

INFRASTRUCTURE COST MANAGEMENT IN THE DIGITAL ERA

**DATA-DRIVEN PERSPECTIVE TOWARD ACHIEVING NATIONAL
ECONOMIC DEVELOPMENT**

A LECTURE DELIVERED BY

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30TH BIENNIAL CONFERENCE & ANNUAL GENERAL MEETING

**THEME: INTEGRATED COST MANAGEMENT SOLUTION FOR SUSTAINABLE
INFRASTRUCTURE PROJECT DELIVERY**

ORGANISED BY

NIGERIAN INSTITUTE OF QUANTITY SURVEYORS

21ST – 25TH NOVEMBER 2023



PRESENTATION OUTLINE

- Infrastructure Landscape
- Cost Management
- Data and Construction 4.0
- Data in Cost Management
- Conclusion





INFRASTRUCTURE LANDSCAPE ...

INFRASTRUCTURE LANDSCAPE.....

- There is a massive deficit in infrastructure globally
- In Nigeria about \$2 trillion is required annually over a period of 25 years to bridge this gap ...
- A budgetary provision of N1.24 trillion was made in the 2023 budget to cover for infrastructure



INFRASTRUCTURE LANDSCAPE.....

- **Sadly, projects are poorly delivered**, though there are pockets of excellent deliveries. **This is the case in most developing economies.**
- Several efforts are made toward improving the industry's performance e.g. re-engineering/thinking: philosophy, laws, delivery systems, etc.
- **Cost management plays a central role in project delivery. What do you think?**



PROJECT DELIVERY.....

- **Cost management ~~has been in~~ is the eye of the storm in most poorly delivered infrastructure projects.**
- **Cost overrun due to inaccurate estimate**
- **Lets take a look at some examples. ...**



PROJECT DELIVERY.....

- Berlin Brandenburg Airport: €2.8b – over €7.0b. Opened 2011, 2020
- Big Dig (Boston USA): \$2.4b - \$15b. 1991 – 2007
- Channel Tunnel (UK/France): £4.65b – over £9b. 1988 – 1994
- High Speed 2 (HS2) Rail Project UK: £55.7b in 2009 – £180b in 2023
- Eko Atlantic City (Nigeria): \$6b. Started 2009 -

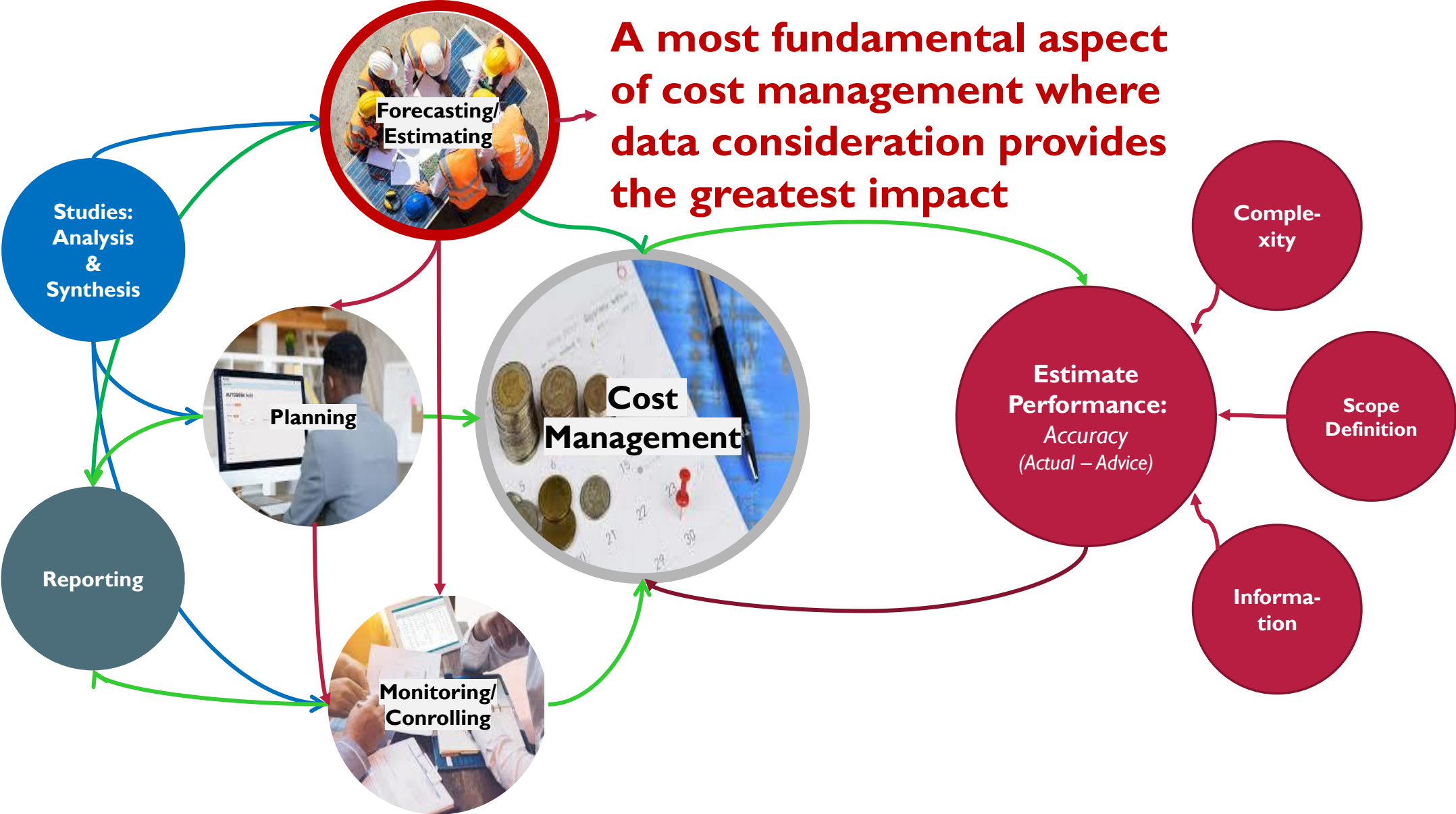




COST MANAGEMENT ...

COST MANAGEMENT

A most fundamental aspect of cost management where data consideration provides the greatest impact



COST MANAGEMENT

Cost Management Application



Client Organisations

Managing cost for the client relative to her organisational goals and objectives



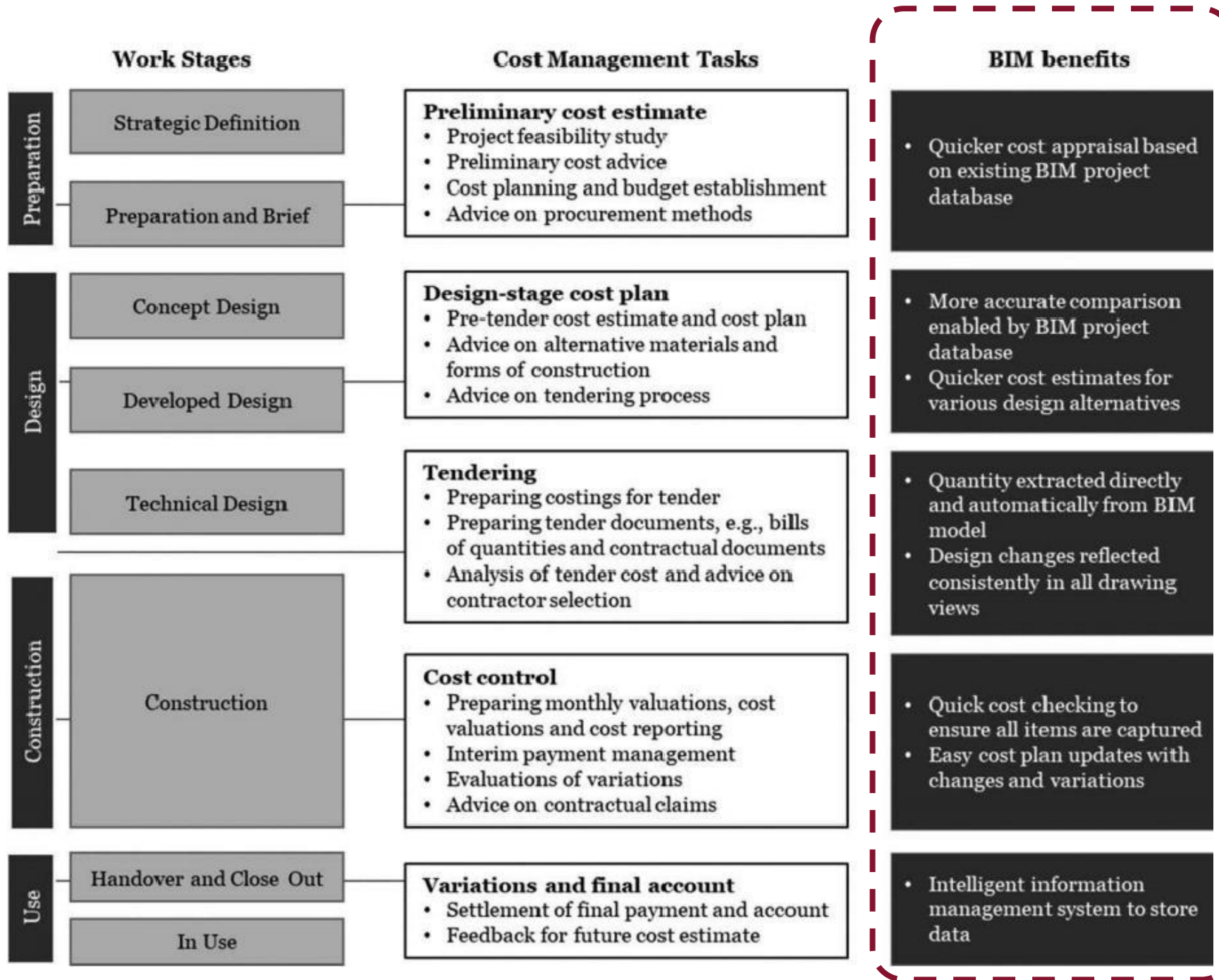
Contractor Organisations

Managing cost for the contractor relative to her organisational goals and objectives



Project Organisations

Managing cost relative to project goals and objectives from either **client's** or contractor's perspective



Current drawbacks

- Lacks data capabilities of introspectively informing design
- Data capabilities are mostly suitable for visualization, analysis and synthesis of current design

DATA IN CONSTRUCTION

DATA IN CONSTRUCTION



Knowledge

Information/facts that is known, providing insight about an entity and leading to call for action

Information

Facts provided about an entity e.g. drawings, BOQs, schedules, price books, specifications etc

DATA IN CONSTRUCTION

Wisdom

Expert knowledge that permits exceptional insight, judgement, advice about complex and uncertain matters

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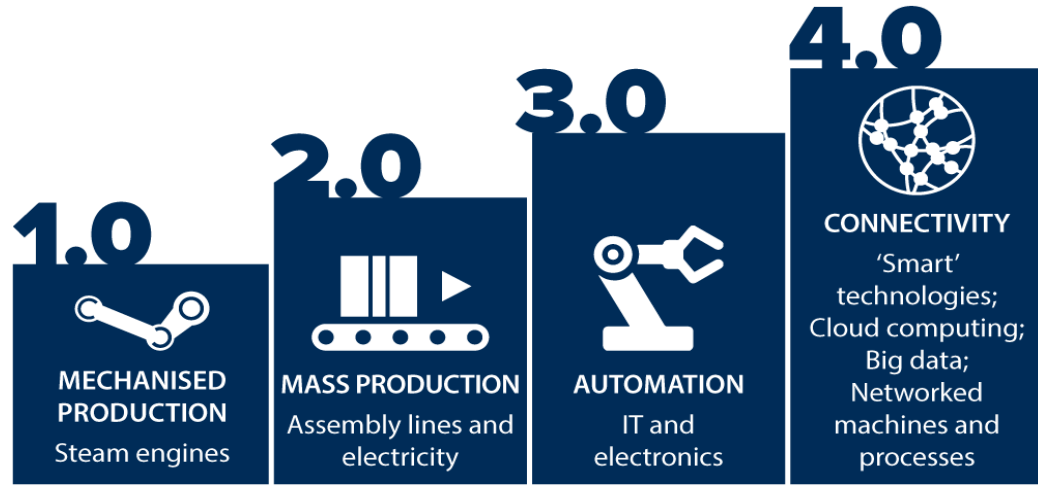
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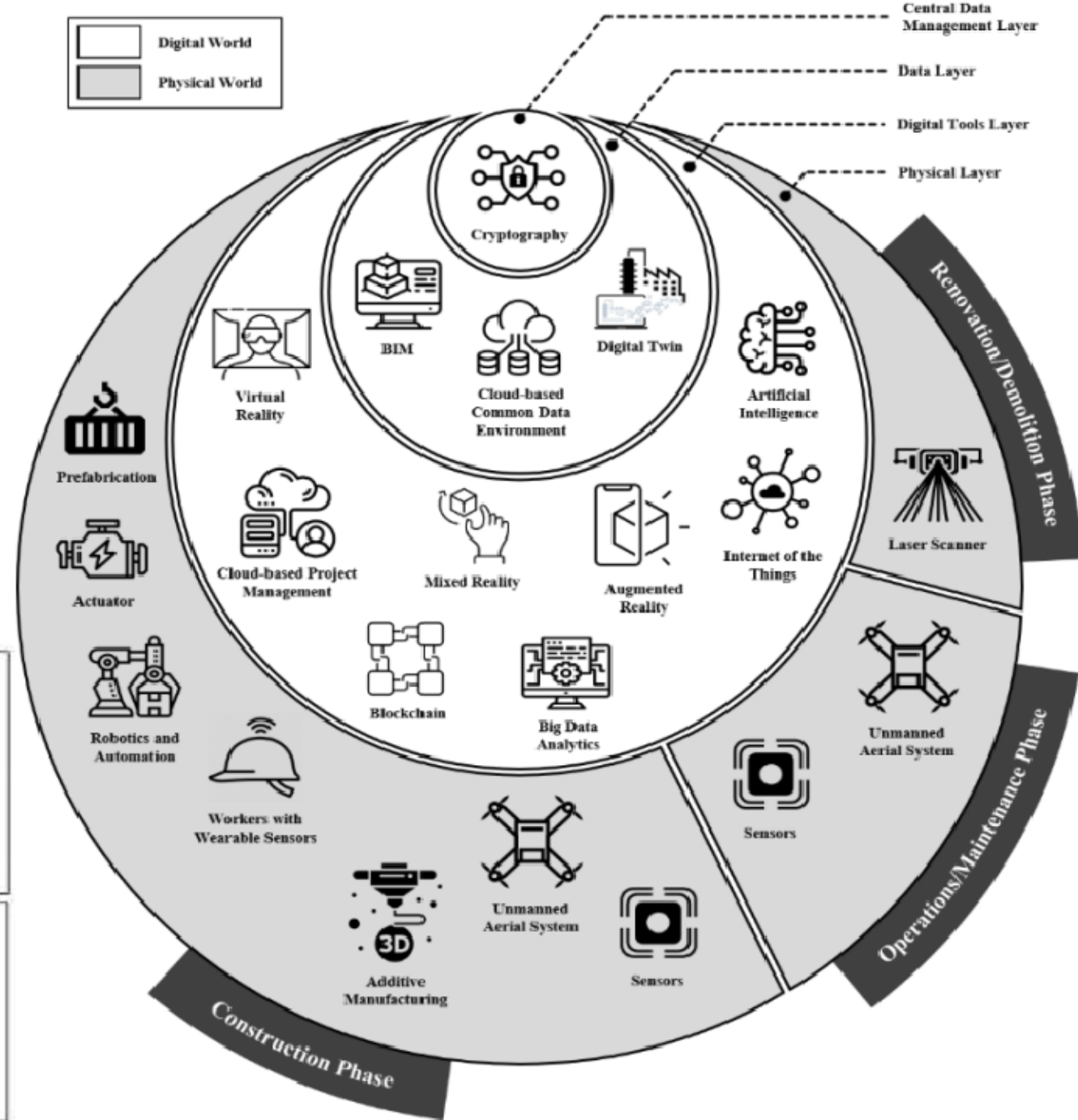
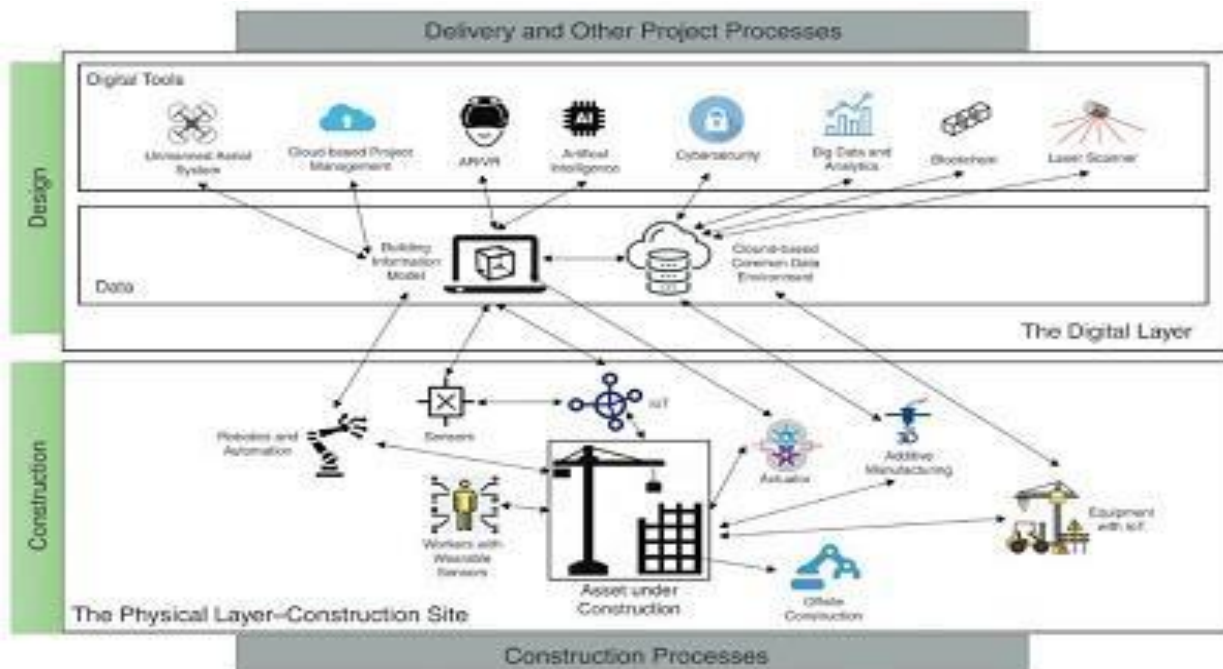
Data

The smallest unit of fact about an entity e.g. wall – material, length, thickness etc that has been stored for future use

THE DIGITAL ERA...

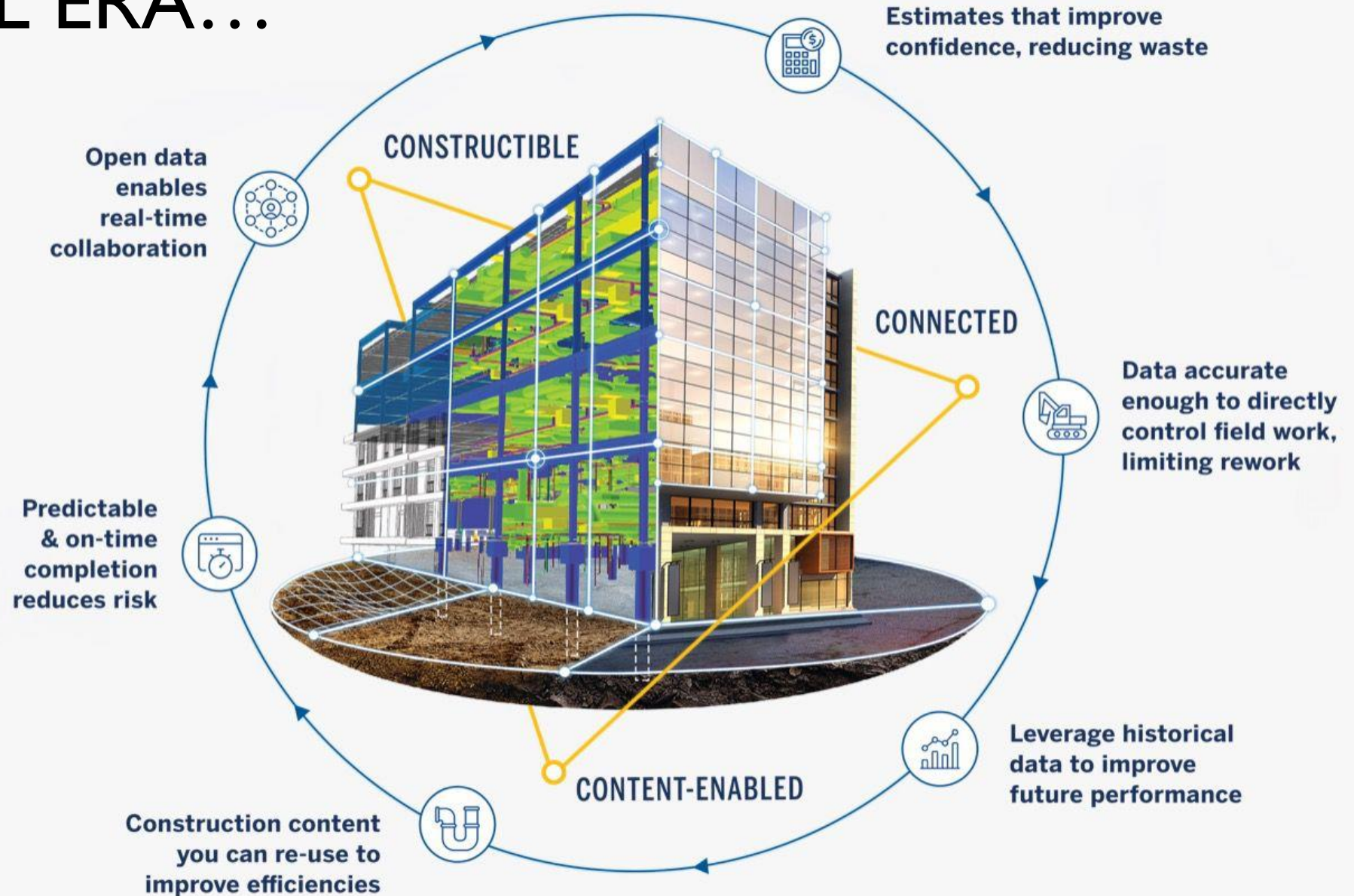


The stages of industrial development
Source: Oxford Analytica

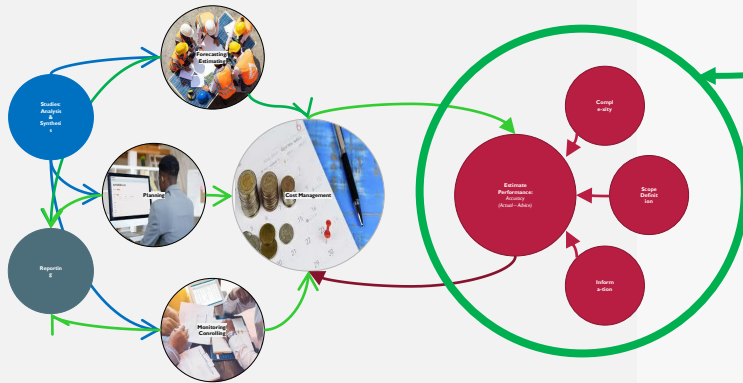


Use of Construction 4.0 Digital...

THE DIGITAL ERA...

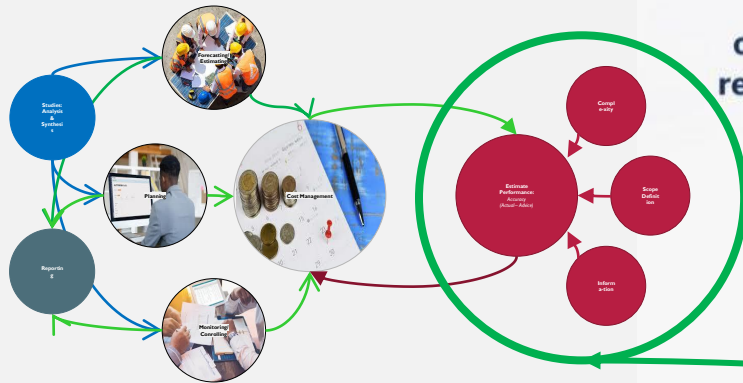


THE DIGITAL ERA...



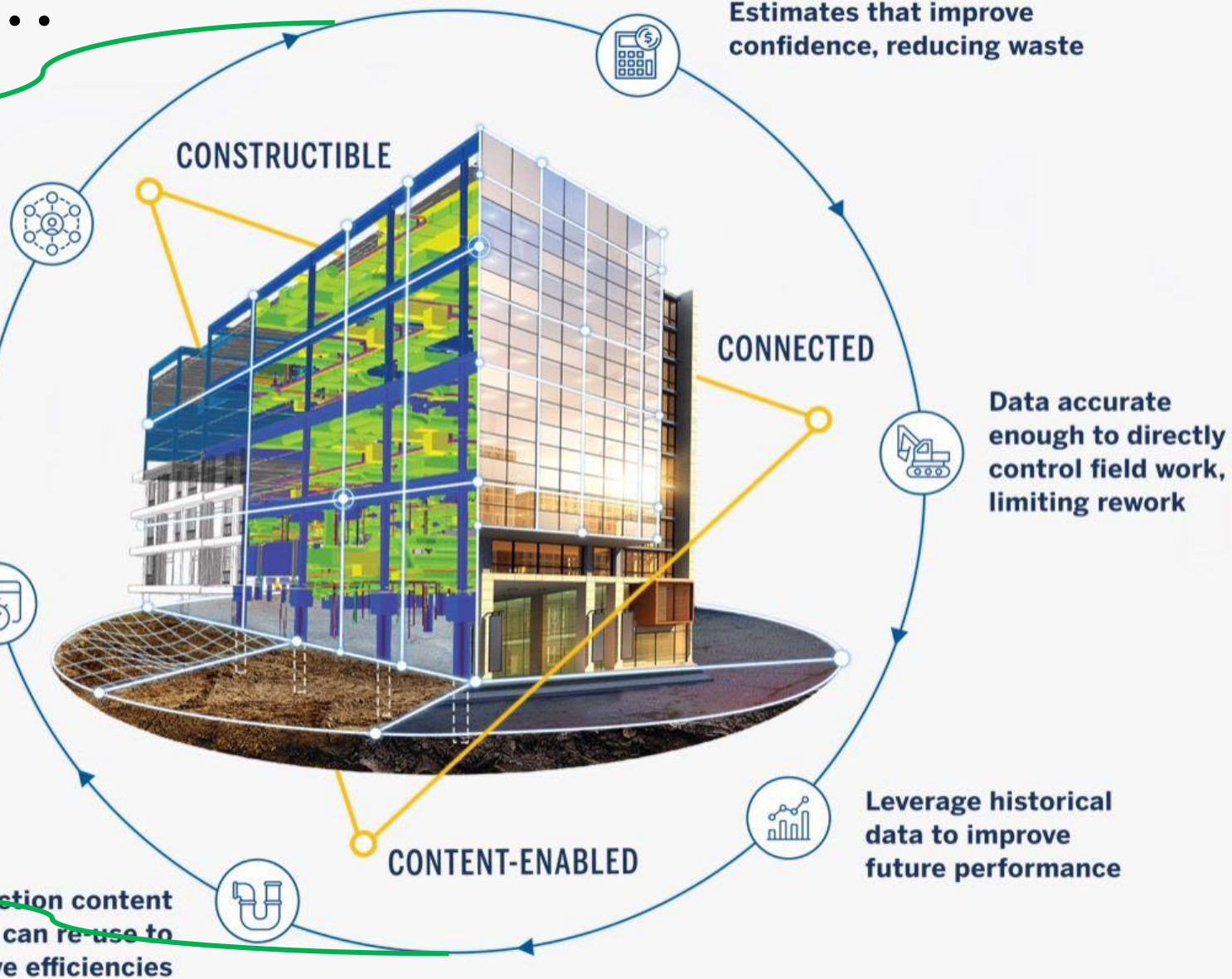
Open data enables real-time collaboration

Data is the key toward improving estimate performance



Predictable & on-time completion reduces risk

Construction content you can re-use to improve efficiencies



THE DIGITAL ERA...



DATA IN COST MANAGEMENT

DATA IN COST MANAGEMENT

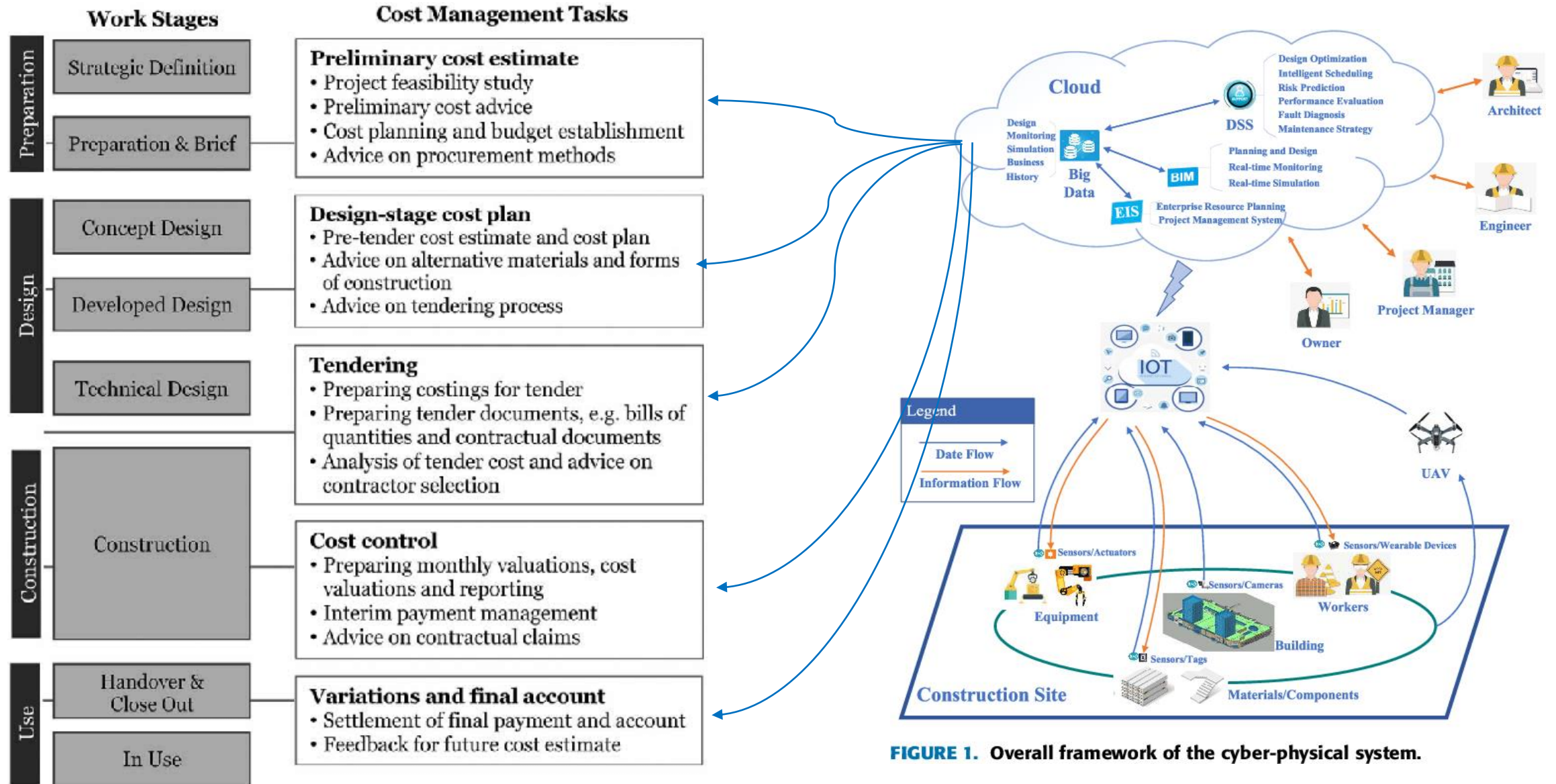


FIGURE 1. Overall framework of the cyber-physical system.

DATA IN COST MANAGEMENT

Companies can create an analytics strategy that generates value.

Advantage vs effort matrix



¹Includes machine learning (supervised and unsupervised), artificial intelligence, and deep learning.

Big Data Analytics

Data Assets
OLTP / OLAP
Unstructured Data
Machine / Sensor Data
Social Media
Third-Party Sources

Analytics Layer			
Data Visualization	Advanced Statistics	Predictive Analytics	Machine Learning

Big Data Management		
Big Data Integration	Big Data Governance	Big Data Security
<ul style="list-style-type: none"> High-Performance Ingestion Scalable and Optimized Processing Flexible Deployment 	<ul style="list-style-type: none"> Data Quality & Self-Service Data Prep End-to-End Data Lineage Data Matching & Relationship Discovery 	<ul style="list-style-type: none"> 360 View of Sensitive Data Risk Analytics of Sensitive Data Policy-Based Protection of Sensitive Data

Universal Metadata Catalog

Big Data Storage & Processing		
Hadoop	MPP	NoSQL

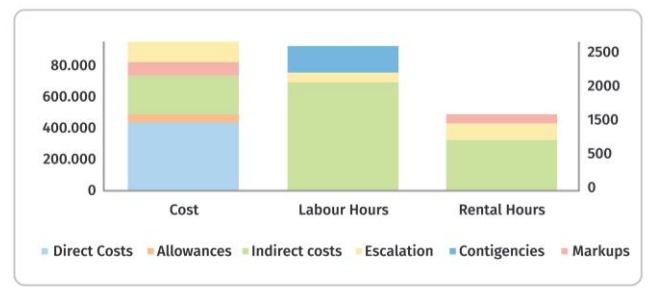
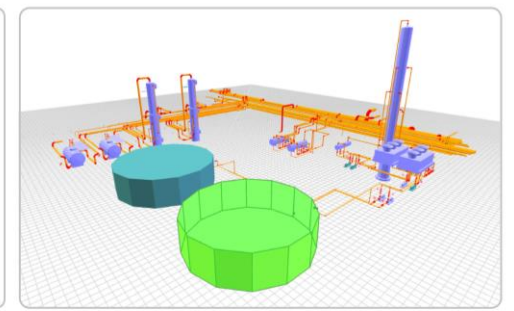
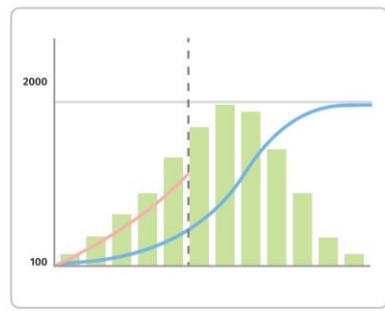
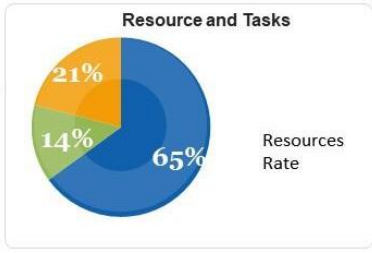
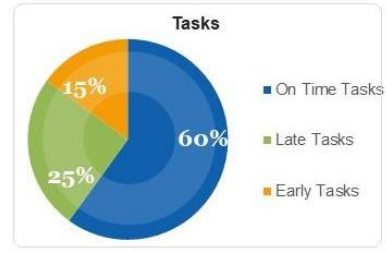
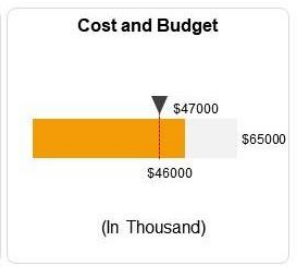
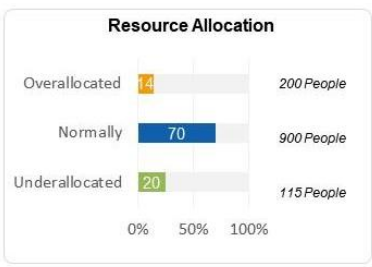
Data Products
Customer Engagement
Fraud Detection
Campaign Effectiveness
Predictive Maintenance
Location-Based Services

COST MONITORING – DASHBOARD



Project Summary

PROJECT MANAGER	
START	
FINISH	2018-04-04
DURATION	287 day(S)
COMPLETE	42%
BUDGET	\$62 600,00
GOA	Open Black sea port in 2018



Work Pack Management Overview

Work Pack Filter: All | Execution Team Filter: All

10 Total Number of Work Packs
 11 Total Number of Scope Items
 382 Total Number of Planning Tasks
 330 Total Number of Activities

Activity Progress in %: 55

Upcoming Activities

ActivityStartDate	Title of Activities
28-9-2021	Place Scaffolding (A001)
6-10-2021	Place Scaffolding (A001)
12-10-2021	Place Scaffolding (A001)
18-10-2021	Place Scaffolding (A001)
21-10-2021	Prefab Piping (A001)
26-10-2021	Place Scaffolding (A001)
27-10-2021	Acceptance Prefab By Inspection (A007)
27-10-2021	Acceptance Prefab By Inspection (A007)
28-10-2021	Prepare treating Air/N2/Water
28-10-2021	Acceptance Prefab By Inspection (A007)

Planned Labour Hours by ExecutionTeam

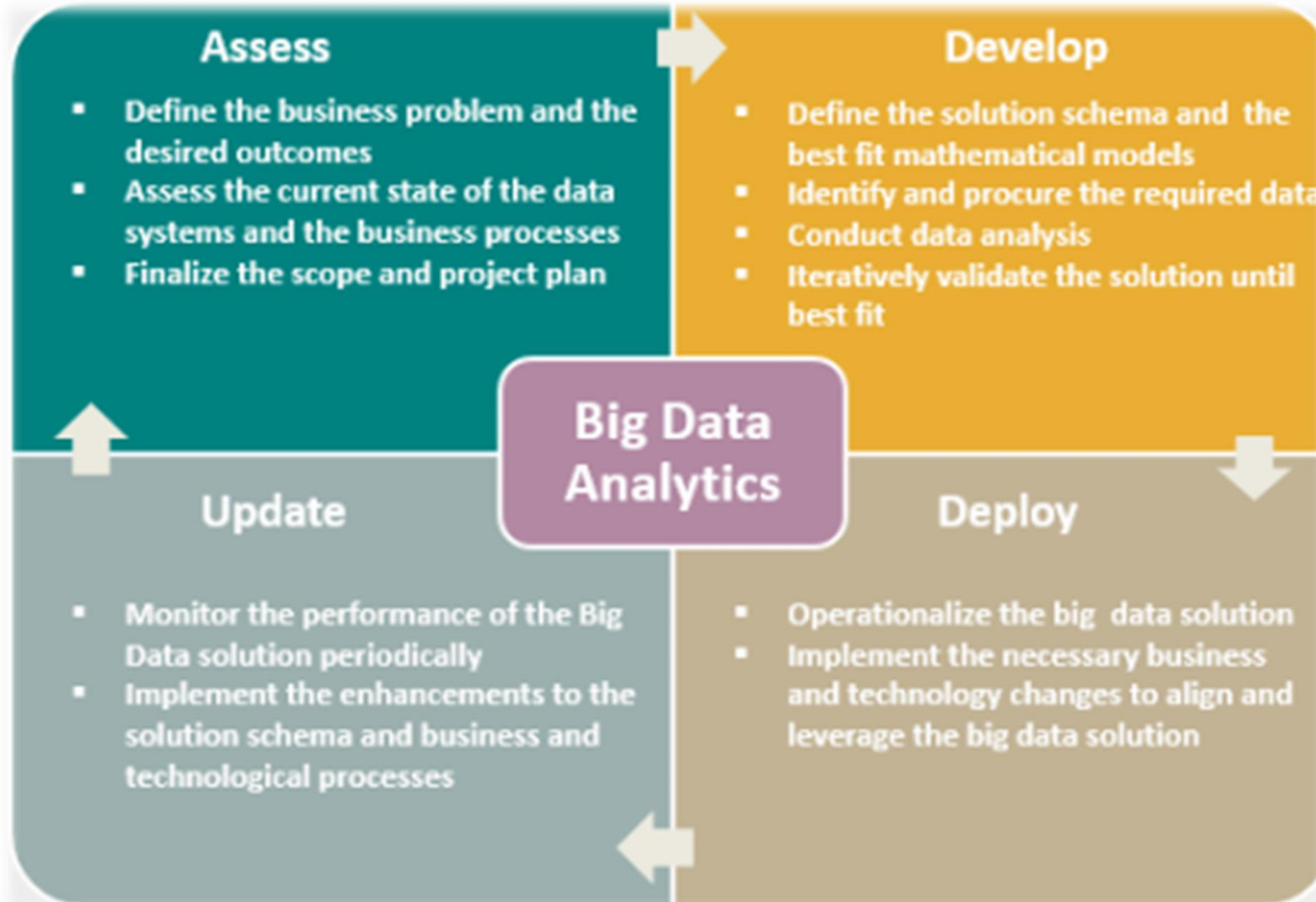
61 (10.45%)
 195.5 (11.04%)
 206.41 (15.05%)
 892.51 (50.41%)
 355 (20.05%)

ExecutionTeam: Mechanical contractor B, Scaffolding contractor, Mechanical contractor A, Tracing contractor, Owner QA/QC

BIG DATA FOR COST MGT - CHALLENGES



BIG DATA FOR COST MGT - SOLUTIONS



CONCLUDING REMARKS

- **We are indeed a blessed profession!** We hold the crucial key to solving the industry's perennial problem – Cost Overrun.
- **Measurement is our life wire!** We are a resilient profession. Let's sustain it by harnessing technology toward a data driven agenda in managing cost of infrastructure.
- **We can improve on our economic development!** By harnessing the powers of Big Data, we can potentially double financial capacities to undertake more infrastructure projects.
- **Together we can! – the Industry, Profession, NIQS, You and I**

THANK YOU...

