.3-1.5	1.[illegible].3-1.5	1.1-1.2,1.4	
Work Management (WMT)	2.1-2.5, 2.9	2.1-2.6, 2.9	2.1-2.5, 2.9, 2.[illegible]	2.1-2.[illegible].8-2.10		
Situational Awareness (SAW)	3.1, 3.2, 3.5	3.1, 3.2, 3.5, 3.6	[illegible]-3.6	3.1, 3.3, 3.[illegible] 3.6		
Technical Expertise (TE)	4.1, 4.2, 4.4	4.1-4.4	4.1[illegible]	4.1-4.4	4.1-4.4	4.1-4.4
Risk Management (RM)	7.1-7.5, 7.7	[illegible].7	[illegible]-7.7	7.1-7.7		
System Thinking (ST)	5.1, [illegible]	5[illegible]5.4, 5.6	5.1-5.9	5.1-5.4, 5.6-5.9		
Coordination and Handov[illegible]	6.1-6.[illegible]	6.1-[illegible]	6.1-6.5, 6.7	6.1-6.8		
Problem-Solving & Decis[illegible] Making (PSDM)	[illegible]-9.9	9.1-9.9	9.1-9.9	9.1-9.9	9.1-9.9	9.1-9.9
Self-Management (SFM)	1[illegible]-10.10	10.1-10.10	10.1-10.10	10.1-10.10	10.1, 10.2, 10.3,10.5, 10.8	
Communication (COM)	11.1-11.4, 11.7, 11.9	11.1-11.9	11.1-11.9	11.1-11.9		
Teamwork (TW)	8.1-8.14	8.1-8.14	8.1-8.14	8.1-8.14		

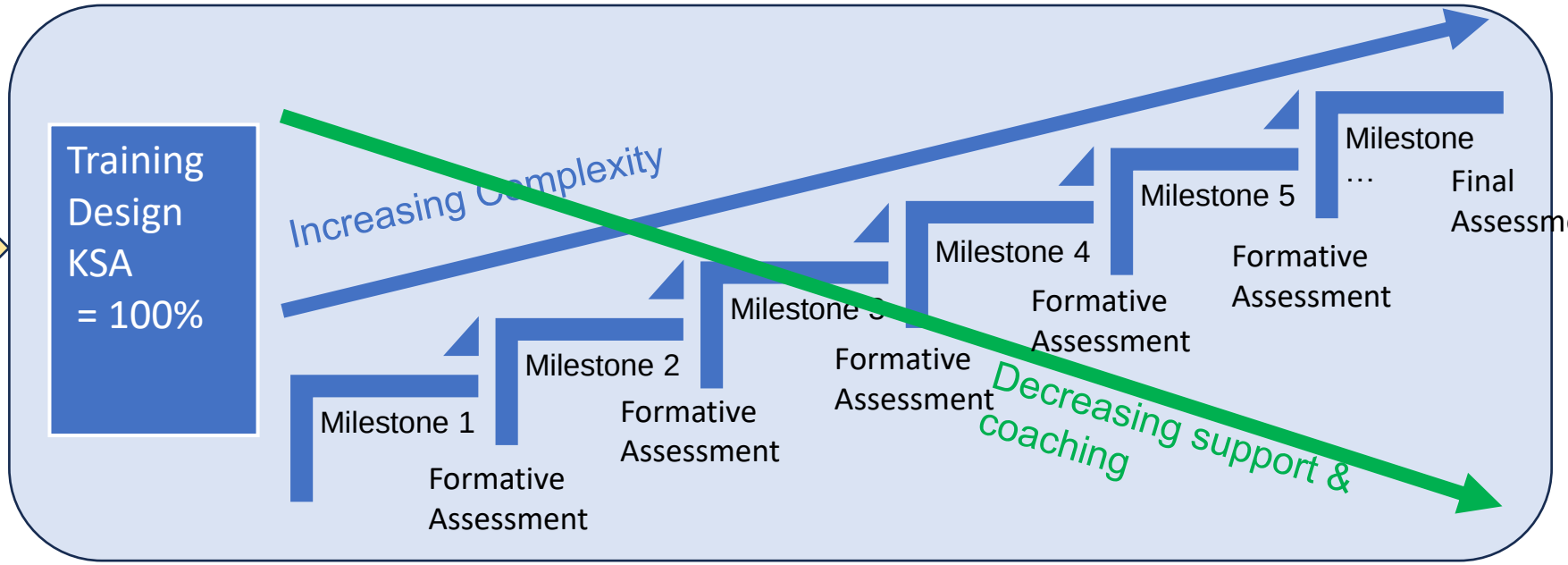
SAMPLE

Adapted competency model. *A group of competencies with their associated description and performance criteria adapted from an ICAO competency framework that an organization uses to develop competency-based training and assessment for a given role. (ICAO-Doc-9868 Procedures for Air Navigation Services Training – 3rd Edition 2020)*

Training execution

Inputs:
- ICAO PANS Competence Frame
- EASA Part-66 Privileges / Content
- OEM OSD
- Industry Request

Target Competency (KSA)



Pre-Requisites

Entry Assessment

Gap Analysis

Training Path Decision between 0-100%

How can AI support CBTA

Competence Profiles
Compute optimal competence profiles for defined tasks and working conditions

Training Development
Matching task categories (INS, R/I, SGH, …) and criteria's (Complexity, Frequency, Safety, …) with KSA elements, OBs for milestones to teach defined specific competency and levels in the learning steps and assess what has been achieved at the end.

Individual Learning Paths Management
Compose and monitor individual training paths based on individual level of competences

Who is EAMTC

A pan-”EASA world” industry Association

- Dedicated to Maintenance Training
- Registered in the Netherlands

www.eamtc@org

Main objective:

- Improve safety through training
- To represent the training industry with EASA and other Authorities

A culturally diverse organisation

- Members share mutual goals

Misson Statement

Shaping the future of aviation maintenance training

eamtc
european aviation maintenance training committee

Member

Hans Mayer
President

www.eamtc@org