

 **TOUR 2024**

**Digital Twin, AI e Robotica
applicate alla sicurezza
antincendio**

Andrea Nicosia Vinci

 **BIMON**

 **agorà**

**SAFETY
VILLAGE**

FIRE & LIFE SAFETY

Agenda

- 01 ● INTRODUCTION
- 02 ● THE PROBLEM
- 03 ● THE SOLUTION
 - Digitalization in the construction industry
 - AI for safety on site
 - Robotics
- 04 ● CONCLUSIONS

ANDREA NICOSIA VINCI

VDC MANAGER BIMON

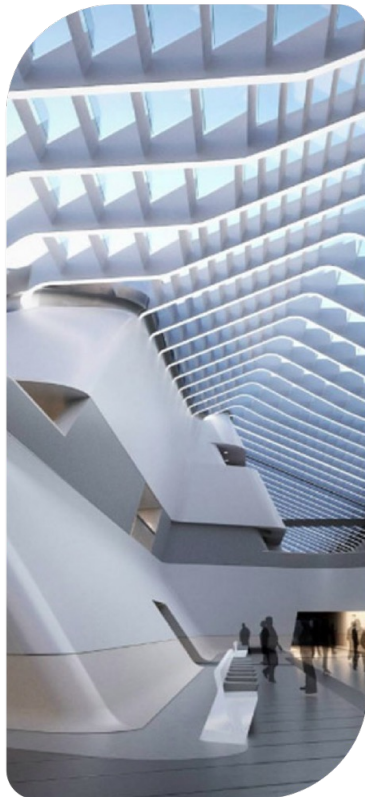
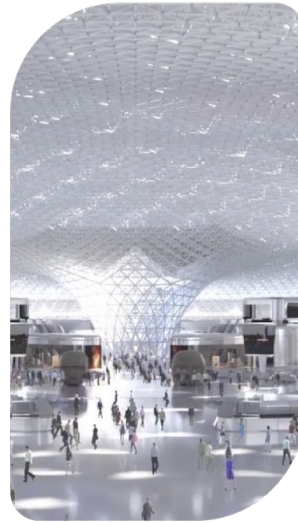
BIM Manager, Computational Designer, Coder. In short, a tech enthusiast. Worked on several international large-scale projects, including towers, bridges, and stadia. Expert in parametric modeling, workflow optimization and data management, embracing Project Management from the first steps of the AEC career. Always been an early adopter, gazing towards innovation and learning.



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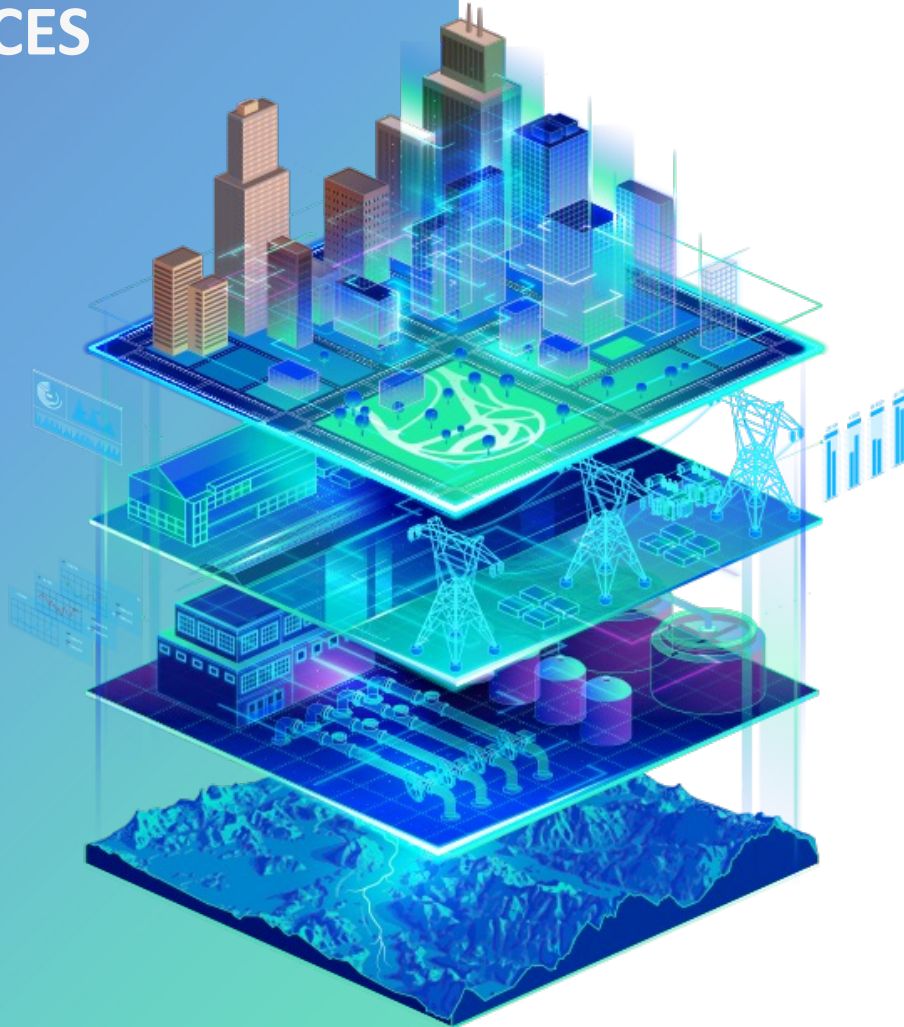
 BIMON

We are a Company that operates as a leader in Building Information Modelling (**BIM**) and **Digital Twin solutions** in order to disrupt and innovate the Architecture & Construction industry.

Combining **AI and cloud platforms**, BIM enables to integrate multidisciplinary structured data to create a digital representation of an asset throughout its life cycle, from planning, design, construction and commissioning.

We work in different industries supporting our clients in the realization of **complex interventions** using BIM and Digital Twin technologies and developing AI solutions.

SERVICES



ENGINEERING.

Engineering services that optimize the design with 20% savings in construction costs.



DIGITAL.

Digitization services to obtain real-time data from assets and improve their construction.



SOLUTIONS.

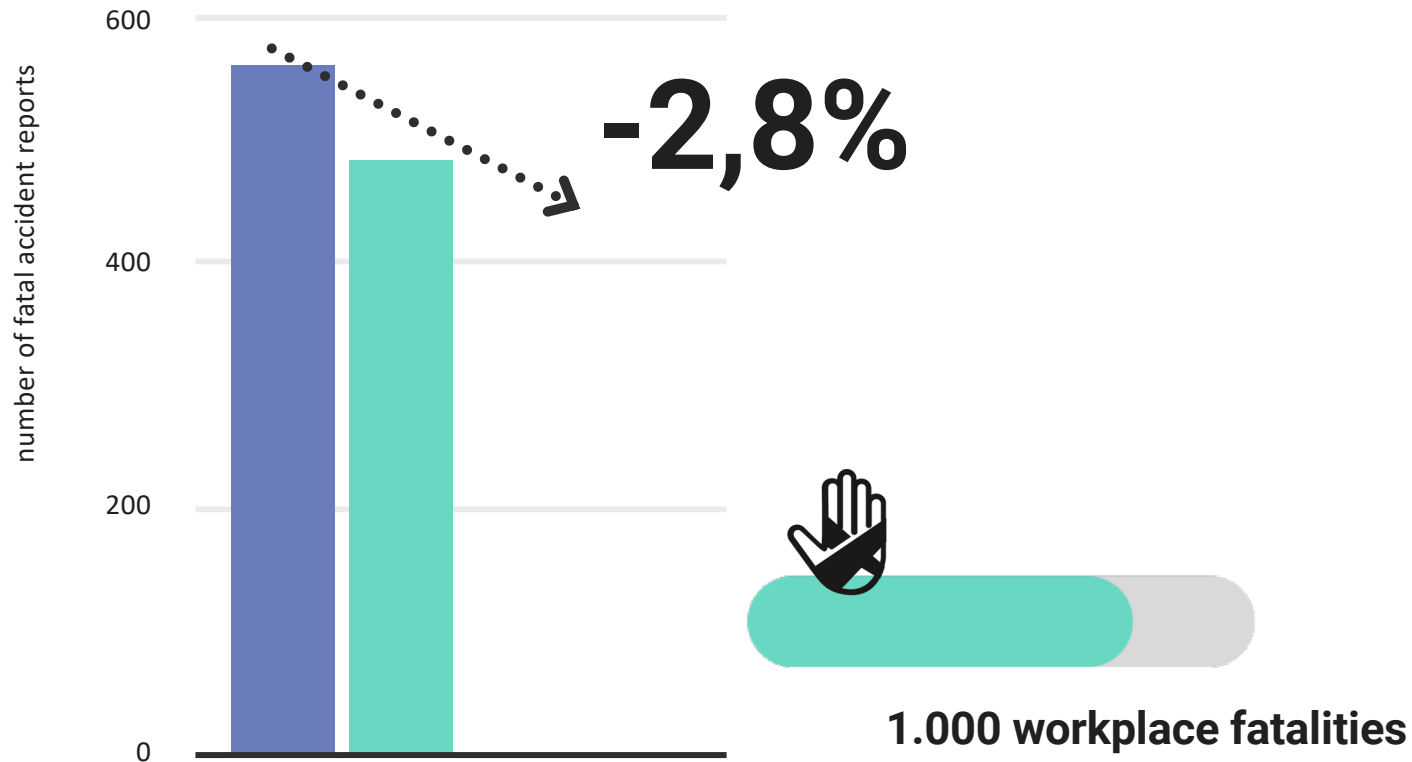
AI solutions and products to achieve savings in energy consumption and asset maintenance.

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Statistics

Accidents in the construction industry



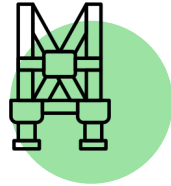
Source: Occupational accident data for the first half of the year- INAIL

2022 2024

Occupational accident data for the first half of the year, provided by INAIL, show a downward trend: **450 fatal accident reports** showing a **decrease of 2.8 percent** compared to 2022. However, it is important to note that this still corresponds to **a total of 1,000 workplace fatalities**, (three deaths per day on average!) a number that remains worryingly high and far from acceptable.

Top 10 MOST CITED STANDARDS - FY 2022

www.osha.gov/top10citedstandards



1 Fall Protection:
General Requirements
1926.501
5,915 violations



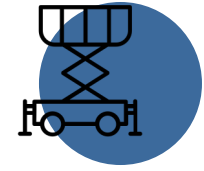
2 Hazard
Communication
1910.1200
2,639 violations



3 Ladders
1926.1053
2,449 violations



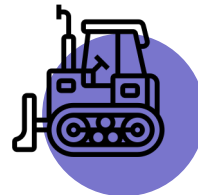
4 Respiratory Protection
1910.134
2,412 violations



5 Scaffolding
1926.451
2,251 violations



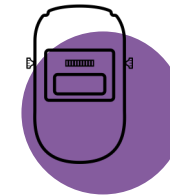
6 Control of Hazardous
Energy (Lockout/tagout)
1910.147
2,139 violations



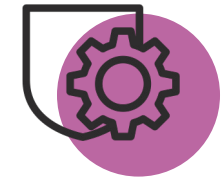
7 Powered
Industrial Trucks
1910.178
1,896 violations



8 Fall Protection:
Training Requirements
1926.503
1,762 violations



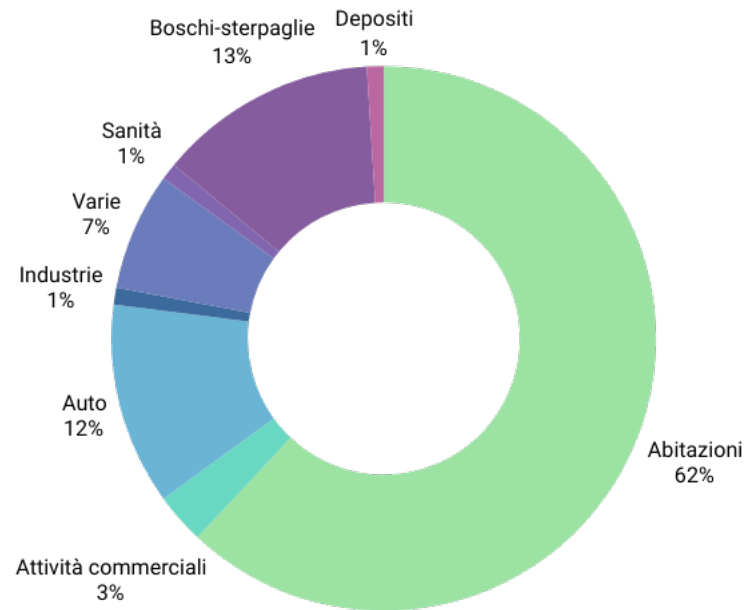
9 Personal Protective and
Lifesaving Equipment:
Eye and Face Protection
1926.102
1,572 violations



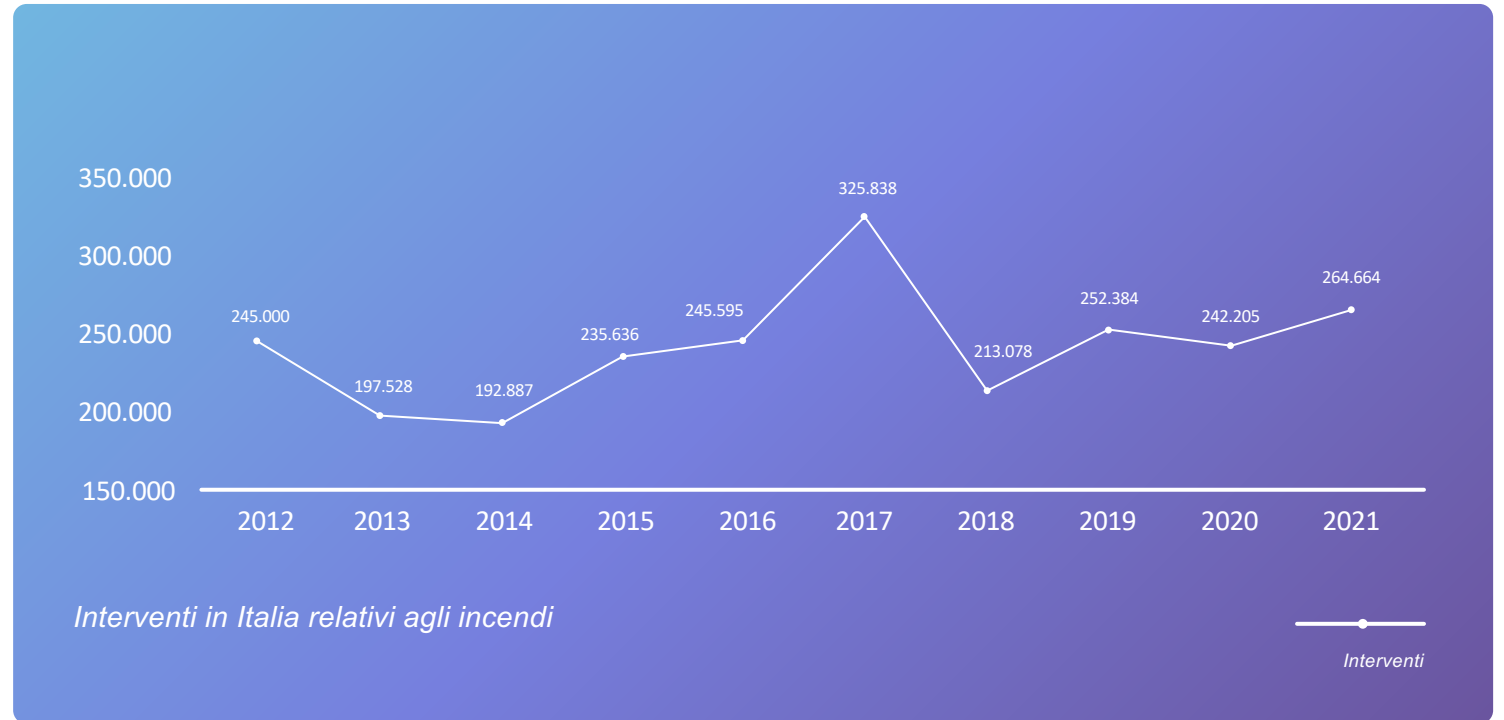
10 Machine
Guarding
1910.212
1,469 violations

Statistics

Fire-related Accidents in Italy



Morti per incendio ed esplosione in ITALIA







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Most industry sectors display a meaningful association with five or more technology trends.

Relevance of trend to industry¹

Minimal relevance     High relevance

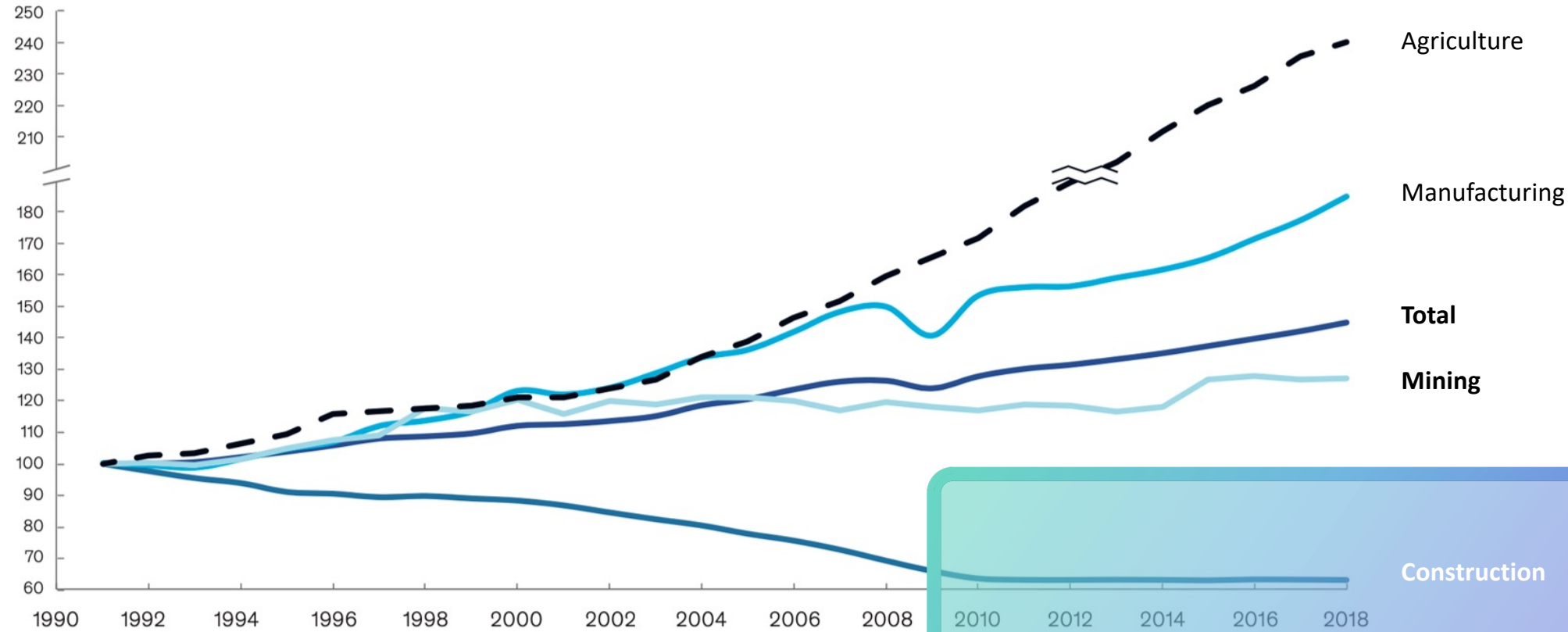
Silicon Age

Engineering Tomorrow

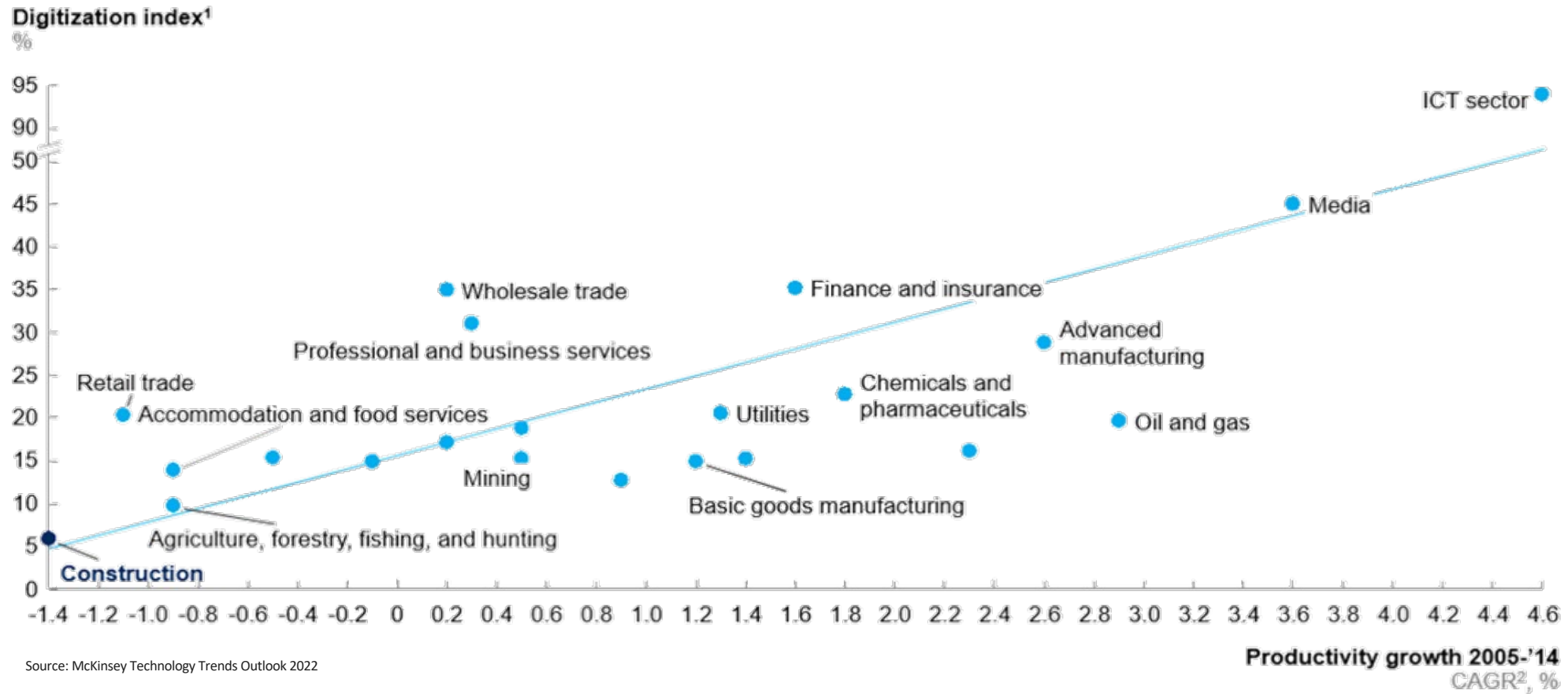
| Industry | Silicon Age | | | | | Engineering Tomorrow | | | | | | | | |
|--|-----------------------|------------|--------------------------|--------------------------------|---------------------|--------------------------------------|----------------------|--|--------|---------------------------|------------------------|--------------------|------------------------------|-----------------------------------|
| | Advanced connectivity | Applied AI | Cloud and edge computing | Immersive-reality technologies | Industria-lizing ML | Next-generation software development | Quantum technologies | Trust architectures and digital identity | Web3 | Future of bio-engineering | Future of clean energy | Future of mobility | Future of space technologies | Future of sustainable consumption |
| Aerospace and defense | High | High | High | High | High | Medium | Low | Low | Medium | High | Minimal | High | High | High |
| Agriculture | High | High | High | Minimal | High | Low | Low | High | High | High | Minimal | High | High | High |
| Automotive and assembly | High | High | High | High | High | Low | High | High | High | Low | High | High | Low | High |
| Aviation, travel, and logistics | High | High | High | High | High | Low | Low | High | High | Low | Minimal | High | High | High |
| Chemicals | High | High | High | High | High | Low | High | Low | High | High | High | Low | Low | High |
| Construction and building materials | High | High | High | High | High | Low | Low | High | High | Low | High | High | Low | High |
| Consumer packaged goods | High | High | High | High | High | Low | High | High | High | High | Minimal | Low | Low | High |
| Education | High | High | High | High | High | High | Minimal | High | Low | Low | Minimal | Minimal | Minimal | Low |
| Electric power, natural gas, and utilities | High | High | High | High | High | Low | High | High | Low | Minimal | High | High | High | High |
| Financial services | High | High | High | Low | High | High | Low | High | High | Minimal | High | High | Low | High |
| Healthcare systems and services | High | High | High | High | High | Low | High | High | High | High | Minimal | High | Low | High |
| Information technology and electronics | High | High | High | High | High | High | High | High | High | High | High | High | Low | High |
| Media and entertainment | High | High | High | High | High | Low | Minimal | High | High | Minimal | Minimal | High | Minimal | Low |
| Metals and mining | High | High | High | High | High | Low | High | Low | Low | High | High | High | High | High |
| Oil and gas | High | High | High | High | High | Low | High | Low | High | High | High | High | High | High |
| Pharmaceuticals and medical products | High | High | High | High | High | High | High | High | High | High | Minimal | Minimal | Low | High |
| Public and social sectors | High | High | High | Low | High | High | Low | High | High | Minimal | High | High | Low | High |
| Real estate | High | High | High | High | High | Low | Minimal | High | High | Minimal | High | High | Low | High |
| Retail | High | High | High | High | High | High | Minimal | High | High | Minimal | High | High | Minimal | High |
| Telecommunications | High | High | High | High | High | High | High | Low | High | Minimal | Low | High | High | High |

¹Relevance estimated qualitatively by industry experts based on trend's potential to affect an industry; degree of relevance is scaled at both trend and industry levels.

Global Productivity Growth

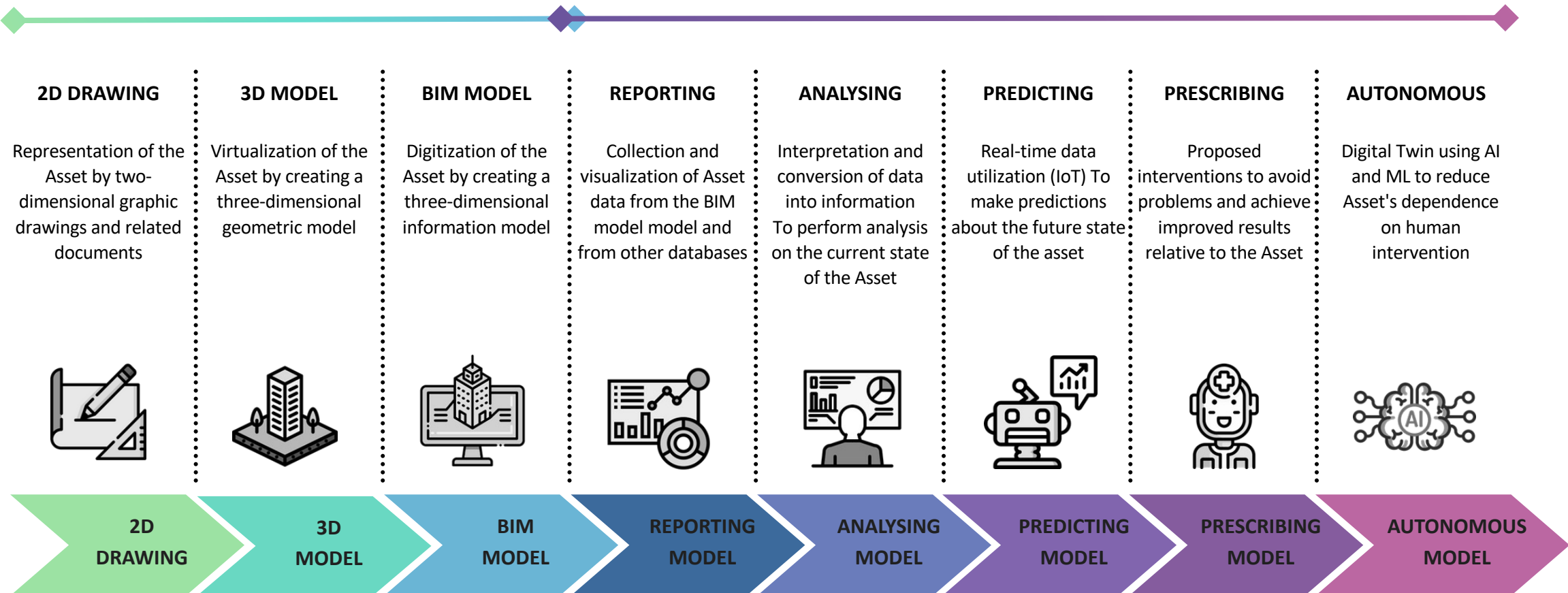


Digitalization and Productivity



Source: McKinsey Technology Trends Outlook 2022

Digital Maturity Goals and Levels



BIM

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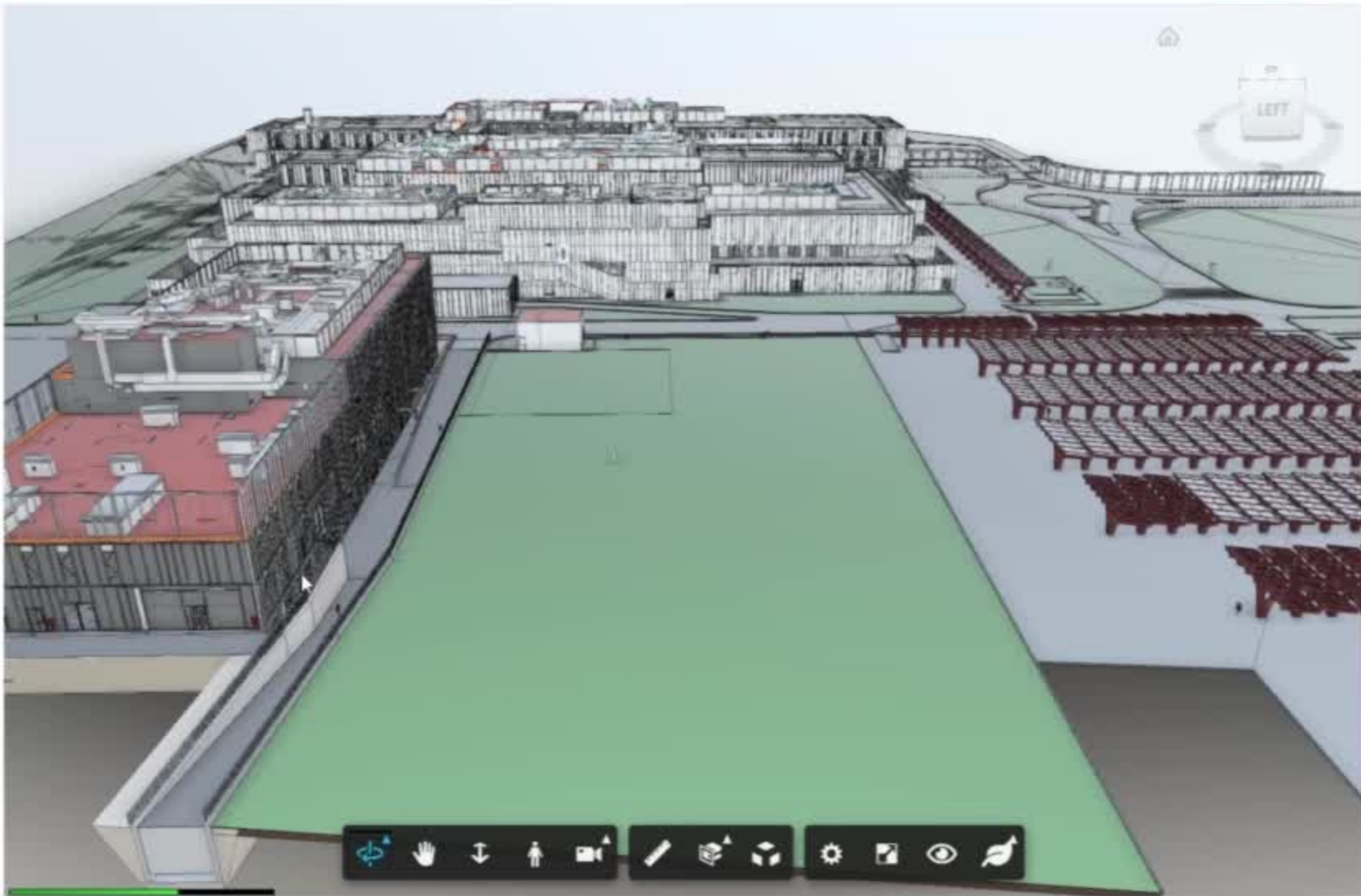
Modelo - Models

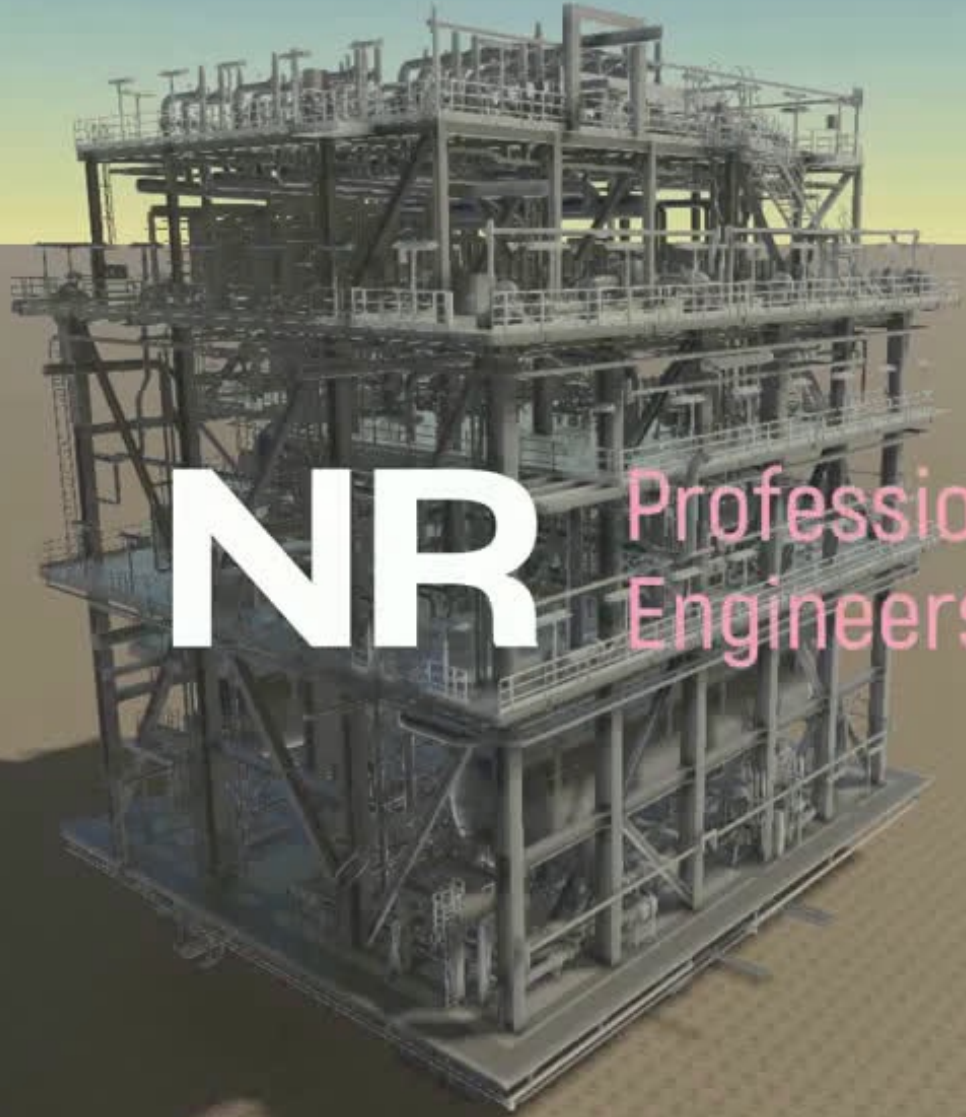
Models Browser

Search...

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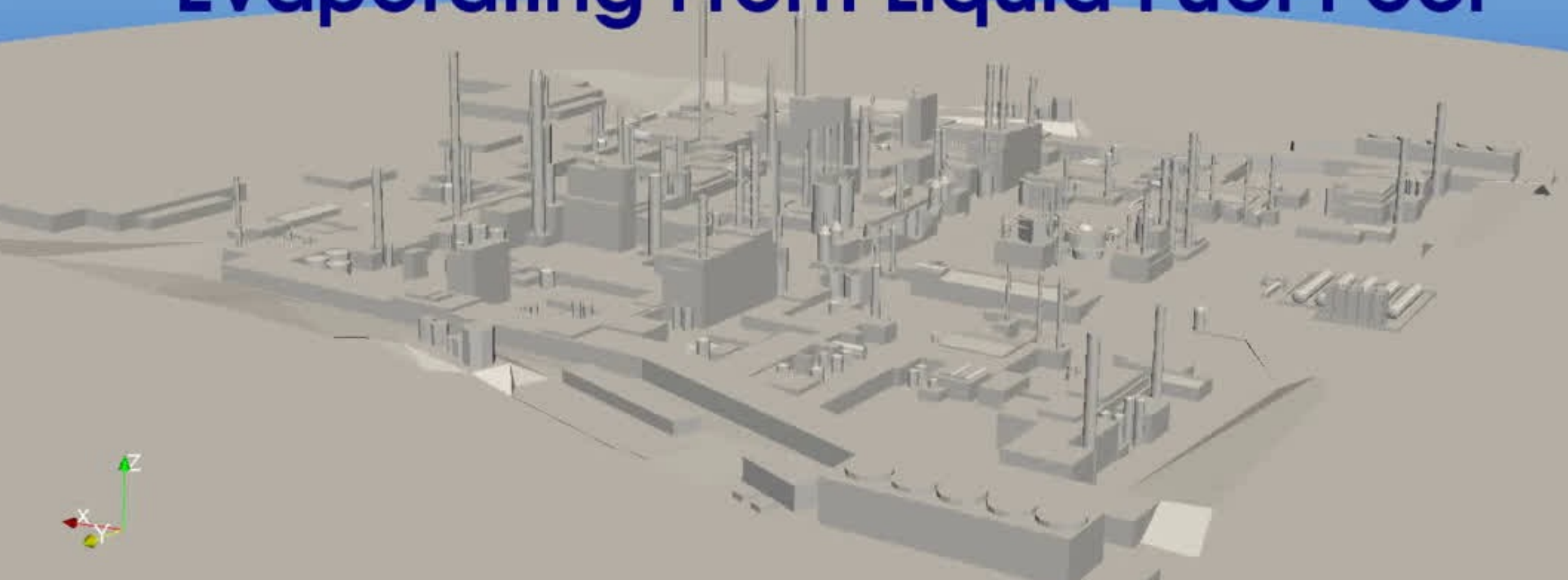


NR

Professional
Engineers

Time Lapse Simulation ~1/2 hr of Vapor Cloud Dispersion Phase

Green Contours Are Propane Vapor
Evaporating From Liquid Fuel Pool





SPORT VENUE EVACUATION
Football Stadium | Colored by Exit Time







Agenda

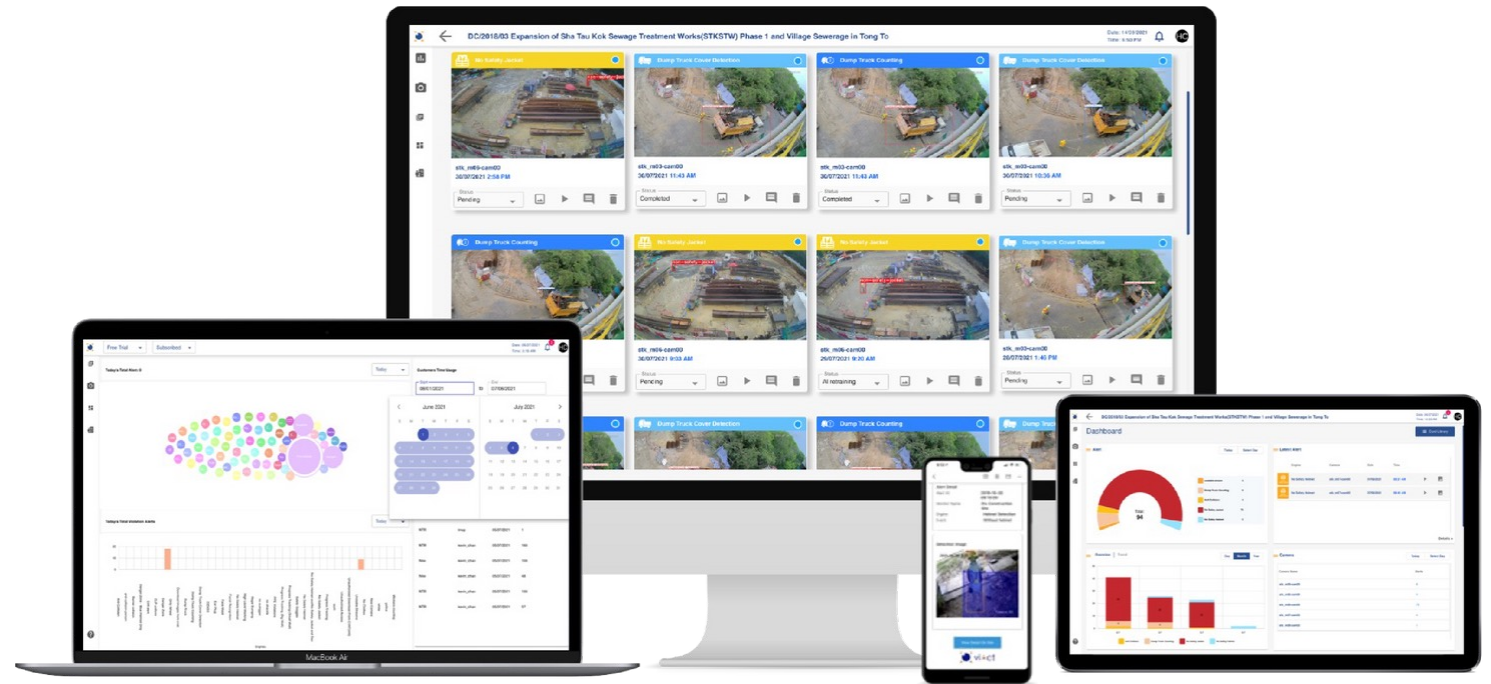
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SAFETY.AI

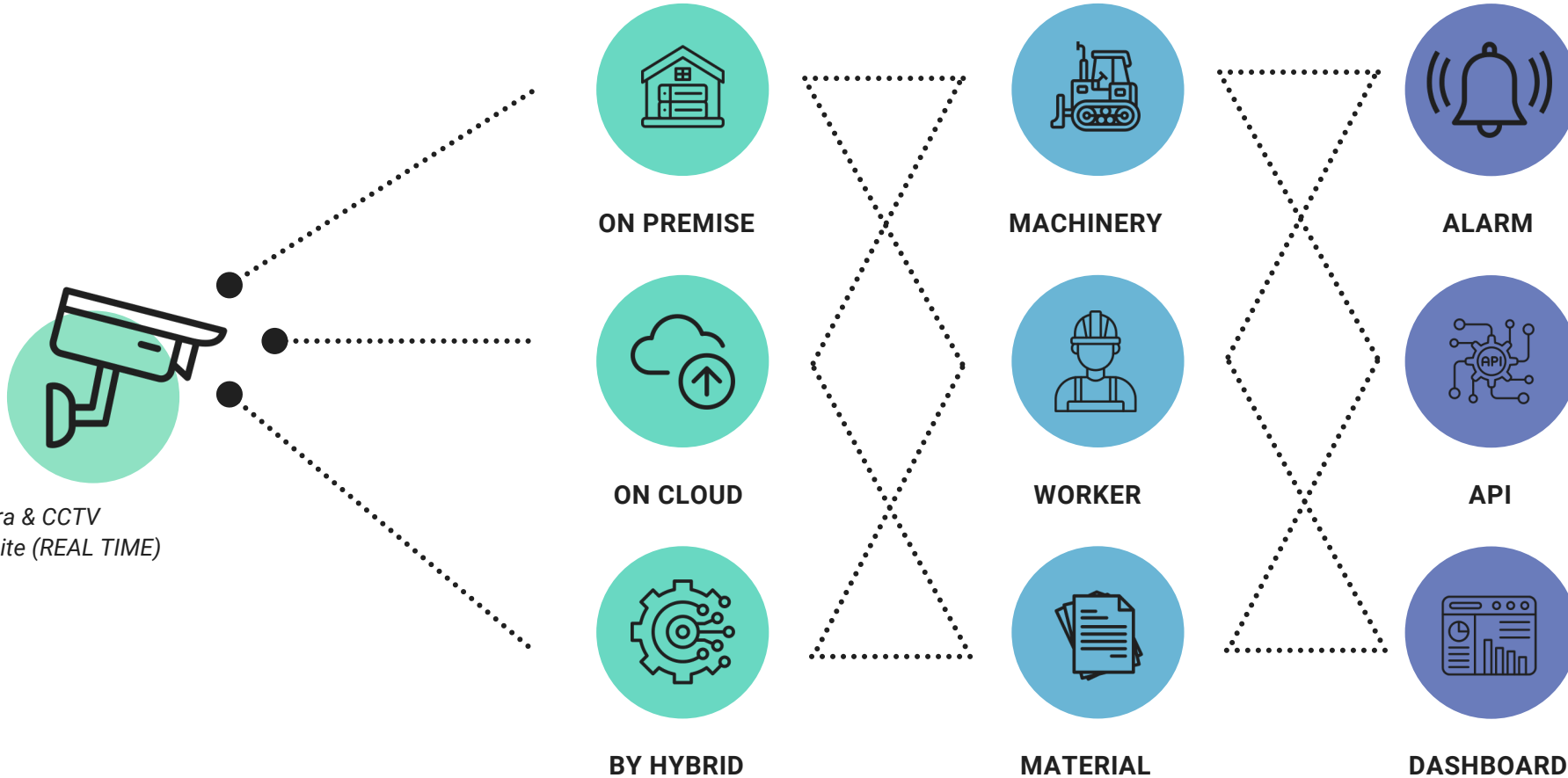
FOR AI MONITORING



-  Desktop & Mobile friendly
-  Real Time instant alert
-  Video clips review
-  3D model visualization
-  Work progress report
-  Log data analysis



HOW DOES IT WORK?



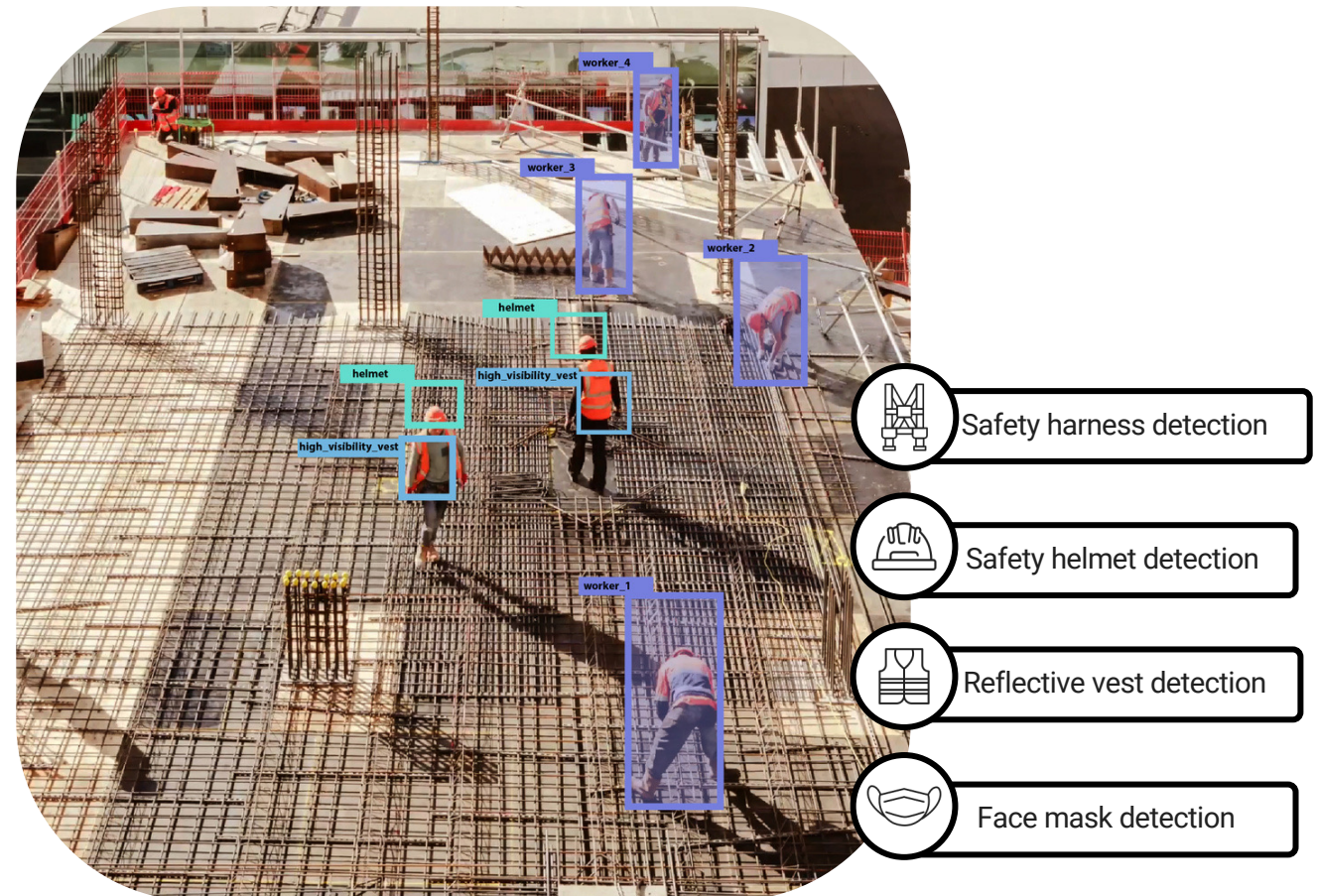
Use Cases

PPE Detection

The importance of PPE in the workplace should never be ignored. The predictive equipment acts as a final barrier between workers and the occupational hazards faced by them everyday.

PPE Detection can help yur projects to:

- ① Avoid **95%** of injury caused by PPE non - compliance
- ① Avoid **80%** of potential compensation cost
- ① Save **70%** of cost than manual monitoring



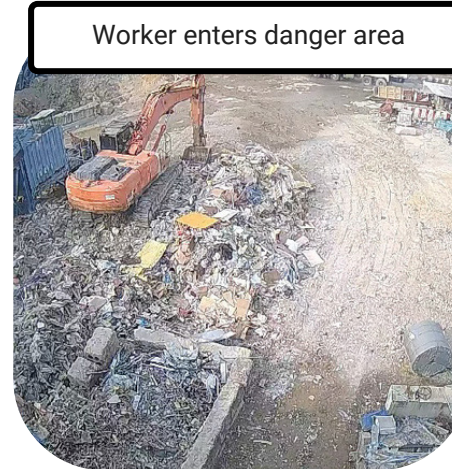
Use Cases

Danger Zone Alert

Danger zone intrusion is one of the most common causes of fatal accidents at construction site

Danger Zone Alert allows:






- ① Dynamic AI detection of danger zones, such as holes and fencing
- ① Detect workers and vehicles entering the danger zone
- ① Manage multiple zones in one platform
- ① Monitoring worker - machine anticollision



Machinery anti-collision system



DZAAS Anti-collision System

-  Smart Collision Detection
-  Smart Intrusion Detection
-  Lifting Danger Zone
-  Lifting Object Recognition
-  Machinery Operation Tracking

Keep People Safe

Working area 1
Computer Vision
Detects People
In Dangerous
Areas

Person 4,5,6
are in the
red rope zone

person 1

person 2

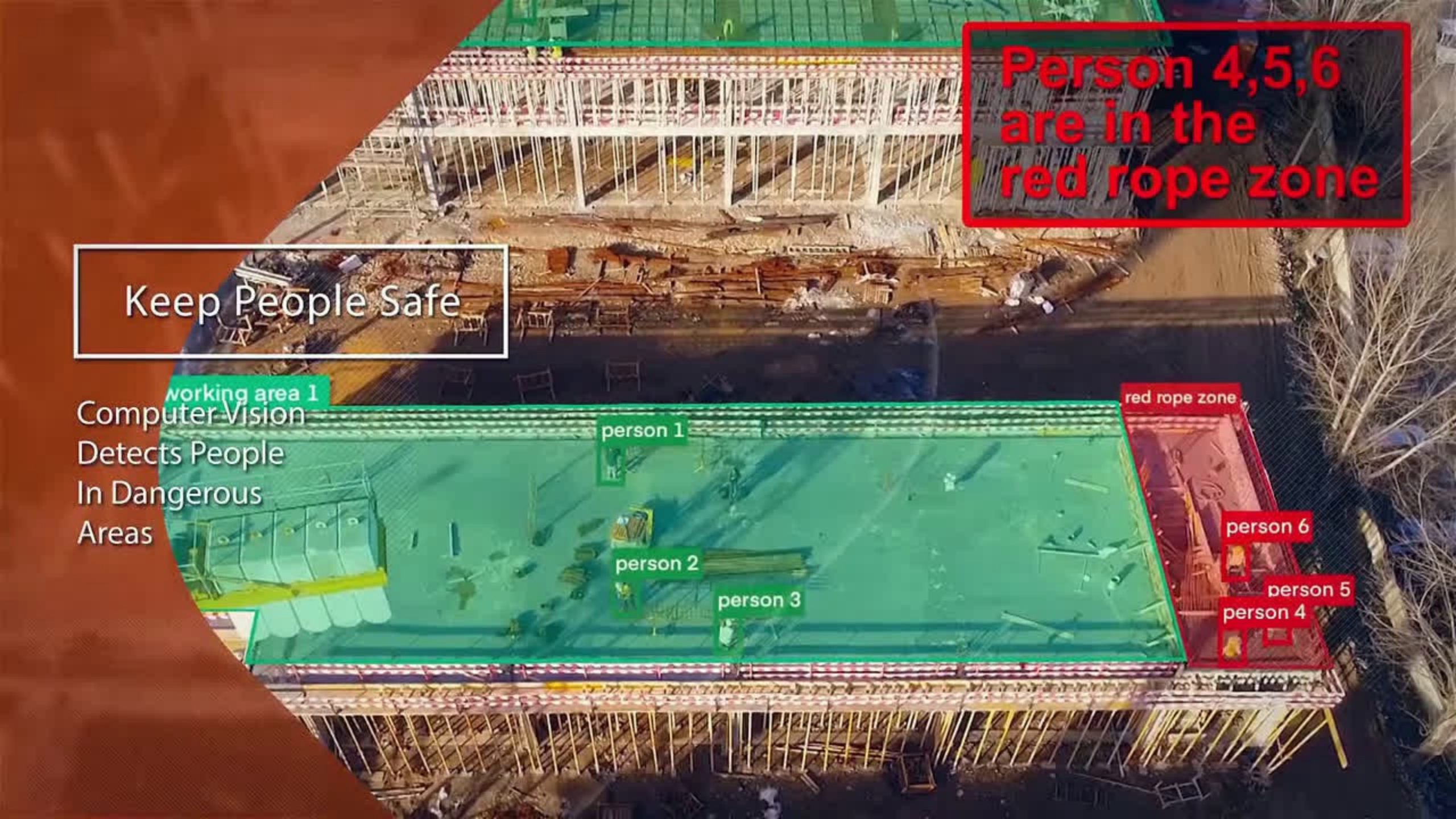
person 3

red rope zone


person 6

person 5

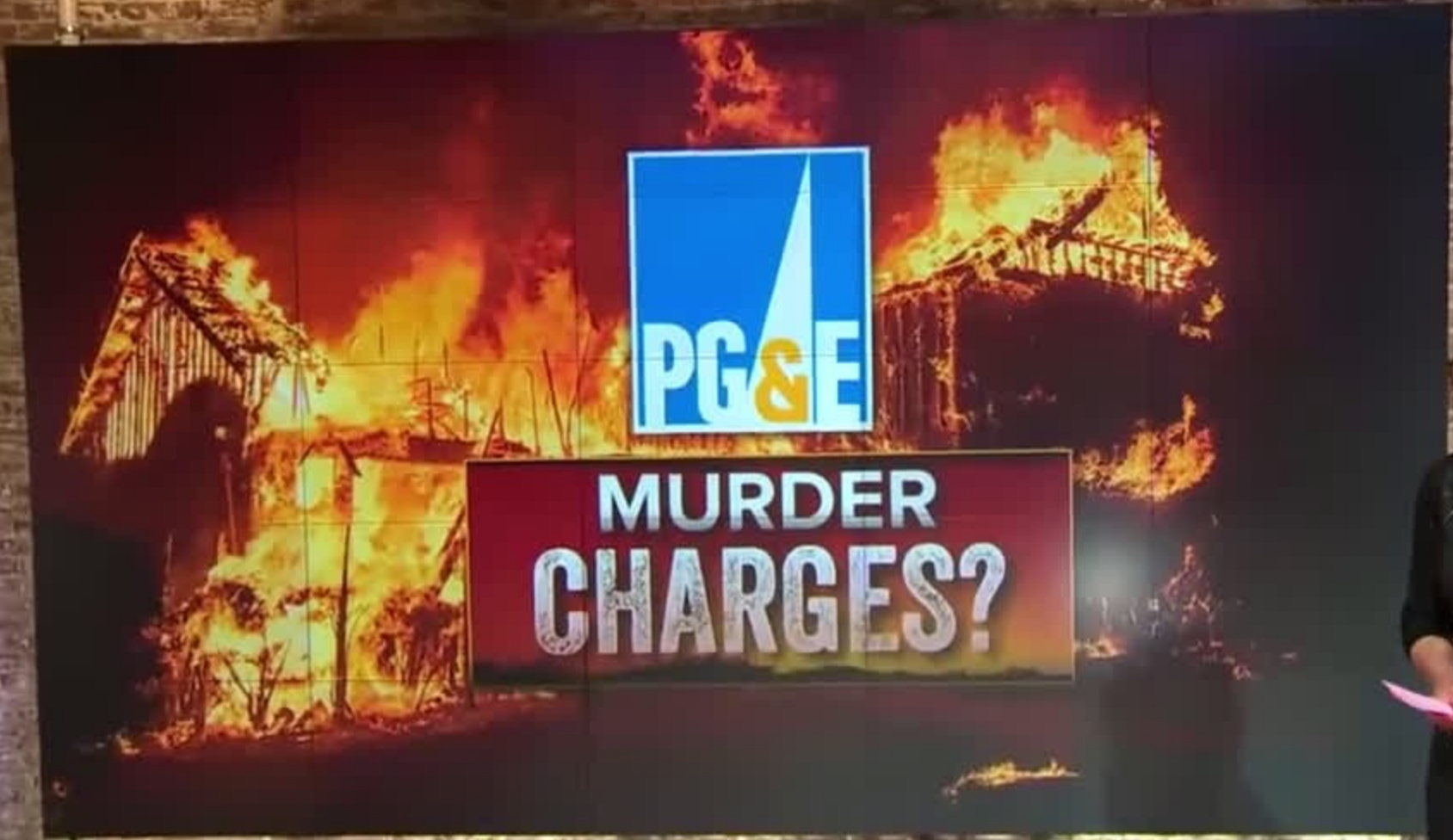
person 4



Reuters/Roddy Scott
Edinburgh, Scotland, UK



These firefighters are wearing
artificial intelligence-powered helmets



Training in VR



Class C
Flammable
Gases

Class A
Combustible
Materials

Class E
Electrical
Equipment

Class F
Cooking Oils
and Fats

Class C

Class B

▶ LUDUS ▶

FIREFIGHTER SERVICE AND EMERGENCY SERVICES SIMULATOR ▶

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CONSTRUCTION TODAY.



~ **85%** of construction projects experience overrun



On-budget delivery requires comprehensive site visibility



True visibility requires vast amounts of **site data**, infeasible to capture with today's manual processes



WHY CONSTRUCTION ROBOTS?



FULLY AUTONOMOUS ROBOTS

working collaboratively with humans



PERFORM

dirty, dull and dangerous tasks



IMPROVE

safety, quality and speed of construction







R.E.D.
School of Robotics & Defense
SARC robotics





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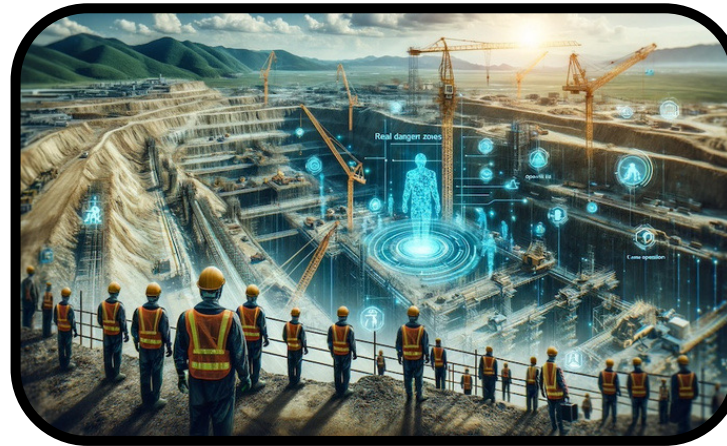
Conclusions

DIGITALIZATION



- the construction sector is characterized by **low productivity** and very high **safety risk**;
- **digitalization** can transform the industry and solve its problems;
- **digital twins** can contextualize and visualize asset data and make more informed or autonomous decisions.

AI FOR SAFETY ON SITE



- the use of AI on the construction site can **help detect dangerous situations** and prevent workplace accidents;
- **computer vision** is an available and integrable technology that allows for data analysis and interpretation;
- **AI and data analysis** can help us in predicting dangerous situations and improve safety planning and control.

ROBOTICS



- **autonomous robots** can perform dangerous actions instead of humans, preventing accidents;
- **exoskeletons** can help workers on construction sites perform tasks that could compromise their health;
- **robotics** will be increasingly present on our construction sites and help prevent accidents.

**GRAZIE
PER
L'ATTENZIONE**

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