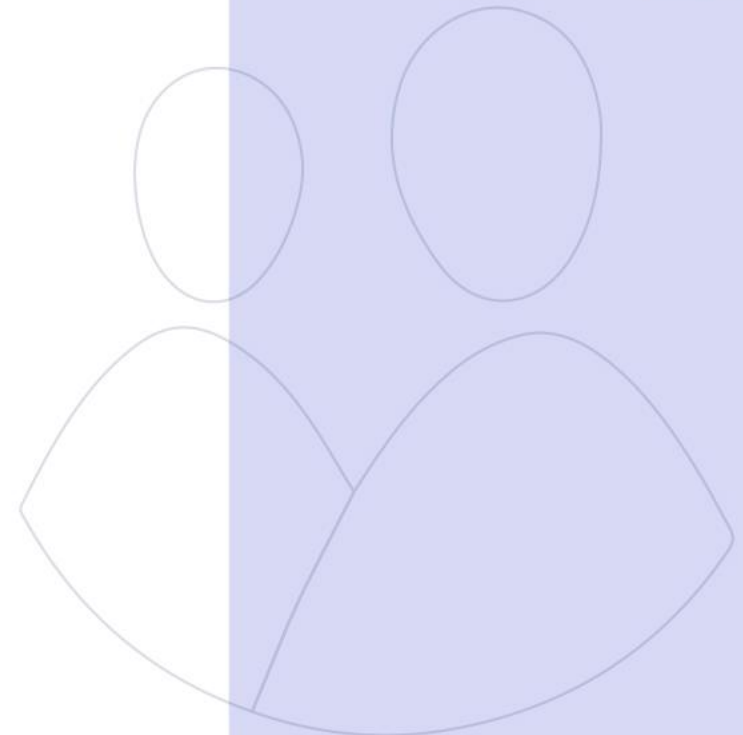


Building Digital Trust in Construction Project Controls



Contruent

 **Project Controls**
EXPO
Washington, DC - USA

Meet the Speaker



Chief Product Officer
Rich Humphrey, Contruent

Construction and Engineering Software Development

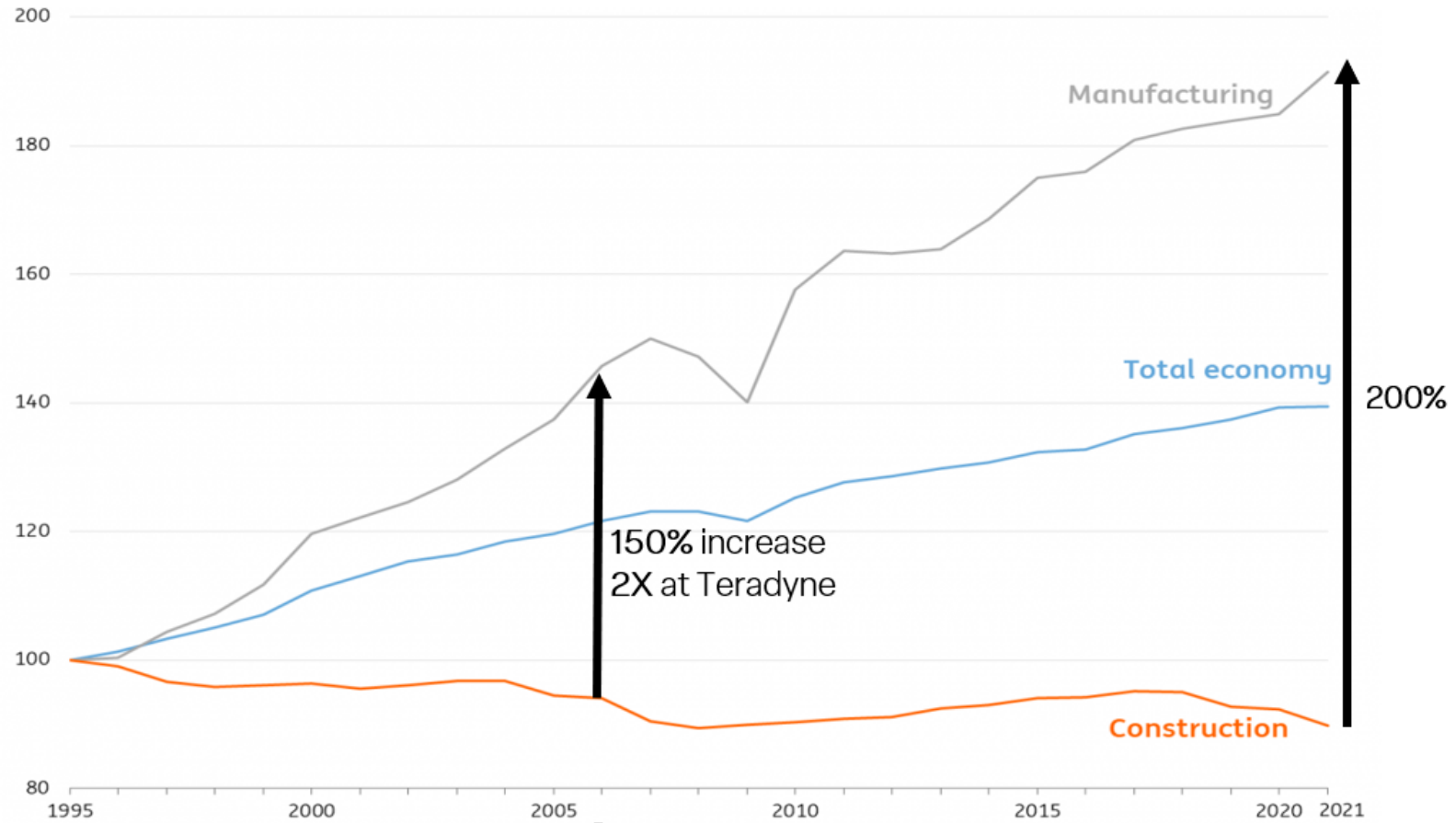
Hi-Tech Manufacturing Product Development

Construction Project Management, Civil Engineering

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EXPO
Washington, DC - USA

Meet the Speaker



Construction
Clark, US Army Corp.
MSCE, Carnegie Mellon

High-Tech Manufacturer
Teradyne

Construction & Engineering Software Development
Autodesk, Bentley & Contruent

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About Contruent



Our Mission

Empowering decision-makers to build our world's infrastructure with precision and speed.



Con·tru·ent

Derived from 'construction' + 'true' + '-ent' (performing, promoting, or causing a specific action)



Origin

1990s: Began as ARES PRISM, project controls software.

We Have a Problem!

27%

On average, projects have a 27% cost over-run



55%

Only 55% of projects are delivered on time and on budget



3.8x

Projects are 3.8x more likely to fail without full integration of systems and processes



Demand for Infrastructure



The recent trillion-dollar infrastructure bill will help drive new projects in the US to satisfy demand.

Project Complexity



Increasing Requirements:

- Transparency
- Sustainability
- Health and safety
- Quality controls
- Design complexity
- Project size
- Faster, lower cost

Resource scarcity is increasing including:

- A lack of skilled labor and inability to attract new talent
- Higher material costs and supply chain issues
- Large capital equipment utilization



Future of Work



Covid has accelerated the need to accommodate remote work collaboration.

Data Transparency and Trust



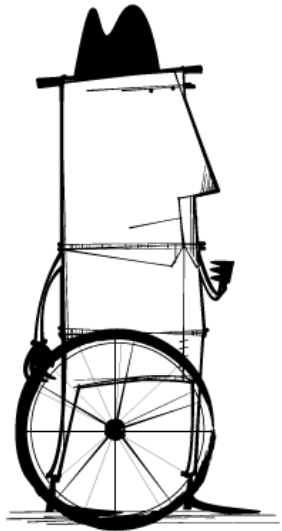
30%
Data
Silos

90%
Not
Structured

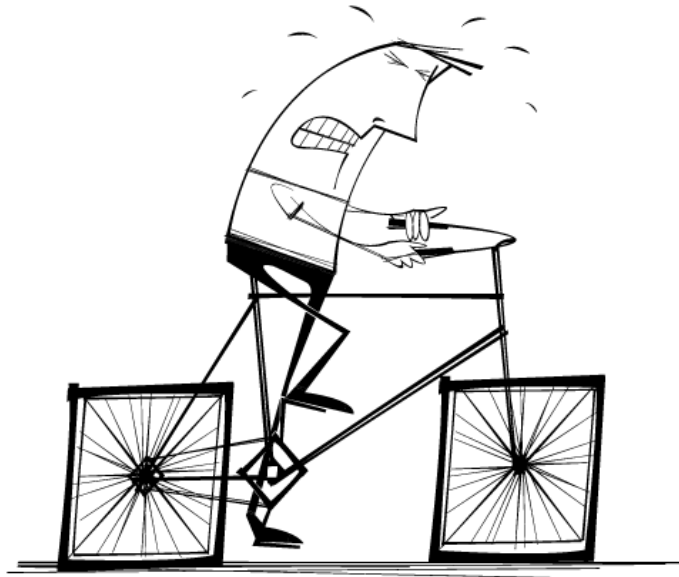
4%
Data
Utilization

Too Busy to Improve?

ERRR...



**CAN'T STOP.
TOO BUSY!!**

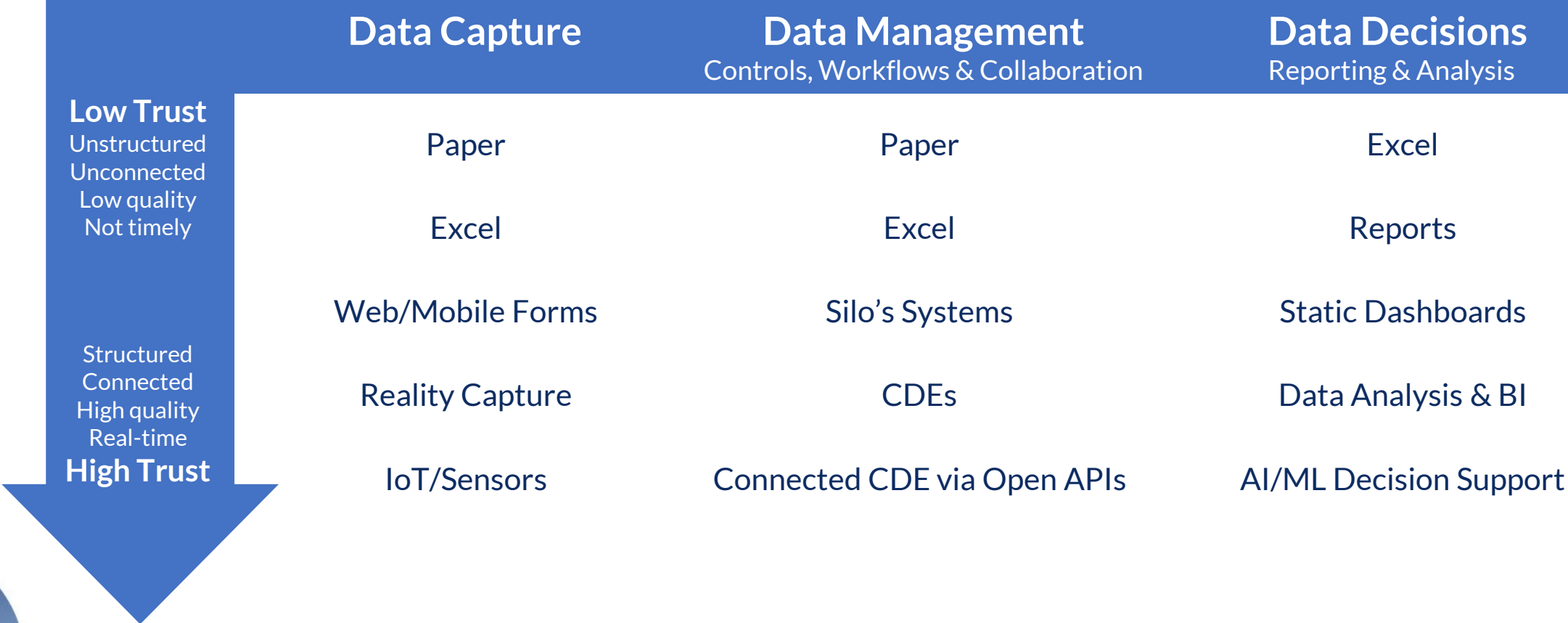




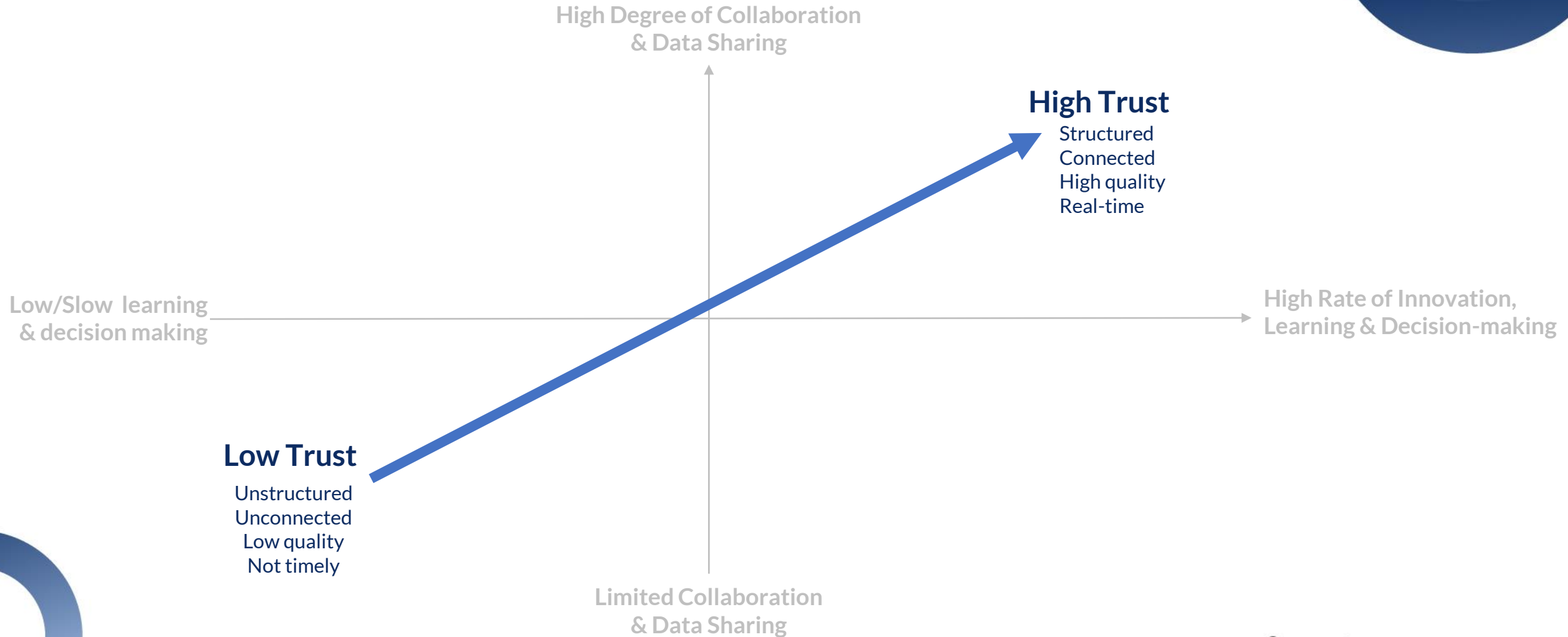
Current State of Digital Trust

Trust equals better
collaboration and
productivity.

Current State of Digital Trust



Data Management: Connected Platforms

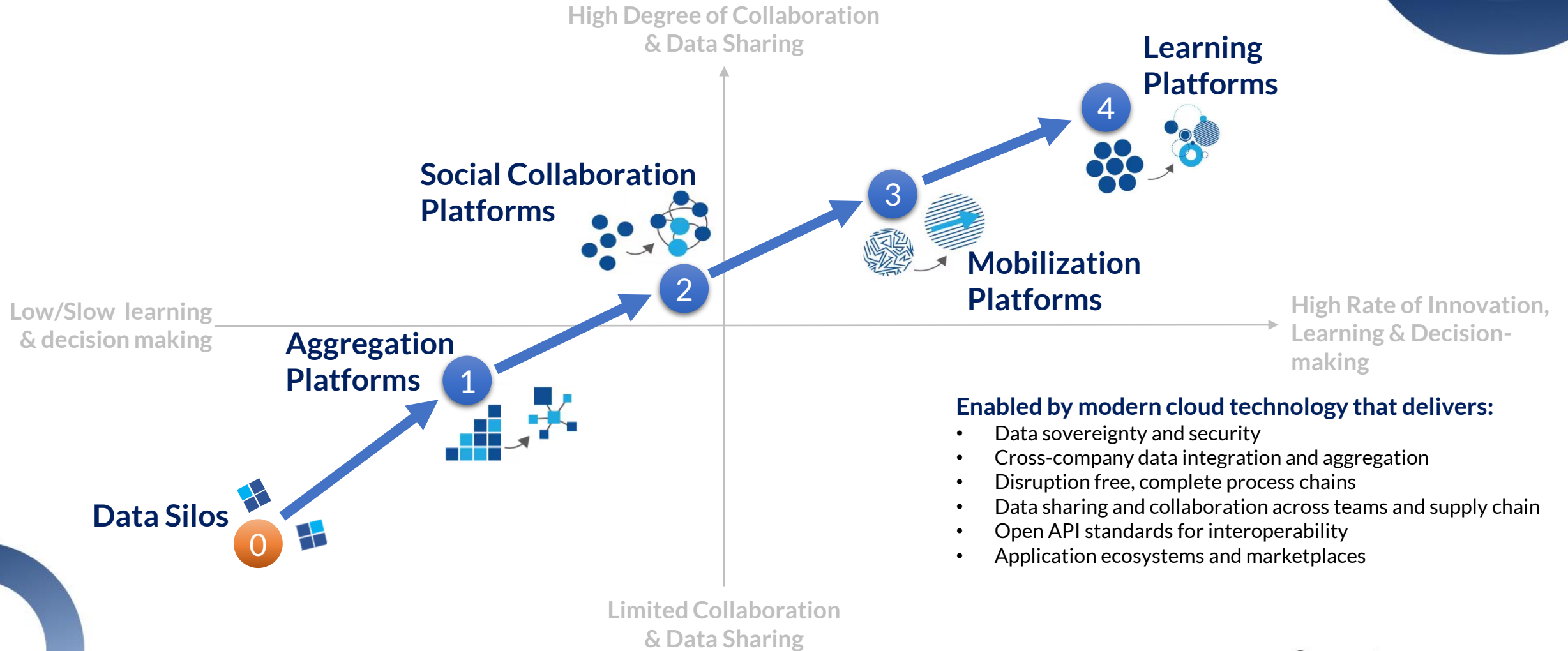


[Hagel, J., *The power of platforms: Part of the Business Trends series*. Deloitte University Press, April, 2015. 15: p. 2015]

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Data Management: Connected Platforms



Enabled by modern cloud technology that delivers:

- Data sovereignty and security
- Cross-company data integration and aggregation
- Disruption free, complete process chains
- Data sharing and collaboration across teams and supply chain
- Open API standards for interoperability
- Application ecosystems and marketplaces

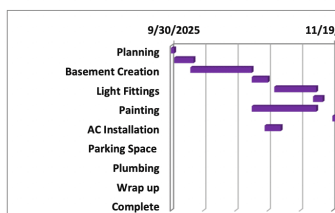
Data Decisions

Low Trust

Unstructured
Unconnected
Low quality
Not timely

Siloed Excel & PDF Reports

| Construction Schedule Template | | | | | | |
|--------------------------------|-------------|-----------------|------------|------------|----------|----------|
| Project Name: | Start Date: | Total Duration: | | | | |
| Project Manager: | End Date: | | | | | |
| TASK DESCRIPTION | STATUS | ASSIGNED | START DATE | END DATE | DURATION | COMMENTS |
| Planning | Complete | | 9/21/2025 | 9/30/2025 | 10 | |
| Raw Material Accumulation | Complete | | 10/1/2025 | 10/6/2025 | 6 | |
| Basement Creation | Complete | | 10/6/2025 | 10/24/2025 | 19 | |
| Floors Creation | Complete | | 10/25/2025 | 10/29/2025 | 5 | |
| Light Fittings | Complete | | 11/1/2025 | 11/13/2025 | 13 | |
| Sewage Pipelines | Complete | | 11/13/2025 | 11/15/2025 | 3 | |
| Painting | In Progress | | 10/25/2025 | 12/5/2025 | 20 | |
| Accessories Installation | In Progress | | 11/19/2025 | 12/10/2025 | 22 | |
| AC Installation | In Progress | | 10/29/2025 | 12/9/2025 | 5 | |
| Fire Extinguishers | In Progress | | 11/22/2025 | 12/15/2025 | 24 | |
| Parking Space | Not Started | | 11/29/2025 | 12/20/2025 | 22 | |
| Appliances | On Hold | | 12/10/2025 | 12/22/2025 | 13 | |
| Plumbing | In Progress | | 12/10/2025 | 12/22/2025 | 13 | |
| Final Inspections | Not Started | | 12/27/2025 | | | |
| Wrap up | Not Started | | 12/31/2025 | | | |
| House Cleaning | Not Started | | 1/3/2026 | | | |
| Complete | Not Started | | 1/3/2026 | | | |



| Ref # | Bid Item # | Item Description | Qty | UNIT | Engineer's Estimate | | CONTRACTOR A | | CONTRACTOR B | | |
|-------------------------|------------|---|-----|------|---------------------|-----------|--------------|-------------|--------------|------|------|
| | | | | | UNIT AMOUNT | BID | UNIT AMOUNT | BID | UNIT AMOUNT | BID | |
| 1 | 1.001 | Cut & Fill | 1 | LS | 500 | \$ 500.00 | 500 | \$ 500.00 | \$ - | \$ - | |
| 2 | 1.002 | Removal of Stone/Cut | 1 | LS | 900 | \$ 900.00 | 900 | \$ 1,000.00 | \$ - | \$ - | |
| 3 | 1.003 | Trenching For Utility Hookups | 1 | LS | 600 | \$ 600.00 | 600 | \$ 600.00 | \$ - | \$ - | |
| 4 | 1.004 | Foundation Excavation | 1 | LS | 200 | \$ 200.00 | 200 | \$ 200.00 | \$ - | \$ - | |
| 5 | 1.005 | Foundation Footing Drains | 1 | LS | 200 | \$ 200.00 | 200 | \$ 200.00 | \$ - | \$ - | |
| 6 | 1.006 | Curbs/Drains | 10 | EA | 45 | \$ 45.00 | 5 | \$ 50.00 | \$ - | \$ - | |
| 7 | 1.007 | Curbs | 10 | EA | 5 | \$ 50.00 | 6 | \$ 60.00 | \$ - | \$ - | |
| 8 | 1.008 | Swales | 10 | EA | 5 | \$ 50.00 | 5 | \$ 50.00 | \$ - | \$ - | |
| 9 | 1.009 | Backfill | 200 | CY | 14 | \$ 280.00 | 15 | \$ 300.00 | \$ - | \$ - | |
| 10 | 1.010 | Compaction | 1 | LS | 500 | \$ 500.00 | 500 | \$ 500.00 | \$ - | \$ - | |
| 11 | 1.011 | Top Soil | 200 | CY | 125 | \$ 250.00 | 125 | \$ 250.00 | \$ - | \$ - | |
| 12 | 1.012 | Finish Grading | 1 | LS | 590 | \$ 590.00 | 600 | \$ 600.00 | \$ - | \$ - | |
| 13 | 1.013 | Seeding/Sod | 100 | CY | \$ - | \$ - | \$ - | \$ - | \$ - | \$ - | |
| 14 | 2.001 | Founding/Pile | 4 | EA | \$ - | \$ - | \$ - | \$ - | \$ - | \$ - | |
| 15 | 2.002 | Foundation wall/interim wall/gade beams | 4 | EA | \$ - | \$ - | \$ - | \$ - | \$ - | \$ - | |
| 16 | 2.003 | Slab - Foundation, Basement, Garage | 3 | EA | \$ - | \$ - | \$ - | \$ - | \$ - | \$ - | |
| 17 | 2.004 | Street Reinforcing | 1 | LS | \$ - | \$ - | \$ - | \$ - | \$ - | \$ - | |
| 18 | 2.005 | Anchor Bolts, Hold Downs | 16 | EA | \$ - | \$ - | \$ - | \$ - | \$ - | \$ - | |
| 19 | 2.006 | Bulkheads | 5 | EA | \$ - | \$ - | \$ - | \$ - | \$ - | \$ - | |
| TOTAL BASE BID | | | | | \$ | 4,185.00 | \$ | 4,310.00 | \$ | \$ - | |
| TAX | | | | | 9.9 % | \$ | 426.69 | \$ | 426.69 | \$ | \$ - |
| TOTAL BID AMOUNT | | | | | \$ | 4,611.69 | \$ | 4,736.69 | \$ | \$ - | |

High Trust

Structured
Connected
High quality
Real-time

Dynamic Dashboards and AI/ML assisted BI

The dashboard displays the following key metrics:

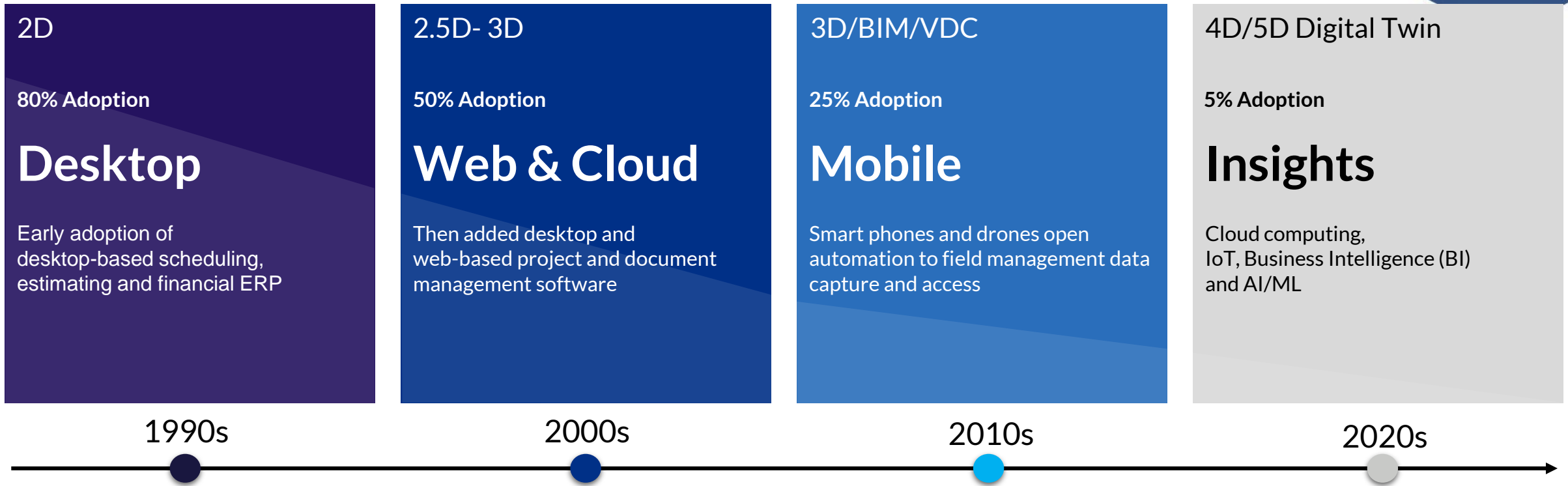
- Variance of Completion %: 0.52%
- Schedule Variance %: 22.74%
- Cost Variance %: -4.95%
- Projects With SPI >= 0.95: 1
- Projects With CPI <= 0.95: 4

Key performance indicators include:

- Schedule Performance Indicator (SPI): 1.23
- Cost Performance Indicator (CPI): 0.95

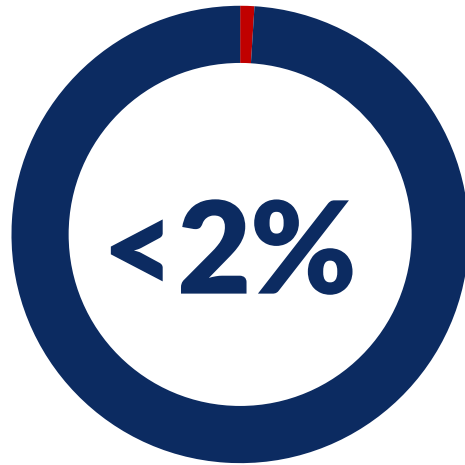
The dashboard also features a Budget and Forecast Data bar chart, an Approved Budget Distribution pie chart, and a Schedule Gantt chart. A user is shown interacting with the system on a computer monitor.

Construction Digital Evolution

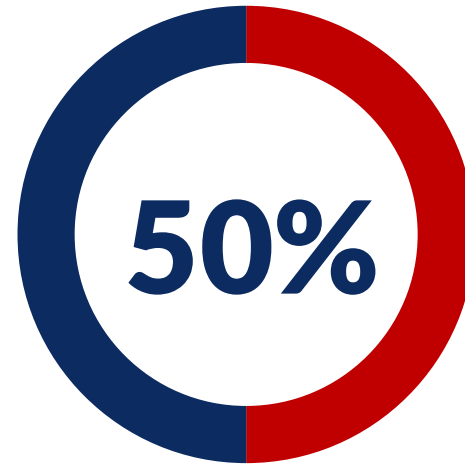


**Adoption is lagging technology evolution.
Technology leadership is not equal to market leadership.**

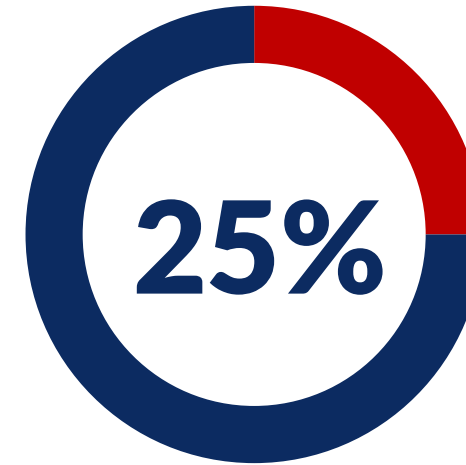
The Construction Industry Has Been Slow to Digitize



57% of firms spend less than 2% of total revenue on IT and software.



The construction industry spends half as much on IT compared to the global industry average.

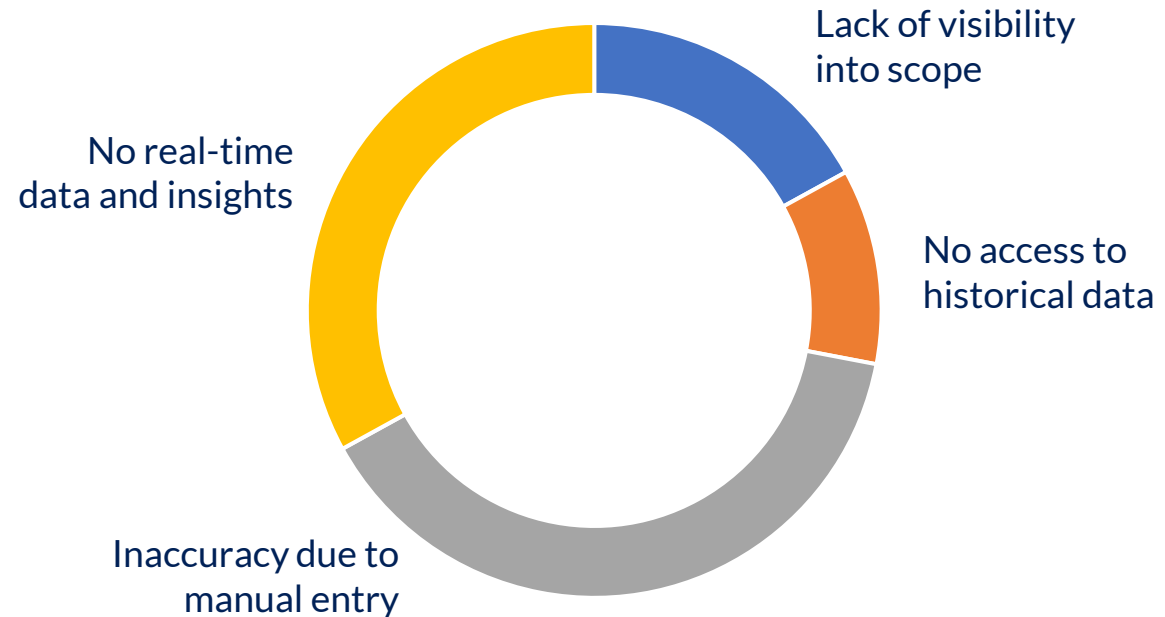


25% of firms have a digital software strategy.

Obstacles to Building Digital Trust

- Lack of Investment
- Black box and auto calculations
- Fear of the unknown (AI/ML)
- Data quality, verification
- Data lag and timing of data
- Volume of Data
- Security of Data

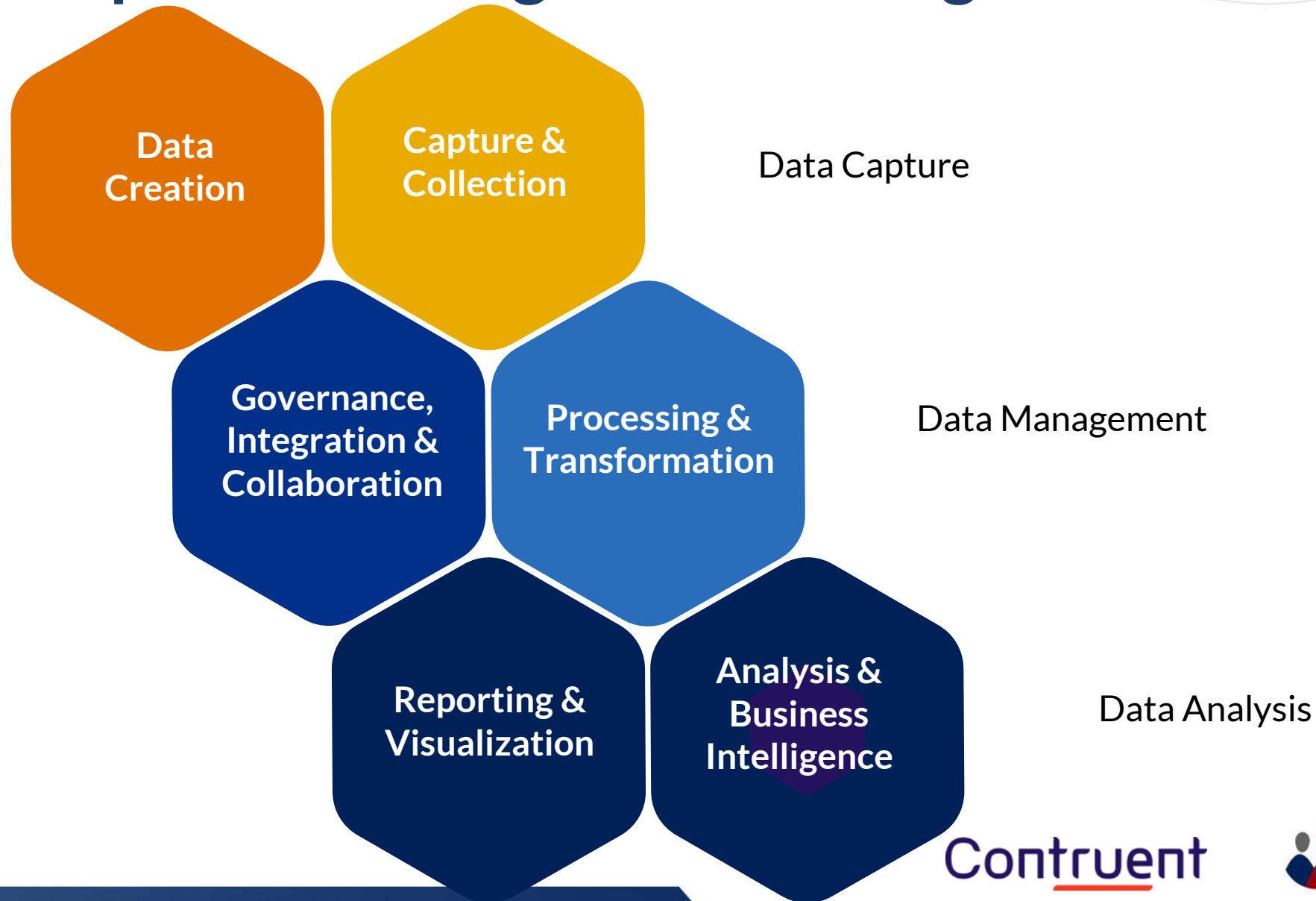
Which of the following challenges have you experienced the most with traditional project controls software?



How Do We Build Trust Going Digital!

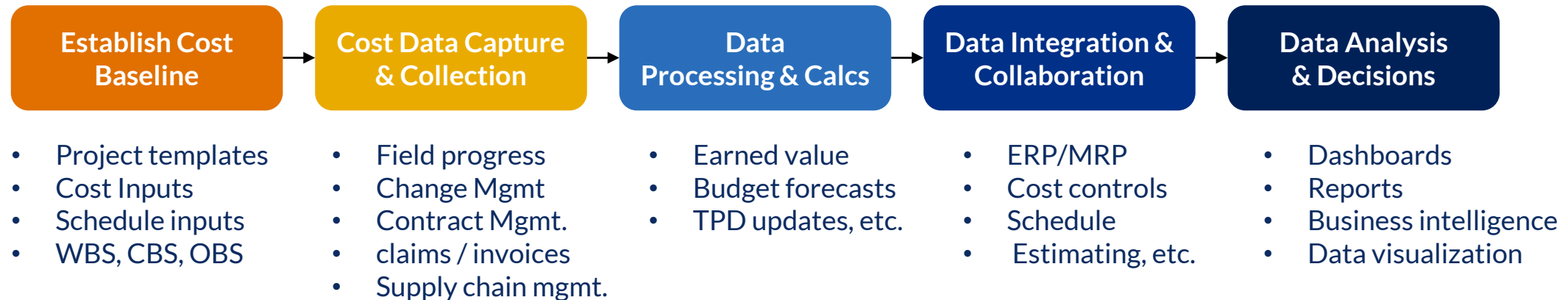


Develop the Building Blocks of Digital Trust



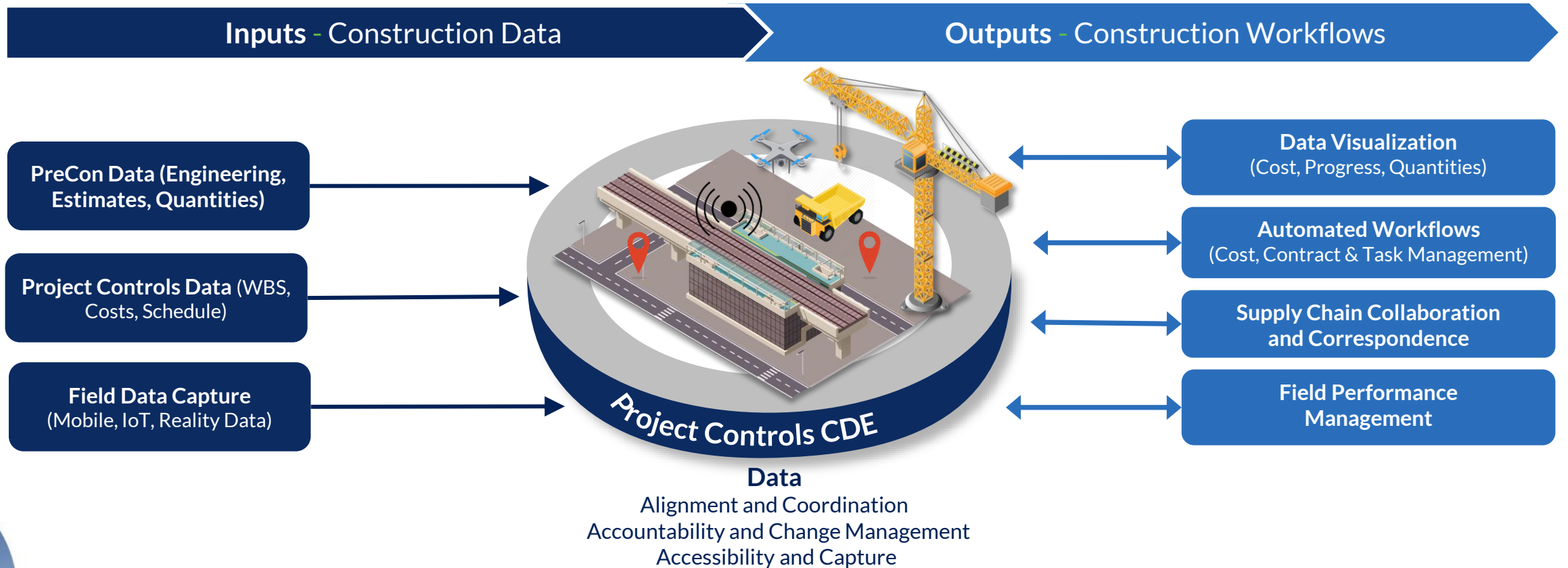
Data Trust and Project Controls Process

Leveraging a Project Controls CDE to manage inputs and outcomes including:



Data Trust and Project Controls

Transform Project Controls and Program Management and deliver better, more predictable project outcomes.

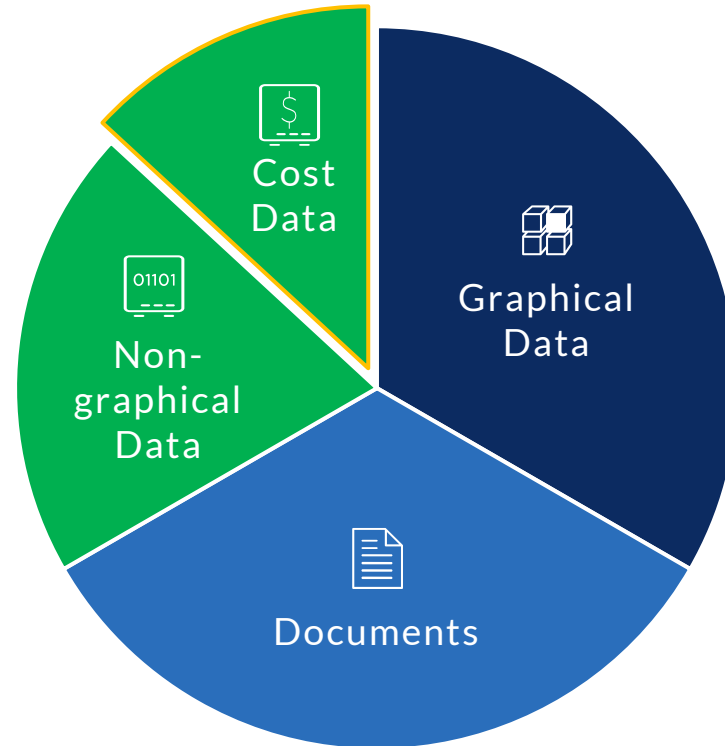


Common Data Environment

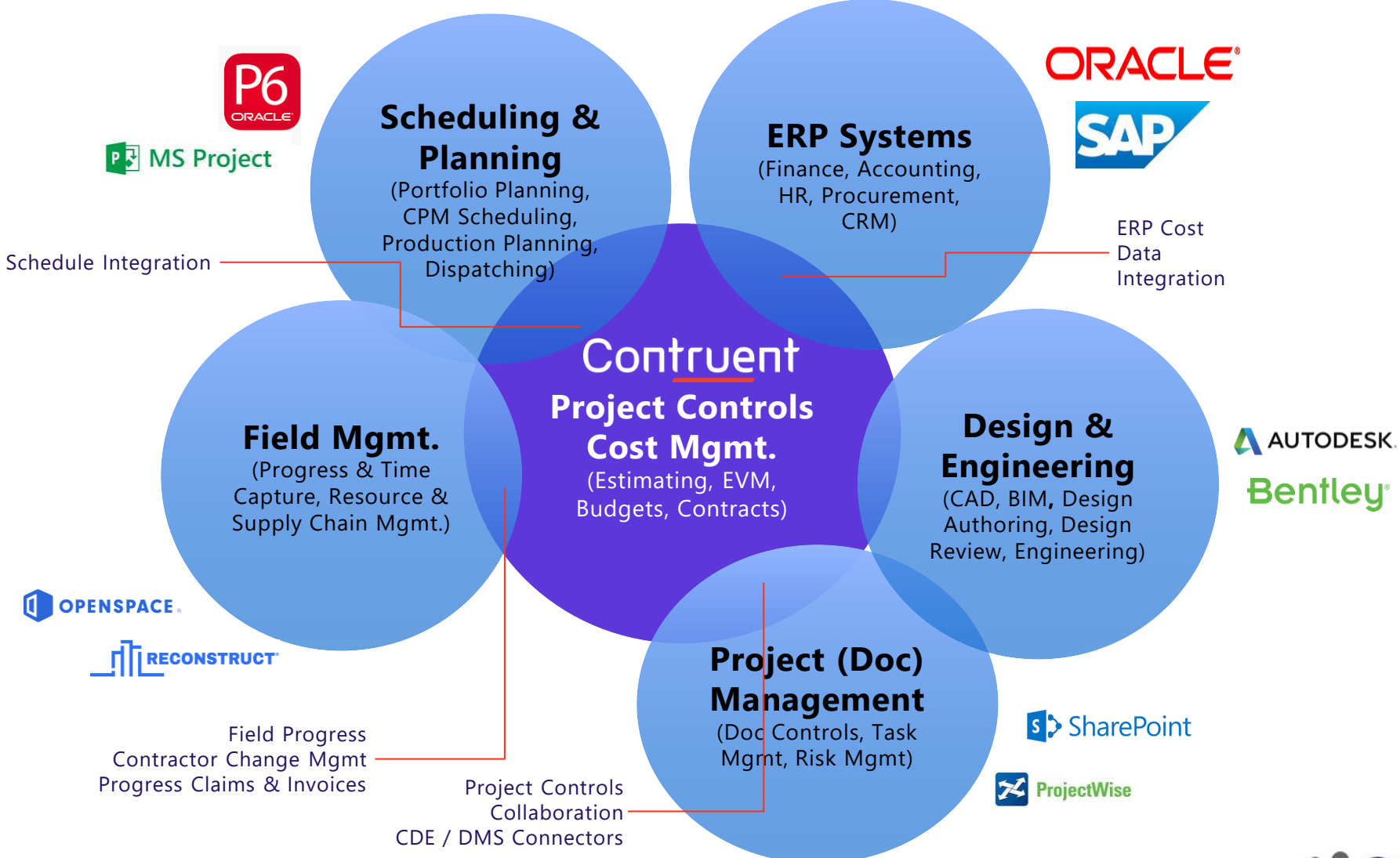
Project Controls CDE: Cost and Schedule

- Single source of truth
- Connects all data types around the project
- Data access and capture procedures
- Workflows enabled on top of CDE
- Data security

Common Data Environment



Connected Data Environment



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Data Capture In Realtime

- Mobile apps and devices
- Reality capture
- IoT—sensors



Collaborative Workflows

- Automated workflows
- Repeatable templates & procedures
- Structured data
- Connected data and resources
- Cloud-based coordination

Main Menu / Approvals / Change Summary / 0005-0005

* Change Order Summary - 0005-0005 [Approved] [Rejected]

| Change Information | | Status Details | |
|--------------------|---|----------------|-------------|
| Project ID | PROJECT A - Sample Project A | Status | SUBMITTED - |
| Change ID | 0005-0005 | Status Date | - |
| Description | scope update | | ✗ Not Final |
| Details | This change is regarding a scope update in the concrete pouring volume. The revised amounts have been reflected in this change order. | | |
| Comments | | | |

Approvers receive email notifications and can utilize mobile devices to make decisions

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Welcome, ARE06-CBITAR

Main Menu / Approvals / Change Summary

Change Summary Filter By: Pending All Projects

| Change ID | Impact ID | Approved Budget Changes | Control Budget Changes | Financial Budget Changes | EAC Changes | Created By | Last Modified |
|-----------|-----------|-------------------------|------------------------|--------------------------|-------------|------------|---------------|
|-----------|-----------|-------------------------|------------------------|--------------------------|-------------|------------|---------------|

Advanced change management with workflows for an in-program user notification, action items, review and approval

Collaborative Workflows

Supply Chain Coordination

Contractor Portal provides visibility into the progression of contractor claims, allowing you to track progress

Contract Information

Project ID: PROJECT 2
 Project Title: Sample Project 2
 Contract ID: C002
 Description: Surveying Services
 Contractor ID: SM001
 Contractor Name: Smith & Sons Surveying Limited

Previous / Current Progress Claim

Status: Accepted
 Approved Invoices: 5/13/2022
 Last Status Date: 6/20/2022
 Submitted By: ADMINISTRATOR
 Submission Date: 6/20/2022
 Claimed Hours
 Claimed Costs

Contract Pay Items

| Item | Description | Price Unit | Quantity | Original Quantity | Approved Quantity | Proposed Quantity | Adjusted Quantity | Quantity Installed | Quantity This Period | Original Hours | Approved Hours | Proposed Hours | Adjusted Hours | Hours Worked | Hours Worked This Period |
|------|-------------------------------------|------------|----------|-------------------|-------------------|-------------------|-------------------|--------------------|----------------------|----------------|----------------|----------------|----------------|--------------|--------------------------|
| 001 | Surveying Work - Potable Water Area | LOT | 1.00 | 1.00 | 1.00 | | | | | 65.00 | 65.00 | 65.00 | 65.00 | | |
| 002 | Surveying Work - Fuel Storage Area | H | 210.00 | 1.00 | 1.00 | | | | | 90.00 | 90.00 | 90.00 | 90.00 | | |

Contruent Welcome, ARE06-CBITAR

Main Menu / Contractor Portal

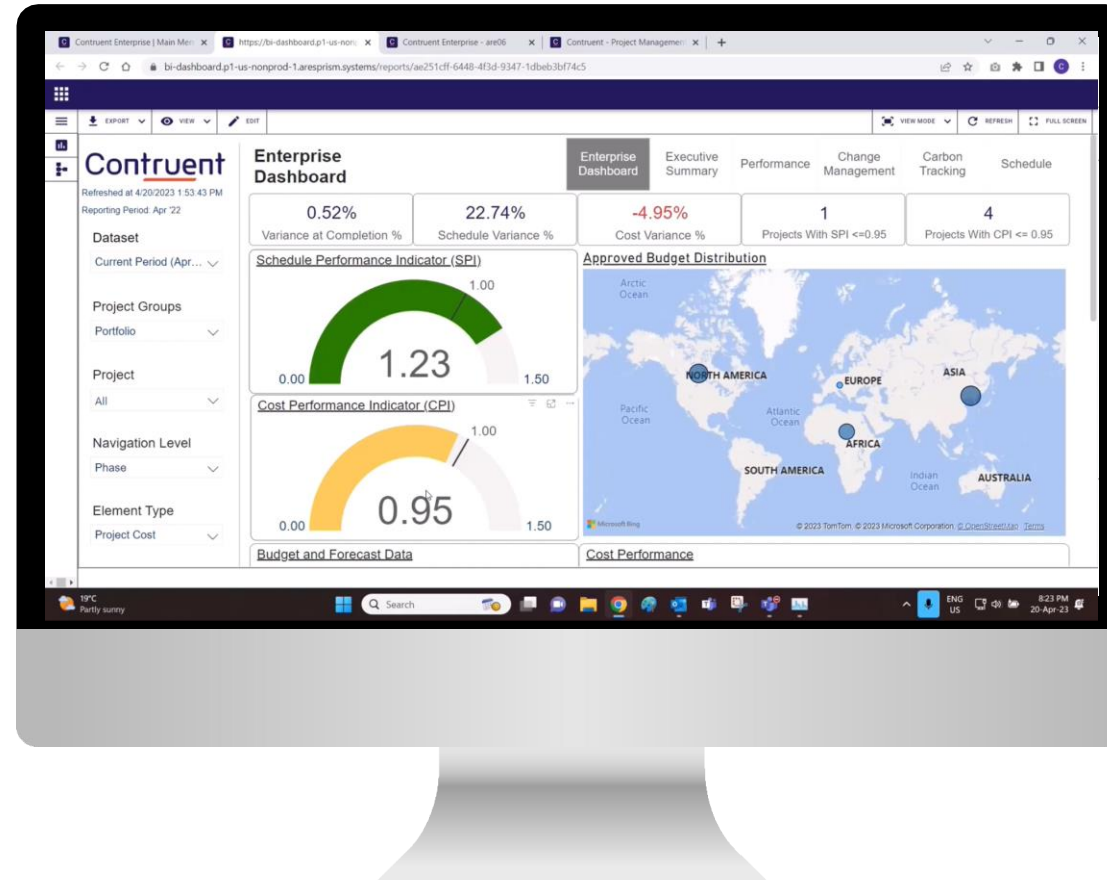
Contractor Portal

- Contract Progress Claims**
View and Submit Contract Progress Claims
- Cost Progress Claims**
View and Submit Cost Progress Claims

Gated contractor access for data viewing, template downloads and uploads

Data Visualization, Analysis & Decisions

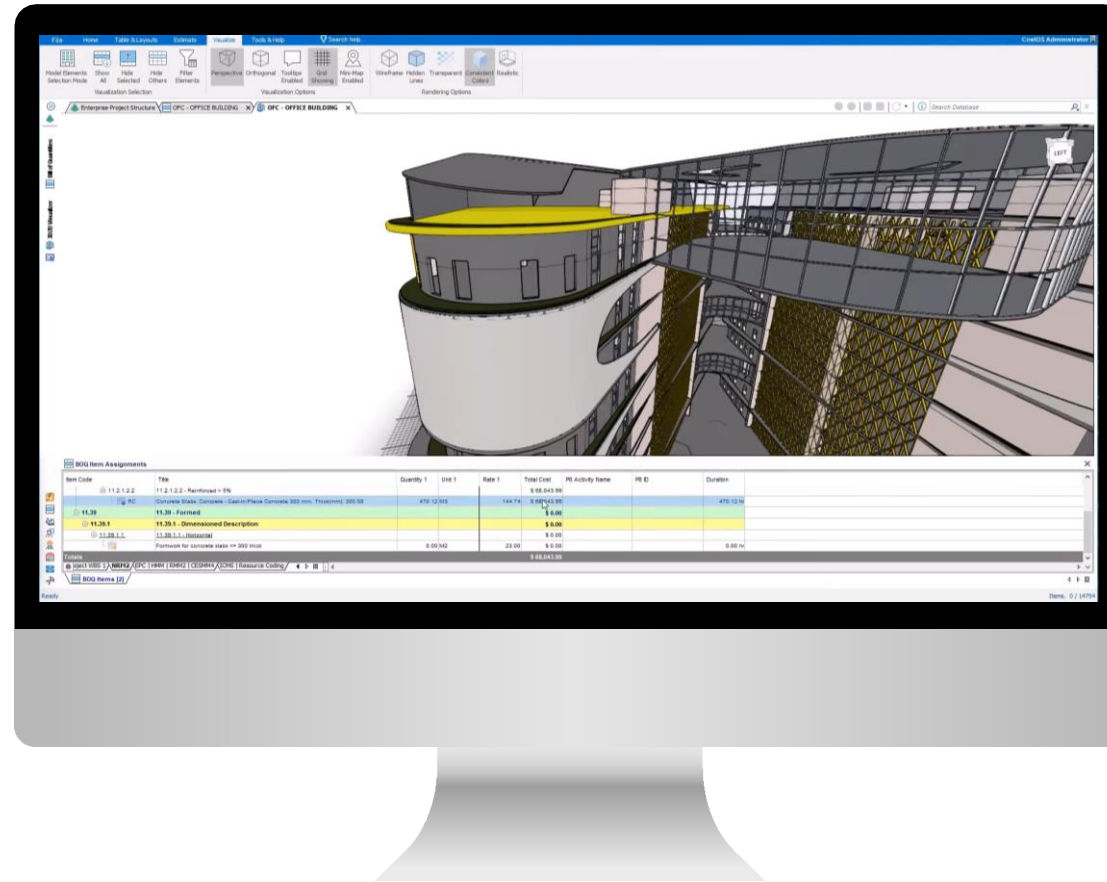
- Dashboarding and reports
- Business analytics/intelligence
- BIM 3D/4D/5D and digital twins
- AR/VR
- AI/ML



With enterprise dashboards that show key performance indicators and allows users to easily drill down into problem areas.

Data Visualization, Analysis & Decisions

- Dashboarding and reports
- Business analytics/
intelligence
- BIM 3D/4D/5D
and digital twins
- AR/VR
- AI/ML



With model-based 3D/5D environments, data can be interrogated and analyzed in a more immersive experience reducing errors and omissions.

Project Controls Data Trust Summary

How to build trust, increase collaboration and improve productivity:

- Capture real-time, structured quality data capture with mobile, reality capture and IoT
- Break down data silos with open platforms and common data environments
- Make data more accessible to more team members (share) with cloud/web-based collaboration software
- Make better sense of your data with purpose-built solutions that put data to work
- Make data more visible with data analysis, dashboards and reports so you can better, faster decisions

What will be the outcomes of data trust?

- **Productivity:** Teams will be more efficient/productive as they have access to the data. They need to do their work; they can more easily coordinate with others; and they can respond quicker to events and issues
- **Risk and Dispute Management:** Resolve disputes and avoid issues as there is more access to the same data (i.e., events, project schedule, costs, material quantities/progress)
- **Project Controls:** Keep projects in control as near-real time access to higher quality data for cost and schedule



CONTRUENT

The capital project controls software that's project-ready right out-of-the-box to drive project performance.

Contruent Enterprise

Built by **Project Controls Experts** for Project Controls Professionals



Purpose-built by expert,
experienced
practitioners who do
what you do



Over 25 years of best
practices and
intellectual property
programmed in



Intuitive workflows get
more of your team
involved sooner and more
easily



Harmonize data between
and across projects to
facilitate better decision-
making

To ensure your projects stay
on time and on budget

Contruent Enterprise

Best-in-Class Project Controls Solution



Cost Management
Optimize Project Spend & Performance



Change Management
Account for Change & Maximize Efficiency



Data Insights
Improve Visibility to Make Informed Decisions



Contract Management
Manage Contracts & Contractor Activity

Project Controls Add-Ons

Engineering, Procurement & Field Management
Extended Project & Portfolio Visibility

Integrator
Control Project Spend End-to-End

Estimator
Set Budgets with Quantity Take-off & Estimating

Contruent Enterprise

Faster to Achieve Your Desired Business Outcomes

| Optimize Project Spend & Performance | Improve Visibility to Make Informed Decisions | Manage Change & Maximize Efficiency | Manage Contracts & Contractor Activity |
|---|---|--|---|
| <p data-bbox="333 654 517 758">2%</p> <p data-bbox="236 822 614 986">Reduction of annual spending due to better forecasting and fewer overruns</p> <p data-bbox="285 1015 565 1100">Common Data Environment</p> | <p data-bbox="851 654 1105 758">80%</p> <p data-bbox="754 822 1202 943">Reduction of time spent on data collection, entry and validation</p> <p data-bbox="851 1015 1105 1100">Data Visualization</p> | <p data-bbox="1431 654 1615 758">4%</p> <p data-bbox="1276 822 1778 943">Reduction of contract overspending due to improper change management</p> <p data-bbox="1419 1015 1638 1100">Automated Workflows</p> | <p data-bbox="1989 654 2173 758">1%</p> <p data-bbox="1837 822 2326 943">Reduction of contact spend with better data quality and reliable reporting</p> <p data-bbox="1951 1015 2211 1100">Supply Chain Collaboration</p> |

Contruent Enterprise

Comprehensive Cost Controls Solution for Owners/EPCMs



- Delivers a project controls common data environment for projects/programs and the enterprise
- Deep, lifecycle solution that connects estimating, costs, contracts and field performance
- Project and portfolio data insights and intelligent decision support

Deliver Fastest Time-to-Value



- Easy to deploy and scale with modern SaaS platform
- Easy to use/learn with modern web/mobile user experience
- Self admin and automations
- Open data access with APIs and integrations to connect costs controls to other critical systems

Connect Teams that Own Project/Program Costs and Budget



- Keeping everyone on the same page—cost controls collaboration connecting teams and supply chain
- Understand status, forecast and how to get there with quick data access, forecasting (time phasing) and task management
- Best-in-class change management
- Real-time data access to make faster better decisions



THANK YOU