

Update on Site Management Platform (SMP) and Virtual TOP

*Presented by:
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Audit and Inspection Group*

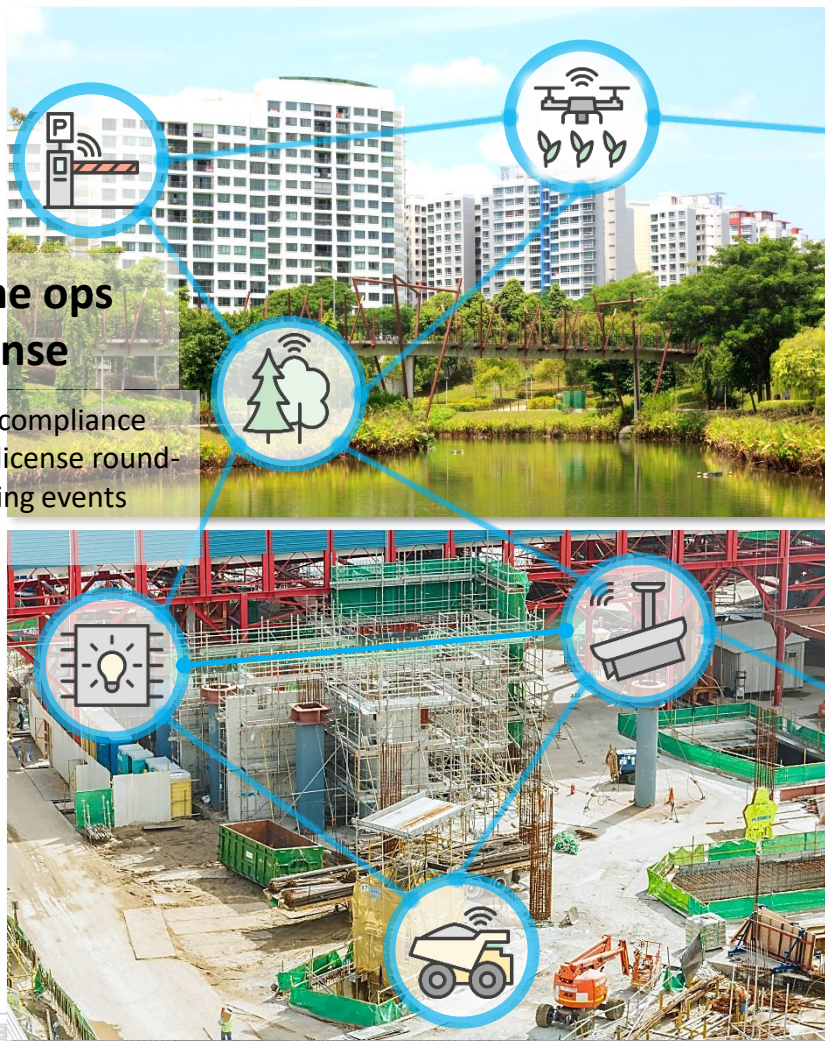




Harnessing data for regulatory and compliance inspections ops, enabling officers to identify trends and make informed decisions.

Real time ops response

E.g. ensuring compliance to exhibition license round-the-clock during events (NParks)



Predictive Analysis for efficient resource deployment

E.g. deploying enforcement officers to identified hotspots for carpark offences (URA)

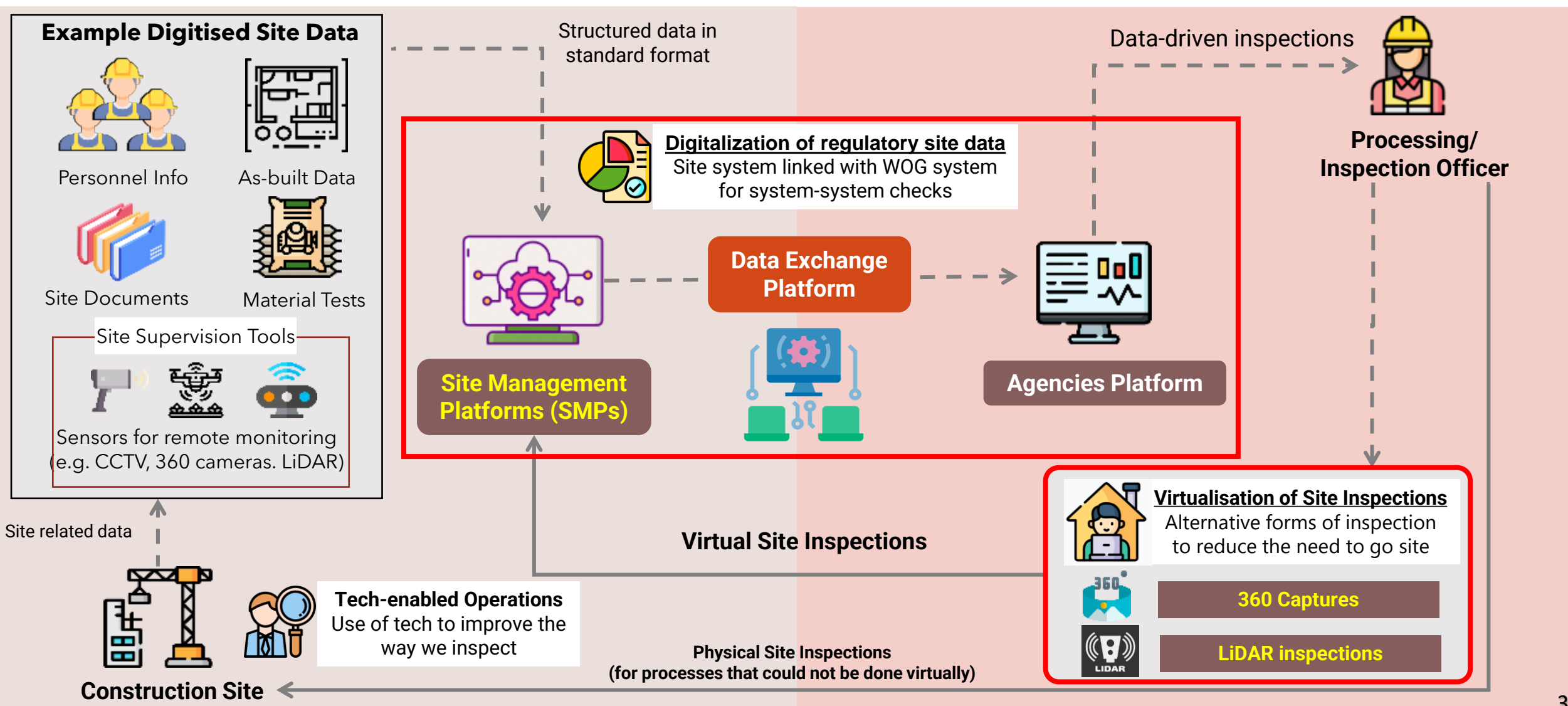


Preventive Intervention

E.g. early detection of site safety non-compliance (HDB, NParks, BCA)



To achieve the envisioned future as a data driven smart regulator, A&I is looking to digitalize and virtualise our inspections so as to make the regulatory checks more efficient and effective.





Digitalization of regulatory site data





Site Management Platforms (SMP) are digital tools designed to help construction sites manage data and digitalize processes to achieve Integrated Digital Delivery (IDD).

Legend:

Site Management Platform (SMP) related IDD use cases

2. Visualisation & Design Checks
3. BIM-based Documentation
4. Integrated Concurrent Engineering (ICE) Meetings

Site Management Platforms to manage data and digitalise processes



Different solutions are available to manage these use cases of IDD

1. Digital Carbon Management (New)

6. Digital Request for information (RFI)

7. BIM-based Cost Estimation

8. Digital Contract Management (New)

17. Digital Handover

11. Digital Safety Planning & Mgmt.

12. Digital Site Management

13. Digital Progress Monitoring

14. Digital Inspection

15. Data-driven Project Performance Monitoring

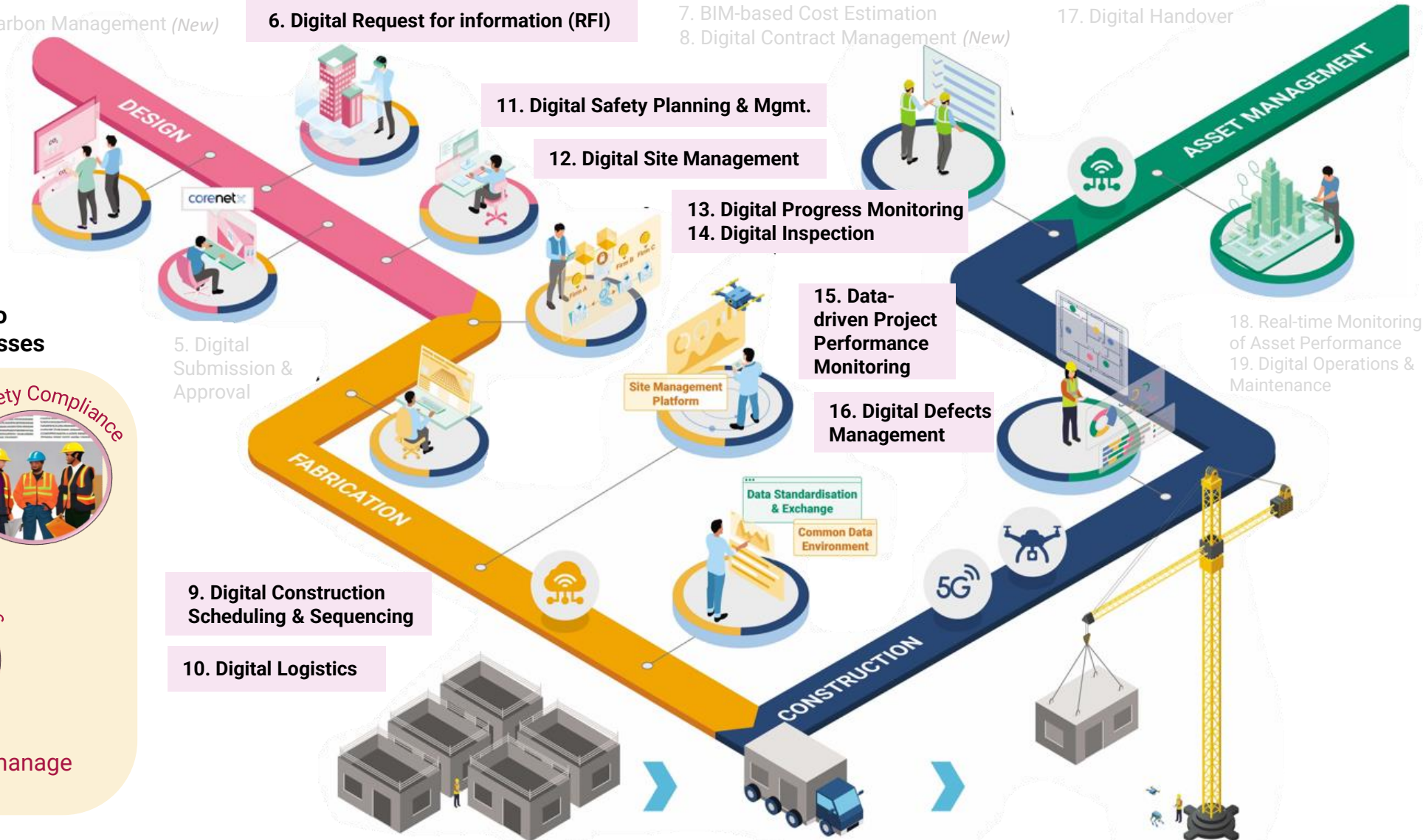
16. Digital Defects Management

18. Real-time Monitoring of Asset Performance

19. Digital Operations & Maintenance

9. Digital Construction Scheduling & Sequencing

10. Digital Logistics



Current Practice

Structural safety documents and reports are kept as hardcopies with no standardisation.

Pain points



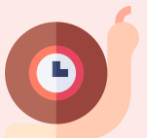
Need physical inspection



No standardisation



Messy and disorganised



Time-consuming

Envisioned Future

Data on these documents and reports can be stored digitally on Site Management Platforms (SMP) to improve collaboration and site supervision.

Example Structural Safety Data

Site Progress

Material Test Results

I&M

Inspection reports



SMP

Project Parties

Builder

Sub-contractor

QP

Site Supervisor

Developer

Intended Outcomes



Improved data accuracy



Improved site supervision



Improved efficiency



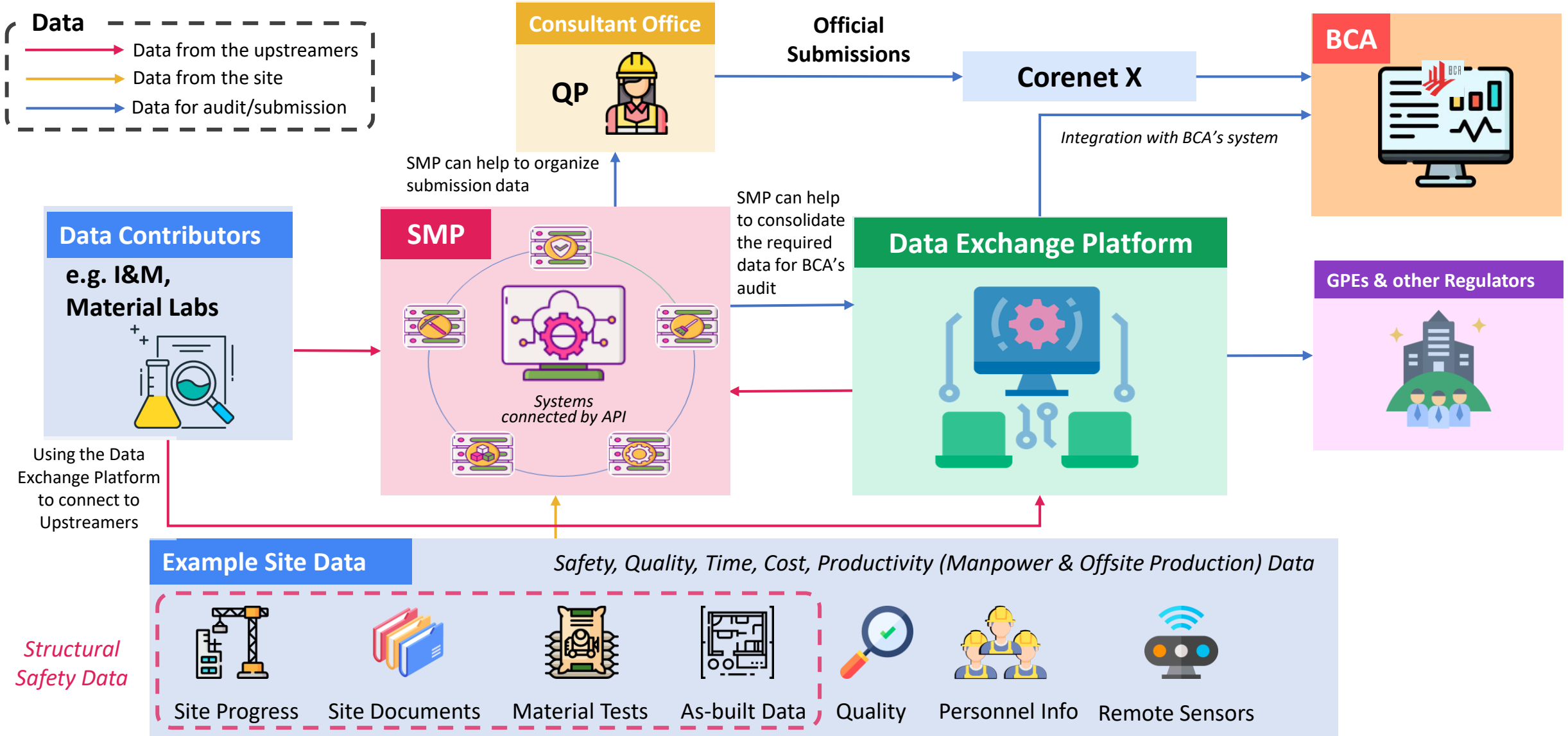
Data Analytics



Audit Trail

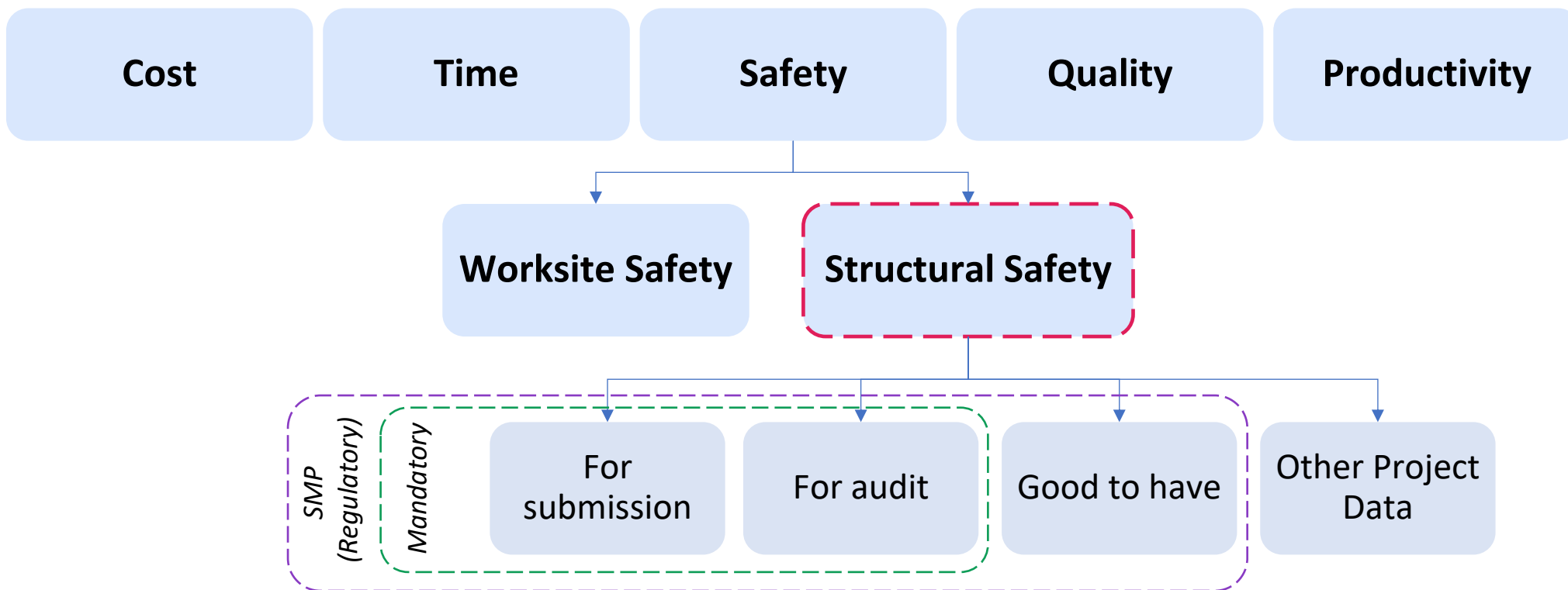


SMPs facilitate the digitalization of data from upstreamers and the worksites, allowing firms to analyse trends and make data-driven decisions. The data consolidated could also easily be sent to authorities for more efficient auditing.

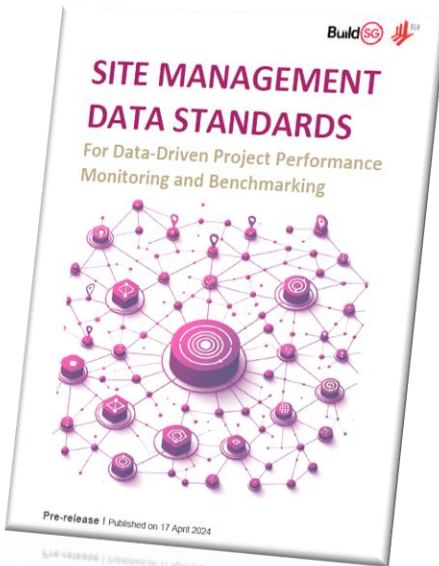
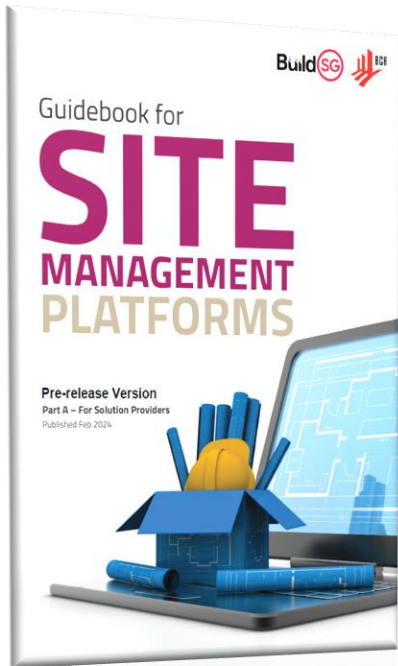




Industry-Wide Data Standards for Critical Site Datasets required for Project Performance Monitoring



BCA has set out the Site Management Data Standards to guide the industry on how to use Site Management Platform and Digitalise their sites.



- Solution providers are encouraged to comply with BCA's common data standards to ensure a more connected built environment

Requirements on the data to be kept on SMP (aligned to regulatory needs)

In Structured Data Format *i.e. can be stored in columns and rows*

1. QP/SS Attendance Record
2. Site Investigation Report
3. Pile Load Test
4. Piling Installation Record
5. Instrumentation & Monitoring
6. ERSS Annex C-1: Site inspection & Approval Records
7. Annex D : Certification of Monitoring Building Settlement
8. Concrete Cube Test Results
9. Steel Strength Test Results
10. Generic Notification Module
11. Site Progress

These data standards covered
under **Site Management Data
Standards**

In Unstructured Data Format *e.g. PDFs, photos, videos, reports*

1. Pre-con Survey Report
2. Temporary Building Design (COS, PE Design & Layout plans)
3. Steel Mill Cert & FPC
4. MET test results
5. Welding Test Report
6. QP(D) Approval for Proprietary Product
7. 360 Captures
8. Original Reports for structured datasets (if necessary)
9. BCA Permit to carry out structural work
10. BCA Approved drawings/Amendment plans
11. Site Supervision Plan

Please refer to the full data standards:

www1.bca.gov.sg/docs/default-source/idd/prerelease_draft_site_mgmt_data_standards.pdf?sfvrsn=cc5b1fef_2



A&I understand that different firms currently have different level of readiness in digitalisation. For more digitalised sites, the documents checks would be audited fully remotely, reducing physical touch points and improving efficiency.

Level of Site Document Digitalisation

Level 0**Physical Documents**

All site documents maintained in **hard copy, physical format**

Level 1A**Digitised Documents**

Mixture of site documents in **hard copy and PDF (unstructured)**

Level 1B

All site documents in **PDF (unstructured)**

Level 2A

Structured Data
(as to BCA Data Standards)



Mixture of site documents in **PDF (unstructured) + structured data**

Level 2B

All site documents in **structured data**

Level 3**Connected Data**

Site documents are connected via **Exchange Platform**

Current**Site Management Platforms (SMPs)**

No changes to the current BCA document audit

Fully remote digital document checks

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Please do not distribute it without BCA's prior approval.



For digital document check, BCA officers would be given access to the SMPs to view the required documents, removing the need for physical document on site. The BCA site checks would then be able to be focused to the site works.

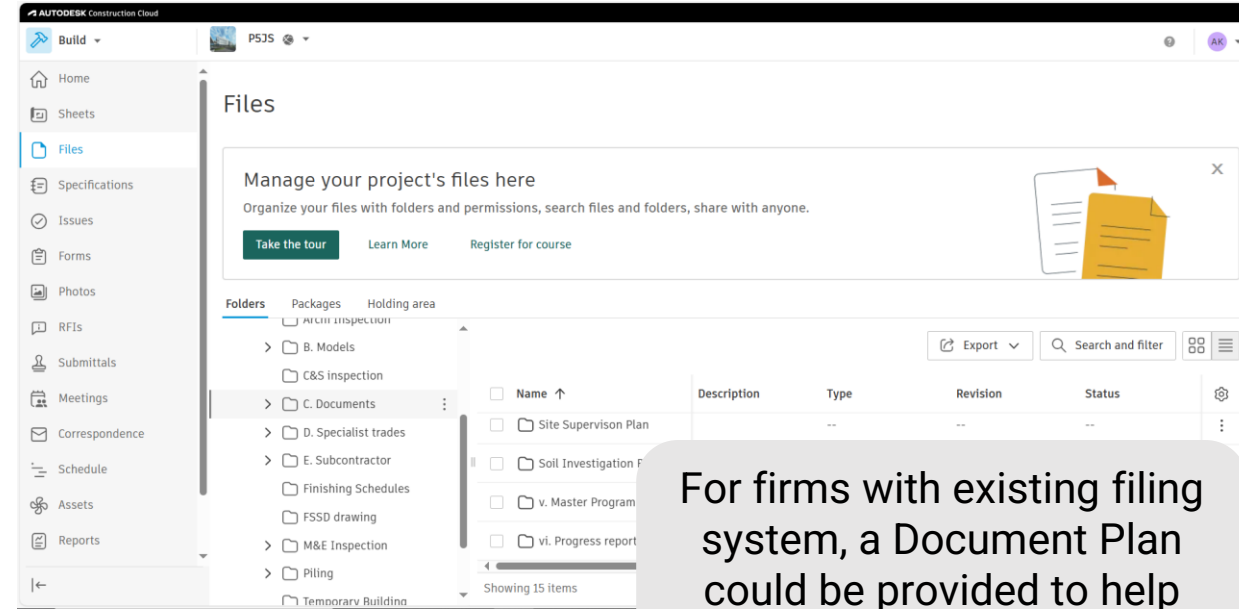
Drive

BCA audit 20250213

Download all

Name	Owner	Last modified	File size
1 QP SS Attendance record	Owner hidden	13:30	—
2 Soil investigation report	Owner hidden	13:30	—
3 Pile load test	Owner hidden	13:30	—
5 Instrumentation and monitoring	Owner hidden	13:30	—
6 Annex C	Owner hidden	13:30	—
8 Cube result	Owner hidden	13:30	—
9 Rebar test report	Owner hidden	13:30	—
10 Site progress	Owner hidden	13:30	—
12 Precondition survey	Owner hidden	13:30	—
13 Temporary build design	Owner hidden	13:30	—
18 Permit	Owner hidden	13:30	—
19 ST Drawing	Owner hidden	13:30	—
20 Site supervision plan	Owner hidden	13:30	—

Good practice of filing the documents according to the Data Standards headers



For firms with existing filing system, a Document Plan could be provided to help BCA navigate the platform

Level 1 or 2 Audits

Firms to consistently file the required document in their SMP

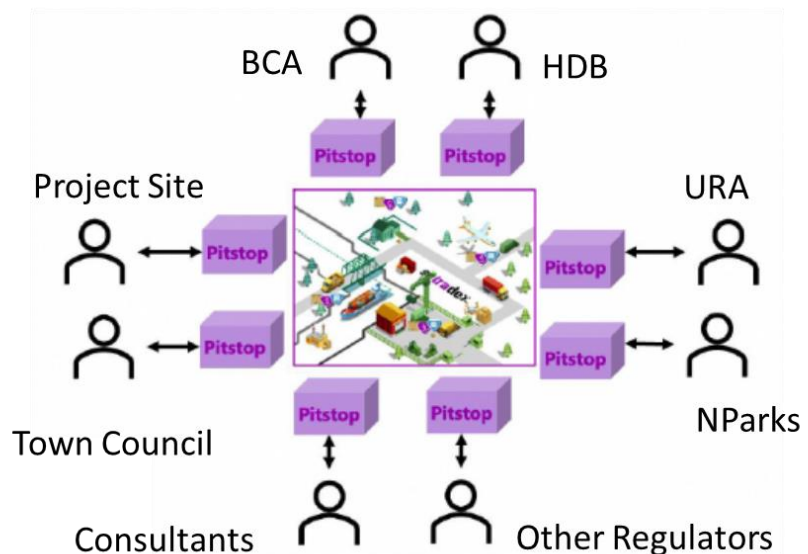
Firms would arrange the document and provide a guide to BCA officer on how to navigate their SMP

BCA officer will conduct the required checks and contact the RE/RTO if any issues were found

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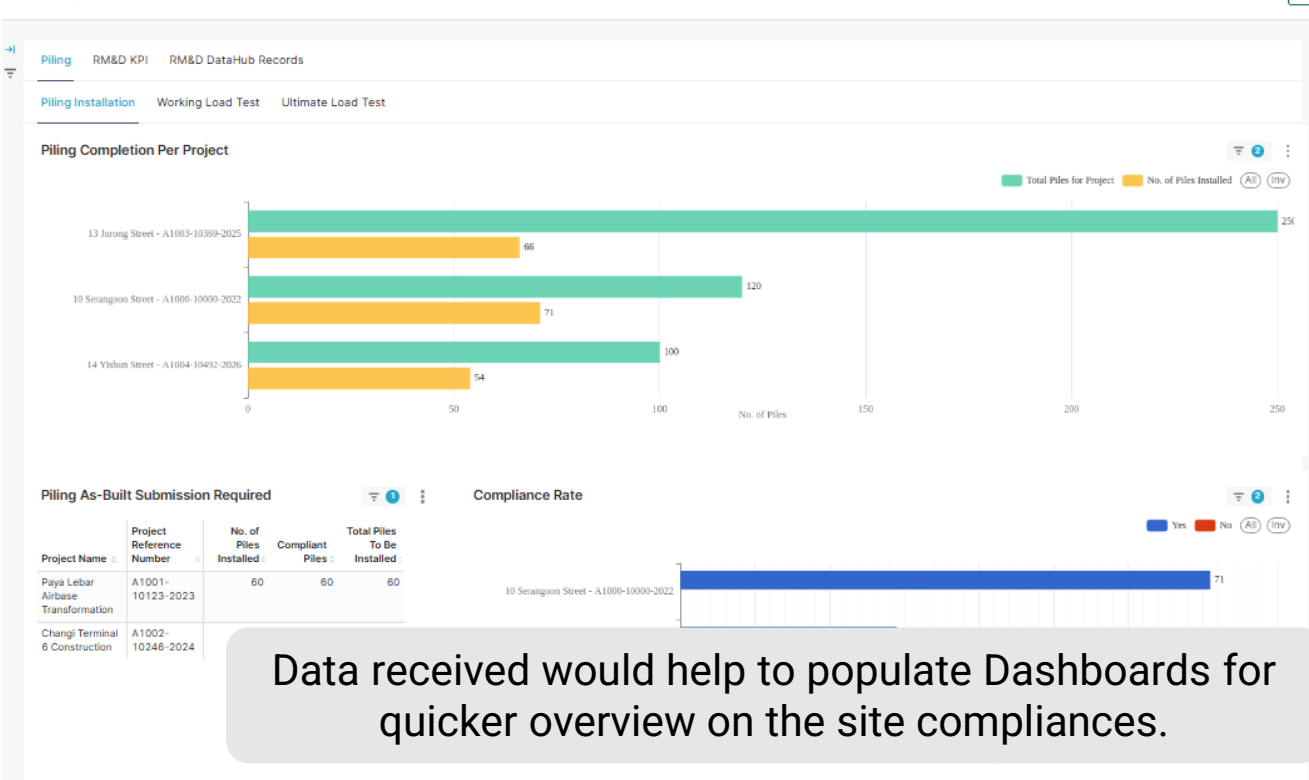


As more sites become digitalized, more SMP would need to send data from their site to BCA. Thus, it would make sense for SMPs to be connected to a Data Exchange Platform.



Increasing connectiveness between the various stakeholders through a data exchange platform

BCA Dashboard



Data received would help to populate Dashboards for quicker overview on the site compliances.

Level 3 Audits

Firms to consistently file the required document in their SMP

SMP would send the required documents through the data exchange platform for BCA audits

BCA officer will conduct the required checks and contact the RE/RTO if any issues were found

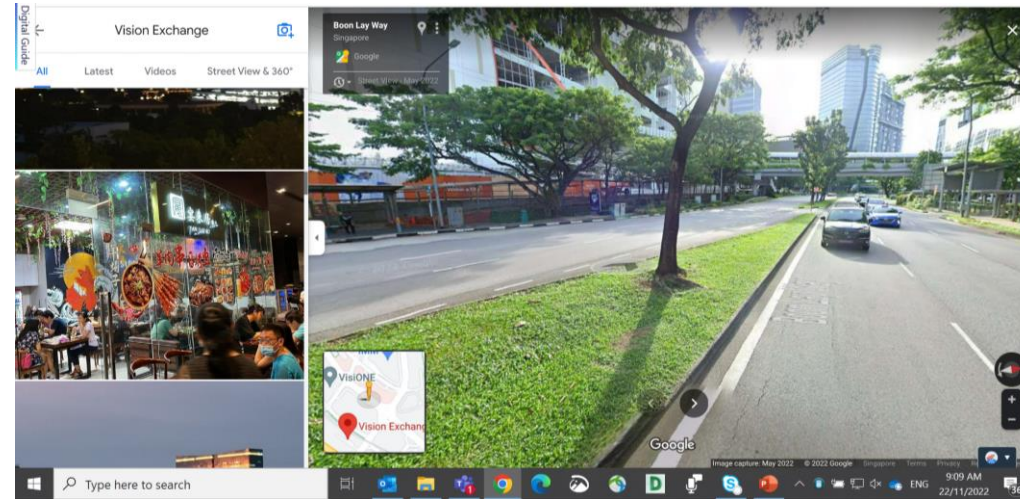


Virtualisation of Site Inspections





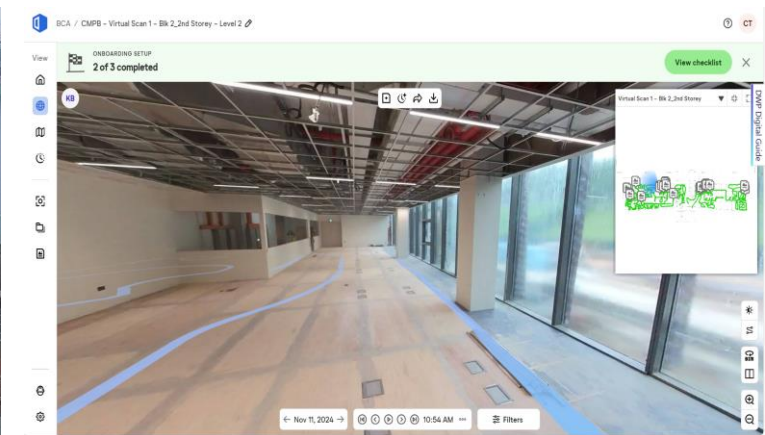
360 Capture uses 360 camera to give a 360 view at the point



Why 360 Capture

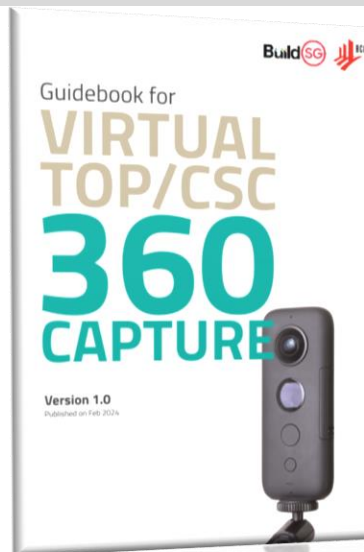
- Ready Technology
- Generally, more affordable for industry compared to more advanced tech like LiDAR
- Industry have also been using it

360 Capture could create a digital twin of the physical site and users can move around seamlessly like in Google Street View

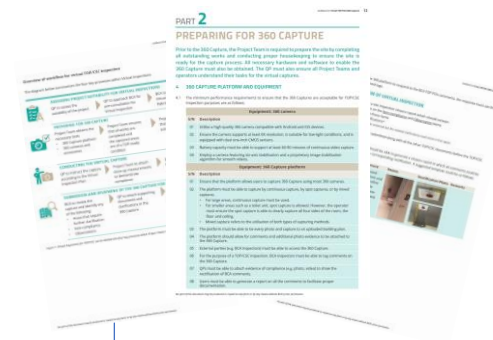




BCA worked with JTC to pioneer virtual inspection at SemiconSpace in 2022. Thru the experience, shape the virtual TOP process and requirements



Developed the guidebook for VI for industry to adopt the processes.



Mega projects like PDD adopted a hybrid Virtual TOP inspection where the project was divided into areas covered by virtual inspections and key areas covered under physical inspection.

2023



Pilot with Teambuild at Keat Hong Verge to work out Virtual inspection for HDB projects



Inaugural Smart inspection Seminars to share the use of virtual 360 capture as an alternate TOP inspection

2024



Pilot with CDL at City Square Mall A&A to complete inspections with the mall's continuous operation.

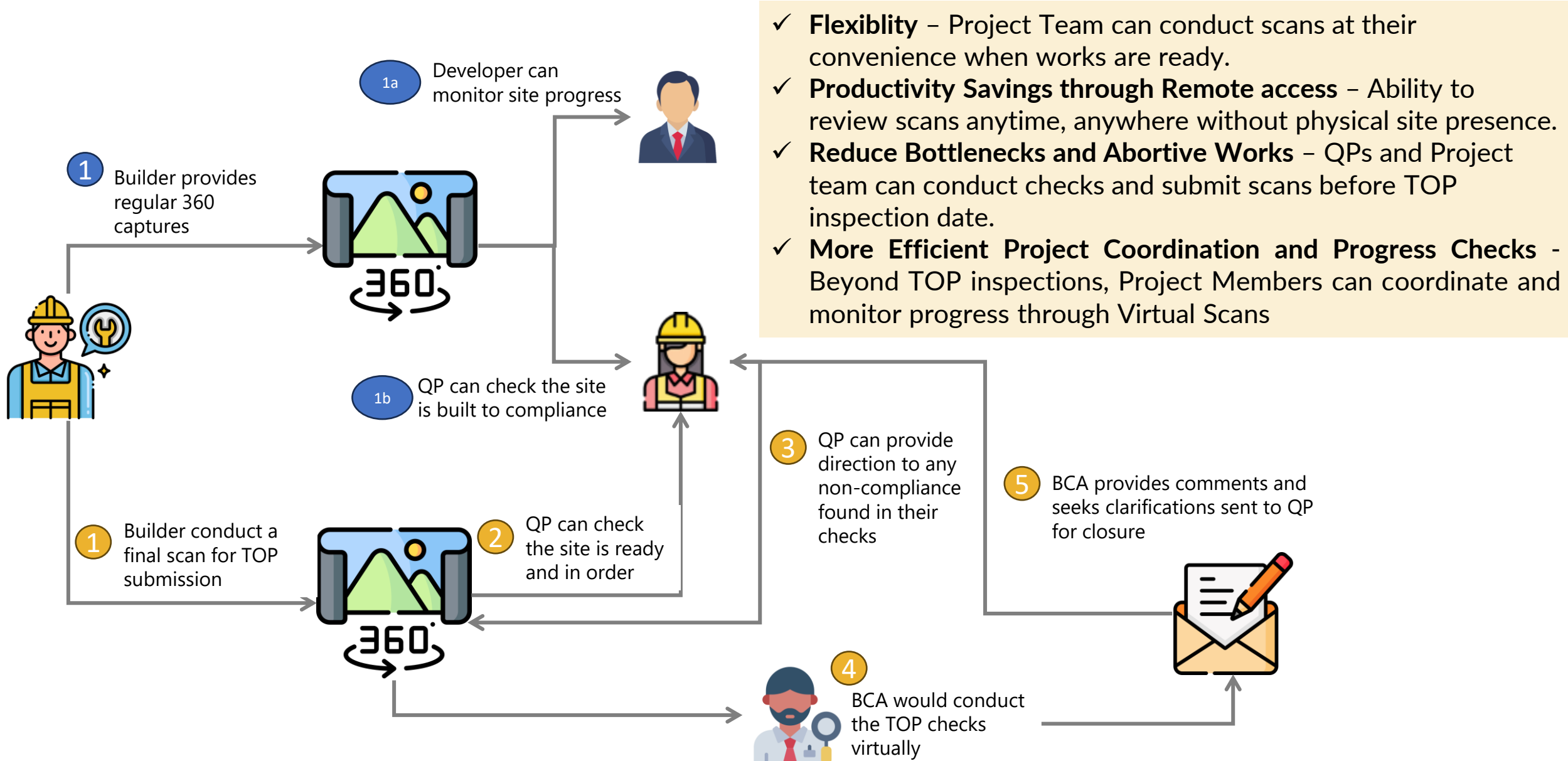


BCA-HDB focus group sessions to share with builders on virtual TOP processes

2025



Working closely with Solution Providers on R&D to advance 360-degree capture technologies





Pre-consultation between project team and BCA officers

Capturing (by project team)

Inspection (by BCA officer)



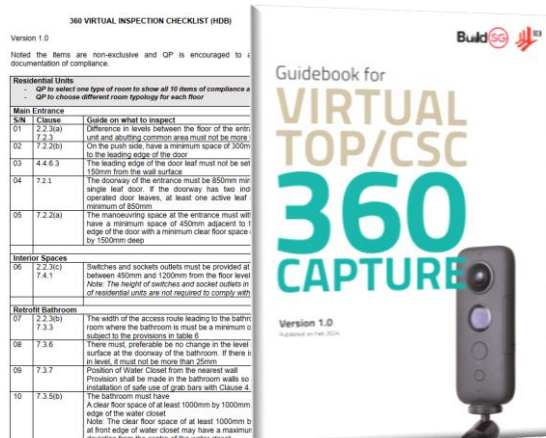
Industry arranges a pre-consultation with BCA on the virtual inspection for TOP



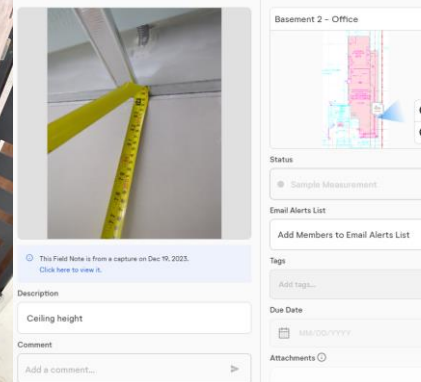
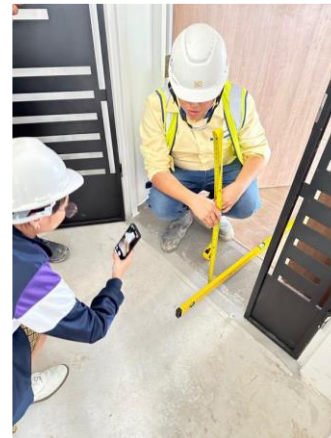
Project team conducts their capture using 360 cameras



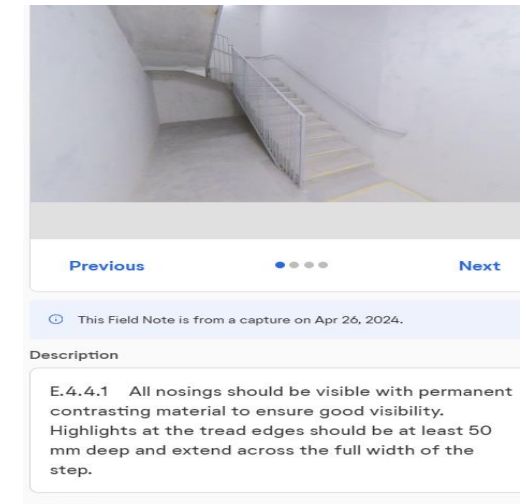
BCA officer reviews the captures and check for any non-compliances



Guidelines for industry to prepare for the virtual TOP inspections



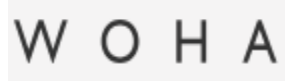
Picture evidence is attached to the capture, to show compliance to requirements





More than 50 projects have completed virtual inspections with the support of industry partners

OUR PARTNERS





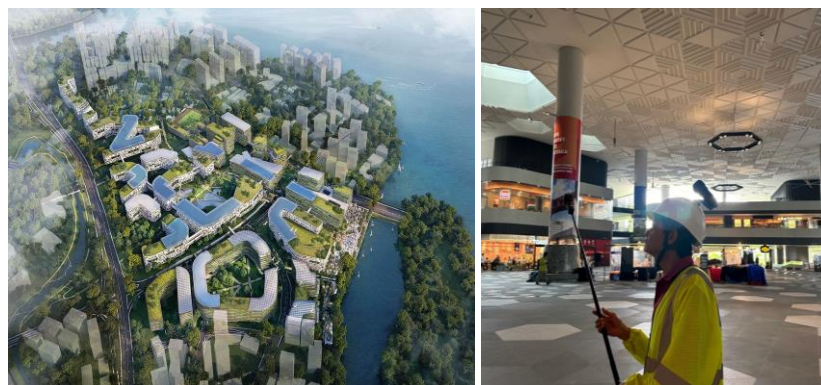
Grove Spring @ Yishun



"A detailed 360° Visual Recording isn't just documentation — it's our commitment to truth, transparency, and technology. It reminds us that excellence begins with accountability, and that doing the right thing starts with seeing everything clearly and self-regulating at every step."

- Teambuild -

Punggol Digital District



"This digital platform not only streamlines the TOP process but also serves as a comprehensive archival tool. These digital records prove valuable for further post TOP downstream processes, such as for handover or defect records and facilities management (FM) maintenance documentation."

- JTC -

NS Hub (New CMPB)



Virtual TOP streamlines the entire TOP process by providing the Qualified Person with remote access to comprehensive visual records for inspection, direct annotation capabilities, and a seamless digital communication channel with the BCA. This integrated technological approach expedites approval timeline and enhance overall project efficiency."

- DP Architects -





Apart from 360 Capture, there are emerging technologies that could be also use for virtual inspections. A&I would set up the various guidelines for different firms (at their different readiness in virtual technologies) to adopt more productive technologies for inspections.

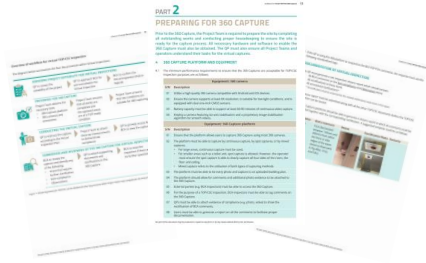
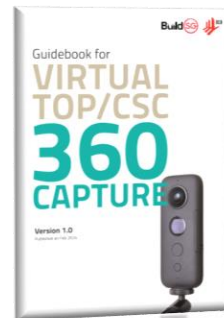
Physical Inspection



Physical Inspection would still require the booking of BCA officers to conduct the checks on-site.

360 Capture Inspection

The use of 360 Capture together with photos to show compliances would replace the physical inspection.

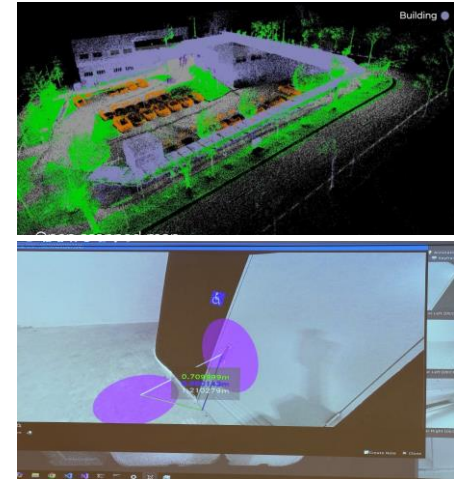


The 360 Capture guidebook set up the processes and what is needed to adopt virtual TOP inspections.

Alternate Inspection types

LiDAR Inspection

The use of LiDAR would enable dimensional measurement checks and this would reduce the photos required to be attached to show dimensional compliance.



Coming soon

A&I is working with progressive firms to set up the process for LiDAR Virtual TOP Inspections to cater another alternate process for those ahead of the curve



Find out more about which solution best suits you

- 1) Visit the different solution providers in our Tradeshow and Tech Talks in the afternoon



- 2) Work with your preferred solution providers to enhance your current processes

Transform current process to smarter inspection process

- 1) Work with BCA and other industry partners to adopt SMPs and virtual inspections for TOP



- 2) Contact BCA to kick start the new smart inspection processes like how many of your peers have already done so

Co-create the future for Smart Inspections

- 1) Join us in pilot for the different initiatives (e.g. connecting to the Data Exchange Platform and LiDAR)



- 2) Join us to build use cases in virtual and digital inspections and share the success story with us to further inspire the industry

Join us to co-create the future of Ops-Tech and data driven inspections for built environment

The End



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