



DIGITALISATION IN CONSTRUCTION

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cidb SACI | 12/09/2024

CONTENT OF PRESENTATION



- Background – Industrial Revolutions
- The need for digitalisation
- The science of digitalisation
- Digital construction
- The possibilities
- Way forward



Disclaimer: MY BIM FIELDS

The person: (the need)

- Construction Manager
- Lecturer, Researcher: UCT, SCUBE, CBPM
- BIM Community Africa – member in Excellent Standing 😊
- Digitalisation Enthusiast & Activist
- Rural and township developer
- Small/emerging business developer

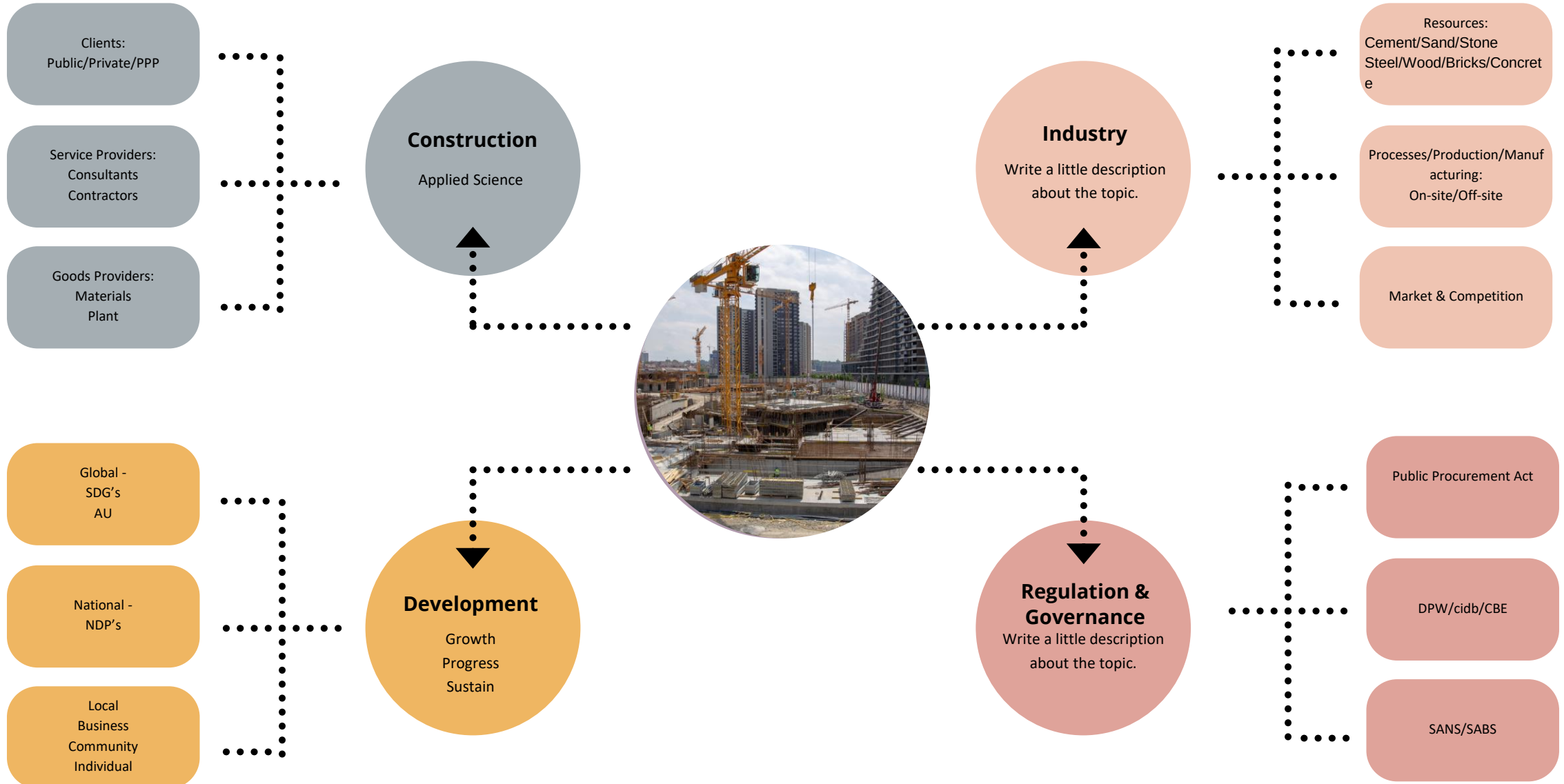
The process: (the solutions)

- Engagement, collaboration
- Research, co-creation
- Continuous improvement –
 - optimum efficiency, modelling
- Innovation
- Compliance, governance

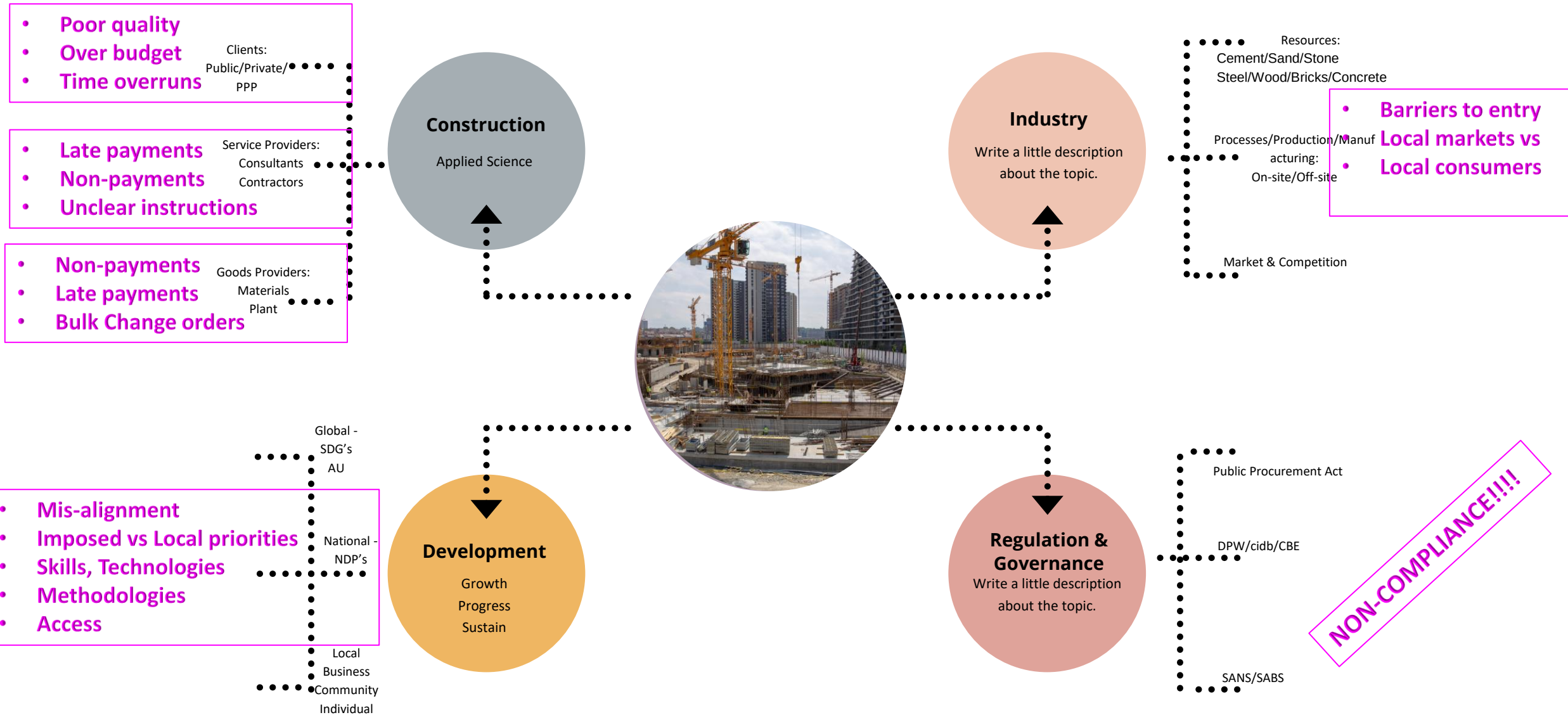
The tech (enabler):

- Tools; Platforms; “Solutions”/Applications: Infrastructure

Construction Industry Development



Construction Industry Development – the challenges

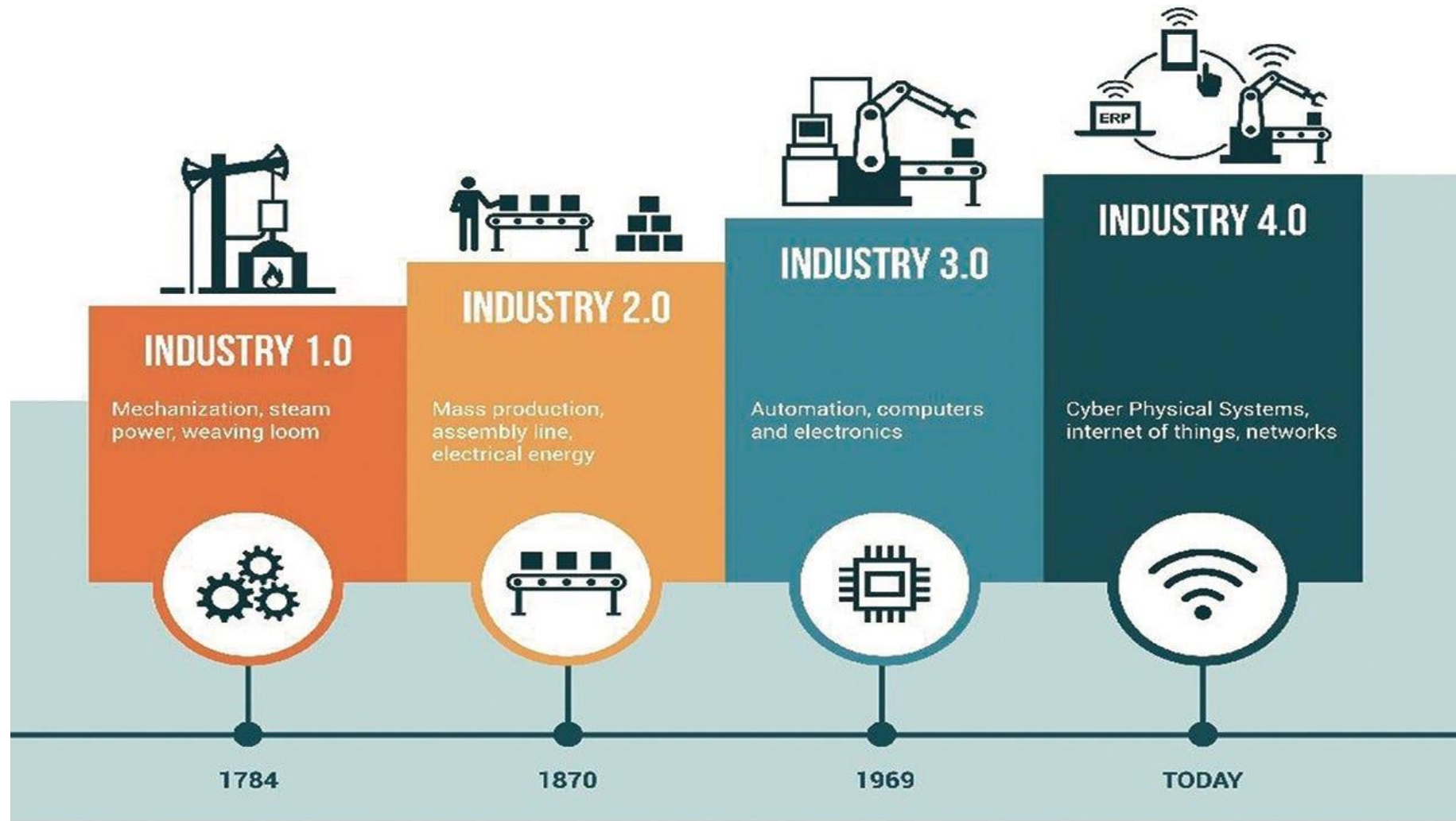




Seeking Science for Solutions

Digital transformation

The Industrial Revolutions – MAJOR CHANGES



Digitalisation as a science



- Digitalization as a science involves the systematic study of how digital technologies transform
 - data,
 - processes,
 - and structures
- across various domains,
 - business,
 - society,
 - and industry.
- It draws on theories and principles from
 - information science,
 - systems theory,
 - management science,
 - and technology innovation

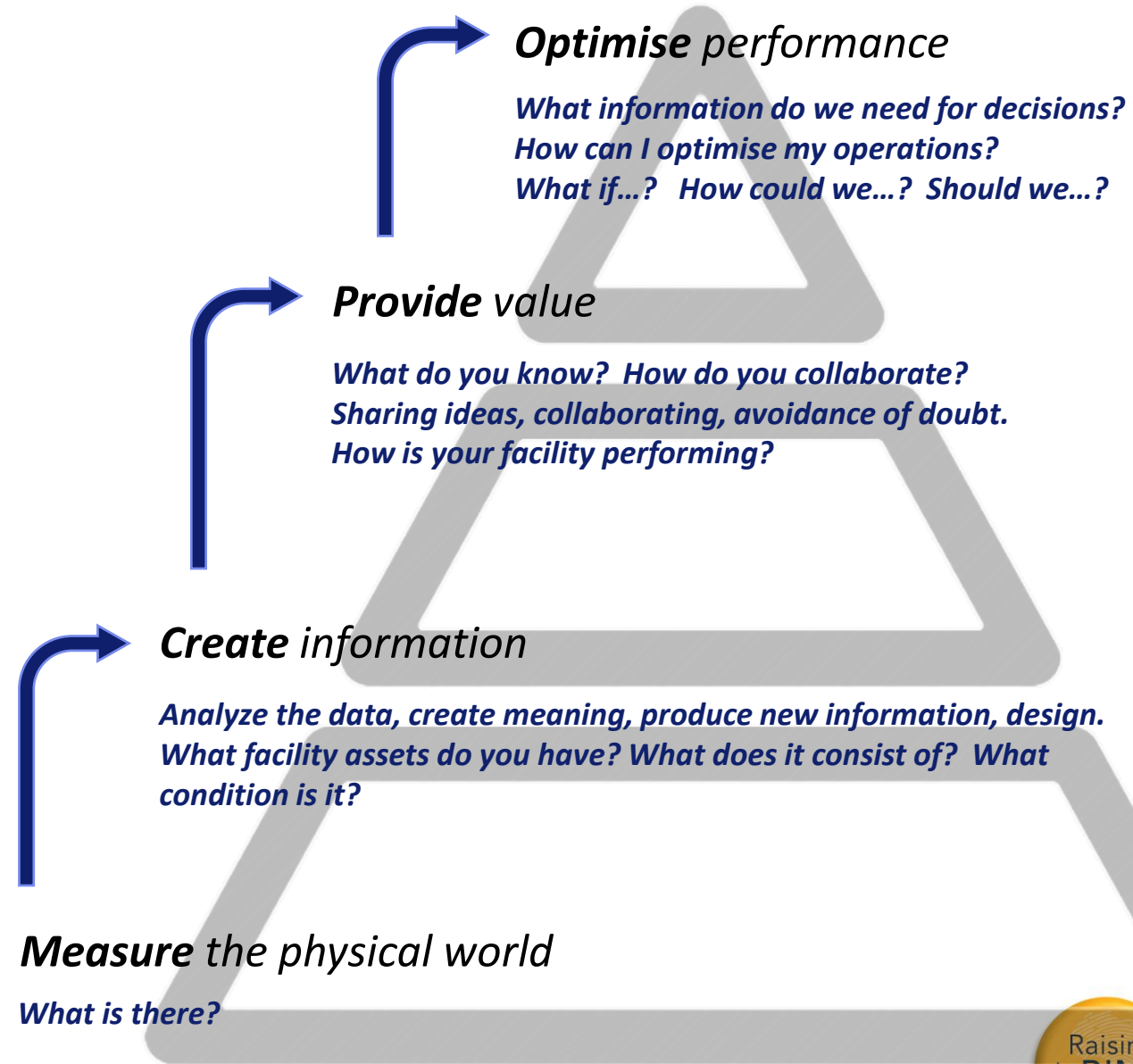
What do we seek from digitalisation?

~~WISDOM~~ *Intelligence*
Derive & Attain

KNOWLEDGE
Interpret

INFO
Process / synthesise

DATA
Collect



Key Theories/Principles in Digitalisation



- Information Theory – quantification, error correction, transmission – communication
 - Systems Theory – control systems, feedback loops, regulation mechanisms
 - Socio-technical systems – technology and social structures, environments, behaviour
 - Diffusion of innovations - rate of spread/use of technologies
 - Platform theory – exchanges, networks, cloud computing, e-commerce, e-governance
 - Digital Twin – enables real-time monitoring, simulation, optimisation
-
- Automation
 - Integration
 - Data integrity
 - Interoperability
 - Security and privacy
- Digital eco-systems

Digital Construction – the science

A. Amin Ranjbar et al.

Journal of Building Engineering 44 (2021) 103341

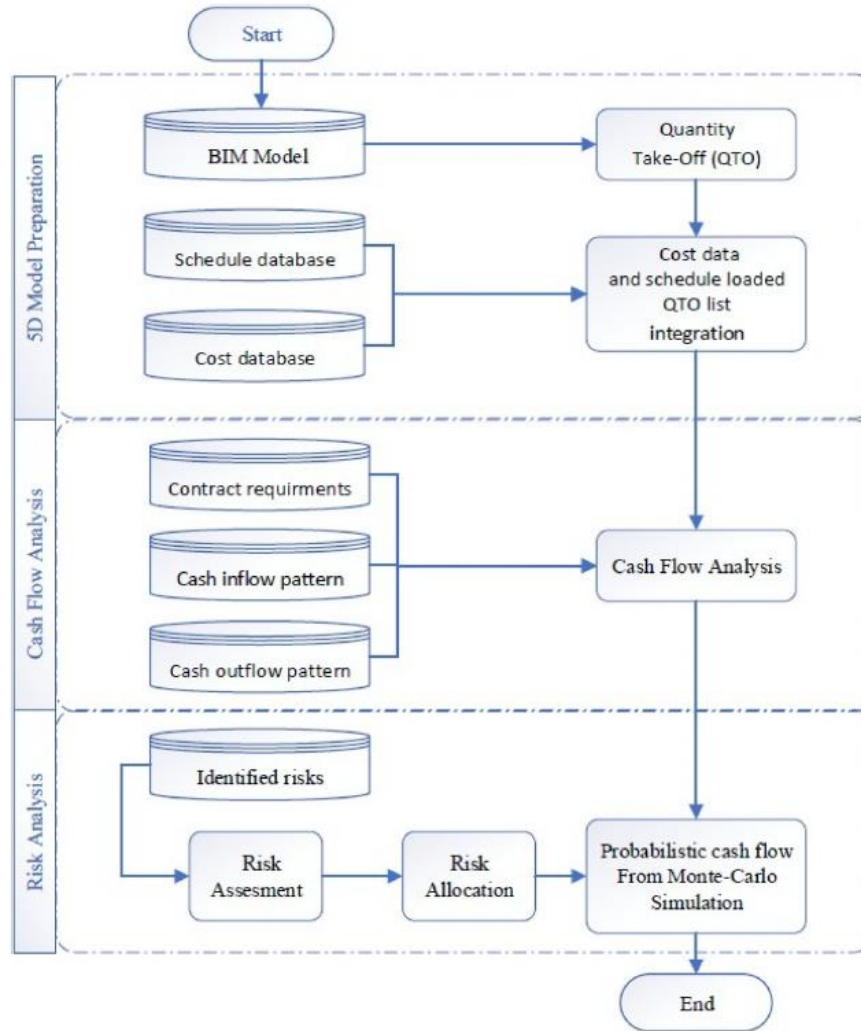
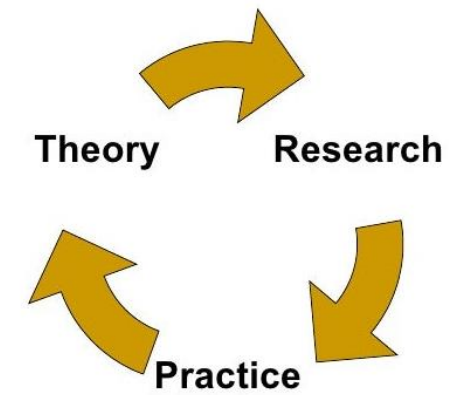
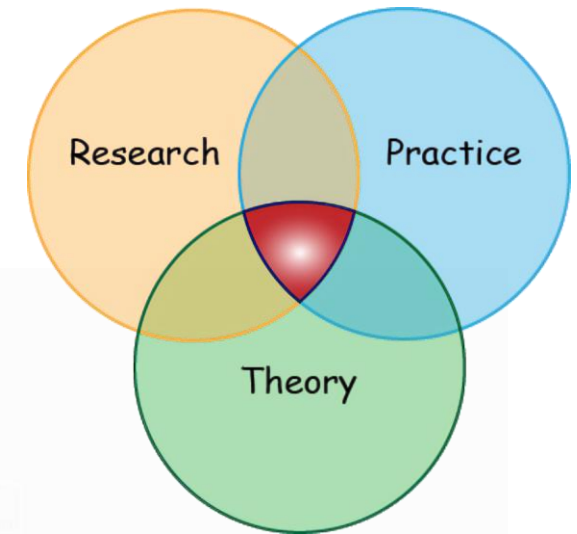
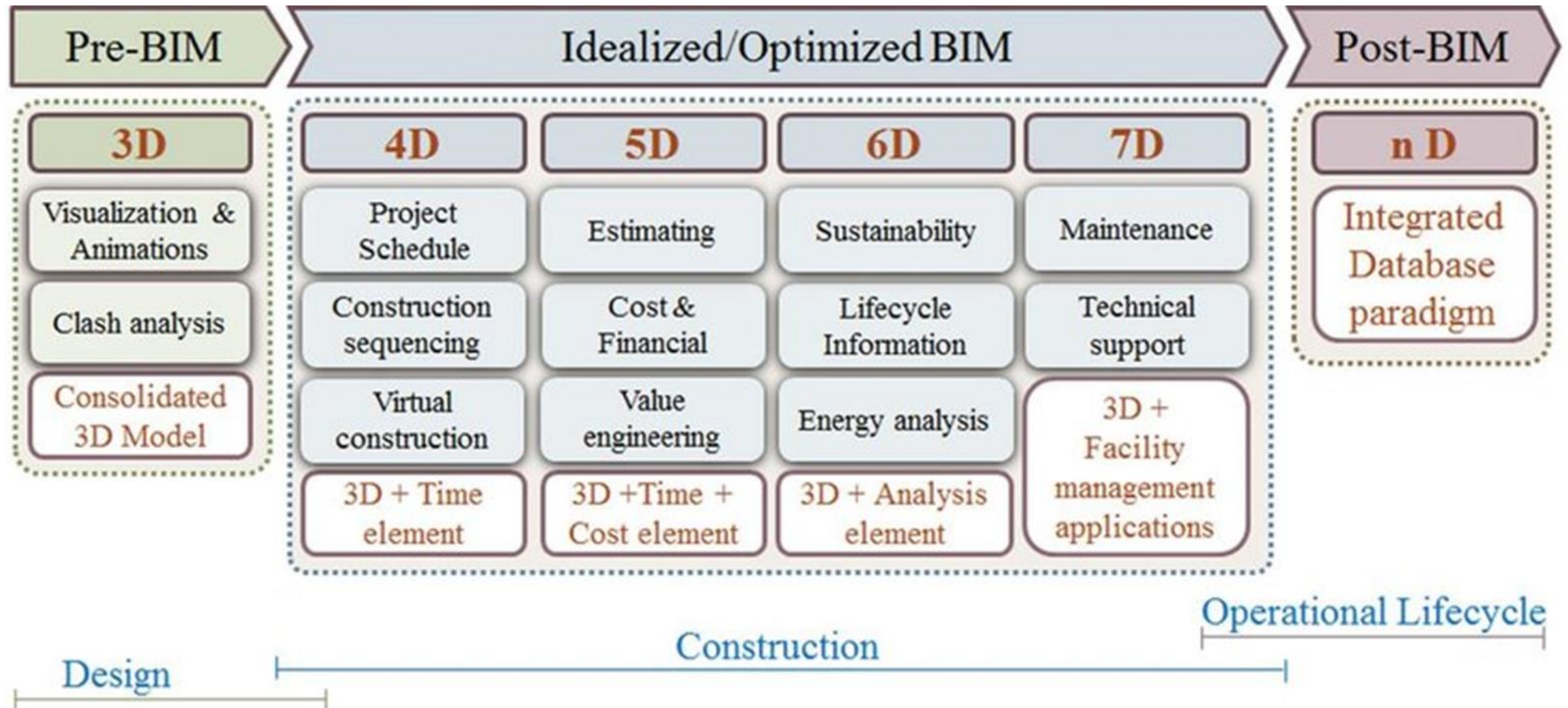


Fig. 1. The proposed cash flow risk analysis framework.



BIM nD terminology through the building's lifecycle



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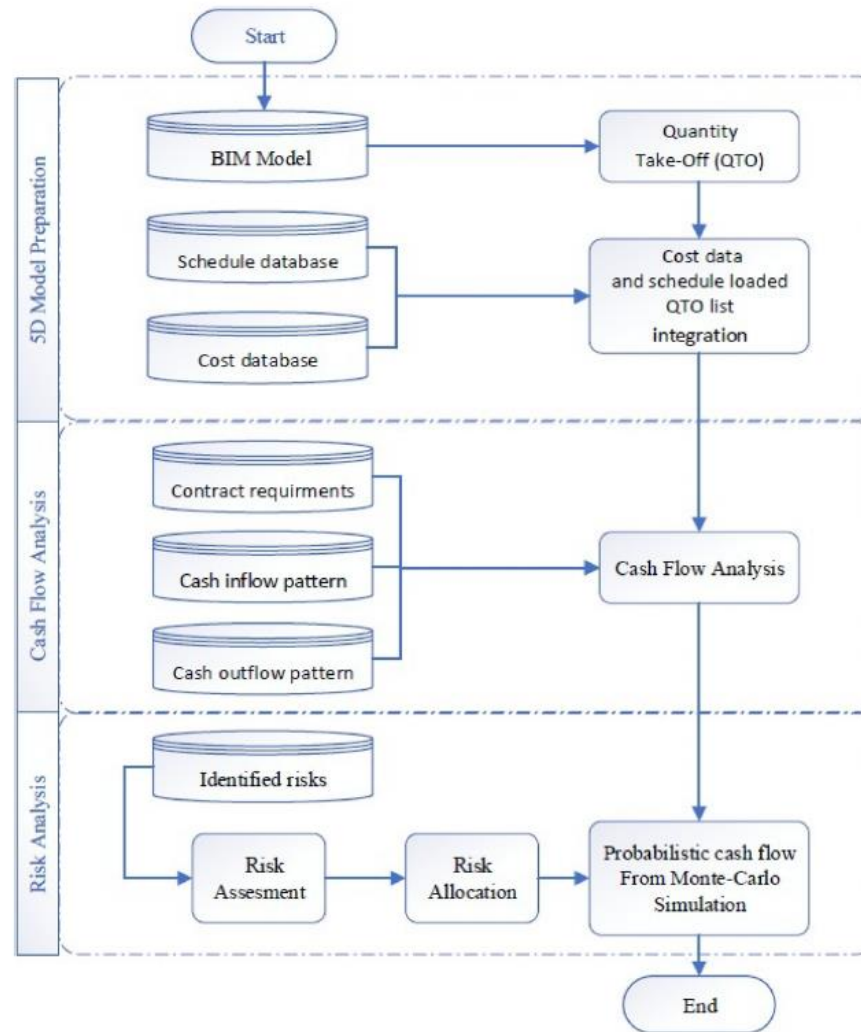


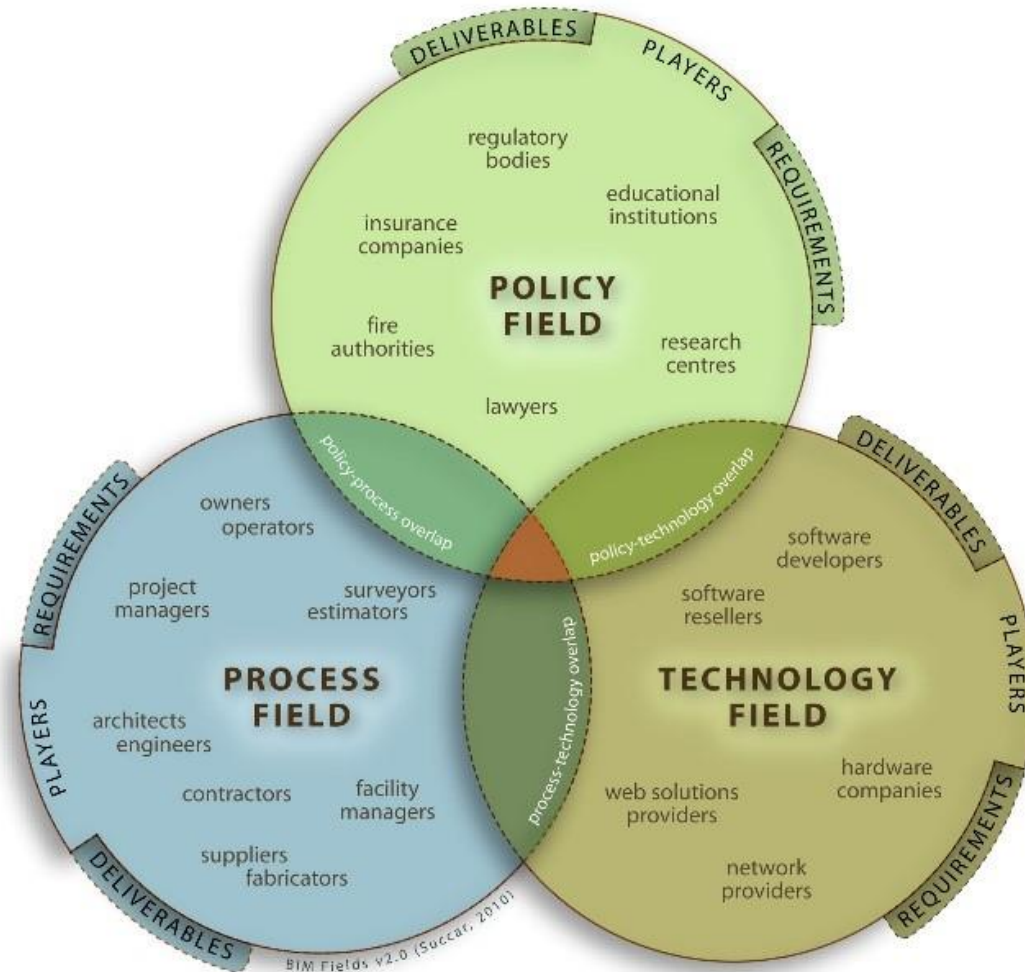
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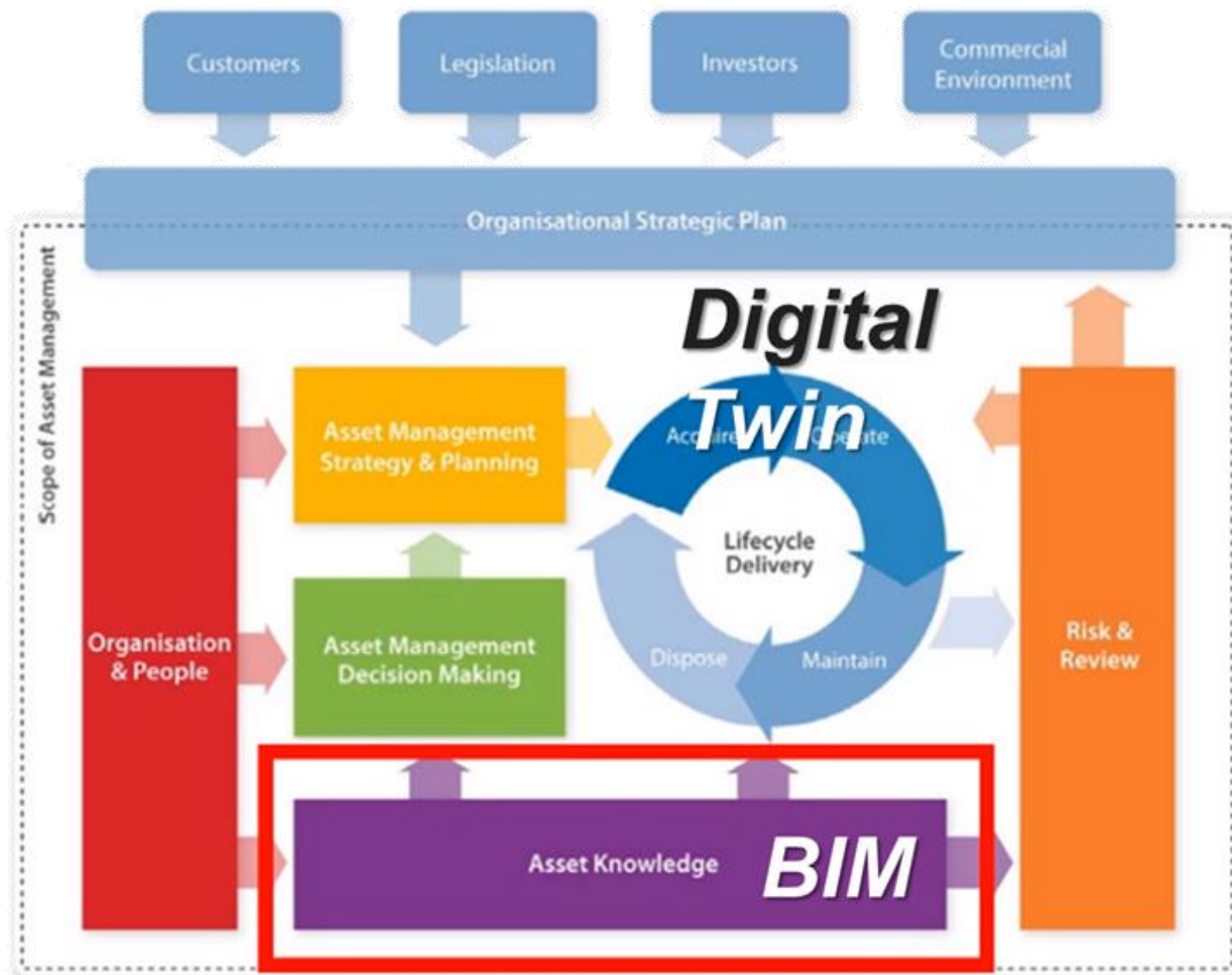


Fig. 2. The case project model.

Digital Construction – Eco-System

BIM: who's business is it anyway?





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ISO19650 - Standard and Guidance Digital / BIM information management



Based on the BS1192 series

ISO 19650 in a nutshell

- Define agreed information objectives (owner, operator, employer)
- Integrate the information objectives into the planning and procurement stages
- Plan and execute the project and create the digital deliverables and construct the physical assets simultaneously
- Commission and handover BOTH the physical and the virtual assets.



Lifecycle Optimisation

Owner, Consultants

CAPEX stage to OPEX Stage

The changing players

Facilities Management

FM Contractor

Occupation and
Operations

*Owner, Operator
Tenants*

TRANSITION

Commissioning

*Main Contractor + subbies
Principal Agent
Engineering Consultant*

Construction

*Main Contractor + subbies
Principal Agent
Engineering Consultant*

Procurement

Planning

Architects, Planners

Conceptual Design

*Architects,
Engineers*

Design and Engineering

*Owner's Procurement
Professional Team*

Change Management

Information Standards

Cost models

Organisation KPIs

Sustainability goals

Predictive Maintenance

Project requirements

Energy Performance Certification

Maintenance schedules

Project planning

What information do you need??

Asset Registers

ESG reporting

Engineering specifications

Knowledge Management

Facilities management

Enterprise management



TECHNOLOGY FIELD: “THE TOOLS”



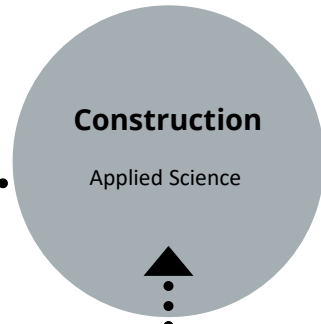
Construction Industry Development – the possibilities

- Poor quality
 - Over budget
 - Time overruns
- Clients:
Public/Private/
PPP

- Late payments
 - Non-payments
 - Unclear instructions
- Service Providers:
Consultants
Contractors

- Non-payments
 - Late payments
 - Bulk Change orders
- Goods Providers:
Materials
Plant

- Mis-alignment
 - Imposed vs Local priorities
 - Skills, Technologies
 - Methodologies
 - Access
- Global -
SDG's
AU
- National -
NDP's
- Local
Business
Community
Individual



- Resources:
Cement/Sand/Stone
Steel/Wood/Bricks/Concrete
- Processes/Production/Manufacturing:
On-site/Off-site
- Market & Competition

- Barriers to entry
- Local markets vs Local consumers

- Public Procurement Act
- DPW/cidb/CBE
- SANS/SABS

NON-COMPLIANCE!!!!

Construction Industry Development – Integrated way forward



Thank you
Enkosi
Baie Dankie

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