Preparing the Way for Digital Construction Transformation
Serving 5 of the world's largest industries
Transforming the way they work

Agriculture  Building Construction  Civil Engineering and Construction  Geospatial  Transportation and Logistics

Our integrated technologies and innovation solutions are helping customers increase productivity and profitability across multiple industries around the world.
Connecting the Physical and Digital Worlds

**Construction**
- 3D model at anchor bolt level detail drives pinpoint construction accuracy during fabrication and construction
- Construction verification against the model
- 3D design model imported to the machine control and guidance equipment in the field
- Progress monitoring enables schedule optimization

**Agriculture**
- Real time field conditions update and inform optimal farm management plan
- Farm/crop management plans flawlessly executed in the field

**Transportation**
- Real time road, vehicle, and driver conditions aligned, managed and optimized to meet customer needs
Challenges in Digital Construction Transformation

Urbanization & Population growth

Productivity lags industry average

Skill Labor Shortage

90% of companies face shortage

30% Less workers under 24yrs
Advancing Digital Construction Transformation

Adoption

Growth in AEC tech from 300 vendors in 2016, to 1,000 to 2017 to over 2,000 in 2018

Noninvasive & Wearable Technology on the Rise

240% Increase in Drone Adoption
80% Capture Field Data on Mobile Devices
80% Prefer Cloud to On Premise

AEC Firms hiring data scientists, Chief Data Officers and Blockchain experts

Return on Investments

30% Reduction in Errors and Clashed with Mixed Reality
Free up Capital by 5-15%
90% Decrease In Time Measuring and Processing Site Data

10% Compression in Project Schedule
80% Reduction in Rework
30% Increase in Prefab

50% Increase in Productivity of Field Tasks
5% Increase in Accuracy of Estimates
30% Reduction in Operations and Maintenance
Digital Construction accelerates Efficiency and Accountability

**Between stakeholders**
Owner ⇔ architect engineer ⇔ General contractors ⇔ sub contractors

- Project capital program management
- Project document & contracts management
- Production schedule, work order mgmt as built QA

**In the office**
Business ⇔ project/team ⇔ field
Between departments
Building product manufacturer supply

- Procurement
- Job Cost
- Scheduling
- Reporting

**In the field**
Scope ⇔ actual ⇔ handover
Labor ⇔ equipment ⇔ materials
Models/production vs. documents

- Supervise
- Instrument
- Equipment
- Material
- Fabrication Pre-fab
- Labor
Geospatial data

BIM data

Project & Timeline data

Machine & equipment data

Financial & Supply data

Visualize, optimize, connect, inform and automate construction process

The next transformation: Data Driven Construction
Data is king, powering other emerging technologies

**Big Data, IoT & Cloud Computing**

**AI & Machine Learning**

**xR, Mixed Reality**

**Autonomous Machines**

**Connected Construction**

**Drones & Vision**

Growth in Industry Adoption (YoY)

While dozens of industries use drones, the fastest growing commercial adoption of aerial data comes from the construction, agriculture, and mining industries.

- 239% Construction
- 198% Mining
- 172% Agriculture
- 171% Surveying
- 118% Real Estate
Data powers AI, providing intelligent decision making for construction productivity and automation

From reporting (hindsight):
- Progress
- Expenses
- Alerts

To informing (insight):
- How to finish faster
- How to finish cheaper

To automating:
- Estimates
- Schedules
- Work orders
- Machines

Industry Trend: Chief Data Officers and data scientists being hired by leading contractors
.....it will extend beyond construction to optimize and automate design, maintenance and operation of our cities
How can governments accelerate adoption?

- Develop a Digital Construction Strategy to encourage the use of digital technologies both internally and, externally with contractors to increase collaboration and transparency and, reduce time, rework and change orders.

- Foster a culture of innovation and encourage and nurture institutional knowledge to use new technologies to be more effective in all phases of the project delivery life cycle from pre-design through maintenance operations.

- Leverage incentives or programs encouraging the use of digital construction technologies that improve the quality, costs and schedules of a project.

- Ensure transparency with your partners by leveraging digital technologies to access shared analytics and dashboards which provide daily insight into project errors, costs, schedules, materials, and labor.

*McKinsey April 2019 Capital Projects & Infrastructure*