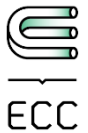


54th Annual ECC Conference

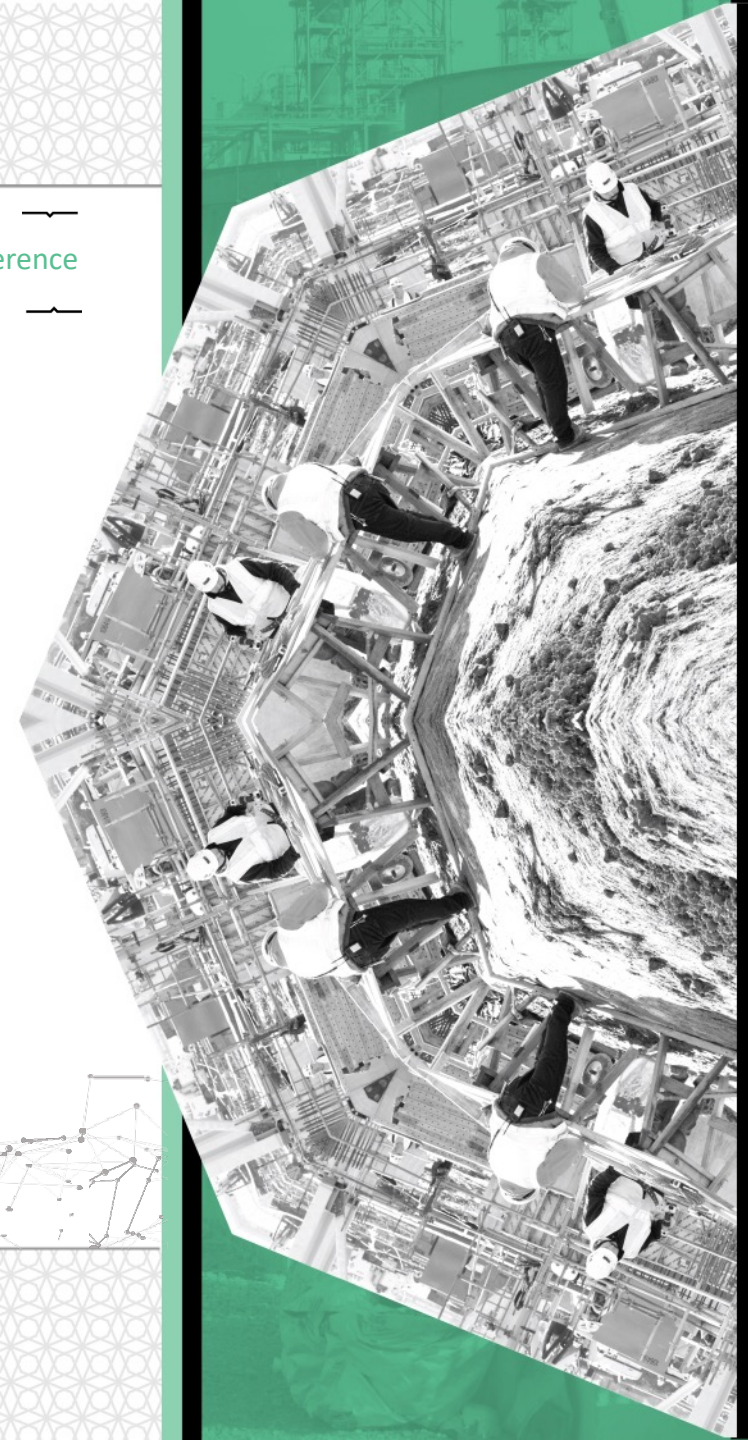
Making Digitalization a Reality



Team Members:

Scott Mayhew, Chemicals Growth Business Opportunity Manager, Shell

Presented: **September 2022**



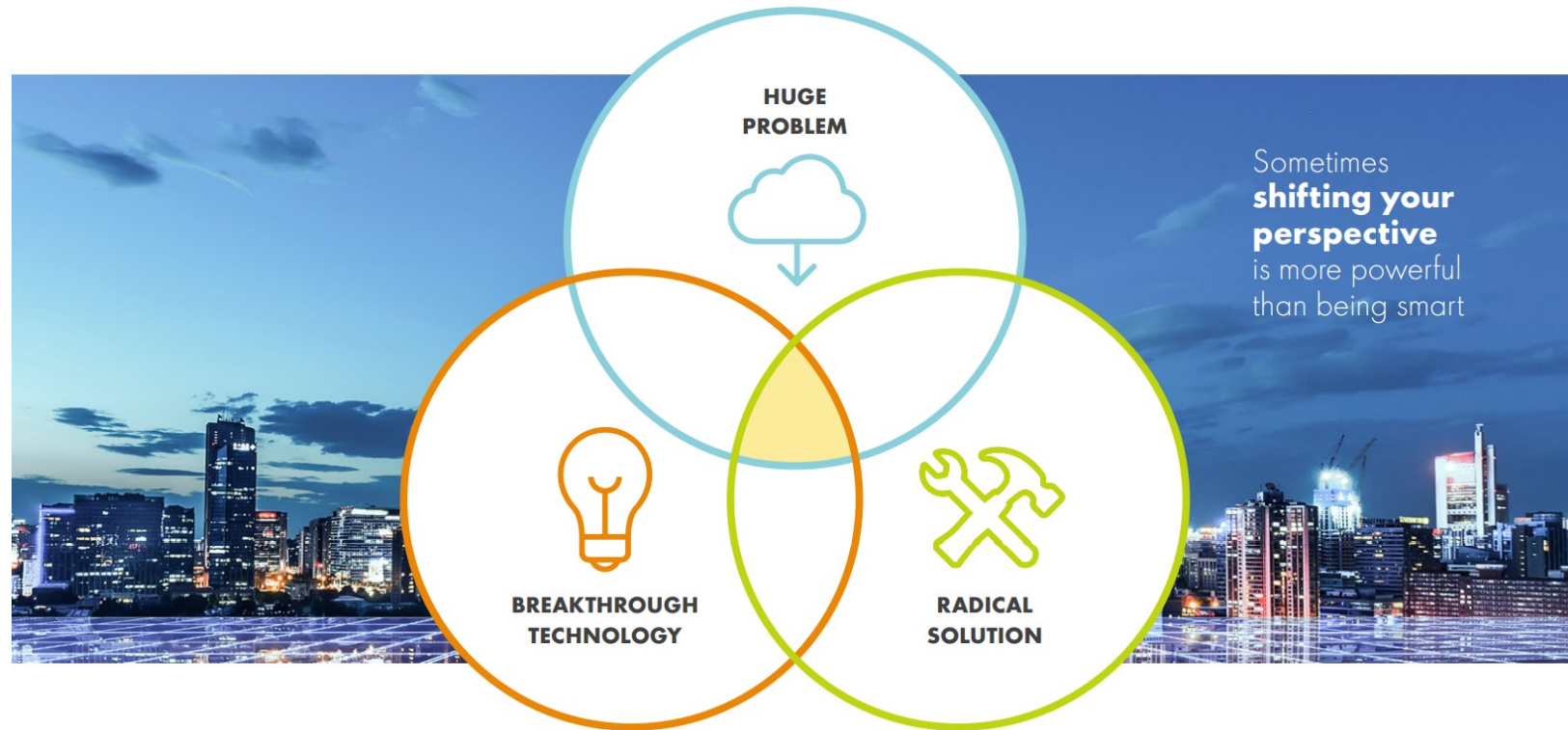
Topics of Discussion

- Why Digitalization?
- What is Digitalization?
- The Journey from Analog to Digital
- Real World Applications
- Investing in the Digital Unknown

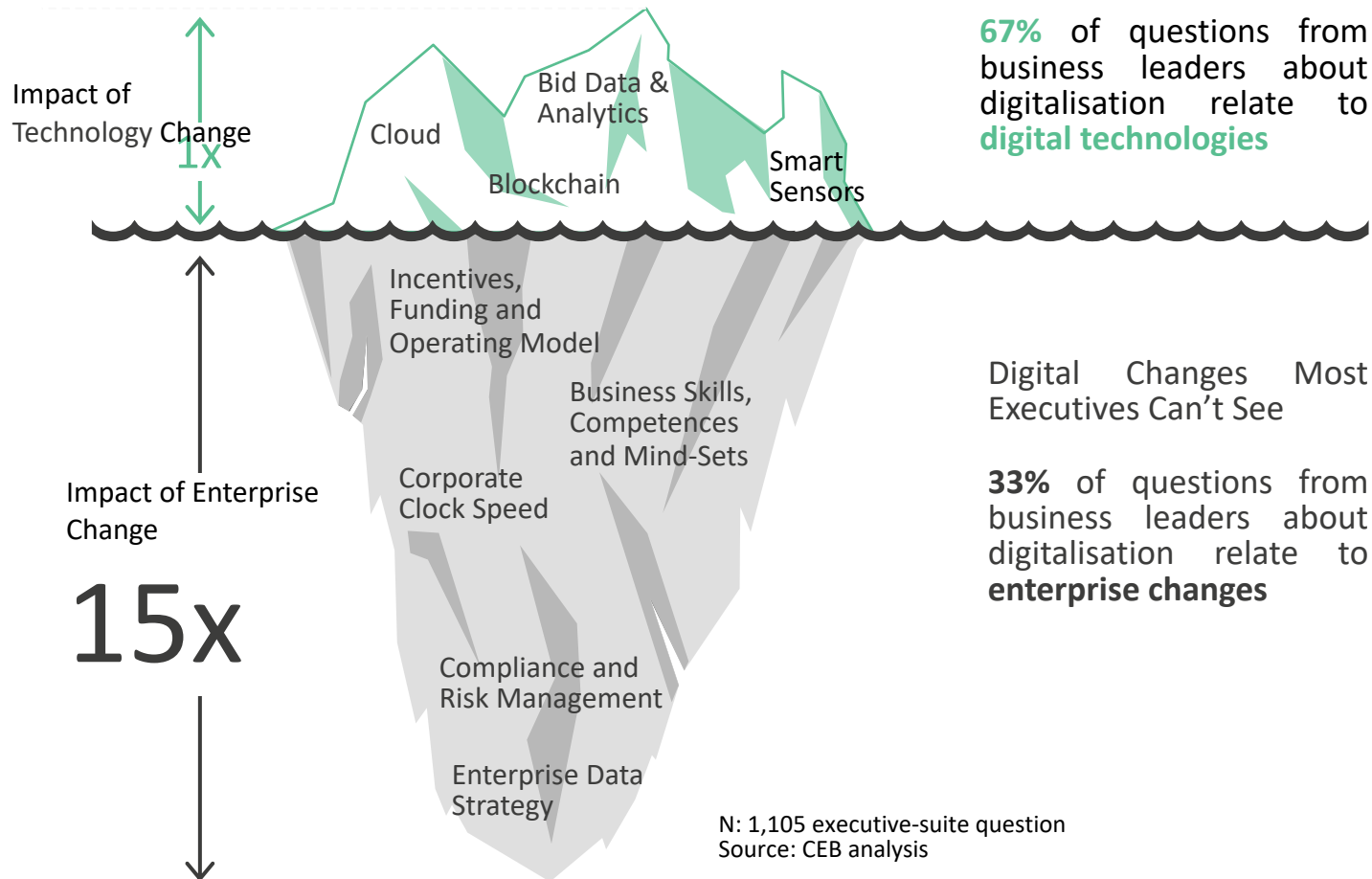
What is Digitalization

Digitalization is the use of digital technologies to **change a business model and provide new revenue and value-producing opportunities.**

Digitalization is underpinned by culture and process (ways of working) to **fundamentally change the way we make decisions and react to the environment in which we operate.**



Digital Technology, just the tip of the iceberg



The journey from analog to digital requires dedicated commitment from the top down, dedicated resources and a strategic view of the target areas to influence.

To drive value there are key areas beyond just technology to address:

- **LEADERSHIP, CULTURE, MINDSET AND WAYS OF WORKING:** Building pervasive Digital leadership and literacy
- **CAPABILITIES:** Right people, right place, right time
- **OPERATING MODEL:** A delivery model for digital technologies which caters to data and information risk management

Real World Applications in Action

3D Models

Simulators

Virtual Reality

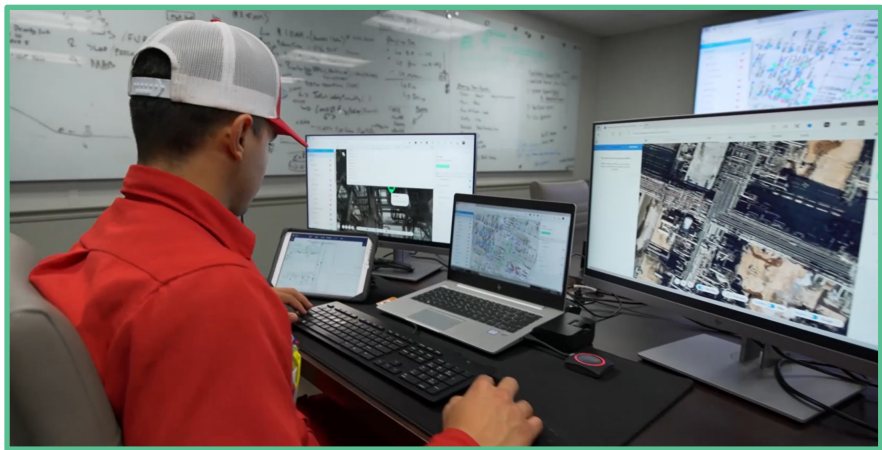
Augmented Reality

Connected Field
Worker

Drones and
Advanced
Analytics



Connected Field Worker



- Remote engineering support to connected field workers.



- Field construction personnel connected to data, work plans, communications, and the ability to record and document work real time.

BENEFITS OF CONNECTED WORKER



Improved safety performance – agility and flexibility, unlocking Personnel On-Board reductions, enabling virtual support



Increased productivity & efficiency – easy access to data, documents & applications to complete a task on site



Reduced transit time waste & increased hands on tool time – e.g. no need to return to PC to get permit



Improved data quality, decision-making, collaboration & problem resolution – data capture on site, coaching, knowledge sharing

Benchmarked statistics across Oil Companies:



Expected reduction in Incidents



Productivity Increase

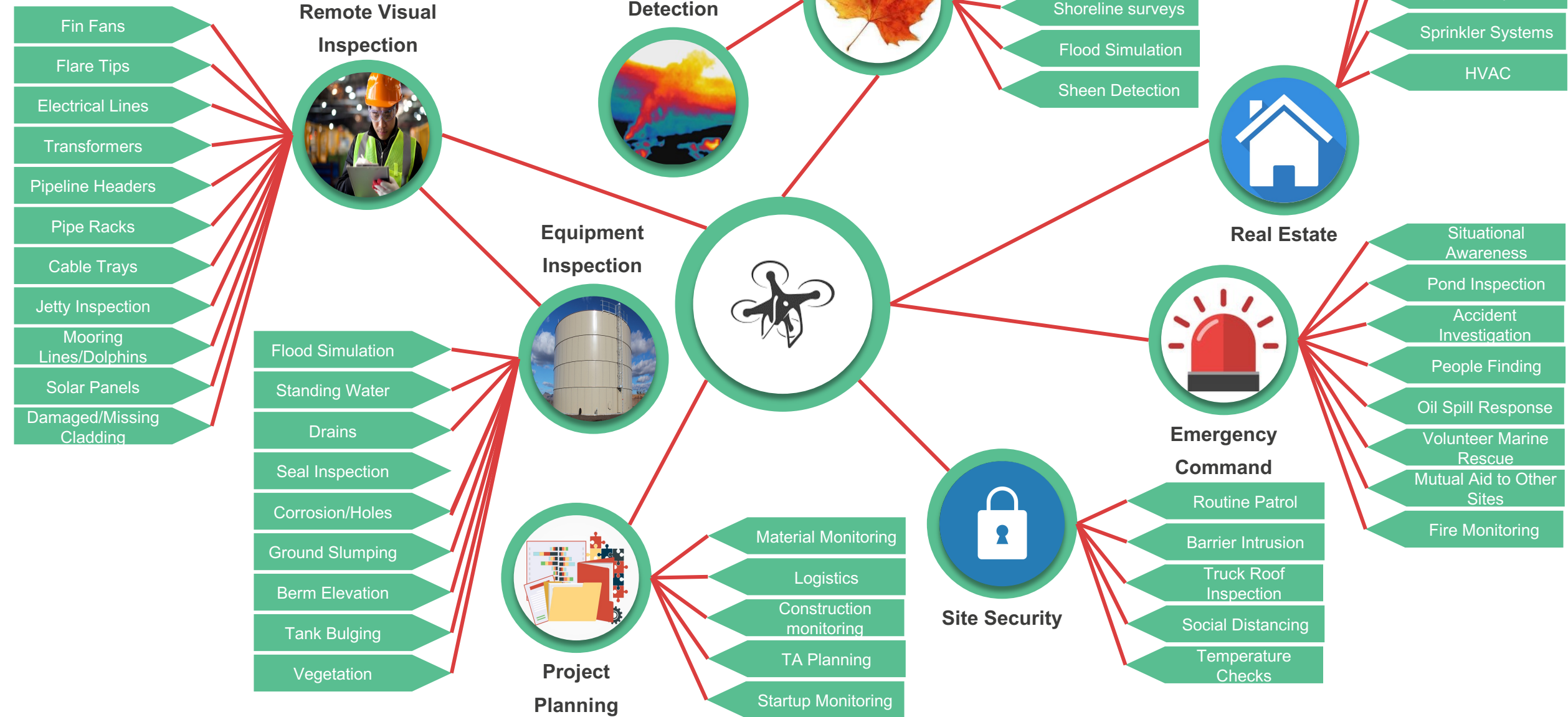


Impact O&G

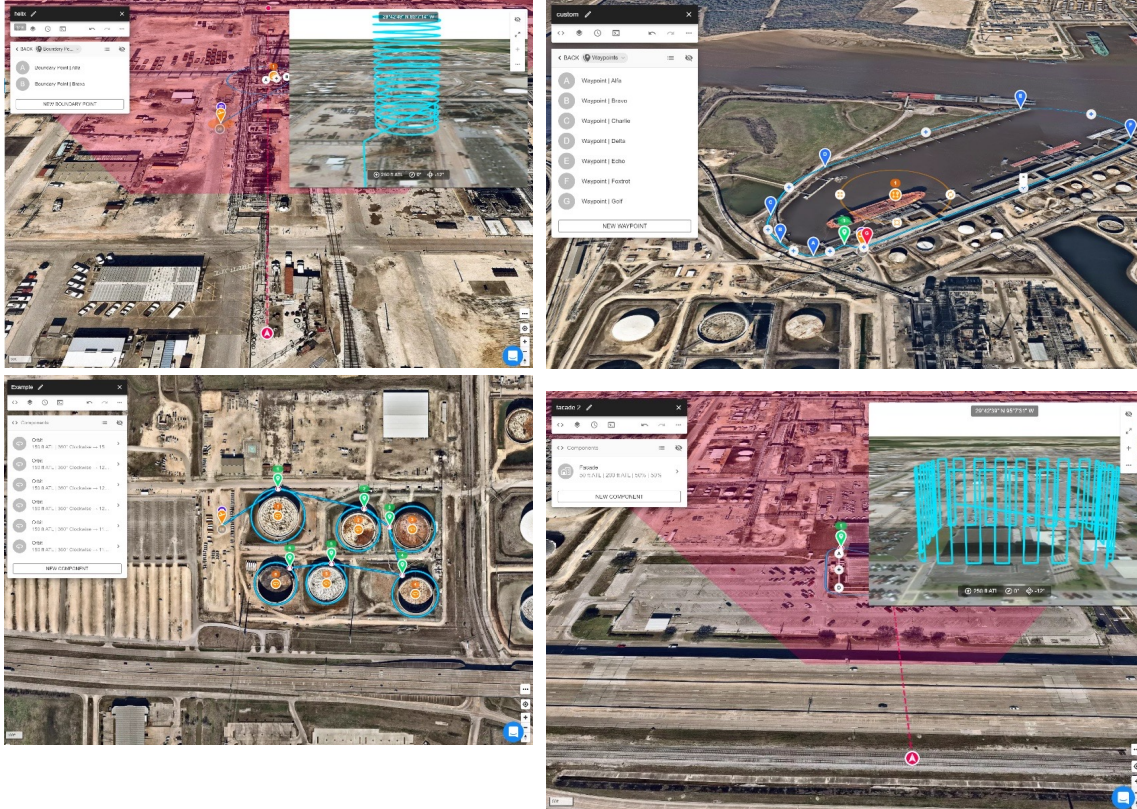


- HSSE performance augmented by real-time insights and conditions.

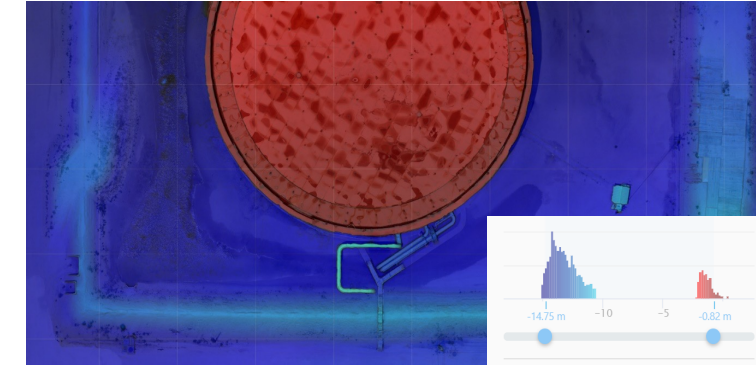
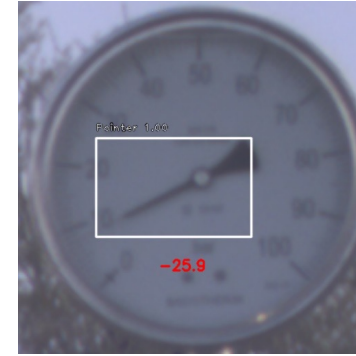
Potential Drone Use Cases



Drones and Advanced Analytics in Action



Build the Custom Flight Plan

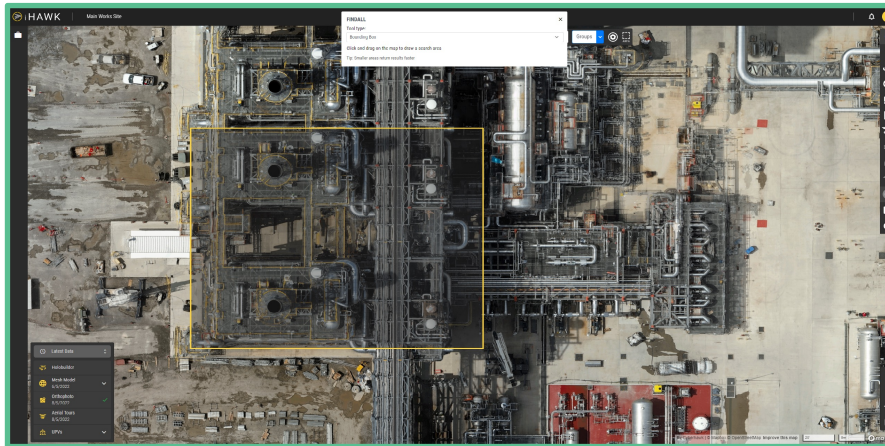


- UHD (Ultra High Def) images and video uploaded to the cloud.
- Visuals are processed using advanced analytics to produce readings that were previously manual, and defects (deltas from previous images/flights) are visually identified.
- FLIR (Forward Looking InfraRed) available for thermal imaging and gas detection.
- Trained inspectors use their time focused on concern areas.

Drones and Construction



- UHD ariel images with the ability to zoom to near ground level.



- Ability to utilize visuals to identify and record quality defects, find documentation, evaluate and predict traffic patterns, etc.

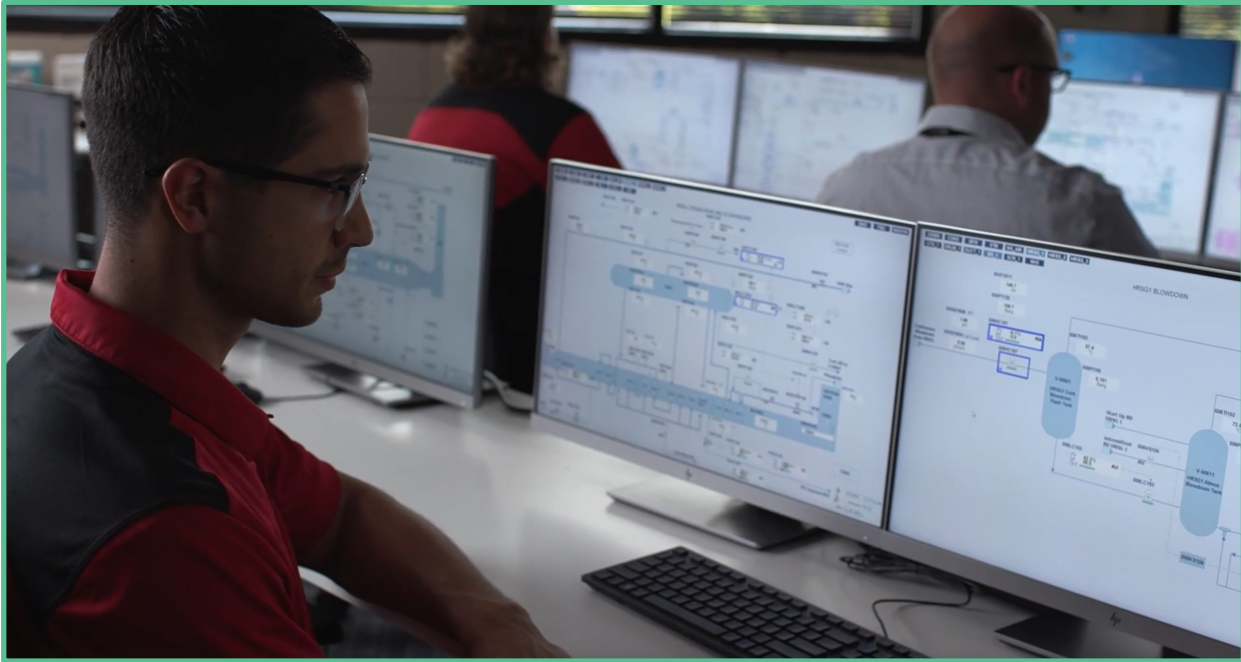


- Compare images side-by-side across different time scales.



- Ariel UHD video and stills are high quality enough to train, evaluate progress, or even plan work.

Simulators and 3D Models



- Dynamic Simulators utilized to simulate actual running conditions of an asset or piece of equipment.
- Utilized for training personnel in a safe risk-free environment without interfacing with actual equipment. Also allows for training on abnormal conditions, which is hard to accomplish on a running asset or piece of equipment.



- Full 3D models of an asset or equipment.
- Virtual environment that can be utilized for everything from training personnel to a full GUI for equipment data, specs, etc.
- Allows for access virtually and on mobile platforms.
- Proven invaluable during site construction when visualizing the as-is to the to-be states while in the field.

Virtual and Augmented Reality



- Learning simulations using 360 video create an immersive experience for trainees to engage through scenarios.
- Virtual reality (VR) integration with 360 cameras, drone footage, etc. creates an environment that nears reality.
- VR allows for training away from the asset or equipment, enabling the avoidance of hazardous operating or construction environments.



- Augmented reality (AR) can be utilized by the end user through wearables (as in this picture) or a mobile device (i.e. iPad or iPhone).
- AR unlocks the capability of true remote support as it delivers visuals as well as verbal interaction.
- AR delivers an environment where procedures, instructions, training, etc. can be visually prompted to the user real-time.

Emerging Digital Technologies



DATA SCIENCE

Data science, Data visualization, Machine learning, Statistics, Data Science R&D; Data Engineering

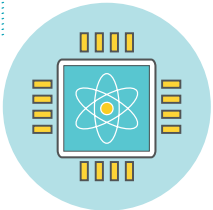


COMPUTATIONAL SCIENCE

Com. Chemistry & Materials Science, Digital Rock & Image analysis, Fluid flow reactor engineering, Computational technology



EMERGING DIGITAL TECHNOLOGIES



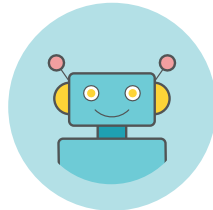
Quantum Computing

Zeroes, Ones, and Both



Machine Vision

Automatic Inspection and Decision Making



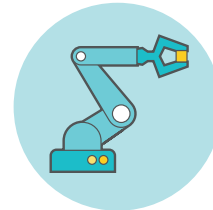
Chatbots

A Conversational Partner



Digital Realities

Contextual Interaction



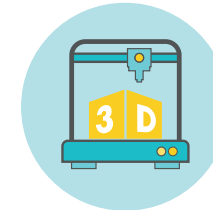
Robotics

Address the 'Human Exposure Bottleneck'



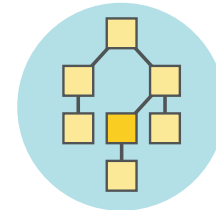
IoT & Sensors

Interconnected Devices & People



3D Printing

Novel Designs/Parts Manufacturing

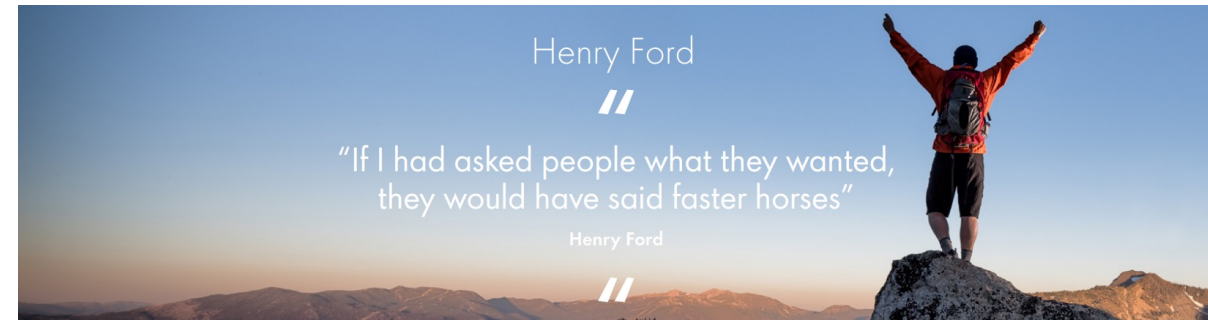


Blockchain

Distributed ledger: Open/Closed

Investing in a Digital Unknown

Think Big - Start Small - Experiment - Replicate



Key Digital Movement Capabilities

Sensing and Scanning

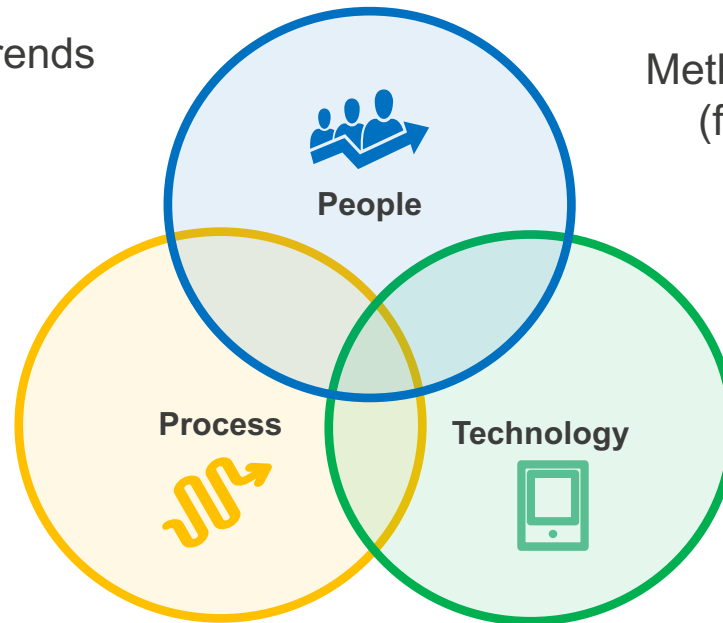
Anticipate and respond to digital trends and opportunities

Manage Digital as a Portfolio

Financial resource allocation devoted to digital and targets / indicators to guide decisions and measure success

Network and Ecosystem

Connections to external resources and stakeholders who can amplify initiatives



Digital Ideation to Implementation Process

Methods and approaches to drive digital (from concept to prototype to pilot)

Governance

How decisions are made to initiate and extend digital initiatives

Skills and Resources

Leadership and employee skills required to drive and execute a digital agenda

Source: Deloitte analysis