TOUR 2024

Digital Twin e AI applicata all'ingegnerizzazione della sicurezza antincendio tra normativa e digitalizzazione

Andrea Nicosia Vinci

BIMON

SAFETY VILLAGE

FIRE & LIFE SAFETY

agorà

Agenda

01 INTRODUCTION

02 THE PROBLEM

03 THE SOLUTION

- Digitalization in the construction industry
- AI for safety on site
- Robotics

04 CONCLUSIONS

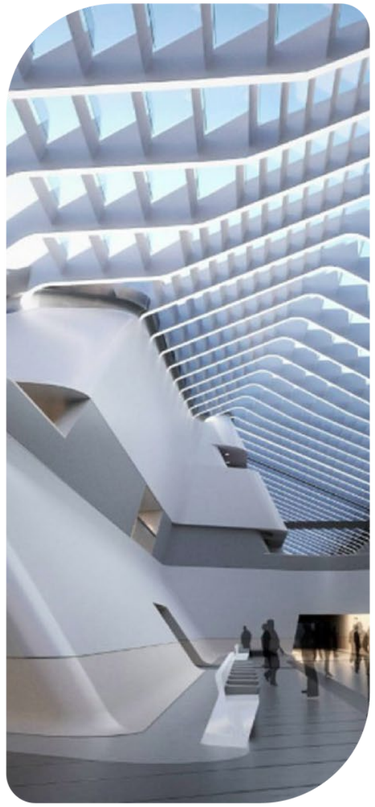
ANDREA NICOSIA VINCI

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.

+39 3200824276

a.nicosia.vinci@bimon.it



SAFETY VILLAGE

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.

BIMON

SERVICES

ENGINEERING.

Enginnering 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.

Agenda

01 INTRODUCTION

02 THE PROBLEM

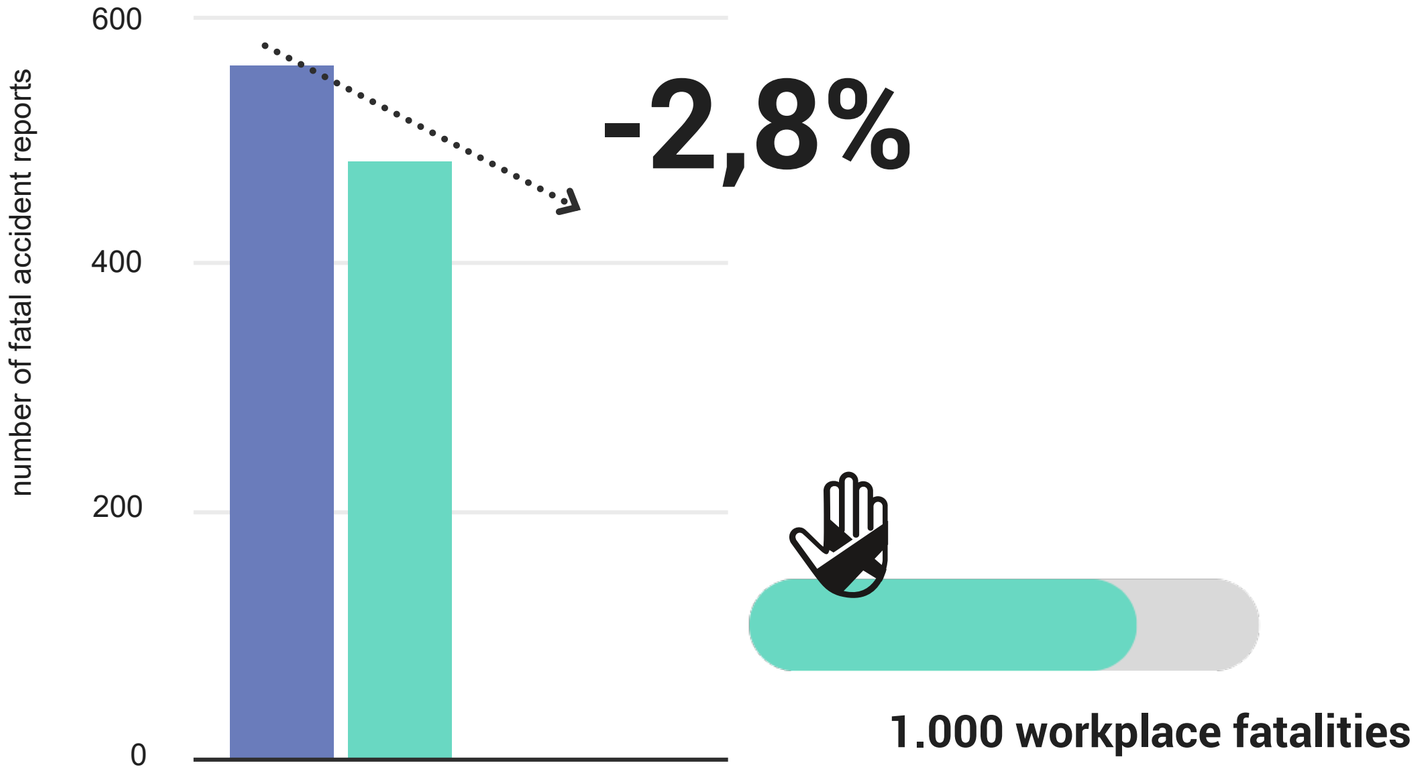
03 THE SOLUTION

- Digitalization in the construction industry
- AI for safety on site
- Robotics

04 CONCLUSIONS

Statistics

Accidents in the construction industry



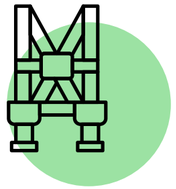
Source: Occupational accident data for the first half of the year- INAIL

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

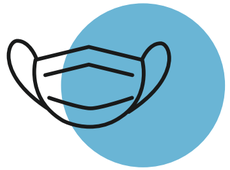
www.osha.gov/top10citedstandards



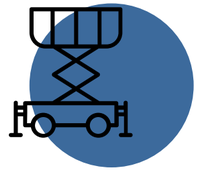
1 **Fall Protection: General Requirements**
1926.501
5,915 violations

2 **Hazard Communication**
1910.1200
2,639 violations

3 **Ladders**
1926.1053
2,449 violations

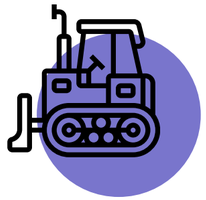


4 **Respiratory Protection**
1910.134
2,412 violations



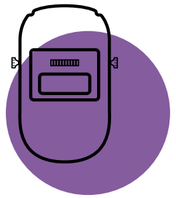
5 **Scaffolding**
1926.451
2,251 violations

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

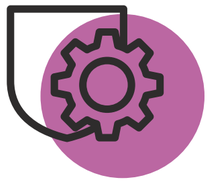


7 **Powered Industrial Trucks**
1910.178
1,896 violations

8 **Fall Protection: Training Requirements**
1926.503
1,762 violations



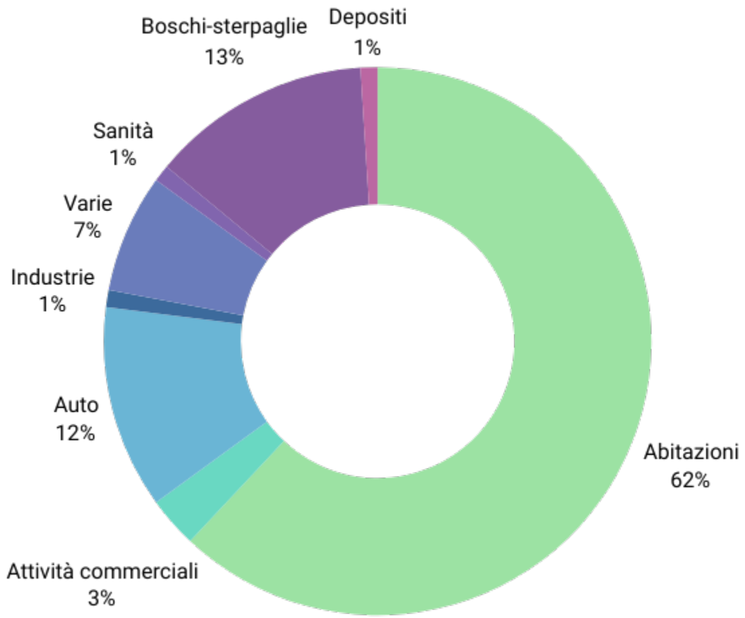
9 **Personal Protective and Lifesaving Equipment: Eye and Face Protection**
1926.102
1,572 violations



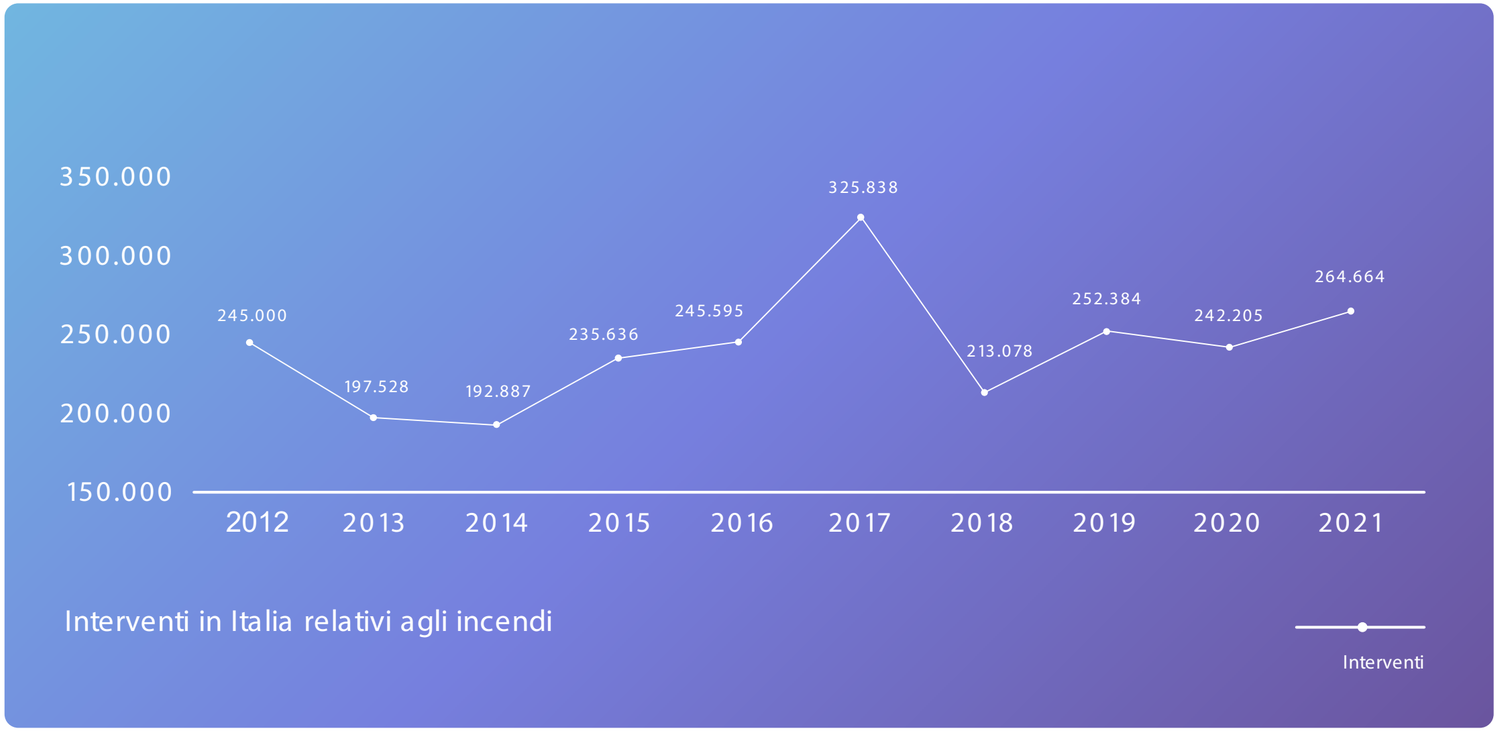
10 **Machine Guarding**
1910.212
1,469 violations

Statistics

Fire-related Accidents in Italy



Morti per incendio ed esplosione in ITALIA



Agenda

01 INTRODUCTION

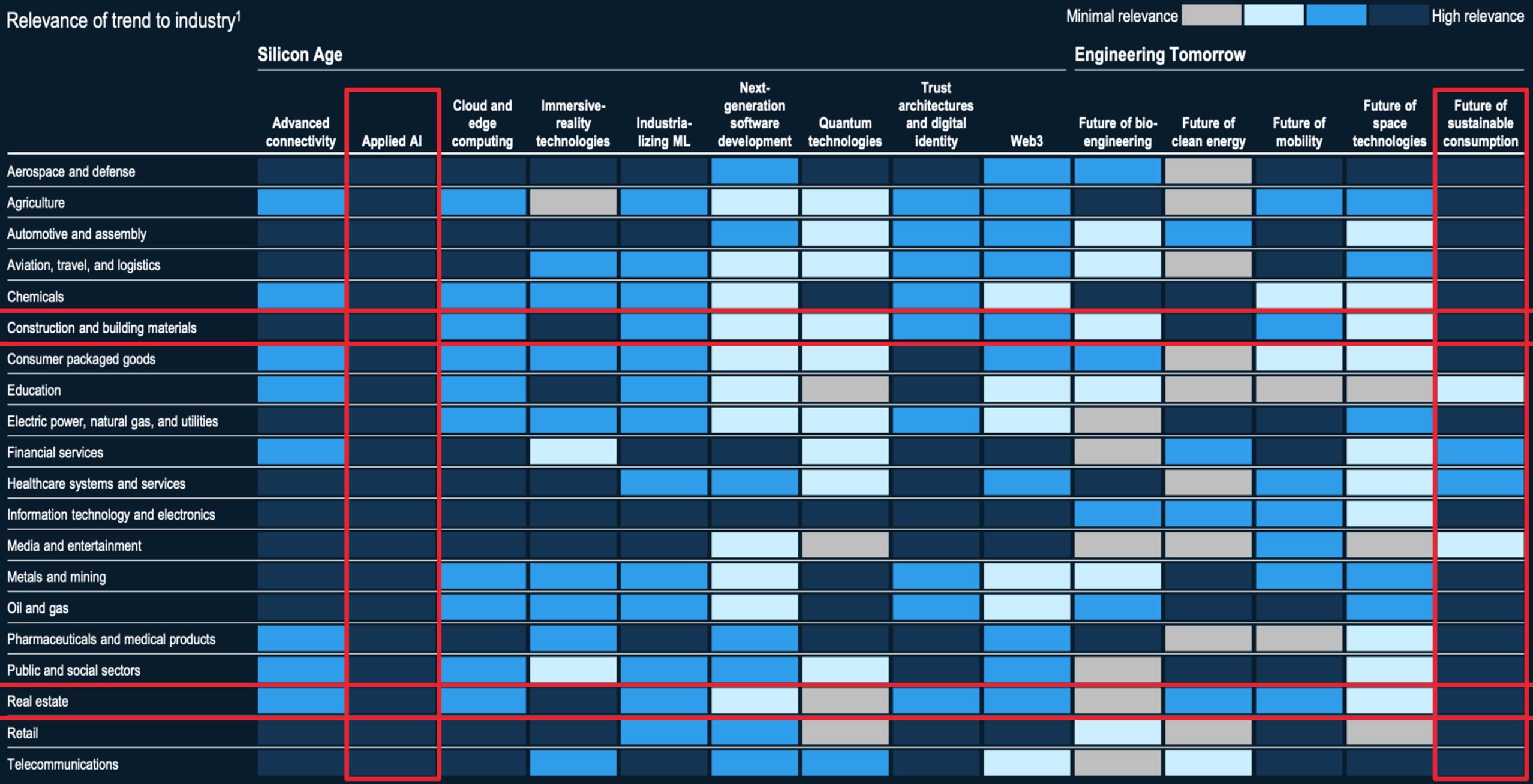
02 THE PROBLEM

03 THE SOLUTION

- Digitalization in the construction industry
- AI for safety on site
- Robotics

04 CONCLUSIONS

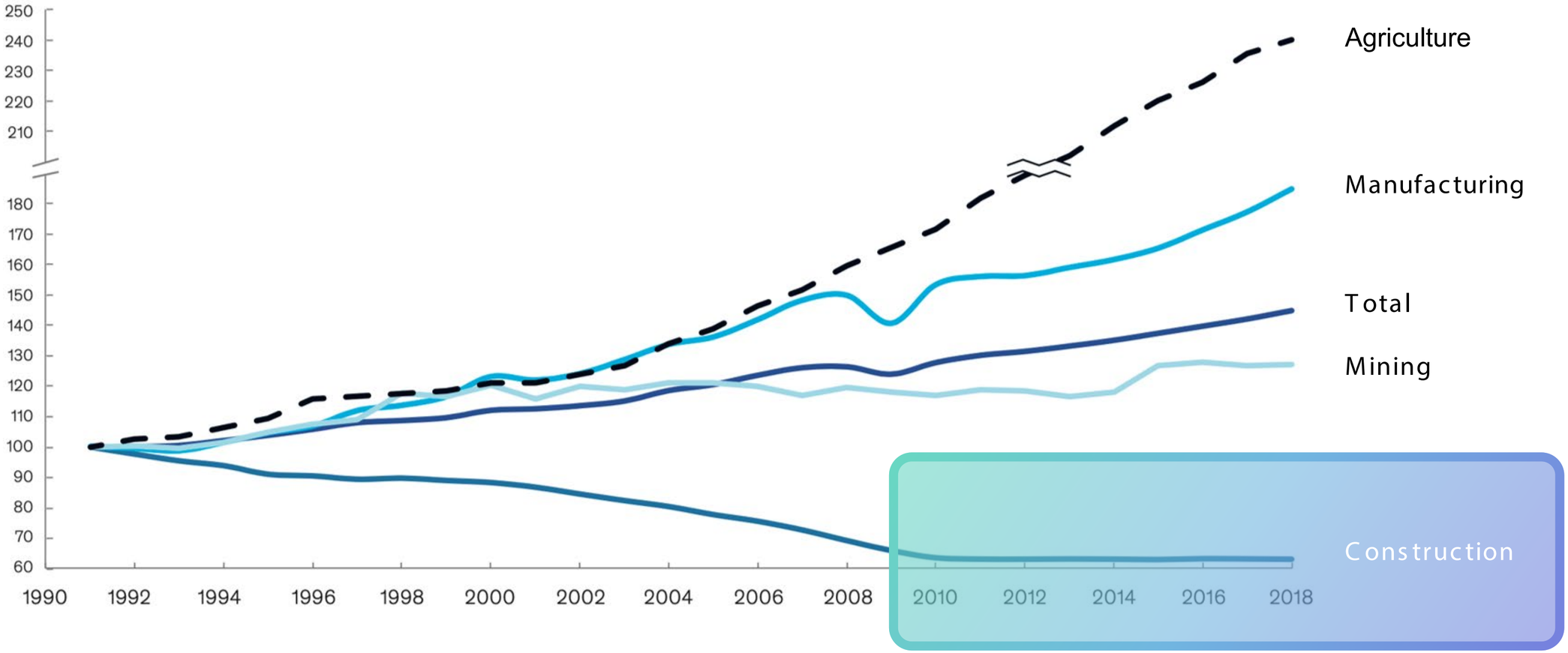
Most industry sectors display a meaningful association with five or more technology trends.



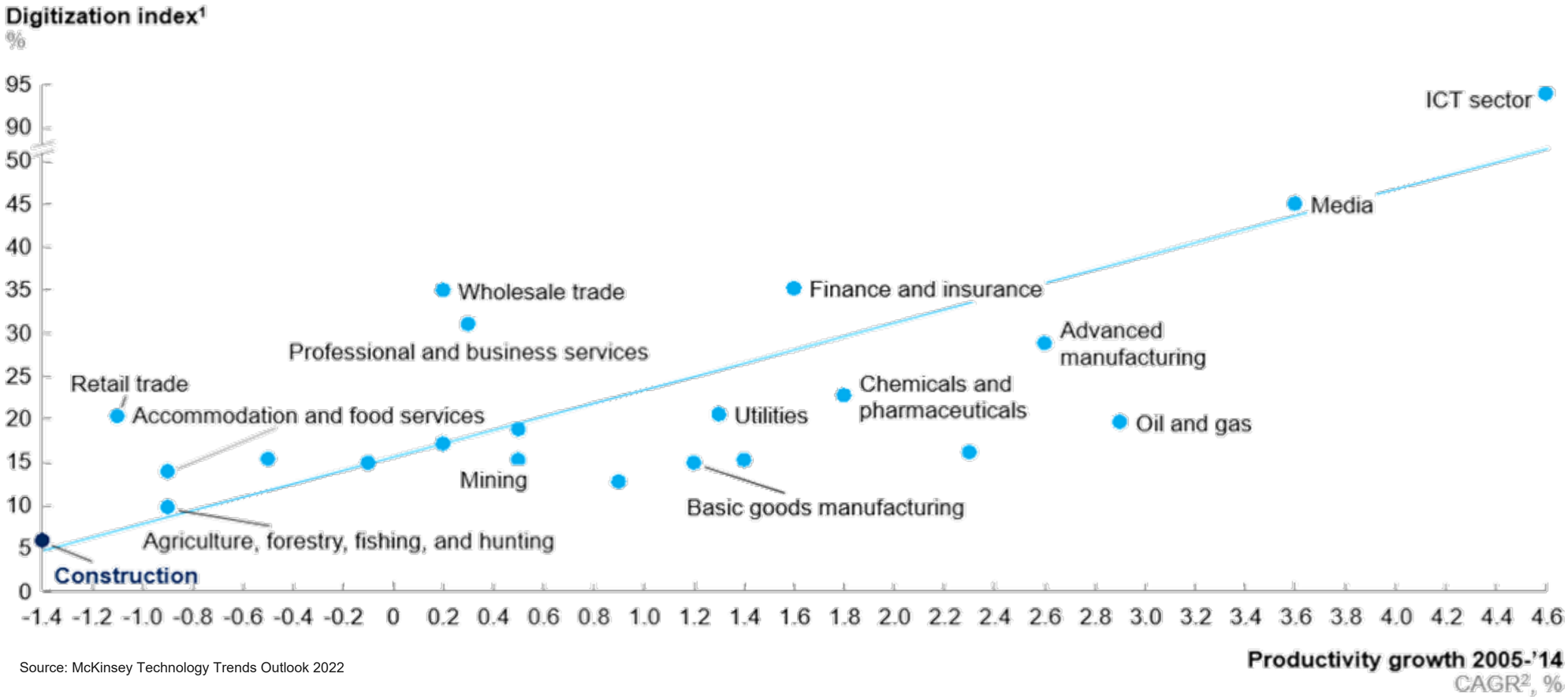
[1]Relevance estimated qualitatively by industry experts based on trend's potential to affect an industry; degree of relevance is scaled at both trend and industry levels.

Source: McKinsey Technology Trends Outlook 2022

Global Productivity Growth



Digitalization and Productivity



Source: McKinsey Technology Trends Outlook 2022

Digital Maturity Goals and Levels

SAFETY VILLAGE

2D DRAWING

Representation of the Asset by two-dimensional graphic drawings and related documents

3D MODEL

Virtualization of the Asset by creating a three-dimensional geometric model

BIM MODEL

Digitization of the Asset by creating a three-dimensional information model

REPORTING

Collection and visualization of Asset data from the BIM model model and from other databases

ANALYSING

Interpretation and conversion of data into information To perform analysis on the current state of the Asset

PREDICTING

Real-time data utilization (IoT) To make predictions about the future state of the asset

PRESCRIBING

Proposed interventions to avoid problems and achieve improved results relative to the Asset

AUTONOMOUS

Digital Twin using AI and ML to reduce Asset's dependence on human intervention

2D DRAWING → 3D MODEL → BIM MODEL → REPORTING MODEL → ANALYSING MODEL → PREDICTING MODEL → PRESCRIBING MODEL → AUTONOMOUS MODEL

BIMON

Agenda

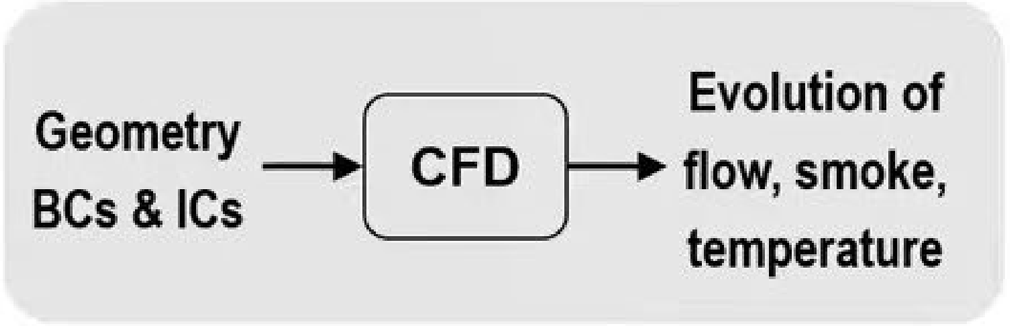
01 INTRODUCTION

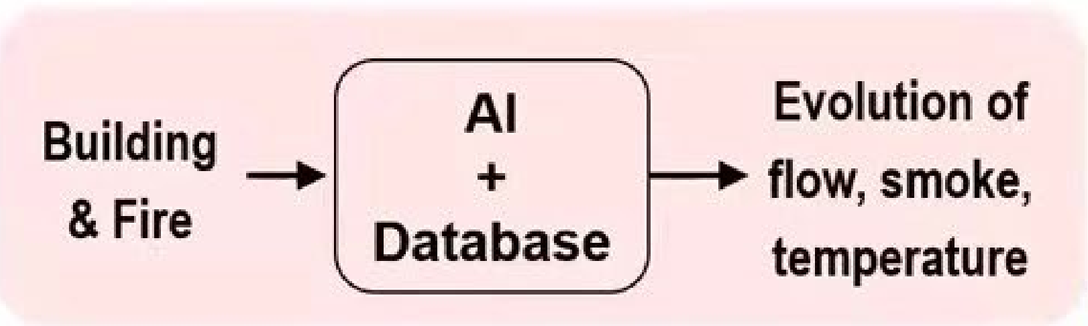
02 THE PROBLEM

03 THE SOLUTION

- Digitalization in the construction industry
- AI for safety on site
- Robotics

04 CONCLUSIONS





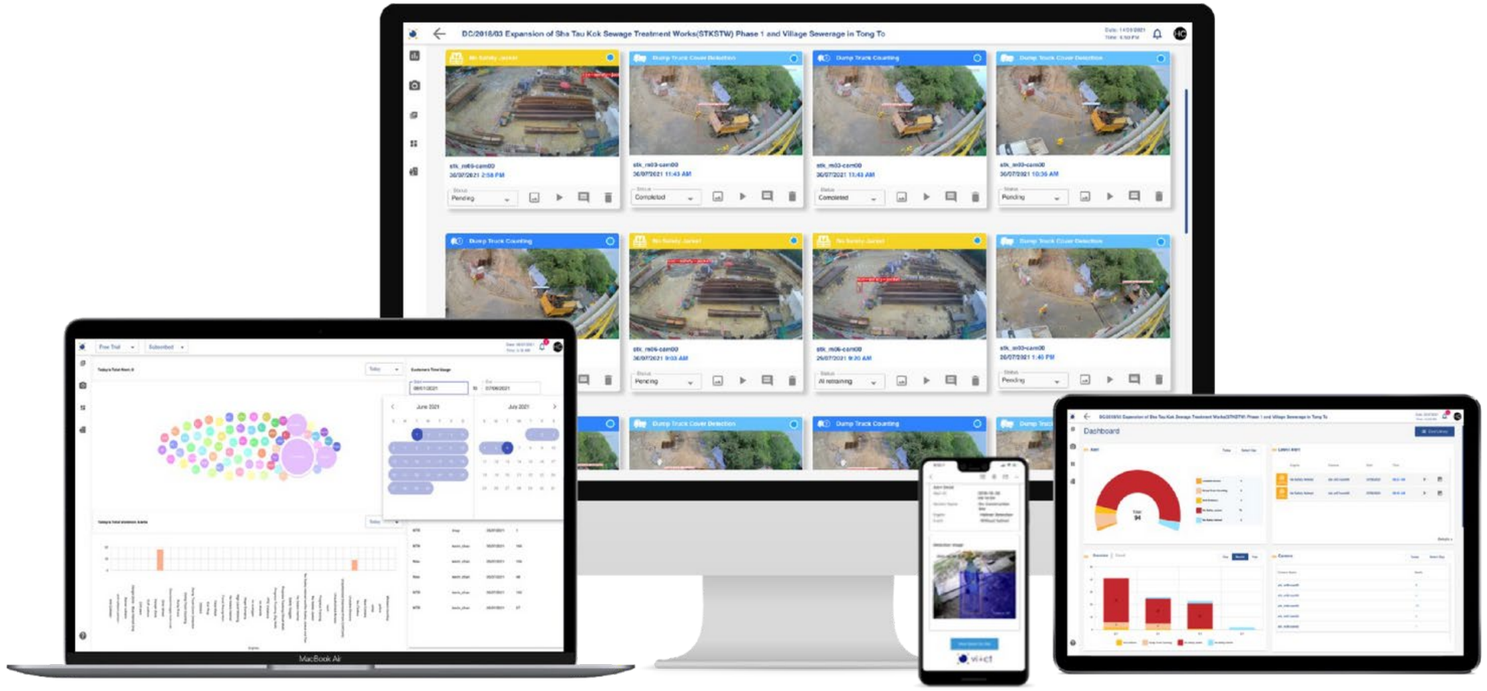
Facts of CFD applications in Fire
Excellent engineering tools
Lead by fire experts, not CFD experts
Understand fire dynamics is critical
Widely used in **PBD** fire safety design
Rarely predict the fire (costly & doubted)
Difficult to support firefighting

Predications of AI in Fire
Excellent engineering tools
Lead by fire experts, not AI experts
Understand fire dynamics is more critical
Widely used in **smart** fire safety design
Fire forecast based on database
Play a key role in smart firefighting

SAFETY.AI

FOR AI MONITORING

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



50+

Pre-built AI Modules promoting ESG

R&D since 2016, 6+ module based research papers in international journals of repute

E ENVIRONMENTAL

- Carbon Footprint Emission
- Dump Truck Cover Detection
- Gas/Water Leakage Detection
- Waste Management
- Illegal Dumping Detection
- Site Entrance Hygiene Monitoring
- Fire/Smoke Detection
- Water Level Monitoring
- Dirty Water Detection
- Dirty Wheels Detection
- Dirty Roads Detection

S SOCIAL

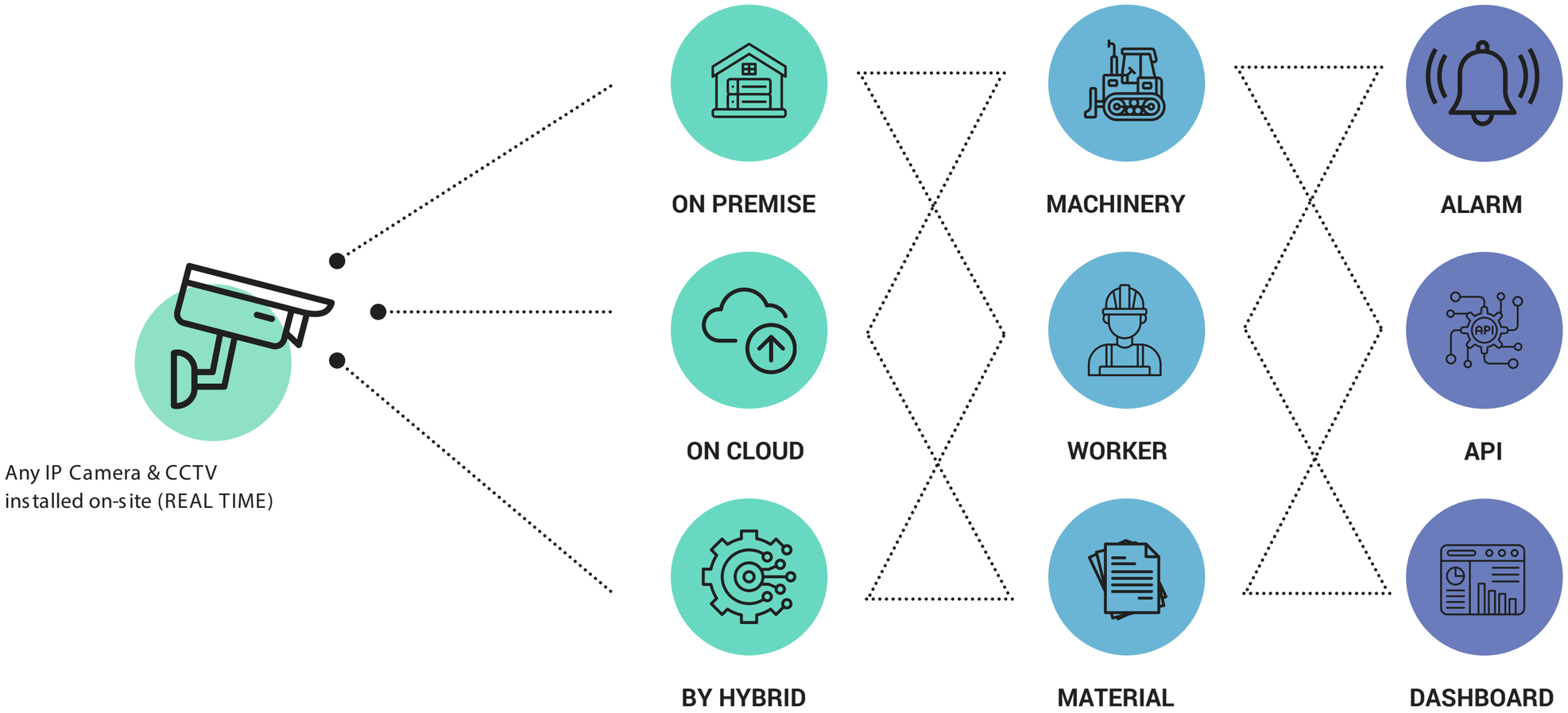
- No Shackle Detection
- No safety helmet detection
- No safety jacket detection
- Work at height
- Tower zone danger zone
- No safety goggles detection
- No safety harness detection
- No outrigger detection
- Anti collision (people)
- No face mask detection
- No clothes detection
- Non-compliance behaviour detection
- Danger behaviour detection
- People/objects fall down detection
- Smoking detection
- Anti collision (object)
- Anti-COVID
- Danger zone intrusion

G GOVERNANCE

- Progress Tracking
- Progress Tracking (Wall)
- Water Barrier
- Traffic Cone & Fencing Detection
- Excavation Progress Tracking
- People Counting/ Tracking
- Unauthorized Access (Vehicle)
- Scissor Lift Operation
- Machine Counting/ Tracking
- Dump Truck Counting/ tracking
- Face recognition
- Vehicle License
- Unauthorized Access (people)
- Material Classification

HOW DOES IT

WORK?



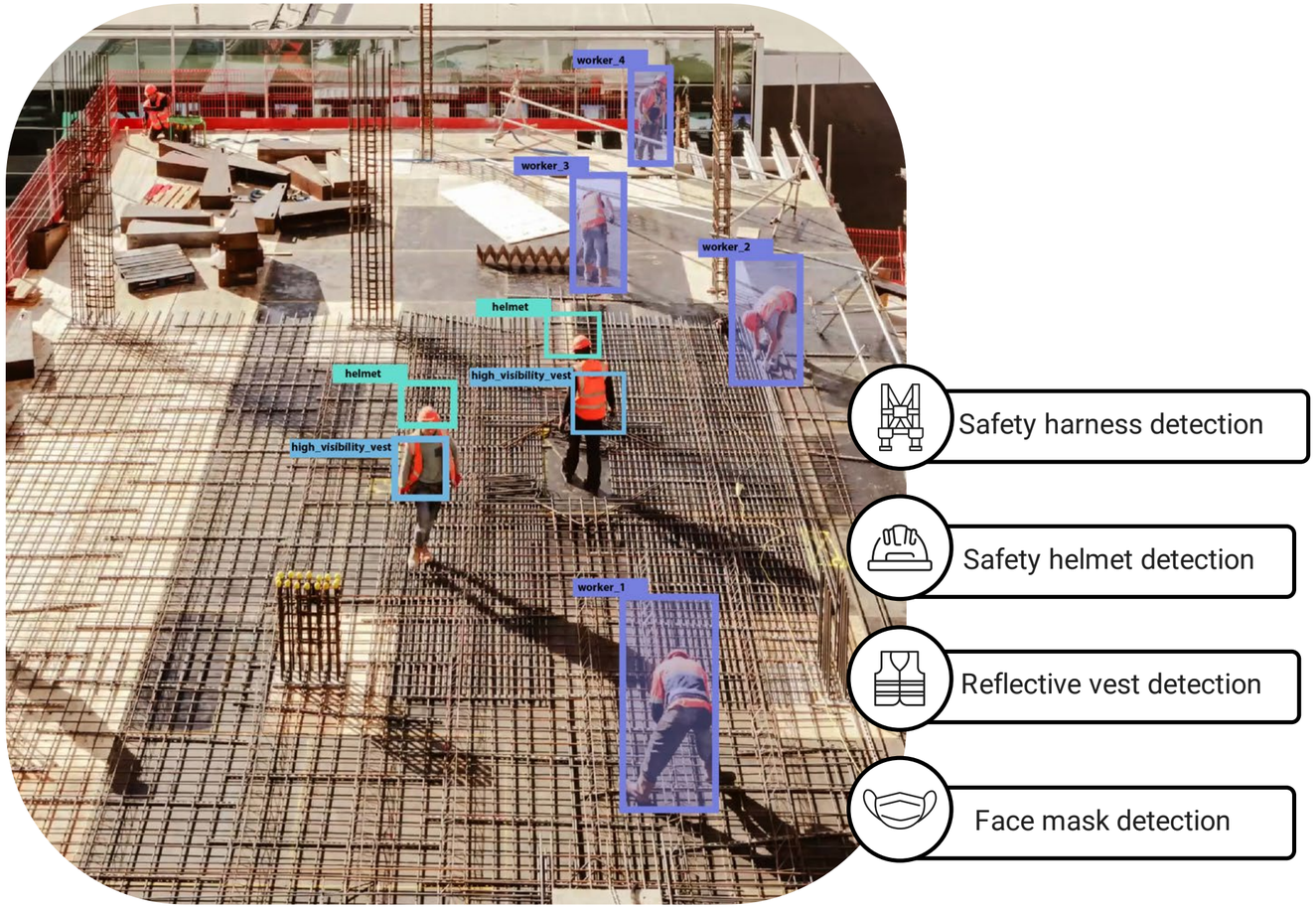
Use Cases

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:

- Avoid **95%** of injury caused by PPE non - compliance
- Avoid **80%** of potential compensation cost
- 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:

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

Worker enters danger area

Vehicle enters human path

Worker-Machine Anti-collison

Unauthorized access - only blue helmet allowed

Machinery anti-collision system

DZAAS Anti-collision System

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

Agenda

01 INTRODUCTION

02 THE PROBLEM

03 THE SOLUTION

- Digitalization in the construction industry
- AI for safety on site
- Robotics

04 CONCLUSIONS

Agenda

01 INTRODUCTION

02 THE PROBLEM

03 THE SOLUTION

- Digitalization in the construction industry
- AI for safety on site
- Robotics

04 CONCLUSIONS

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

Andrea Nicosia Vinci
a.nicosia.vinci@bimon.it