



AMERICAN ARBITRATION ASSOCIATION®

INTERNATIONAL CENTRE
FOR DISPUTE RESOLUTION®

April 4, 2019
1:30-2:45

Artificial Intelligence, Block Chain, Internet of Things... – What Do They Mean for Your Construction Project?

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Moderator: S. Cleo Gladden, Director of ADR Services, Construction Division, American Arbitration Association



Countdown to Human Free Construction



We Built This City - 2015 Remake ©2015 Fredy Wenzel

Christine M. McAnney
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Balfour Beatty Infrastructure, Inc.

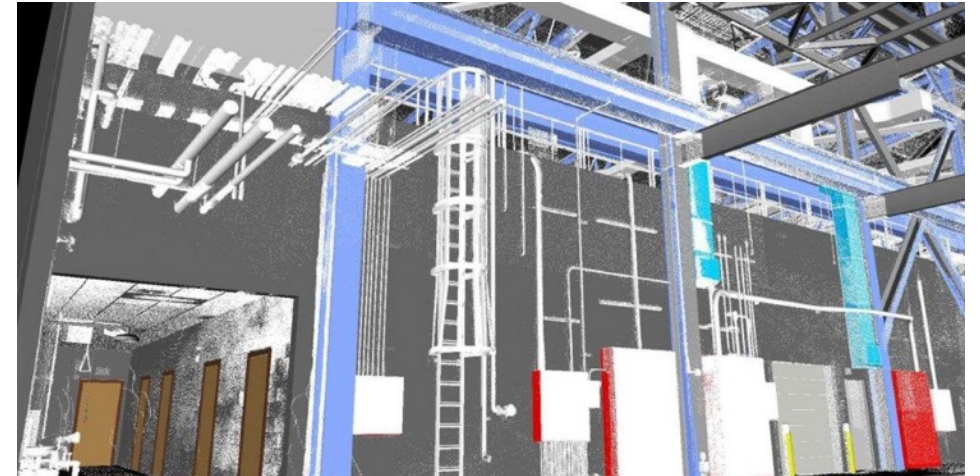
EXPLOSION OF TECHNOLOGIES

- Light Detection and Ranging (LIDAR)
- Cloud Software
- Drones
- Augmented Reality (AR)
- Virtual Reality (VR)
- Internet of Things (IoT)
- Pre-Fab Construction



2018-2019

- Construction specific software-as-service (SaaS) or cloud computing solutions
- Use of data input from multiple sensors and devices – Ex. Mobile devices
- Digital documents will replace paper allowing real-time reporting and increased accessibility
- Higher-definition surveying and geolocation



2019 - AR & IOT (INTERNET OF THINGS)

- Wide adaption of software that will integrate data from Internet of things sensors and augmented reality devices.
- Drones will produce aerial maps of projects that will provide live data feeds to show materials, site conditions, worker location, etc.
- Intelligent asset management and decision-making.

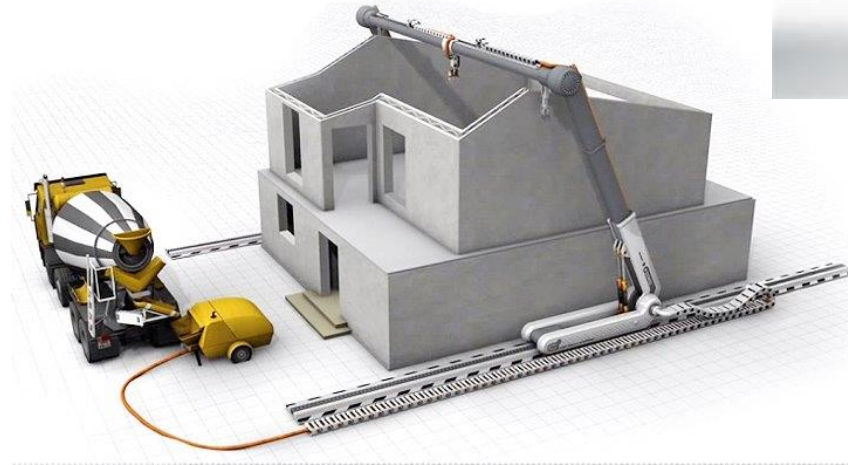


2020 – PRE-FAB CONSTRUCTION AND 3D PRINTING

Pre-Fab takes off combined with 3D printing will make largest shift in organization of construction projects in the modern era

Wearable technology

- Connected to mobile apps
- Exoskeletons



2021 – AUTOMATED DRONES

- Aerial capture of data without need of a FAF pilot (once Fed regulations catch up)
- Improved project evaluation
- Surveillance tool to track productivity
- Security



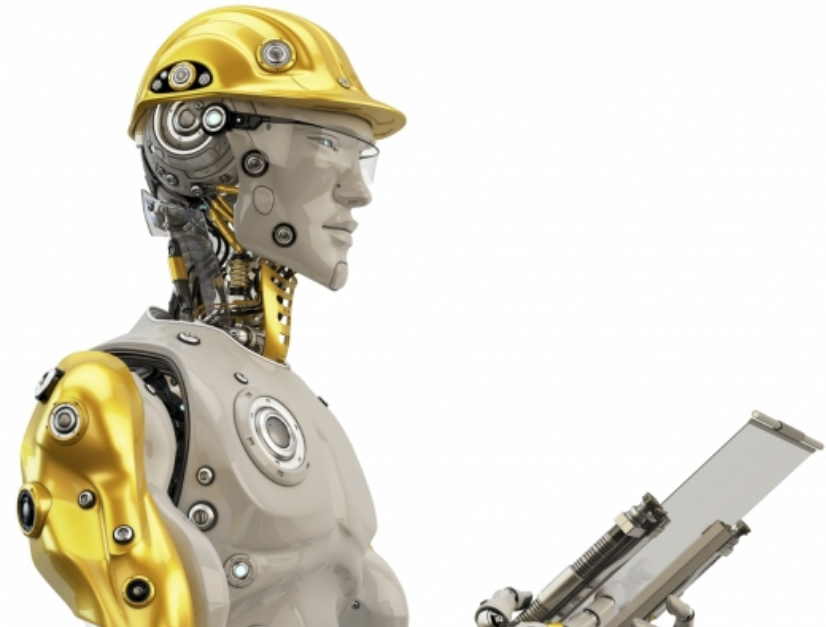
2022 – MACHINE-GUIDED CONSTRUCTION

- Self-guided machinery for excavation and other basic tasks



2023 – ARTIFICIAL INTELLIGENCE

- First versions of artificial intelligence capable of predicting progress and making simple project management decisions



2024 – AUTONOMOUS MACHINERY TAKES OVER

- People will take back seat to machinery on job sites
- Self-driving trucks
- Robots that assemble pre-fab units



2025/2030 – HUMANS DECLINE – NEW TECH RISES

- Drones in sky
- Sensors as eyes on ground
- Self-guided machinery
- Skeleton human crews simply to monitor progress



Worker-Worn RFID Devices and Equipment Tags

Operational Benefits for Project Execution

- Improved safety and first response capability
- Enhanced site security
- Compliance

Data-driven Risk Management

Documentation/Evidence for Use in Claims

Worker-Worn RFID Devices

Safety

- Internal accelerometer detects worker falls from heights
 - Real-time notification to safety personnel
 - Geolocator allows quick response to precise location
 - Can reveal unsafe worker practices (jumping from heights)

WEARABLE TECHNOLOGY

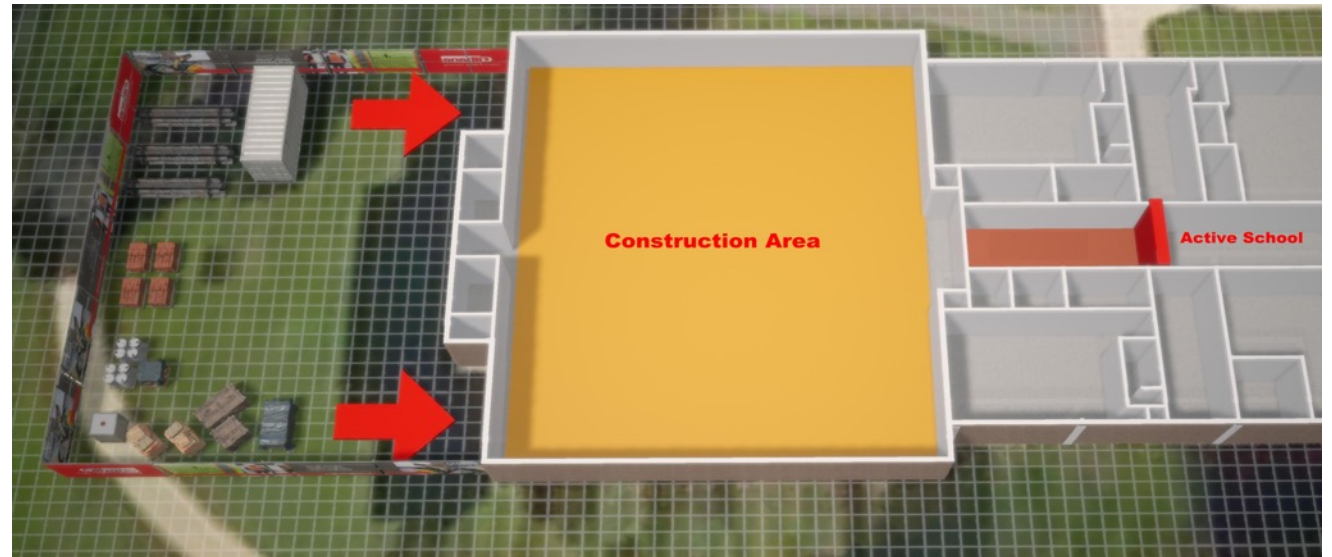
- Push-button activation of injury alarm
- Can provide worker-level evacuation alarms
- Provides accurate head count and evacuation progress in the event of an emergency
- Allows for accident-prone “new worker” tracking



Worker-Worn RFID Devices

Site Security

- Notifies staff of unauthorized worker presence in secure areas



RFID Equipment Tags

Geolocator tracks location of each piece of mobile equipment

- Ensures equipment remains in authorized zones
- Provides accurate equipment inventory

Synchs with worker-worn RFID devices

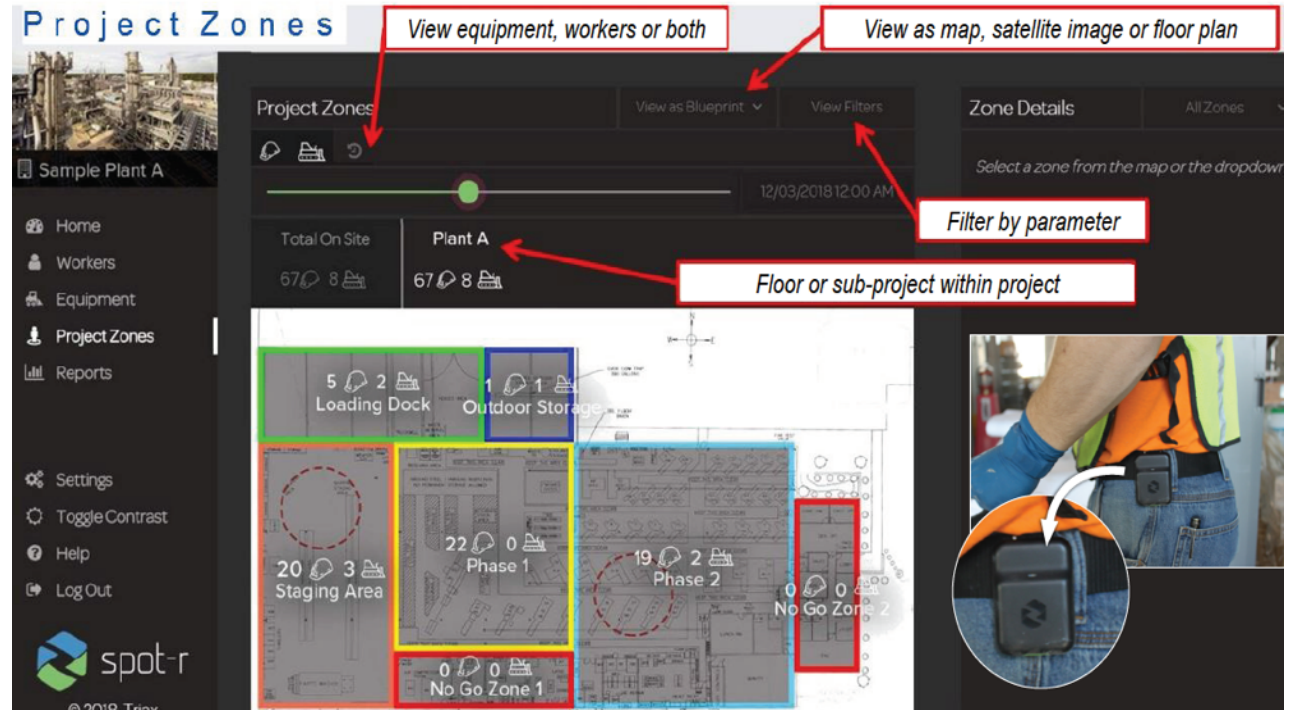
- Worker information can include operator certifications for equipment
- Notifies safety personnel of unknown/unauthorized operators
- Logs operator hours on specific equipment

Records operational history of equipment

- Active versus idle time

Worker-Worn RFID Devices and Equipment Tags

Site Security



Data-Driven Risk Management

Safety and man-hour data can be exported for analysis

Data can be analyzed from various perspectives

- Project-specific for jobsite trend analysis
- Aggregated across multiple projects for broader trends
- Can be viewed by worker, trade or subcontractor on one or multiple projects

Documentation/Evidence for Use in Claims

Injury Claims

- Provides objective safety data for defense against fraudulent claims
- Who, when, where, distance of fall
- Identifies other workers in the area who may have witnessed an incident

Documentation/Evidence for Use in Claims

Construction Claims

- Tracking worker times and locations on site:
 - Assists in auditing time charges – Replaces a time clock
 - Verifies subcontractor manpower numbers and locations (productivity claims)
 - Can generate a heat map – if sub claims that work areas were not available due to other trades working in those areas, data can verify or refute
 - Detects workers lollygagging in area others than where they are supposed to be

Other Considerations

Privacy

- Ends on project site perimeter (non-GPS)
- Workers have no reasonable expectation of privacy

Data Security

- Like any network, the system may be vulnerable to hacking

Collective Bargaining Agreements

- Unions initially balked at worker tracking
- Eventually, unions embraced the safety benefits to workers

RFID Laws Currently in Effect

- Mandatory RFID chip implantation prohibited (5 states)
- Unauthorized RFID “skimming” prohibited (9 states)
- Monitoring or tracking students prohibited (4 states)



INSPECTING THE RIGHT OF WAY



INSPECTING THE WORK



TOWER INSPECTIONS



Helicopter



Drone

BUILDING THE POWERLINE: TOWER INSPECTIONS

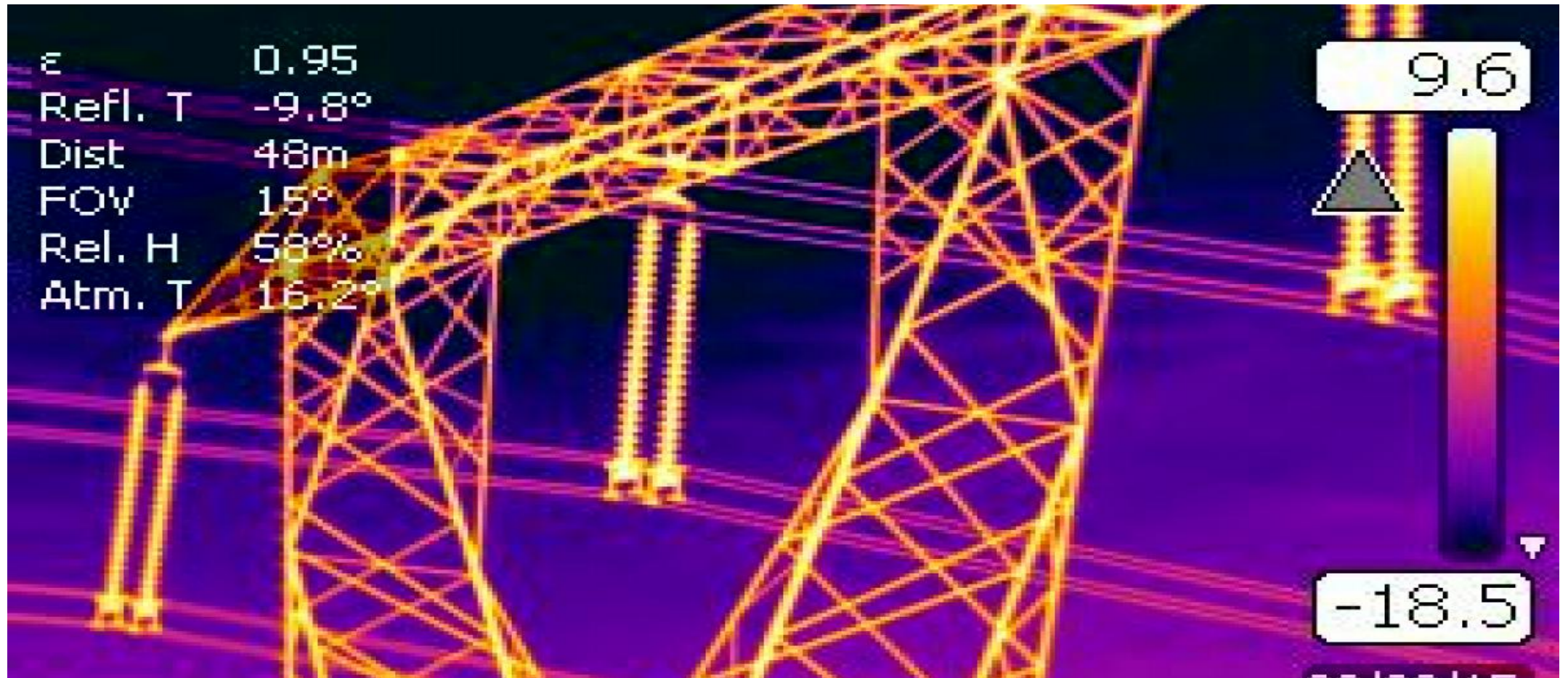


Helicopter



Drone

INFRARED (THERMAL) IMAGING

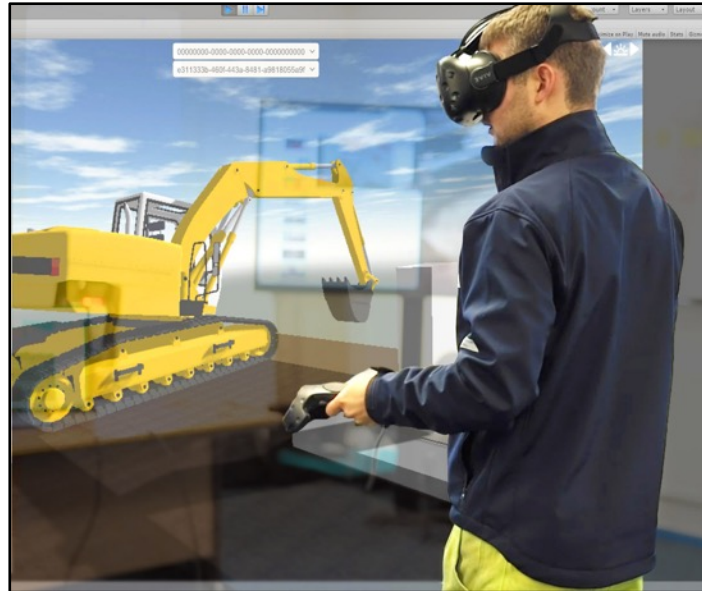


WEARABLES: VIRTUAL REALITY (VR) & AUGMENTED REALITY (AR)

Smart helmets

Currently used mostly in training

- Allows participants to share real-time information



GROUND PENETRATING RADAR

Non-destructive solution for mapping underground features and buried objects



PROJECT MANAGEMENT SOFTWARE SYSTEMS

Manage deficient work items

Provides and memorializes real-time information:

- Equipment moves
- Scheduled maintenance and repair
- Job schedules

Improves communication among project participants

Improves project-management policies





Balfour Beatty

Gilbane



Hogan Lovells



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