
27 July 2023

Welcome to

# The Future of Work

## Building Information Modelling

BIM Harambee .Africa

# General Arrangements

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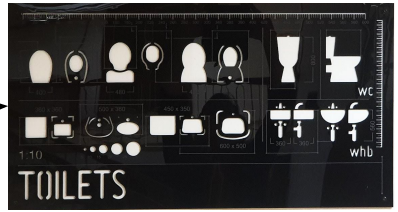
# General Arrangements

## Coffee and refreshments (cash)

- **Artisans** coffee stand outside Lecture Room 3-3
- **Vida-E Cafe** in the basement/courtyard
- **5 minute walk** to Artisan and Pure Cafe restaurants on campus - ask Boukunde students for directions!

## Restrooms

- **Unisex restrooms @** opposite side of lecture rooms next to architecture studios, on every floor




## Emergency Exit

- **Ground** and **Basement @** north, east and west of building.

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**Youtube Live Stream**

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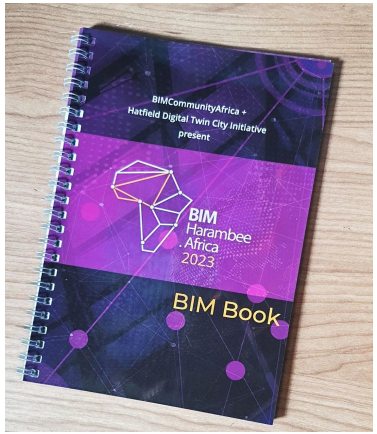
# POPIA

THIS SESSION IS BEING RECORDED

# 2 Day BIMHarambee Event

Department of Architecture, Boukunde, University of Pretoria




## Thursday 27 July

Active learning and on-site demonstrations at Boukunde for all.

**Morning Session | 09:00 - 11:30**

- *What is BIM? No, really?*

**Afternoon Session | 11:45 - 16:45**

- *Live tech demos on Boukunde*
- *BIM Scavenger Hunt*
- *Direct engagement with industry*

## Friday 28 July

Student, Young Professional, and Educator focussed learning sessions.

**Morning Session | 09:00 - 11:30**

- *AECO Student + Young Professional Session*

**Afternoon Session | 12:30 - 15:00**

- *AECO Educator Session*
- *Teaching Case Study: BIM for Circularity*
- *Student exhibition on ground floor.*

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# Thursday

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# Thursday 27 July - Seeing is believing day!

**Morning Session**
09:00 - 11:30

## Real-World BIM learning from the industry experts!

Follow a real BIM process throughout the day, live at Boukunde!

*why* and *what-for* of the BIM project space.

What is BIM thinking, processes, or workflows, and what matters most to whom in the built environment.

**Afternoon Session**
11:45 - 16:45

## Live Scan-to-BIM Technologies of Boukunde

We will demonstrate a live scan-to-BIM technologies of Boukunde — your living laboratory!

## Boukunde BIM Scavenger Hunt - Yes, Prizes!

In the BIM spirit, we will have a Boukunde BIM Scavenger Hunt!
Using the Boukunde models, mobile devices, and digital assets, can you find the clues and win the prize?

## Engage with your industry and peers — ask them questions!

There are student research posters on ground floor and in the Digital Crit Room in the basement!

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# Friday

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# Friday 28 July - My BIM Journey

## AECO Student + Young Professional Session

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| | | |
|---|---|---|
| **09:00** | **SAPOA PropTech in South Africa**<br>The future of the SA property market through technology: how the real estate sector is engaging technology to bring the built environment into a digital age and delivering a range of positive outcomes for stakeholders. | **Matthew Marshall**<br>SAPOA PropTech Committee |
| **09:15** | **What is BIM? No, really?**<br>BIM workflows, core concepts and definitions | **Machiel Odendaal**<br>Technology Manager,<br>Modena AEC and Infrastructure |
| **09:30** | **Boukunde Live-BIM**<br>Outcomes from the live scan-to-BIM of Boukunde and connecting to how BIM is the future of building. | **Richard Matchett**<br>Digital Lead, Zutari |
| | **15 mins comfort break** | |
| **10:30** | **State of the South African Digital Built Environment**<br>Before we “smart city,” we need to BIM. Current environment and possibilities<br>BIM Mandate and ISO 19650 (with National Annex) | **Richard Matchett**<br>**Rudd van Deventer**<br>Director, Spaceworx |
| **11:00** | **What opportunities are there for BIM Professionals?**<br>How do I start my BIM journey as a young professional? | **Shameemah Davids**<br>Digital Lead - Europe, AECOM |
| **11:30** | **Q & A with industry professionals** | **All speakers** |

# Friday 28 July - My BIM Journey

## AECO Educators, Lectures, & Professionals Session

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| | | |
|---|---|---|
| 12:30 | **SAPOA PropTech in South Africa**<br>The future of the SA property market through technology: how the real estate sector is engaging technology to bring the built environment into a digital age and delivering a range of positive outcomes for stakeholders. | **Matthew Marshall**<br>SAPOA PropTech Committee |
| 12:45 | **What is BIM? No, really?**<br>BIM workflows, core concepts and definitions and important issues for educators. | **Suvaniya Pillay**<br>BIM Specialist, Baker Baynes |
| 13:00 | **Boukunde Live-BIM**<br>Outcomes from the live scan-to-BIM of Boukunde and connecting to how BIM is the future of building. | **Richard Matchett**<br>Digital Lead, Zutari |
| | **10 mins comfort break** | |
| 13:30 | **State of the South African Digital Built Environment**<br>Before we "smart city," we need to BIM. Current environment and possibilities<br>BIM Mandate and ISO 19650 (with National Annex) | **Richard Matchett**<br>**Rudd van Deventer**<br>Director, Spaceworx |
| 14:00 | **Teaching Case Study: BIM for Circularity, University of Pretoria**<br>Education case study from the built environment postgraduate research unit. | **Calayde Davey,** Architecture<br>**Helene Potgieter,** HPA<br>**Johann vd Merwe,** Structural |
| 14:45 | **What must graduates be able to do in the professional environment?**<br>Skill sets and learnings for interdisciplinary built environment works. | **Gary Mansfield**<br>Digital Innovation Lead, CKR |
| 15:05 | **Q & A with industry professionals** | **All speakers** |

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# Our legacy through building

Image Credit: Davey, adapted from Sam Rohn (22 February, 2016)

How many buildings are there in the world?

# 100 Billion Buildings in the World

of all types and sizes in the world.

This number includes **everything** —
from **huts to high-rises.**

The vast majority of buildings are located in Asia and

# Africa

Image Credit: Davey, adapted from Sam Rohn (22 February, 2016)

One Nine Elms Construction (Sep 24, 2022)


The global building stock will exceed
183 Billion
Square Meters in 2026
Navigant Research (26 April, 2018)
Image Credit: Davey, adapted from Sam Rohn (22 February, 2016)

# 2050

# 70%

of the world population will live in urban settlements.

UN Convention to Combat Desertification (27 October, 2020)

Image Credit: Statista (2023)

# Today

The world's cities occupy just

**3%**

of the Earth's land

UN Convention to Combat Desertification
(27 October, 2020)

But account for

**80%**

energy consumption

But account for

**75%**

carbon emissions

Image Credit: Statista (2023)


2050
Yes, new buildings are more energy efficient, sure…but
80%
of buildings that will be standing in 2050 globally *have already been built.*
**“We must prioritise upgrading the buildings we already have in order to avoid high embodied carbon emissions for decades to come.”**
— Emily Parish, The Climate Group (12 August 2022)

# 70%

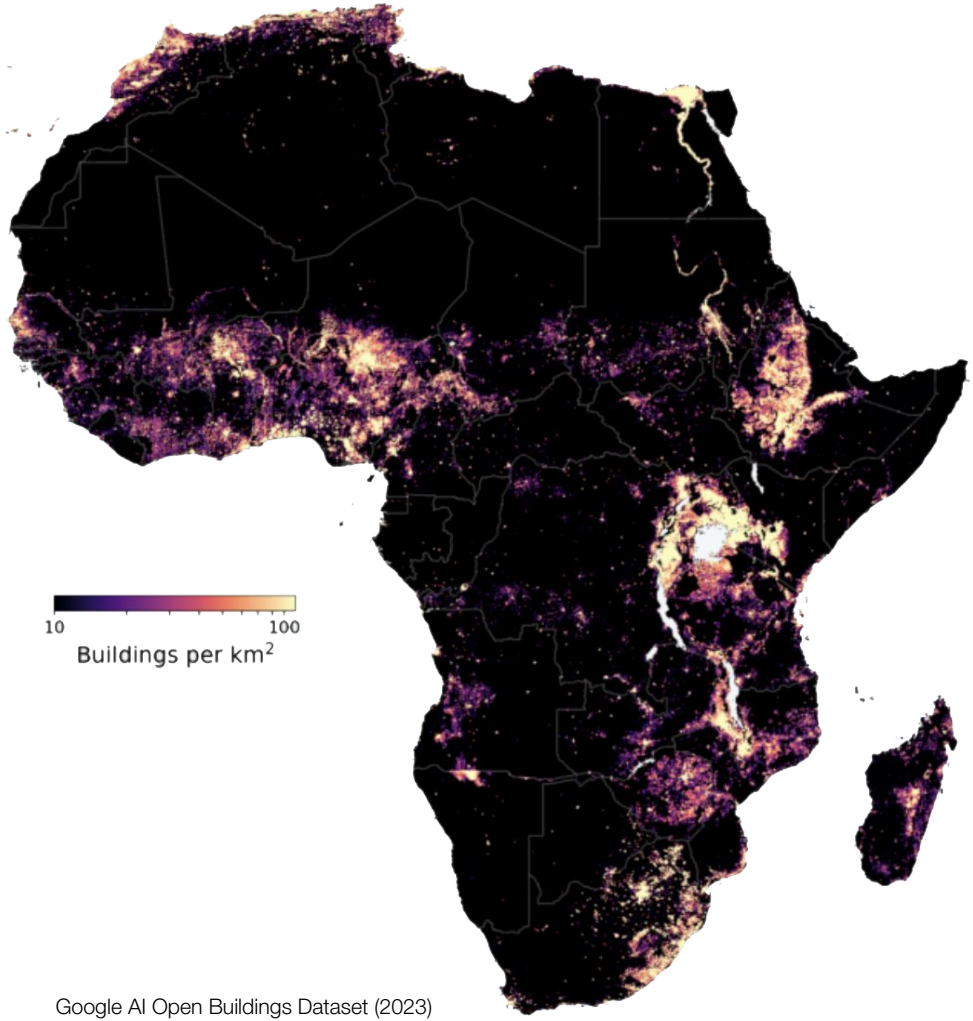
of the African building stock in 2040 *still has to be built*

majority of this growth will be in *cities*

# 200%

Additionally, hundreds of smaller African cities double in size every 20 years

UN Global Status Report for Buildings and Construction (2022); Vidal (2018)



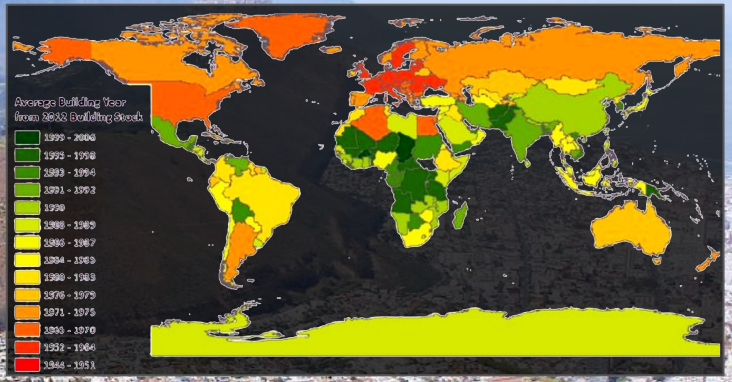

Google AI Open Buildings Dataset (2023)

**But, if all the buildings are built already…**

**how long do we need to take care of our existing building stock?**

## Average Building Year as of 2012

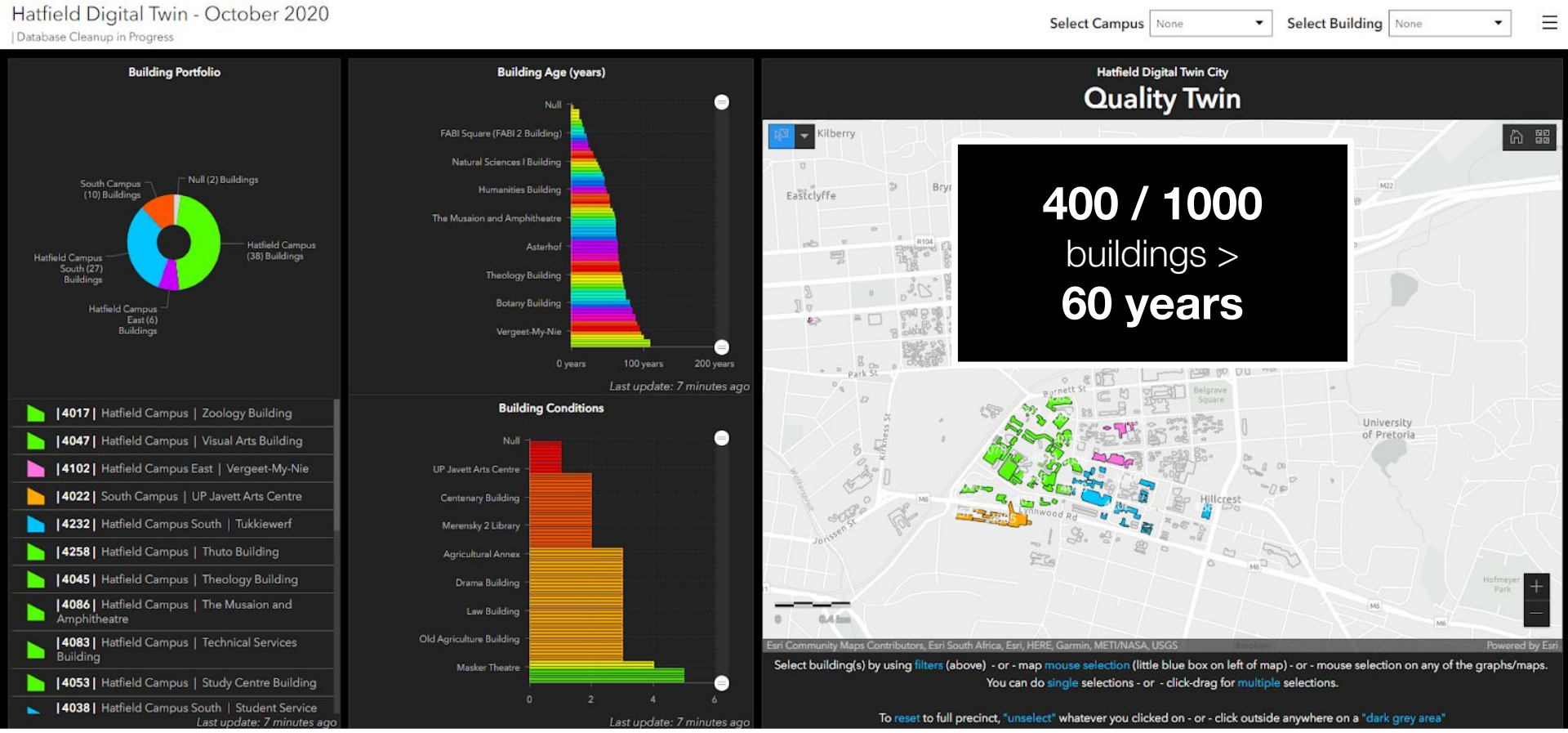
Daniell, E, J, et al (2014)




Generally, Average Age

# 70 yrs

| | |
|---|---|
| Historical (temples, etc) | 500-1000 years |
| Steel structures | 100 - 150 years |
| Concrete structures | 100 years |
| Private Real Estate | 60-80 years |
| Rigid roads | 30-35 years |
| Flexible roads | 8-10 years |




# HATFIELD DIGITAL TWIN CITY - HERITAGE ASSET DATASET

Led by Dr. Davey & Ms Helene Potgieter — Students in Architecture + Geoinformatics

# Lifecycle Math

Commercial Building Design (ave max)
3 yrs (dev & design) + 3 yrs (construction)

**6%**

making a building

High-performing regions
9 months - 24 months = 4%

Merely 6% of a buildings life is in its design and construction

**94%**

of its life is in use.

Maintenance, operations, utilities, deconstruction, upgrades, etc…


# How will we create a future human habitat that thrives?


# What is our legacy going to be?


Harambee.

# Together.

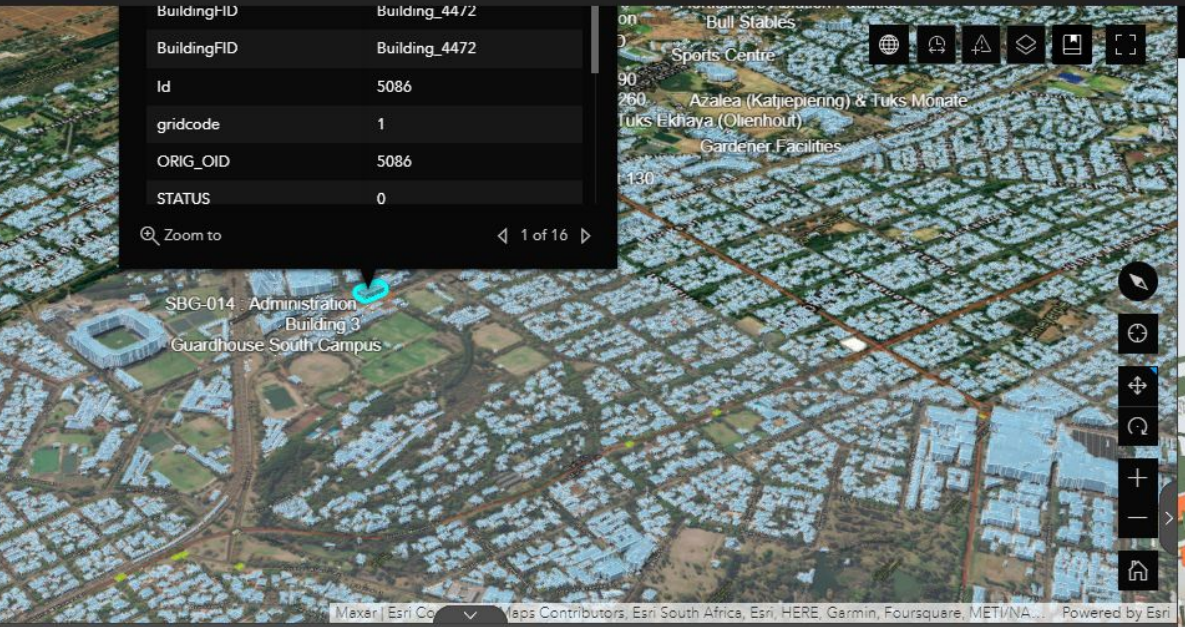
We are building the digital commons for thriving buildings, cities, communities, and environments in Africa.


Harambee

# Before we Tech, we must Culture

We are building the digital commons for thriving buildings, cities, communities, and environments in Africa.

er 2022





Add Links

Documents

Search

Display Name | Boundary | Spatial Reference

unt | Project

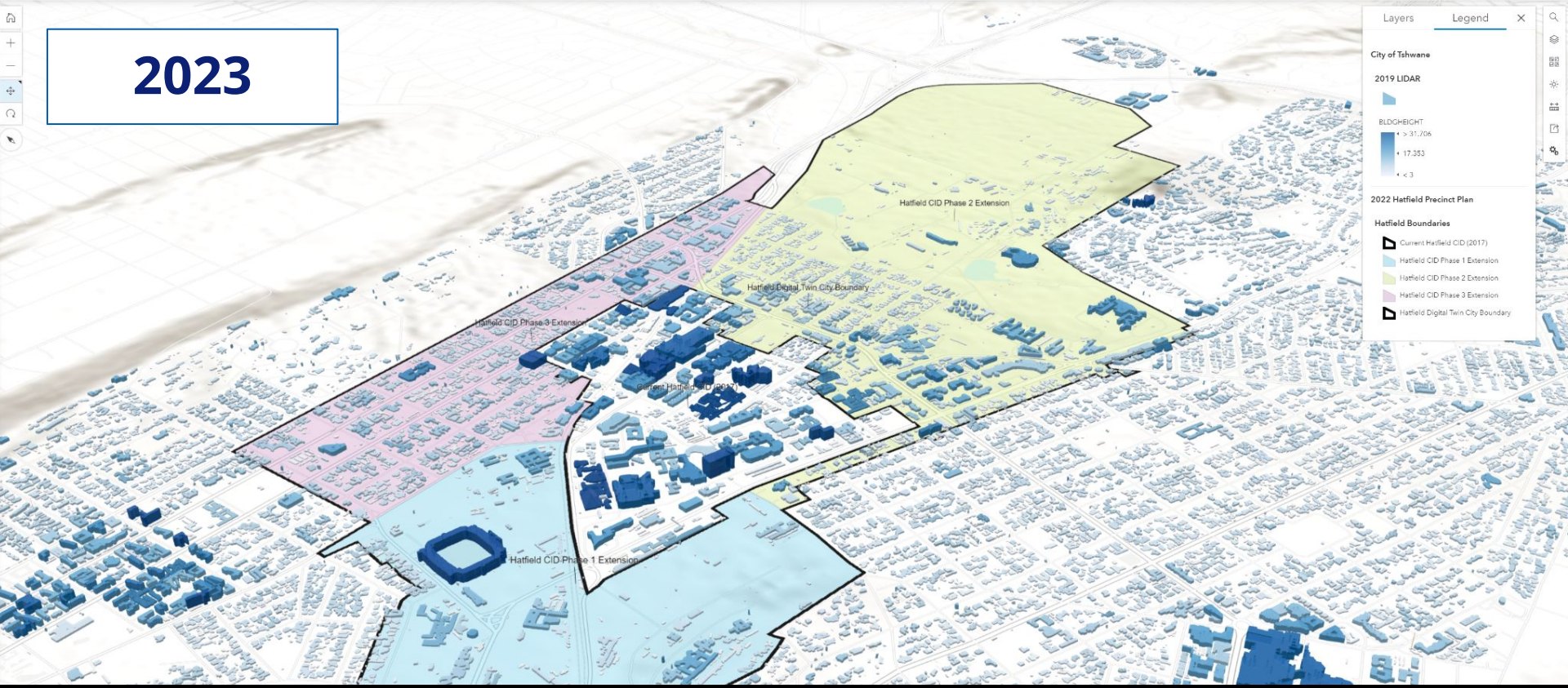
arambee | UP Hatfield Digital Twin City (2022)

etition

# GEO-BIM DIGITAL TWINS


BUILDING REALITY-CAPTURE


# REALITY CAPTURE




# HATFIELD DIGITAL TWIN CITY LAB

## HIGH DENSITY DISTRICT OPEN DATA SYSTEM IMPROVEMENT

Students are updating!


Architecture
Structural Engineering
Construction Economics
Civil Engineering
Urban Planning
Industry Partners
Cities
Public Sector
Owners
Private Sector
Organizations
Service Sector


Architec-
ture
Civils +
Structural
Quantity
Surveying
Geography
Cities
Owners
Organiza-
tions
Industry
Partners


Architecture
Structural Engineering
Construction Economics
Civil Engineering
Quantity Surveying
Industry Partners
City of Tshwane
Public Sector
UP Facilities
Private Sector
Hatfield CID
Service Sector


Our goal is not to show you a "perfect project" but engage you in

# BIM Behaviour

Collective Project Culture through BIM Technologies

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1

Leave your badge at the door.

2

Do something good for someone else.

3

Take care of the future.


Workflows

# BIM Work Stages

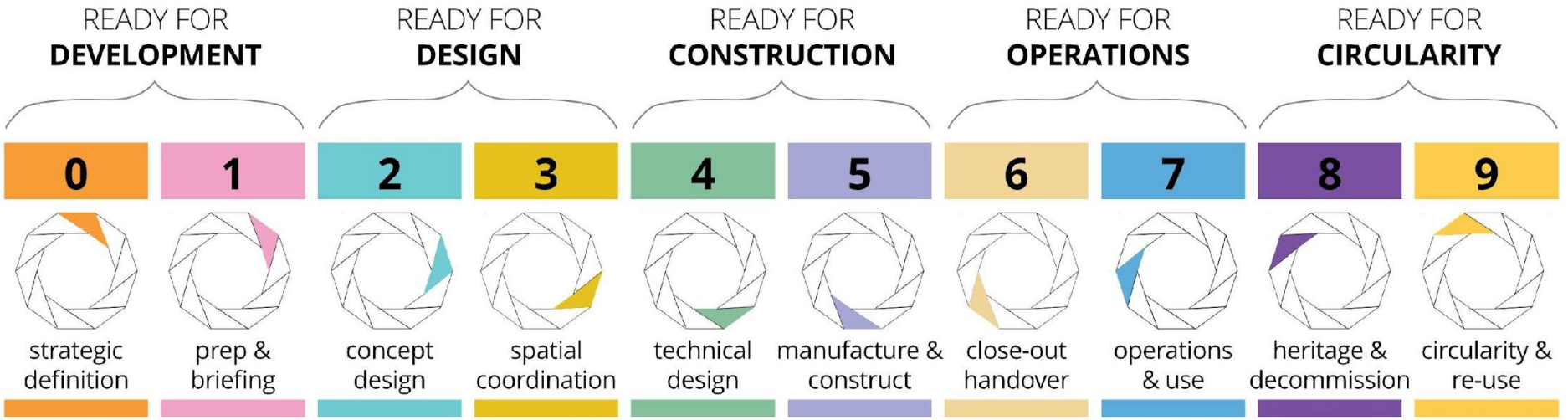
Collective Project Culture through BIM Technologies

# Before we BIM, ask Why?

## Owner's Project Requirements

- Why do we want to work together at all?

# BIM Work Stages

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BIM Work Stages

# Stage 0

## Strategic Definition: Culture & Purpose

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DEPARTMENT OF ARCHITECTURE, UNIVERSITY OF PRETORIA

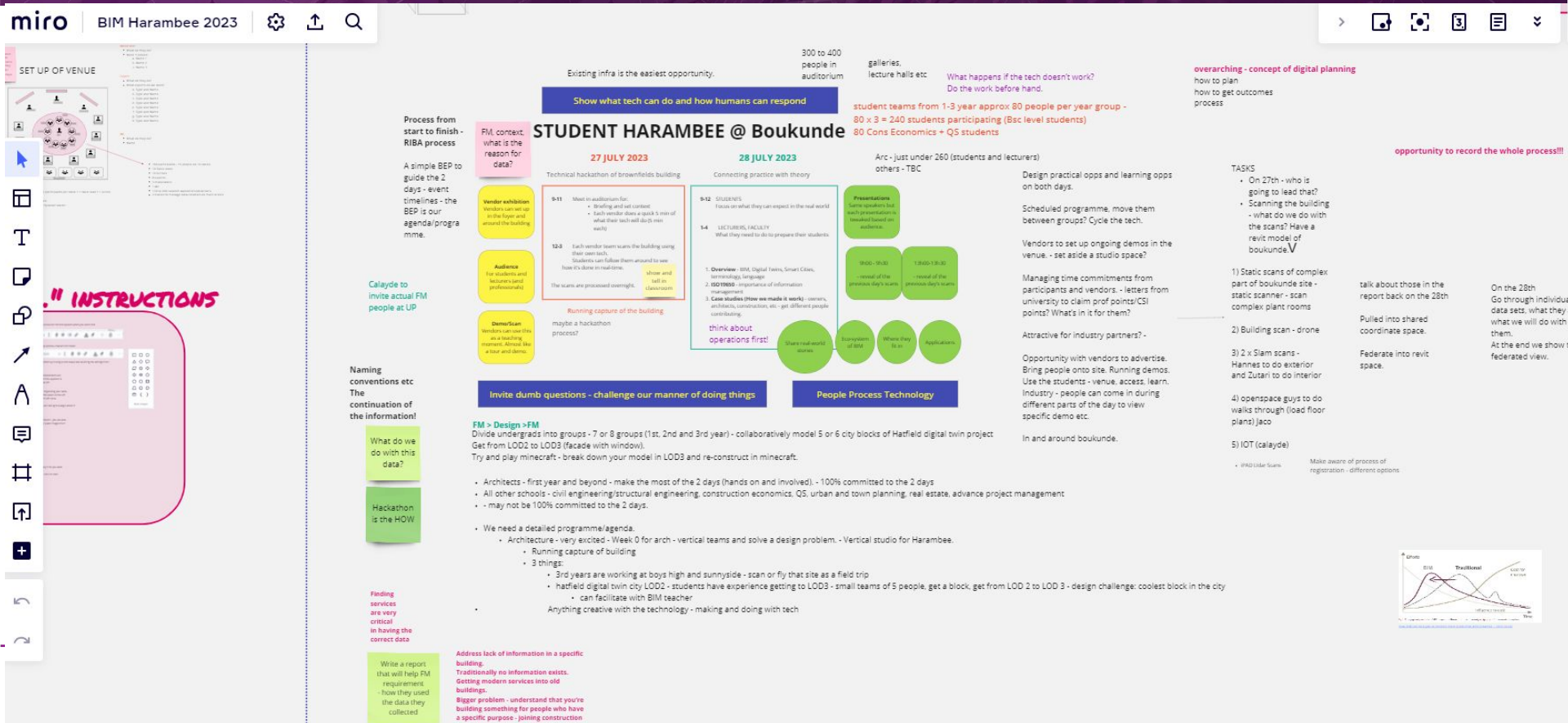
# How to BIM in Africa

- To talk about BIM in Africa
- To practice BIM in Africa
- To demonstrate that new and better ways are possible
- To get new people to do better things

- BIM is not about perfect products, but about intelligent processes
- BIM => *Better Information Management*
- Lead and serve others through behavioural change within our work

To expose a new generation of African built environment practitioners to process-driven and collaborative ways of working together

# Before we BIM, how do we produce value?
# Before we BIM, how do we serve others?




# But, what *is* BIM, and why should I care?

# BIM in a nutshell

- Create Information
- Share information
- Use information

**… to create, manage and derive value from things that you can build.**

# Lifecycle Optimisation

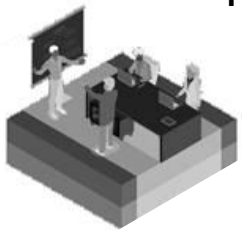
## The Development Cycle

*Growth of Knowledge*

Facilities Management

Planning

Occupation and Operations



Conceptual Design

Commissioning

Construction

Design and Engineering

Procurement

Image adapted from www.tekla.com

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BIM Harambee Africa

# CAPEX stage to OPEX Stage

*The changing players*

**Facilities Management**

*FM*
*Contractor*

**Lifecycle Optimisation**

*Owner,*
*Consultants*

**Occupation and Operations**

*Owner,*
*Operator*
*Tenants*

**Planning**

*Architects,*
*Planners*

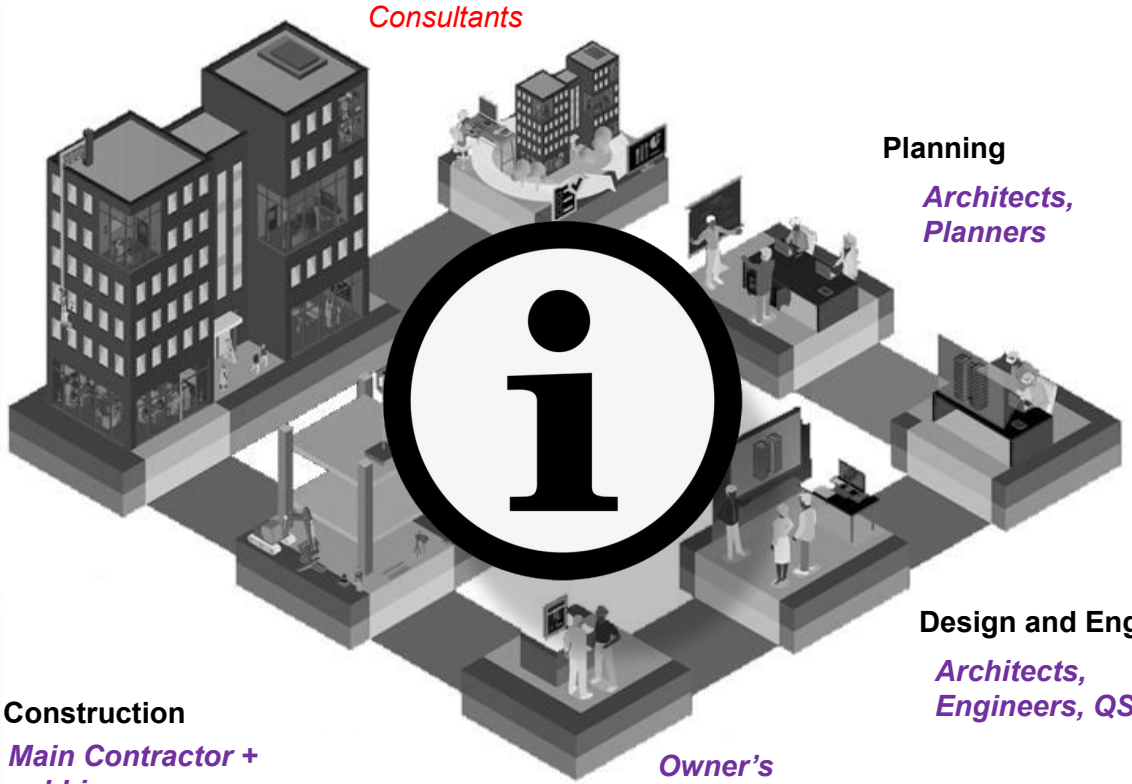
**Conceptual Design**

*Architects,*
*Engineers, QS*

*TRANSITION*

**Commissioning**

*Main Contractor +*
*subbies*
*Principal Agent*
*Engineering Consultant*



**Design and Engineering**

*Architects,*
*Engineers, QS*

**Construction**

*Main Contractor +*
*subbies*
*Principal Agent*
*Engineering Consultant*

**Procurement**

*Owner's*
*Procurement*
*Professional Team*

Image adapted from www.tekla.com

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That’s a lot of information!

How do we avoid chaos?

# You need a Standard!!

ISO 19650 = how to BIM

**BIM =**

Building Information Modelling

***Or…***

**BIM =**

BETTER Information MANAGEMENT


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# You need a Team!!

**Project Team**

Appointing Party = Client

Lead appointed party = Lead

Appointed party = the other guys

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# You need a plan!!

BIM Execution Plan (BEP)


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# You need a …

# … and you need some …

Catenda
the open way

ARCHICAD

Twinmotion

Microsoft

esri

OPENSPACE

Bentley

HILTI

unity


AUTODESK

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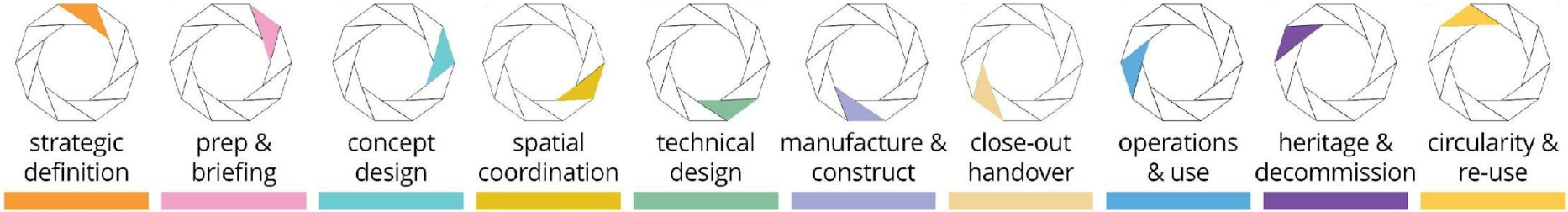
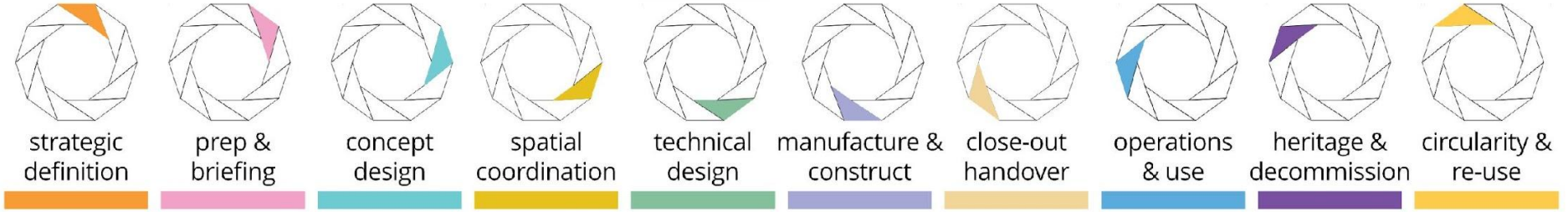
# How does that relate to the AECO scope of work??

# BIM Work Stages




# Let's take a look at some of the players in each of these stages

What they do, what tools they use and what they contribute to the information model




Define what the outcomes should be

Develop the plan for implementation

Collect and share reference info

Initial concepts, options, selections and outlines

Make sure everything fits

Detailed design, quantify, specify, ready to build

Make sure everything still fits

Tender for the work, win

Build it, tweak it, change it… manage it and record it

Handover useful information to operator

Use the asset / facility for its intended purpose

Maintain, modify, repurpose…

End of life

Re-use, recycle, salvage, repurpose

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BIM Work Stages

# Stage 0

## Strategic Definition: Project Works

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## BIM Stage 0

# Architecture 5.0

## Strategic Definition

1. Project overview
2. Information Requirements
3. ISO baseline documents (OIR, AIR, AIM >> EIR)
4. Procurement

# Architecture 5.0

## Owner's Project Requirements

- We want a to upgrade the lifecycle and utility of Boukunde for future generations.
- We want to create and practice together as new kinds of built environment creators in new kinds of ways.

# Architecture 5.0

**Constraints**

We have a very “limited budget.”

**Project Principles**

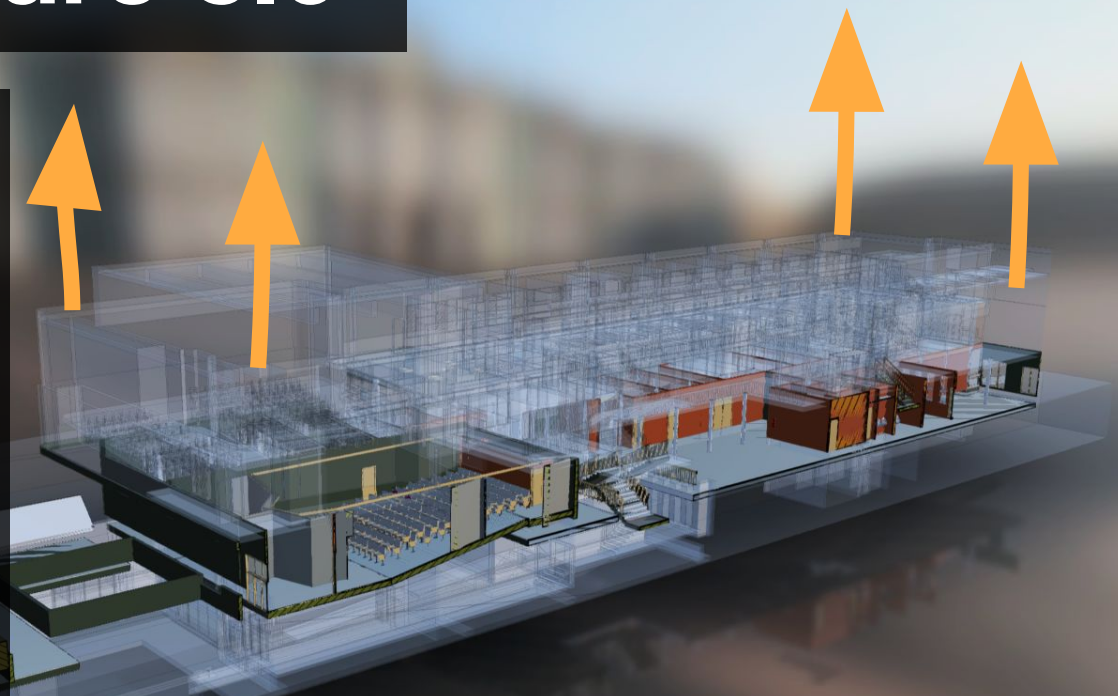
We do not want to mess up the world, so we won’t make a “new” building.

It must be awesome for students and learning to take place.

It must be way cooler than Engineering 4.0…hehe

**Project Solution**

Additional two floors on top of existing building



# Architecture 5.0

**Project Program**

Creative workshop areas for learners to work on novel built environment topics

- York Timber Chair
- Green & Living Walls
- Flexible Facades
- Climate Adaption
- Alternative Building Construction Materials
- Future Cities & Urbanism
- Urban Mining & Circularity
- "Digital Learning Zones"
- VR / AR  & Community Engagement
- Living Labs & Learning Moments

# Architecture 5.0

What information is needed from this project by the building owner(s) in the future?

Project Information Thread

## OIR >> AIR >> PIR >> EIR

**Organisational Information Requirements**
**Asset Information Requirements**
**Project Information Requirements**
**Employer's Information Requirements**

BIM Work | Stage 0

# BIM OIR

**Organisational Information Requirements**

**"What information do we need form this building + design process to ensure effective decisions, reporting and planning happens?"**

- Client to-do list for *NOW* and *LATER*
- Outline the essential data and digital deliverables support BIM project delivery process effectively for the whole team.

BIM Work | Stage 0

# BIM AIR

**Asset Information Requirements**

**"Begin with the the end in mind"**

- Specific things on the project model formats, content, design systems etc…
- Details on the operational systems, building systems information management etc.

BIM Work | Stage 0

# BIM PIR

**Project Information Requirements**

## "Who needs what when, and how would they like to receive information?"

- Culture of communication, submissions, information content, information milestones etc
- Define the handover information for the end of the project NOW, not later.

BIM Work | Stage 0

# BIM EIR

**Employer Information Requirements**

## "How will we produce reliable information for proper procurement and contracting?"

- Specific things on the model formats, content, design systems
- Details on the operational systems, building systems information management etc.

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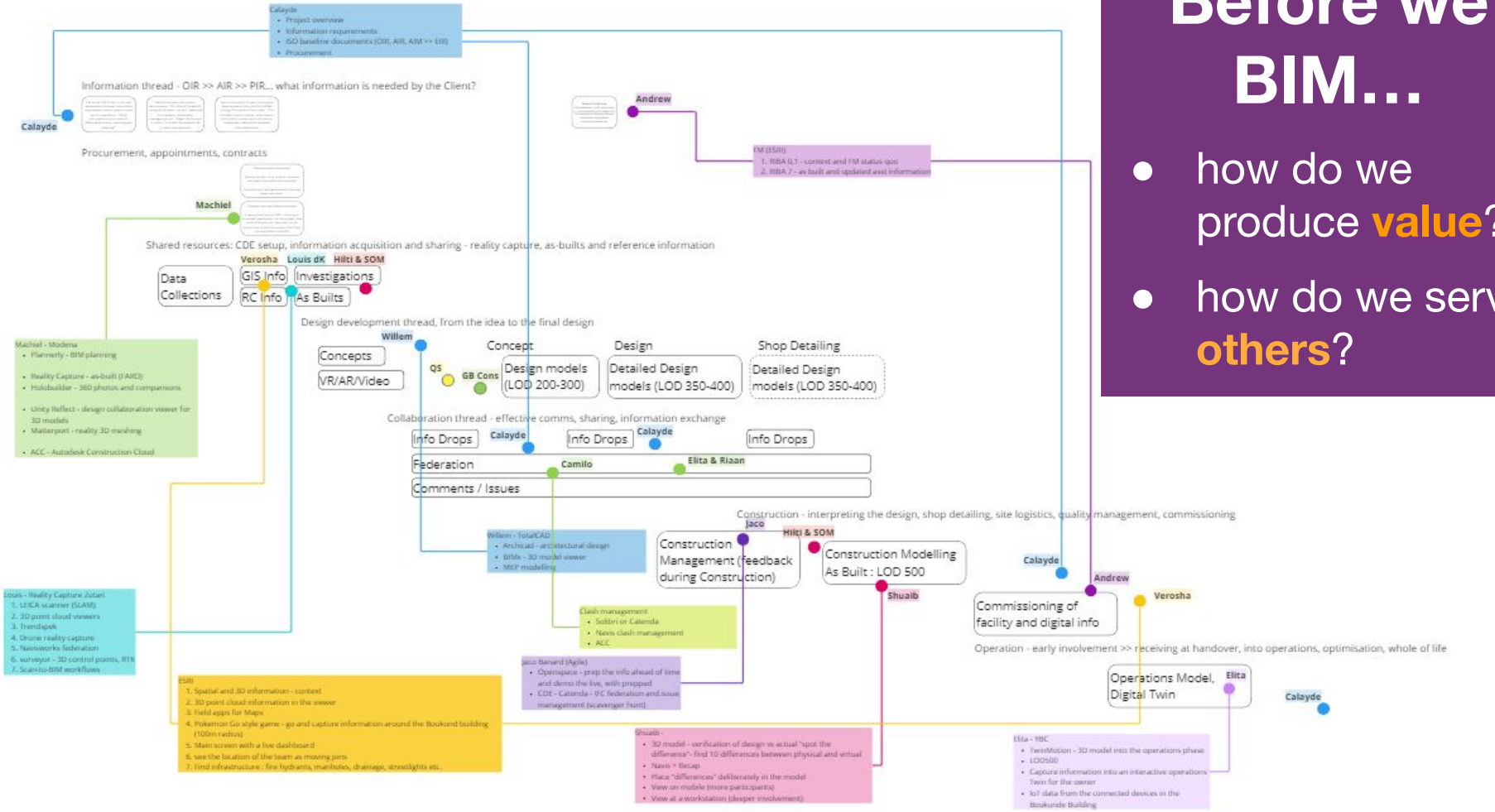
# Before we BIM...

- how do we produce **value**?
- how do we serve **others**?



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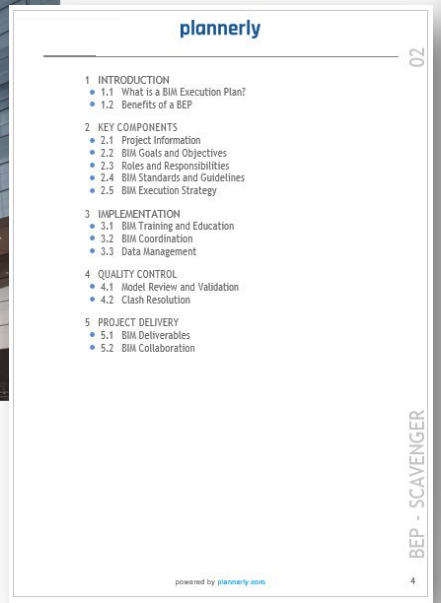
## BIM Work Stages

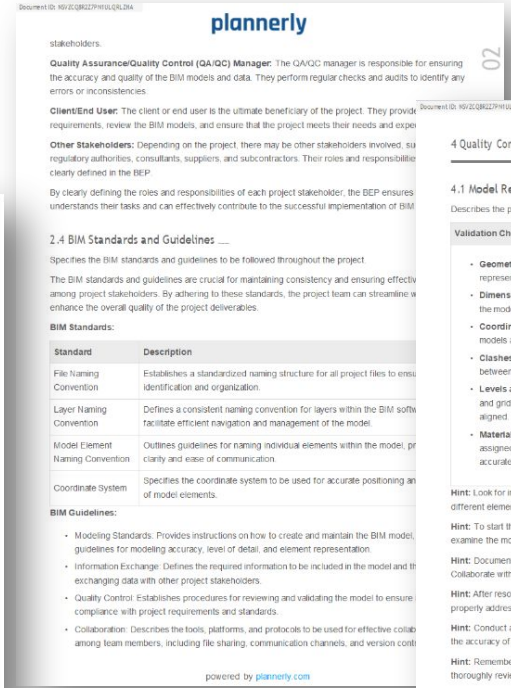
# Stage 1

## Prep and Briefing

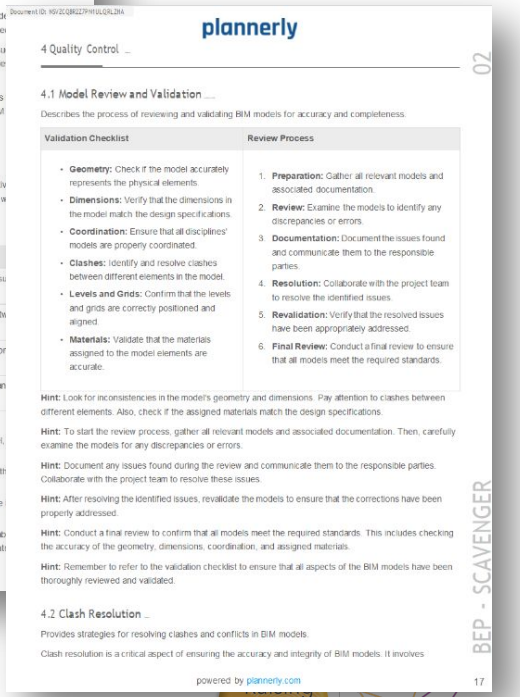
MODENA, SOM, HILTI, ZUTARI, ESRI

# BIM Execution Plan - BEP


MODENA
Architecture | Engineering | Construction | Infrastructure




the BIM tide

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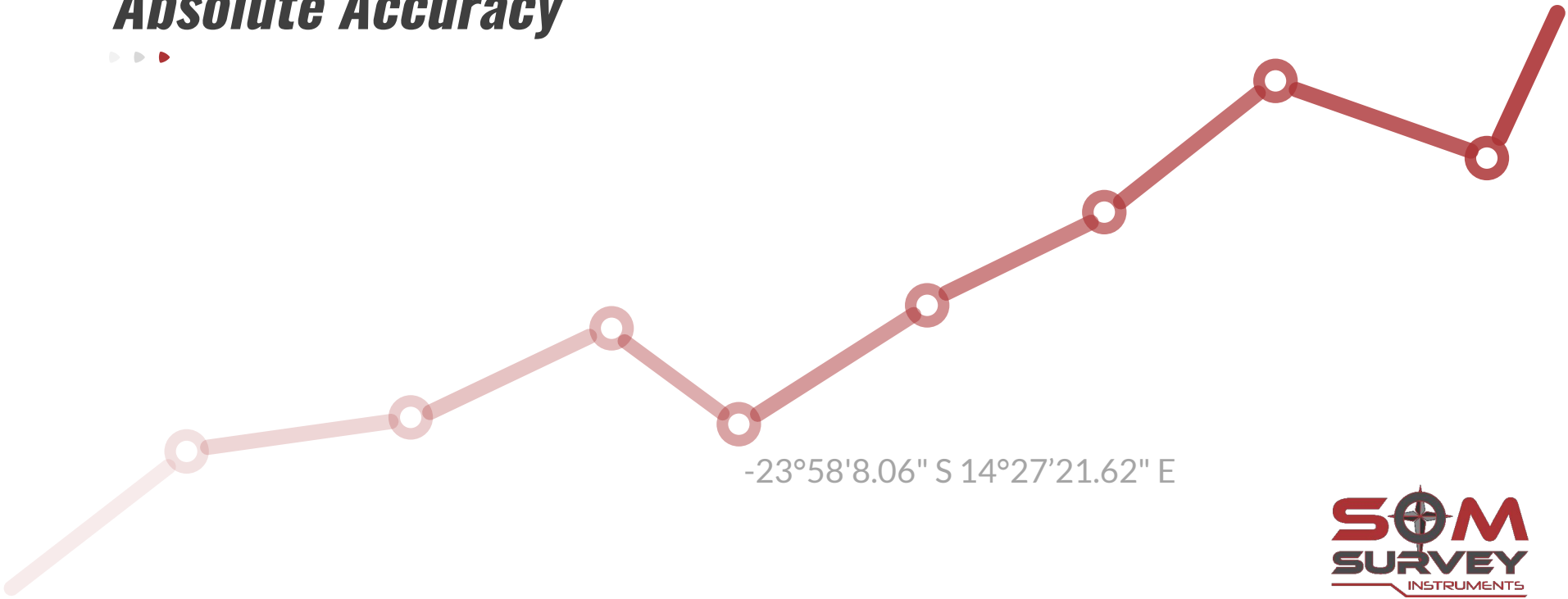
SOM
SURVEY
INSTRUMENTS
THE IMPORTANCE OF ACCURATE
GEOSPATIAL INFORMATION

# What is geospatial information and why it's important.

-33°58'8.06" S 18°27'21.82" E

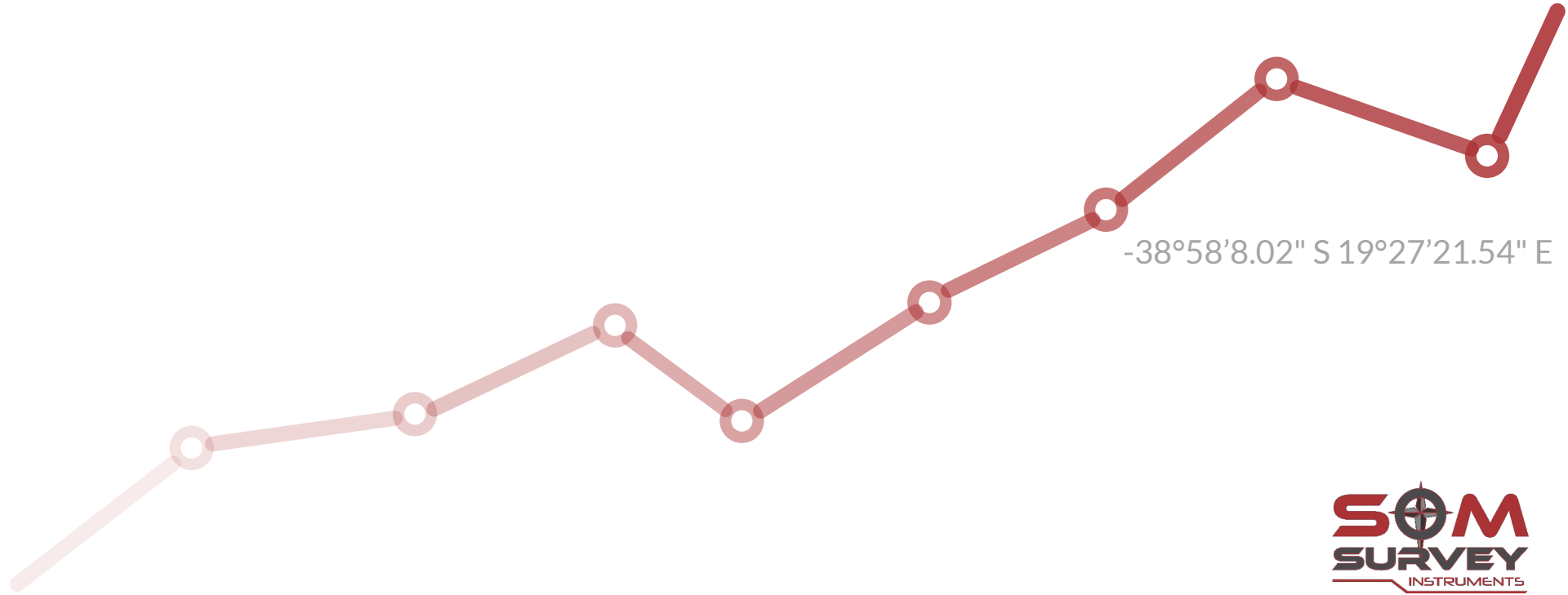
SOM SURVEY INSTRUMENTS

# *Relative Accuracy VS Absolute Accuracy*




SOM SURVEY INSTRUMENTS

# The Importance of Establishing Accurate Control on Site



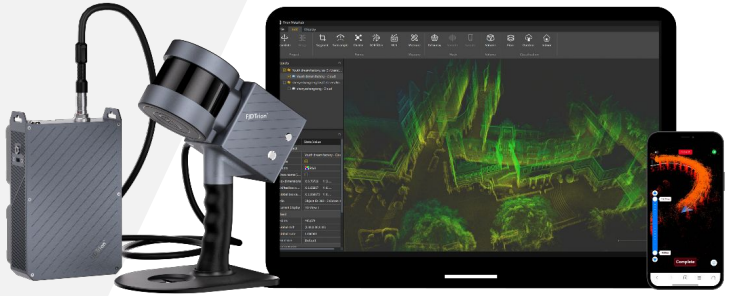

SOM SURVEY INSTRUMENTS

# *Obtaining Geospatial information - Today*

GNSS Receivers


Surveying Drones

LiDAR Scanners

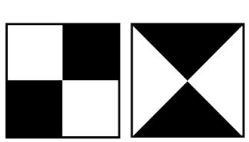


# Collect and share reference info

We call this Reality Capture

We digitize real world assets by using technology and software. These Reality Twins becomes the geometric reference information.

# What is used in industry



DroneDeploy

Bentley

CONTEXT CAPTURE

PIX4D

3DR

TruView

R360

AUTODESK® RECAP™ PRO

esri

HOLO BUILDER

A FARO® Technologies Company

OPENSPACE

Trendspek

RealityCapture

Raising the BIM tide

BIM Harambee Africa

# Survey Control

Critical importance to ensure that all data is referenced to the same geographic base information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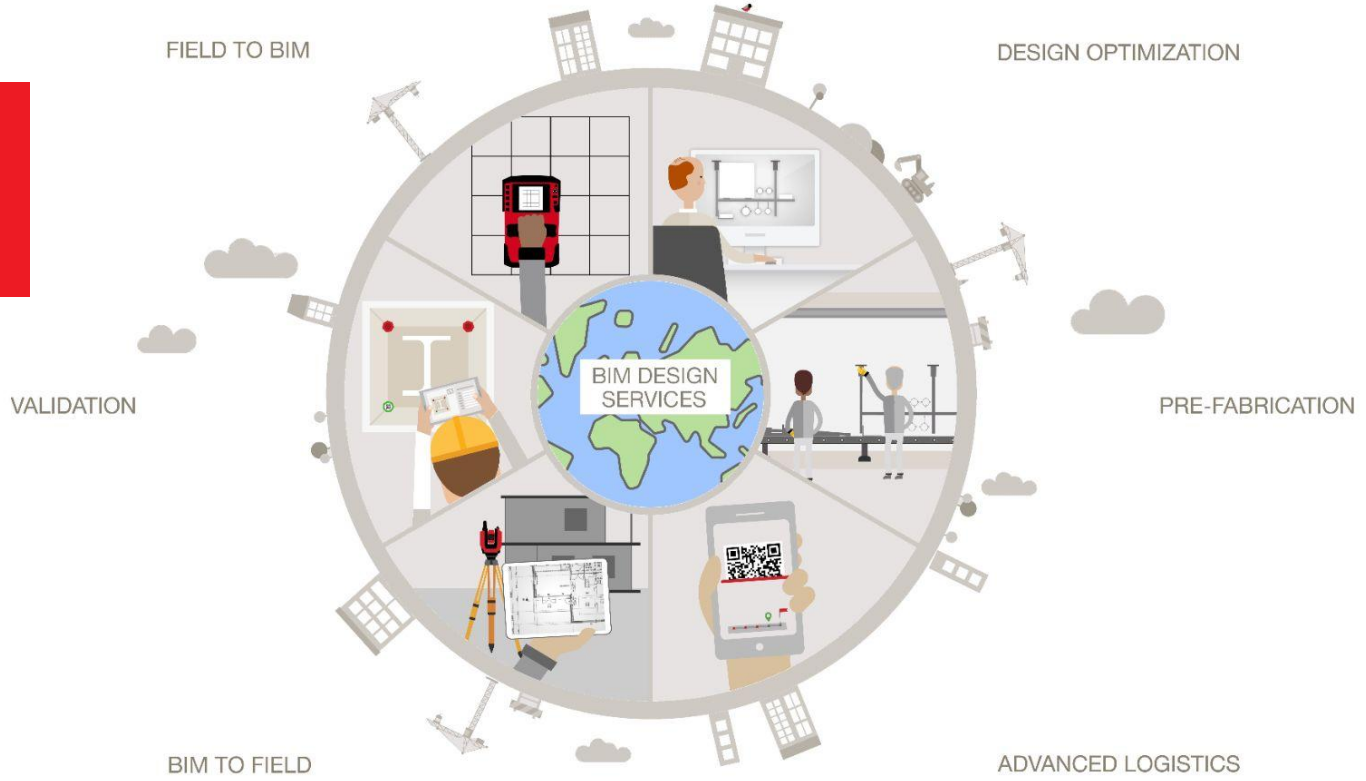
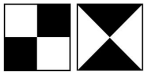

FIELD TO BIM
DESIGN OPTIMIZATION
VALIDATION
BIM DESIGN SERVICES
PRE-FABRICATION
BIM TO FIELD
ADVANCED LOGISTICS

# Drone Photogrammetry

Drone photogrammetry is the process of taking a structured set of photos using a flying camera (drone) to capture the site and external information.



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# 3D Scanning


3D scanning is the process of using a LiDAR handheld SLAM (Simultaneous Localisation and Mapping) or stationery scanner to capture the measurements inside an asset.

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# 3D Images

3D images provides us with the ability to see the internal assets and condition.

OPENSPACE

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# What does all of this deliver

- Survey Control – Control point coordinates
- Drone Photogrammetry – Point Clouds, 3D Meshes, Orthophotos, DSM, DTM
- 3D Scanning – Point Clouds, 3D Meshes
- 3D Photos - Imagery

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# What is the benefits?


- Rapid data acquisition – less time on site, more and higher accuracy information.
- Geometrically accurate information
- Virtual site visits by the project team
- Document as-built conditions
- Create detailed layouts and models that could be used for inspections, project execution planning, spatial planning, design and delivering layouts.
- Create an accurate basis for BIM
- Capture locations of assets in a space
- Remote analysis by relevant skillset anywhere in the world
- Integrates with various of the software in industry through exchange formats.

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# The Science of Where

## Esri's ArcGIS

**Location :** What is here?

**Proximity :** What is around me?

**Trends :** What has changed here?

**Patterns :** What patterns emerge?

**Modeling :** What if? Scenarios

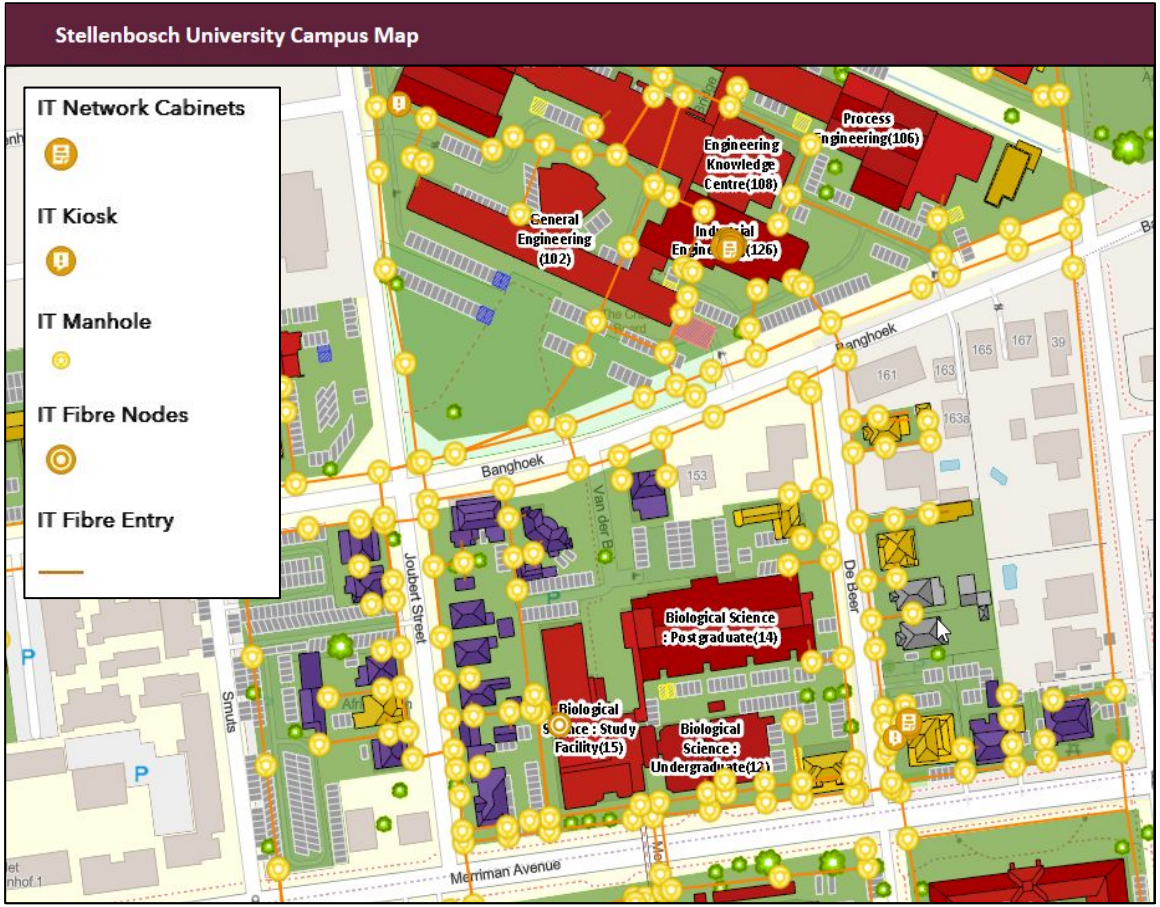
Geographic Information System (GIS)

esri South Africa
THE SCIENCE OF WHERE

# GIS on Campus

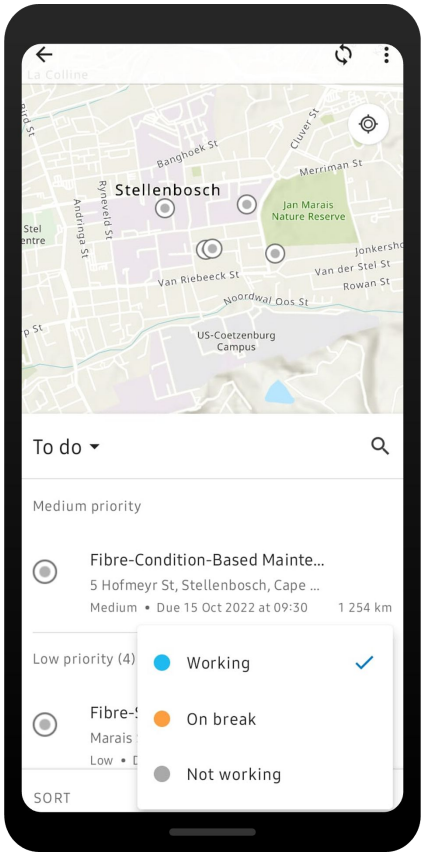
## GIS Data Collection

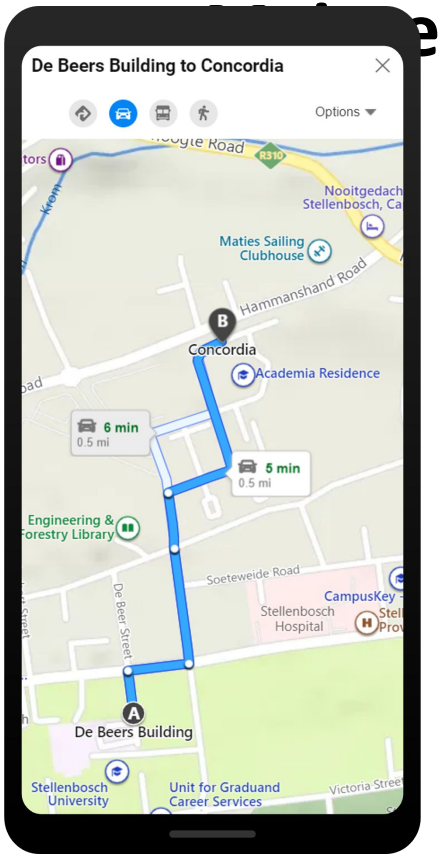
- Campus areas
- Walkways
- Facilities
- Infrastructure
- Construction areas
- Parking, Trees, Security
- Signage
- Utilities

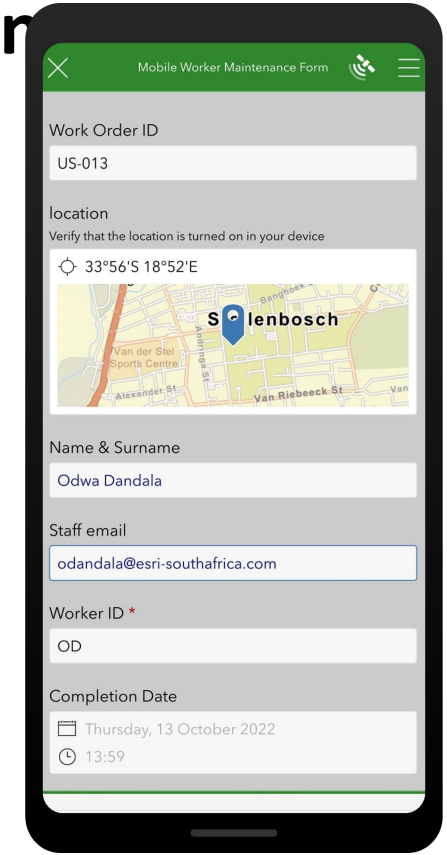


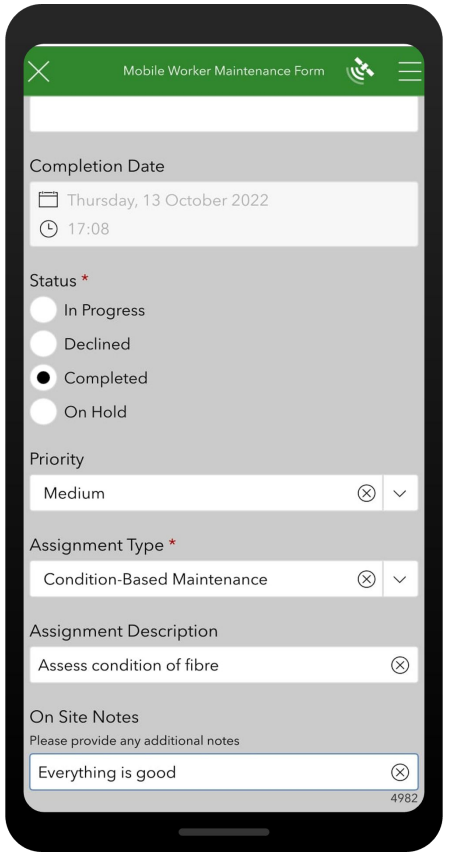

esri South Africa
THE SCIENCE OF WHERE

# GIS: Asset Collection, Verification and




esri South Africa
THE SCIENCE OF WHERE

# GIS Key Takeaways

**GIS is about Where to Build.**

- **Site Survey and Site Selection.**
- **Feasibility Analysis.**
- **Environmental Impact Assessment.**
- **Accurate Spatial Data Collection**
- **Asset Inventory Management.**

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# BIM Work Stages

# Stage 2

## Concept Design

TOTALCAD

# TotalCAD

## SOLUTION CENTRE

GRAPHISOFT | DISTRIBUTOR

GRAPHISOFT Archicad®

GRAPHISOFT DDScad™

GRAPHISOFT BIMcloud®

GRAPHISOFT BIMx®

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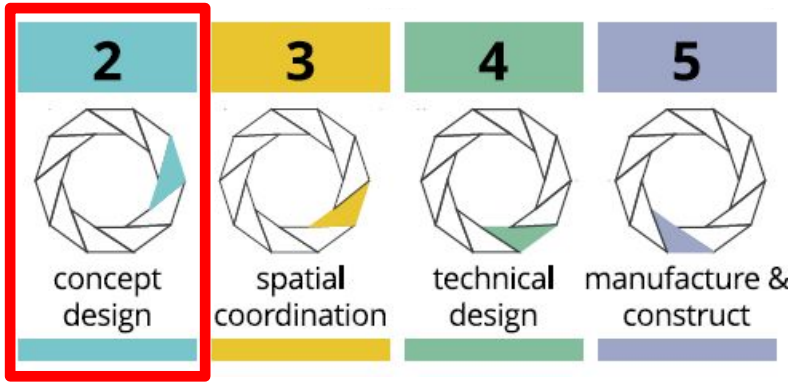
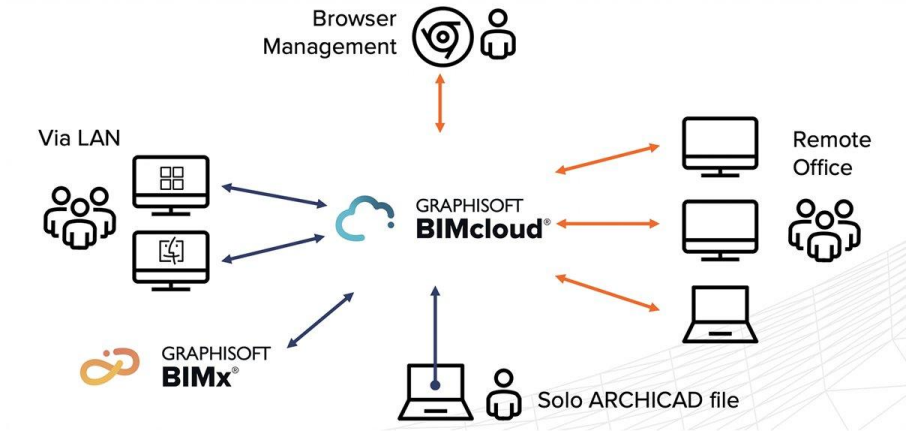
BIM Harambee . Africa

# Architectural Design



GRAPHISOFT
# BIMcloud®

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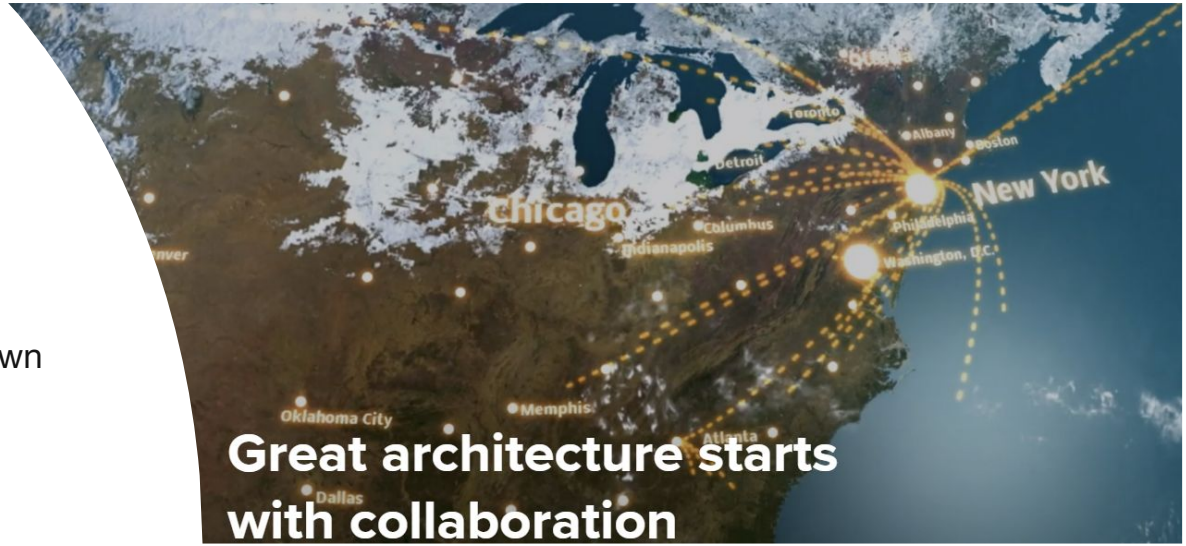
**Architectural Team**

- Ronel Basson – KZN
- Gert Coetzee – Cape Town
- Willem Viviers – Gauteng

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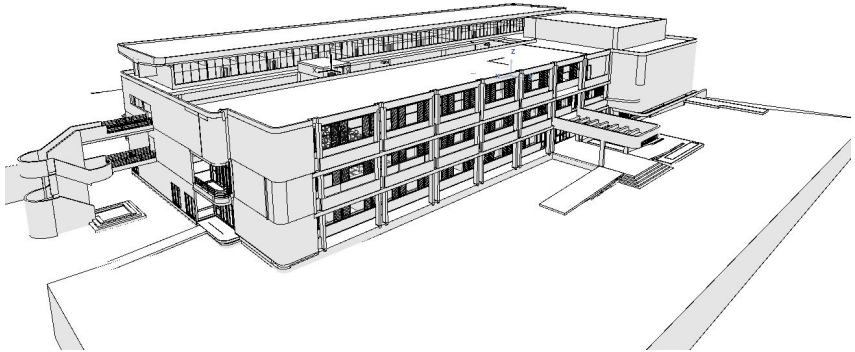
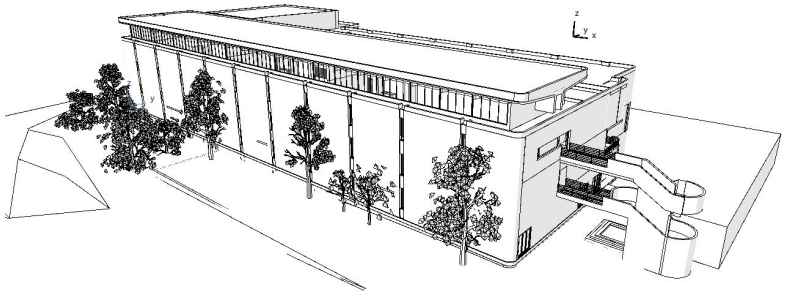
# BIM Authoring Tool

# Project Preparation & Setup

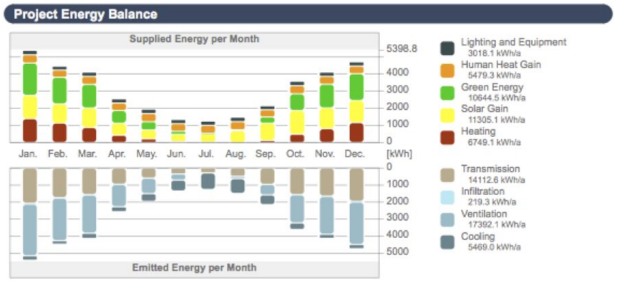
- Import existing building data – IFC, GIS, DWG, PDF…
- Quality Assurance (QA)
- Import Classification set (Uniclass 2015 & OmniClass)
- Share file on BIMcloud for team to start

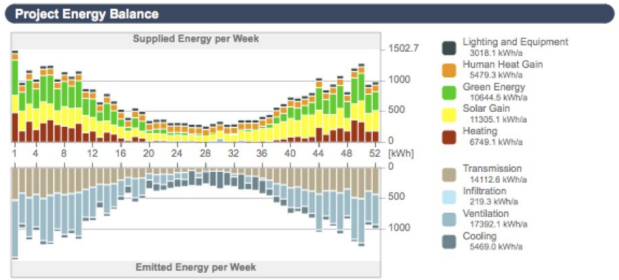
# Existing IFC Model



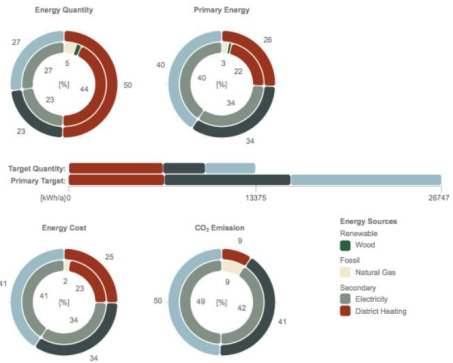


# Energy Analysis




| Energy | | | | |
|---|---|---|---|---|
| Target Name | Quantity kWh/a | Primary kWh/a | Cost EUR/a | $CO_2$ Emission kg/a |
| Heating | 6749 | 6868 | 446 | 146 |
| Cooling | 0 | 0 | 0 | 0 |
| Service Hot-Water | 0 | 0 | 0 | 0 |
| Ventilation Fans | 3608 | 10824 | 721 | 779 |
| Lighting & Appliances | 3018 | 9054 | 603 | 651 |
| Total: | 13375 | 26747 | 1771 | 1577 |




| Energy | | | | |
|---|---|---|---|---|
| Target Name | Quantity kWh/a | Primary kWh/a | Cost EUR/a | $CO_2$ Emission kg/a |
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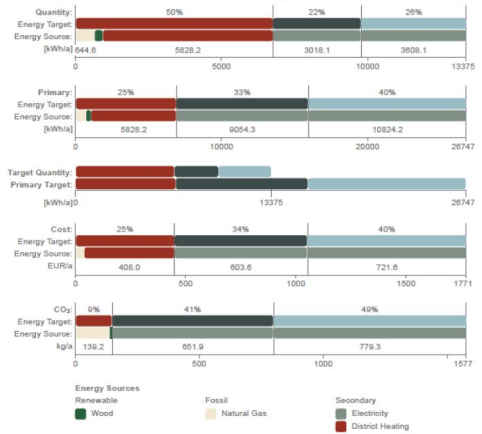
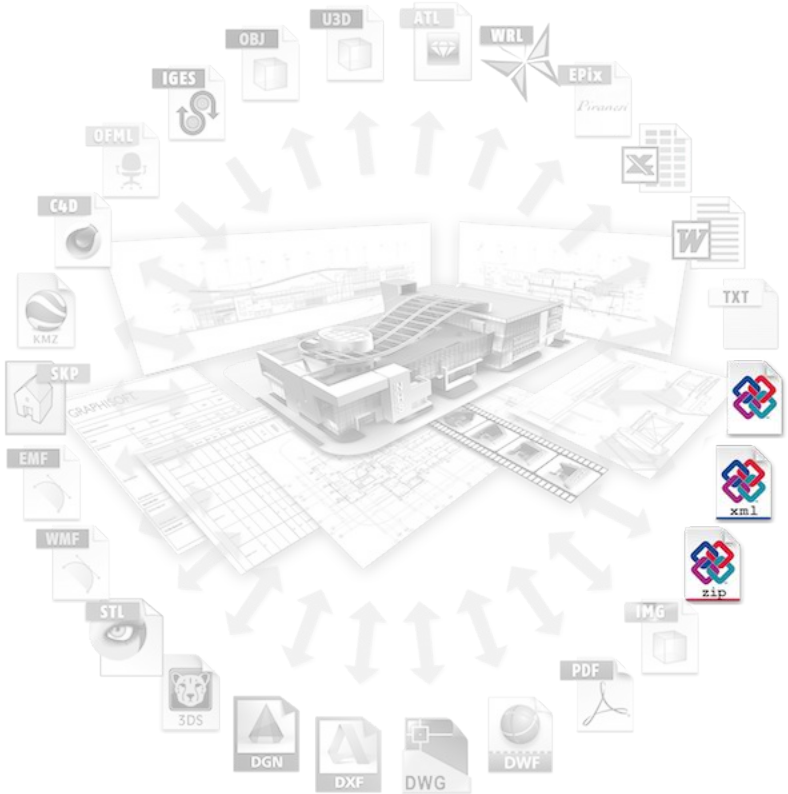


# Project Team Coordination & Collaboration

IFC




BCF

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# Communicate Concept with Client

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BIMx®


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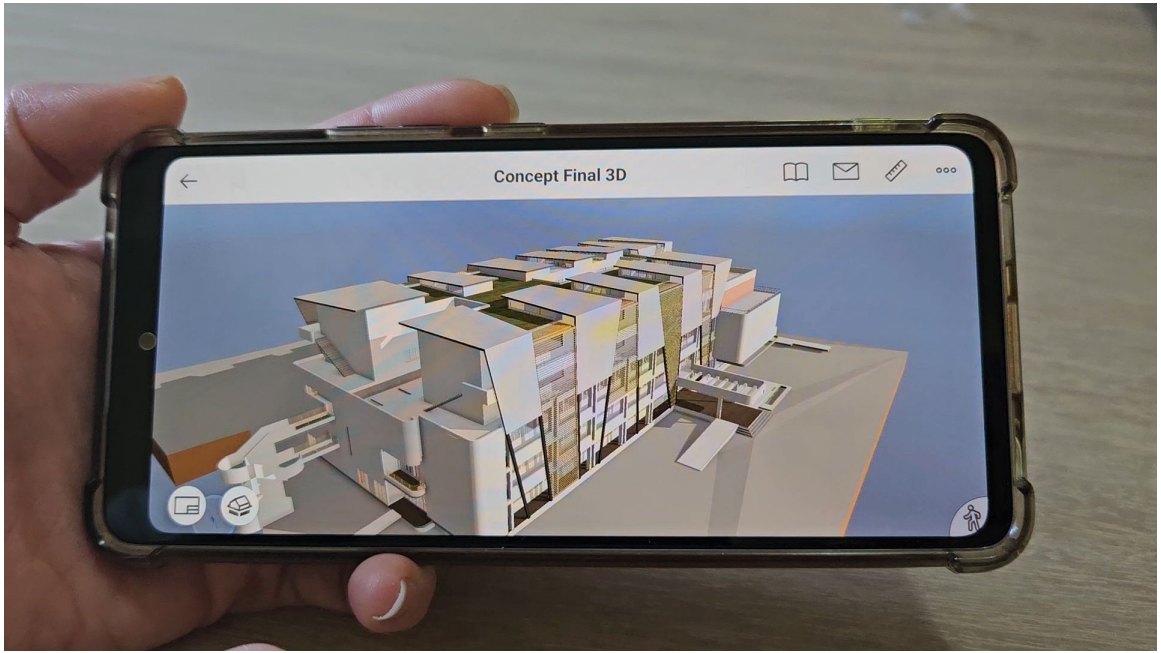
GRAPHISOFT
BIMx®

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BIM Harambee .Africa

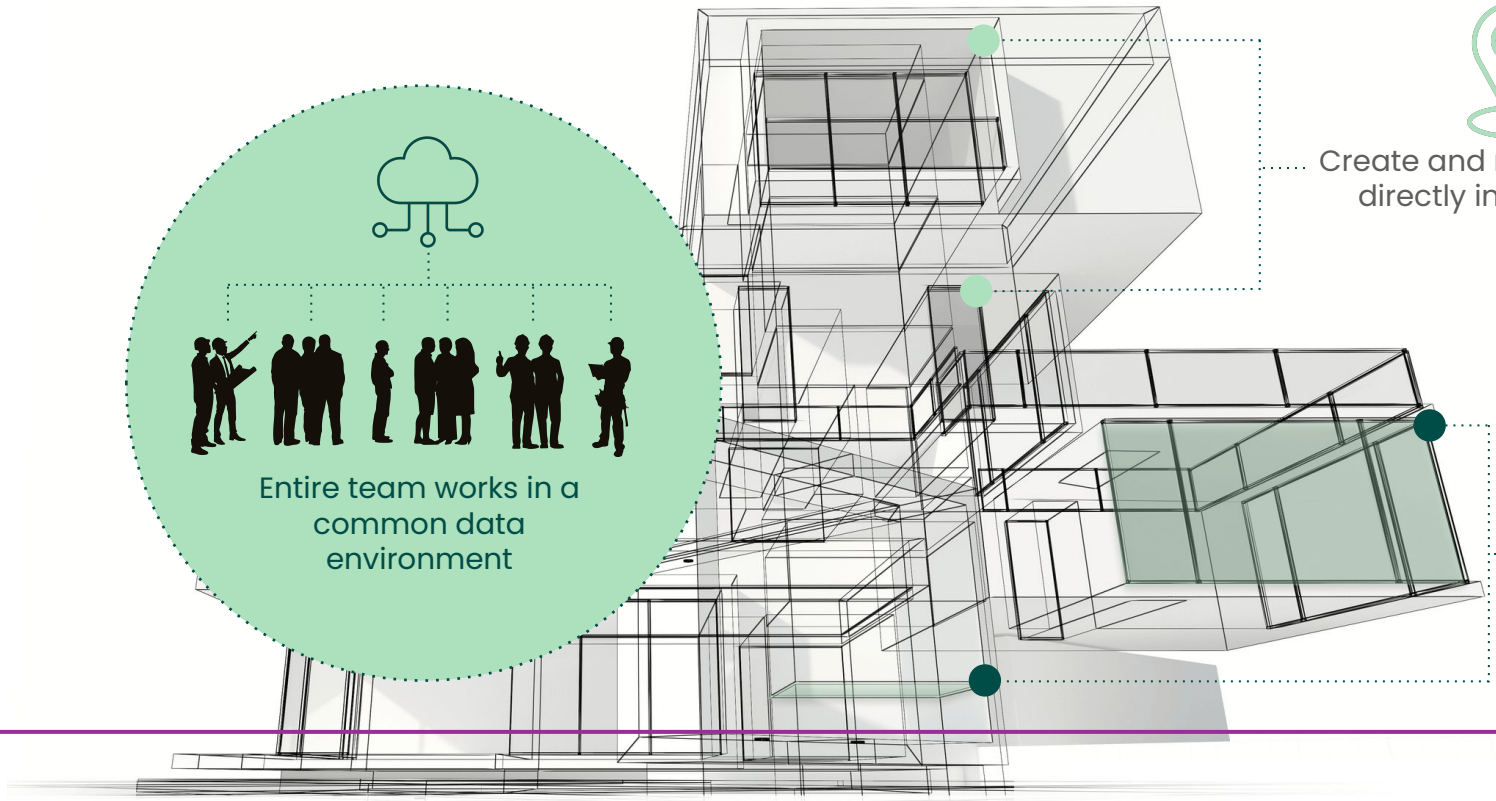
BIM Work Stages

# Stage 3

## Spatial Coordination

CATENDA

# Reinventing communication and collaboration



Entire team works in a common data environment

Create and resolve issues directly in the model

Click on any object to access all stored data

Raising the BIM tide

BIM Harambee Africa

# ..offering reached full circle

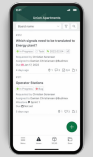
With Catenda, the digital twin can now follow the entire lifecycle of a building

**Catenda** Hub

Catenda's Common Data Environment powerful cloud based, BIM enabled coordination tool

**Catenda** Site

Catenda Site puts the power of Catenda Hub on the construction site and can provide a segway for using Catenda in the asset management phase



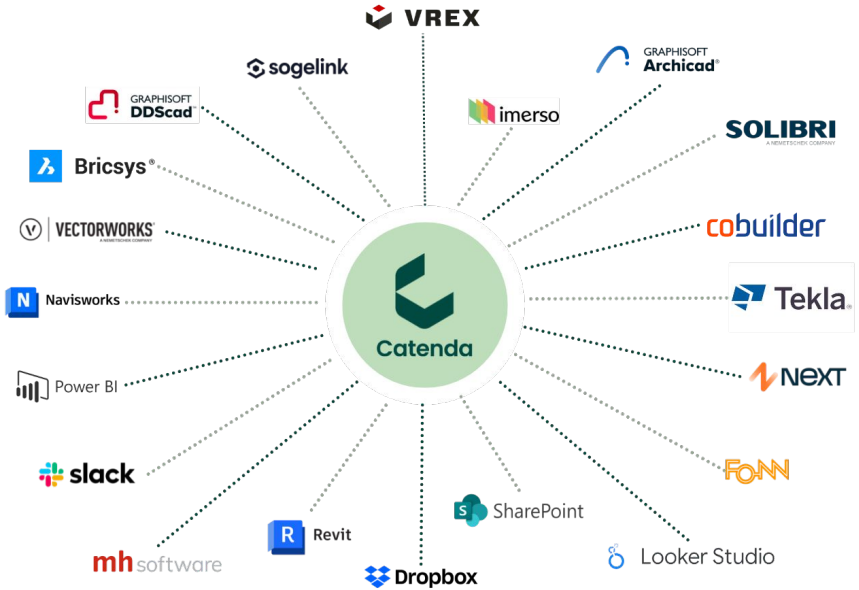
**Catenda** Duo

A building operating system application enhanced by the power of BIM and visualization.

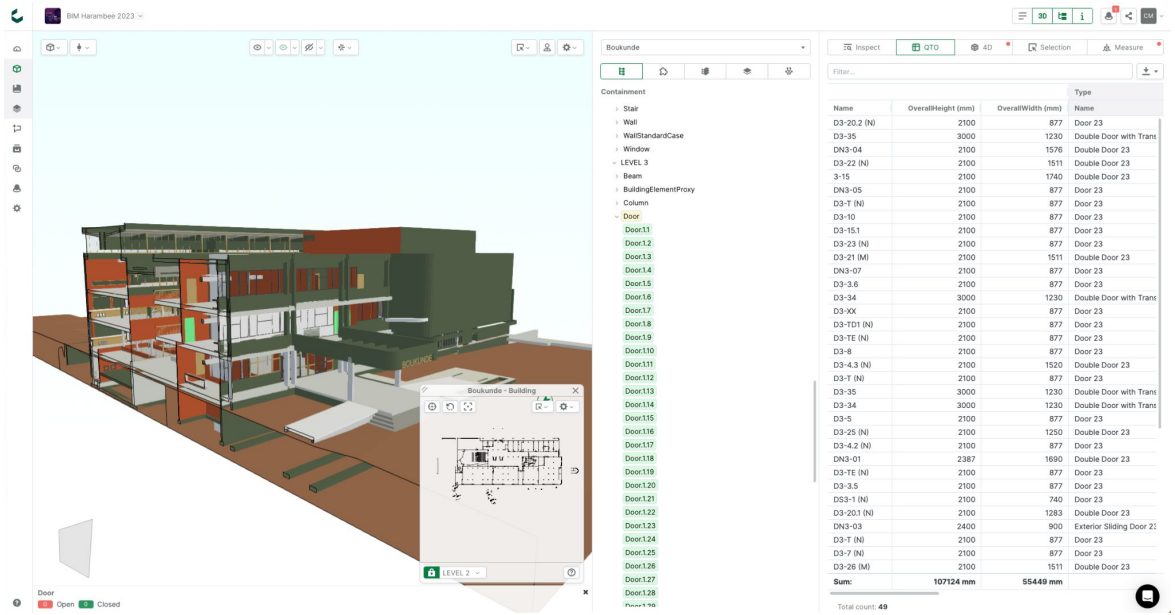
Design → Construction → Operations

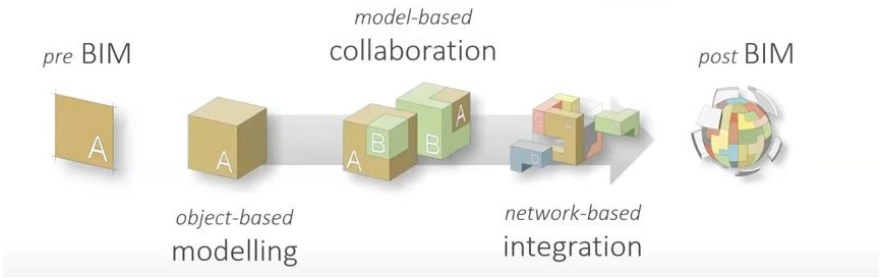
Catenda

# With a growing ecosystem




Catenda




- The Common Data Environment (CDE) centralizes all the information and documents needed for the project in one common area.
- Prepare / Manage / Use (Data)
- Object base / Model Based / Network Integration Based
- Knowledge sharing / Data based design

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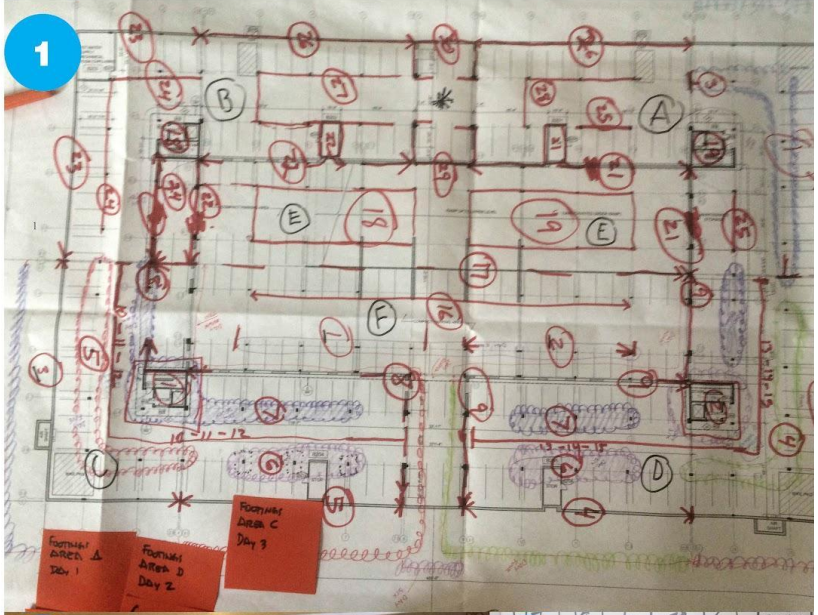
BIM Harambee Africa

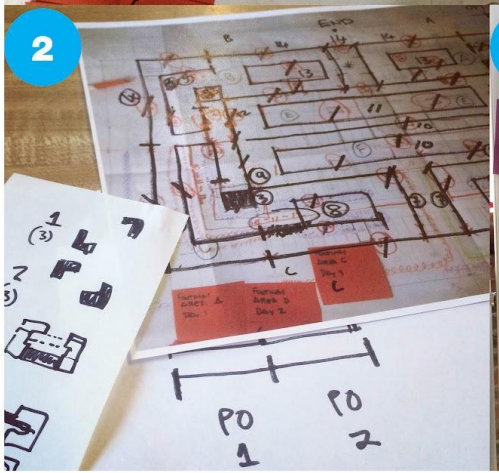
BIM Work Stages

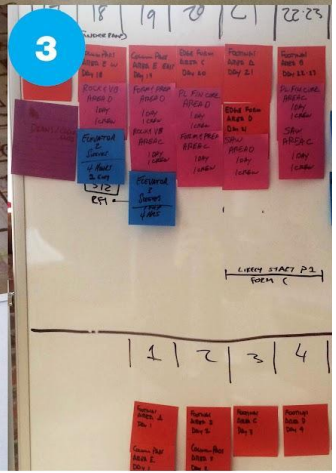
# Stage 4

## Technical Design

YORK BROTHERS CONSTRUCTION





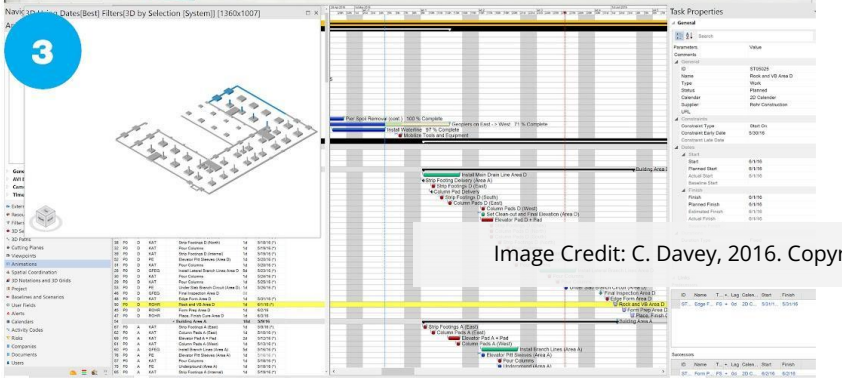
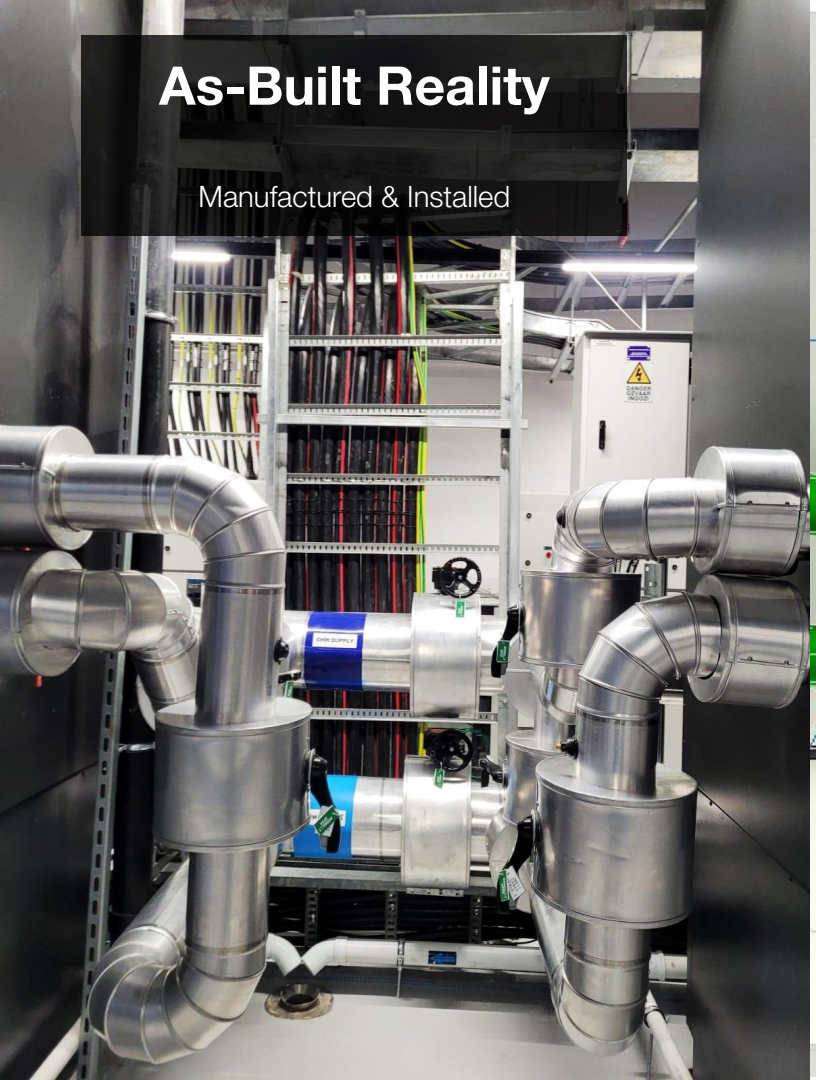



Image Credit: C. Davey, 2016. Copyright.

Image Credit: C. Davey, 2016. Copyright.

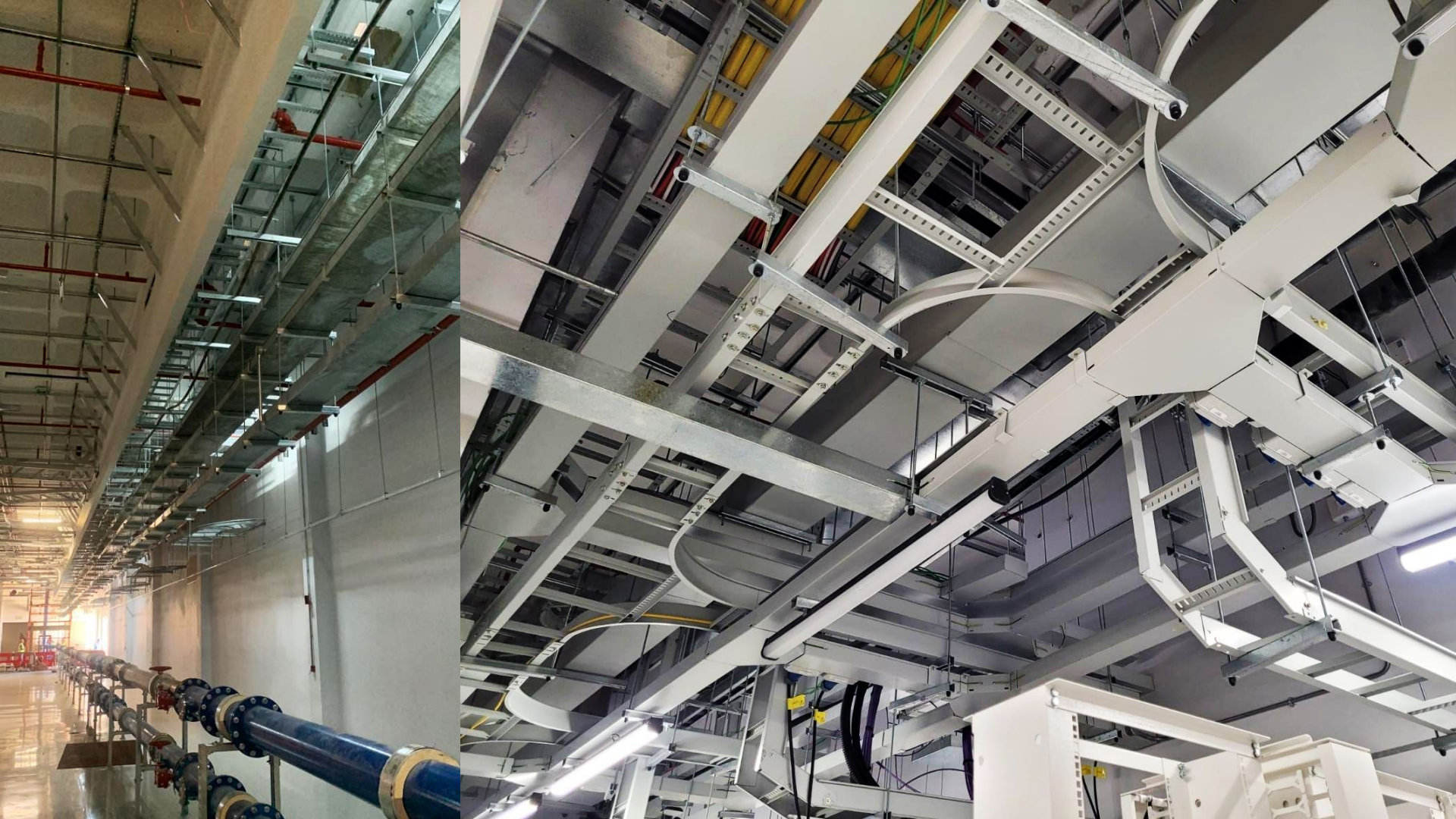


## As-Built Reality

Manufactured & Installed

## BIM Technical Coordination Model

Detail Design & Coordination for Construction



BIM Work Stages

# Stage 5

## Manufacture & Construction

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OPENSPACE, BAKER BAYNES


# 360° Jobsite Capture & Artificial Intelligence

**Jaco Barnard,**
**Managing Director, Agile Business Technology**

# OpenSpace Automates 360 Documentation & Analytics

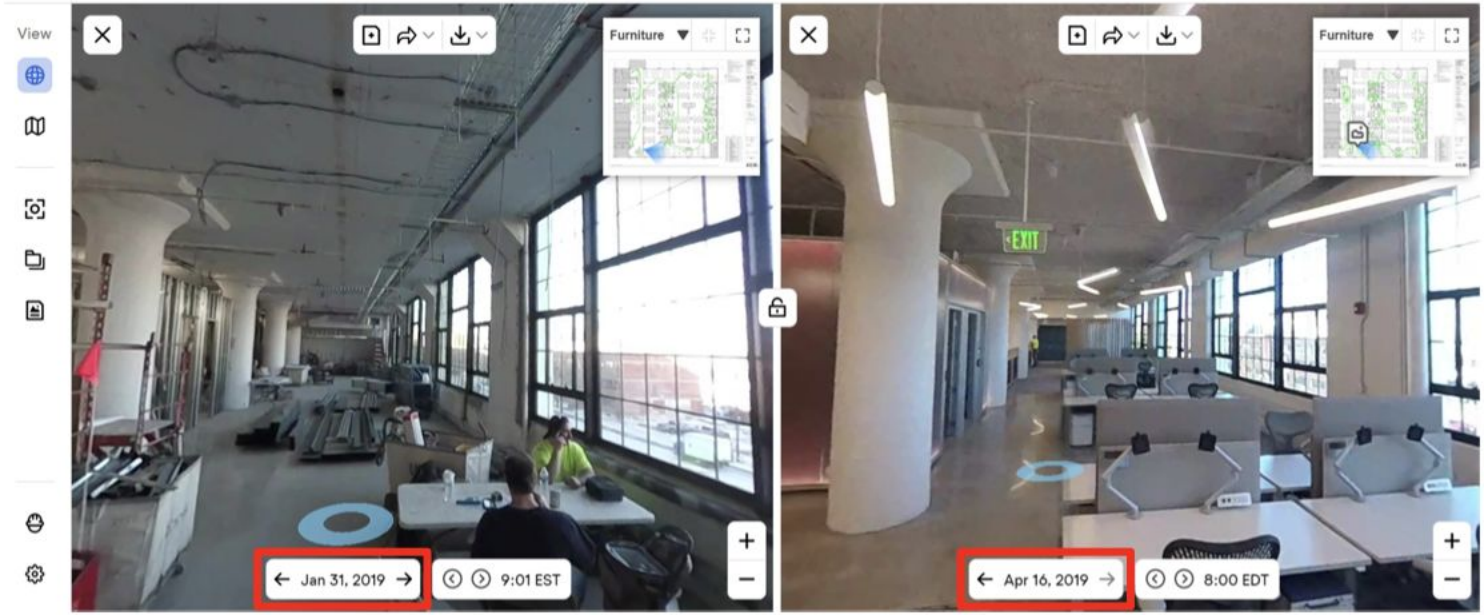
## HOW IT WORKS

A wearable 360 camera and mobile app (iOS and Android supported).

OpenSpace Vision Engine processes, organizes, and securely stores the data

Browser-based virtual jobsite viewer. Integrated with project management software.

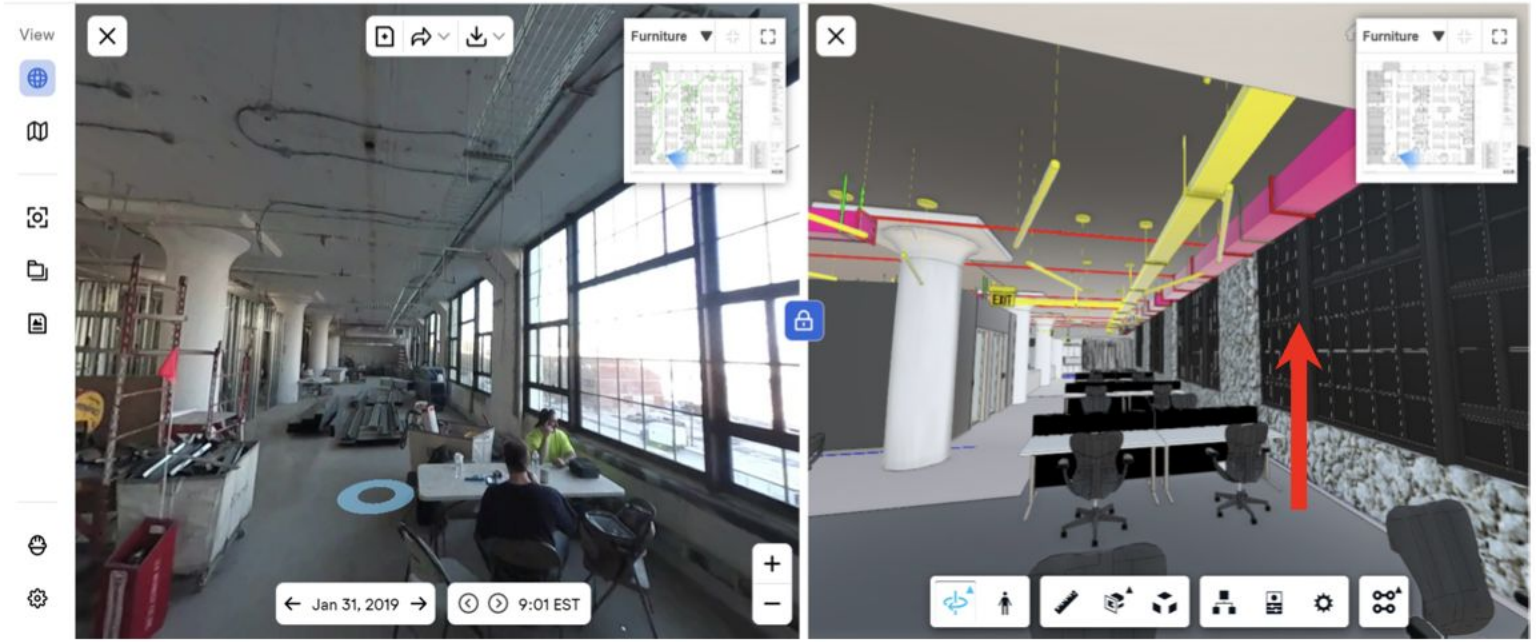
# See What Was There Today, Yesterday, a Week Ago, or Even Five Years Ago






OPENSPACE

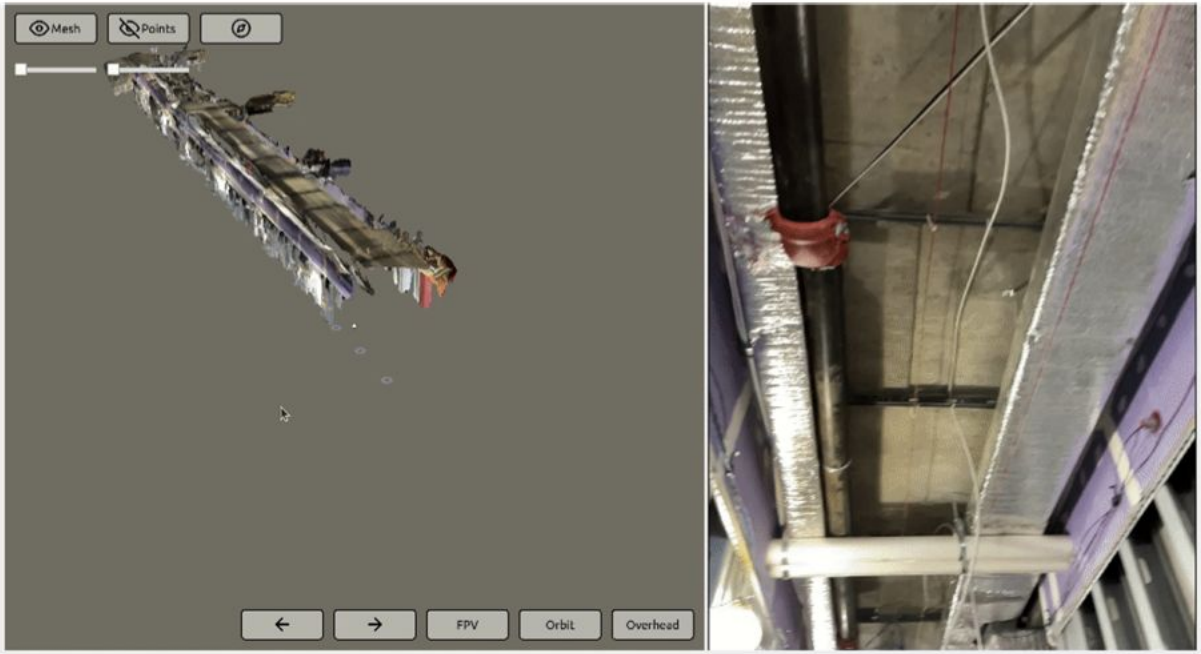
# Compare Actual Site Conditions to Your 3D Model






OPENSPACE

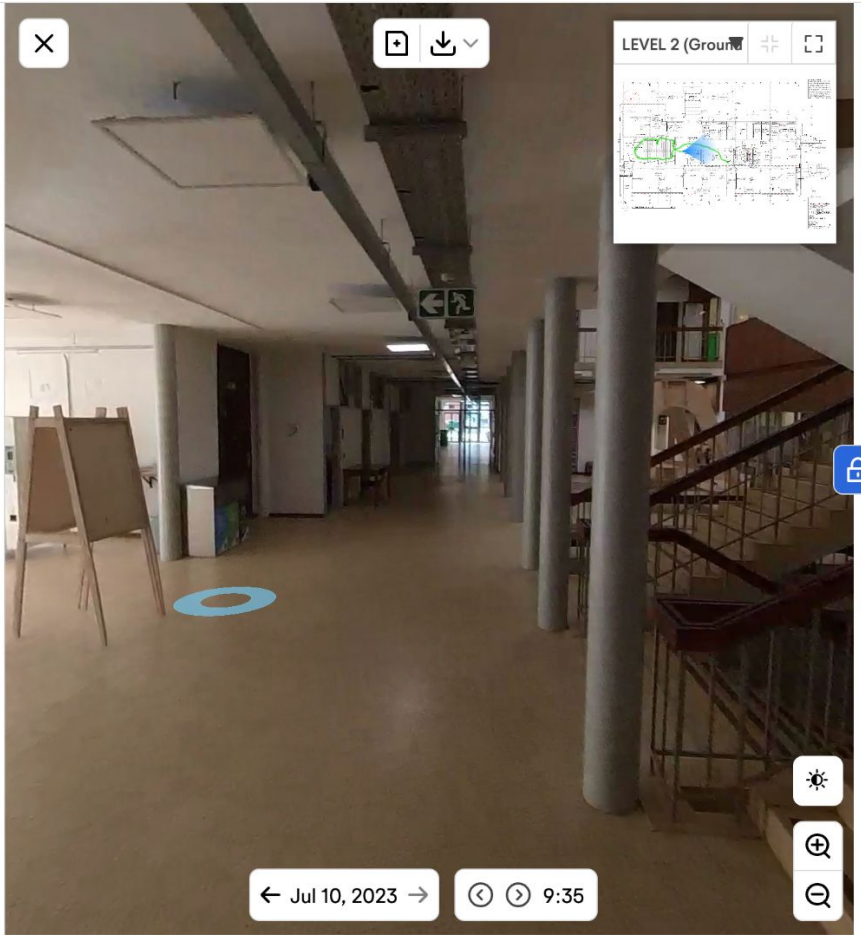
# 3D Scanning with Smart Phones






OPENSPACE

View




# Three Pillars of 360 Jobsite Capture

## Simple

Tap Start
Walk like Normal
Tap Stop

## Fast

30 minutes or less from upload to view

## Powerful

If you can use Google Street View you can use OpenSpace



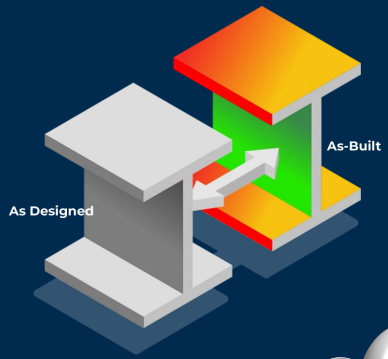


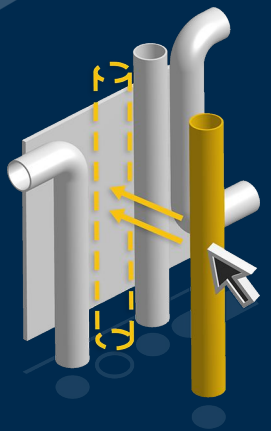


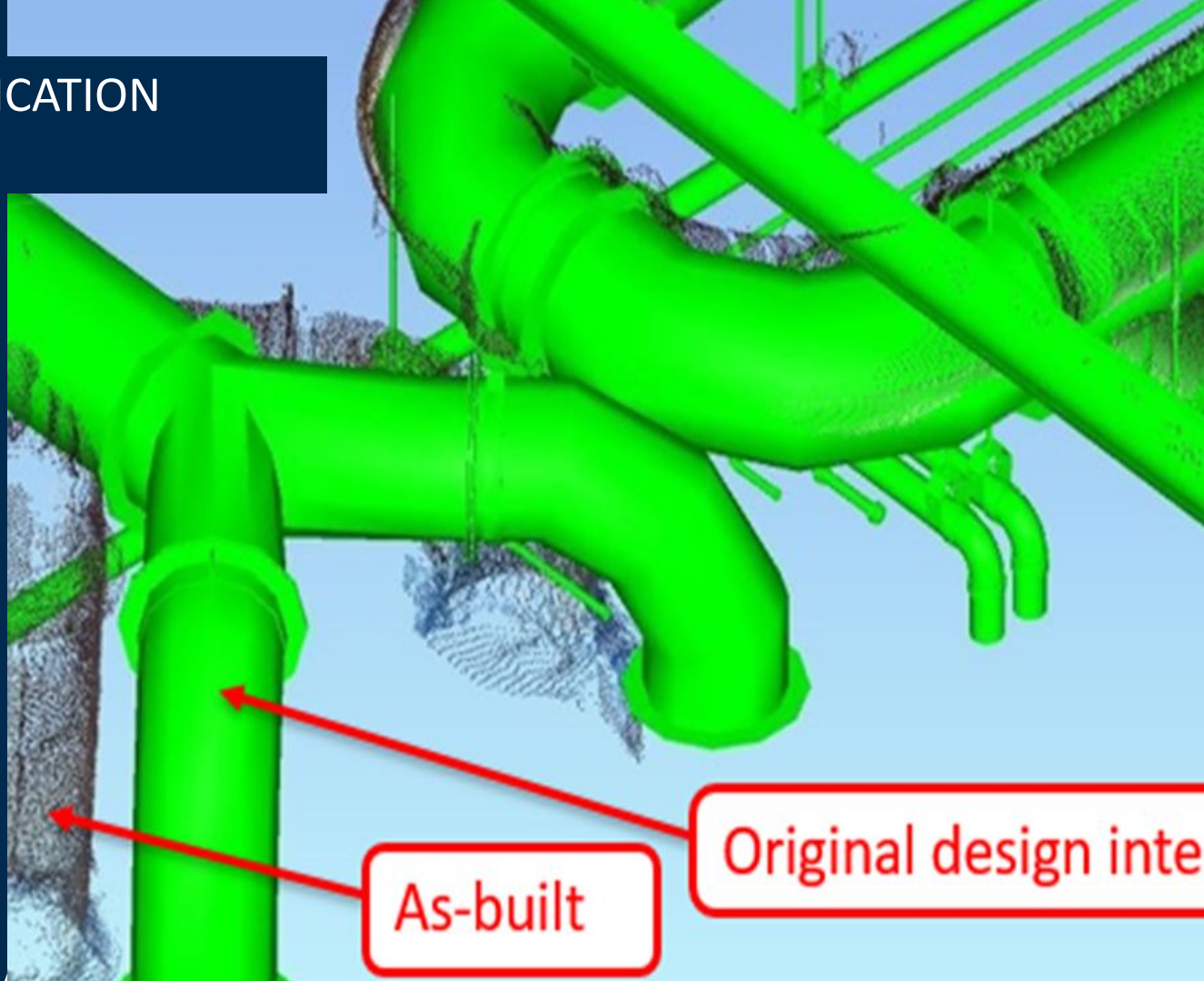
LEAVE NO ROOM FOR INTERPRETATION

# REALITY CAPTURE
## Construction Monitoring

# CONSTRUCTION VERIFICATION
## Quality Control



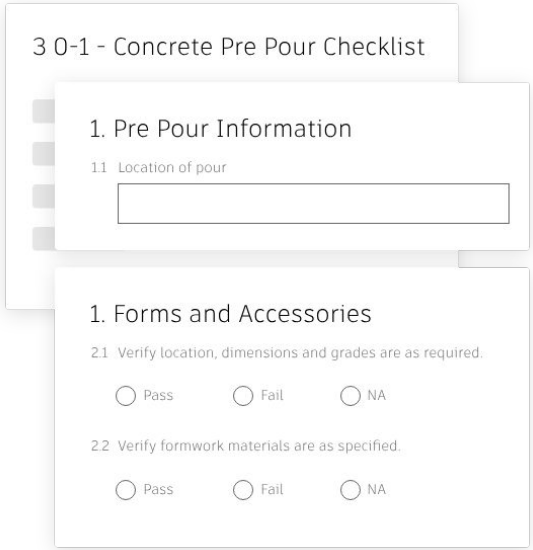



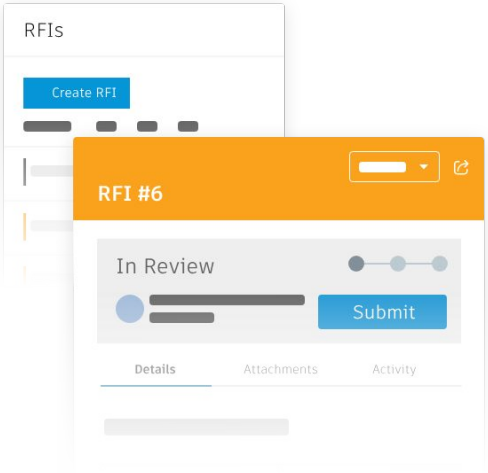


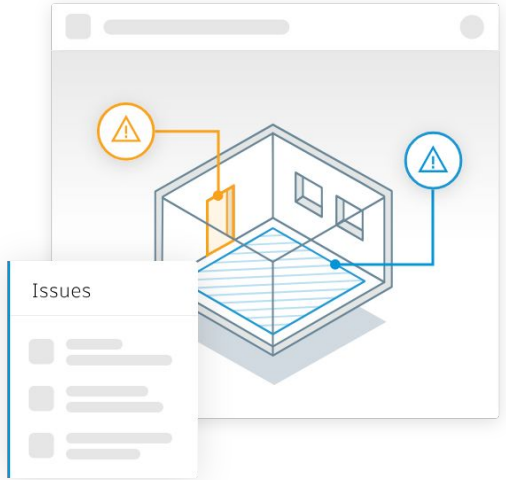
# QUALITY INSPECTIONS

# CONSTRUCTION MANAGEMENT

## MANAGE AND TRACK CONSTRUCTION ISSUES & CHANGES



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BIM Work Stages

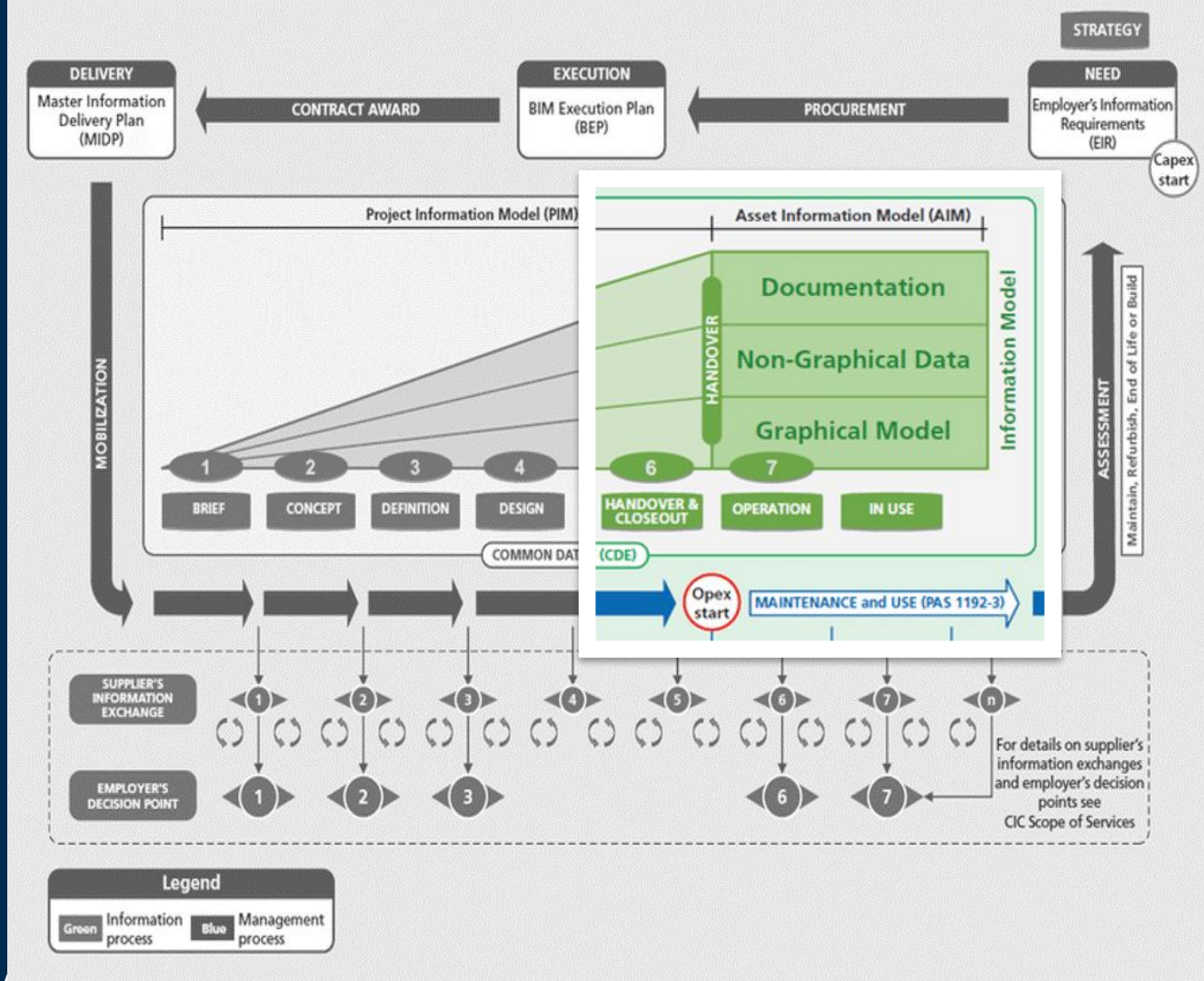
# Stage 6

## Close-out & Handover

BAKER BAYNES

# BIM

## From PIM - AIM



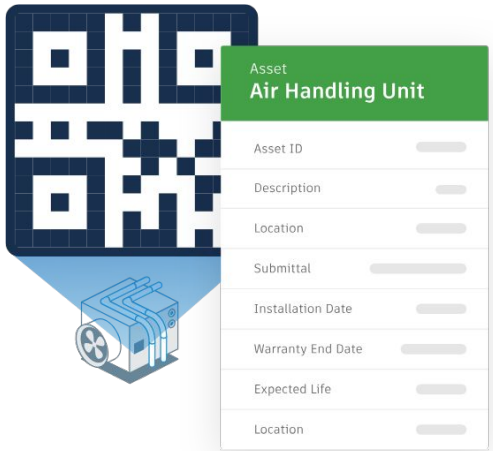
## COMMISSIONING

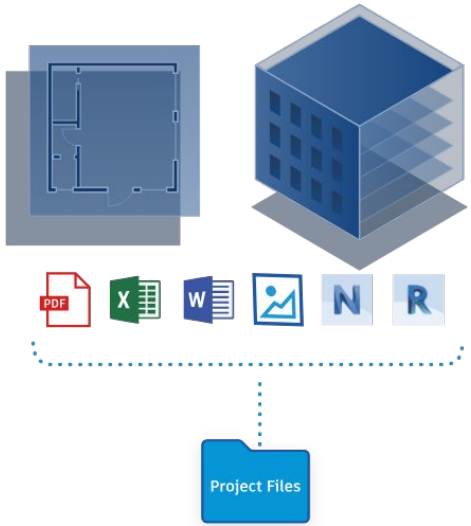
- Access asset data and resolve defects

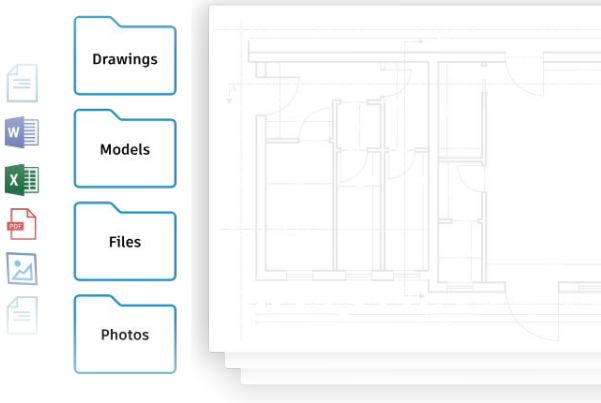
## GENERATE TURNOVER DOCUMENTATION

– That meets Information Requirements

## DELIVER ACCURATE AS-BUILTS

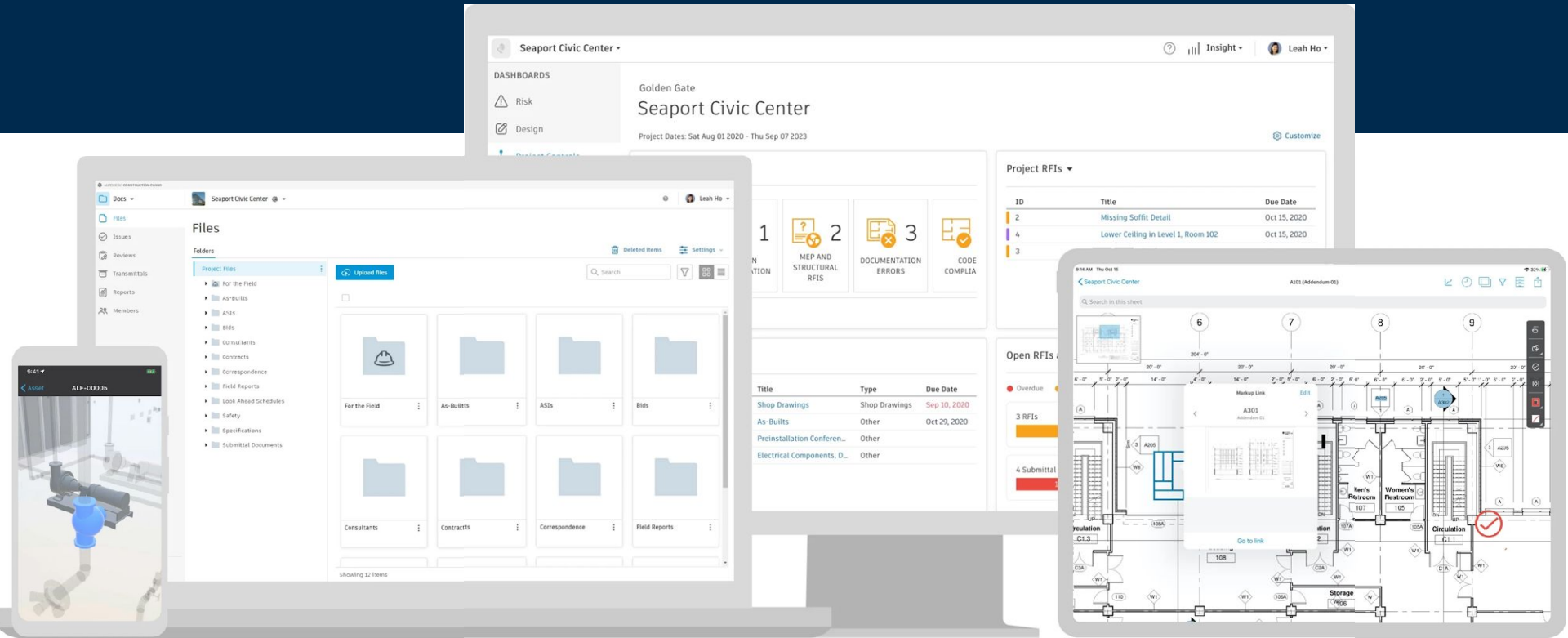


# COMMON DATA ENVIRONMENT

- Structured information, that someone can find (and use) 10 years down the line



BIM Work Stages

# Stage 7

## Operations & Use

ESRI, YORK BROTHERS CONSTRUCTION

# ArcGIS GeoBIM

Connecting projects and assets in context

## Improving project coordination and delivery

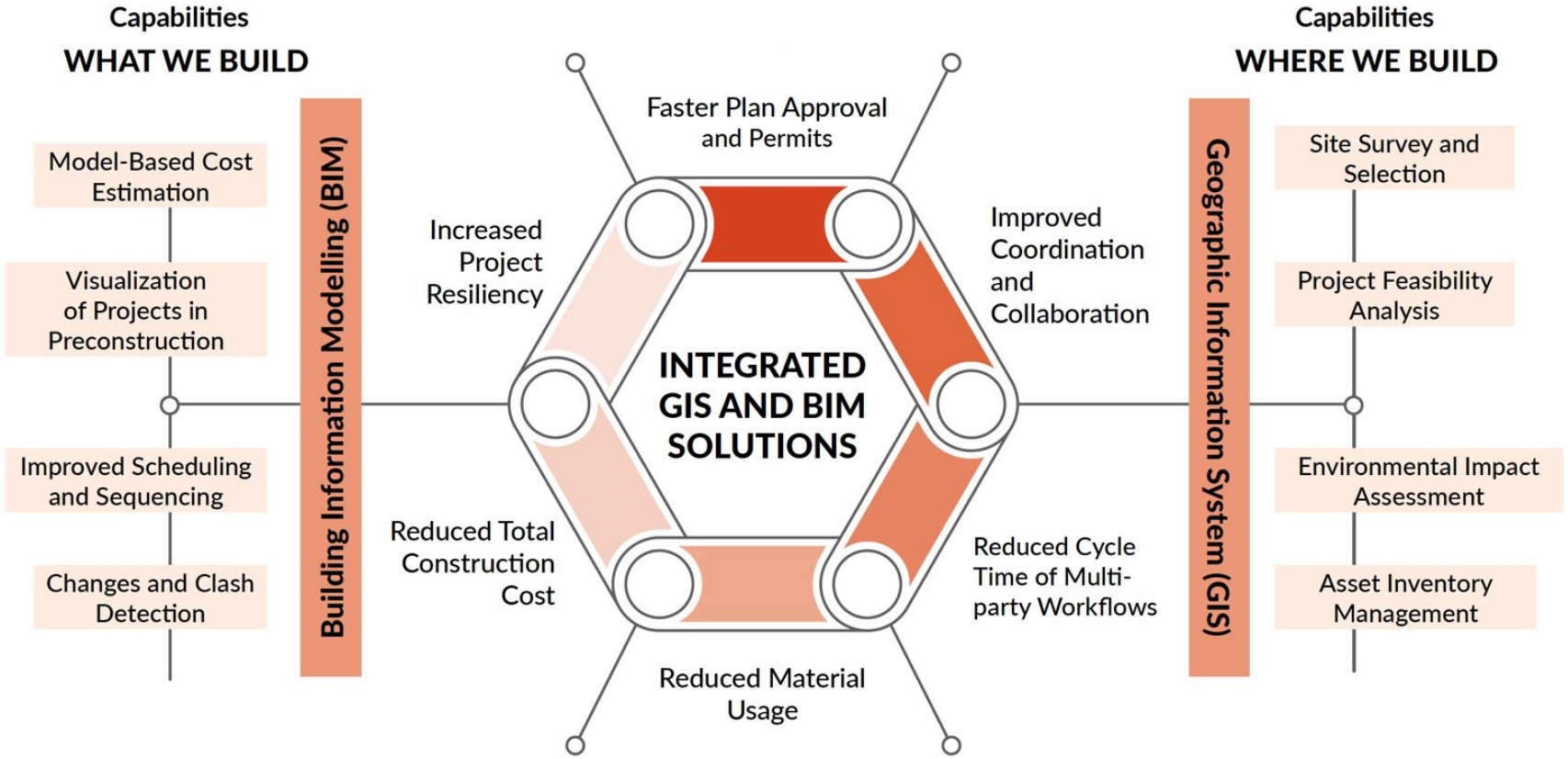
ArcGIS GeoBIM delivers an innovative, easy-to-use web-based experience for teams to explore and collaborate on building information modeling (BIM) projects and issues, using data from multiple systems in a geospatial context. Architecture, engineering, construction (AEC) and operations teams can easily work with linked data and documentation in configurable web apps to simplify communication and collaboration.

esri South Africa

www.esri-southafrica.com | +27 11 238 6300 | info@esri-southafrica.com

BIM Harambee .Africa

# GIS and BIM benefits



# ArcGIS GeoBIM

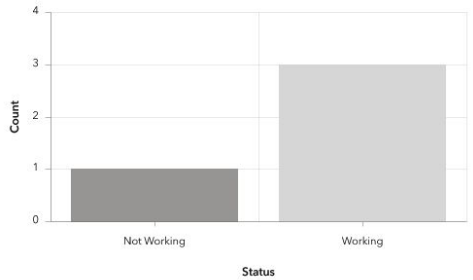
# Campus Operational Management

## Utilities Maintenance Assignments Dashboard

Work Order ID: None

Assignment Type: None

### Working Status




### Number of Assignments

22

In the Last 90 days

### Completed Assignments


In the Last 90 days

19 of 22

**Assignment Type: Electricity-Daily and Planned Maintenance**

| | |
|---|---|
| Description | IT Fibre Nodes due for quarterly maintenance check |
| Priority | Low |
| WorkOrder ID | US-019 |
| Due Date | 21/10/2022, 09:00 |


### List of Assignments

Work Order ID: US-015
**Assignment Type**: Fibre-Unplanned Maintenance
Status: Assigned
Priority: Critical

Work Order ID: US-017
**Assignment Type**: Fibre-Unplanned Maintenance
Status: Completed
Priority: Critical

Work Order ID: US-020
**Assignment Type**: Fibre-Condition-Based Maintenance
Status: Assigned
Priority: Critical

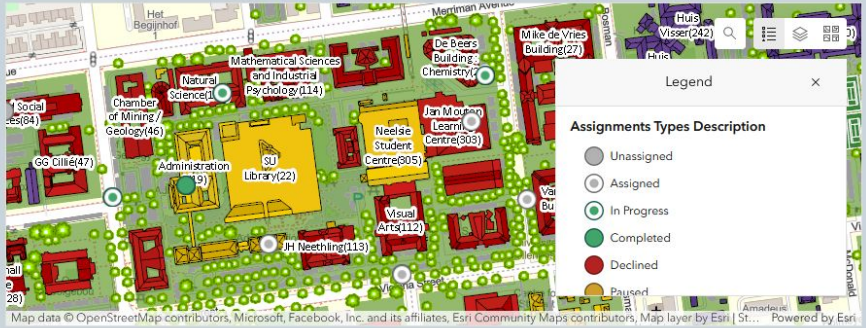
### Workers

Technician
Viewer User
Working

Technician
Odwa Dandala
Working

Lead Technician
Skhumbuzo Simelane
Not Working

Technician
Rudolf de Munnik
Working




### Assignment Status

# Campus Operational Management

## Maintenance Condition Assessment Dashboard

| Work Order ID | Condition | Verification Status |
|---|---|---|
| None | None | None |

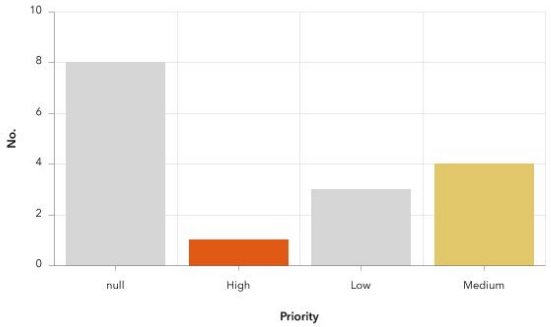
**Total Surveys**

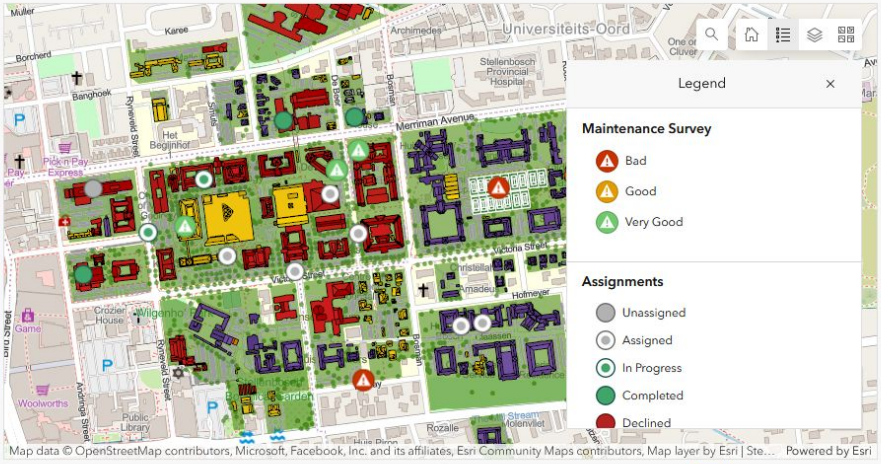
16

Submitted

| Bad | Good | Very Good |
|---|---|---|
| 2 | 9 | 5 |

### Received Priority Status




1 of 16

**Survey Details**

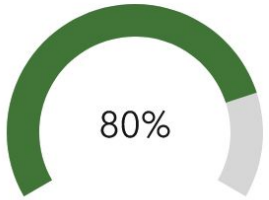
**Mobile Worker Maintenance Form**

| | |
|---|---|
| Work Order ID | US-011 |
| Completion Date | 13/10/2022, 12:49 |
| Status | Completed |
| Priority | Medium |
| Assignment Type | Condition-Based Maintenance |
| Assignment Description | De Beers Building - Construction along the parking lot cut the entry IT fibre cable . Construction to be alerted about underground fibre entry points. Costs unknown. To assess affeuted floors. |

9 of 11

**Survey Details Attachments**


### Work Progress Status




Work Order ID: US-011
**Assignment Type**: Condition-Based Maintenance
Completion Date: 13/10/2022, 12:49
Manager to approve costs.

Work Order ID: US-011
**Assignment Type**: Condition-Based Maintenance
Completion Date: 13/10/2022, 12:49
Manager to approve costs.

Work Order ID: US-013
**Assignment Type**: Condition-Based Maintenance
Completion Date: 13/10/2022, 13:59
The status is still good for another 3 months

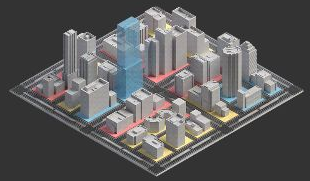
Work Order ID: US-011
**Assignment Type**: Condition-Based Maintenance
Completion Date: 13/10/2022, 12:49
Manager to approve costs.

Work Order ID: US-016
**Assignment Type**: Condition-Based Maintenance
Completion Date: 14/10/2022, 07:23
Assessed, in good condition

Work Order ID: US-019
**Assignment Type**: 489071a8-d594-4650-96d4-259cb145750f
Completion Date: 21/10/2022, 09:00

HEFMA
southern africa

# CAMPUS DIGITAL TWIN



PLAN

DESIGN

OPERATE

BUILD

Stellenbosch University
forward together
sonke siya phambili
saam vorentoe

# Stellenbosch University Campus Map

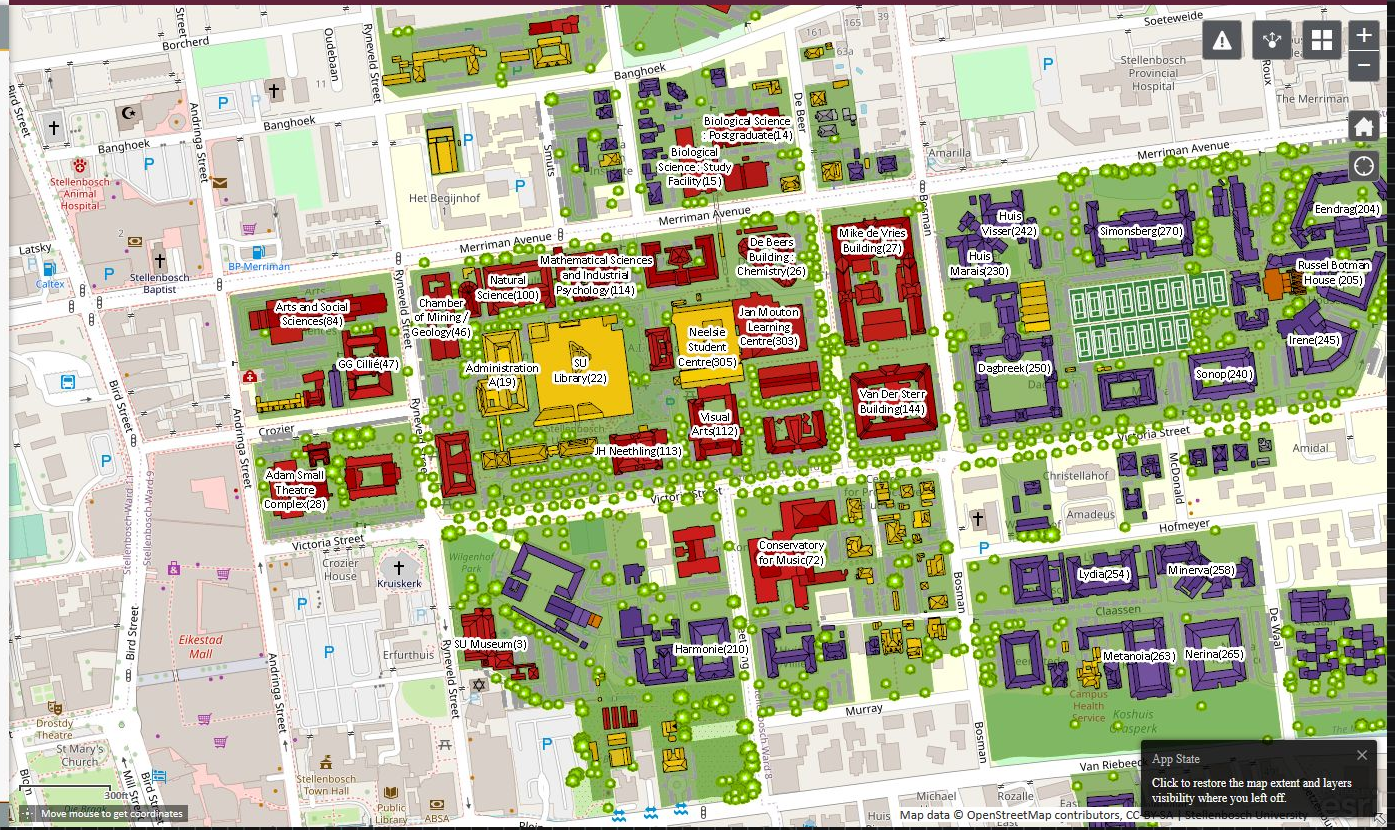
Feedback | Help

## Search

Enter search text

- Campus
- Parking Area
- Campus Destinations
- Libraries
- Faculties
- Building

Clear




App State

Click to restore the map extent and layers visibility where you left off.

# CAMPUS NEW BUILDING DESIGN

# CAMPUS FIELD WORK MOBILE

Mobile Worker Maintenance Form

Work Order ID

US-013

location

Verify that the location is turned on in your device

33°56'S 18°52'E


Name & Surname

Odwa Dandala

Staff email

odandala@esri-southafrica.com

Worker ID *

OD

Completion Date

Thursday, 13 October 2022

13:59

Mobile Worker Maintenance Form

Completion Date

Thursday, 13 October 2022

17:08

Status *

- In Progress
- Declined
- Completed
- On Hold

Priority

Medium

Assignment Type *

Condition-Based Maintenance

Assignment Description

Assess condition of fibre

On Site Notes

Please provide any additional notes

Everything is good

4982

Mobile Worker Maintenance Form

Condition *

- Bad
- Good
- Very Good

Pictorial Evidence

Signature *

**Compliance***

I agree that the assignment is completed

# CAMPUS FIELD SURVEYS

## Maintenance Condition Assessment Dashboard

| Work Order ID | Condition | Verification Status |
|---|---|---|
| None | None | None |

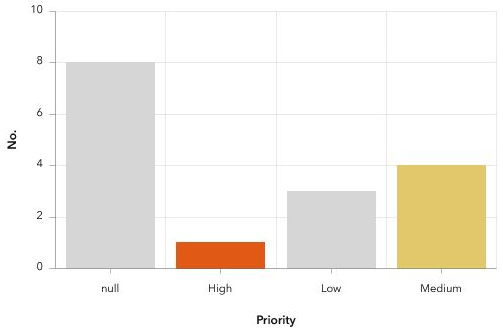
Total Surveys

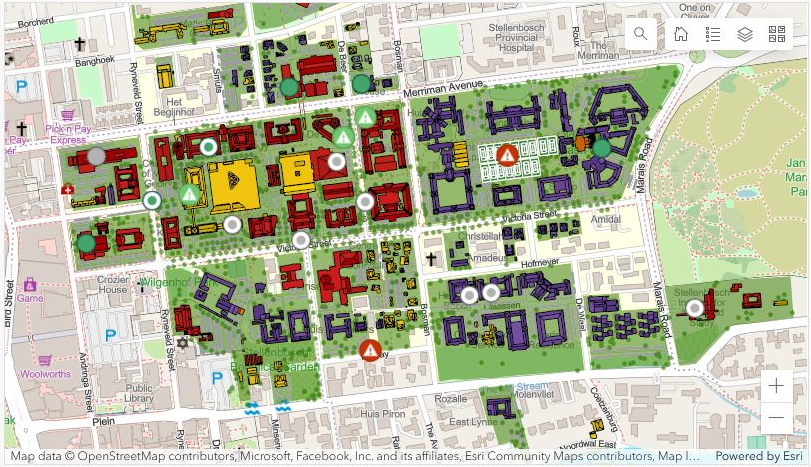
16

Submitted

| Bad | Good | Very Good |
|---|---|---|
| 2 | 9 | 5 |

### Received Priority Status




1 of 16

**Survey Details**

### Mobile Worker Maintenance Form

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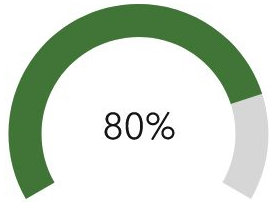
9 of 11

**Survey Details Attachments**


### Work Progress Status

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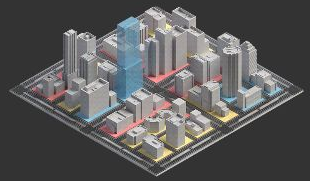
HEFMA
southern africa

# CAMPUS DIGITAL TWIN



PLAN

DESIGN

OPERATE

BUILD


27, 28 July 2023

BIM
The Future of Work

BIM Harambee .Africa

Hosted at the Department of Architecture, Boukunde building, University of Pretoria

## To Play - Download
## ArcGIS Field Maps

Download on the App Store

GET IT ON Google Play

..... more detail @ venue

esri South Africa

BIM Harambee .Africa

BIM Work Stages

# Stage 8

## Heritage or Decommissioning

BIM Harambee .Africa

UNIVERSITY OF PRETORIA

# RESULTS from an Industry Perspective: (b) Unpack the value / learnings

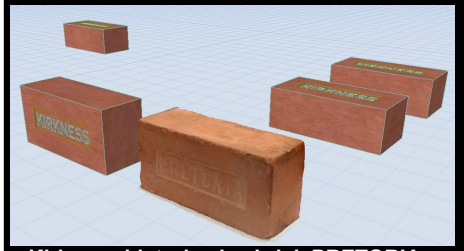
**IPAD Pro 12.9- inch**
**6th Generation**

**Application (APP)**

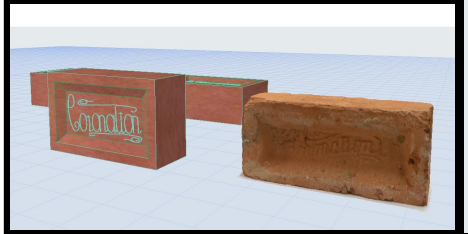
polycam

**Learnings:**

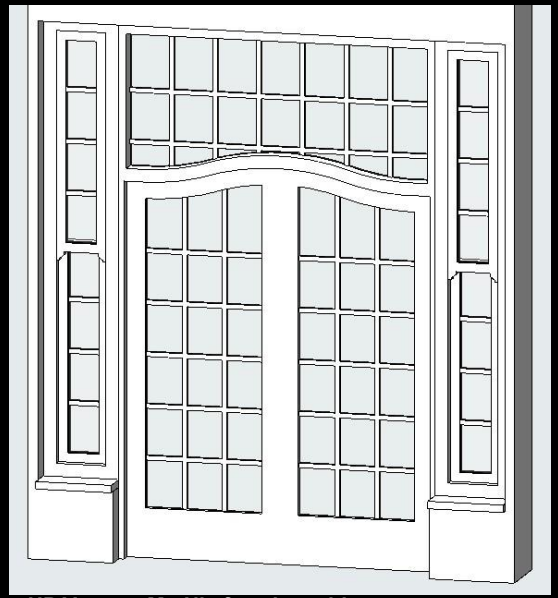
2. Scanning as a sole means of recording is not sufficient to produce the level of accuracy & detail required.
2. Point Cloud Data cannot be 100% accurately translated into any CAD model.
3. Accuracy required to capture complex historic fabric require accuracy to the millimetre. ***(5mm discrepancy over 100m = 500mm)
4. HPA also in the process to compile a 3D library of historic fabric



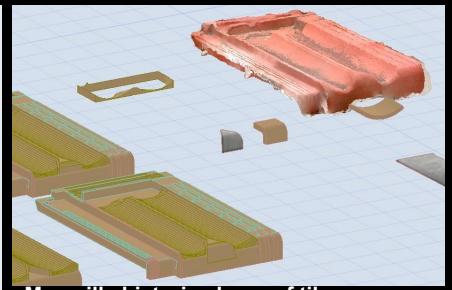

Kirkness historic clay brick PRETORIA (est 1888) - quarry @ UP Groenkloof Campus)




Coronation historic clay bricks DURBAN (est 1902 @ coronation of Edward VII)



UP Vergeet-My-Nie female residence – door to archive

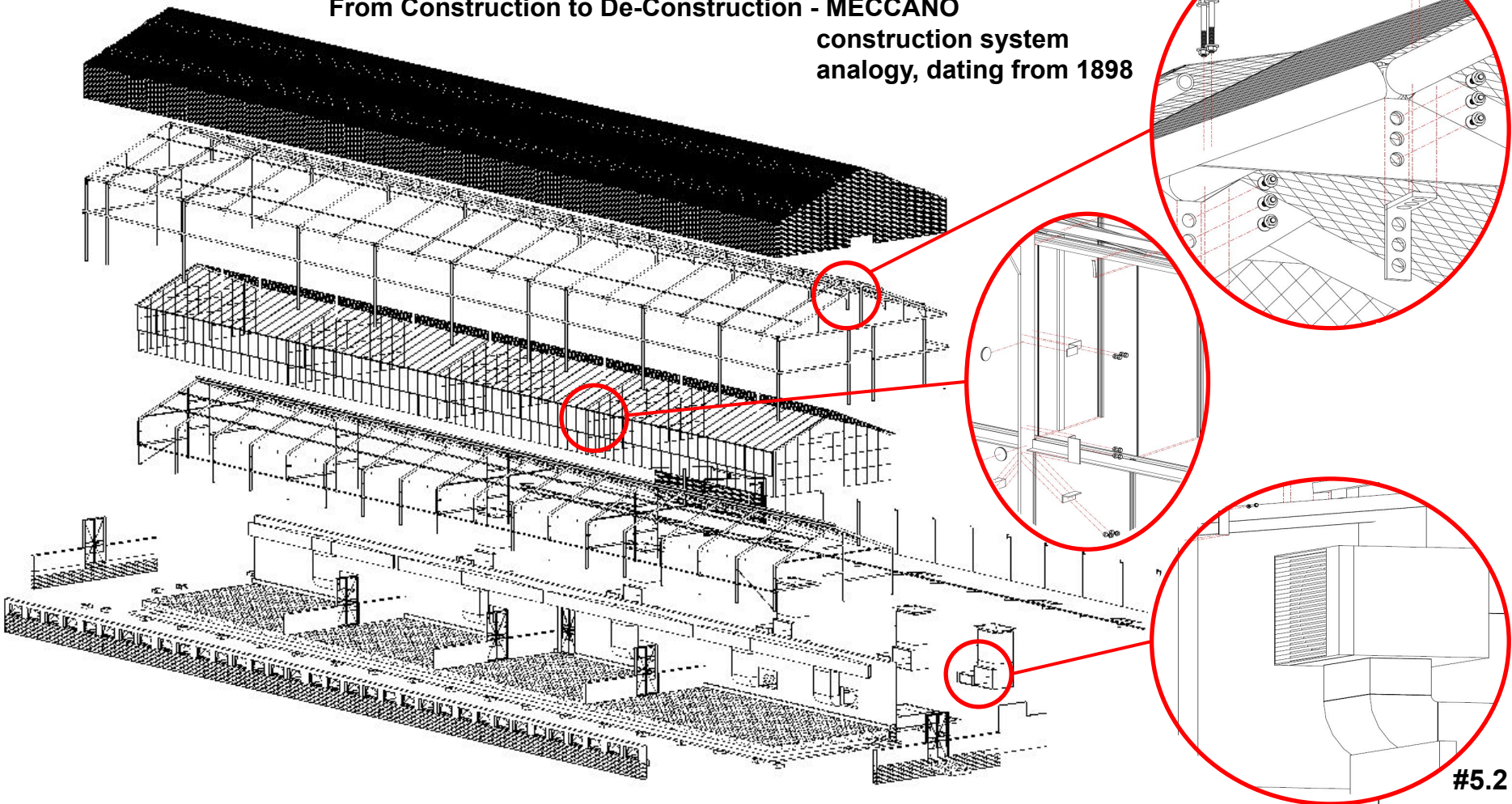


Marseille historic clay roof tile (various models)

Pta City Hall Historic Kirkness clay roof tile

#5.3

**Greenhouse 1 exploded CAD model – with 100% accuracy down to each nut & bolt.**
**From Construction to De-Construction - MECCANO construction system analogy, dating from 1898**



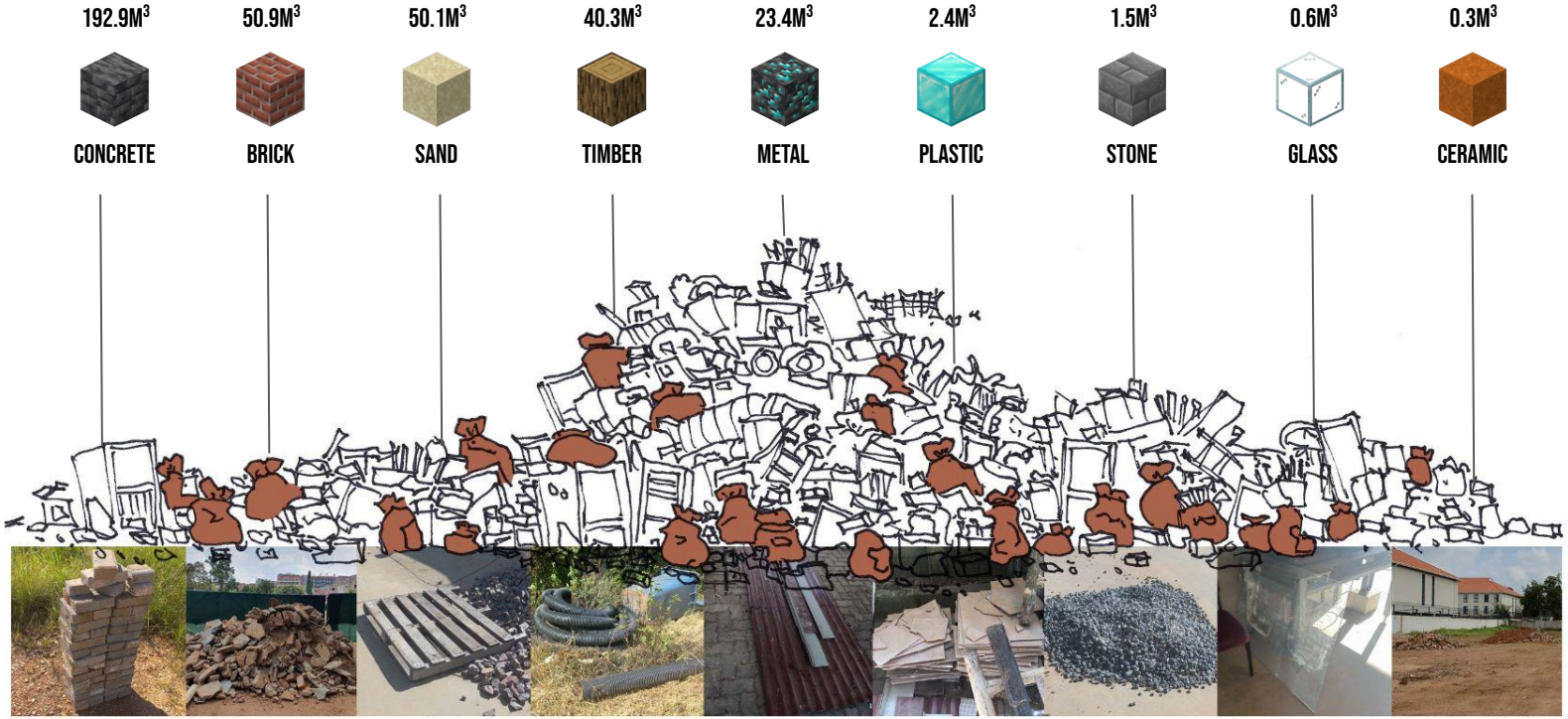
BIM Work Stages

# Stage 9

## Circularity & Re-Use

BIM Harambee .Africa

UNIVERSITY OF PRETORIA




"WASTE, EXCLUDING HAZARDOUS WASTE, PRODUCED DURING THE CONSTRUCTION, ALTERATION, REPAIR OR DEMOLITION OF ANY STRUCTURE, AND INCLUDES RUBBLE, EARTH, ROCK AND WOOD DISPLACED DURING THAT CONSTRUCTION, ALTERATION, REPAIR OR DEMOLITION."
(DEPARTMENT OF ENVIRONMENTAL AFFAIRS, 2012)

# Reframe Real-World Problems

## Heritage & Circularity Opportunities

TAYLOR, 2023
GOVENDER, 2023
MINECRAFT, 2023


Wait a minute,
BIM and Digital Twins are simply the vehicles to create a
Circular Built Environment

BIM Harambee .Africa

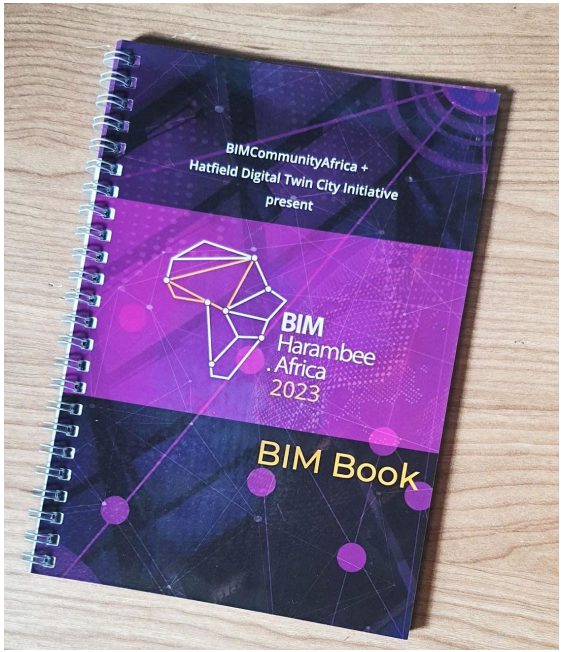
27 July 2023

Welcome to

# The Future of Work

## Afternoon Activities

BIM Harambee .Africa




## Thurs 27 July | How it works

### IMPORTANT INFORMATION

After the presentations on Thursday morning, you will get the chance to explore Boukunde and see what exciting tech is available. And also take part in the Scavenger Hunt that some of our partners are hosting. Check out their stand for more info.

### Floor by Floor

You will see on your nametag that you have a coloured dot. Each dot represents the group you belong to. Red dots in the red group etc.

**Starting at 11h45, you will go to the floor as assigned below. Every hour you will move to the next floor as allocated.**

| | 11h45 | 12h45 | 13h45 | 14h45 |
|---|---|---|---|---|
| | Basement | Ground Floor | Floor 1 | Floor 2 |
| | Ground Floor | Floor 1 | Floor 2 | Basement |
| | Floor 1 | Floor 2 | Basement | Ground Floor |
| | Floor 2 | Basement | Ground Floor | Floor 1 |

Make sure you ask questions, listen to the presentations and exhaust your curiosity!

**Refreshments are available for sale from the Vida-e Caffé in the basement, and The Artisan pop-up (both in Boukunde).**
**For more substantial meals, you can find 'The Artisan restaurant' next to Rautenbach Hall.**