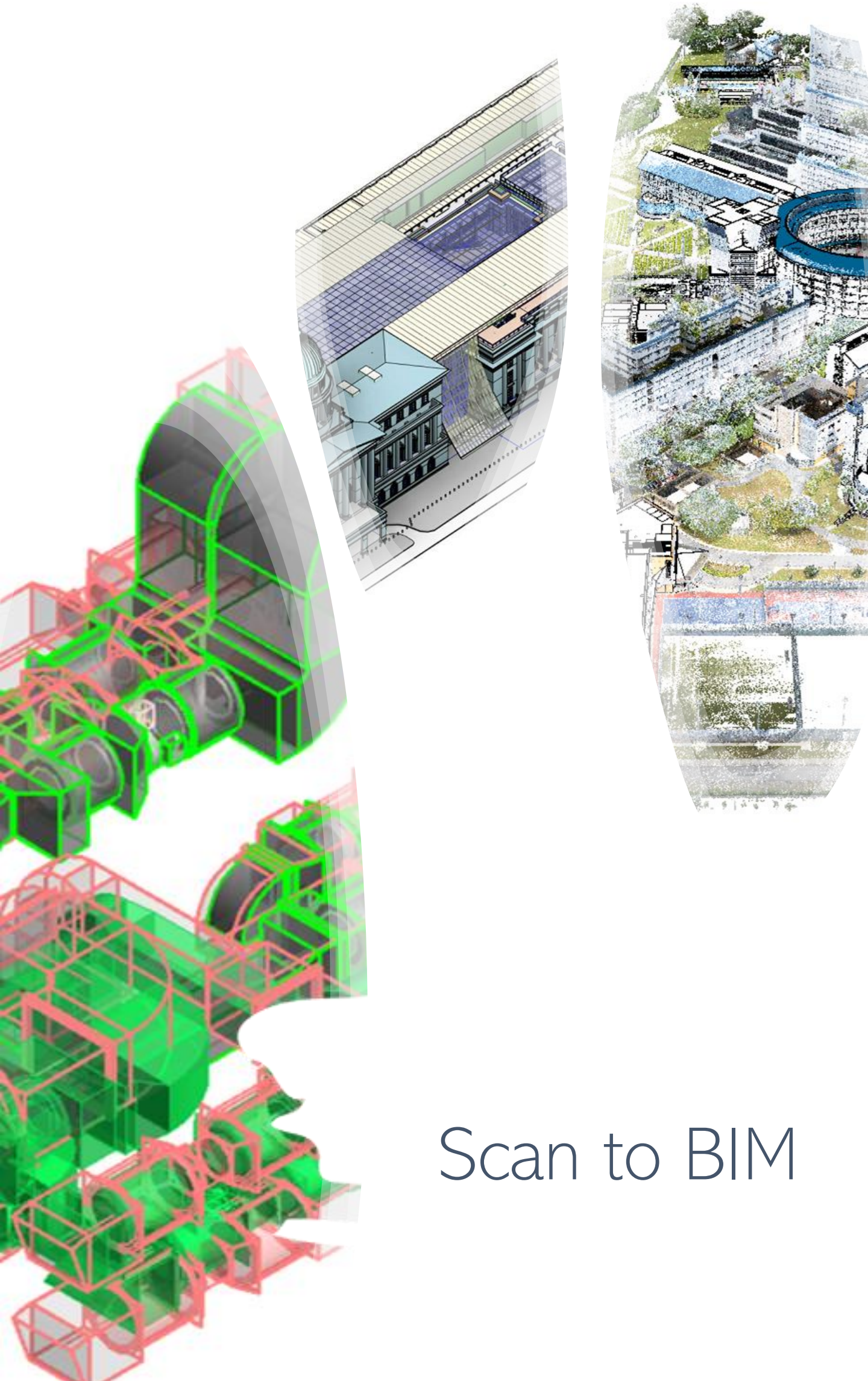
Loy Seah
BIM Specialist

Project Typology

Project Listing



Scan to BIM

Scan to BIM Projects

SMM / Temasek Polytechnic

Project Manager

The development of an as-built multi-disciplinary BIM Model for downstream Facility Management integration with BMS & CMMS. Due to the project size of more than 500,000sqm^2, the project was awarded to both BIMLife & Vizzio to conduct laser scanning & BIM model development on 50+ blocks including Academic, Facilities & Residential areas. The as-built BIM model incorporated assets of high-fidelity models & information to developed into an O&M model and involves clash coordination process to resolve areas of limited information.

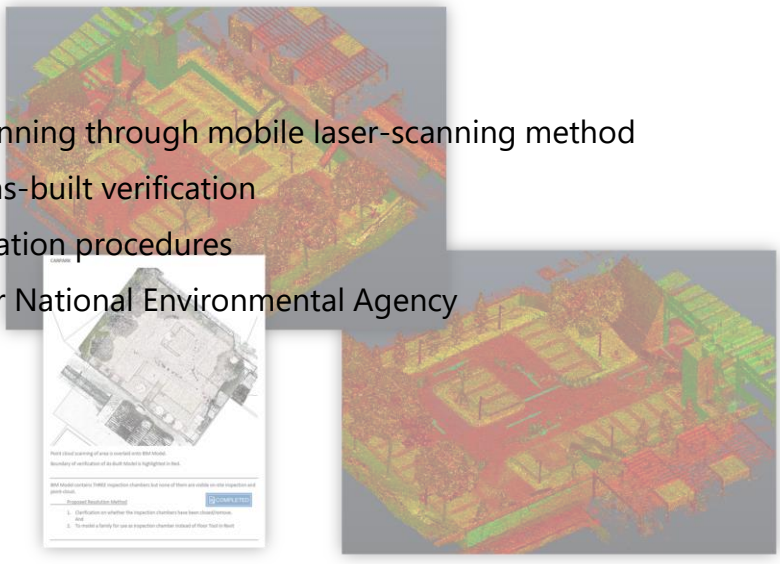
- Creation of Work Breakdown Structure (WBS)
- Responding to JIT production opportunities
- Project coordination with multiple stakeholders of different nature (Client, FM Team, Site Users, Service partner)
- Parallel production management of scanning team & BIM team
- Development BIM Model Management standards
- Development of 500+ families/assets with standardization
- Serve as liaison for BIM process with facilities management

Pal-Link Construction Pte Ltd / Mandai Crematorium

Project Lead

The 2 Storey Crematorium Complex with 2 Basement Levels and 2 Storey Substation Building at Mandai Avenue requires as-built verification through a vendor proposed scanning method. Multiple site teams were operating to construct the columbarium complex and thus laser scanning process had to be conducted parallelly. The verification involves the correction of over 30+ discrepancies of as-built as compared to construction BIM Model.

- Planning & scheduling of scanning through mobile laser-scanning method
- Conduct point cloud to BIM as-built verification
- Developing report for rectification procedures
- Stamp of approval records for National Environmental Agency



Scan to BIM Projects

GPSLand / Central Mall

Project Lead

Central Mall is a unique development that comprises a cluster of conservation shophouses. Our usual partner with GPSLand to provide scanning services followed by BIM Modelling efforts through point cloud from BIMLife. The project consists of a stretch of two-storey shophouses featuring office spaces, restaurants & bars. The BIM model is developed solely through point cloud data as there were no as-built drawings available.

- Usage of point cloud to develop BIM models with physical space in close proximity to each other.
- Usage of 360 photogrammetry for identification of building elements.
- BIM Modelling & BIM Modelling Management standards
- Coordination between Architecture and Structural models

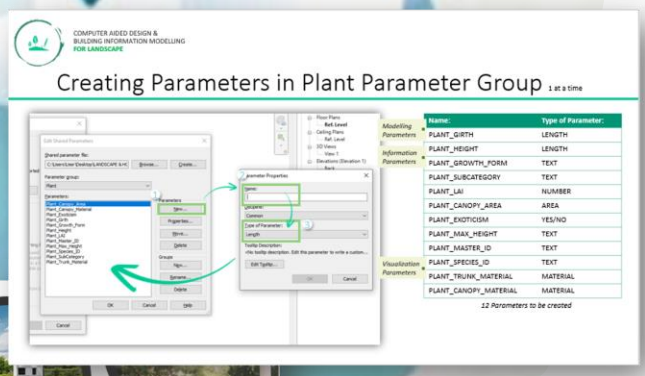
GPSLand / Tuas Checkpoint (Ongoing 2023)

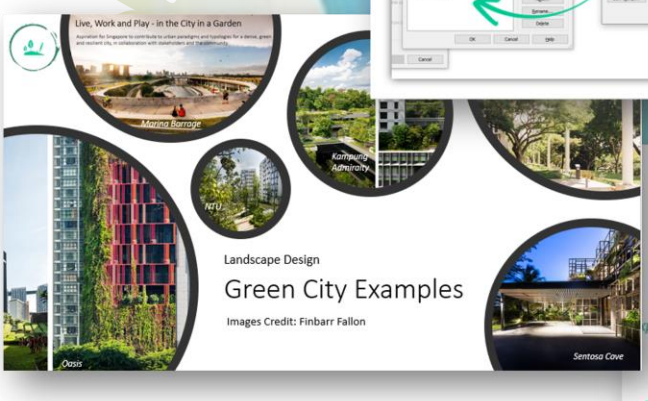
Project Lead

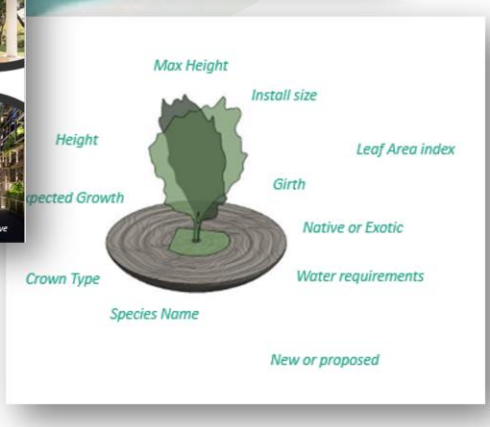
Tuas Checkpoint scan to 3D project requires accurate capture and representation of all digital replica and elements of the Immigration Clearance operation. The total capture and modelled area will exceed 200,000sqm^2, comprising of multiple transport lanes and counters as well as security equipment such as – Cargo Scanners, Radiation Monitor, X-ray, Metal Detector etc.

- Usage of point cloud to develop BIM models with physical space in close proximity to each other.
- Usage of 360 photogrammetry for identification of building elements.
- BIM Modelling & BIM Modelling Management standards
- Liaison with Client on specification requirements

Courseware & Curriculum Development

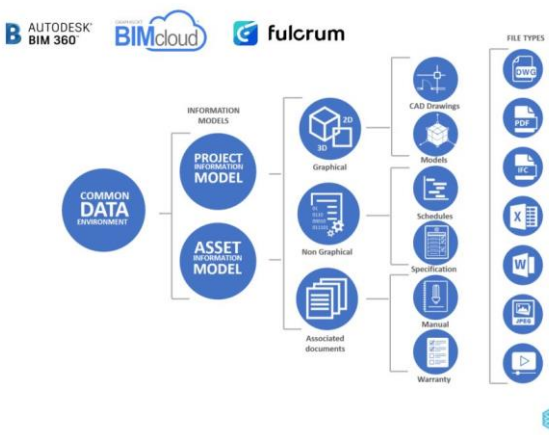






- Construction Sequencing
  - To optimize logistics and site management, contractors perform construction simulations with their BIM Model.
  - This provides everyone in the project team to have a better understanding of the process and progress on site.
  - Through simulations, a team could further research on various options which could speed up construction and reduce congestions on site.

AUTODESK NAVISWORKS FUZOR SYNCHRO™



- Common Data Environment
  - BIM based CDEs such as BIM360, BIMcloud & Fulcrum provides data environments specifically catered to AEC workflow.
  - Such "Modern Day CDEs" provide additional features that enhance our once analog process of working with information. Features such as
    - Issues Management (Creation, Resolution, Backlog)
    - Defects Management
    - RFI Management
    - BIM viewer (3D Viewer, Markups, Dimensioning)
    - Synchronization of files with local BIM models
  - Notice how they have features beyond the essential needs of a CDE

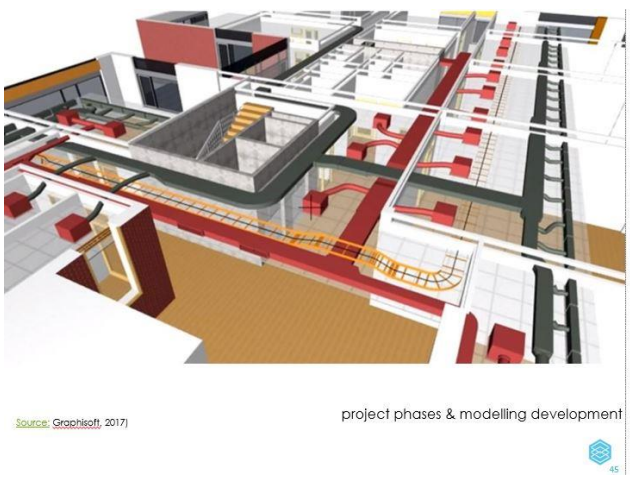
Courseware & Curriculum Development

7

Woh Hup Construction Engineering / BIM Adoption & Implementation

Content Master

This project was in collaboration with Singapore Polytechnic as part of Industry & Partnership project that aims to provide adult skills upgrading with companies in the built industry. The purpose was to craft a courseware for upgrading the skills of employees in Woh Hup – and this content had to perform specifically with the existing workflows. Upon successfully carrying out the Training Needs Analysis, the team was tasked with creating 11 modules which were specific to the job roles of the company. Additionally, they had to create an interactive medium in the form of Performance Support Scheme, which allows trainees to build upon the skills they learn from the 11 modules.



Defined Job Roles in Consortium
Architectural Manager
BIM Specialist (BIM Mngr, BIM Coord, BIM Modellers)
Senior Architectural Coordinator
Senior Design Engineer
Senior M&E Coordinator
Quantity Surveyor (Contract Mngr)
Senior Site Engineer (Project Mngr)

- In-charge of creating curriculum and course outline for different groups of professional, identified through Training Needs Analysis (TNA)
- Needs analysis of Woh Hup group of subcontractors to facilitate holistic application
- Curation of holistic theoretical materials to understand BIM ecosystem
- Curation of step-by-step handholding in BIM tools with visual guides
- Video content creation
- Post-processing of vendor specific marketing materials
- Analysis and production through BIMLife project experience as learning experiences
- Analysis and production of Woh Hup projects experience as learning experiences
- Partial involvement with developing Train-The-Trainers (TTT) programme on pedagogical skills in conducting BIM training, coaching or mentoring to staffs.

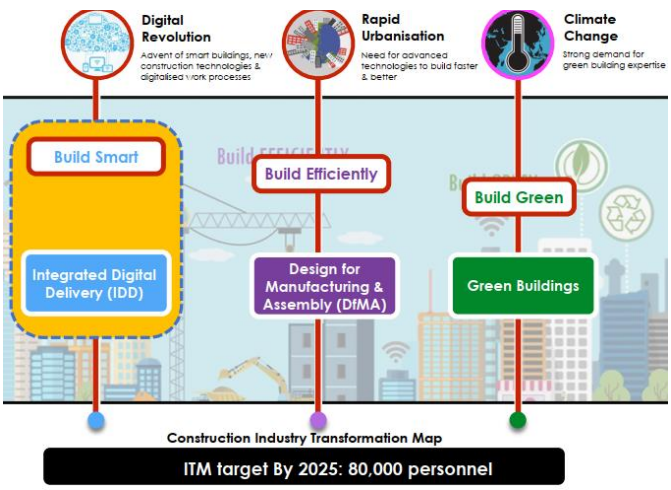
Courseware & Curriculum Development

Singapore Polytechnic / BIM Management Content

Content Provider

Singapore Polytechnic PACE Academy engaged BIMLife to upgrade their educational materials with real technological application in actual projects to supplement their theoretical knowledge. It aims to capitalizes on technology to help businesses transform collaboration, productivity, and innovation across various professional building disciplines. With over 50+ projects of varying nature within the portfolio of all BIMLife's staffs, our role was to provide case studies scenarios within content materials. The materials developed was later incorporated into BCAA Specialist Diploma in BIM.

- Consolidation of knowledge from existing portfolio
- Feeding content into various topics across segments of BIM, VDC & IDD
- Correct & future-proof existing contents of SP material
- Year to year content upgrade



Modules	Topics
BIM Fundamentals	BIM Fundamentals and Concepts Definitions of Project Phases and Modelling Development Quality Assurances and Management Processes BIM Collaboration and Coordination Processes BIM in Practice
BIM Standards & Implementation Strategies	Introduction to BIM Standards and Guidelines BIM System Setup and Specifications BIM Best Practice and Implementation Strategies BIM Execution Plan Introduction to BIM Contract and Risk Management
BIM for Design Coordination & Documentation	Introduction Design Coordination and Documentation for BIM BIM for Documentation and Submission BIM for Design Visualisation and Spatial Coordination BIM Disciplinary Strategies for Model Integration [Architecture/ Structure/ MEP] BIM Objects | Team Work | BIM Server BIM for Project Review and Coordination BIM for Design Stages/Tendering Quantity Take-off and Costing
BIM for Quality Assurance, Design & Quantity Surveying	BIM for Quality Assurance Model Checking BIM for Quantity Surveying BIM for Sustainability and Energy Analysis BIM for Buildability BIM for Structural Analysis
BIM for Construction Planning & Coordination	Introduction to BIM for Construction and Planning Information in Project Lifecycle Coordination in Project Visualisation, Quantities and Estimation Precast Construction and Prefabrication As-Built Development

Courseware & Curriculum Development

9

CapitaLand & Redars Developers / IDD Ecosystem

Content Master

Another partnership with education experts in Digital Building Innovation Center (DBIC) of Singapore Polytechnic.

This course aims to educate Project Managers on the Application of Integrated Digital Delivery [IDD] and Smart Technologies into Building Projects within Singapore BIM Landscape. It will illustrate the various benefits in the Upstream and Downstream activities pertaining to the entire Construction Value Chain.

idd Planning | idd ecosystem | conceptual design | schematic design | development design | tender | construction | as-built | facility managment

These benefits will be demonstrated through the Design, Construction and Post Construction Phases, where it will begin from IDD Pre-Planning, IDD Ecosystem, Conceptual Design to Facility Management. It will also illustrate, the various possibilities and opportunities IDD bring to the Built Environment, when it is adapted within the Building Processes and beyond for Operations & Maintenance. As Attendees are representatives of Developer/ Owners, they will gain insight on the possible pitfalls and benefits if BIM Values are not realized to their fullest potential.

- Develop content according to IDD 4 Segments of Digital Design, Digital Manufacturing & Fabrication, Digital Construction & Digital Asset Management
- Comprehensive development of technologies across planning, design, tender, construction & operation stages.
- Consolidation and post-processing of vendor provided contents
- Gathering of information from built environment professionals building disciplines
- Re-purpose CapitaLand Funan BIM Model for learning purposes
- Develop quizzes and test for certification for attendees' knowledge verification

Technological Training Content
Integrated Digital Delivery
IDD Pre-Planning
IDD Ecosystem
Conceptual Design
Schematic Design
Design Development
Tender
Construction
As-Built
Facility Management

Courseware & Curriculum Development

Ngee Ann Polytechnic / BIM for Landscape Design & Horticulture

Content Master

As part of the Ministry of Education motion to improve future skilled workers in the built industry in the domain of BIM, Ngee Ann Polytechnic awarded BIMLife to create a module within the diploma of Landscape Design & Horticulture. We were given full control over the development of content materials and Loy was appointed as adjunct lecturer for 2 semester before passing the baton to Ngee Ann lecturers.

BIM for Landscape is a topic rarely covered and to date there is no guidelines or requirements from authorities for landscape architects to produce BIM models. The lack of guide and interest results in uncertain path of landscape architects' participants in an integrated BIM approach. Loy undergo ground-up studies to determine the use cases and benefits of encompassing BIM for LA that would increase productivity, information accuracy, trees as maintenance assets, and improve collaboration across project team. These experimental studies and developed strategies of implementation will hopefully form part of BCA guidelines to landscape architects in the future.

- Pedagogy analysis for best condition to training during Covid period
- Development of framework and outline of contents
- Content Development
- Assignment Development & Grading
- Admin matters in Student Administration System
- Participation in analysis of students' education performance

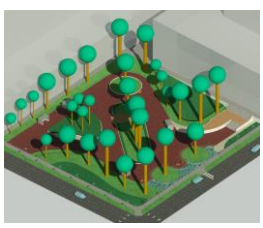
The goal of integrated BIM for Landscape for this project are,

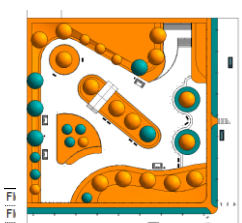
(1) To spark interest/motion and serve as future case study for adoption of Landscape to BIM

(2) Increase Synergy with team members through collaboration of homogeneity in file format exchange

(3) The study & implementation of Landscape BIM for facility management and operations

(4) Leverage BIM for National Parks Board Landscape Excellence Assessment Framework (LEAF) for the following submission segments – GnRP, Native vs Non-native species, Retain on Site, Quantity of native species planted





Fl	pressus	Turf	575 m²	Level 1
Fl	pressus	Turf	462 m²	Level 1
Fl	pressus	Turf	154 m²	Level 1
Turf - 200 - Axonopus compressus			1191 m²	
Floor	Turf - 200 - Axonopus compressus (dwarf variegated)	Turf	443 m²	Level 1
Turf - 200 - Axonopus compressus (dwarf variegated): 1			443 m²	
Floor	Turf - 200 - Axonopus compressus (dwarf)	Turf	163 m²	Level 1
Floor	Turf - 200 - Axonopus compressus (dwarf)	Turf	154 m²	Level 1
Turf - 200 - Axonopus compressus (dwarf): 2			316 m²	
Floor	Turf - 200 - Cynodon dactylon (L.) Pers.	Turf	113 m²	Level 1
Floor	Turf - 200 - Cynodon dactylon (L.) Pers.	Turf	113 m²	Level 1
Floor	Turf - 200 - Cynodon dactylon (L.) Pers.	Turf	254 m²	Level 1
Floor	Turf - 200 - Cynodon dactylon (L.) Pers.	Turf	256 m²	Level 1
Turf - 200 - Cynodon dactylon (L.) Pers.: 4			736 m²	
Grand total: 10			2686 m²	

Courseware & Curriculum Development

SG Enable / BIM for Asset Data Management

Content Master

SG Enable aims to foster an inclusive society for person with disabilities to live, learn and work. As part of achieving those goals, they awarded BIMLife to develop a BIM curriculum and training provisions within the Enabling Academy to equip persons with disabilities with skillsets to work within the built industry.

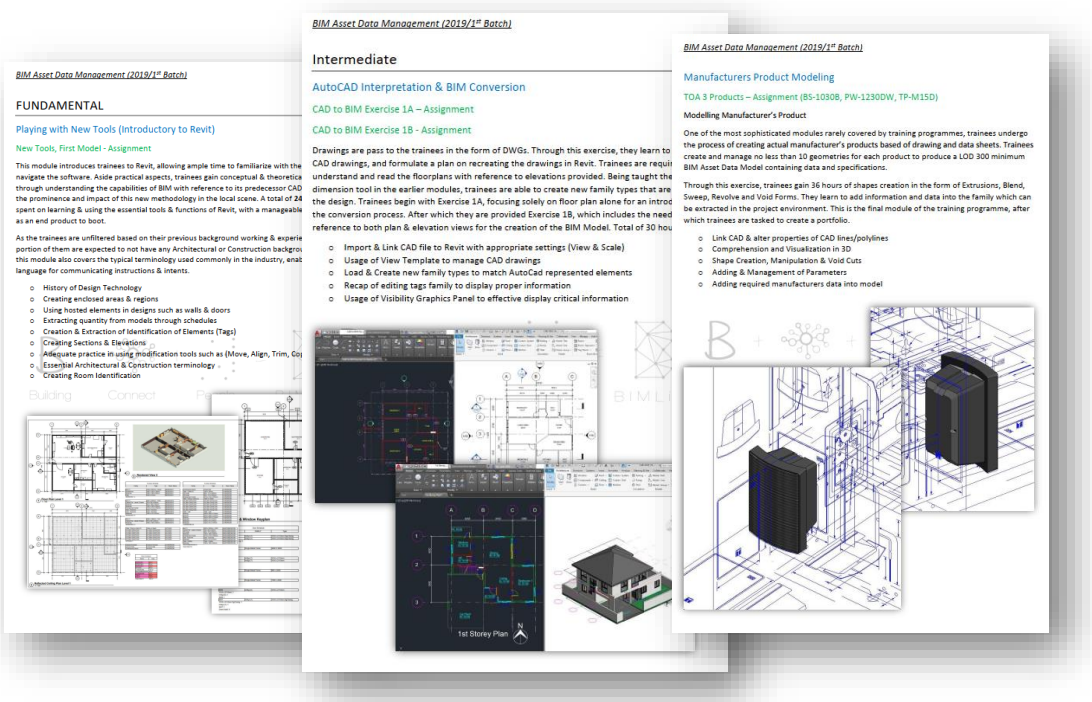
A 5 months full day training programme was run 5 days a week to equip trainees with industry knowledge and practical skills to apply on jobs related to BIM. The complexity of the programme was due to the nature of trainees who were not aware of BIM, much less coming from the built environment sector. Interested parties had to undergo interviews to ensure they are suitable for the intensive training in anticipation that they will be able to successfully achieve project goals of attaining job employments. The disabilities of students were varied, with cases of loss of limb/s, limited motion, deaf as well as autism presented challenges in conducting training.

Of the approximate 20 trainees, 4 of them were employed by companies offering wages align with non-disabled personnel. Unfortunately, even with the promoted motion of an inclusive society and government incentives for employers to hire PWDs, there still presents a systemic bias similar to that of racial & gender discrimination. We hope that the motion of encouraging inclusiveness continue to persist and help shine a light on their possible contribution and knowledge which we could leverage on.

To play a small part in this motion, Loy have created success stories that hopes to inspire both PWDs and employers. These videos can be found in the link below,

https://www.youtube.com/watch?v=tP_Fny5mheA&t=8s

https://www.youtube.com/watch?v=w3kKJhNmf6s



- Course Lecturer & Content Development
- Development of curriculum for 5 months training programme comprising of Basic, Intermediate & Advance modules
- Administrative tasks such as logging and attendance
- Misc event planning tasks such as hardware & software, facilities & food/snacks provision, sign language interpreter
- Conduct performance review sessions with trainees to align them with course outcome
- Research on opportunities for suitable employment based on trainees' performance, interest & motivations.
- Assignment Development & Grading

Courseware & Curriculum Development

12

Loy Seah / Computational BIM Course

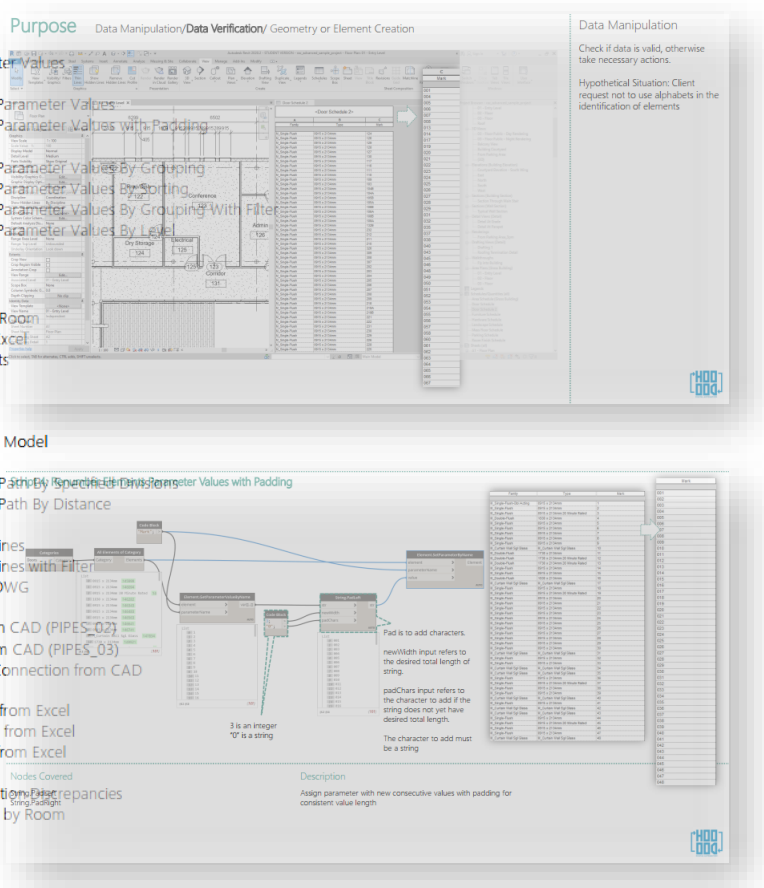
Content Owner

One of Loy's highlights of 2020 was the creation of a Computational BIM course solely focusing on Dynamo to improve modelling & documentational efficiencies. The course was developed as a result of BCAA students multiple request to conduct a Dynamo course which they felt was insufficient in the specialist computational BIM diploma. As such, he crafted an 18-lesson programme which provides an in-depth application of Dynamo, and participants of the training will attain its own certification. To be able to create this programme from the ground up was an exciting and eventful process, building generic & bespoke solutions for multi-disciplinary teams.

- Curriculum planning (Online course)
- Course lecturer
- Courseware development for basic & advance courses
- 28 Scripts with detailed explanation of connection of nodes
- Crafting of bespoke solutions for real project implementation

Content IP solely owned by Loy Seah

Week	Category	
1	Introduction	
2-4	Data Manipulation And Creation	Script 1: Add Prefix to Parameter Values Script 2: - Script 3: Renumber Elements Parameter Values Script 4: Renumber Elements Parameter Values with Padding Script 5: Rename Sheets Script 6: Renumber Elements Parameter Values By Grouping Script 7: Renumber Elements Parameter Values By Sorting Script 8: Renumber Elements Parameter Values By Grouping With Filter Script 9: Renumber Elements Parameter Values By Level
5	Sheet Creation	Script 10: Create Sheets From Room Script 11: Create Sheets from Excel Script 12: Delete Unused Sheets
6	Annotation Creation	Script 13: Tag Rooms in View Script 14: Tag Doors in View Script 15: Tag Elements in Link Model
7	Element Creation	Script 16: Create Elements on Path By Specified Divisions Script 17: Create Elements on Path By Distance
8	Element Creation	Script 18: Create Pipes From Lines Script 19: Create Pipes From Lines with Filter Script 20: Create Pipes From DWG
9	Element Creation	Script 21: Create Sprinkler from CAD (PIPES_02) Script 22: Create Sprinkler from CAD (PIPES_03) Script 23: Create Sprinkler & Connection from CAD
10	Facility Management	Script 24: Input Element Data from Excel Script 25: Create Family Types from Excel Script 26: Place Family Types from Excel
11	Facility Management	Script 27: Check Element Location Discrepancies Script 28: Duplicate Schedules by Room
12	Quiz and Assignment	



Courseware & Curriculum Development

Kingston Property Management / BIM for Property Management

Content Master

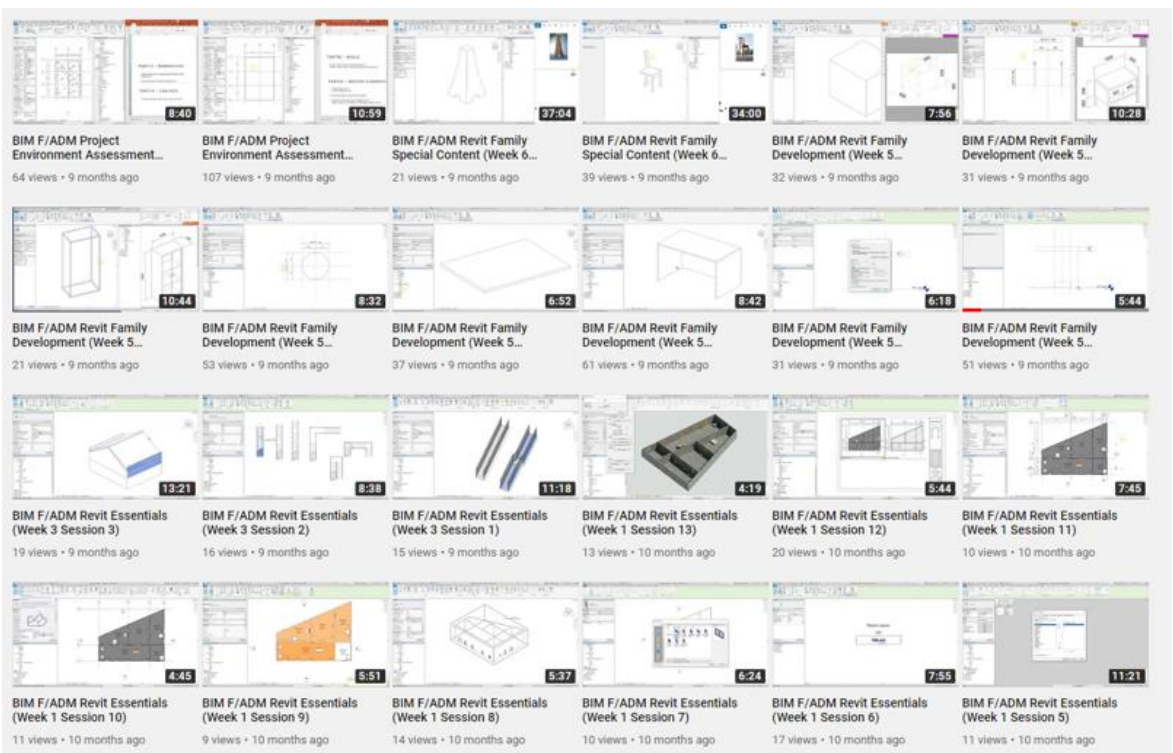
A quick turnaround 2-day training for facility managers to understand the concepts and use cases of BIM towards operation & maintenance. Trainees were taught fundamentals of BIM concepts as well as having practical lessons on BIM models hosted in BIM Authoring/Reviewing software and Common Data Environment.

- Curriculum and event planning
- Course on Revit & BIM360 document management & issue tracking
- Course lecturer

Online Youtube Educational Materials / Public Content

Content Owner

The content on Loy Seah's youtube channel is publicly accessible for interested parties in BIM ecosystem. It includes playlists segmentizing contents such as Asset Modelling in LOD 500, Digital Automation, VDC Naviswork Essentials and IDD BIM360 essentials.



Lecturer & Training Experience

Lecturer & Trainer

Keong Hong (A1 Contractor)

Trainer

ID Architects is an active and innovative member of building and construction industry in the last 30 years, ID Architects grows and excels through continuously improving its design capabilities by exploring, adopting and inventing new methodologies and digital technologies in its practices working with client, developers, construction companies, engineering firms, consultants, contractors, government agencies and technology companies in the ecosystem.

The Digit Alpha Solution Set consist of 4 segments – BIM, VDC, XR & PIM. As a service provider, BIMLife role was in the programme was to provide BIM training to a diverse group of stakeholders in Keong Hong, with most of them engage in National Skin Center project.

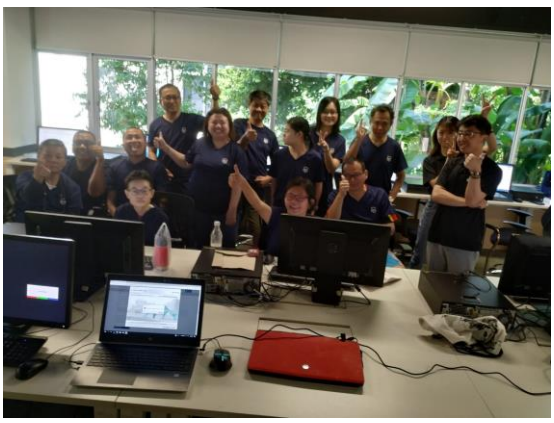
The solution set taps on IMDA SMEs Go Digital funding and seeks to implement solutions to actual projects with assessment & evaluation of outcomes after its deployment.

Loy Seah conducted a total of 110 man-hours of BIM training on Revit, Naviswork & BIM360.

SG Enable / BIM for Asset Data Management

Trainer

The training was a 5 month long intensive programme for people with disabilities, which requires interviewing candidates' suitability, BIM training, facilities management and prospective job assignment.



As most trainees had no experience within the built industry, it was important to provide fundamental knowledge and practical skills required to perform certain job roles. Loy Seah also serve as a mediator between companies and trainees to ensure compatibility and also included on the job progress monitoring to supplement project needs.

The practical training solely focuses on Revit.

Lecturer & Trainer

Ngee Ann Polytechnic / BIM for Landscape Design & Horticulture Lecturer

As BIM has been implemented into various disciplines and enforced by the public authority, there is a push to also integrate landscape architecture into this process. Schools are revising their curricula to ensure they are up to date with the practices of the ever-evolving industry.

Loy Seah was tasked by Ngee-Ann Polytechnic to create – from scratch – a module that teaches students to operate new technologies. There was a lot of uncertainty, as there were no formal directives from the government on how technology is to be implemented into the process; therefore, all materials were predictive. To compensate for this, the team researched various ways that landscape architects can benefit from the implementation of BIM, proposing innovative ways in which this technology can provide the most value with the least hassle.

Upon completion of the preceding undertaking, Loy Seah was selected as the adjunct lecturer to conduct 2 semester worth of classes.

Assignment Overview

4th Session	**BIM Model – HDB Apartment** Students will create BIM Model of their Apartment. Grading will be judge on Modelling & Documentation of the project.	20%
8th Session	**CAD Drawing – HDB Apartment** Students will create CAD Drawing of their Apartment. Grading will be judge on Drafting Techniques and Layer Management of the file.	20%
10th Session	**Revit Family Creation** Students will design their own choice of hardscape elements (families). Grading will be judge on complexity of geometry and parametric capability of the families.	30%
15th Session	**Landscape Design Project** Students will use all knowledge gain from previous sessions to design landscape. Grading will be judge heavily on Leaf Excellence Assessment Framework.	30%

COMPUTER AIDED DESIGN & BUILDING INFORMATION MODELLING FOR LANDSCAPE

Landscape Design

Session 11-15

Lecturer & Trainer

Formwerkz Architects

Trainer

The architectural design consultants had a new mixed use residential & commercial project that requires BIM submission. With a lack of suitable BIM modelers in the market, the directors opted for upgrading the existing team, to educate them on BIM fundamentals and execution of BIM within Revit, Naviswork & BIM360. The project team involved Architects, Drafters & Project Managers which were chosen to undergo training after working hours worth 18 sessions of 2 hours each.

Loy was in-charge of curriculum development; however, the training package did not include study materials as the training sessions were recorded, allowing repeated online viewing whenever necessary.

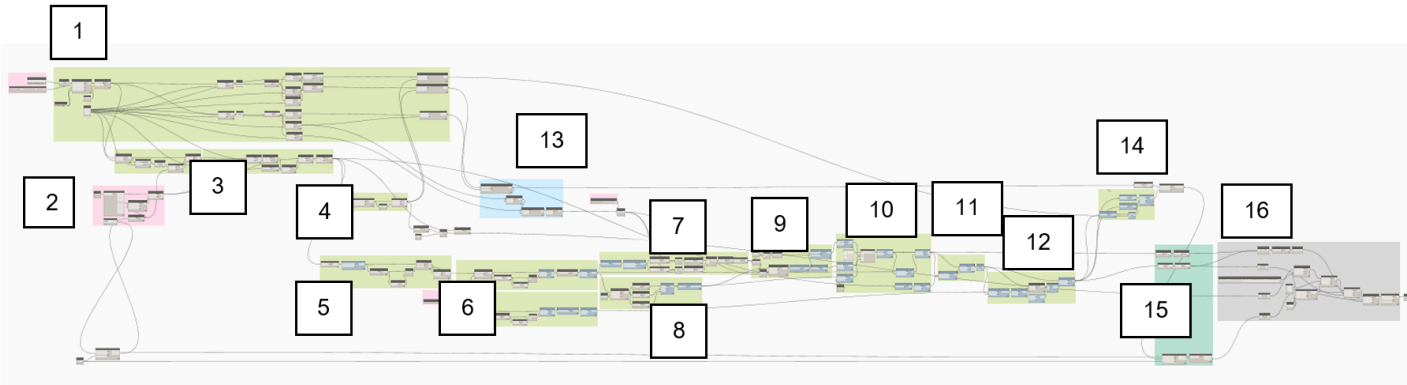
Beyond training in authoring tools, other key area of focus involves educating trainees on BIM Standards, BIM Coordination Process as well as BIM ICE session.

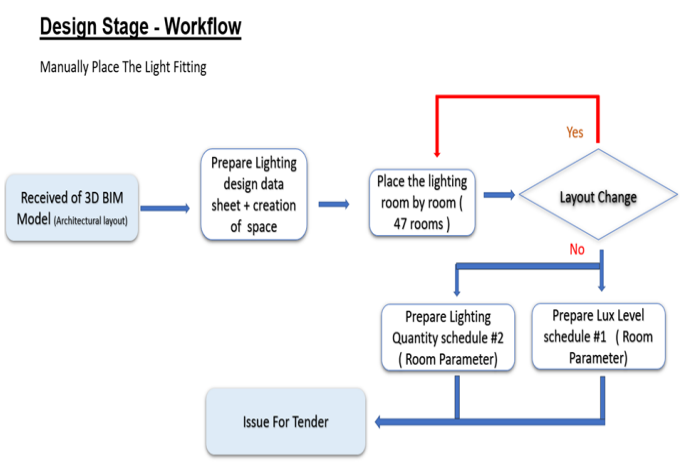
Computational BIM Research for VDC

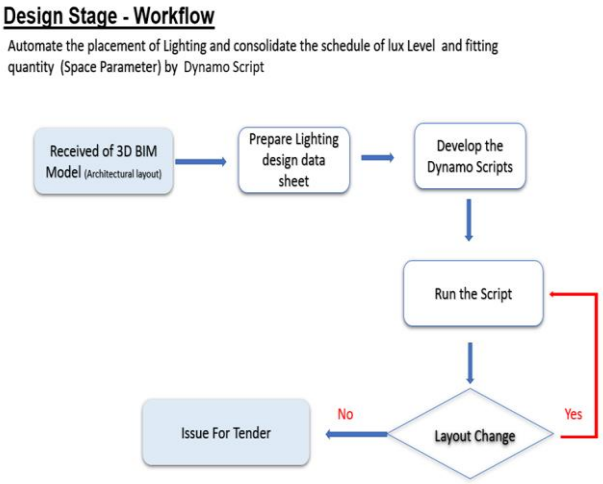
Lecturer

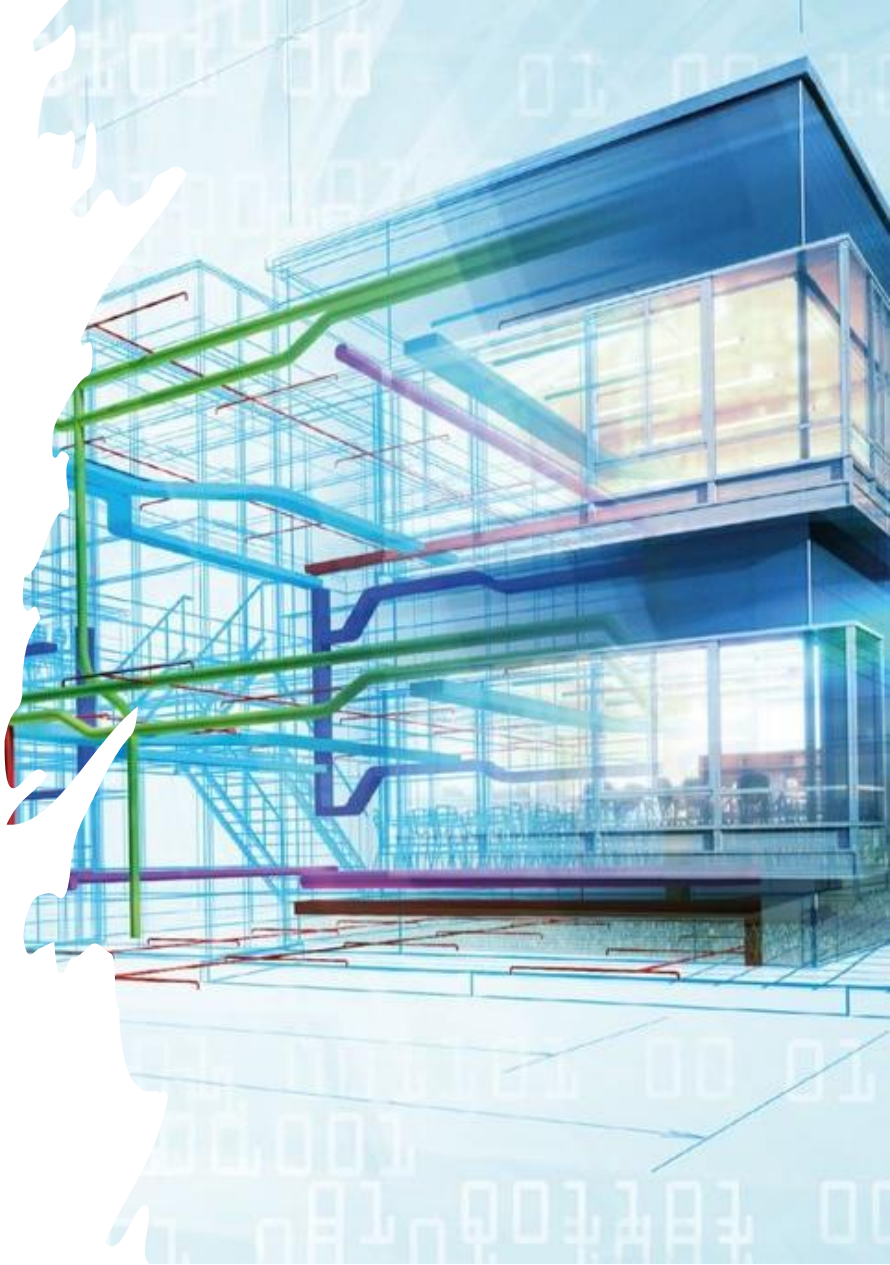
Loy was invited as a Distinguish Speaker for a community driven VDC knowledge sharing group to share and spark new ideas in Computational BIM. The bulk of the session involves breaking down to the nitty-gritty details of automated solutions developed in BCAA which he was awarded the Gold Award. He shared details on building scripts to help improve efficiency in design & documentation and present a real-world use case for such applications.

Though he was invited to be part of the steering committee at the point in time, he turned down the opportunity due to conflicting schedules with other projects.

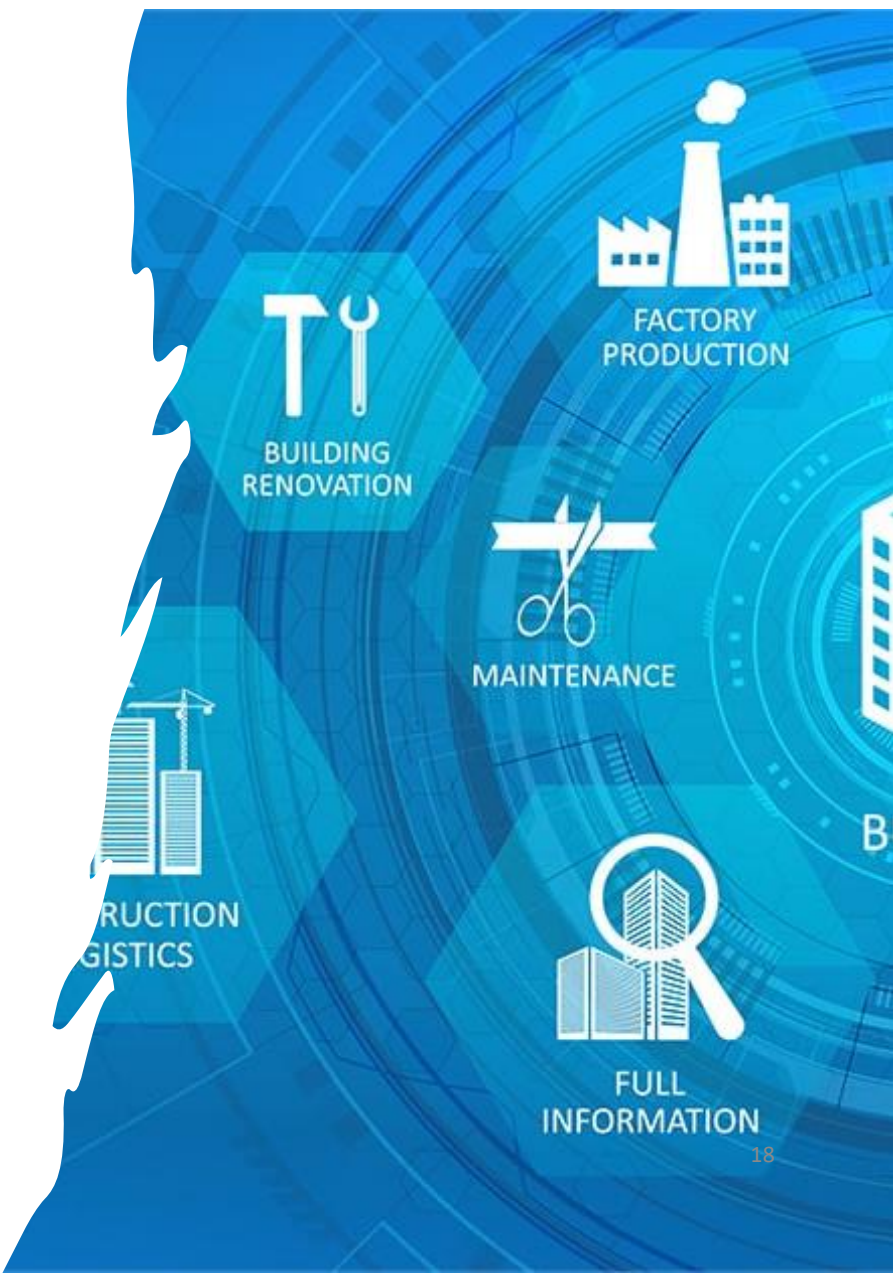








BIM Consultancy



BIM Consultancy

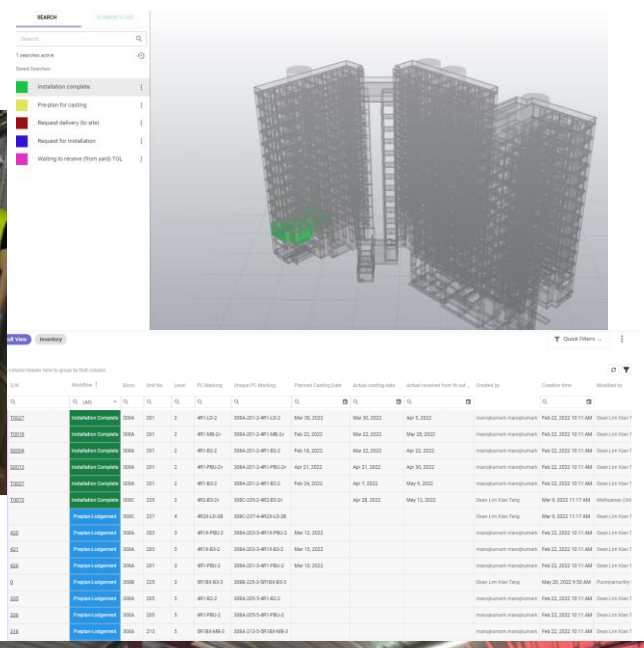
Guan Ho Construction / HDB Tengah Park

District Contract 7 (Ongoing)

Consultant

BIMLife is engaged as a BIM Consultant to fill the gap between technology domain experts and the built industry in Integrated Digital Delivery (IDD). Along with Director Webb Poh, we assist in the implementation of PTW Systems, VR, Maxhub, Reality Capture, 4D sequencing in Fuzor, PPVC logistic tracking solution and digitalized checklist for quality assurance within the grant from BCA for Productivity Innovation Project.

- Seteup of VR & Maxhub solutions along with guidelines for ICE sessions
- Provide training for development of 4D simulation with Fuzor
- Acting as knowledge integrators between Tech Vendor and Client due to funding for developing customized solutions for Digital Project Management Platform & Construction Management Platform.
- Preparation of report to compare technological adoptions to achieving KPIs
- Breakdown of PPVC logistical process for integration with digital solution
- Execution of Reality Capture Solution, Matterport to capture Timber Mockup of HDB units



BIM Consultancy

Koh Brothers / Founders' Memorial (Ongoing)

Lead Consultant

BIMLife is engaged as a consultant to propose a holistic IDD suite and development of BEP as part of Tender requirements. It is a sui generis of a project, requiring a comprehensive technological proposal that will suit such a distinct development.

- Study of tender requirements and opportunities for differentiated product
- Formulation of IDD technologies and implementation Plan
- Development of Pre-Contract BIM Execution Plan
- Analysis of latest technologies & applicable use cases for project
- Cost & resource analysis for implementing technology

BIM Consultancy

Fonda Global Engineering / Rifle Range Road (Ongoing) Lead Consultant

BIMLife is engaged as a BIM Consultant to provide confidence to project execution, providing knowledge and problem-solving sessions to immediate issues.

The project will run for a total of 33 months to upgrade building and infrastructure which involves Scan to BIM processes running in parallel to upgrading works in 7 phrases.

Lead Consultant

- Root cause analysis
- Resolution of issues
- Scan to BIM process

Beth EL / Changi General Hospital &

Changi East Integrated Facilities (Retainer Agreement) Lead Consultant

Beth EL is a Security & Blast specialist in Singapore and due to an increase in contractual obligations to provide BIM models as consultant, they needed a supporting arm in BIM given their lack of knowledge in this segment.

Loy is engaged by Beth EL to provide both BIM Modelling & BIM Consultancy services and act as an "external" BIM Manager to coordinate efforts of the multi-disciplinary team. It includes developing security BIM objects with asset attributes and classification required by the client. Such objects include intercom, x-ray, cctv and other forms of detectors.

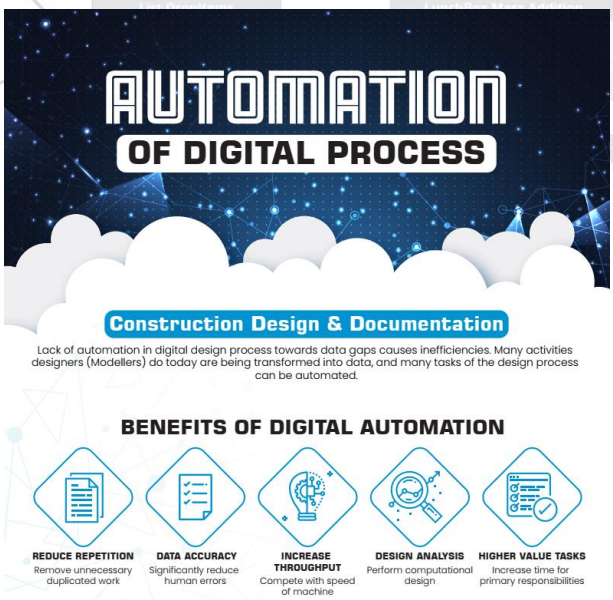
Formwerkz Architects / Maxwell Mixed Use Development Lead Consultant

According to contractual requirements, FW had to use BIM technology as part of design and tender submission. This was their first project and BIMLife were brought in to provide confidence in BIM implementation.

Loy was appointed the leading consultant and consultancy included..

- Assessment of manpower resources & competency
- Candidate hunting and BIM Manager competency
- Software & Hardware adequacies for BIM execution
- Health check for ongoing projects
- Implementation of training programme to upgrade staffs

Computational BIM



Computational BIM

DIGITAL AUTOMATION

Interesting in a multi-disciplinary approach to solving problems, Loy initiated and spearheads Hoodoo, the Automation Department in BIMLife to provide agile solutions for modelling & documentation. His current endeavor is exploring the opportunity for Automation, Big Data & Data Analytics, producing greater scale of efficiency from BIM Models.

Loy was recognized with the Gold Award in Specialist Diploma in Computational BIM from BCAA in 2020 and was later invited as a Distinguish Speaker for Singapore VDC community group to share in depth of his computational BIM applications.

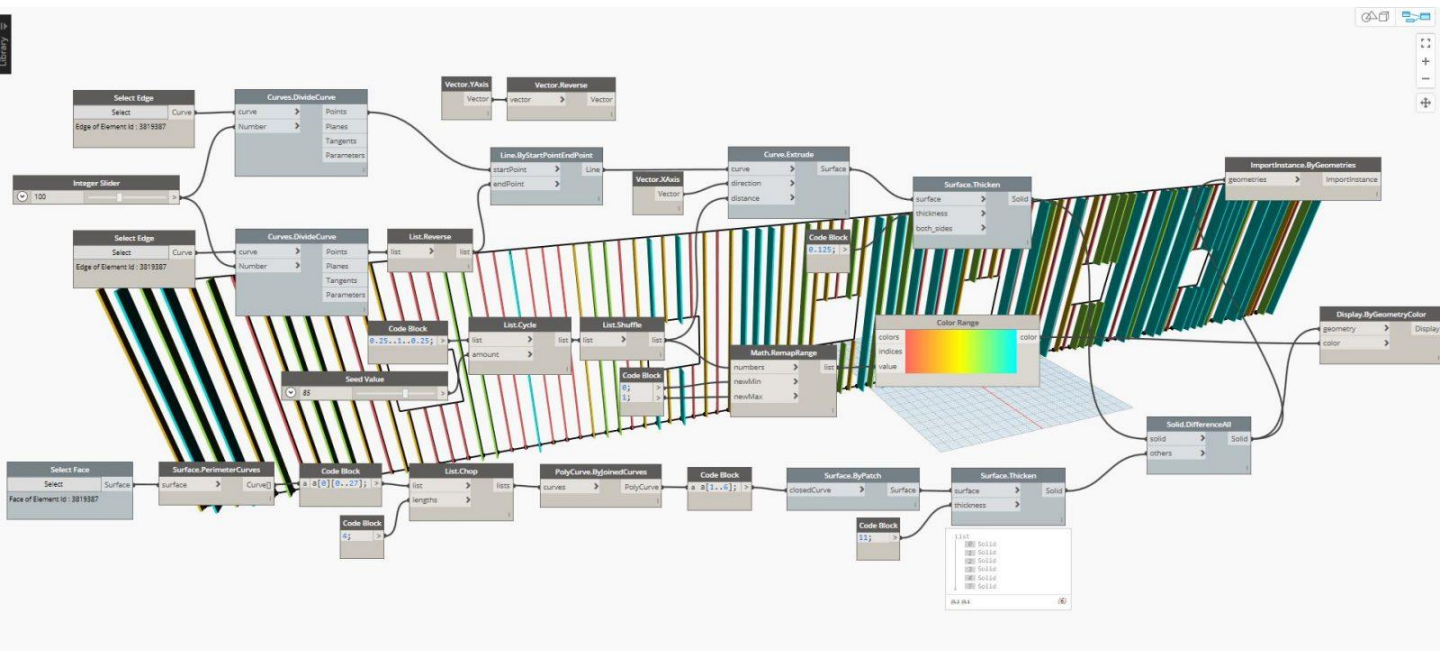
The following segment showcases his involvement in 4 projects:

Arch'lab with National Health Science

Keong Heong Contractor National Skin Center

Rico Engineering Computational BIM Team

Beka Computational BIM Team



Computational BIM

ArchLab / Health Science Authority

Specialist

Archlab is the medical planner for the new Health Science Authority building in Outram road. Given the size of the building, quantity of rooms and MOHH requirements of developing Roombook Documentation, it requires an extensive team of BIM modelers to create the output.

Loy took the opportunity in creating automation tools to automate the Roombook development processes, thus reducing the amount of manpower required. This automation processes lead to fewer human errors and reduced the time needed for additional human intervention in corrective measure. At the same time, it increases the consistency of deliverables ensuring a high-quality submission was achieved.

A total of 16 synchronous scripts developed in Dynamo was executed for documentation processes as well as asset information delivery. There were approximately 220 rooms and 1800 specialty assets involved.

The execution was arranged in 2 phases,

Phase 1:

- Create Sheets automatically based on number of rooms
- Automatically place views onto the right sheets
- Generate key plans for each room
- Generate 3 types of schedules per room

Phase 2:

- Generate 1 floor plan per room
- Generate 4 elevations per room
- Generate 1 rcp per room
- Generate 1 Axonometric 3D per room

Phase 3:

- Synchronizing 1800~ asset with 55 attributes from excel
- Synchronizing 220~ rooms with 153 attributes from excel

A preliminary studies for Computational BIM execution above conclude that it took 8.4% of the time compared to a team of 3 Modelers.

Computational BIM

ArchLab / Health Science Authority

Specialist

A post-implementation study was conducted to quantify the benefits of time & cost savings due to automated processes delivered by Dynamo within Revit. Preliminary study data are as shown below.

	Manual	Output	Manual Time Taken	Automated Time Taken
Phase 1				
Create Sheets	40sec/sheet	7 sheets per room = 1400 sheets	15hr30min	15min
Create Room Key plan	40sec/view	1 view per room = 200 key plans	2hr10min	20min
Create Schedule (3 per room)	30sec/schedule	3 schedules per room = 600 schedules	5hr	20min
Insert Views Into Sheets	15sec/view	12 views per room = 2400 views	10hr	1hr
Phase 2				
Create Floor Plan	60sec/room	1 view per room = 200 floor plans	3hr20min	20min
Create 4 Elevations	120sec/room	4 elevations per room = 800 elevations	6hr40min	1hr
Create Reflected Ceiling Plan	60sec/room	1 view per room = 200 ceiling plans	3hr20min	20min
Create Axonometric 3D	40sec/room	1 3D per room = 200 3D views	2hr10min	30min
Total (Core Only)			**48 Hours 10mins**	**4 Hours 5mins**

	Manual	Output	Manual Time Taken	Automated Time Taken
Behind the Scenes				
Batch Rename Families (Specialty Equipment)	20secs/family	Rename 2000~ families	11hr5min	20min
Rename Unused Sheets	5sec/sheet	25% of sheets = 350 sheets	30min	10min
Set Upper Case For Parameter Value				
Set Cover Page Details	20/sheet	1 cover page per room = 200 sheets	1hr5min	5min
Duplicate Current Sheet	40sec/sheet		40sec/sheet	10sec/sheet
Place View Coordinates Test				
Rename Views (Key Plan)	5sec/view	1 view per room = 200 plans	15min	10min
Set View Templates	5sec/view			
Created But Not Used				
Create Sheet Data From View Names	60sec/room	1 view per room = 200 floor plans	3hr20min	20min
Set Parameters From Room Spatial Location	120sec/room	4 elevations per room = 800 elevations	6hr40min	1hr
Rename Unused Sheets (Again)	5sec/sheet	25% of sheets = 350 sheets	30min	10min

Computational BIM

Keong Hong Contractor / National Skin Center

Specialist

With Health Science Authority implementation of Computational BIM being a huge success, similar approach towards the MOHH requirements of RDS & RLS was implemented. A preliminary study shows a total of 2000 man-hours is required to produce the following for 760 rooms whereas the automation would take approximately 100 hours with regular computer processing speed.

Number of Rooms in NSC

Rooms : 760

Execution Includes:

-Floor Plan: 760
-Reflected Ceiling Plan: 760
-Elevation: 3040
-Schedules: 760
-Axonometric View: 760
-Sheets : 6080

Unlike the HSA project, a preliminary study was first required to determine if Dynamo Execution was worth the cost. As such, a cost analysis study was developed by Loy to calculate the total time-saving in relation to expenditure. The proposal was later approved by the Executive Director and was ready to roll out.

Other key aspects of involvement includes:

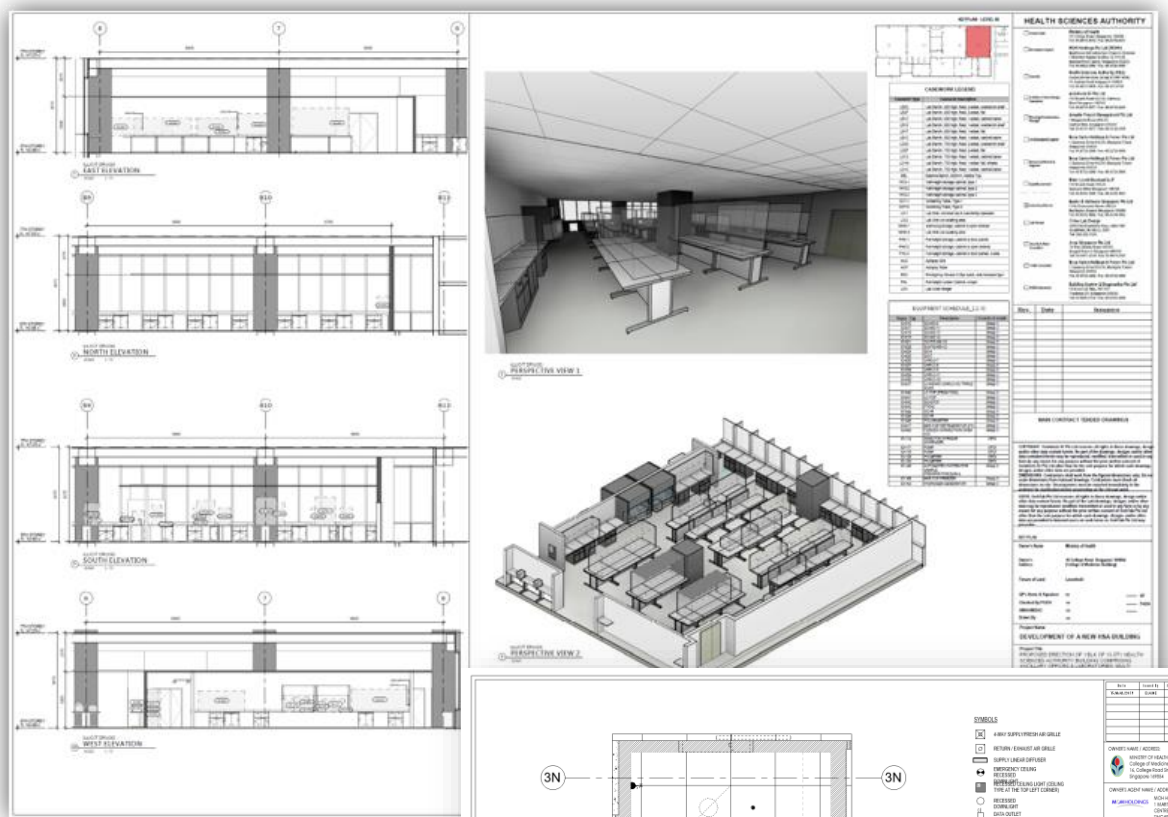
- Analysis of output requirements
- Counter proposal of RDS & RLS requirements
- Coordination efforts with Main Contractor

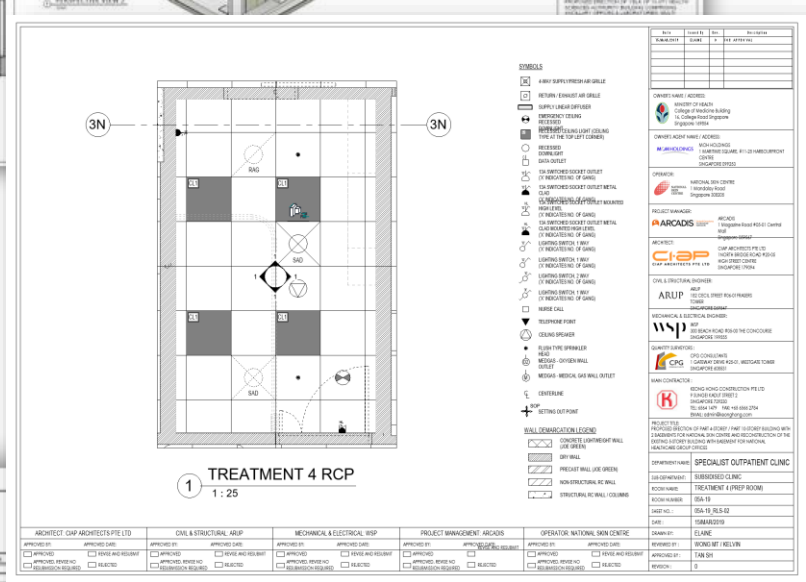
Computational BIM

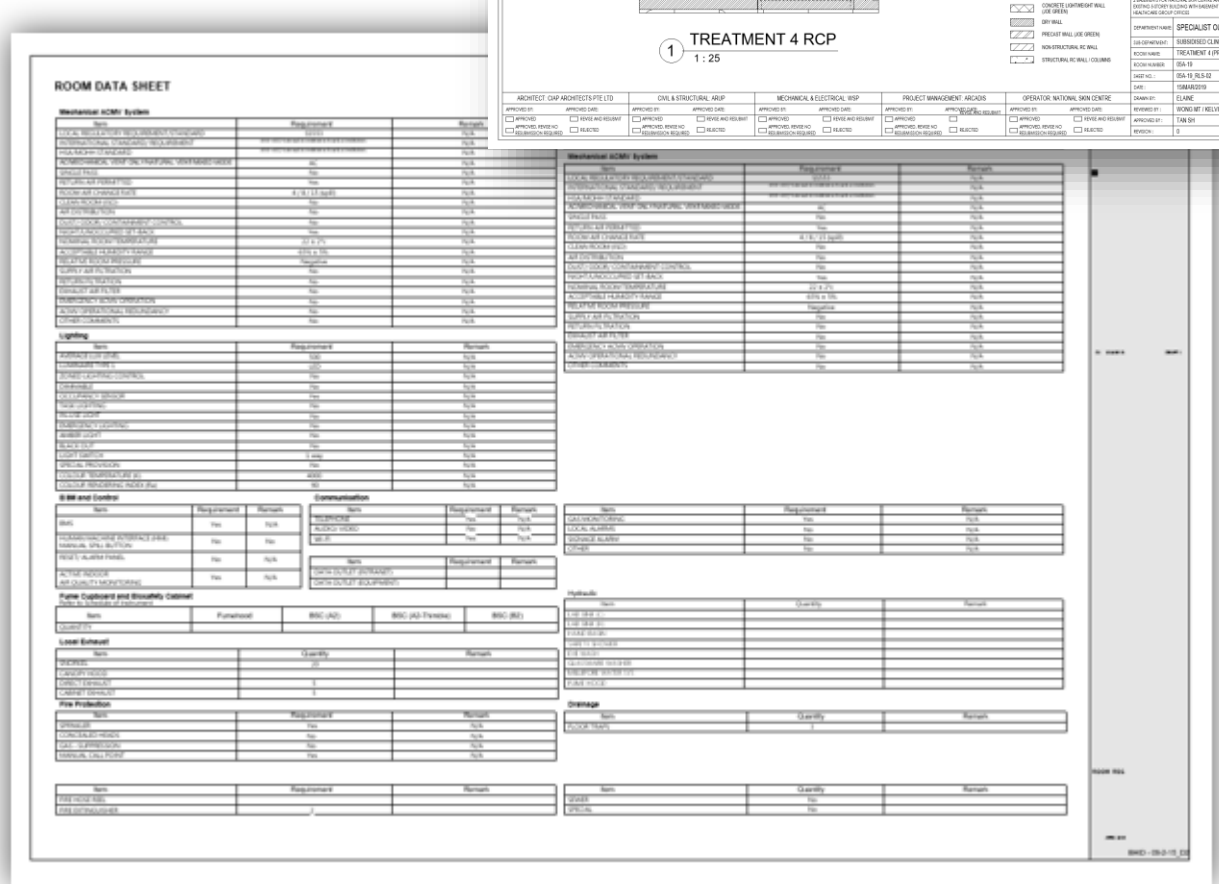
Health Science Authority & National Skin Center

Specialist

The images below shows the QA/QC standard required of MOHH in delivery of RDS & RLS. Over 90% of shown items within documentation was produced by automation.



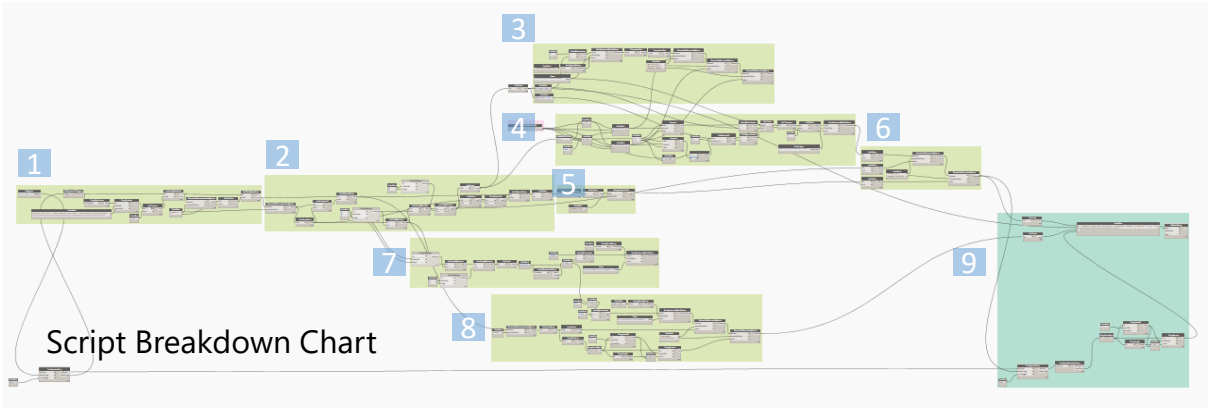




Computational BIM

Collaboration with Ai Chen from Rico Engineering | Automated Fire Schematic Diagram

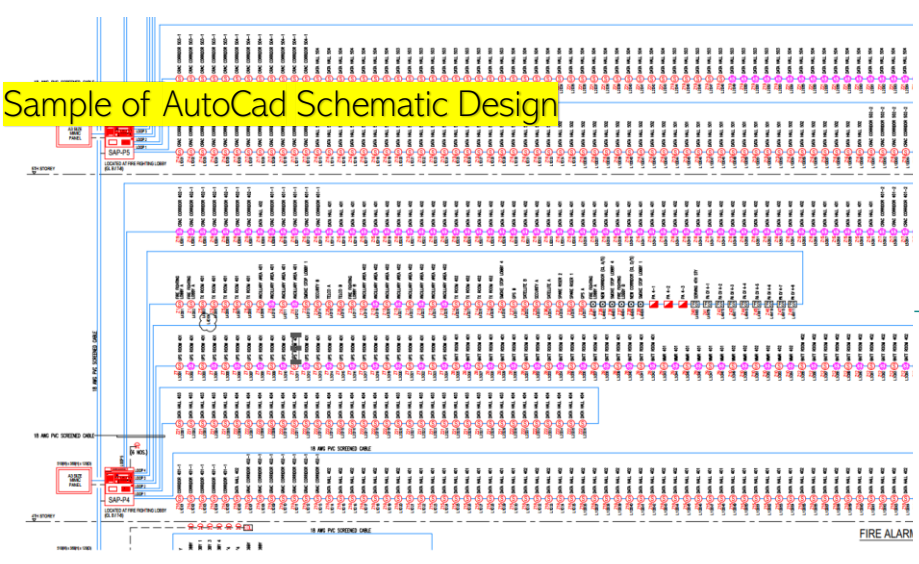
Rico Engineering is a fire protection consultant in Singapore, with vast experience in BIM projects. Ai Chen spearheads the BIM division in her company intends to implement automated solutions to improve productivity within her team. In a fortunate encounter with Loy at BCAA, they both shared their knowledge and created a script to automate the production of Fire Safety Schematic Diagram. Leading the project is Loy, whose role involves segmenting tasks within the automation as well as building the main bulk of the script.



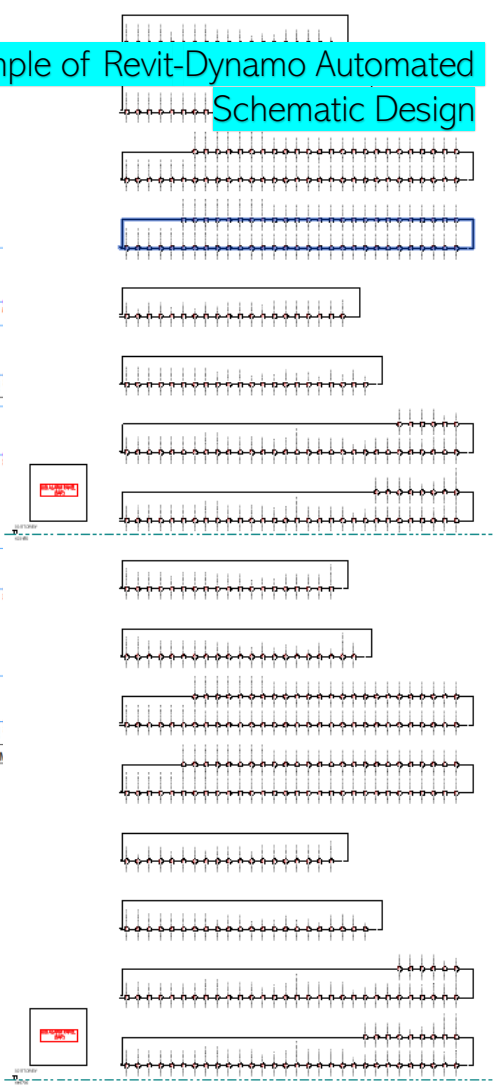
Script Breakdown Chart

The script was tested on an ongoing 8 Storey Data Centre building of Rico Engineering, which spans approximately 24 loops and 800 fire elements to be covered. The below images showcases the output which we can focus on two areas. The first observation shows that most of the elements can be automated, almost up to 90% of the required diagram. Secondly, the project manager needs to accept that the output may differ visually as compared to a diagram drawn in AutoCAD.

Sample of AutoCad Schematic Design



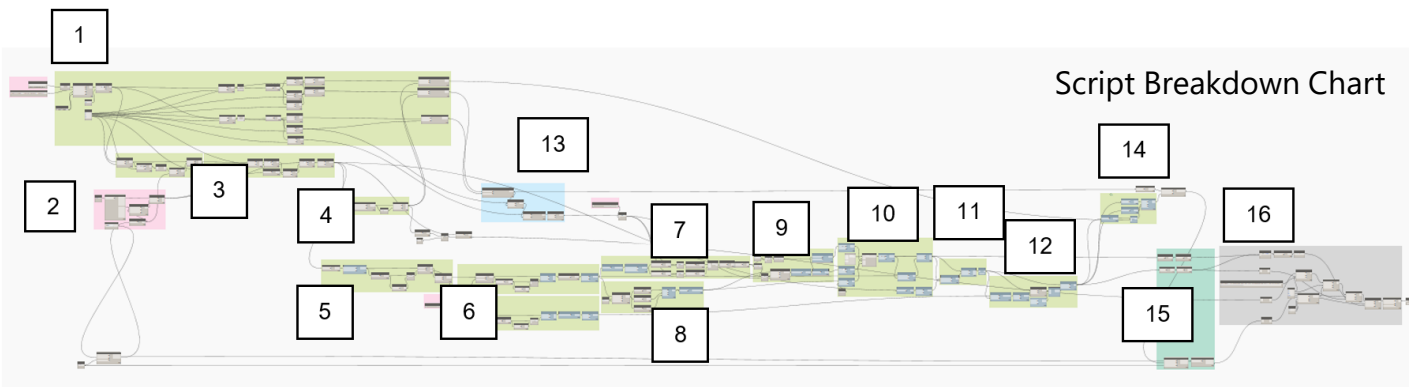
Sample of Revit-Dynamo Automated Schematic Design



Collaboration with Kok Cheung from Beca Engineering | Automated Lighting Fixtures Placement

Beca Engineer needs no introduction to the local industry players. Kok Cheung is one of the few engineers Loy have the privilege of meeting that has keen interest in Computational BIM. The goal of the project was to develop a script that takes into consideration a design matrix while automating placement of functional lighting fixtures. The design matrix will determine the Lux output of the combined lighting fixtures within the room and ensures the building is getting the right light level in the space for its application. A design matrix is responsible for values corresponding to output by different lighting systems as well as determines room requirements.

Leading the project is Loy, whose role involves segmenting tasks within the automation as well as building the main bulk of the script.



Script Breakdown Chart

The script was tested on a make-shift BIM model that accounts for all design parameters. It involves developing a model that includes a multi-level model, rooms of varying functionality type, a common set of lighting fixtures and grid ceilings. The experimental BIM model showed a preliminary time-saving efficiency of 98%, drastically reducing the hours required to produce a conceptual lighting layout.

The main drawback of the script is its success rate of approximately 90% based on varying room sizes. This highlights that through the automated placement of fixtures, around 10% of the rooms will have inadequate lighting. As such, we design a schedule that will inform the Designer of rooms that does not meet minimum lux requirements and will therefore require manual inputs.

ROOM FUNCTIONAL CATEGORY	LIGHTING TYPE	CEILING HEIGHT
01 Private Office	LED - PANEL	2800
02 Open Office	LED - PANEL	3000
03 Conference	LED - DOWNLIGHT	2800
04 Corridor	LED - DOWNLIGHT	3200
05 Restroom	LED - DOWNLIGHT	2800
06 Elec/Mech	LED - BATTEN	2800
07 Main Entrance	LED - DOWNLIGHT	3300
08 Sub Entrance	LED - DOWNLIGHT	2800

LIGHTING TYPE	REVIT MODE	LIGHTING COVERAGE
LED - PANEL	38 Watts	4000
LED - DOWNLIGHT	18 Watts	2500
LED - BATTEN	40 Watts	3000

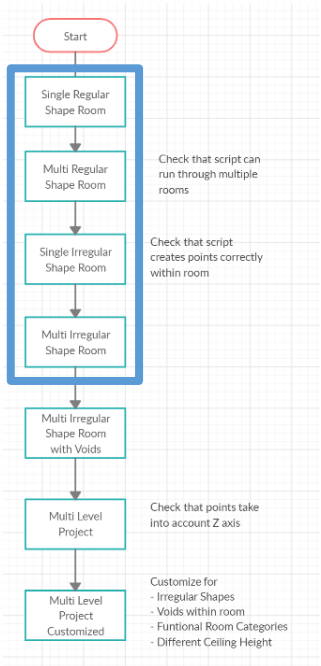
<Space Lighting Analysis>

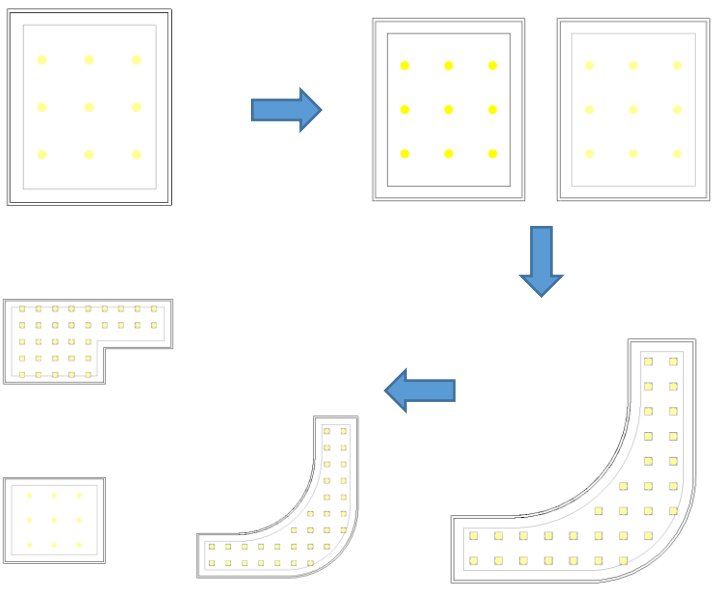
A	B	C	D	E	F	G	H
Level	Name	Average Estimated I	Required Lighting L	Lighting Delta	Lighting Type	Fitting Name	Light Fitting Qty
Level 1	CONFERENCE 101	349 lx	300 lx	49 lx	3. Conference Room	7.5 WATT	15
Level 1	CONFERENCE 102	326 lx	300 lx	26 lx	3. Conference Room	7.5 WATT	15
Level 1	CONFERENCE 103	303 lx	300 lx	3 lx	3. Conference Room	7.5 WATT	9
Level 1	CORRIDOR 101	229 lx	150 lx	79 lx	4. Corridor	8 WATT	7
Level 1	CORRIDOR 102	81 lx	150 lx	-69 lx	4. Corridor	8 WATT	1
Level 1	ELEC/MECH	304 lx	250 lx	54 lx	6. Elec/Mech	18 WATT	3
Level 1	ENTRANCE	204 lx	250 lx	-46 lx	8. Sub Entrance	10 WATT	3
Level 1	MAIN ENTRANCE	324 lx	250 lx	74 lx	7. Main Entrance	10 WATT	15
Level 1	MEN'S ROOM	279 lx	250 lx	29 lx	5. Restroom	6 WATT	13
Level 1	OFFICE 101	298 lx	300 lx	-2 lx	1. Private Office	32 WATT	3
Level 1	OFFICE 102	310 lx	300 lx	10 lx	1. Private Office	32 WATT	3
Level 1	OFFICE 104	399 lx	300 lx	99 lx	1. Private Office	32 WATT	3
Level 1	OFFICE 105	304 lx	300 lx	4 lx	1. Private Office	32 WATT	3
Level 1	OFFICE 107	608 lx	300 lx	308 lx	1. Private Office	32 WATT	9
Level 1	OFFICE 108	316 lx	300 lx	16 lx	1. Private Office	32 WATT	3
Level 1	OFFICE 109	205 lx	300 lx	-95 lx	1. Private Office	32 WATT	1
Level 1	OPEN OFFICE 101	564 lx	500 lx	64 lx	2. Open Office	20 WATT	39
Level 1	OPEN OFFICE 102	510 lx	500 lx	10 lx	2. Open Office	20 WATT	34
Level 1	WOMEN'S ROOM	279 lx	250 lx	29 lx	5. Restroom	6 WATT	13
Level 1: 19							

The script was later upgraded to include a compensation factor that could over-provision lighting fixtures to reduce the number of inadequate room lighting situations. Of course, doing so will have its own drawback as well. The script ended up with the creation of 423 lighting fixtures for 35 varying function rooms in less than 2 mins.

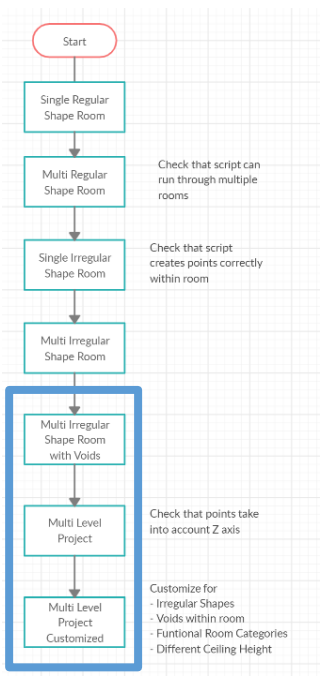
Computational BIM

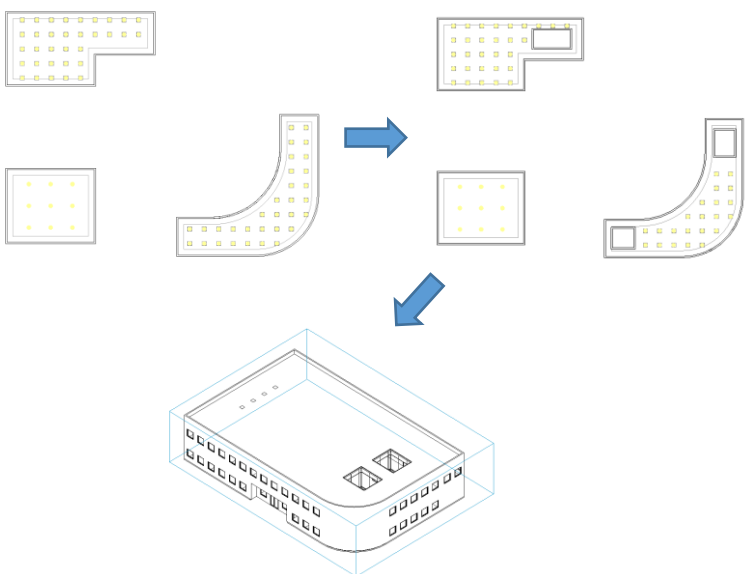
The images below demonstrate the workflow and execution of the script on the test project. It starts with single room demonstration and gradually expands to take into account all design considerations.

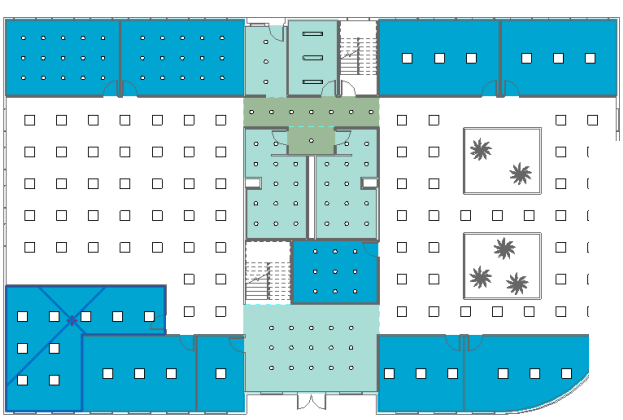


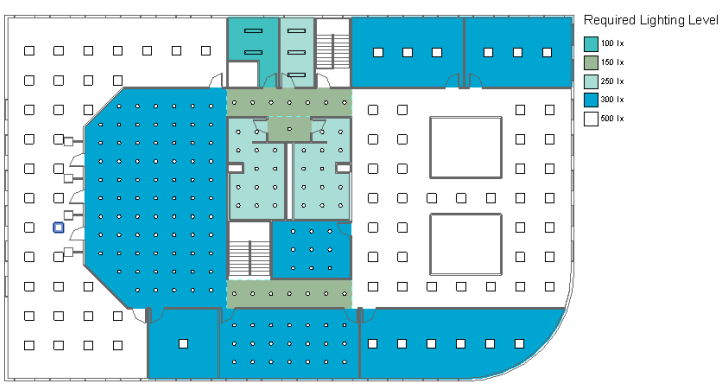


Development of multi-stage script test

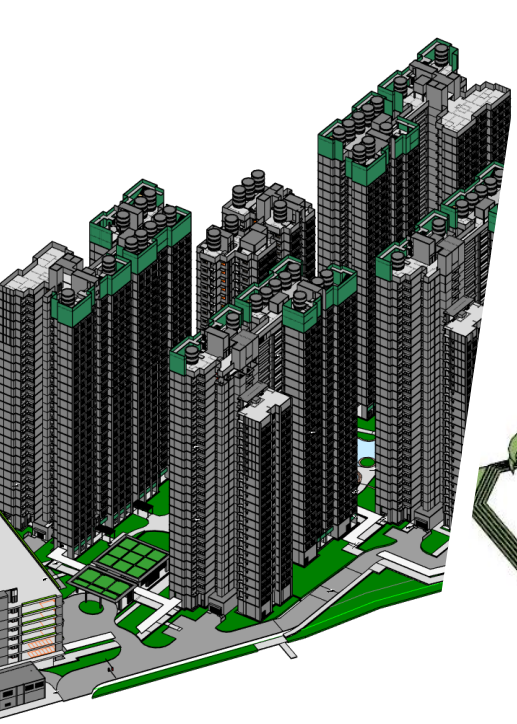


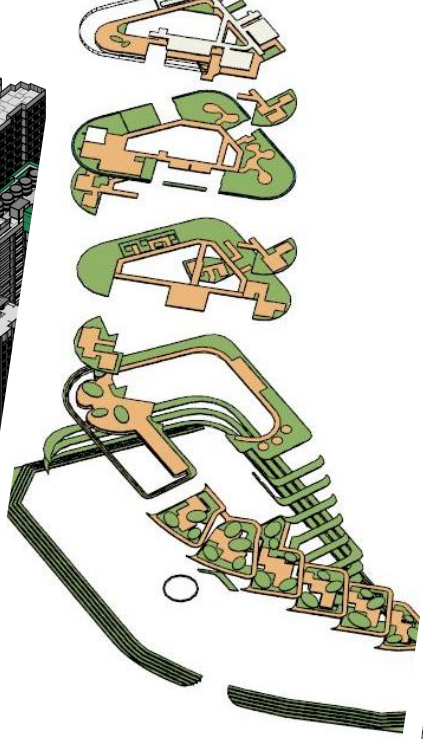


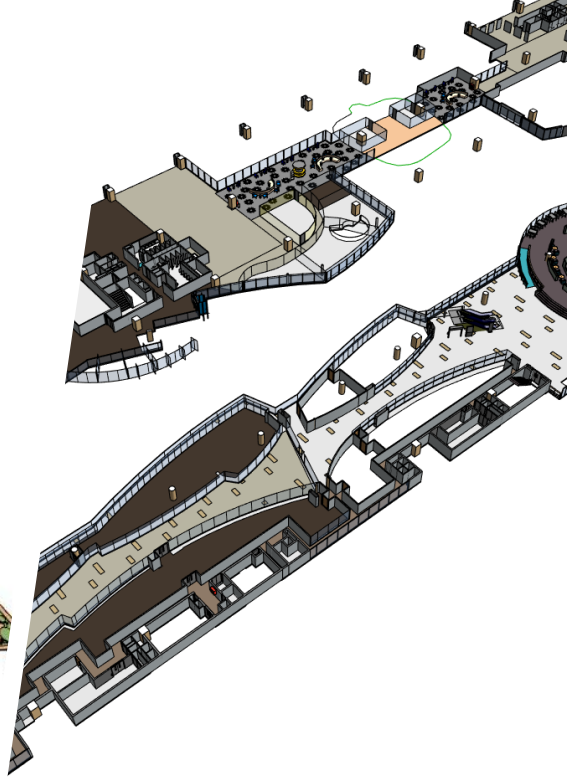




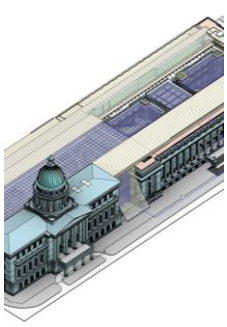
Output of the script. Creation of 423 lighting fixtures in less than 2 minutes

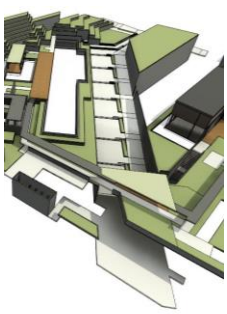


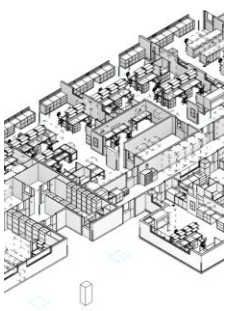


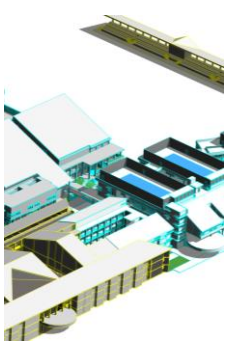


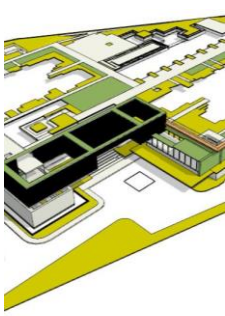
BIM Modelling

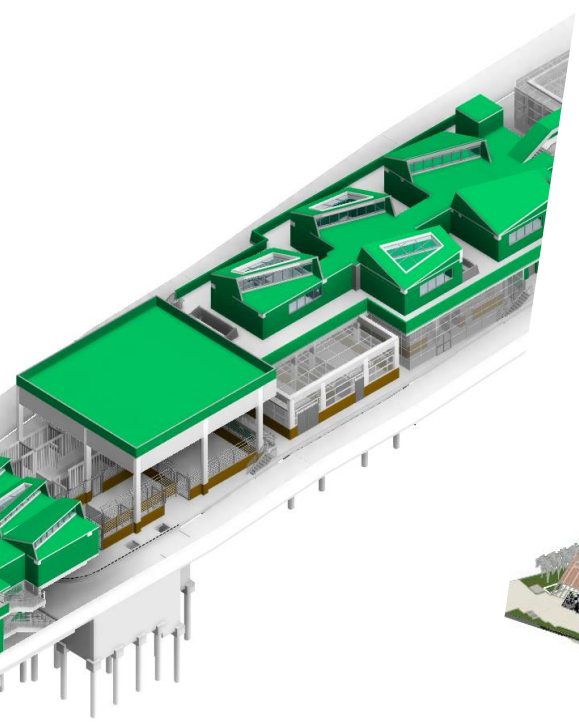










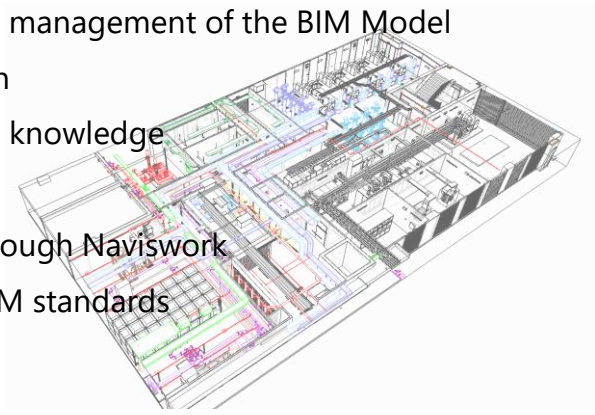


BIM Modelling (Multi-disciplinary)

SMM (Subsidiary of Surbana Jurong) / Temasek Polytechnic Project Manager

The BIM modelling of Temasek Polytechnic included 25 blocks of approximately 220,000sqm up to LOD 500, built with historical information of CAD & PDF drawings and then corrected with up-to-date laser scanning information. BIM models include Architecture, ACMV, Mechanical, Plumbing & Sanitary and Gas.

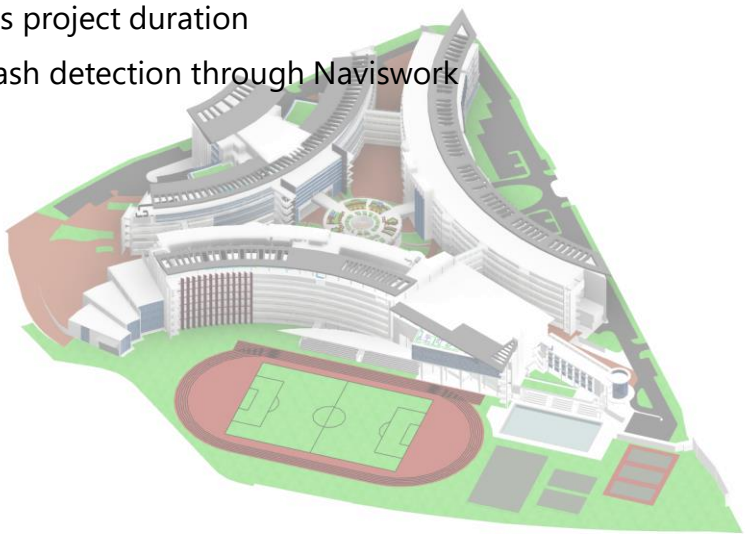
- In-charge of development BIM model standards and adherence to contractual requirements
- Development of WBS, scheduling and production management of the BIM Model
- Updating progress reports across project duration
- Development of educational materials for Clients' knowledge
- Work with JIT opportunities in modelling
- Conducting mullti-disciplinary clash detection through Naviswork
- Coordination with another awarded vendor on BIM standards
- Cost management for BIM team



ConnyOnAir / ITE College East Project Manager

The BIM modelling of ITE College East included 3 blocks (Admin, Business & Technology) of approximately 100,700sqm up to LOD 350. BIM models include Architecture and ACMV modelling

- In-charge of development BIM model standards and adherence to contractual requirements
- Development of WBS, scheduling and production management of the BIM Model
- Updating progress reports across project duration
- Conducting multi-disciplinary clash detection through Naviswork



BIM Modelling (Multi-disciplinary)

CPG Consultants / Singapore American School

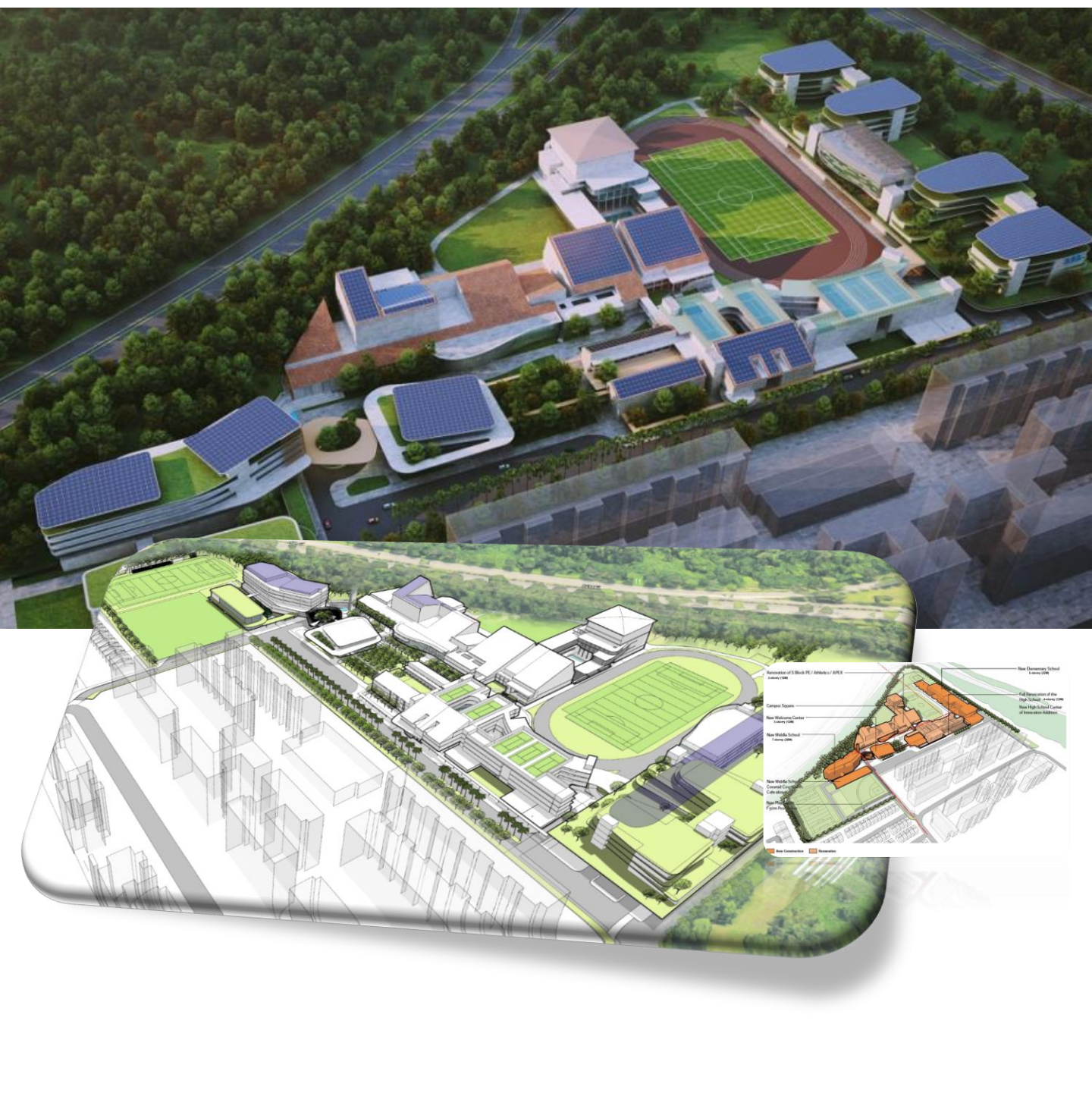
Project Manager

Singapore American School is an A&A project consisting of multiple blocks. The BIM models were developed to reflect the varying building status (existing, demolished & proposed). The scope of Modelling spans across 8 affected blocks of approximately 120,000 sqm of varying LOD requirements.

The LOD requirements for planned demolish segments is LOD 200, while retained existing segments are modelled at LOD 300 and proposed new buildings are at LOD 350 for tender submission purposes.

BIMLife was in-charge of developing Architecture, Structural & Lighting BIM models.

- Developing Model Segregation plan
- Developing lean BIM library for consistency of modelling standards across various blocks
- Development of WBS, scheduling and production management of the BIM Model
- Updating progress reports across project duration
- BIM Model coordination across site



BIM Modelling

BIMLife provides BIM modelling services on an extensive list of projects.

Loy is involved in developing BIM Models in the following projects, and usually serves as the Project Lead, and on occasion part of the production team. He is also responsible for managing relationship with clients, providing opportunities of return businesses as well as referrals. Our longest running clients of more than 5 years with Landscape Architects EcoPlanAsia & TinderBox have solidify our consistency in project delivery. Furthermore, we have over 15+ return projects from TOA Corporation over the last 3 years.

Architectural:

Ong&Ong / Toapayoh HDB

Ong&Ong / Tampines HDB

Ong&Ong / Mandai Zoo

Mode Architect / Sembawang HDB (Ongoing 2023)

Archlab / Health Science Authority

Formwerkz Architect / Maxwell Condo

Lew Surveyor / Changi Airport

GPSLand / Tuas Checkpoint (Ongoing 2023)

Landscape:

EcoPlanAsia / Anchorvale Condo

EcoPlanAsia / Tulip Garden Condo

EcoPlanAsia / Hoe Chiang Road Commercial Building

EcoPlanAsia / Bukit Batok Condo

EcoPlanAsia / Lentor Central Condo

EcoPlanAsia / Slim Barracks Condo

EcoPlanAsia / Parkview Condo

EcoPlanAsia / Tampines Condo

Tinderbox / Irwell Bank Road Condo

Tinderbox / Fernvale Road Condo

Tinderbox / Kampong Java Condo

Tinderbox / Tengah Garden Condo

Tinderbox / Tembusu Condo

Tinderbox / Peace Center Commercial Building

Security:

Beth EL / Changi East Hospital

Beth EL / Changi Airbase

Asset Development:

ATT System Groups / Security High Fidelity Models

TOA Corporation (China & Japan) / Communication Electronics (200+ models)

BIM Modelling

Thymn is an Architectural, Civil & Structural and Construction Management firm primarily focusing on the private residential typology.

Loy is involved in developing BIM Models in the following projects. As an Architectural Modeler and a young individual in the industry, he is not responsible for client management & architectural design. However, he spearheads the BIM adoption & implementation at a young age of 22, building up BIM standards & libraries, while training the Architectural team on BIM modeling practices. The firm continues to benefit from the structure he set-up and have called upon him to assist in new projects after his departure.






Private Residential:

17 Moreton Close

17 Ernani Street

17 Stokesay Drive

34 Jalan Pintau

50 Bridport

124 Coronoation Road

347 Yio Chu Kang Road

77 Stokesay Drive

8 Happy Avenue

7 Duchess Road

Industrial:

21 Tuas West Drive

68 Senoko Road

Cleantech Business Park

38 Tuas Basin Link

Logos Warehouse

In addition, a 600+ BIM model library was developed solely by him, with inputs from the Architects he work with. This enable all design teams to jump straight to design with a variety of building elements with parametric capabilities.