*"**Integrating** and **Digitalising** the Built Environment **Value Chain**"*

Streamlining work processes and **connecting** stakeholders...

...through **digital data**, **innovation** and **technology**...

...across the **whole project life cycle** from design, construction, fabrication, to facilities management...

... to deliver a **better outcome** for end users.

INTEGRATED DIGITAL DELIVERY

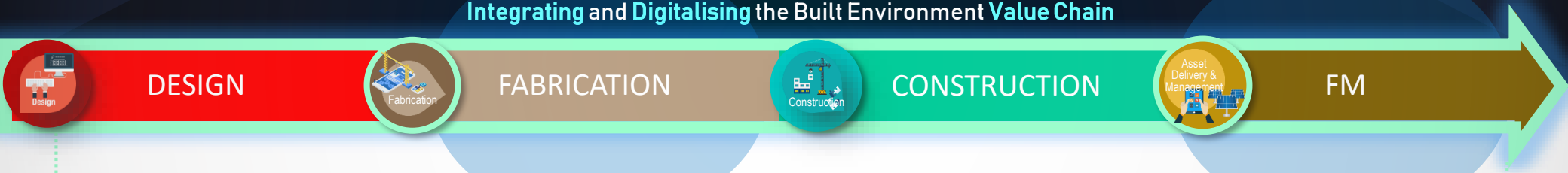
IDD TECHNICAL GUIDE: **THE "HOW" OF IDD IMPLEMENTATION**

Key Areas to Move From VDC to IDD

Build Twice: First Virtual, then Real

DESIGN → CONSTRUCTION

Integrating and **Digitalising** the Built Environment **Value Chain**



STREAMLINED AND INTEGRATED PROCESSES

FABRICATION
Key to **value chain** integration

FM
Key to **life cycle** integration

IDD Implementation Overview

Identify **IDD USE CASES** ⋯⋯> Determine key areas to further **STREAMLINE AND INTEGRATE**

- DESIGN COORDINATION
- SHOP DRAWING APPROVAL
- PRODUCTION MANAGEMENT
- LOGISTICS TRACKING
- RESOURCE MANAGEMENT
- PROGRESS MONITORING
- ASSET MODEL HANDOVER
- SMART FM

Example:

BIM based coordination & shop drawings

ICE coordination & **virtual mock-ups**

- **Streamlined** ICE process
- Improved **information standards**
- **2D + BIM** hybrid shop drawings
- **Digital** submission & approval
- **Automated** checking

Process Innovations & Transformation

[RESOURCES]

See examples of **IDD USE CASES** and download **TEMPLATE**

See **IDD FRAMEWORK AND METHODOLOGY** for process streamlining and integration

See **CASE STUDIES** for examples of process transformation

IDD Use Cases Across the Value Chain

The following are some examples of IDD use cases that you can consider for every phase:

DESIGN

- Generative design
- Design optimization
- Design analyses and simulations
- Integrated design modelling
- Design collaboration
- ICE coordination
- Digital virtual mock-up
- Advanced visualization
- Design model quality checking
- Cost planning and estimates
- Tender documentation

FABRICATION

- Fabrication detailing
- Detailed fabrication coordination
- BIM-based fabrication drawings
- Fabrication drawing submissions & approval
- Quantity Takeoff
- Digital procurement
- Production planning and scheduling
- BIM for off-site production automation
- Production management
- QA/QC Inspections
- Logistics tracking and monitoring

CONSTRUCTION

- Cloud-based model collaboration
- Construction ICE coordination
- Digital virtual mockups
- RFI & issue documentation & tracking
- Materials submission & approval
- Shop drawing submission & approval
- Construction planning & scheduling
- Cost planning & cost control
- BIM-to-Field (digital layout)
- Progress monitoring
- Progress update & claims
- QA/QC inspections
- Safety planning, surveillance, & inspections

FM

- As-built verification & documentation
- Defects management
- **Asset model handover**
- Digital commissioning
- Real-time monitoring of asset performance
- Smart operation and maintenance

[SAMPLE IDD USE CASE]

RFI and Issue Documentation & Tracking

KPI

Reduced time taken for issue documentation and resolution

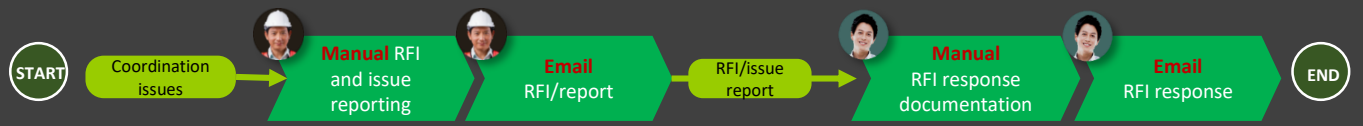
CHALLENGE STATEMENTS:

- Reduce manual documentation and paperwork
- Improve issue / RFI response time
- Move towards real-time issue tracking and monitoring

PROCESS

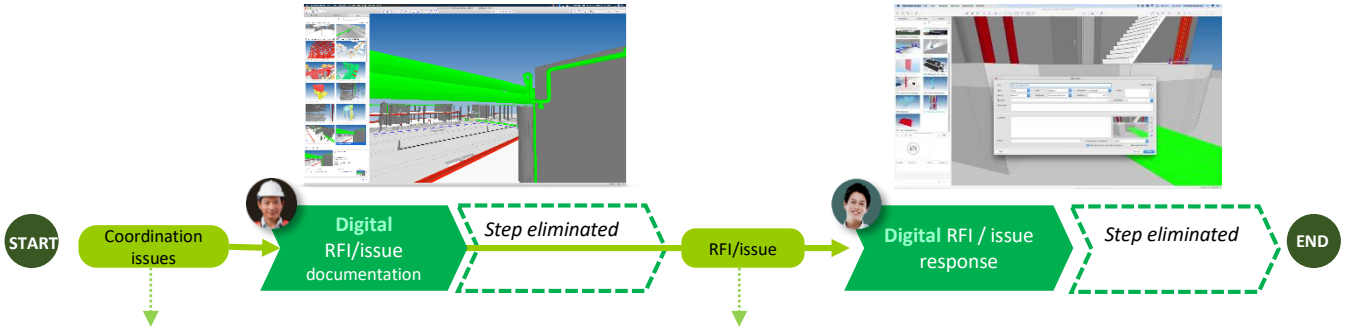
CONVENTIONAL PROCESS:

After ICE sessions, issue reports and RFIs are still manually compiled, documented, and tracked



NEW PROCESS:

RFIs and issues are captured via a cloud-based platform, thereby reducing manual documentation while providing real-time updates to issue resolution status



INFORMATION

All issues are tagged with key information that are necessary for tracking and data analytics

BCF format:

- ❑ 3D location of clash
- ❑ Other textual information

Issue / RFI parameters:

- ❑ Issue / RFI tracking number
- ❑ Assigned responsible party
- ❑ Issue priority/urgency
- ❑ Type of issue
- ❑ Issue status

TECHNOLOGY

Clashes detected in Solibri are exported as BCF format to BIMCollab for cloud-based tracking and issue monitoring

IDD Framework & Methodology

The following methodology serves to guide project teams in utilizing the IDD framework to improve and transform actual processes. As these are only a set of guidelines, your team may implement any of the principles as you see fit, so long as your outcome is to **apply innovative thinking and digital technologies to streamline and integrate current processes in project delivery.**

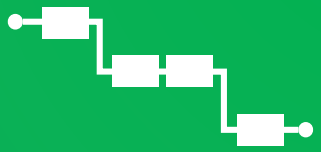
START ····· END

01

OUTCOME BASED KPIS

Clearly define **challenge statements** to meet **desired outcomes**

02



PROCESS STREAMLINING

Identify process **bottlenecks** and brainstorm innovative **countermeasures**

03

INFORMATION STANDARDS

Streamline critical **information exchanges** and define **data standards**

04

COMMON DATA ENVIRONMENT

Effectively set up **Common Data Environment** and apply **digital technologies** to support streamlined processes

Outcome based KPIs

OUTCOME-BASED KPIs

- Provides intent and direction for process streamlining
- Helps to identify key information exchanges for standardization
- Defines relevant project health indicators for CDE data analytics

PRIORITY OUTCOMES

Determine your desired project outcomes from IDD implementation

- ❑ *What is our client's desired outcome?*
- ❑ *What other outcomes are critical for this project?*
- ❑ *What outcomes are useful for benchmarking across similar projects?*

TIME: On Time Completion

$$ REWORK

QUALITY

CRITICAL USE CASES

Identify key project use cases that have the most effect on project outcomes

- ❑ *Which processes have the most potential to meet or improve our outcomes?*
- ❑ *Which processes are bottlenecks or barriers to outcomes?*
- ❑ *E.g. Which processes result to the most delays or rework?*

TIME: On Time Completion

DESIGN CONFIRMATION

LOGISTICS TRACKING

START 1 2

CHALLENGE STATEMENT

Define your specific objectives for process streamlining

- ❑ *What is our desired end state?*
- ❑ *In what areas do we want to improve this process?*

DESIGN CONFIRMATION

- ✓ *Reduce process time of **design confirmation***
- ✓ *Reduced number of design changes*

TARGET KPIs

Identify relevant measurable KPIs and set targets

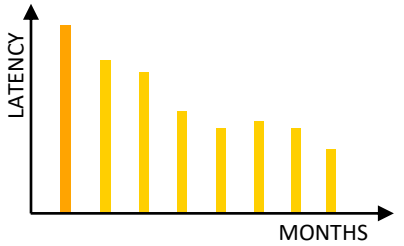
- ❑ *Can we translate our challenge statements into KPIs that can be measured?*
- ❑ *What is our current benchmark?*
- ❑ *What is our target productivity improvement?*
- ❑ *Do these KPIs help achieve our outcomes?*

Reduce design confirmation latency **from xx to xx**

METRICS

Identify relevant metrics or project health indicators for performance tracking over time

- ❑ *What indicators are meaningful for us to track?*
- ❑ *How do we measure?*
- ❑ *What are our sources of data?*



3 4 5 PROCESS

Process Streamlining

The "How" of achieving outcomes and KPIs

PROCESS STREAMLINING

Helps to identify key information exchanges for standardization

Helps to identify relevant technologies & solutions to deploy

SET PROCESS BOUNDARIES

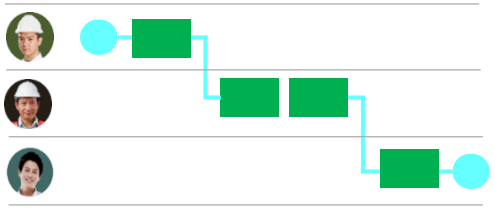
Determine your effective scope for process steam lining

- ❑ *What is our process start and end?*
- ❑ *Does this scope cover our objectives in question?*
- ❑ *Is this scope manageable?*

PROCESS MAP

Map how the process is currently being done (not how it should have been done)

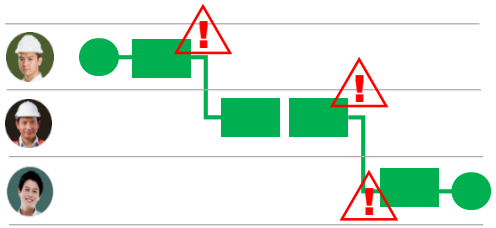
- ❑ *Who are the stakeholders involved in this process?*
- ❑ *Where do the process inputs come from?*
- ❑ *Where are the handoffs between stakeholders?*



PAIN POINTS

Walk through your process to identify current problems and inefficiencies

- ❑ *Which tasks or exchanges are still manual or inefficient?*
- ❑ *Which tasks typically result in errors?*
- ❑ *Are there any data re-entries, duplicate efforts, or rework?*

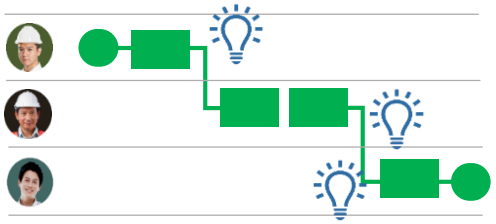


8

BRAINSTORM

Brainstorm possible areas for process improvement and innovative countermeasures to pain points identified

- ❑ *Can the task be digitalized or automated?*
- ❑ *Can the information be extracted from BIM or digital data?*
- ❑ *Can we improve our ICE or collaboration process?*
- ❑ *Can we improve our data standards?*

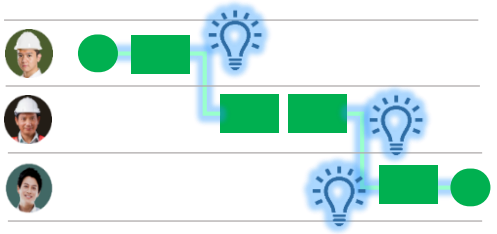


9

FUTURE STATE

Map proposed future state process incorporating brainstormed strategies

- ❑ *Which strategies should we prioritize for implementation?*
- ❑ *What resources do we need?*
- ❑ *How should we phase implementation?*



10

Information Standards

The “How” of achieving outcomes and KPIs

Streamlines processes even further through improved data exchanges

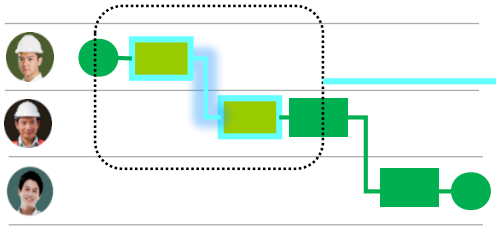
INFORMATION STANDARDS

Enables seamless data integration between digital solutions

KEY INFORMATION EXCHANGES

Identify critical information exchanges for further streamlining and standardization

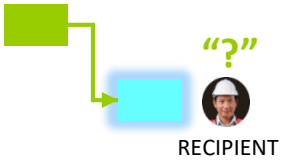
- ❑ *Which information exchanges are bottlenecks?*
- ❑ *Which exchanges are inefficient / result to rework or long latency?*
- ❑ *Which information deliverables can be improved?*



INFORMATION REQUIREMENTS

Determine information requirements from recipient

- ❑ *What information do I need to do my task effectively and efficiently?*
- ❑ *What information must be correct?*
- ❑ *Do I need it in a certain format?*
- ❑ *Can I streamline my information requirements?*



INFORMATION COMPLIANCE

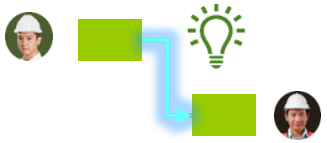
Determine extent of information compliance by author

- ❑ *Am I already providing these requirements?*
- ❑ *If not, can I consider to provide these requirements?*

BRAINSTORM

Brainstorm innovations to effectively and efficiently meet requirements

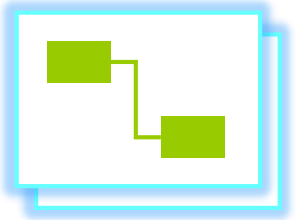
- ❑ *Can we automate information extraction / production?*
- ❑ *Can we automate checking / verification of information?*
- ❑ *Can we improve our standards and templates?*
- ❑ *Should we make further improvements to process?*



STANDARDISE

Document streamlined information exchanges as new / improved data standards which may include:

- ❑ *Deliverables*
- ❑ *Data format*
- ❑ *Core information*
- ❑ *Quality standards*



Common Data Environment

Provides insights to “project health” through data analytics

Digitalizes streamlined processes and other project use cases

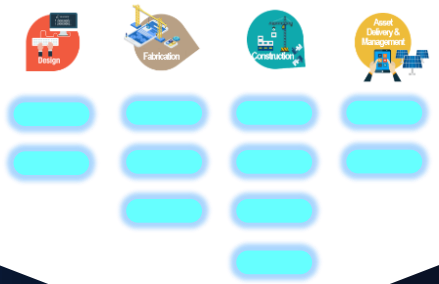
Digitalizes information exchanges

COMMON DATA ENVIRONMENT

DIGITAL USE CASES

Identify all digital use cases throughout your project

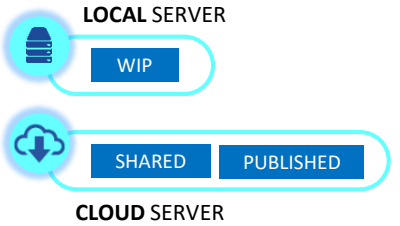
- ❑ *What are all the digital use cases for this process?*
- ❑ *What other digital use cases are we looking into for our project?*
- ❑ *What platforms, tools, or digital solutions are we using / considering for each use case?*
- ❑ *Does each tool provide the functionalities we require to carry out each use case effectively?*



DATA STRUCTURE

Determine appropriate data and folder structures to align with use case deliverables and workflows

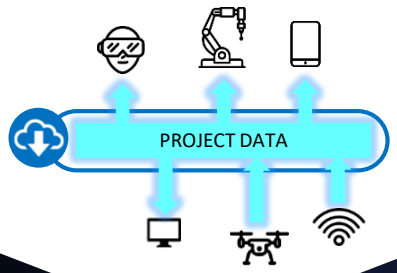
- ❑ *How should we best organize our project data and deliverables?*
- ❑ *Where should we store project data (Work in Progress, Shared, Published, and Archived) for ease of control, sharing, and consumption?*
- ❑ *How should we define CDE roles and responsibilities and access rights?*



DATA & PLATFORM INTEGRATION

Ensure seamless data integration between platforms and digital solutions where possible

- ❑ *Can all our digital solutions integrate with our collaboration platform or where data is stored and shared?*
- ❑ *Can our digital solutions pull / push data seamlessly from / into BIM or our collaboration platform?*
- ❑ *Can different stakeholders access and consume relevant project data without any data loss?*

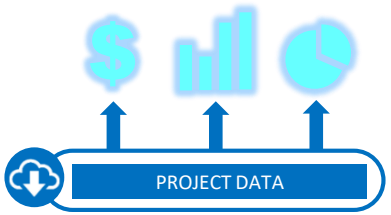


18

DATA ANALYTICS

Setup data analytics to show relevant metrics and project health indicators

- ❑ *Does our collaboration platform have data analytics features?*
- ❑ *Are they able to show our desired indicators and in a format that is useful to drive decision making?*

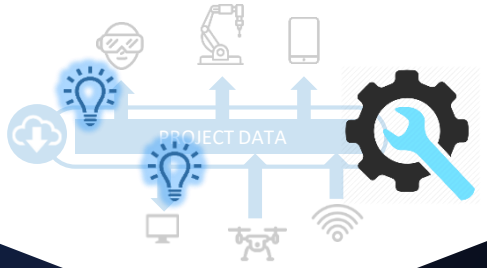


19

CUSTOMIZATION

Develop further enhancements to Common Data Environment or digital workflows where necessary

- ❑ *Can our previous brainstormed innovations be incorporated into our CDE functionalities?*
- ❑ *Do we need to work with the vendor to customize certain features in our digital tools / platforms?*
- ❑ *Do we need to develop APIs or scripts for integration of data or automation of tasks?*



20

See CASE STUDY 1 for actual examples and additional best practices

END