

CASE STUDY 1:

Project Implementation
[Bukit Canberra]

Outcome based KPIs

PRIORITY OUTCOMES:

Both client and the project team defined their desired outcomes from IDD implementation as follows:



CLIENT PRIORITY

Time

On-time project completion



PROJECT TEAM PRIORITIES



Cost

reduce abortive works



**Manpower &
Quality**

Outcome Based KPIs



OUTCOME
KPIs
CRITICAL USE CASES



Time: On-time project completion

Shorten coordination and design confirmation process time from xx to xx

• **Shorten** approval process time from xx to xx

DESIGN CONFIRMATION

Frequent design changes (considering long lead time for precast production) leading to delays

SHOP DRAWING APPROVAL

Manual submission and approval process with long approval latency

Process Focus

To meet their priority outcomes, the project team identified Design Confirmation and Shop Drawing Approvals as their focus for process improvement

Zero production delays as per synchronized site and production schedule

PRODUCTION SEQUENCING

Production sequencing not synchronized with site installation sequence

MATERIALS PROCUREMENT

Long lead time for certain materials (imported) leading to delays if not approved / procured on time

Zero delivery delay of **correct** precast components

PRECAST TRACKING & DELIVERY

Wrong components delivered

Shorten progress update preparation from xx days to xx days of completion

PROGRESS UPDATE & CLAIMS

Manually updated with untimely and inaccurate information

KPI SETTING CONSIDERATIONS:

- KPIs must reflect desired improvements in processes while working towards meeting overall outcomes
- KPIs may be company wide, project based, or team based, depending on the scope or intent of IDD implementation.
- All KPIs must be measurable and the targets set must be ambitious yet achievable
- Ideally, metrics must measure both Quantity and Quality – improvements in Quantity should not affect the Quality of output

Process Streamlining



PROCESS TO STREAMLINE:

Design Confirmation & [CSD] Shop Drawing Approvals

CHALLENGE STATEMENTS:

- Shorten coordination process
- Shorten approval process
- Eliminate rework due to client design changes
- Reduce shop drawing revisions
- Move towards digitalized processes

KPIS:



COORDINATION & APPROVAL TIME
Reduction in overall process time from xx to xx



REWORK:
Reduction of rework due to design changes from xx to xx

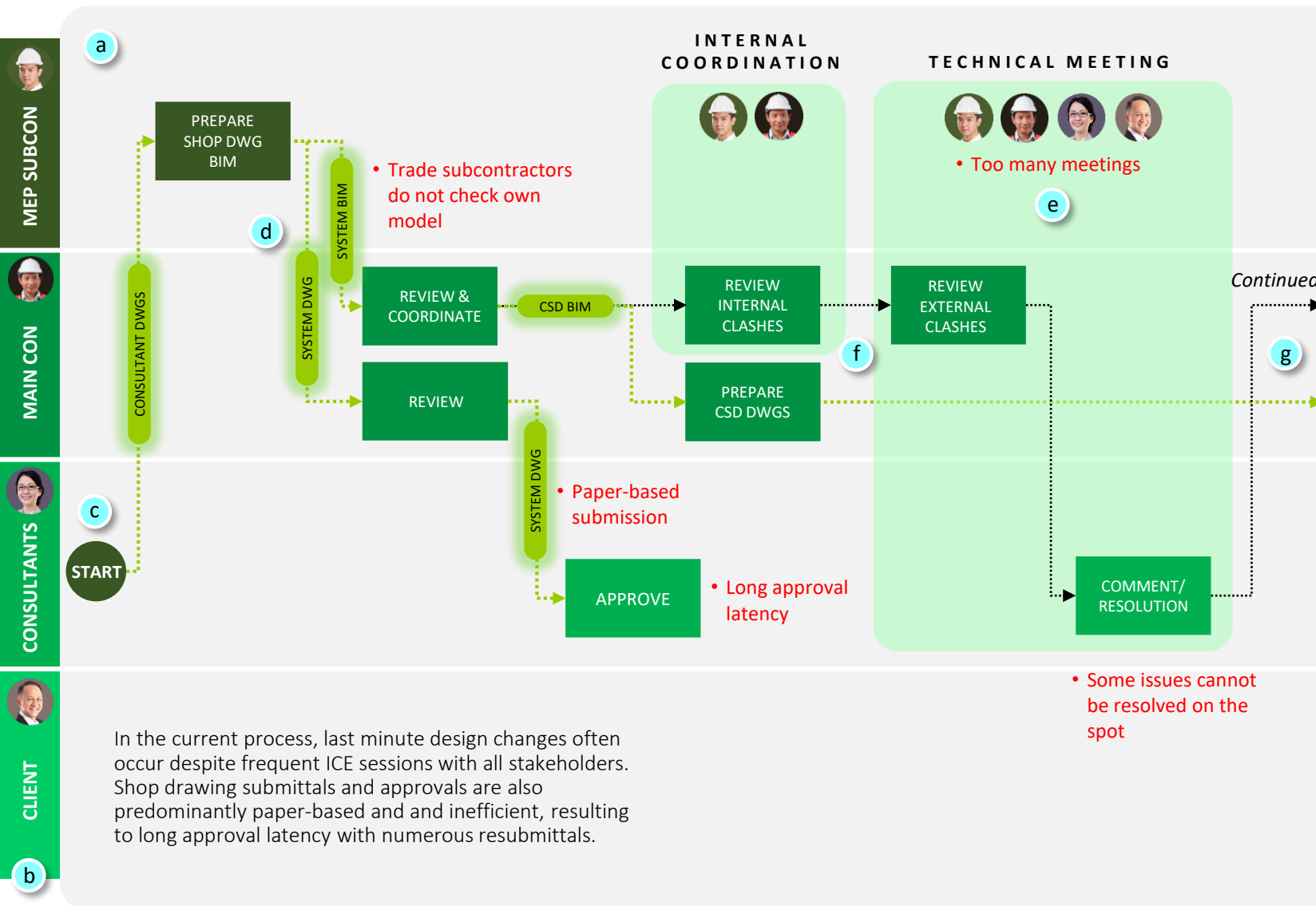


DRAWING RESUBMITTALS
Reduction in number of drawing resubmittals from xx to xx

Process Streamlining

[CURRENT]

DESIGN CONFIRMATION & CSD DWG APPROVAL



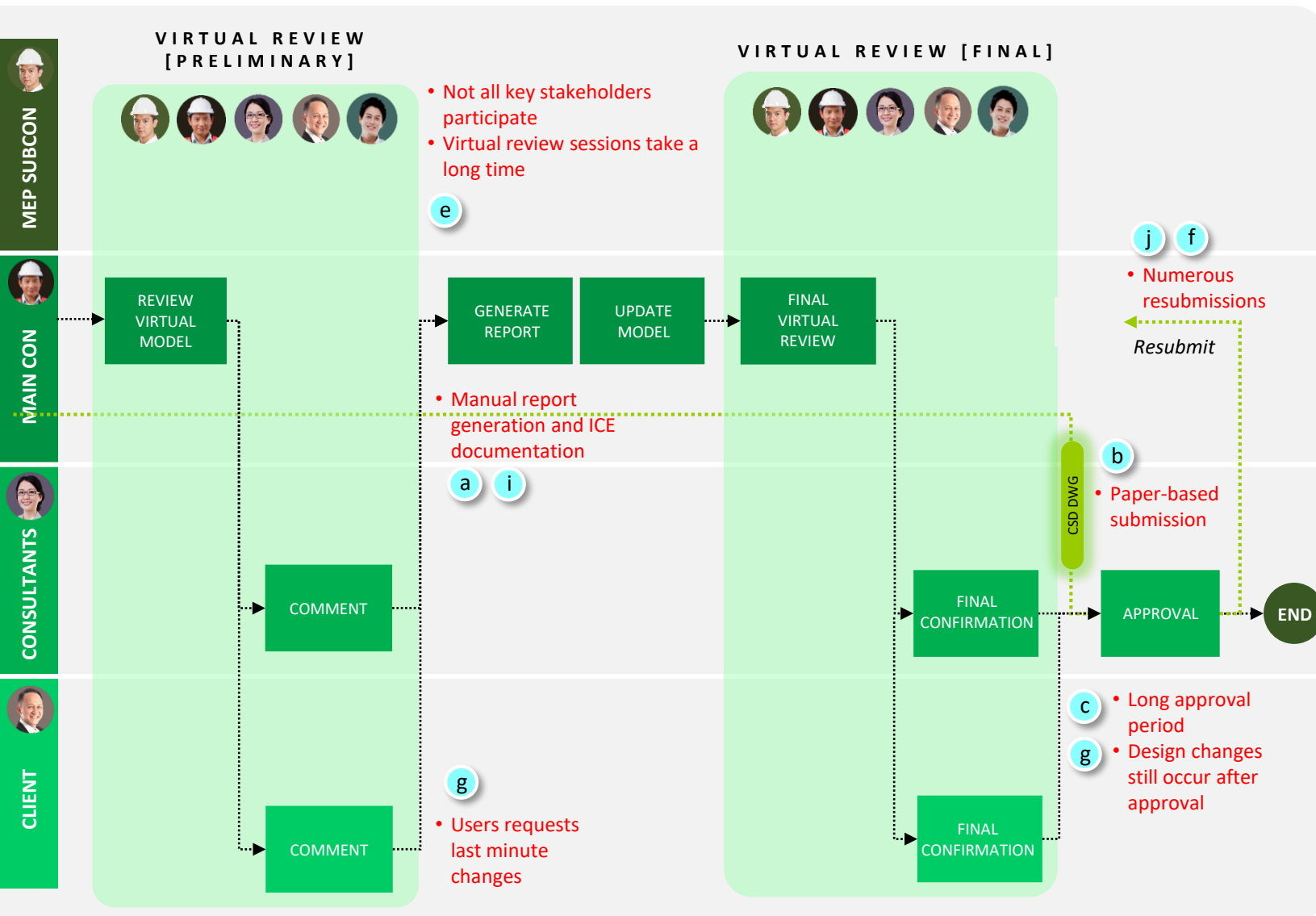
PROCESS STREAMLINING TIPS:

- a** Utilize a swim-lane diagram
- b** Assign a swim-lane for each key stakeholder involved
- c** Identify process inputs
- d** Identify handoffs and information exchanges between stakeholders
- e** Include key meetings / ICE sessions if relevant
- f** Distinguish between information flows vs sequential action
- g** Keep process mapping moving forward

Process Streamlining

[CURRENT]

DESIGN CONFIRMATION & CSD DWG APPROVAL



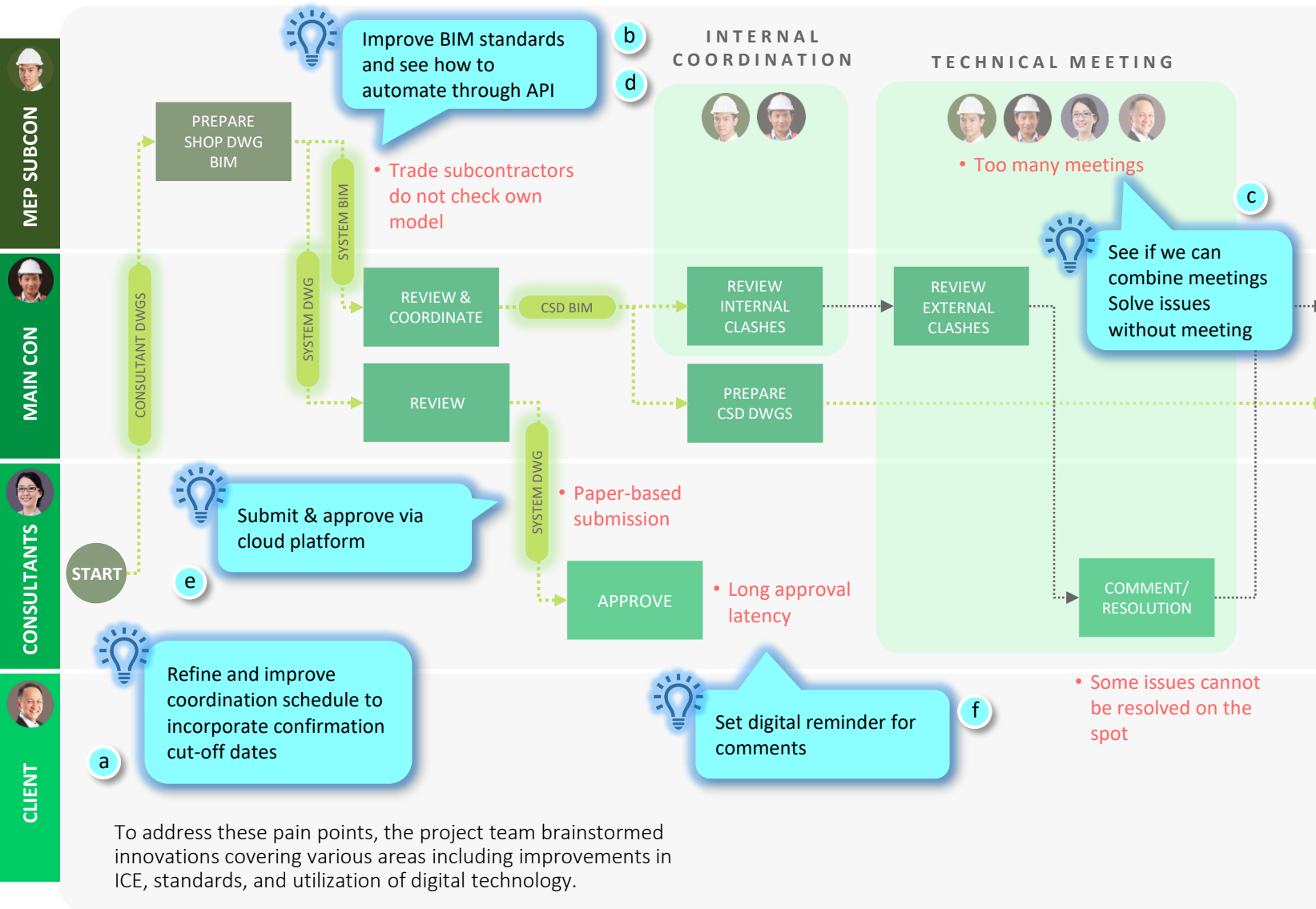
AREAS OF PROCESS INEFFICIENCIES:

- a Manual and paper-based tasks (especially repetitive tasks)
- b Manual data exchanges
- c Long latencies and delays
- d Tasks affected by inaccurate information due to manual entries / errors
- e Inefficient ICE, coordination, or collaboration
- f All types of rework (site rework and process rework)
- g Last minute information that impact downstream activities
- h Manual data re-entry
- i Tedious documentation or paperwork
- j Constant loopbacks (e.g. submitting and resubmitting RFIs and RFAs)

Process Streamlining

[BRAINSTORMING]

DESIGN CONFIRMATION & CSD DWG APPROVAL



POSSIBLE AREAS FOR INNOVATION:

Innovations in **PROCESS & STANDARDS**

- a** Improvements in planning / scheduling
- b** Improvements in standards
- c** Improvements in ICE & collaboration

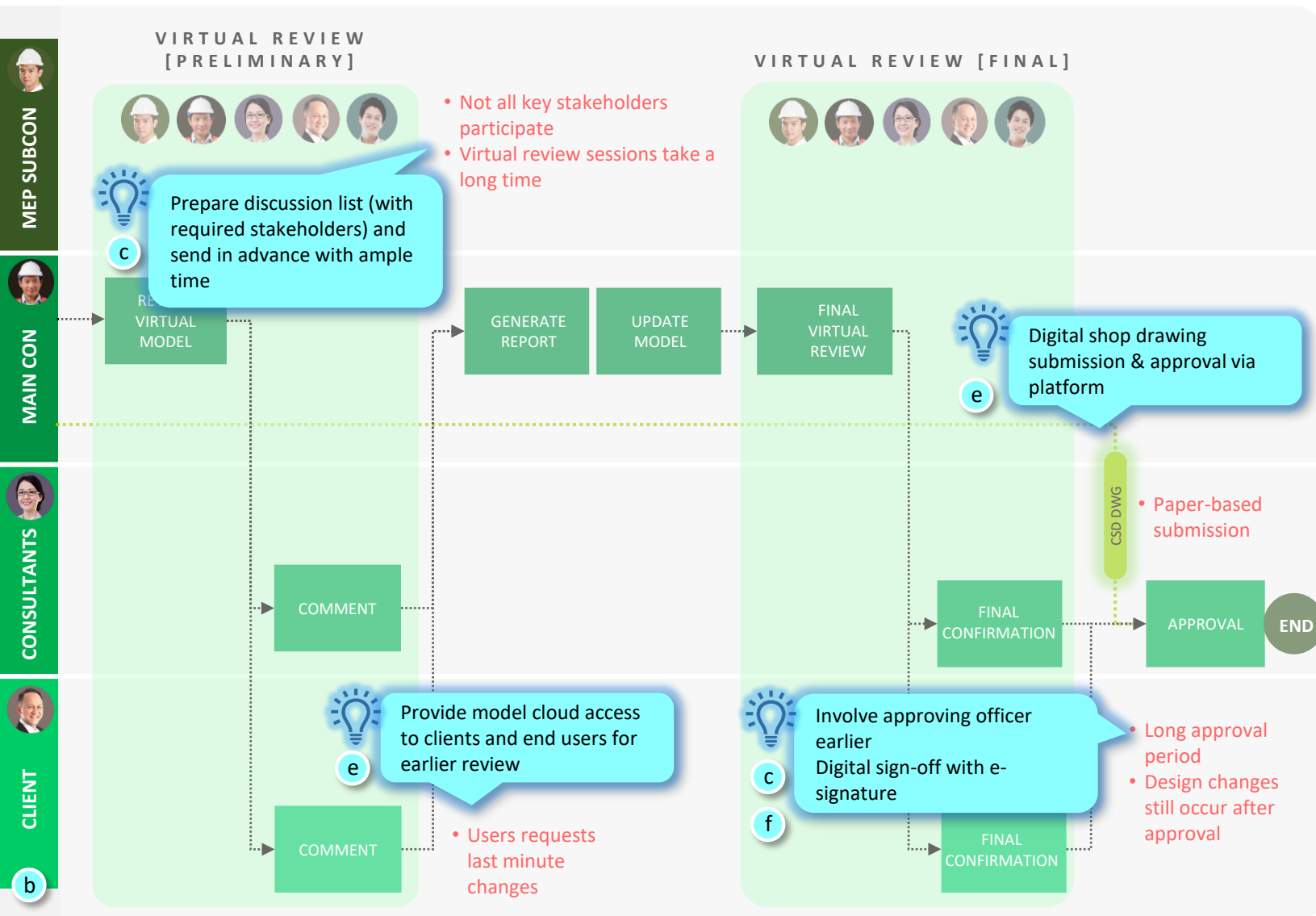
Innovations in **TECHNOLOGY**

- d** Automate task
- e** Digitalize task through use of platform / digital solutions
- f** Customize functionalities in platform / digital solutions

Process Streamlining

[BRAINSTORMING]

DESIGN CONFIRMATION & CSD DWG APPROVAL



POSSIBLE AREAS FOR INNOVATION:

Innovations in **PROCESS & STANDARDS**

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Innovations in **TECHNOLOGY**

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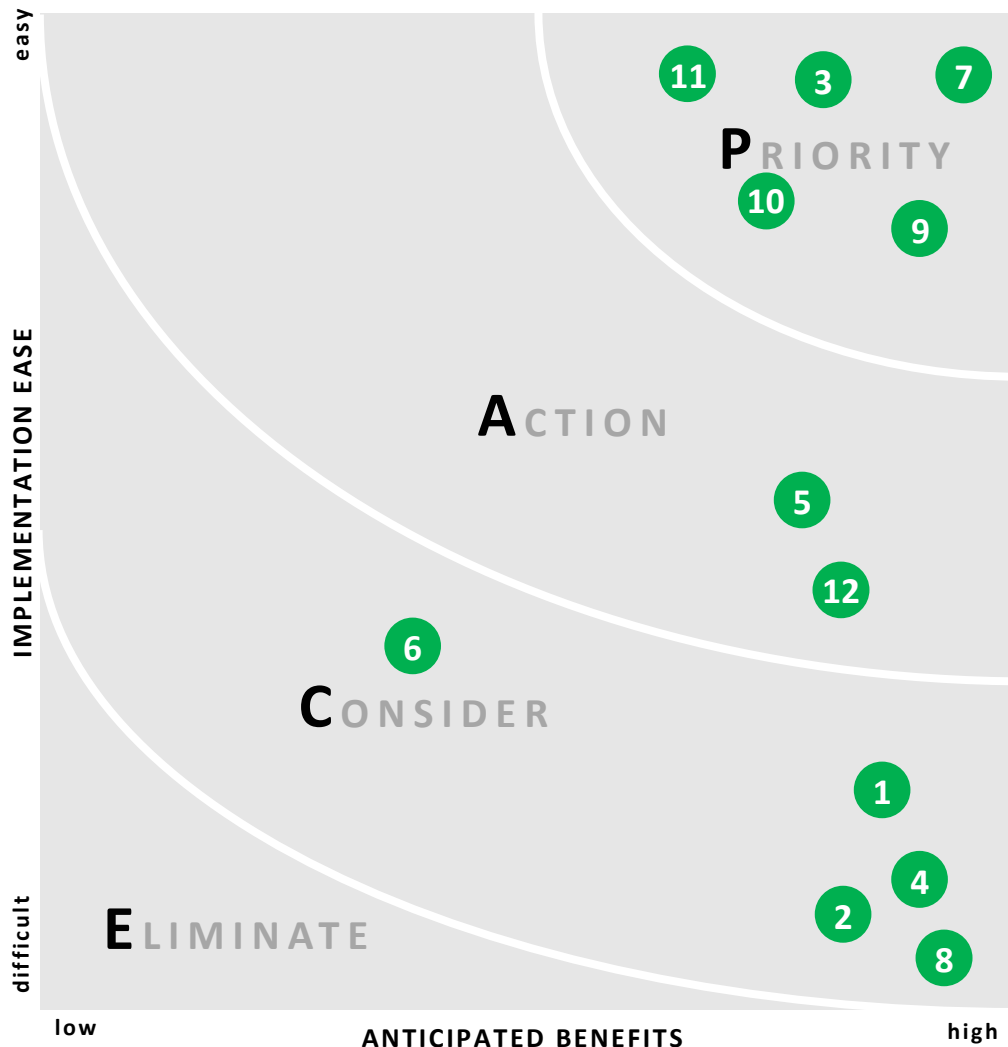
Process Streamlining

[PRIORITIES]

PACE CHART FOR SETTING PRIORITIES



All proposed innovations were prioritized for implementation as follows:



SUMMARY OF PROPOSED INNOVATIONS

STANDARDS:

1. Improve BIM standards

PROCESS:

2. Refine and improve coordination schedule to incorporate confirmation cut-off dates
3. ICE: prepare discussion list (with required stakeholders) and send in advance with ample time
4. ICE: involve approving officer earlier
5. ICE: involve users earlier
6. ICE: explore combining meetings
7. ICE: try to solve items without meeting

TECHNOLOGY:

8. Automate BIM standards checking through API
9. Digital sign-off with e-signature
10. Submit and approve drawings via platform
11. Digital reminder for shop drawing comments
12. Provide model cloud access to clients & end users for earlier review

TOOLS FOR SETTING PRIORITIES:

PACE chart

Prioritizes strategies based on implementation ease versus anticipated benefits

PARETO PRINCIPLE

Identify which 20% of strategies lead to 80% of desired results

VOTING

Allow project teams members to vote on preferred strategies

Information Standards



KEY INFORMATION EXCHANGES:

From the current process map, the project team identified 3 critical information exchanges for further streamlining and standardization:

1 DESIGN ST MODEL



- Base design (AR+ST) confirmation is a bottleneck to MEP design confirmation and coordination
- Design ST model has high potential to be reusable for construction

2 SYSTEM DRAWINGS



- Confirmed and approved individual System DWG is a pre-requisite for CSD prep & approval

3 CSD DRAWINGS



- Drawing approval usually takes up all (contractually required) 28 days, with numerous resubmittals

Information Standards

1 DESIGN ST MODEL



GUIDING QUESTION:



“What information must be provided by the C&S consultant so that both main contractor and subcontractors can utilize 100% of the ST design model without model rework?”



RAW INFORMATION REQUIREMENTS

1. DESIGN INTENT ALIGNMENT

- ☐ Update on latest design
- ☐ Pre-coordination prior to handover
- ☐ Smooth flow of information

2. MODEL STANDARDS

- ☐ Datum level / structural level consistency
- ☐ DWG scale must be same as what we use
- ☐ Line weights and style must be same as what we use
- ☐ No CAD drawings, only BIM
- ☐ Family naming consistency

3. MODEL WORKABILITY

- ☐ Correct model segregation / management to control file size
- ☐ Model cleanup / housekeeping to improve workability



CURRENT INFORMATION COMPLIANCE

1. DESIGN INTENT ALIGNMENT

- ☐ Update on latest design
- ☐ Pre-coordination prior to handover
- ☐ Smooth flow of information

2. MODEL STANDARDS

- ☐ Datum level / structural level
- ☐ DWG scale must be same as what we use
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PROPOSED INNOVATIONS



Consultants to try out cloud-based design collaboration to ensure that:

- C&S consultant always receives latest design updates, which leads to...
- Improved, timely, and better design coordination
- Main con can take over CDE collaborative space after handover



Develop pre-set templates



Develop / update BIM standards

LEGEND: • CURRENTLY PROVIDED • NOT CURRENTLY PROVIDED, BUT WILLING TO PROVIDE • CANNOT BE PROVIDED

Information Standards

2 MEP SYSTEM DRAWING



GUIDING QUESTION:



“What information must be provided by the **MEP sub contractor** so that the **MEP consultant** can **approve the system drawing at first submission without revisions?**”



RAW INFORMATION REQUIREMENTS

- ☐ Correct dimensions
- ☐ Code compliance
- ☐ Clear annotations
- ☐ Correct routings
- ☐ Doesn't stray from design intent
- ☐ Clear clashes with structure
- ☐ Ceiling / headroom compliance



CURRENT INFORMATION COMPLIANCE

- ☐ Correct dimensions
- ☐ Code compliance
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- ☐ Correct routings
- ☐ Doesn't stray from design intent
- ☐ Clear clashes with structure
- ☐ Ceiling / headroom compliance



PROPOSED INNOVATIONS

NOTE: Although all requirements are currently being complied, revisions (up to revision B) still occurred because updates were not being communicated to designer. Proposed solution by both MEP subcontractor and consultant:



Introduce small ICE / meeting between MEP subcon engineer and consultant to communicate updates

LEGEND: • CURRENTLY PROVIDED • NOT CURRENTLY PROVIDED, BUT WILLING TO PROVIDE • CANNOT BE PROVIDED

Information Standards

3 COMBINED SERVICES DRAWING [CSD]



GUIDING QUESTION:



“What information must be provided by the **main contractor** so that the **AR & MEP consultant** can **approve the CSD at first submission without revisions?**”



RAW INFORMATION REQUIREMENTS

- ☐ No clashes / must be well-coordinated
- ☐ Every trade / service must be clearly identifiable / annotated
- ☐ Authority compliance
- ☐ Headroom compliance
- ☐ Maintenance accessibility with clear dimensions
- ☐ User information or comments must be complete
- ☐ Request to receive BIM model for automated checking



CURRENT INFORMATION COMPLIANCE

- ☐ No clashes / must be well-coordinated
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- ☐ User information or comments must be complete
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PROPOSED INNOVATIONS



Provide authority compliance checklist together with submission



Model in coordinated service access with clear dimensions



Cutoff date for user comments
Onboard FM earlier



2D + BIM model submission
auto checking script

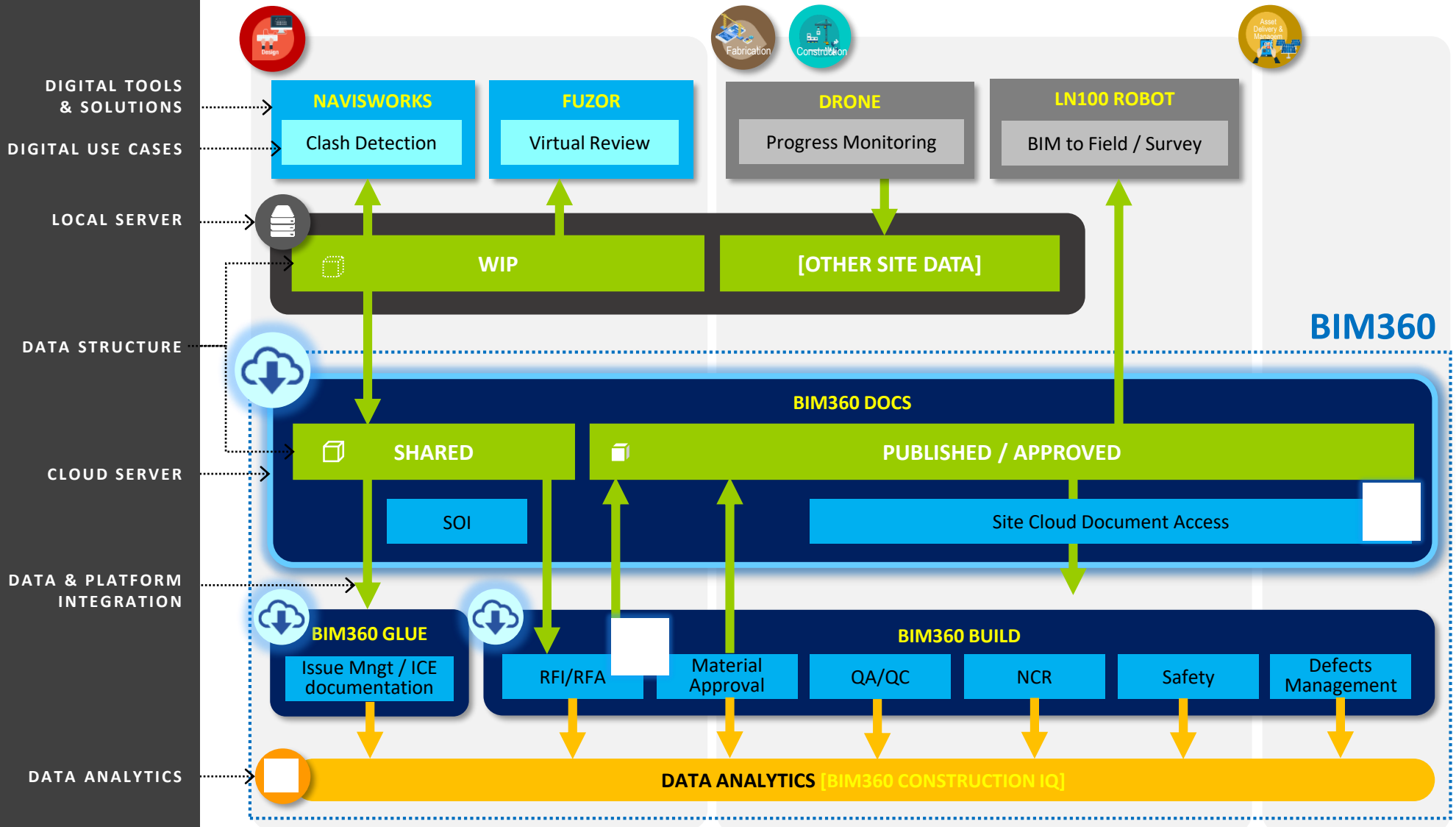
LEGEND: ● CURRENTLY PROVIDED ● NOT CURRENTLY PROVIDED, BUT WILLING TO PROVIDE ● CANNOT BE PROVIDED

Common Data Environment

[SOLUTIONS MAPPING]

All digital use cases and the respective platforms/solutions utilized were mapped together to support the streamlined processes and to work towards seamless data integration. The previous brainstormed technological innovations were also incorporated as part of the CDE functionalities where possible.

CDE COMPONENTS



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[Bukit Canberra Project Team]

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