Are we training *right skills* for the future?

WHAT IS TO CHANGE IN MAINTENANCE?
AND WHAT WILL REMAIN?

OMAINTEC FM
CONFERENCE EXHIBITION 2026

2030

WHAT WILL CHANGE IN MAINTENANCE?

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What Will Change

New Technologies in Maintenance

AI/ML + GenAI/LLMs

Digitalization + advances in CMMS/EAM systems, More Digital Twins + IoT sensors, AR/VR, collaborative robots for maintenance support

More 3D printing + additive renovation

New Ways of Working

More risk management, risk-based maintenance, Reliability engineering,
Master data governance, change management, integrated planning
(production–maintenance–supply chain),
Full Service and Performance-based contracts

New Assets

Robots, Automation, Advanced manufacturing equipment, Smart Infrastructure

Green Tech, Renewables, Batteries, Hydrogen infrastructure, Carbon Capture, EVs and smart vehicles

Demographics & Workforce

Aging / booming population, Lack of personnel, Aging workforce,
Skills gap, Skills mis-match, Skills shift
Remote/hybrid work, need for Digital literacy

New Technologies in Maintenance

New Ways of Working

New Assets

Demographics & Workforce

2030

WHAT WILL NOT CHANGE?

What Will Change

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What Will Not Change

Core mechanical, electrical, safety principles
Hands-on troubleshooting and **manual work**

Teamwork, collaboration, communication, **safety and security, Human–machine teaming**, cyber-security, collaboration with data/IT, production, SCM roles

Fundamental maintenance goals:
reliability, efficiency, and safety; importance of **asset lifecycle management**, core principles of energy and asset management,
dealing with **ageing and obsolete assets**

Importance of **teamwork, communication, leadership, Training and Education**
On-site presence for critical maintenance tasks

WHAT IMPACTS TO TRAINING CAN WE EXPECT?

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On-site presence for critical maintenance tasks

Impacts on Training and Education

Upskilling in **AI/ML** for **predictive analytics**, **GenAI for**
documentation and knowledge sharing, **CMMS/EAM**
software, use of **AR/VR**, **robots programming and**
maintenance, **digital twins and IoT** training modules

Risk management, risk-based maintenance,
reliability engineering training,
data governance, change management, integrated
planning, **contract management, cyber-safety, cross-**
functional collaboration

Robots and automation programming and maintenance
New courses on **green tech maintenance, renewable**
energy systems, and **sustainable asset management**

Mentorship programs for knowledge transfer, digital
literacy training, remote collaboration tools, **virtual**
team management, and adaptability training for hybrid
work environments

WHAT IMPACTS TO TRAINING CAN WE EXPECT?

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CONFERENCE EXHIBITION 2026

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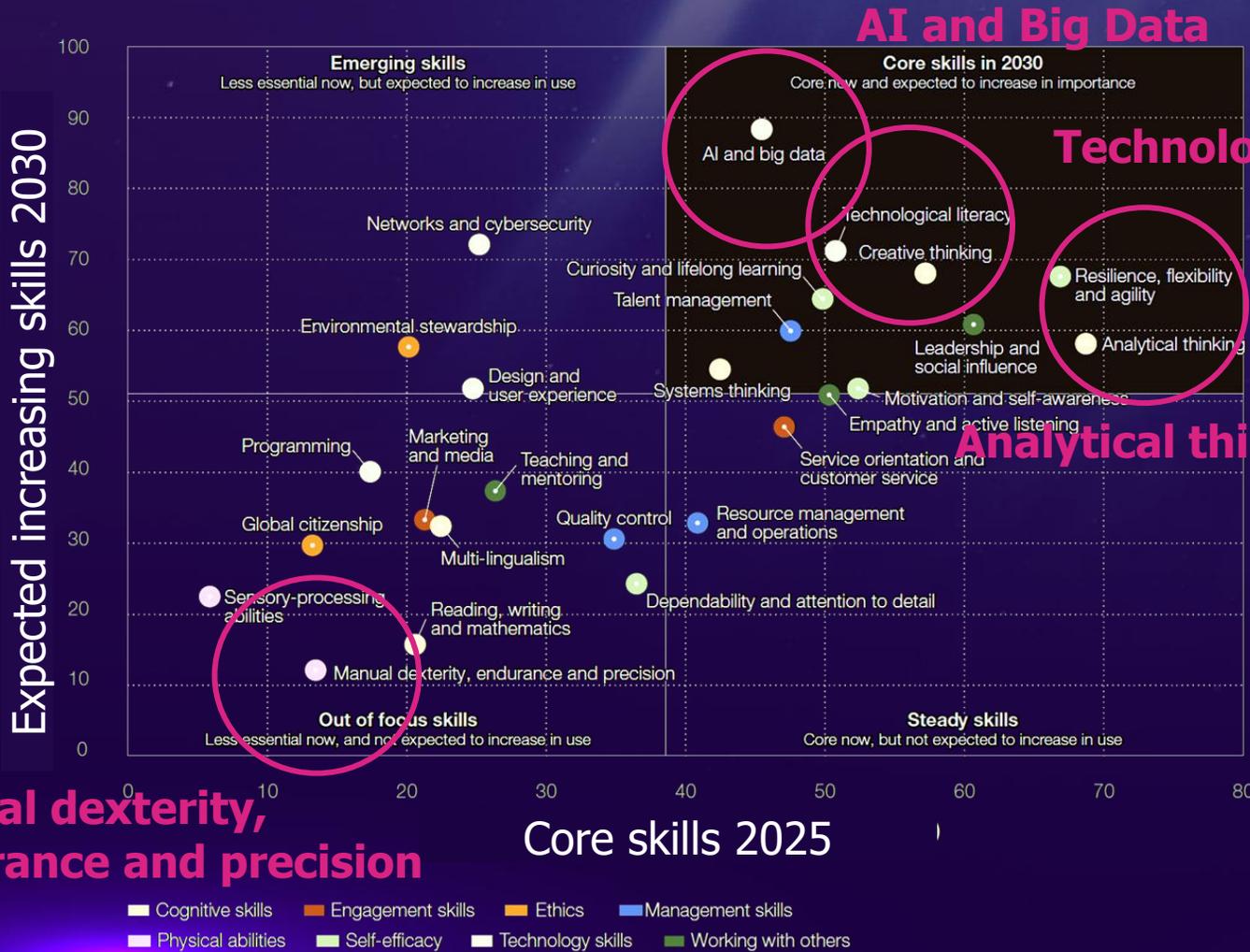production, SCM roles

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Impacts on Training and Education

**Need to keep up with news in AI/ML,
predictive analytics,
GenAI for knowledge management** –
people will **talk to machines and ask
the manuals** using LLMs,
People will learn **how to work with and
program robots and new tech,** and
how to do maintenance for them, will
use **AR and VR** for training and **to
support the field work.**
Digital twins = forget the mundane
work with CMMS orders.

WHAT SKILLS TO WATCH?

AI and Big Data

Technological literacy

Analytical thinking

Manual dexterity, endurance and precision

Core skills 2025

Expected increasing skills 2030

Emerging skills
Less essential now, but expected to increase in use

Core skills in 2030
Core now and expected to increase in importance

Out of focus skills
Less essential now, and not expected to increase in use

Steady skills
Core now, but not expected to increase in use

- AI and big data
- Networks and cybersecurity
- Curiosity and lifelong learning
- Technological literacy
- Creative thinking
- Talent management
- Resilience, flexibility and agility
- Environmental stewardship
- Leadership and social influence
- Analytical thinking
- Design and user experience
- Systems thinking
- Motivation and self-awareness
- Programming
- Empathy and active listening
- Marketing and media
- Teaching and mentoring
- Service orientation and customer service
- Global citizenship
- Quality control
- Resource management and operations
- Multi-lingualism
- Sensory-processing abilities
- Reading, writing and mathematics
- Dependability and attention to detail
- Manual dexterity, endurance and precision

Legend:
- Cognitive skills
- Engagement skills
- Ethics
- Management skills
- Physical abilities
- Self-efficacy
- Technology skills
- Working with others

Skills Gap
Easy to spot

Skills Shift
New skills coming in

Skills Mismatch
Invisible – people are busy, not knowing they need other skills than they have

SKILLS TO BE REPLACED BY AI?
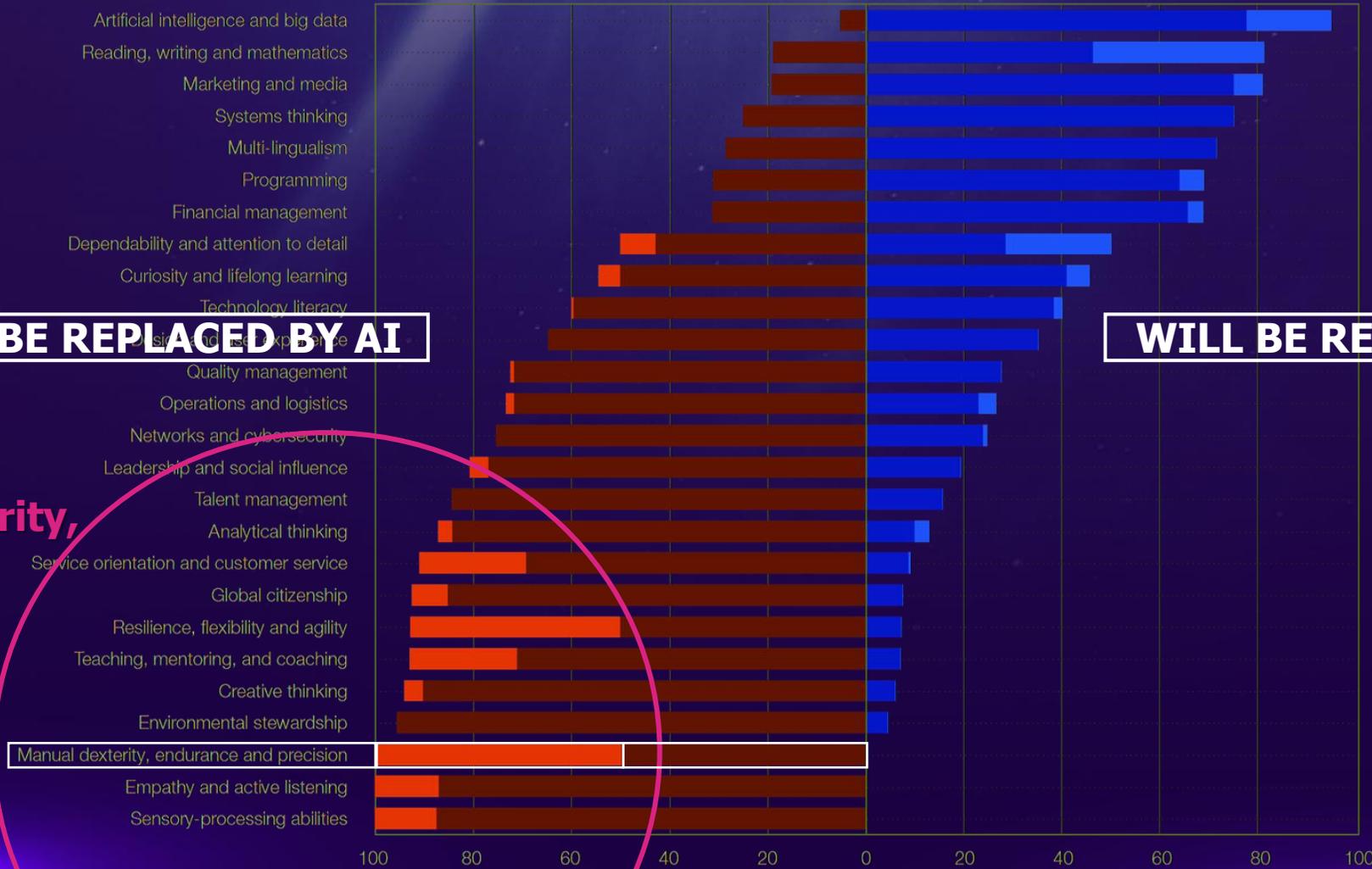
WILL NOT BE REPLACED BY AI

WILL BE REPLACED BY AI

Manual dexterity, endurance and precision will not be done by AI

But maybe robots?

Artificial intelligence and big data
Reading, writing and mathematics
Marketing and media
Systems thinking
Multi-lingualism
Programming
Financial management
Dependability and attention to detail
Curiosity and lifelong learning
Technology literacy
Quality management
Operations and logistics
Networks and cybersecurity
Leadership and social influence
Talent management
Analytical thinking
Service orientation and customer service
Global citizenship
Resilience, flexibility and agility
Teaching, mentoring, and coaching
Creative thinking
Environmental stewardship
Manual dexterity, endurance and precision
Empathy and active listening
Sensory-processing abilities

100   80   60   40   20   0   20   40   60   80   100

Share of all granular skills within each skill group (%)

■ Very low capacity   ■ Low capacity   ■ Moderate capacity   ■ High capacity

SKILLS TO BE REPLACED BY AI?

Work type / focus	Maint. Technician	Maint. Engineer	Reliability Engineer	Maint. Supervisor	Maint. Manager	Asset Manager
Hands-on maintenance (wrench time)	40%	5%	5%	5%	0%	0%
Field inspections / gemba walks	15%	15%	15%	25%	10%	5%
Job preparation & logistics	25%	5%	5%	10%	5%	5%
Documentation & CMMS admin	10%	10%	10%	10%	10%	10%
Planning & scheduling (short–mid term)	5%	35%	10%	20%	15%	10%
Analysis, reliability & improvement	5%	20%	50%	10%	25%	30%
Coordination, meetings & stakeholders	5%	15%	10%	20%	35%	35%
Budgeting, contracts & procurement	0%	5%	5%	5%	25%	25%
Strategy, policy & governance	0%	5%	5%	5%	20%	30%
Training, coaching & people development	5%	5%	5%	15%	10%	5%
Other (breaks, delays, admin overhead)	10%	5%	5%	5%	5%	5%

ROBOTS CAN HELP

AI CAN HELP

AI
IN MAINTENANCE PROCESSES
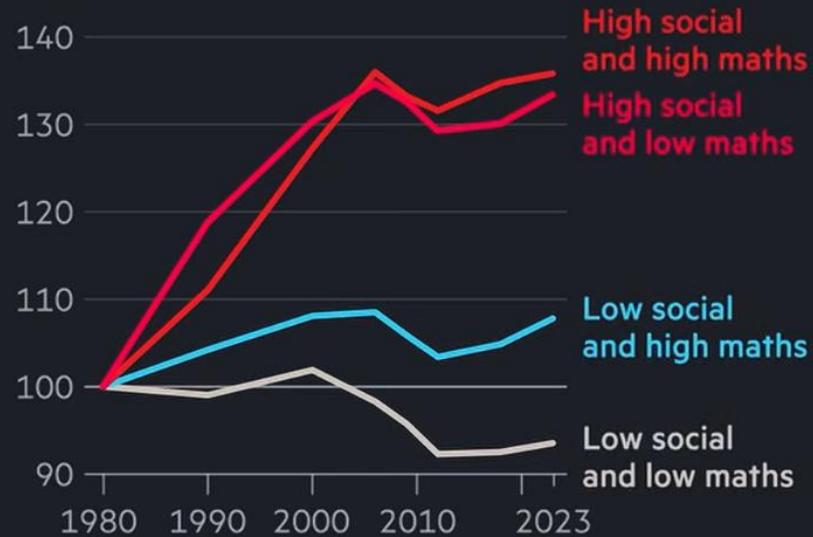
"The future of work isn't about what machines can do, it's about cultivating the human capabilities that make us better at working with our machines, and most importantly, cultivating the capabilities that allow us to work with each other."

Isabella Loaiza
Postdoctoral Associate, MIT Sloan
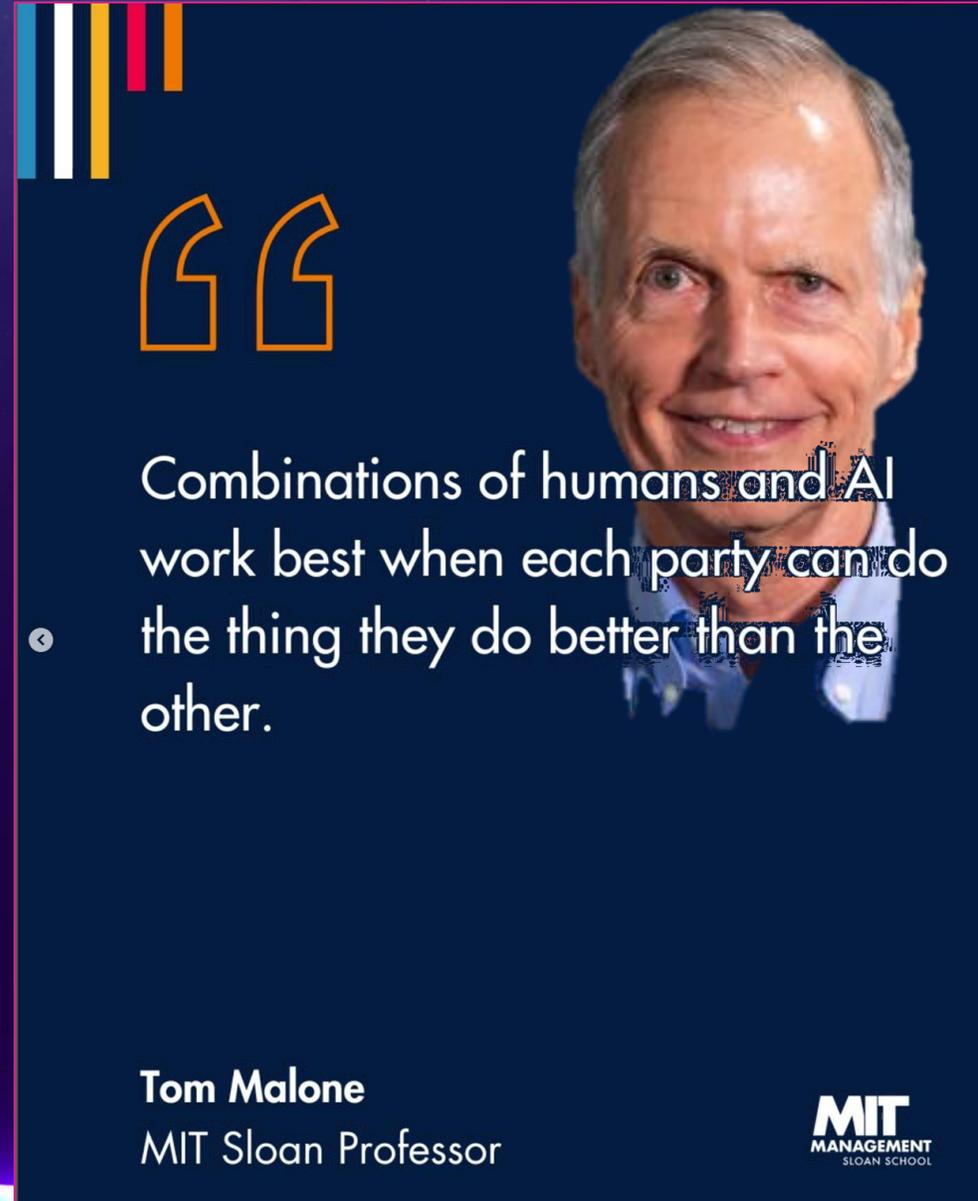
Combinations of humans and AI work best when each party can do the thing they do better than the other.

Tom Malone
MIT Sloan Professor

NEW ASSETS TO BE MAINTAINED: ROBOTS IN INDUSTRY

ORS AND IIOT DEVICES

ADVANCED EDGE COMPUTING NODES
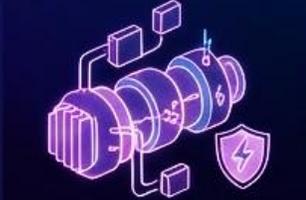
EV POWERTRAINS AND HIGH-VOLTAGE BATTERIES

EV POWERTRAINS AND HIGH-VOLTAGE BATTERIES

ORAGE SYSTEMS (BESS)

NEXT-GEN SOLAR AND WIND TURBINES

GREEN HYDROGEN ELECTROLYZERS

INDUSTRIAL RANGOVIIISIBS
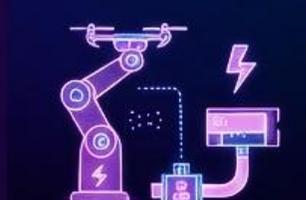
ACTURING MACHINES
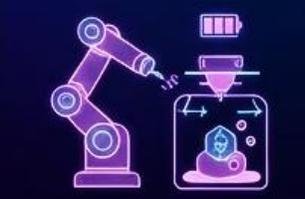
INDUSTRIAL ROBOT SYSTEMS
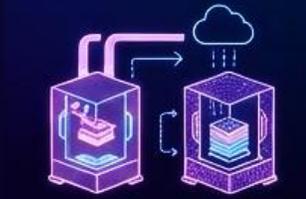
DIGITAL TWINS INFRASTRUCTURE

CARBON CAPTURE & STORAGE (CCCS)
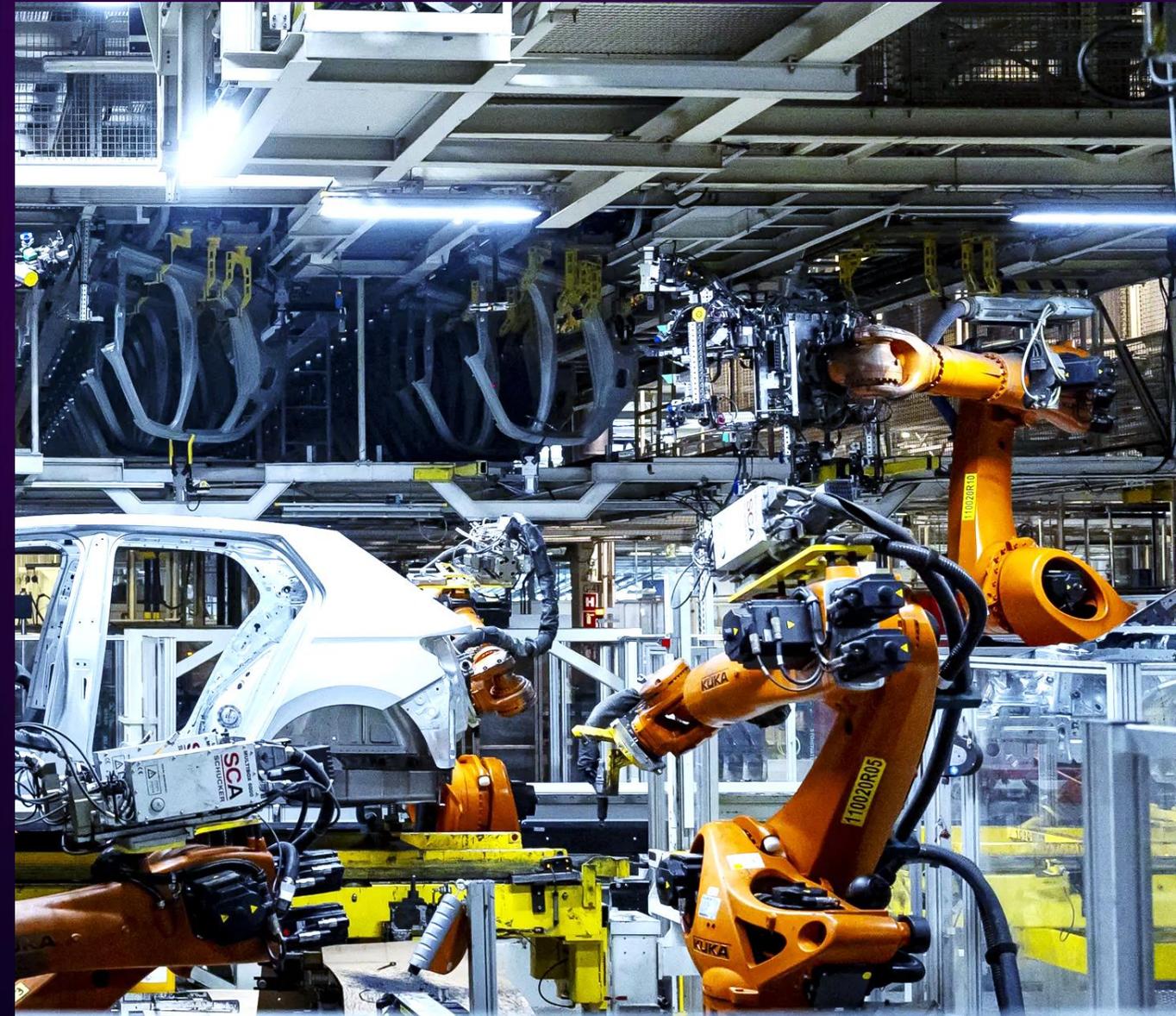
ROBOTIC WAREHOUSES
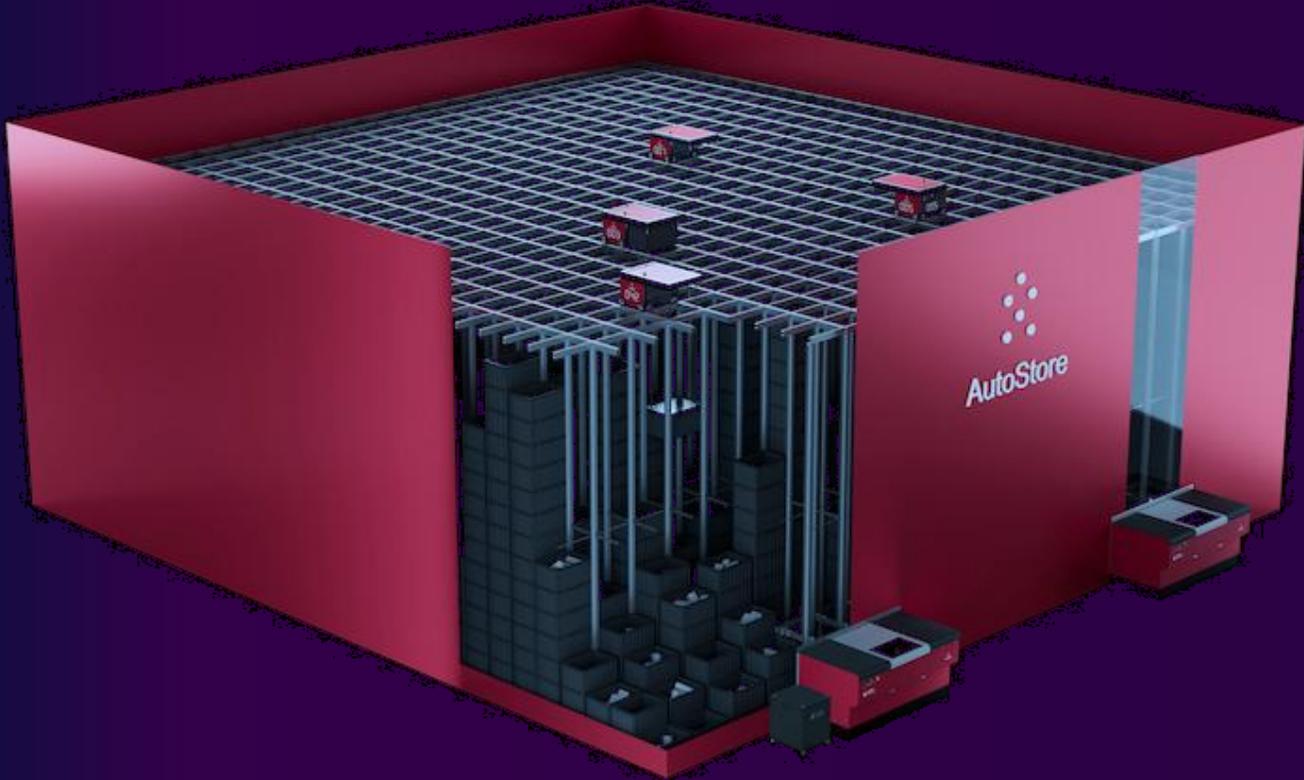
ROBOTS IN PHARMACIES

AUTONOMOUS MOBILE ROBOTS ON THE SHOPFLOOR

ROBOTS TO BE MAINTAINED X ROBOTS HELPING MAINTENANCE

Robots to be maintained
More work and higher qualification for maintenance personnel
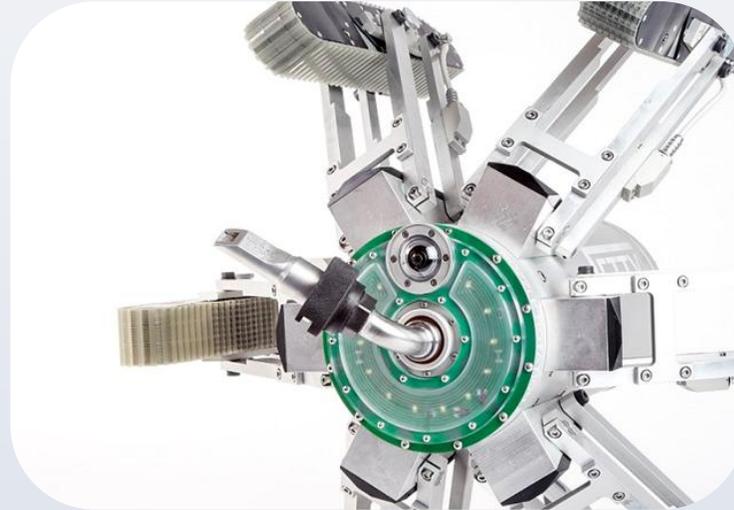
Robots for maintenace
Robots helping maintenance people with inspections, etc.

Service robots for Facility Management
Cleaning, Logistics, Security…

ROBOTS IN MAINTENANCE

https://www.jettyrobot.com/cs/home
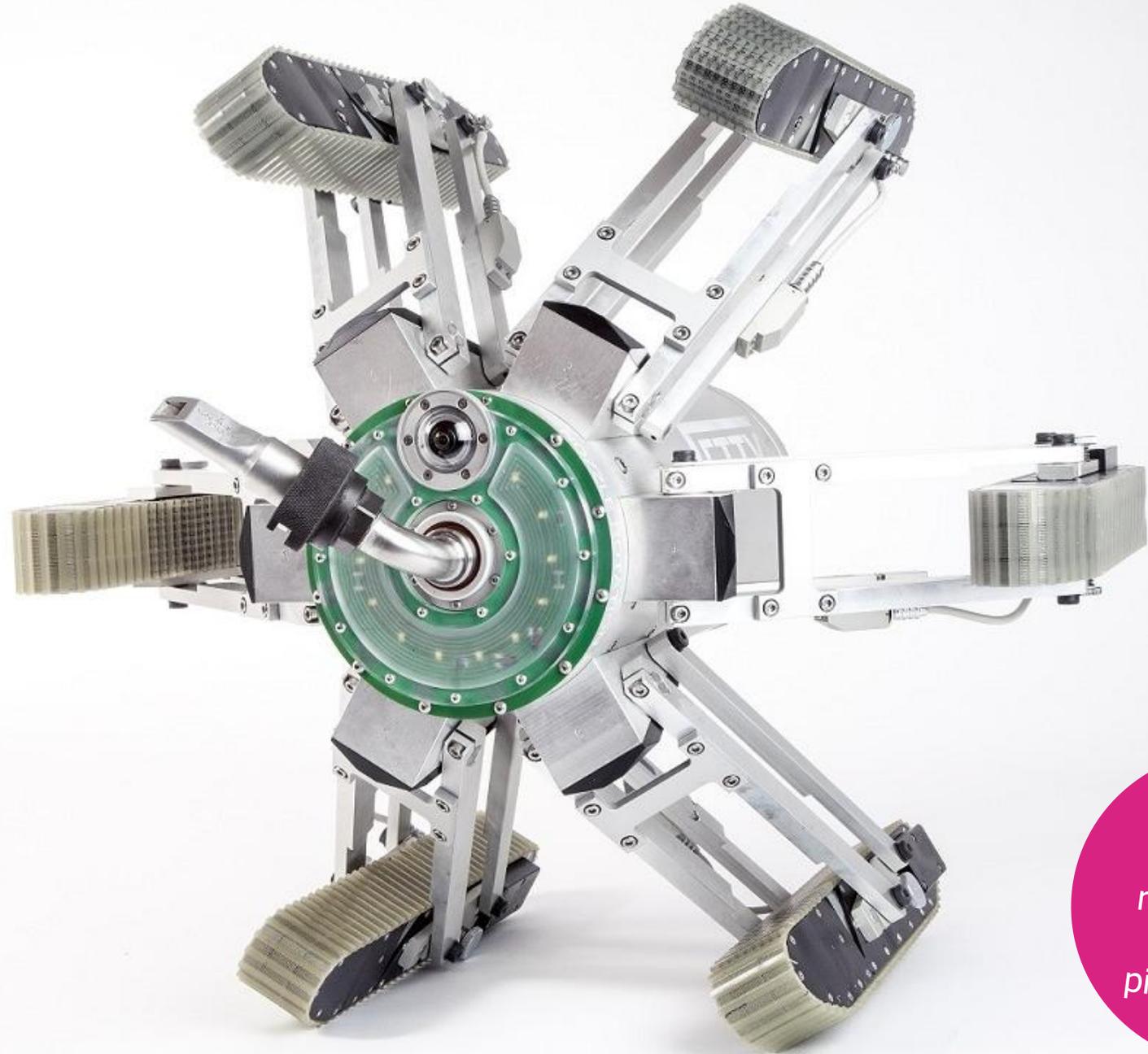
Even more preventive maintenance and easier pipe cleaning

ROBOTS IN MAINTENANCE

hibot

Even more inspections and effective cleaning

Prevention, inspection and cleaning: **ANYmal**

What is possible today?

Even more preventive maintenance and inspections

Who will do the job?

Inspection and maintenance:
Boston Dynamics in Deutsche Bahn

Bogies inspection done by **Cyberdog** instead of people

Robots help people in maintenance

Click to see:
https://www.dbcargo.com/rail-de-en/logistics-news/walking-robot-for-train-maintenance-11863464

https://www.dbcargo.com/rail-de-en/logistics-news/walking-robot-for-train-maintenance-11863464

SERVICE ROBOTS FOR CLEANING
IN FACILITY MANAGEMENT

https://sebotics.com/tn70-reinigungsroboter/

URBAN MAINTENANCE

CAPRA ROBOTICS

AUTOMATE YOUR WORKFLOWS
INSPECTION – LOGISTICS – MAINTENANCE

Our versatile mobile robot platform is the cornerstone of our cutting-edge solutions, designed to adapt and excel in various industrial and urban applications. This patented platform combines unique steering, a flexible chassis and large engine power to deliver unparalleled performance in challenging environments.

Whether you need automation for inspection, logistics, or maintenance tasks, our solutions are engineered to enhance consistency, efficiency, and reliability in your operations. In a world filled with complex tools, we are proud to offer you solutions that are robust in their design, simple to use, and user friendly.

ONE ROBOT - MULTIPLE APPLICATIONS

| | 6 ft | 5 ft | 4 ft | 3 ft | 2 ft | 1 ft | 0 ft |
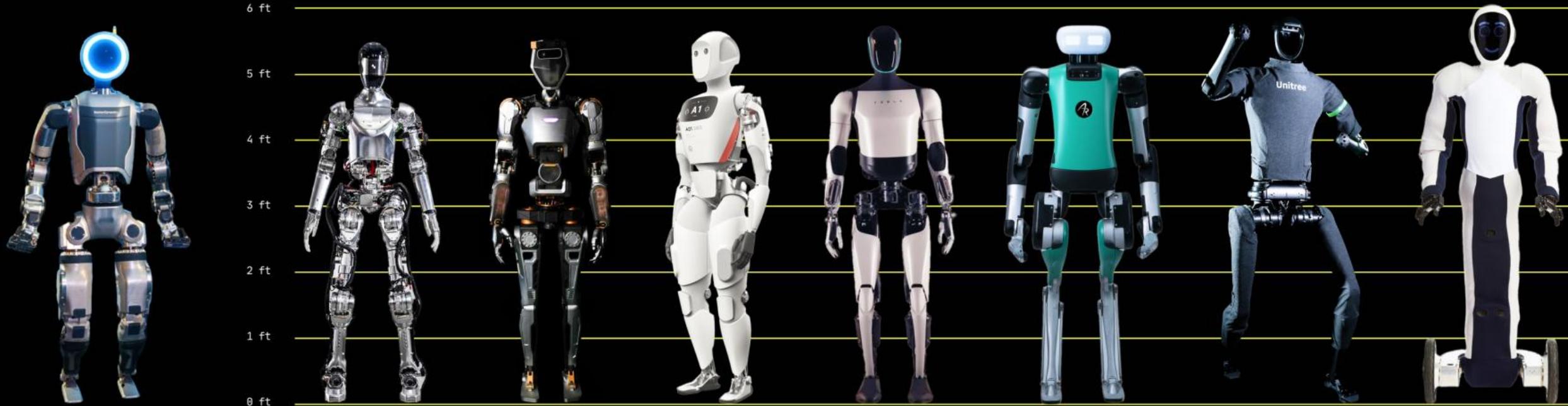
ELECTRIC ATLAS

Developer: Boston Dynamics
Height/Weight: Unknown
Speed: Unknown
Payload: Unknown
Runtime: Unknown

FIGURE 01

Figure AI
5'6" / 132 lbs
2.6 mph
44 lbs
5 hrs

PHOENIX

Sanctuary AI
5'7" / 155 lbs
3 mph
55 lbs
Unknown

APOLLO

Apptronik
5'8" / 160 lbs
Unknown
55 lbs
4 hrs

OPTIMUS GEN 2

Tesla
5'8" / 138 lbs
1.3 mph
45 lbs
Unknown

DIGIT

Agility Robotics
5'9" / 140 lbs
3.3 mph
35 lbs
Unknown

H1

Unitree Robotics
5'10" / 103 lbs
7.4 mph
Unknown
Unknown

EVE

1X Technologies
6'1" / 189 lbs
8.9 mph
33 lbs
6 hrs

Freethink✳

DIGITAL TWINS OF ASSETS, BUILDINGS AND CITIES

twinzo
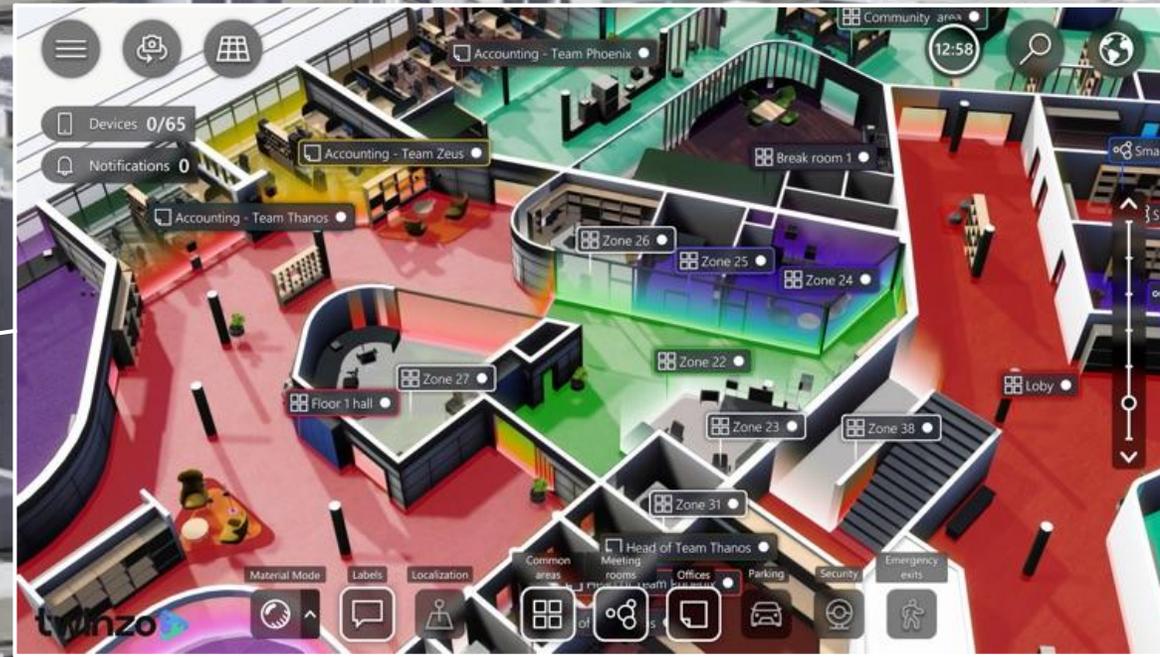
DIGITAL TWINS FOR TRAINING

Workshop
Upskilling Protection Engineers with High-Fidelity Digital Twins (HFDT): A Joint Industry and Training Institute Initiative

Eng. Andrea Bonetti
Teacher for Relay Protection
III course, STF Sweden
Senior Application Engineer
Megger Sweden
Sweden

Eng. Ali Husain
Business Unit Leader – Protection
Megger Middle East
Bahrain

Eng. Dhanabal Mani
Director, Relay Software Development
Megger Dallas
United States

Eng. Khaleel Al-Adani
Head of Electrification &
Automation Products
SIEMENS Ltd
Saudi Arabia

Eng. Hamdan Almukhalas
Country Sales Manager
Megger
Saudi Arabia

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DEMOGRAPHICS
PEOPLE DO MATTER!

Projection of population for 2030 in Czechia

2030

By 2030 in CZ the number of people
aged 50-65 will rise by 17 %

This age group will become
the main workforce in the economy

**DEMOGRAPHICS
PEOPLE DO MATTER!**

European Union – 2023
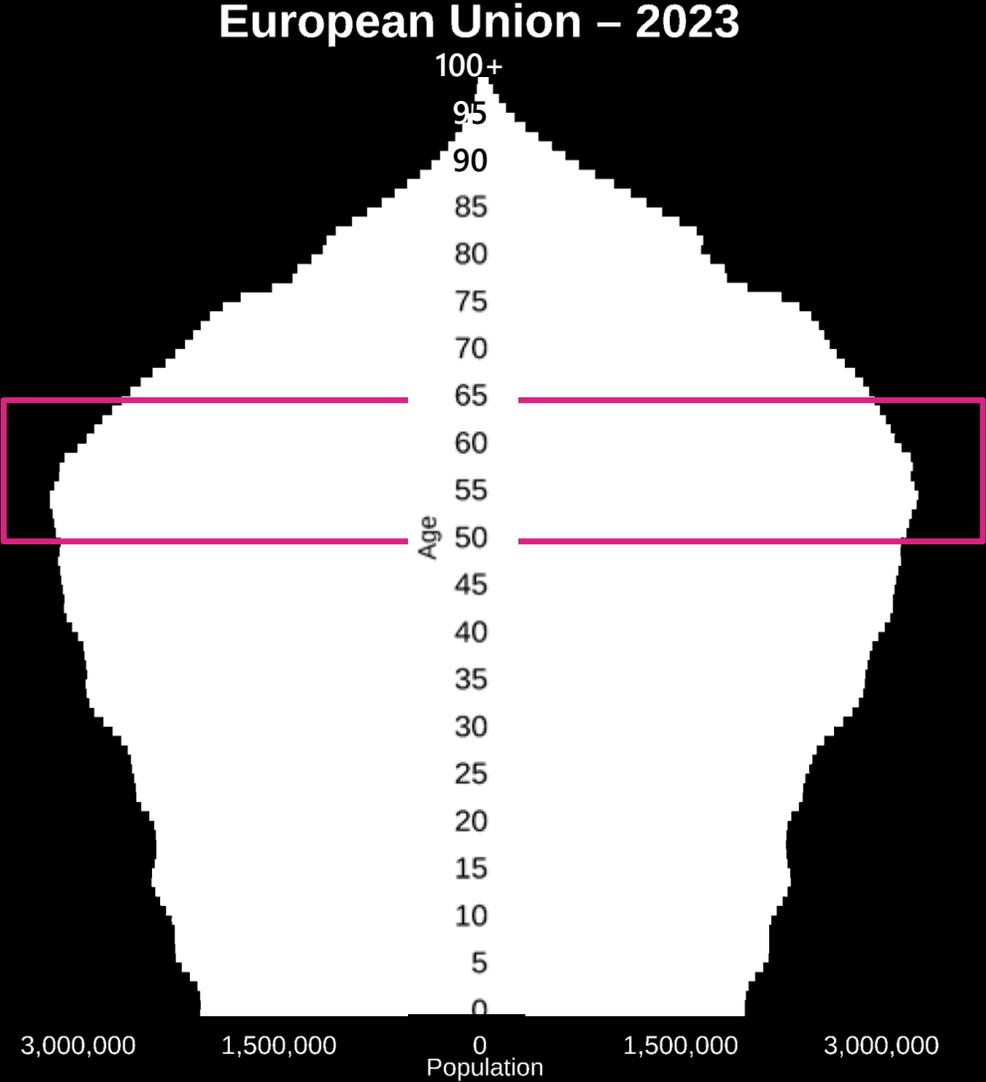
2030

People **aged 50-65**
will be the **main workforce group
in Europe**

50+ is the Golden mine!

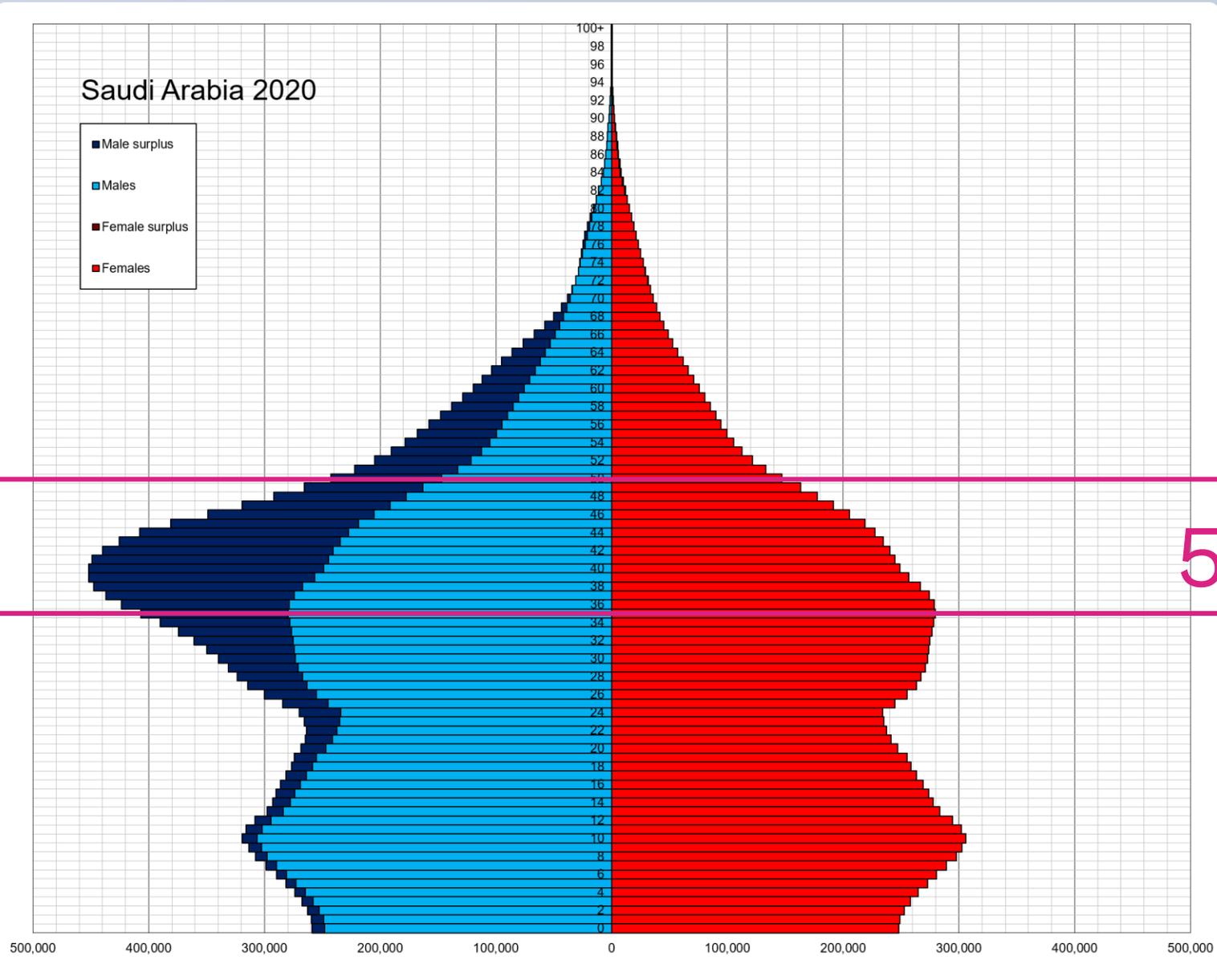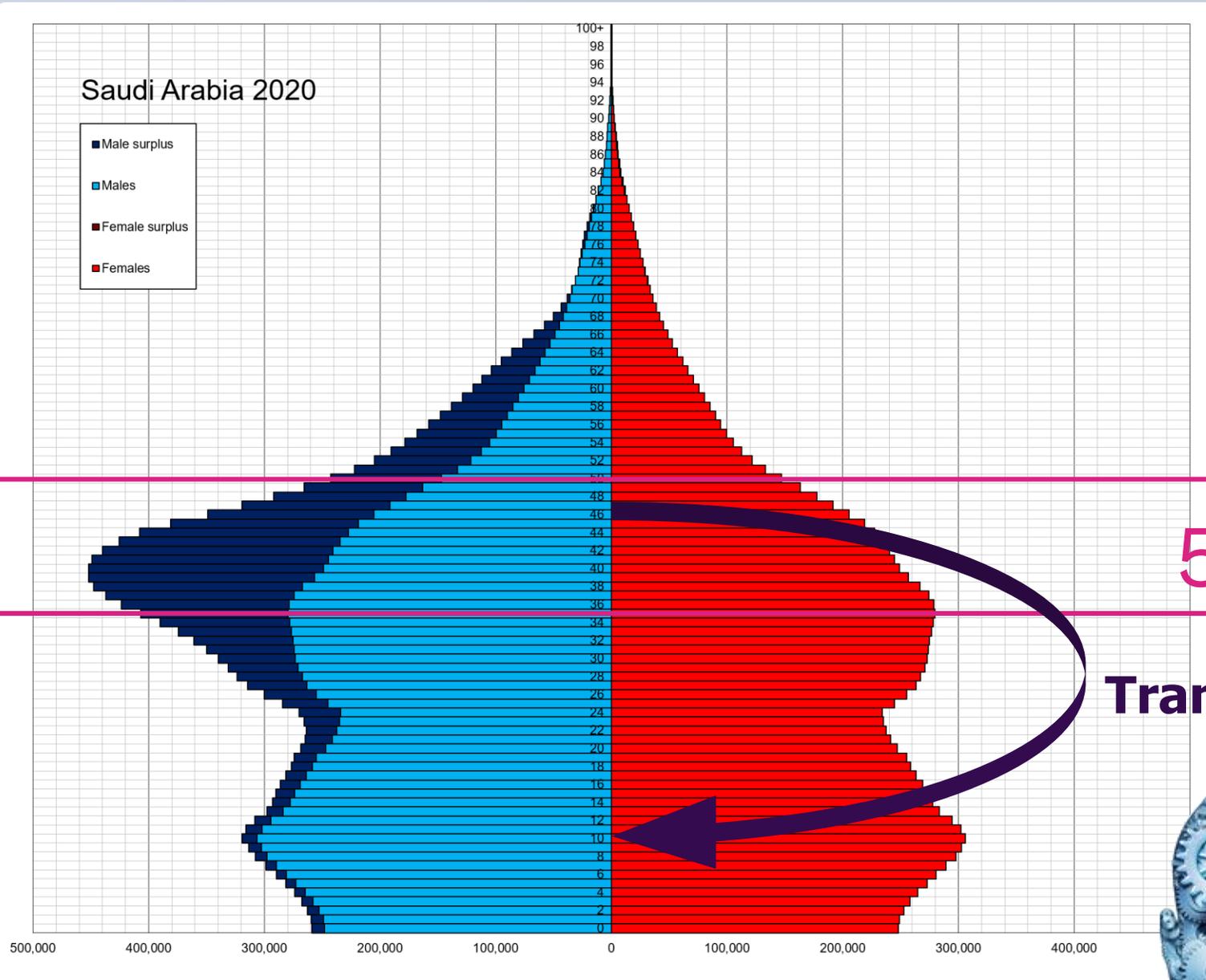# DEMOGRAPHICS SAUDI ARABIA
How people age and retire
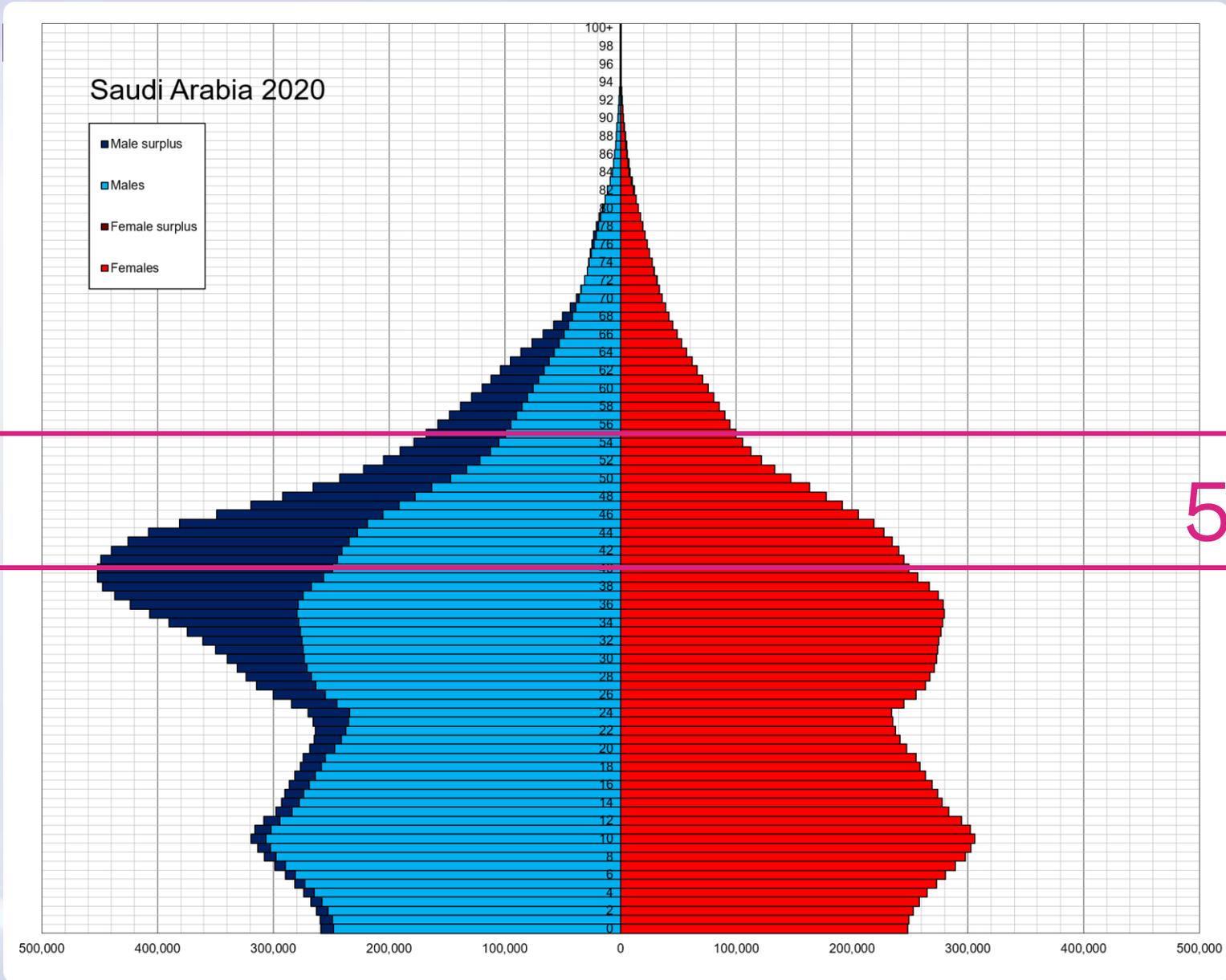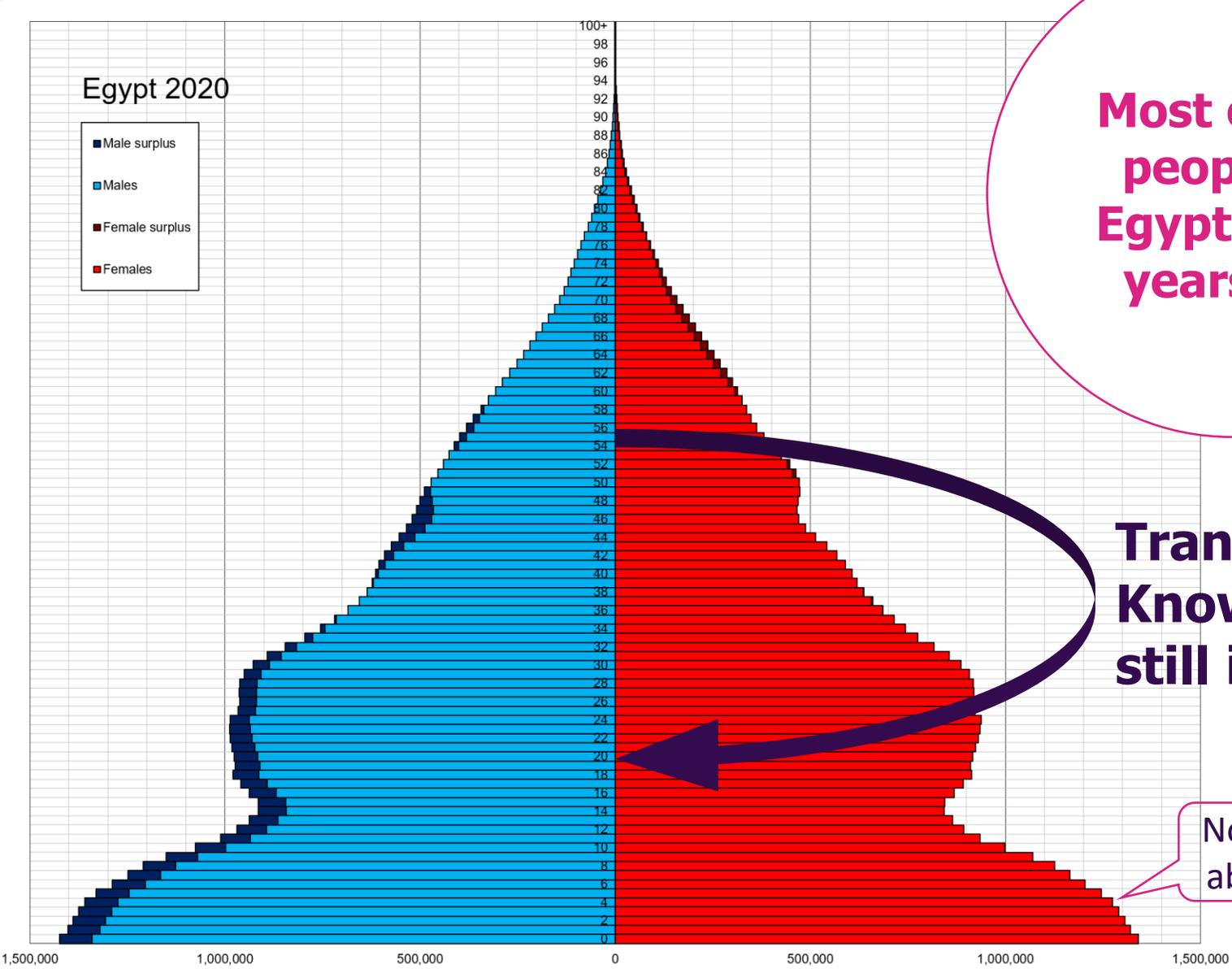
Saudi Arabia 2020

- Male surplus
- Males
- Female surplus
- Females

50-65 in **2020**

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Saudi Arabia 2020

- Male surplus
- Males
- Female surplus
- Females

50-65 in **2030**

500,000 400,000 300,000 200,000 100,000 0 100,000 200,000 300,000 400,000 500,000

Saudi Arabia 2020

- Male surplus
- Males
- Female surplus
- Females

50-65 in **2035**

500,000 400,000 300,000 200,000 100,000 0 100,000 200,000 300,000 400,000 500,000
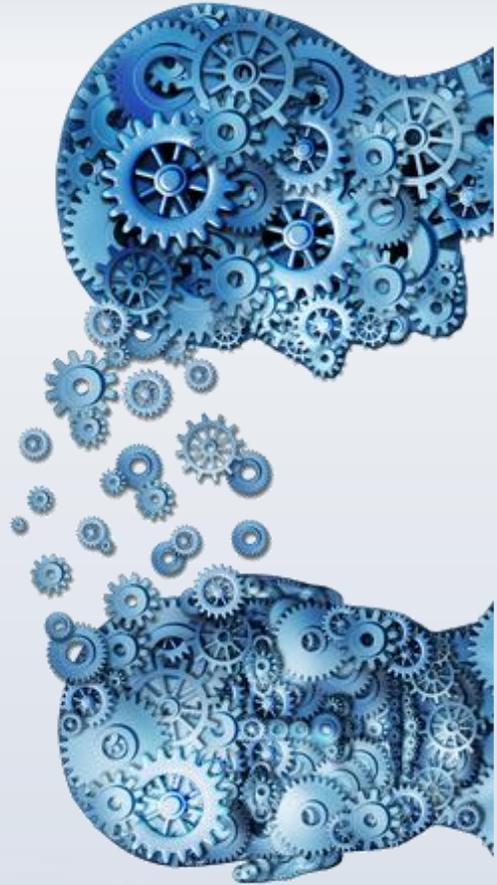
European Union – 2023
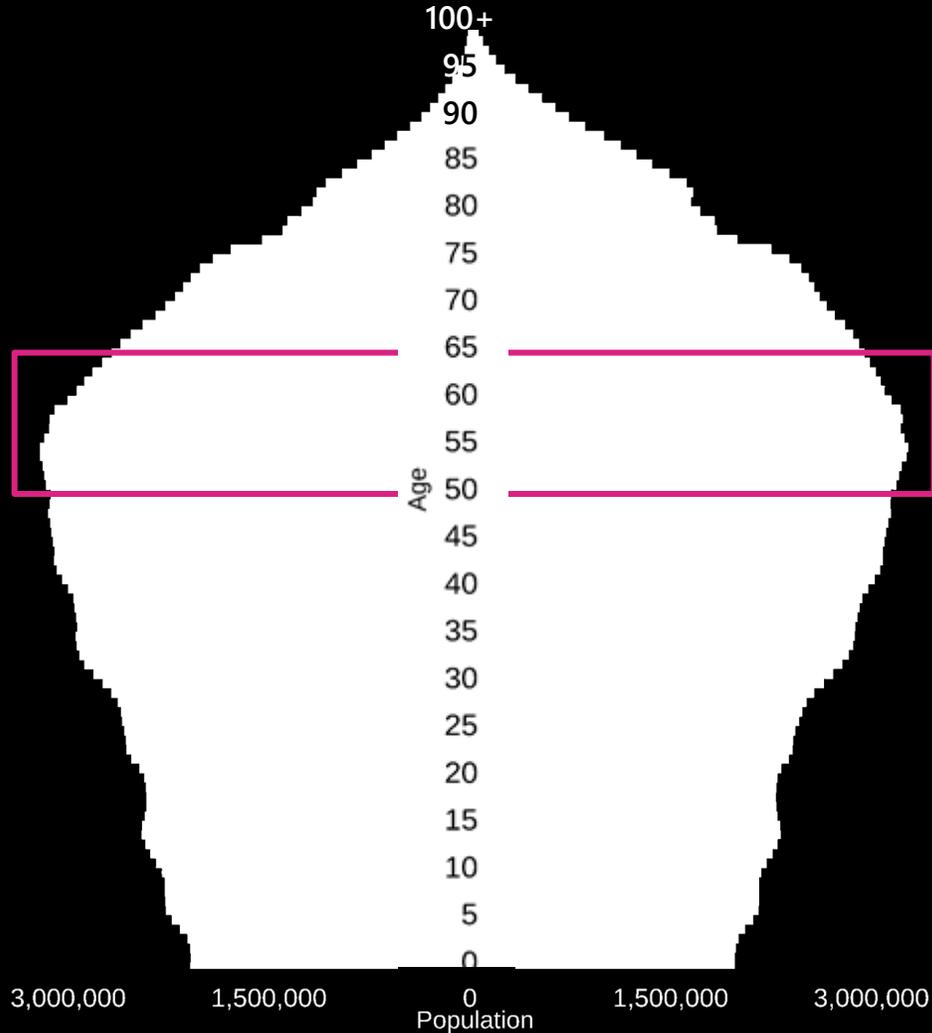
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People **aged 50-65**
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in Europe

50+ is the Golden mine!

WHY DO WE EVEN TRAIN PEOPLE?

DEVELOP PEOPLE

NEW ASSETS AND
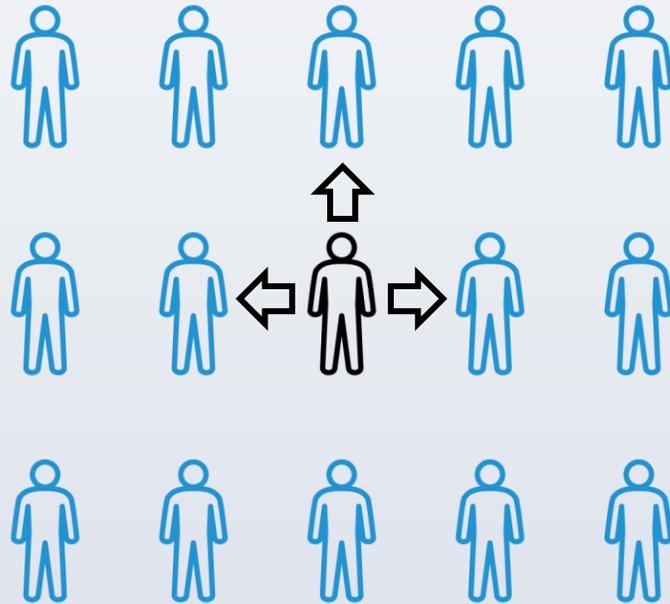TECHNOLOGIES

RETAIN PEOPLE

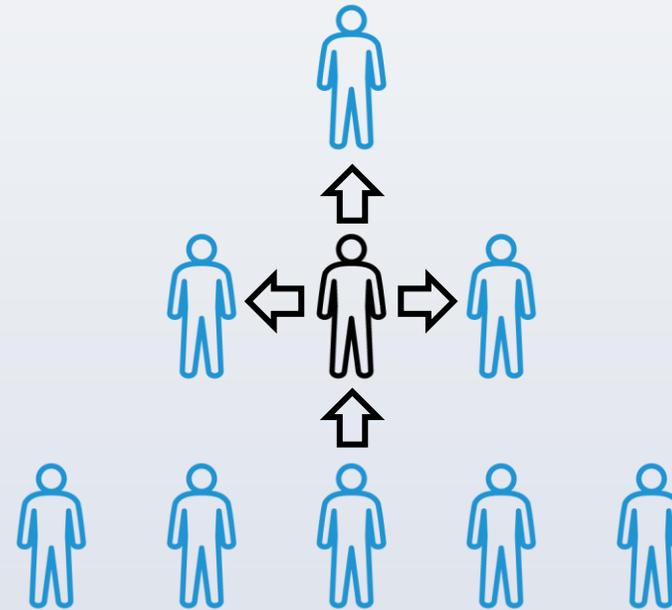PREVENT FLUCTUATION

RETAIN KNOWLEDGE

KNOWLEDGE TRANSFER
BETWEEN GENERATIONS

TRAINING IN LINE WITH STRATEGIC GOALS

UP-SKILL AND RE-SKILL
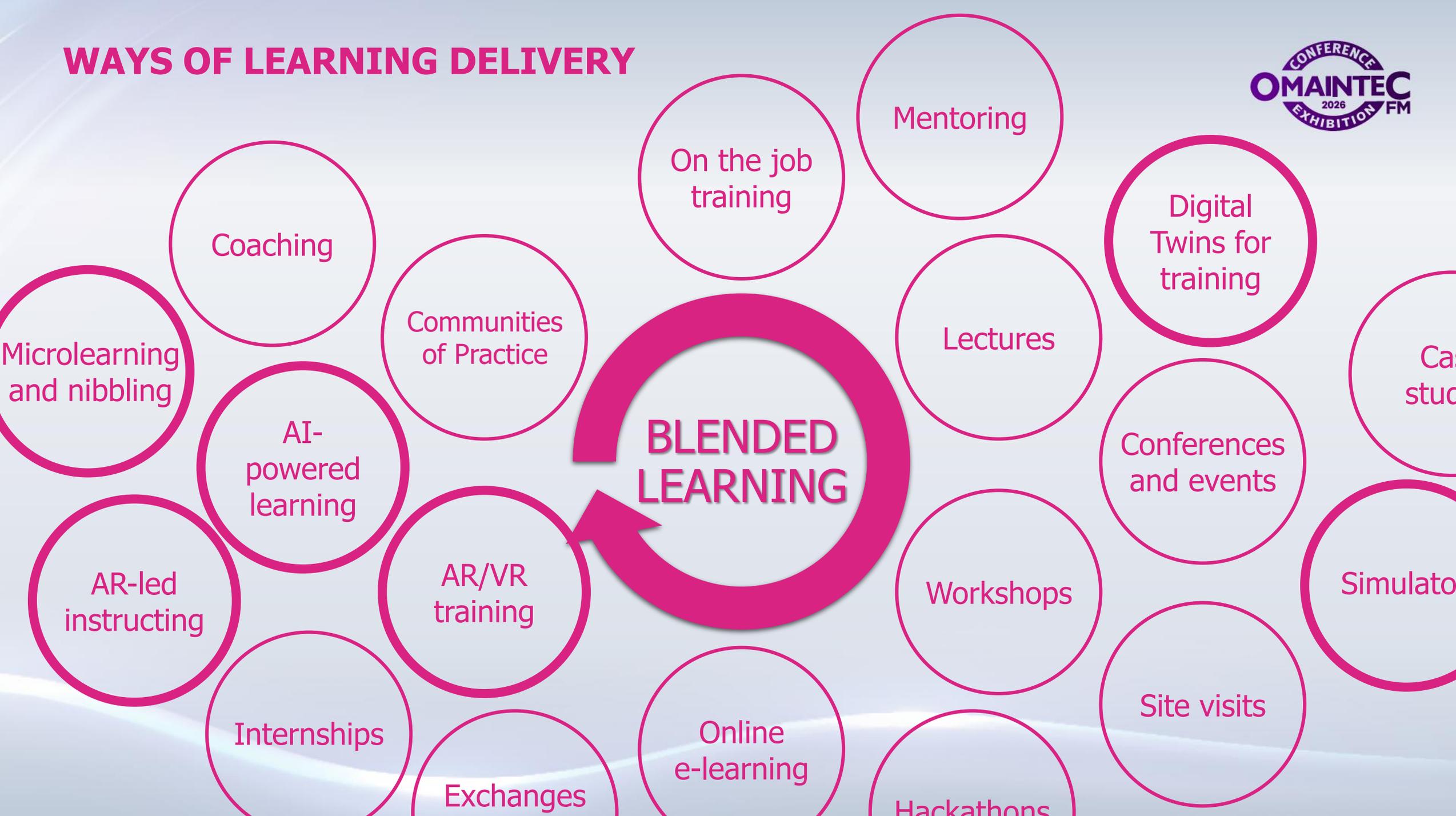## WAYS TO DEVELOP PEOPLE

UPSKILL OR RESKILL?

NOT EVERYONE NEEDS TO BE A MANAGER

A structured **reskilling/upskilling path shall be defined** for all maintenance roles:
Technicians, Planners, Engineers, Managers...

WAYS OF LEARNING DELIVERY

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Mentoring

On the job training

Coaching

Digital Twins for training

Communities of Practice

Lectures

Microlearning and nibbling

AI-powered learning

BLENDED LEARNING

Ca... stud...

Conferences and events

AR-led instructing

AR/VR training

Workshops

Simulato...

Internships

Online e-learning

Site visits

Exchanges

Hackathons

Tansfer of Knowledge
AR-powered field work

Available work instructions

Staff have instant access to manuals, photos, and instructional videos, so they always know what to do on the job. They complete tasks faster and more efficiently, saving you money on repeat visits.

- ✅ information available with a few clicks or voice commands
- ✅ clear texts, photos, and videos for guidance
- ✅ ability to record notes, capture photos, and log data from interventions

FIND OUT MORE →

https://lumnio.com/en/

LUMNIO: AR-powered field work

lumnio

DALŠÍ VIDEA

Capturing Know-how

https://lumnio.com/en/

LUMNIO: AR-powered field work

lumnio

Turning into Clear Work Instructions

DALŠÍ VIDEA

https://lumnio.com/en/

LUMNIO: AR-powered field work

lumnio

Efficient Onboarding of New Hires

https://lumnio.com/en/

GOOD PRACTICES
FOR SETTING UP A TRAINING PROGRAMME

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Help people want learn
Motivate for engagement

Get leaders on board
Lead by example

Assess training needs
Skills needed vs Skills people have

Learn, apply, reinforce
What is not applied is forgotten

Validate and certify
Get your staff certified!

Leverage AI + Digital Tools
for more effective learning

Hands-On and Simulation Training
Practical experience is essential for maintenance roles.

Measure impact
Measure to show progress

Offer Blended Learning for higher engagement and outcomes

Mentoring and Peer Learning
Knowledge transfer from seniors

Continuous Learning
Personal upskilling path for everyone

HUMANS CAN STILL DO THINGS AI CANNOT

Loaiza and Rigobon outlined five groups of human capabilities,
represented by the acronym EPOCH.

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|	
Empathy	**Empathy and emotional intelligence.** AI may be able to detect emotions, but humans can create a meaningful connection and share what the person is experiencing. Occupations such as social work and education illustrate this well.
Presence	**Presence, networking, and connectedness.** Roles in nursing and journalism reflect the importance of physical presence in building connections, fostering innovation, and collaborating with colleagues.
Oppinion	**Opinion, judgment, and ethics.** Humans can navigate open-ended systems, such as the legal profession and the science industry, whereas AI struggles to grasp concepts like accountability and responsibility.
Creativity	**Creativity and imagination.** Humor, improvisation, and "the visualization of possibilities beyond reality," as the researchers put it, remain uniquely human abilities. They are especially valuable in design work and scientific work.
Hope	**Hope, vision, and leadership.** Grit, perseverance, and initiative further embody the human spirit. This means taking on a challenge despite long odds of success, such as starting a new company.
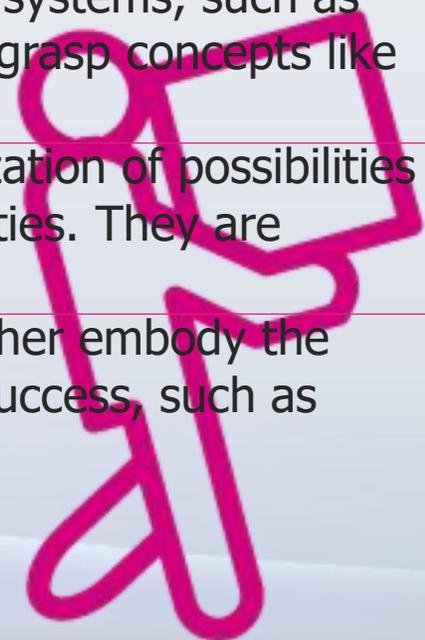
Main changes?

Wrench time – more preventive/predictive work, less repairs
Diagnostics – more sensors, IoT, data from machines, RCA, FMEA
Data work – master data, asset register, data analysis, BI
Digital Twins – digital models, shadows and twins of Equipment
Robots and automation – more robots to maintain
Robots in maintenance – more robots to help with maintenance
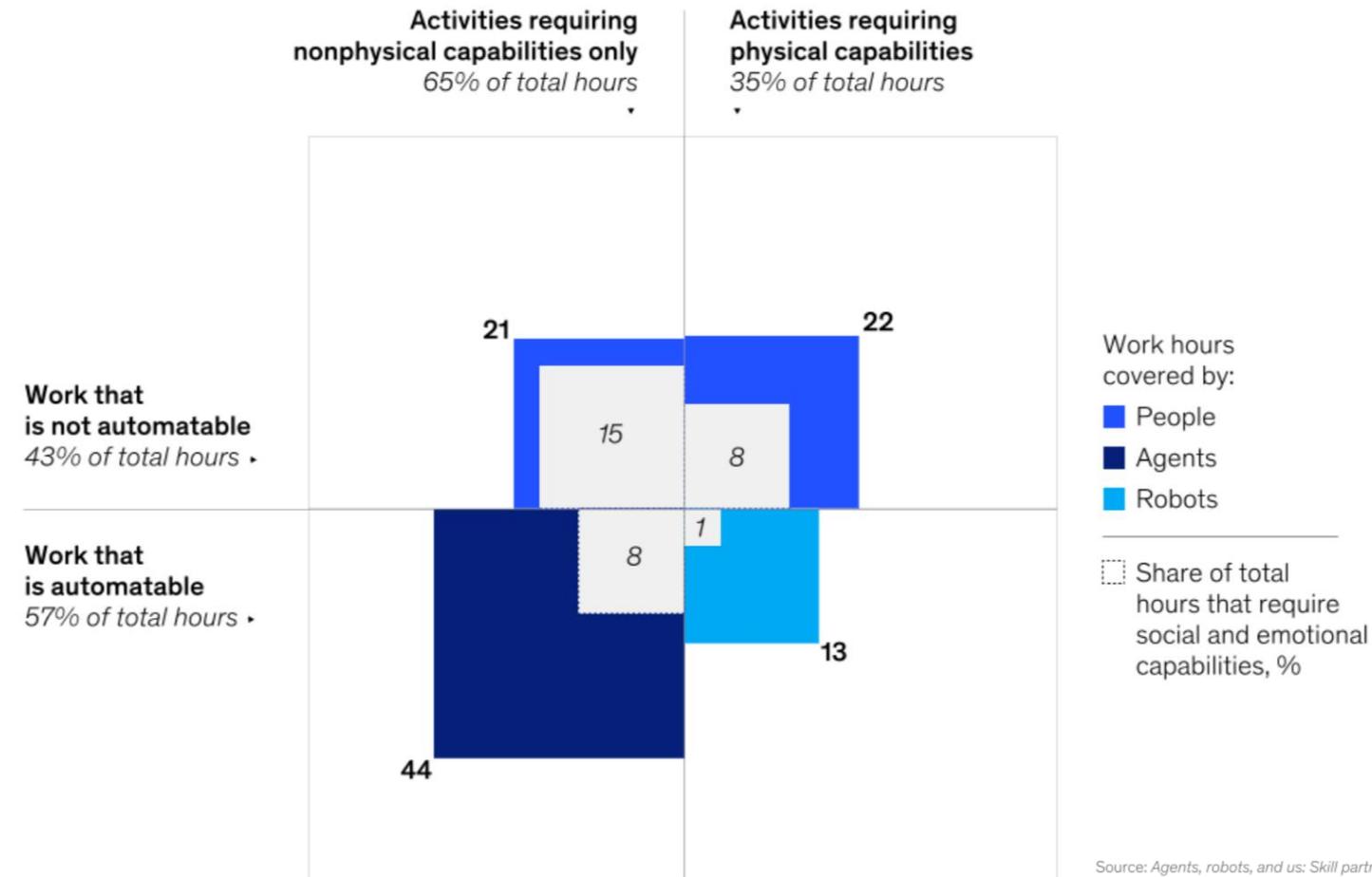Asset Management – performance-based & full-service contracts
Cooperation – manufacturer-vendors-suppliers-contractors
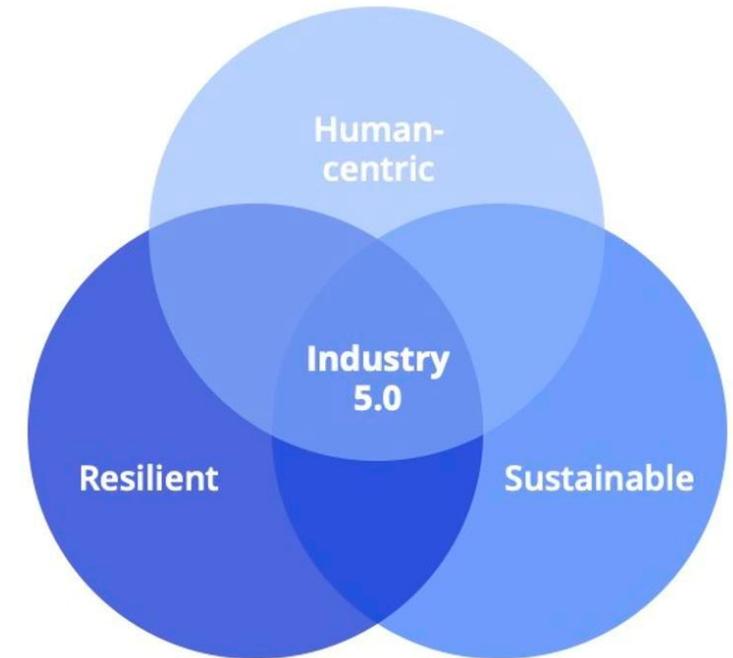Digitalization – more digital, CMMS, EAM, new tools AR, AI...
AI – from computer AI to Physical AI, intelligent devices, humanoids

People, agents, and robots could all play significant roles in the workforce of the future.

Distribution of work hours in the US, by technical automation potential, 2024, %

Activities requiring nonphysical capabilities only
65% of total hours

Activities requiring physical capabilities
35% of total hours

Work that is not automatable
43% of total hours

Work that is automatable
57% of total hours

21   22
15   8
8   1
44   13

Work hours covered by:
- People
- Agents
- Robots

☐ Share of total hours that require social and emotional capabilities, %

EPOCH
Empathy
Presence
Oppinion
Creativity
Hope

Human-centric

Industry 5.0

Resilient   Sustainable