



G-Cloud 15 Service Definition

Accenture Connected Construction

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accenture

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1.0 Scope of our services

Construction is still manual in nature with minimal real-time collaboration & significant process inefficiencies. The industry is facing numerous problems starting from poor productivity, cost over-runs, delayed completion, poor quality, high number of safety incidents, poor working conditions, lack of visibility, siloed working, and no digitalization.

The industry is losing trillions due to stagnant productivity while the market grows and can only be addressed by more reliable & real-time data.

Connected Construction is a **platform** that helps organizations realize full potential from its People, Equipment and Materials by connecting them in real time to improve Safety, Efficiency and Predictive Delivery.

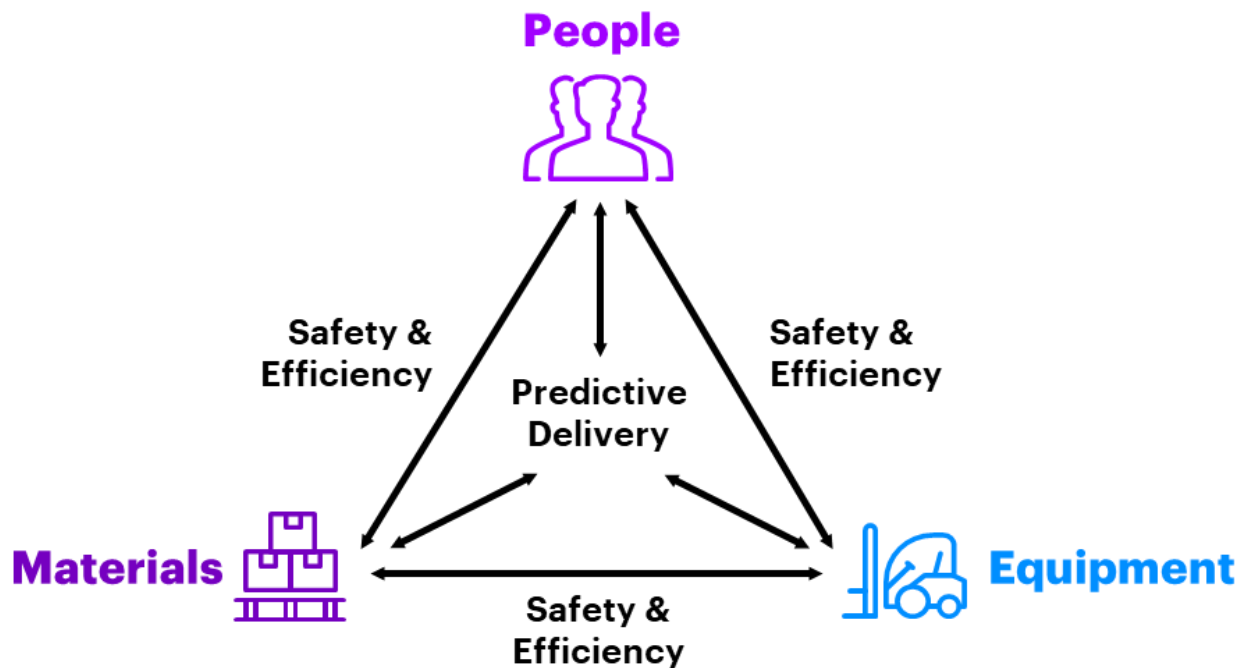


Figure 1: Connected Construction Platform

Connected Construction is Accenture's state of the art in-house developed tool which helps in creating a **connected ecosystem** for a capital project site. With the help of advanced hardware, cloud, backend applications, it connects all the siloed resources and functions on a single platform.

Connected Construction improves safety, productivity, and schedule adherence by intelligently connecting people, equipment & materials in real-time to drive operational improvements.

A TYPICAL CONNECTED CONSTRUCTION SITE

THE SOLUTION BRINGS TOGETHER A **COMPREHENSIVE SET OF FUNCTIONALITIES & INSIGHTS INTO ONE PLATFORM MAKING CONSTRUCTION SITES CONNECTED, INTELLIGENT AND COLLABORATIVE**

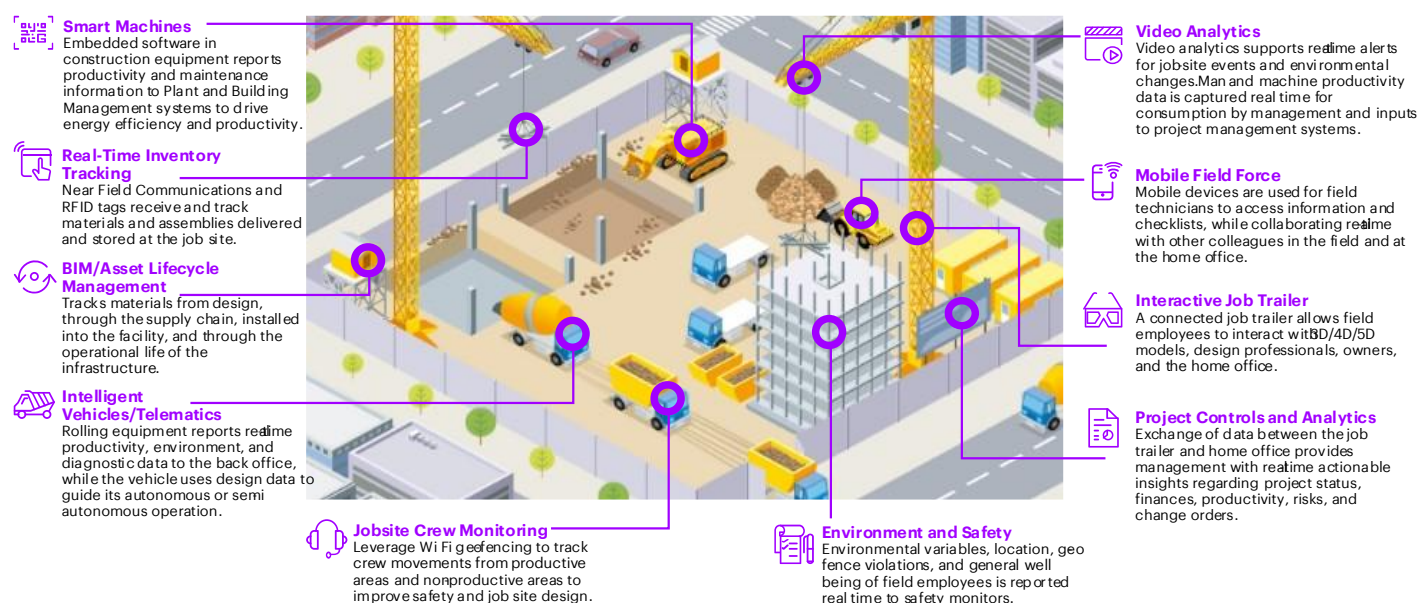


Figure 2: Typical Connected Construction Site

Connected construction brings insights from 4 critical areas and turn them into actionable intelligence through automatic tracking of KPIs and trends against benchmark, with root cause modelling for predicting next best scenarios and actions:

- **Intelligent People, Materials & Equipment**
Complete visualization of all onsite assets; People, Material and Equipment including location, quantity, movement, proximity, availability, time on tools, utilization, downtime.
- **Field Work Packages Optimization**
Spatial Twin, that integrates location and assets against work package; to enable early anomaly checks, asset readiness, completion tracking, crew/skill allocation and field release optimization.
- **Digitally Enabled Field Worker**
Work package visibility at field level; including permit to work, progress update, real-time models for supervisors for crew size/mix (against WP), adoption of digital forms (CR, approvals, instruction materials).
- **Digital Progress Tracking**
Real time construction progress through drones, 360° cameras; for comparison against plans, early visibility, and traceability to enhance schedule adherence.
- **Sustainable Construction**
Real time visibility into Scope 1, 2 & 3 emissions associated with the project, waste generated & recovered, in-depth analysis into operations and generation of recommendations to make reduce carbon impact

1.1 Key Benefits:

The benefits of Connected Construction include:

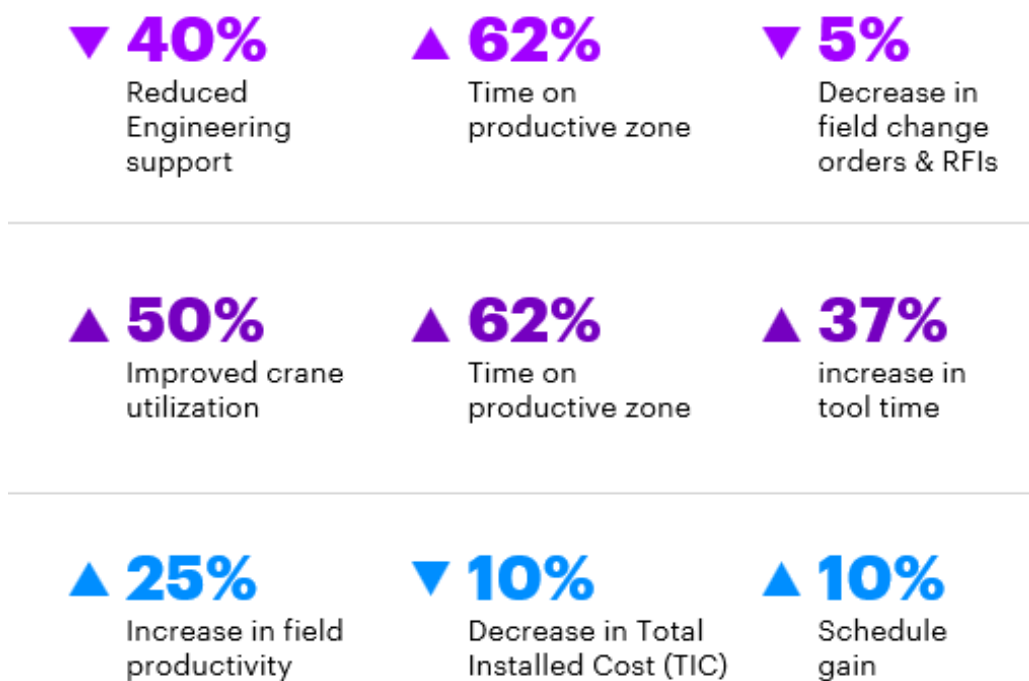


Figure 3: Benefits of Connected Construction

2.0 Our Approach

Connected Construction can be readily configured at any construction site. There are few basic steps in configuring the system at site. We begin with Maturity Assessment where our in-house MAT (Digital Maturity Assessment Tool) does an end-to-end analysis of client's current capabilities, identifies gaps, and charts out a detailed mitigation strategy. Post this a hardware (tags & sensors) are procured and a pilot environment is set up. Post-delivery of the hardware, they are installed & integrated with client systems and tools. Finally, a User Acceptance Testing (UAT) is conducted before the solution must go-live. The pilot is run in multiple sprints to test & validate identified use-cases with custom dashboards & KPIs. The seamless data flow and uniformity is checked for effective integration with other systems.

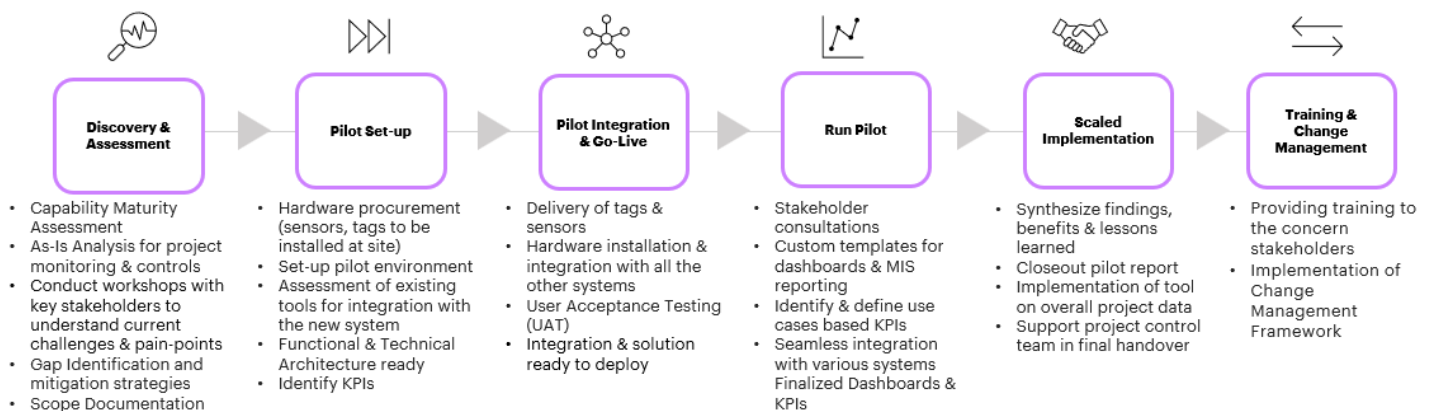


Figure 4: Implementation Methodology

In terms of technology landscape of the solution, one of the most important part is 'Edge Sensor Layer' which is basically all the devices to capture the data on ground. Above this there is a cloud layer which is the Connected Construction Platform hosted on cloud, this is the place where all our data processing, analytics engine is present. The data and system backup are also stored in cloud. Finally, there is 'Device Layer' which is the front end or the USER side interface. The user can access all the dashboards hosted on Laptop, tablets, Mobiles etc. These 3 layers broadly forms technical landscape of the solution.

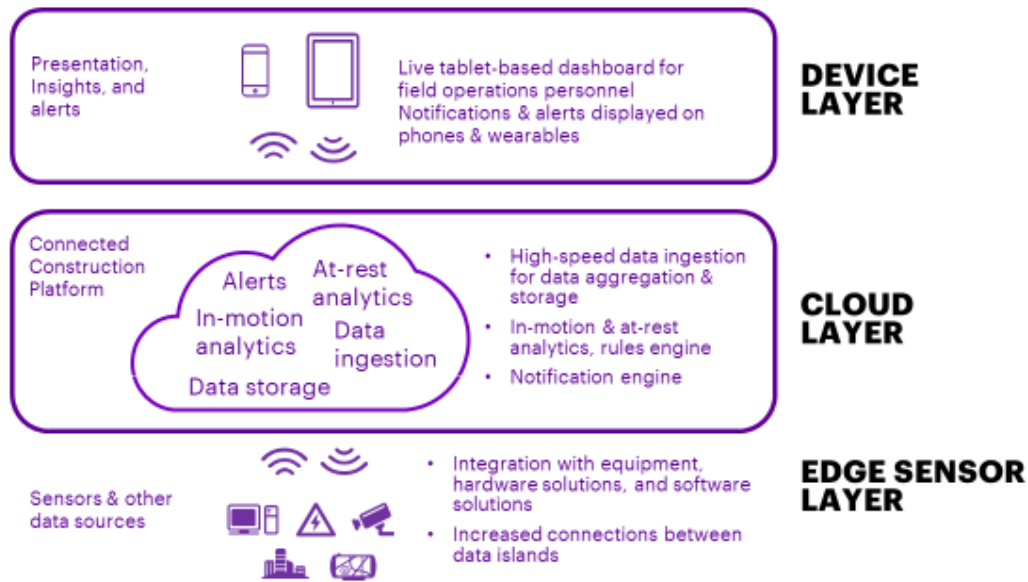


Figure 5: Three Layer Approach

Let us take you through each of the layers in detail:

Edge Sensor Layer: Contains all the Hardware like Mobile Assets Sensors (LPWAN, NB-IoT, UWB, etc.), Asset Sensors (RFID gates, Access management, etc.), Visual data sources (Drone maps, CAD, CCTV, etc.). It further contains External data sources (e.g., Environmental Data, Contractor datasets), Enterprise data systems (e.g., ERP, Primavera etc.), Internal data sources (e.g., Algorithm training data, site/user data, etc.). This has a further layer of IOT Gateway, IOT Security, Edge-Cloud Adapter, Edge-Sensor Gateway, etc.

Cloud Layer: This layer contains the workflow manager, Rule Engine, Analytics Engine, Data Management System, Storage & Backup systems, KPI Functions, data ingestion & cleansing, Access Controls, and Admin Data management (site, asset info, rules, owners, etc.)

Device Layer: This layer contains the dashboards, the user portal & the admin portal (responsive web). It has 3 views: Operations for Visualization & alerts with appropriate breakdown per use case/role (e.g., Work package monitoring, Commodity tracking, etc.). The second one is Executive for Multi-site Visualization and exec dashboards with value tracking functionality (e.g., Owner, PM, etc.). The last one is Functions for Use case specific views with alerting and targeted insights (e.g., HSE, Project Control, Supervisors, IT, etc.)



Presentation, Insights, and Alerts

Operations	Executive	Functions
Visualization & alerts with appropriate breakdown per use case/role (e.g. Work package monitoring, Commodity tracking, etc.)	Multi site Visualization and exec dashboards with value tracking functionality (e.g. Owner, PM, etc.)	Use case specific views with alerting and targeted insights (e.g. HSE, Project Control, Supervisors, IT, etc.)
User Portal & Admin Portal (Responsive Web)		
Identity & Access Management	Localization	Notifications
		In-app alerts



Analytics, Data and Logic layer

Workflow Manager	Role Based Access Control	Geo Map-Layer Management	Batch KPI Functions	Real-time Event manager	Analytics Engine	Stream Analytics
Asset Relationship builder		Rule Engine		Predictive Models		
				Model Re-trainer		
				Visual Twin		
Data Ingestion and cleansing	Data Pipeline, Provisioning and Shaping	Data Context Management	Anomaly Detection	Admin Data management (site, asset info, rules, owners, etc.)		Storage and backup



IOT, Edge, Sensors & Other Data Sources

IOT Security			IOT Secure Edge	Edge-Cloud Adapter		Protocol Translator
Device Register	Device Management	Device Jobs		Edge-Orchestrator		
IOT Gateway				Edge-Sensor Gateway		
Mobile Assets Sensors (LPWAN, NB-IoT, UWB, etc.)	Asset Sensors (RFID gates, Access management, etc.)	Visual data sources (Drone maps, CAD, CCTV, etc.)	External data sources (e.g. Environmental Data, Contractor datasets)	Enterprise data systems (e.g. ERP, Primavera etc.)	Internal data sources (e.g. Algorithm training data, site/user data, etc.)	

Figure 6: Three Layer Approach - Details

3.0 Assets and Tools

Connected Construction Platform

01 Connected Worker: Connected Worker Module connects all the workers at site and aims to achieve value across Site worker productivity & safety thus helping to optimize project operations. Connected Worker Module is deployed to baseline / improve:

- personnel productivity KPIs including time on tools
- % Time in productive zone
- worker fatigue level
- supervision ratio
- worker safety incidents

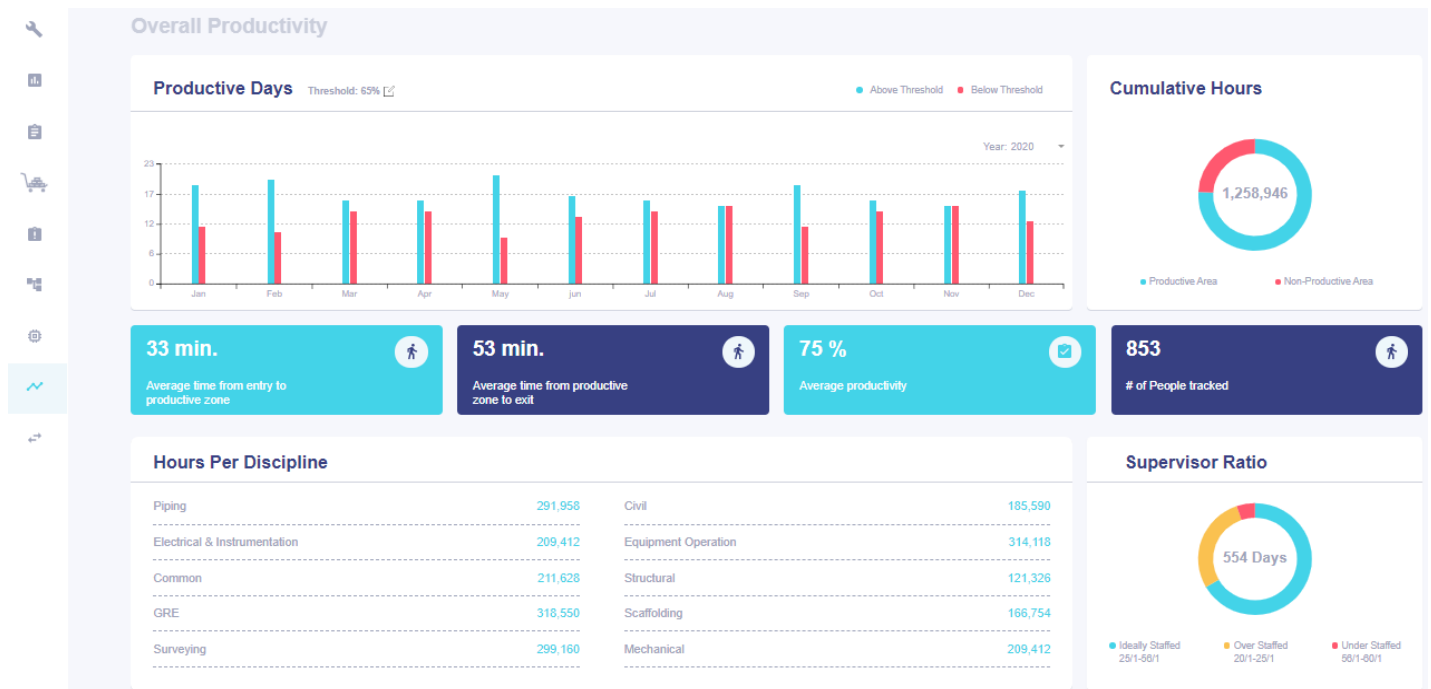


Figure 7: Dashboard

02 Connected Machines: Effective asset utilization and reduced downtime. Connected Machine Module aim to achieve value across Asset Utilization & Productivity, Real time Machine track & trace, Machine-related service contracts. Use Connected Machine Module to baseline / improve:

- equipment utilization (right equipment for right job)
- % Time in productive zone
- vehicle turnaround time
- buy Vs hire Vs dispose

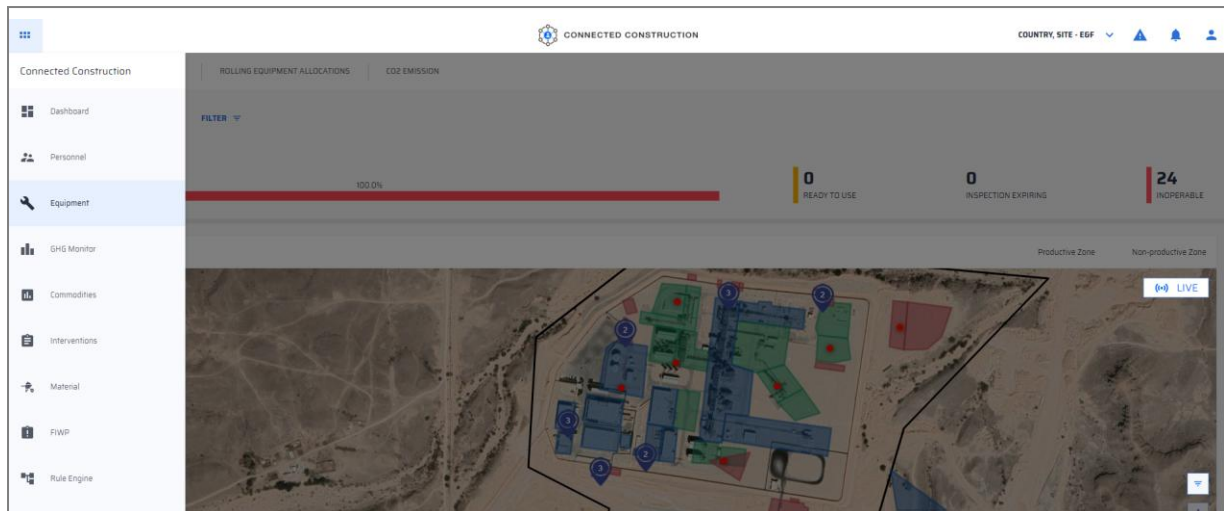


Figure 8: Connected Machines

03 Connected Material: Connected Material Module keeps a track of all inventories at site, it improves material usage and traceability. Connected Material Module aim to achieve value across Sub-optimal material usage & wastage, Material tracking & storage, Construction Cost management, Improved Schedule Management. Use Connected Material Module to baseline / improve:

- material availability & consumption
- inventory ageing
- waste optimization
- material tracking & storage
- reduce material pilferage/theft

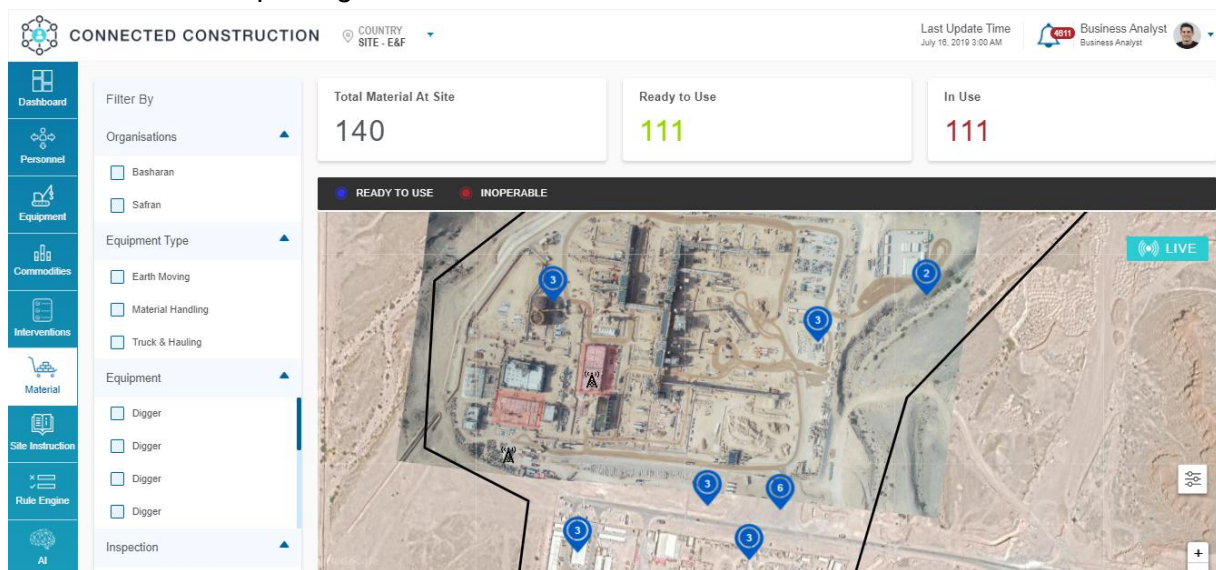


Figure 9: Connected Materials

04 Advanced Work Packaging (AWP): Advanced Work Packaging module ensures early project alignment with pre-defined and manageable work packages across different functions. AWP Module aims to achieve value across Project Lifecycle through Schedule Compression, better manage EPC functions through Construction-driven Project Execution

and visibility on Path of Construction, improve Project Constructability. Use AWP Module to baseline / improve:

- interface management across stakeholders
- change order control
- overall schedule adherence
- project risk management
- reduce rework & errors

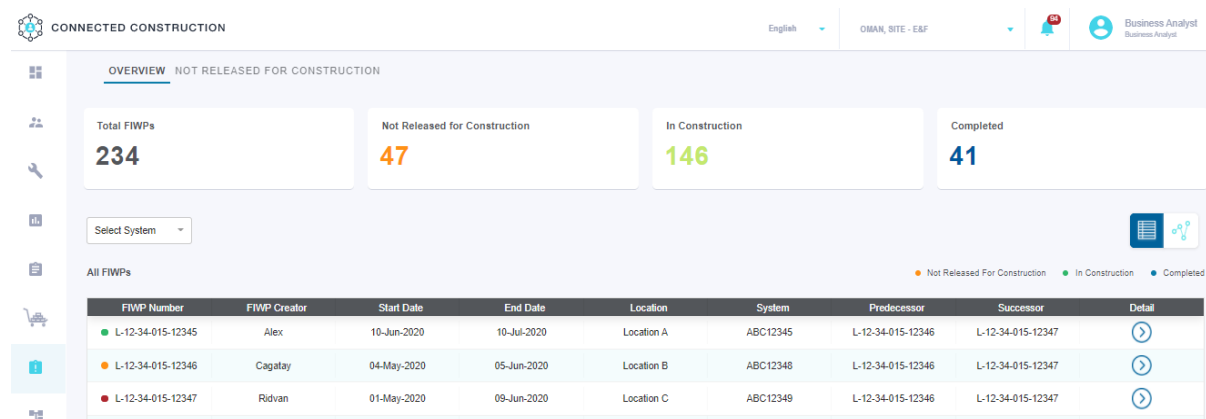


Figure 10: Advanced Work Packing

05 Digital Handover & Start Up: Effective & efficient system handover to ensure on-time start-up. Digital Handover & Start-up Module aim to achieve value across minimizing Construction Punch-Points, Digital signoffs during handover, Completeness & Digitization of Handover documents, Accelerated system readiness. Use Digital Handover & Start-up Module to baseline / improve:

- Handover Cycle-Time
- Document Digitization (Training & operating manuals)
- Re-work & Errors
- System completion
- Time to Market

06 Digital Survey & Inspection: Digital survey & inspection module – utilizes ai & drones to improve project visibility for early risk identification and optimize site maintenance.

Utilize drone & computer vision technology to perform feasibility studies, site surveillance and quantity surveys. Improved site security & visibility for efficient planning and execution. Visual inspection data is collected to be managed in a systematic and holistic manner. Data analytics allow engineers to perform topographical & geospatial studies remotely and accurately. Reduce site hindrances and time to perform quality inspections. Reduce the need of manual/ physical quality supervision at site. Realtime site progress and quality status

07 Sustainability Dashboard: Track, Monitor & Reduce the Scope 1, 2 & 3 Emissions associated you're your project. Track waste generated, recovered, insights into material procured, wastewater recovered, etc. on a single dashboard. The system generates AI based recommendations to make site operations greener. Sustainability Dashboard enable –

- Real-time Monitoring & Reduction in Scope 1, 2 & 3 related GHG emissions
- Reducing waste generation and tracks waste recovered/reused
- Keep track on consumption of utilities (water & power usage)

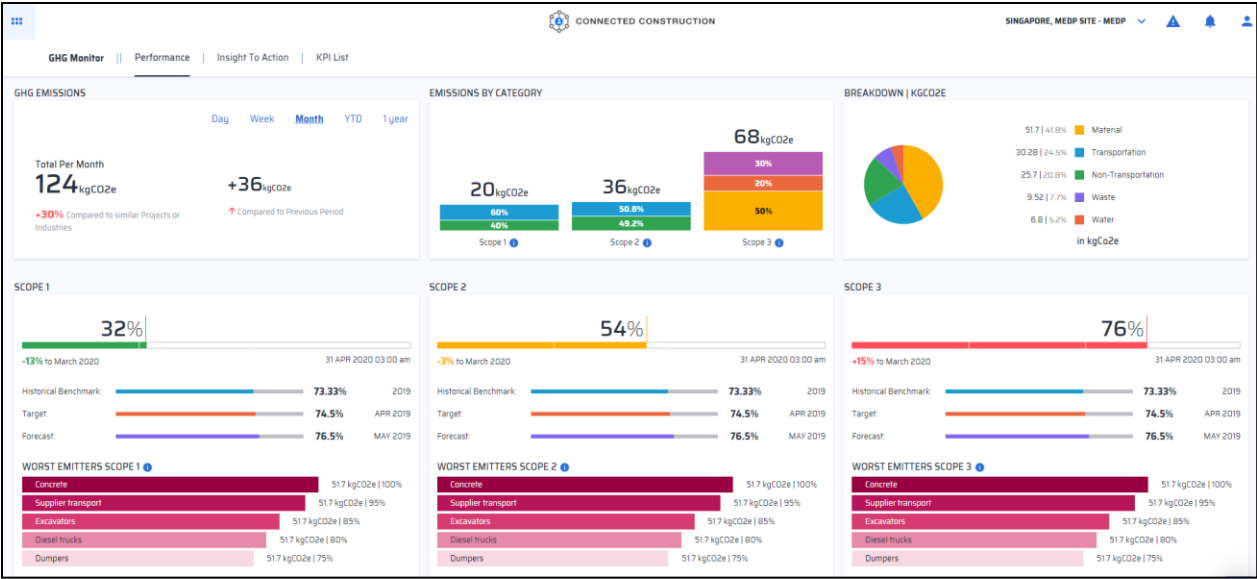


Figure 11: Sustainability Dashboard

4.0 Pricing

Please refer to the associated pricing document/ rate card relevant for this service.

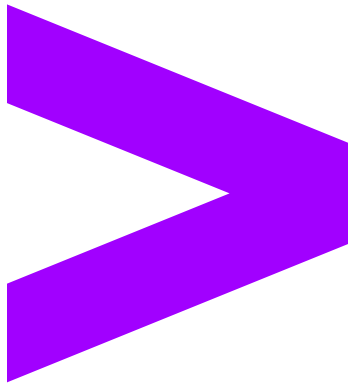
5.0 **Contacts**

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6.0 About Accenture

Accenture is a leading global professional services company that helps the world's leading businesses, governments and other organisations build their digital core, optimise their operations, accelerate revenue growth and enhance citizen services—creating tangible value at speed and scale. We are a talent- and innovation-led company with approximately 799,420 people serving clients in more than 120 countries. Technology is at the core of change today, and we are one of the world's leaders in helping drive that change, with strong ecosystem relationships. We combine our strength in technology and leadership in cloud, data and AI with unmatched industry experience, functional expertise and global delivery capability. We are uniquely able to deliver tangible outcomes because of our broad range of services, solutions and assets across Strategy & Consulting, Technology, Operations, Industry X and Song. These capabilities, together with our culture of shared success and commitment to creating 360° value, enable us to help our clients reinvent and build trusted, lasting relationships. We measure our success by the 360° value we create for our clients, each other, our shareholders, partners and communities



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