

22ND ANNUAL



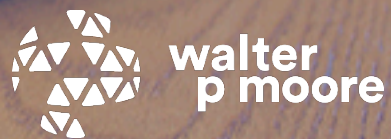
22ND LCI CONGRESS
OCTOBER 19-23

Implementing and Scaling Project-based Innovation

Eileen Phan, Walter P Moore
Timon Hazell, Walter P Moore
Ryan Seckinger, Walter P Moore

THE ABC'S OF LEAN: TRANSFORMATION THROUGH ACTIONS, BEST PRACTICES AND COACHING

October 20th, 2020



Problem Statement

- **Traditional approaches** towards delivery **don't work** for project complexity and schedules.
- Given the challenges and constraints, **innovation is continually necessity** on every project.
- We have the opportunity to **avoid menial tasks and duplication** of work in order to present higher quality solutions in less time.
- Limiting innovation to a few people or projects can negatively impact the **generation and adoption of innovation** while prohibiting teamwork and any possibility towards crowd sourced development.
- **New technology** is emerging every day. Our companies need ways to **adopt quickly and nimbly**. Buildings are becoming more complex and design/construction timelines are being shortened. How can a company in the AEC industry deliver better buildings with less time?

TRANSFORMING DESIGN AND CONSTRUCTION

A Framework for Change



William R. (Bill) Seed, Executive Editor



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www.leanconstruction.org

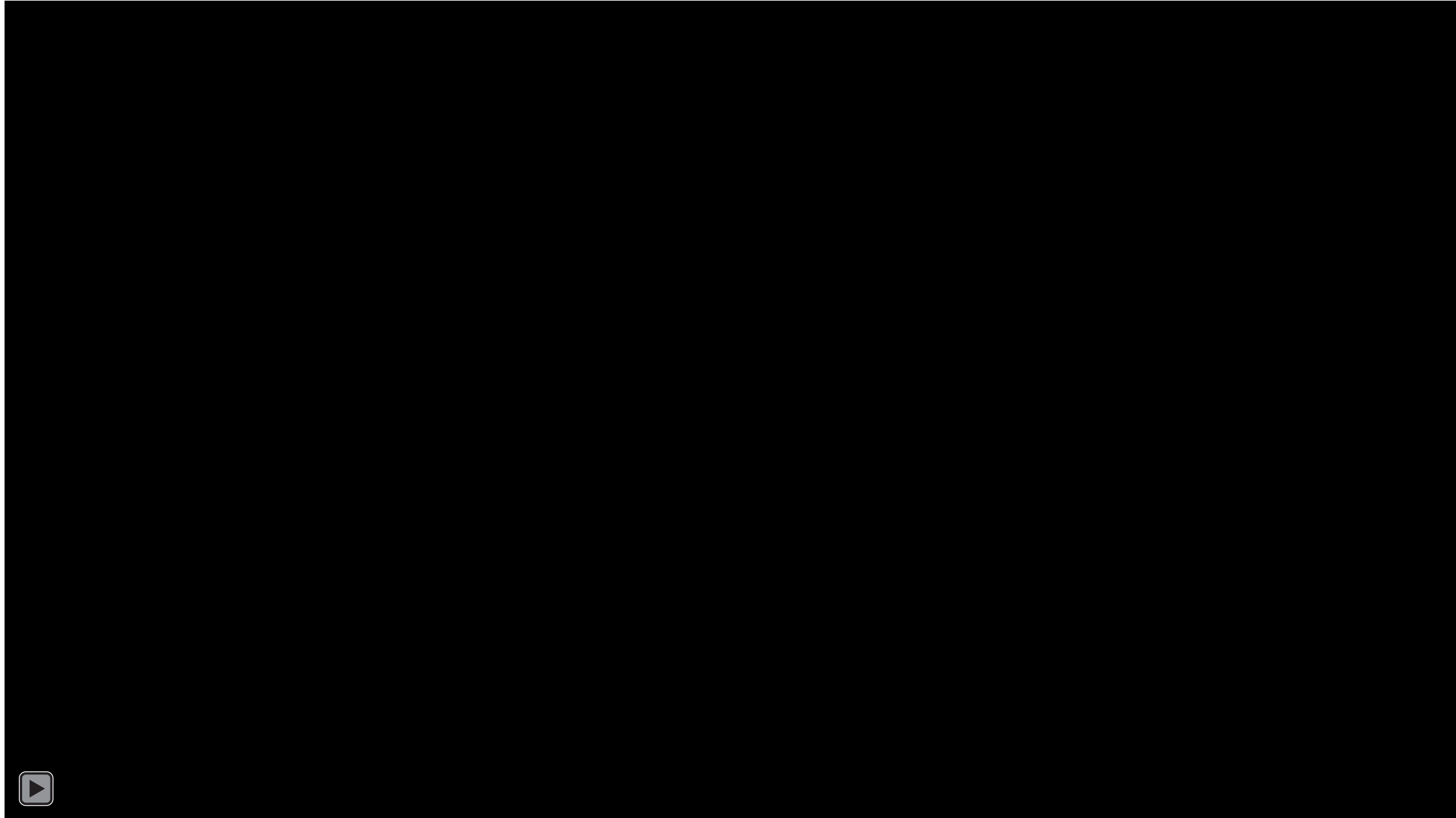
Providing solutions to complex problems in the building environment



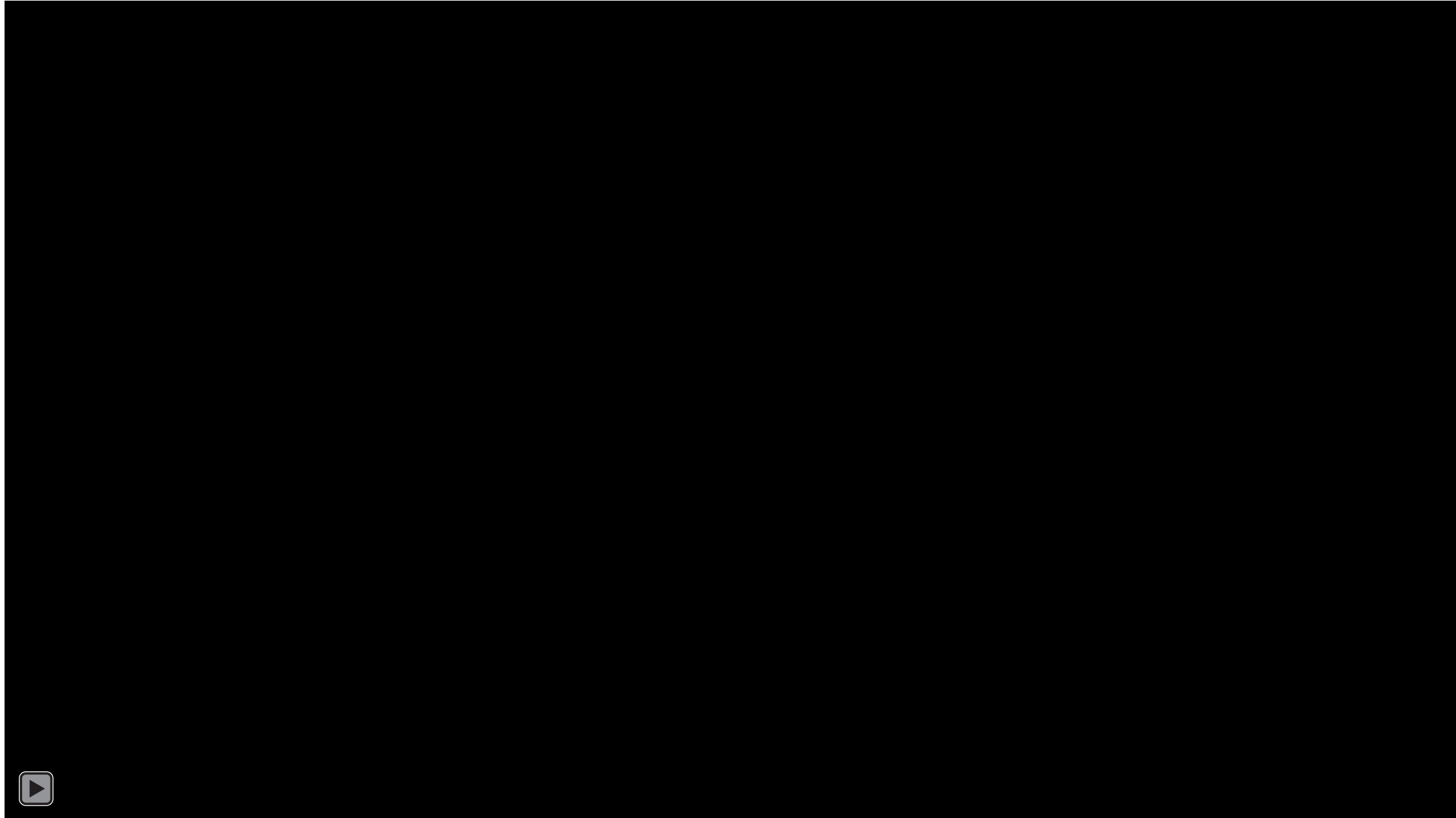




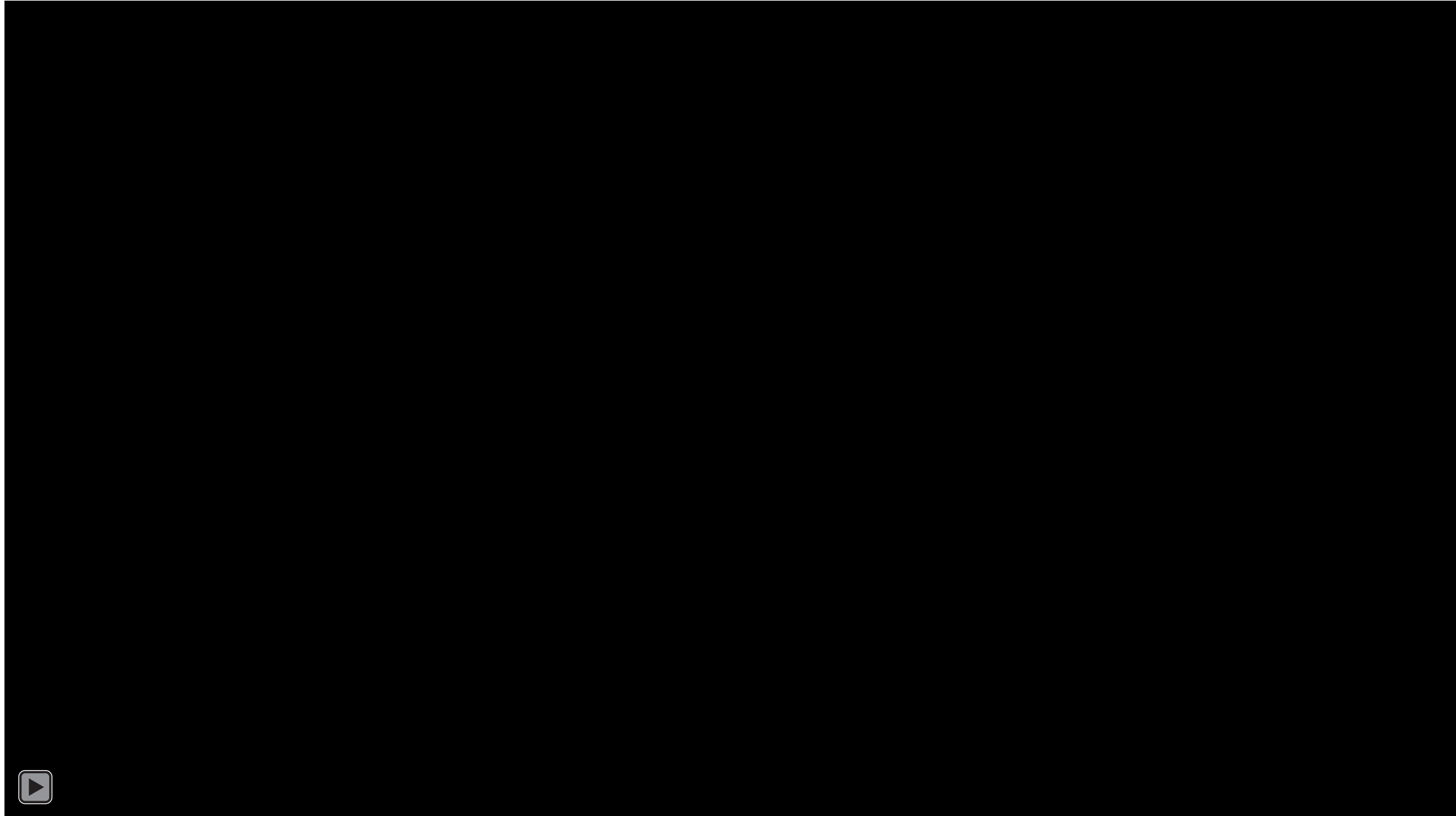
Project Based Innovation



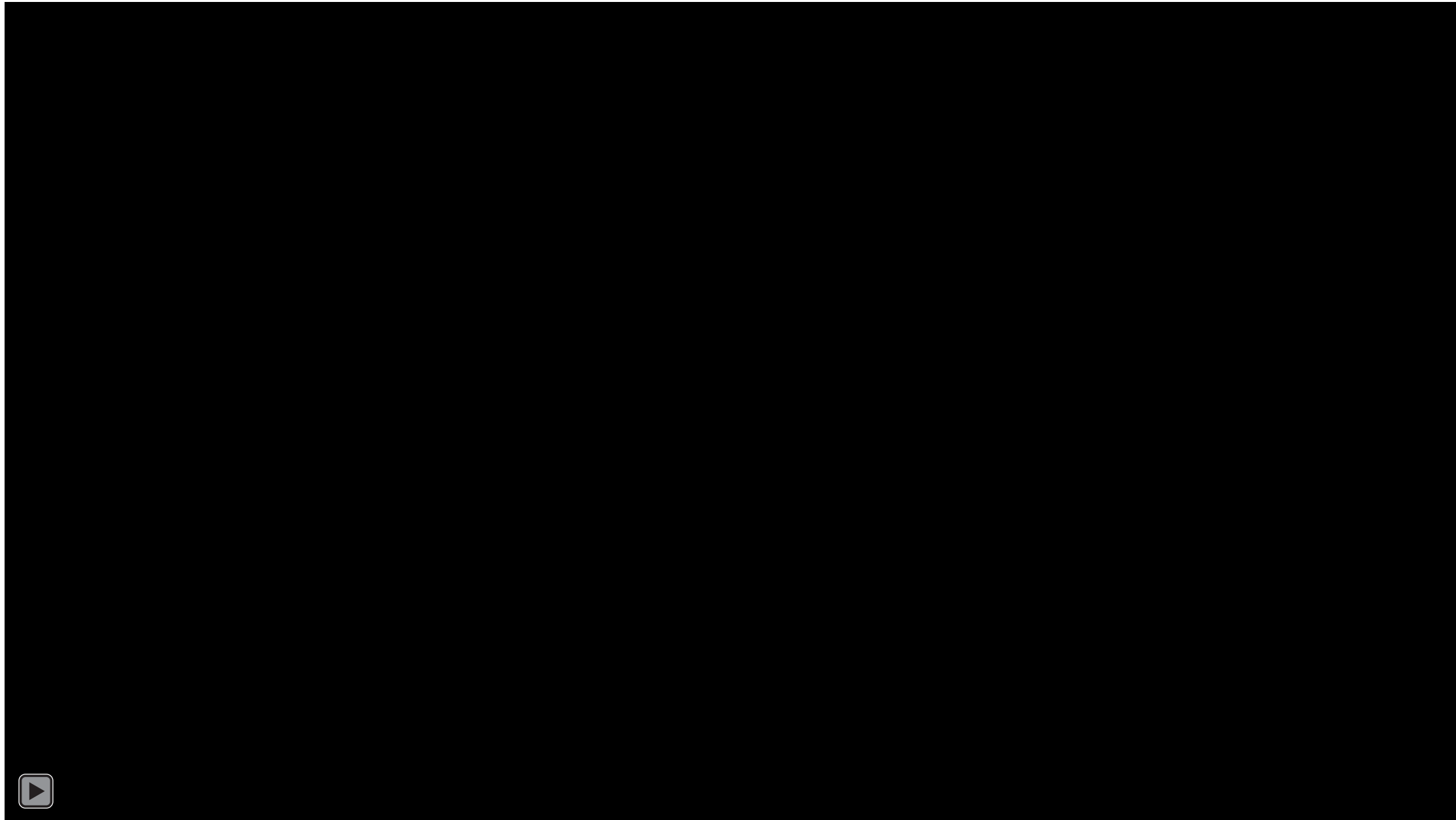
Change Takes Communication



Change is Iterative



Change Takes Team Alignment

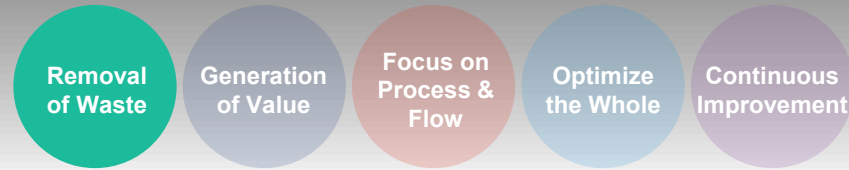


Removal
of Waste

Concierge

Change Takes Communication

Eliminating Waste



8 hours

7 hours

6 hours

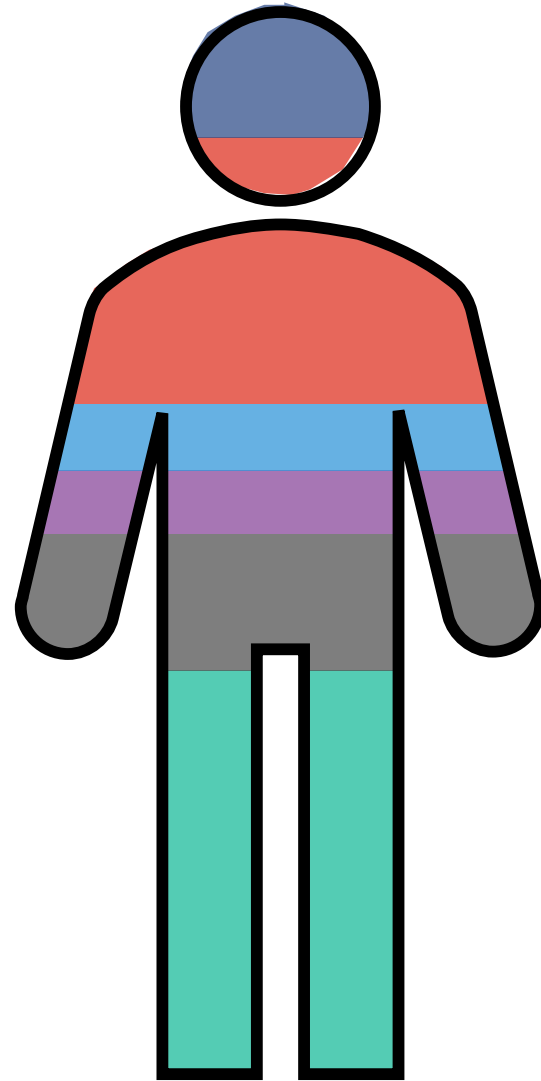
5 hours

4 hours

3 hours

2 hours

1 hour



Printing

Navisworks Export

Slipsheeting

Deleting Old Markups

Running QC Tools

Summarizing QC Findings



Eliminating Waste

Removal
of Waste

Generation
of Value

Focus on
Process &
Flow

Optimize
the Whole

Continuous
Improvement

8 hours

7 hours

6 hours

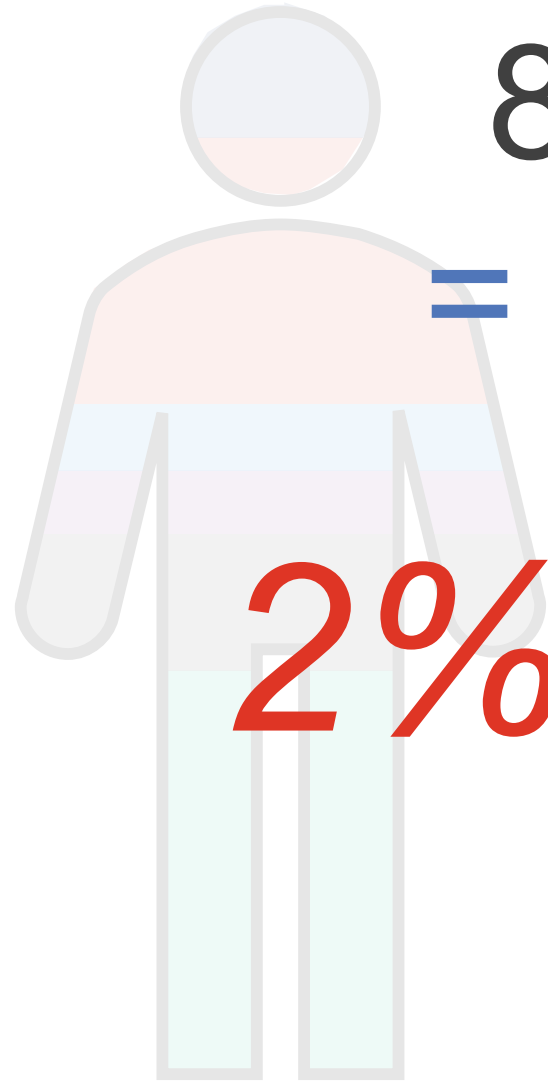
5 hours

4 hours

3 hours

2 hours

1 hour



8 Hours x 2/week
= 16 Hours Weekly

2% Time Wasted





Innovation Centric Communication

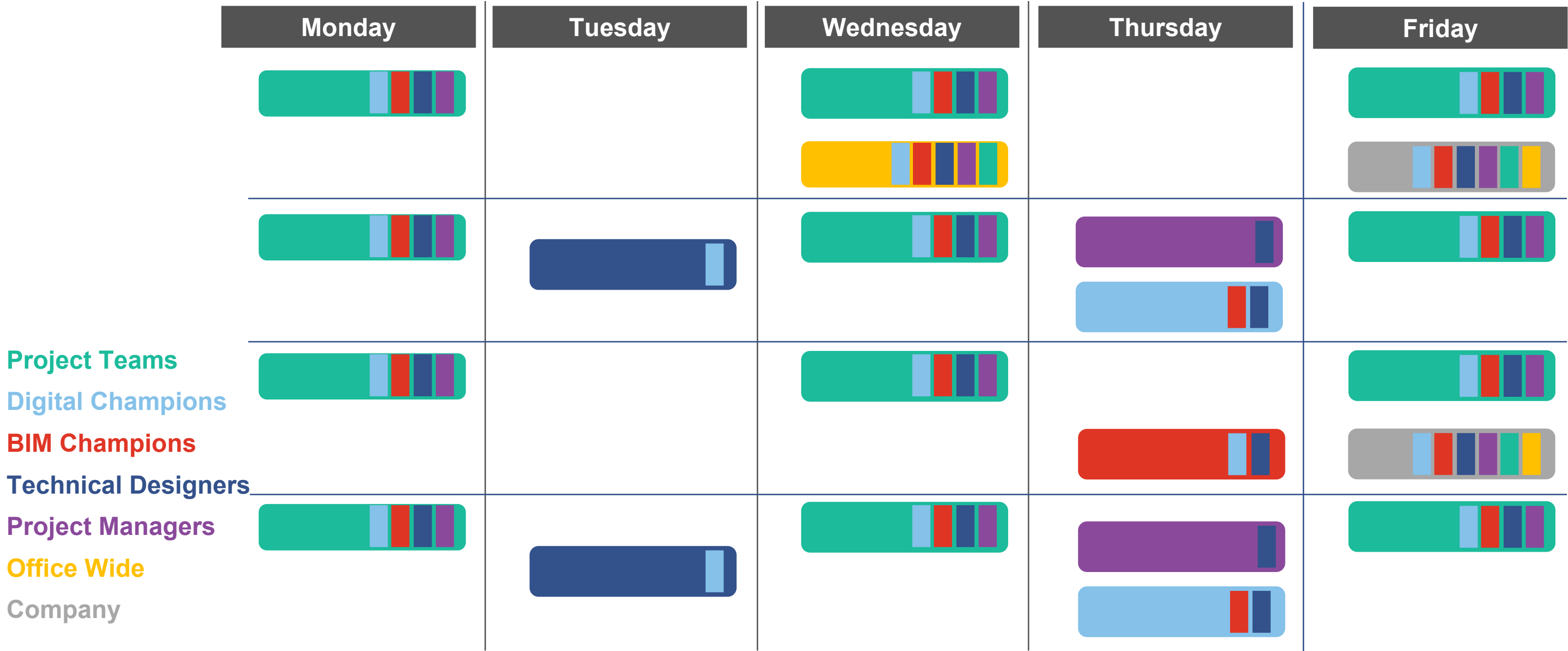
Removal of Waste

Generation of Value

Focus on Process & Flow

Optimize the Whole

Continuous Improvement



Generation
of Value

Quantity Tracking

Change is Iterative



Lean Construction Institute
Transforming the Built Environment

Quantity Tracking

- Removal of Waste
- Generation of Value
- Focus on Process & Flow
- Optimize the Whole
- Continuous Improvement

4,993.28

Material Quantity Tracking

WEST CANOPY

SectionProfile	W	#Ton
HSS20X8X3/8	68	
PIPE18X0.562	105	
PIPE18X0.750	138	
W12X72	72	
W14X109	109	
W14X132	132	
Total		4

Count of SectionProfile

43

#CostEstimate

9.99

STEEL TONNAGE BREAKDOWN

#NorthSouthEastBuilding

#NorthSouthEastCanopy

#WestBuilding

#WestCanopy

#ConcourseBuilding

#ConcourseCanopy

#Scoreboard

#EntranceCanopy

#ScreenWall

Location	Bare Steel Weight (TON)	Connection Weight (TON)	Total Weight (TON)
GCR	34.03	0.00	37.01
MZS	45.07	8.33	57.91
ATC	78.62	15.48	109.76
PLF	135.61	6.80	148.57
MZH	217.04	41.06	283.15
MZM	418.25	86.93	630.46
MZM	520.21	152.59	828.86
BTR	651.90	126.47	973.23
MZA	2,494.95	604.49	3,349.02
CBS	2,630.94	671.00	4,082.29
STC	3,432.50	721.27	5,177.13
LOR	4,669.65	948.16	6,778.92
CON	7,918.56	1,716.08	11,978.68
DEP	9,081.88	2,019.98	12,264.43
HIR	9,432.53	2,811.61	13,077.93
ARR	11,276.02	2,995.22	15,956.72
Total			

Count of Count

29.96K

Total Weight (TON)

75.73K

Zone	Bare Steel Weight (TON)	Total Weight (TON)
HH	31,121.06	45,583.62
HRT	7,459.28	10,522.00
EP	4,931.65	7,340.50
WP	4,434.93	6,592.58
HRW	1,085.65	1,590.66
HRE	964.59	1,248.82
PBT6	292.75	440.44
PBT11	110.30	166.02
PBT13	110.26	165.96
PBT14	108.22	163.07
PBT8	102.75	155.32
PBT25	102.63	155.14
PBT16	102.63	155.14
PBT17	102.63	155.14
PBT2	102.63	155.14
PBT23	102.63	155.14
PBT24	102.63	155.14
PBT3	102.63	155.14
PBT15	101.10	154.46
PBT10	101.73	150.02
Total		

Total

16,836.57

25,379.70

Type	Bare Steel Weight (TON)	Total Weight (TON)
BPL	0.06	0.08
HGR	7.38	10.72
KBM	16.10	24.63
KIC	34.49	51.22
VER	120.32	180.48
BEN	156.27	226.78
LUD	497.98	778.67
PUR	1,154.35	1,465.15
DIA	1,285.19	1,875.21
TBC	1,356.61	1,976.40
BRA	1,390.54	2,417.65
TTC	1,704.50	2,481.28
COL	11,193.21	15,578.19
BEM	16,836.57	25,379.70
GRD		
Total		

Total

16,836.57

25,379.70

Average of Connection Factor

1.17

Average of Design Contingency

1.20

REBOARDS

W	#Tonnage	Length
31	5.36	345.66
90	26.96	599.17
58	12.49	367.34
19	7.46	785.15
22	1.31	119.17
86	21.17	492.33
Total	74.75	2,708.82

CONCRETE CANOPY

#Tonnage	Length	
60.47	3,557.05	
9.33	565.16	
Total	107.81	7,649.43

SCREEN WALL


#Tonnage	Length
12.71	1,816.06


ENTRANCE CANOPY

#Tonnage	Length
14.69	554.37
45.96	1,412.68

CONCRETE BUILDING

W	#Tonnage	Length
5	0.19	76.78
6	0.28	95.00
5	0.38	153.02
5	0.09	36.09
6	4.28	1,426.68
6	2.73	910.33
7	20.72	5,919.60
7	0.47	133.22
7	0.99	281.90
7	0.47	133.22
Total	102.17	16,850.81

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 walter p moore

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Quantity Tracking

- Removal of Waste
- Generation of Value
- Focus on Process & Flow
- Optimize the Whole
- Continuous Improvement

EST BUILDING/BOWL

Profile	W	Flange	Length
K1	5	0.32	115.30
K3	7	0.27	76.81
K4	8	0.32	629.99
K10	13	0.55	84.67
K2	17	13.48	505.66
Sum	948.59	25.233	1,002.05

RGRET TONNAGE

4,993.28

Material Quantity Tracking

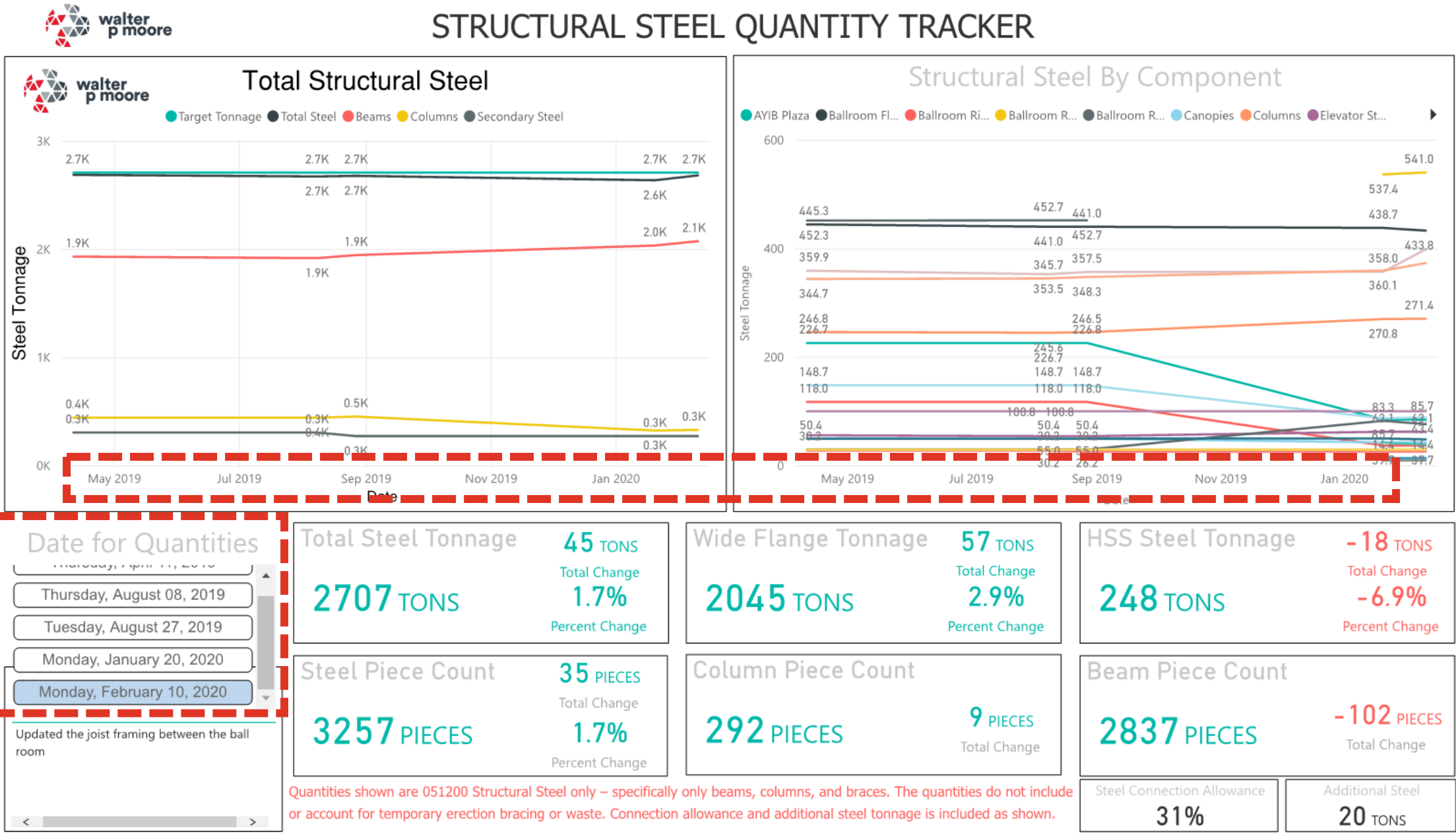
N/S/E CANOPY

SectionProfile	W	#Flange	Length
HSS10X10X1/8	42	36.85	1,083.95
PIPE180X562	105	7.21	137.42
W12X19	138	14.83	214.99
PIPE180X137	171	82.72	967.45
PIPE18X156	208	33.54	322.48
W14X109	109	15.41	428.54
Sum	1,002.05	19,926.73	1,002.05

SectionProfile

ShutN

10K1	n/a
12K3	n/a
14K1	n/a
16KCS1	n/a
16K2	n/a
16K3	n/a
16K4	n/a
16KCS4	n/a
18K3	n/a
18K4	n/a
18KCS4	n/a
20K4	n/a
22K4	n/a
24K4	n/a

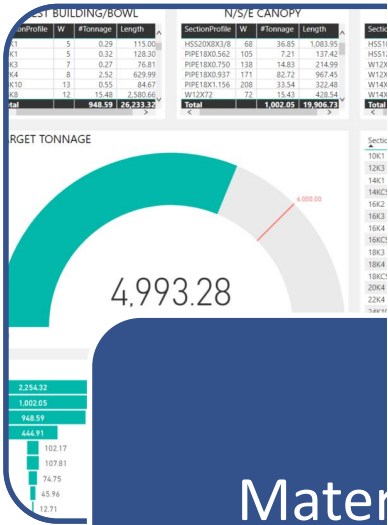


Quantity Tracking

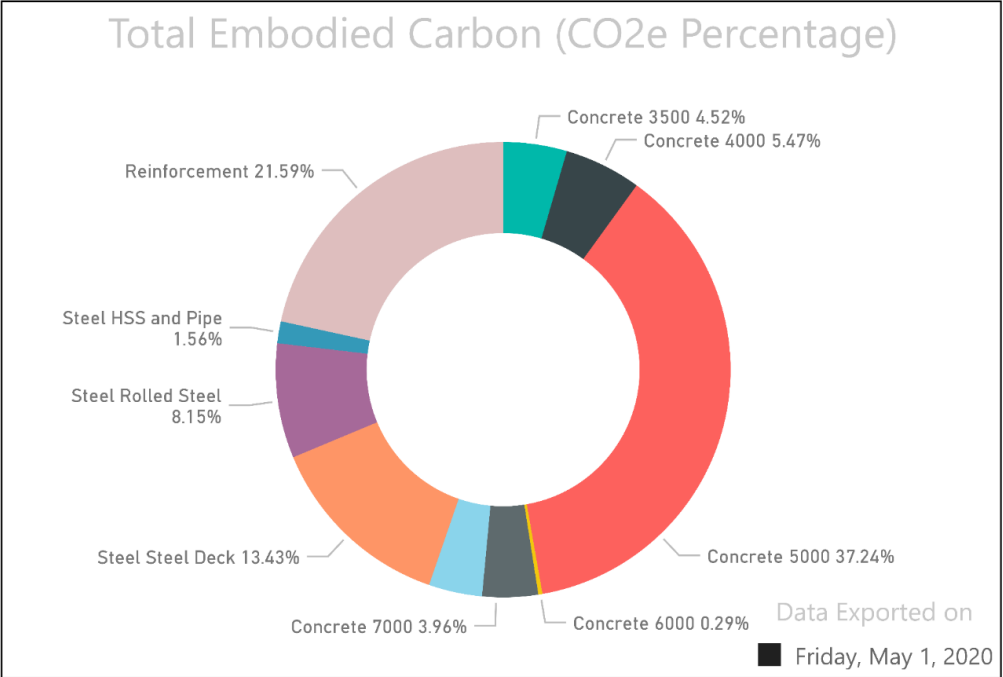
- Removal of Waste
- Generation of Value
- Focus on Process & Flow
- Optimize the Whole
- Continuous Improvement



PROJECT EMBODIED CARBON QUANTITY TRACKER



Material Quantity Tracking



Date for Quantities

Monday, December 2, 2019

Monday, January 13, 2020

Monday, January 20, 2020

Monday, February 10, 2020

Friday, March 27, 2020

Friday, April 17, 2020

Friday, April 24, 2020

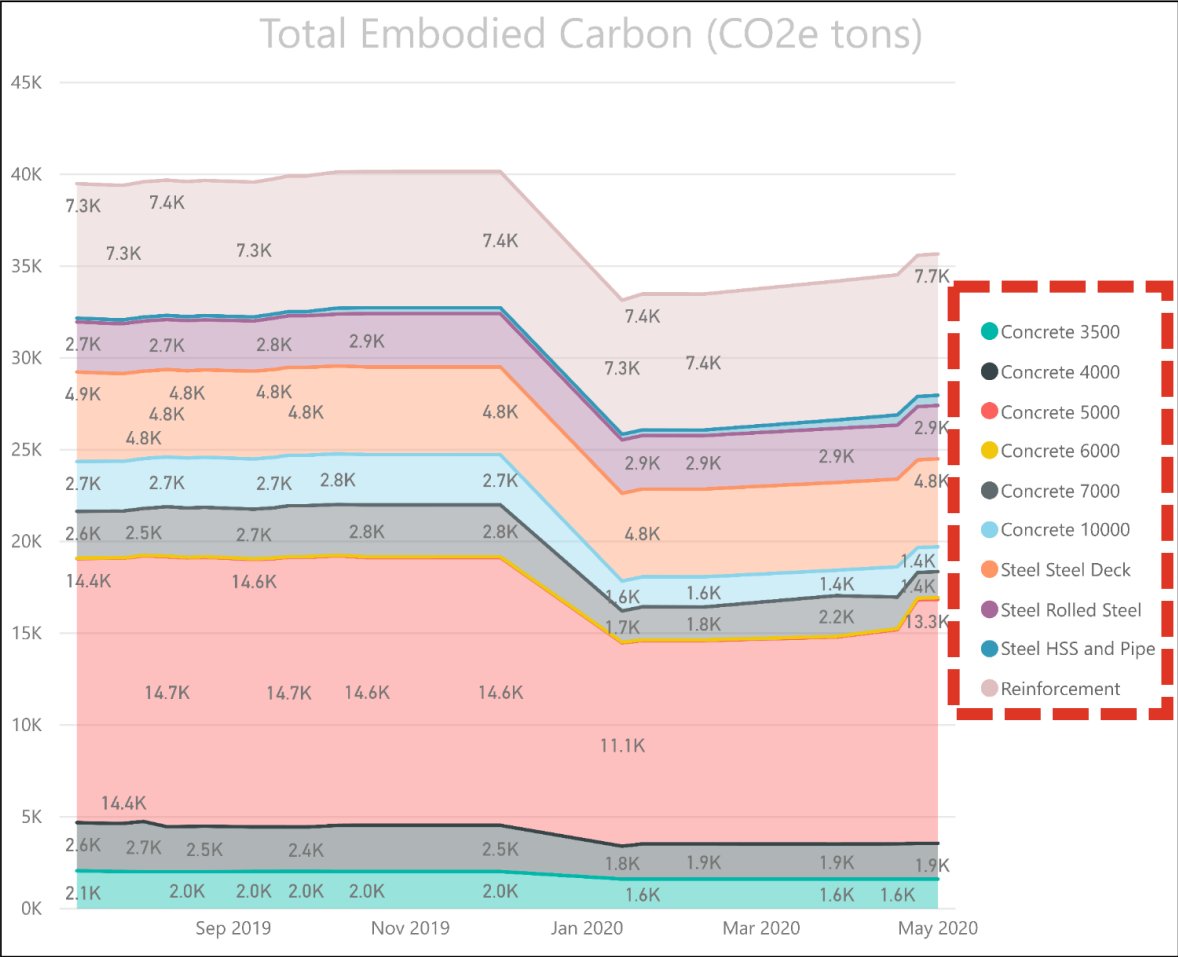
Friday, May 1, 2020

Bill of Material Changes Not Noted Elsewhere

Tracker now includes Steel Tonnage allowances for Secondary Structural Steel in addition to Primary Structural Steel.

Embodied Carbon Factor Notes

Reflects Mix Designs As Received



Material	Embodied Carbon	Total Change
Total Embodied Carbon	74 tons	35.7K tons 0.21% Percentage
Concrete Embodied Carbon	49 tons	19.7K tons 0.25% Percentage
Steel Embodied Carbon	9 tons	8251 tons 0.11% Percentage



Quantity Tracking

- Removal of Waste
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- Continuous Improvement

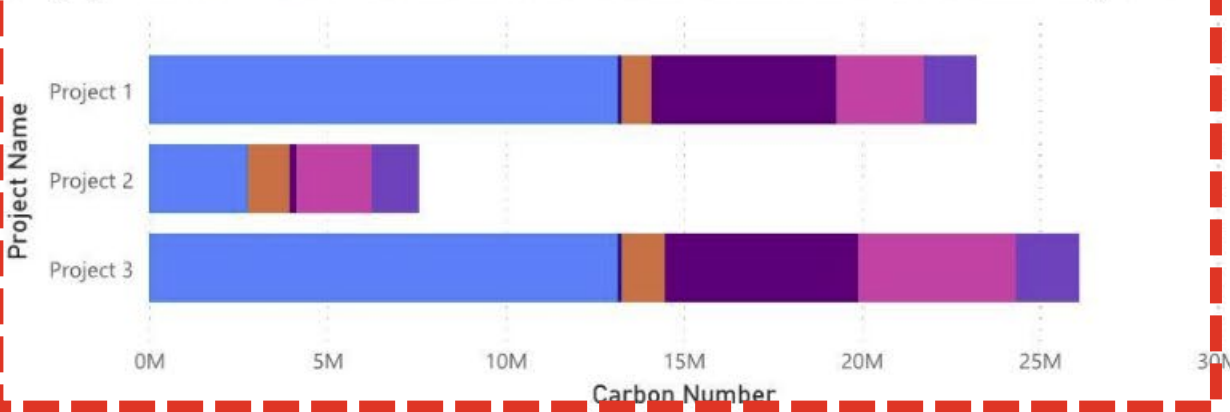
Total Area and Carbon Number by Location and Project Name

Project Name ● Project 1 ● Project 2 ● Project 3

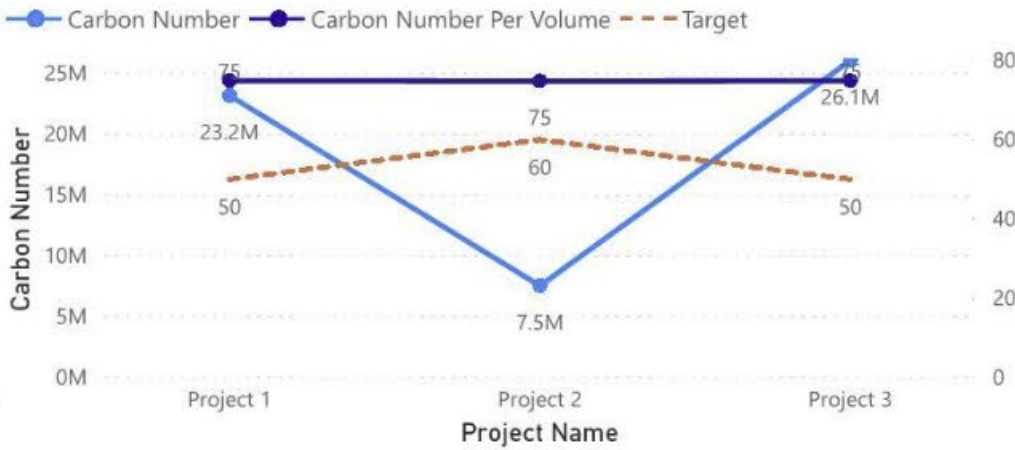


Carbon Number by Project Name and Category.Name

Category.Name ● Floors ● Stairs ● Structural Columns ● Structural Foundations ● Structural Framing ● Walls



Carbon Number, Carbon Number Per Volume and Target by Project Name



Project Name	Start Date	End Date	Total Area	Carbon Number	Element Count	Material Volume	MATERIAL WEIGHT(KIP)	Carbon Number Per Volume
Project 1	5/1/2019	4/1/2020	10000	23.19M	907	309.34K	46.37K	74.95
Project 2	10/1/2019	12/1/2020	8000	7.55M	611	100.91K	15.10K	74.81
Project 3	2/1/2018	5/1/2021	5000	26.06M	1278	347.87K	52.12K	74.92

Focus on
Process &
Flow

Optimize
the Whole

Integrating Teams | Adjusting Delivery Process

Resulting in Fast Tracked LOD400 Models

Change Takes Team Alignment



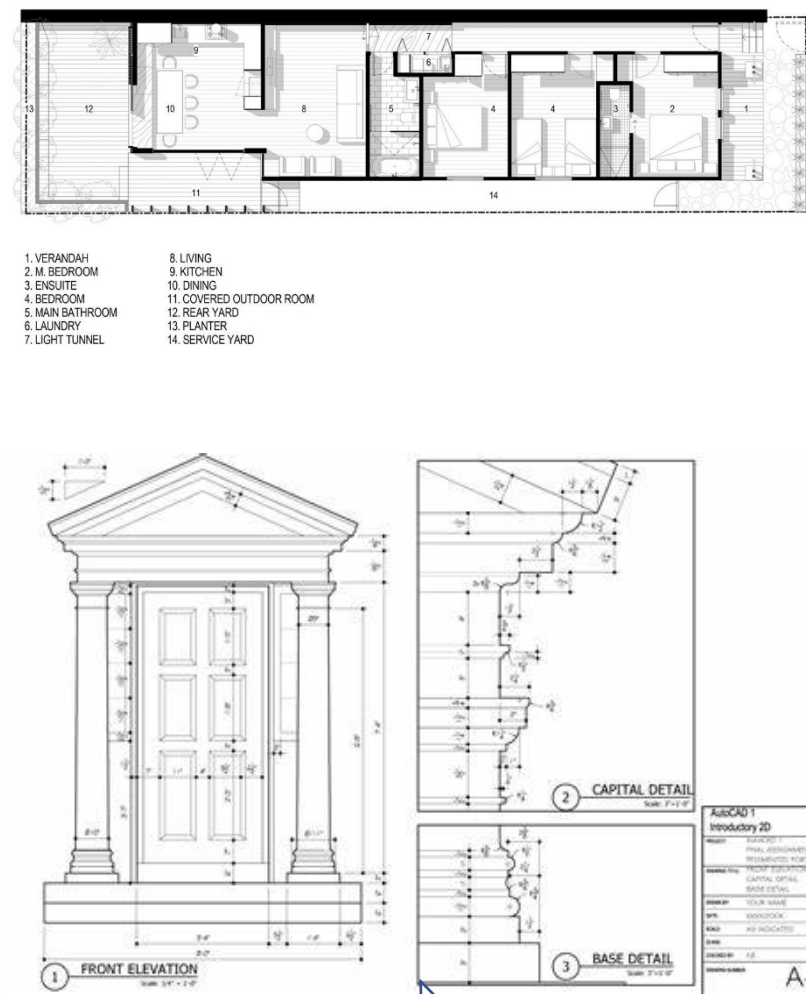
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Transforming the Built Environment

Archaic Workflows with Modern Tools

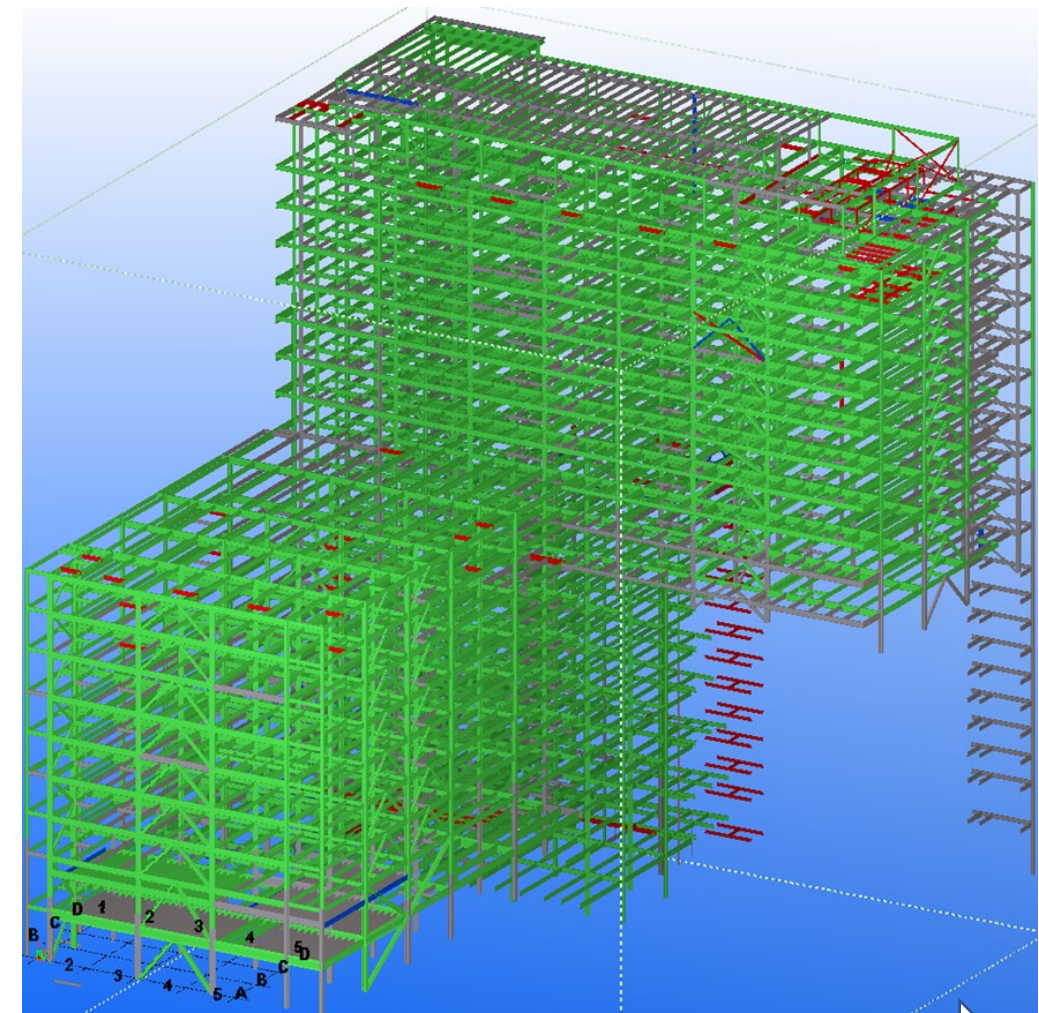
- Removal of Waste
- Generation of Value
- Focus on Process & Flow
- Optimize the Whole
- Continuous Improvement



3000 years



20 years



Old Model Delivery Methods are full of Waste



MODELING & NOT MODELING

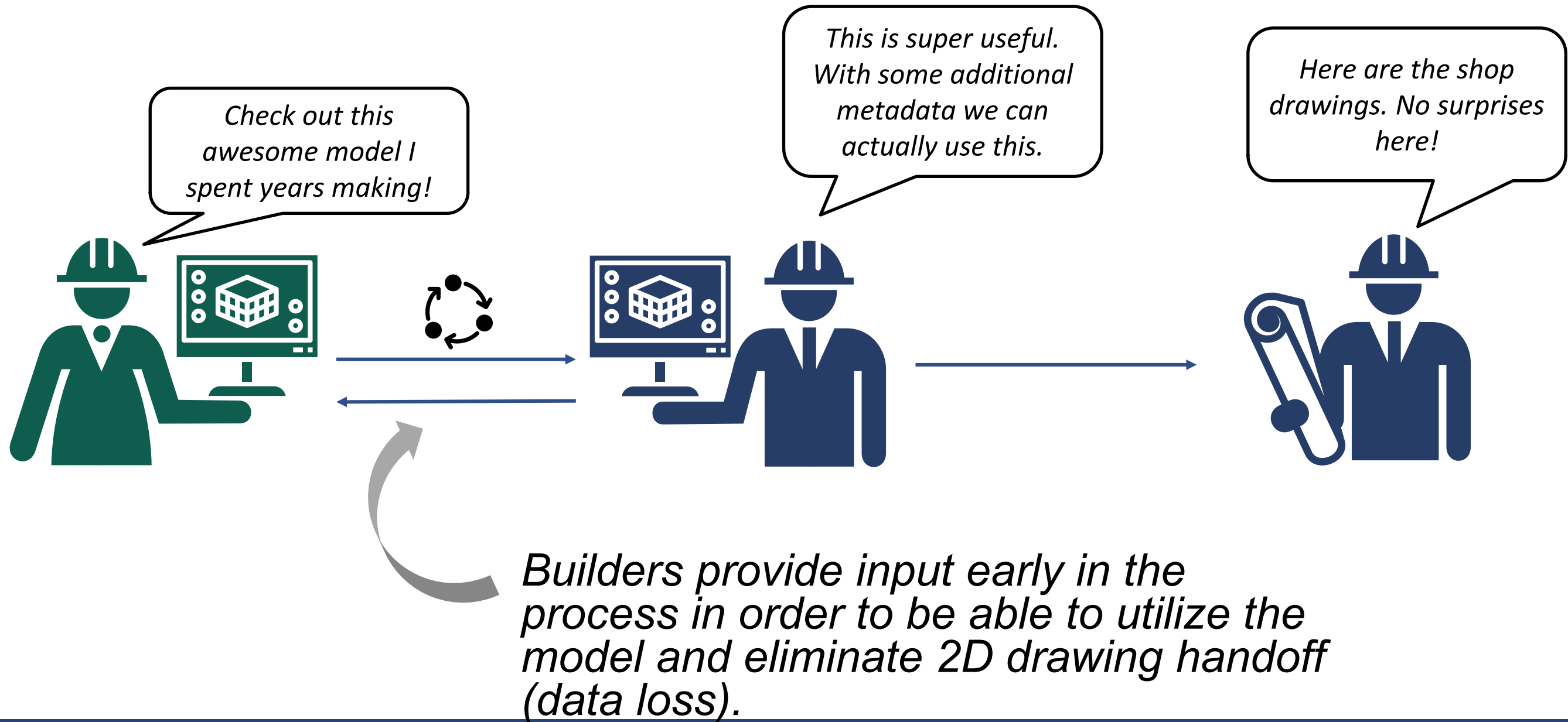
Removal
of Waste

Generation
of Value

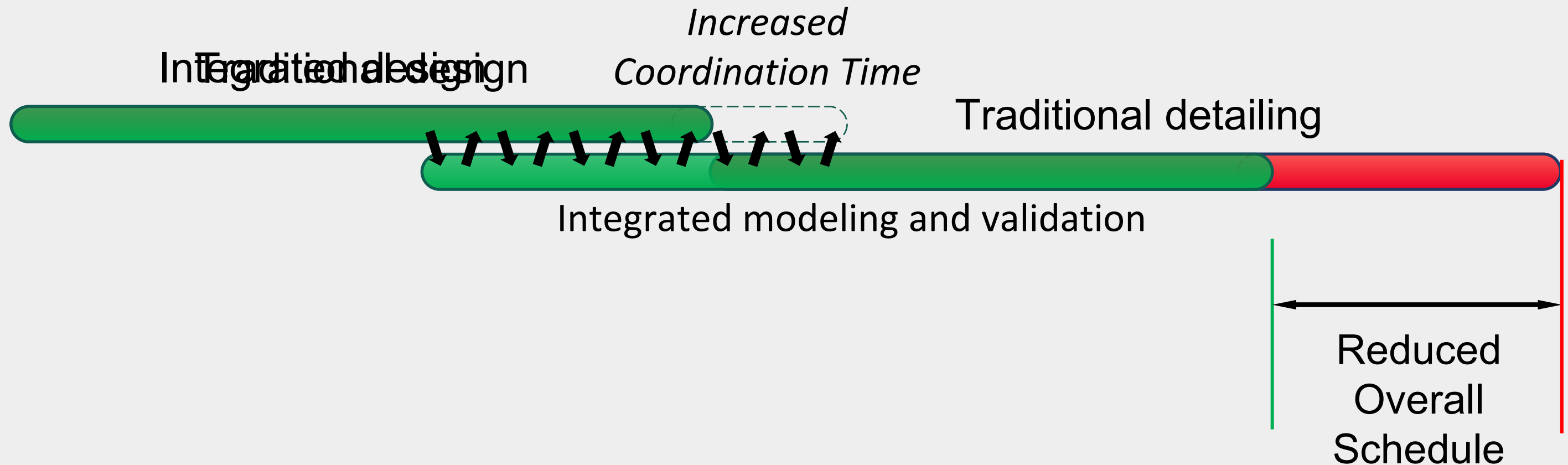
Focus on
Process &
Flow

Optimize
the Whole

Continuous
Improvement



Stacking the waterfall



Continual Education and Innovation

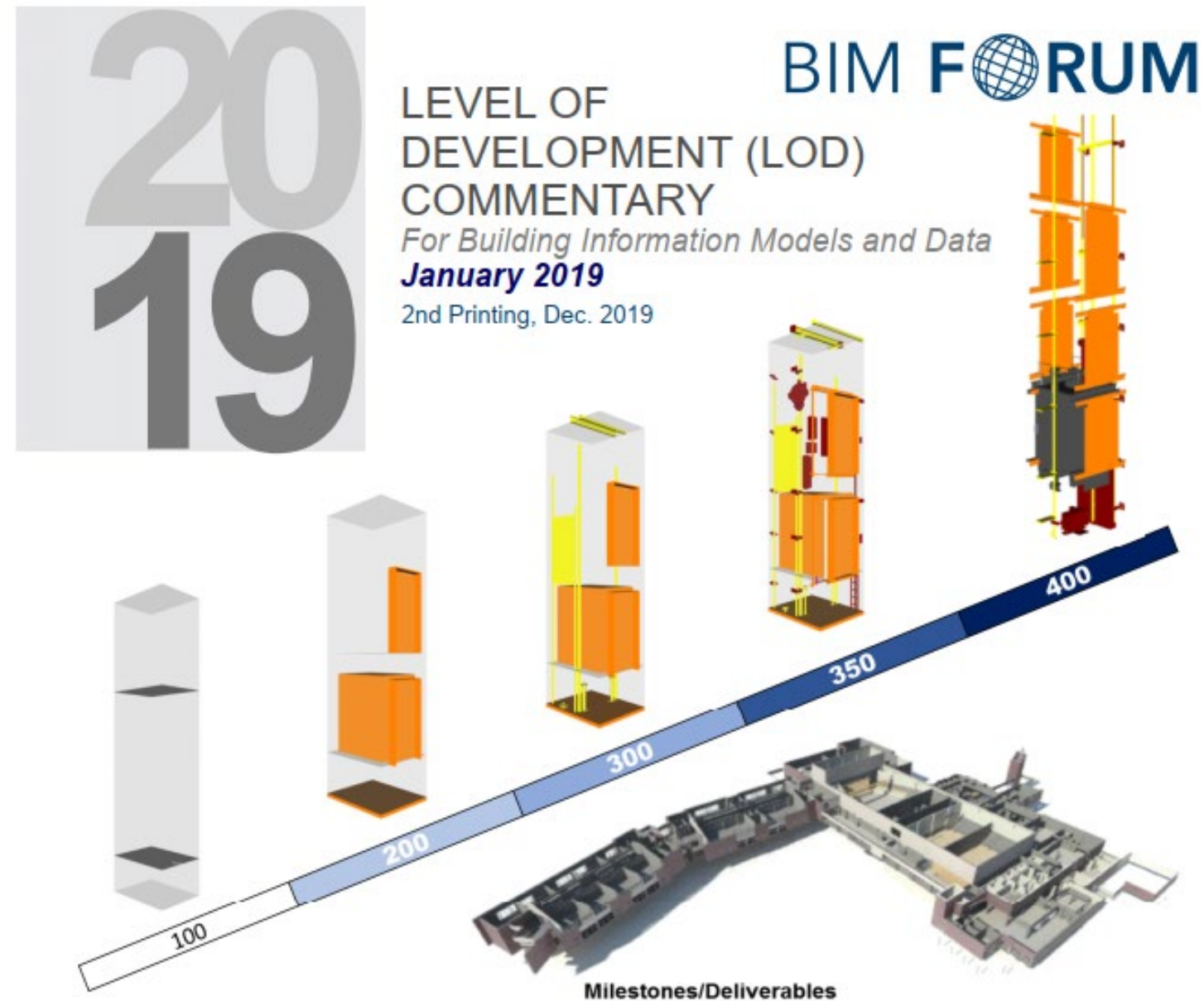
Removal
of Waste

Generation
of Value

Focus on
Process &
Flow

Optimize
the Whole

Continuous
Improvement



Change Takes

Team Alignment

Commitment One to Another

Involving All Stakeholders

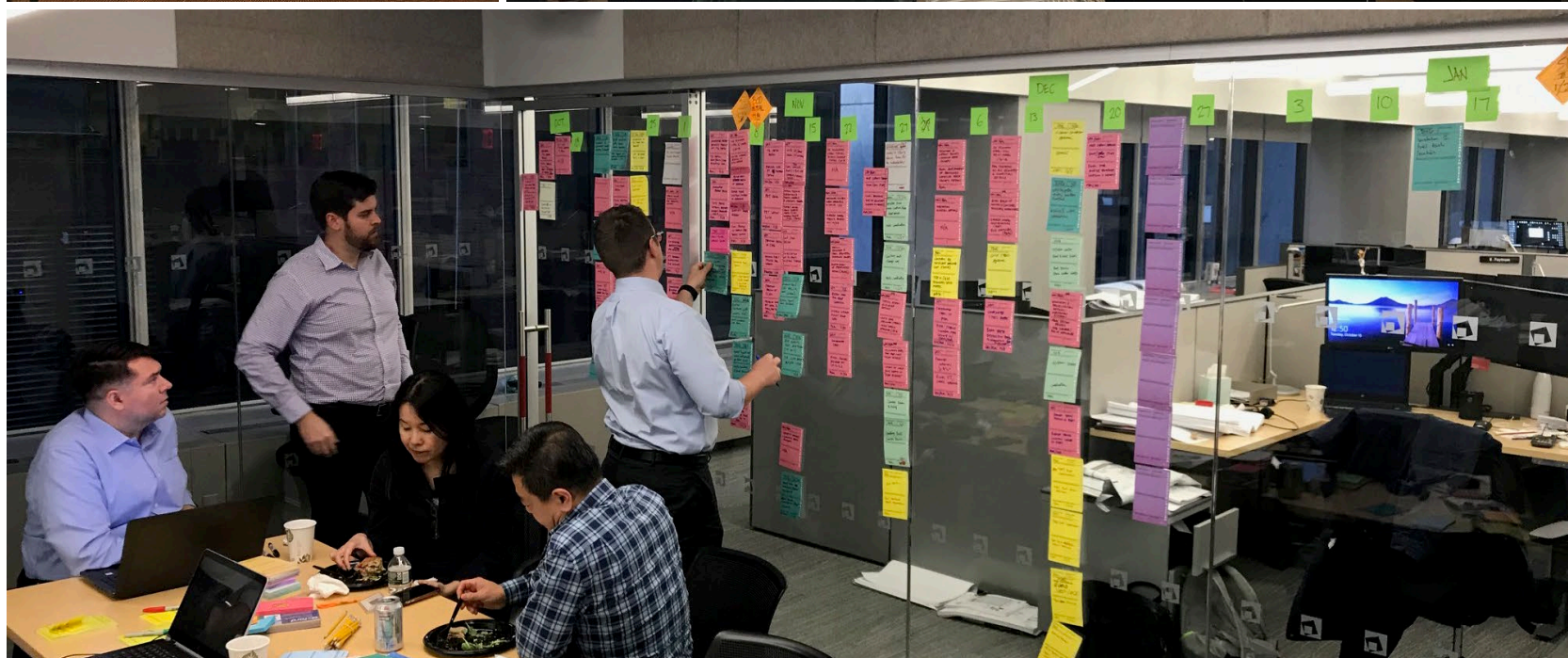
Removal
of Waste

Generation
of Value

Focus on
Process &
Flow

Optimize
the Whole

Continuous
Improvement



OUTPUT: *Custom Model Viewers*

Removal of Waste

Generation of Value

**Focus on
Process &
Flow**

Optimize the Whole

Continuous Improvement



Admin - Manage Projects

Admin - Manage Users

Log off

Manipulate Viewer

Navigation Settings:

Clip View Plane:

Model Object Filters:

Beams:

Columns:

Plates:

Slabs:

Walls:

Rebar:

All:

Representation Filters:

Choose a filter:

► Comments on Selected Objects

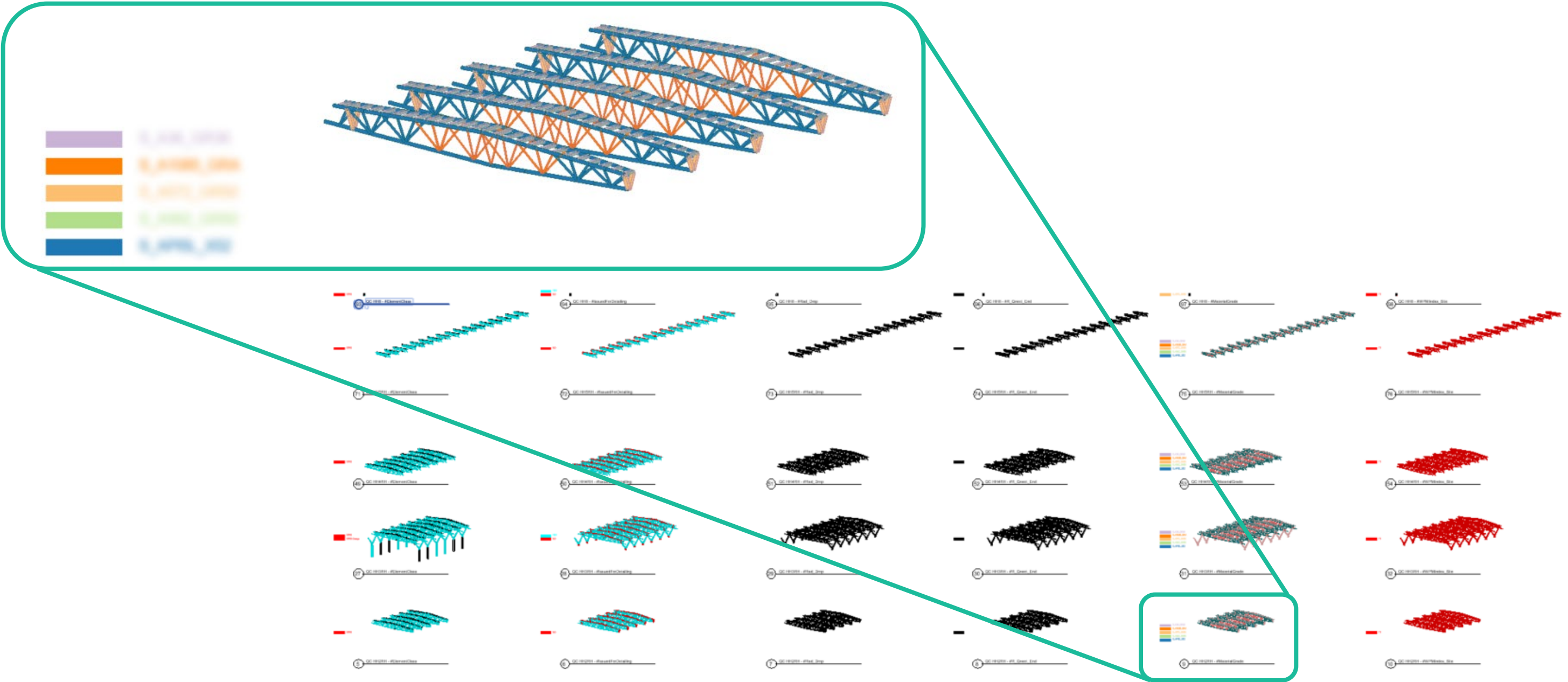
► Model Access Agreement

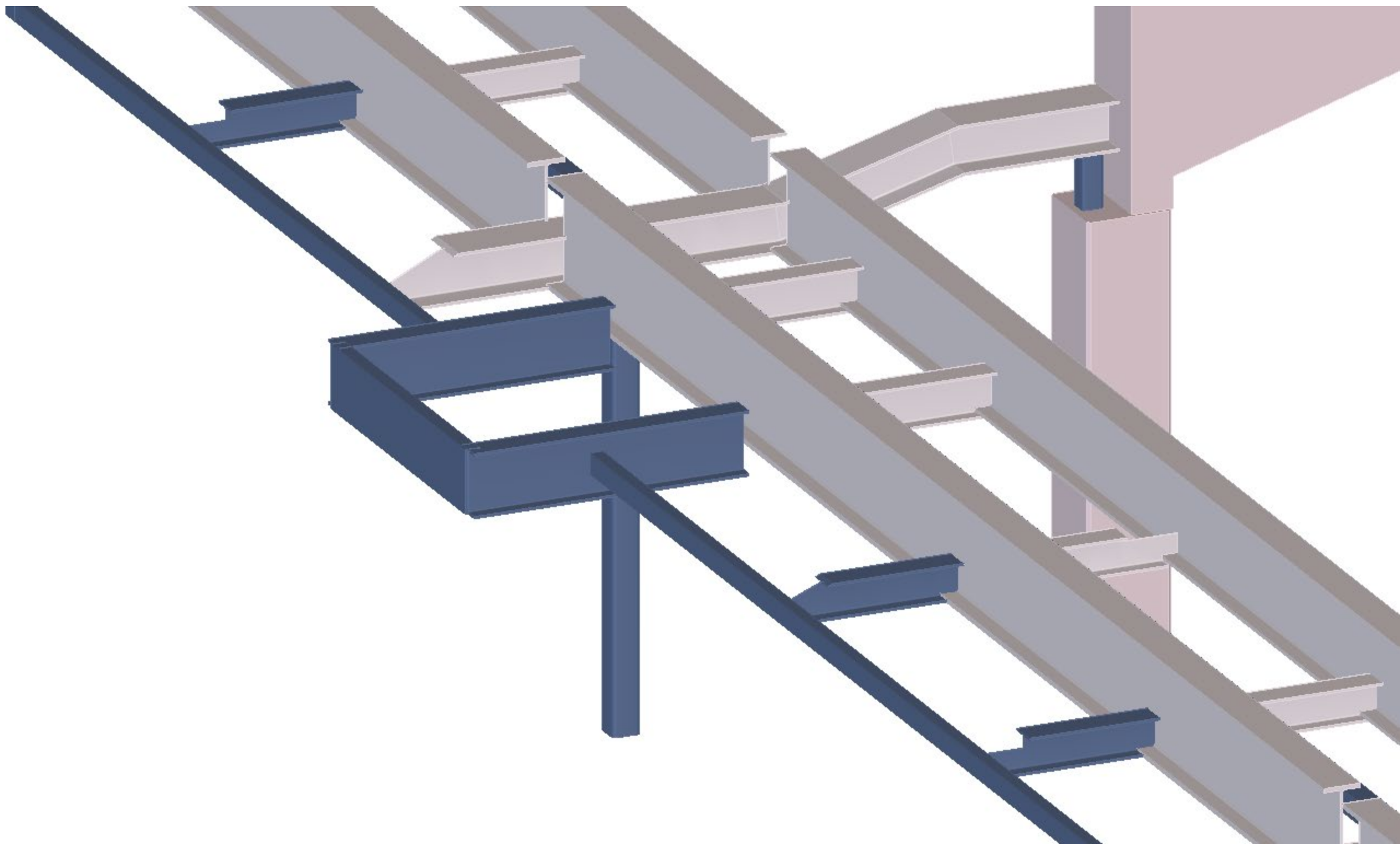
Object Attributes

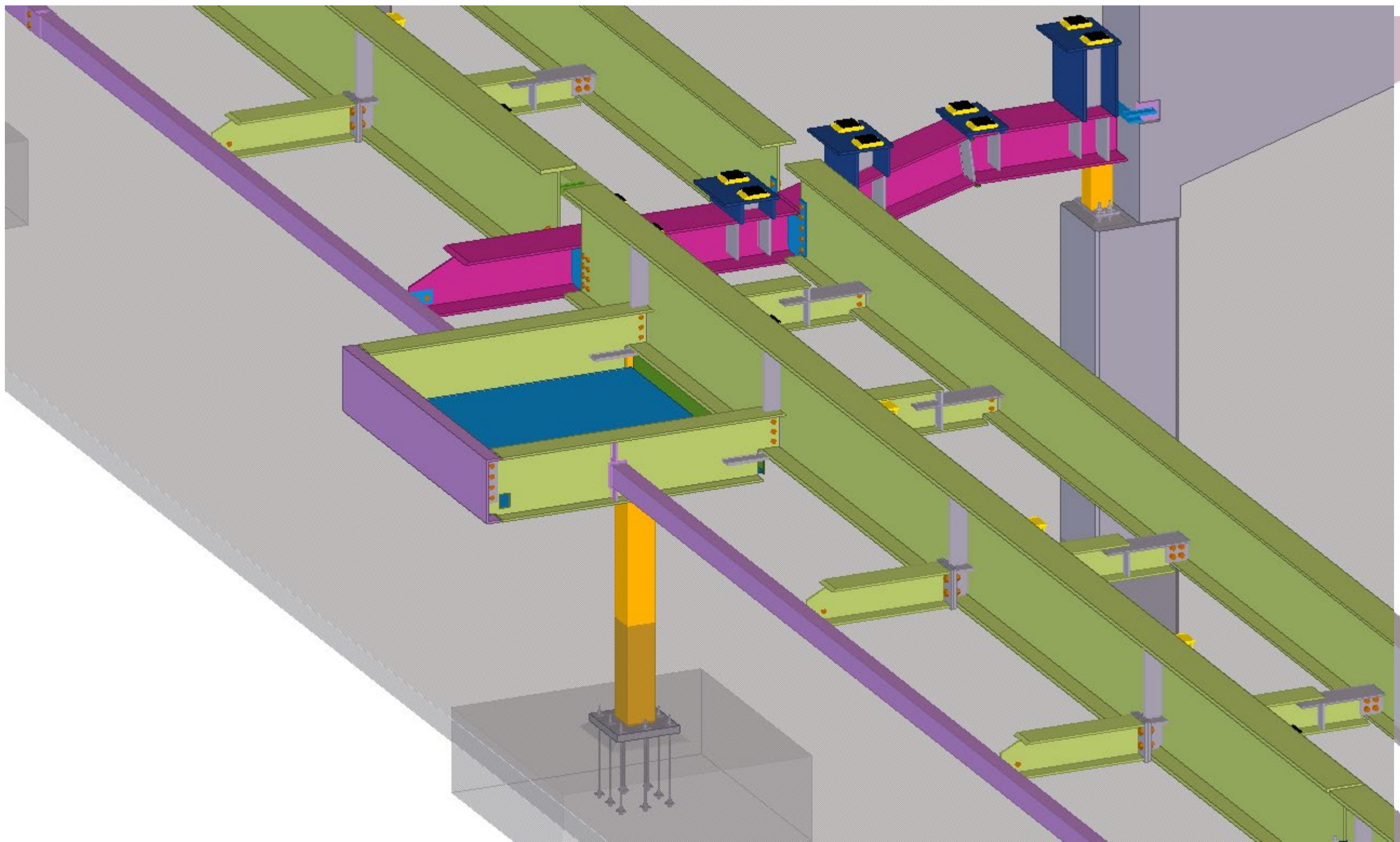
Name	Structural Framing-W Shape - 2020v1:W30x90:4105054
Object Profile	Structural Framing-W Shape - 2020v1:W30x90
Global ID	3M0CV_u_H4OPiptd5liWIZ
Object ID	45624
Object Type	IfcBeam
IsExternal	False
Reference	Structural Framing-W Shape - 2020v1:W30x90
Span	39.9999999999997
Category	Structural Framing
Reference	Structural Framing-W Shape - 2020v1:W30x90
Reference	Structural Framing-W Shape - 2020v1:W30x90
Orientation	Normal
Reference Level	Level: 02 CONCOURSE (TOS)
Display Centerline	True
Reference Level Elevation	33.875
Work Plane	Level : 02 CONCOURSE (TOS)
Elevation at Bottom	31.4166666666666
Elevation at Top	33.875
Length	39.9999999999997
Volume	7.10395869745242
Join Status	Both joins enabled
y Justification	Origin
yz Justification	Uniform

Validating Information Graphically

- Removal of Waste
- Generation of Value
- Focus on Process & Flow
- Optimize the Whole
- Continuous Improvement

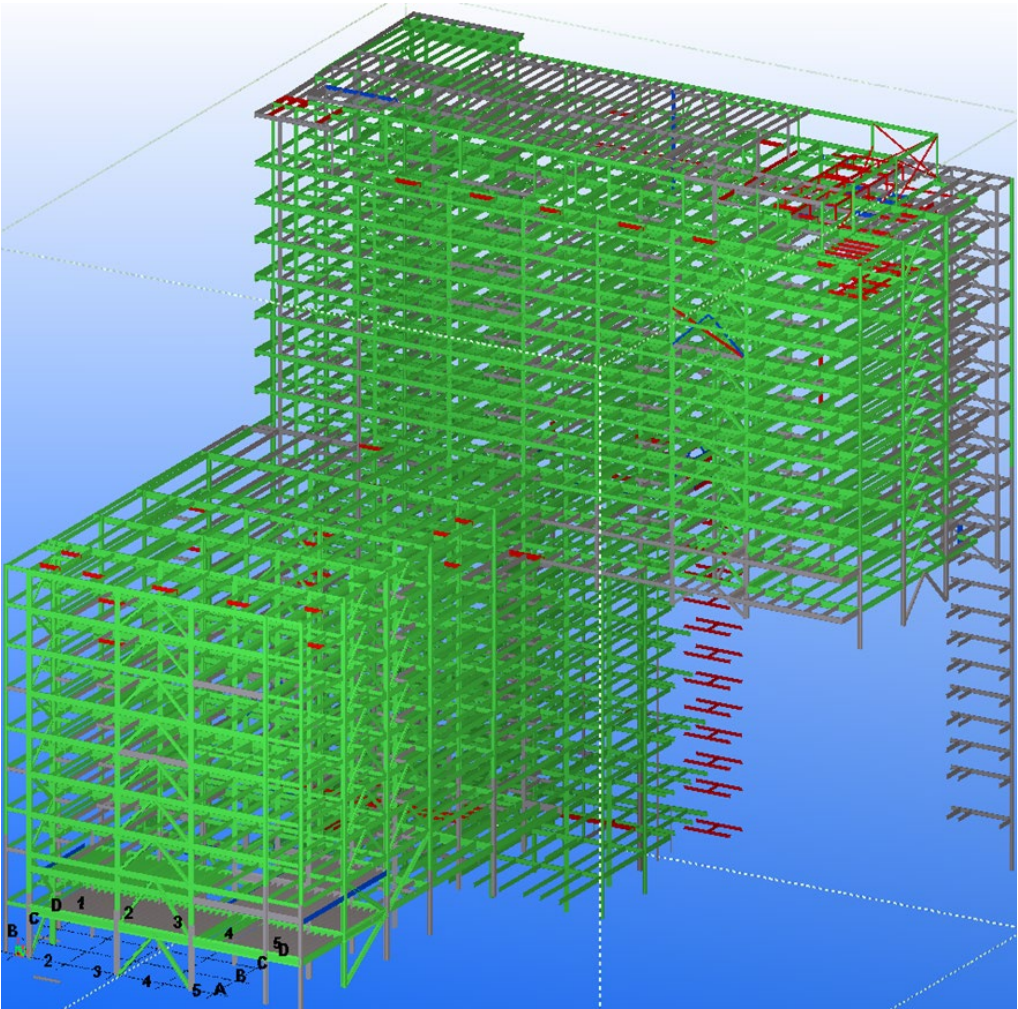
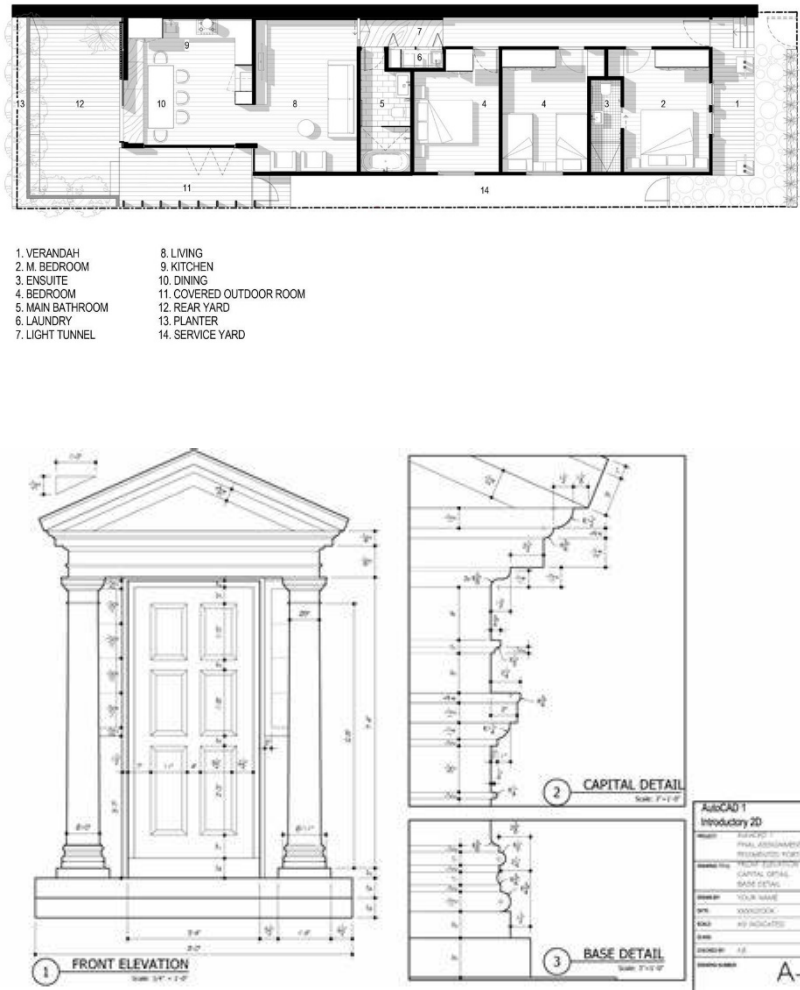






Archaic Workflows with Modern Tools

- Removal of Waste
- Generation of Value
- Focus on Process & Flow
- Optimize the Whole
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Change takes Time to Stick

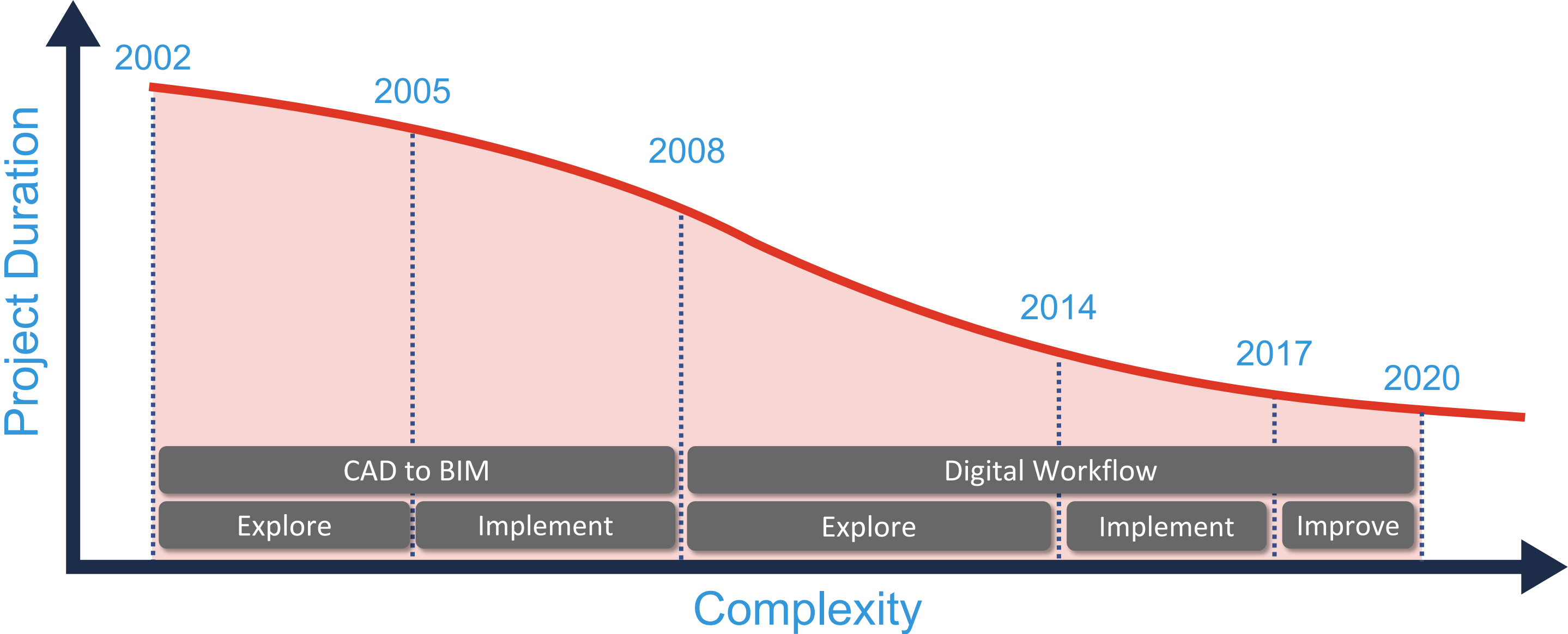
Change Doesn't Happen Overnight



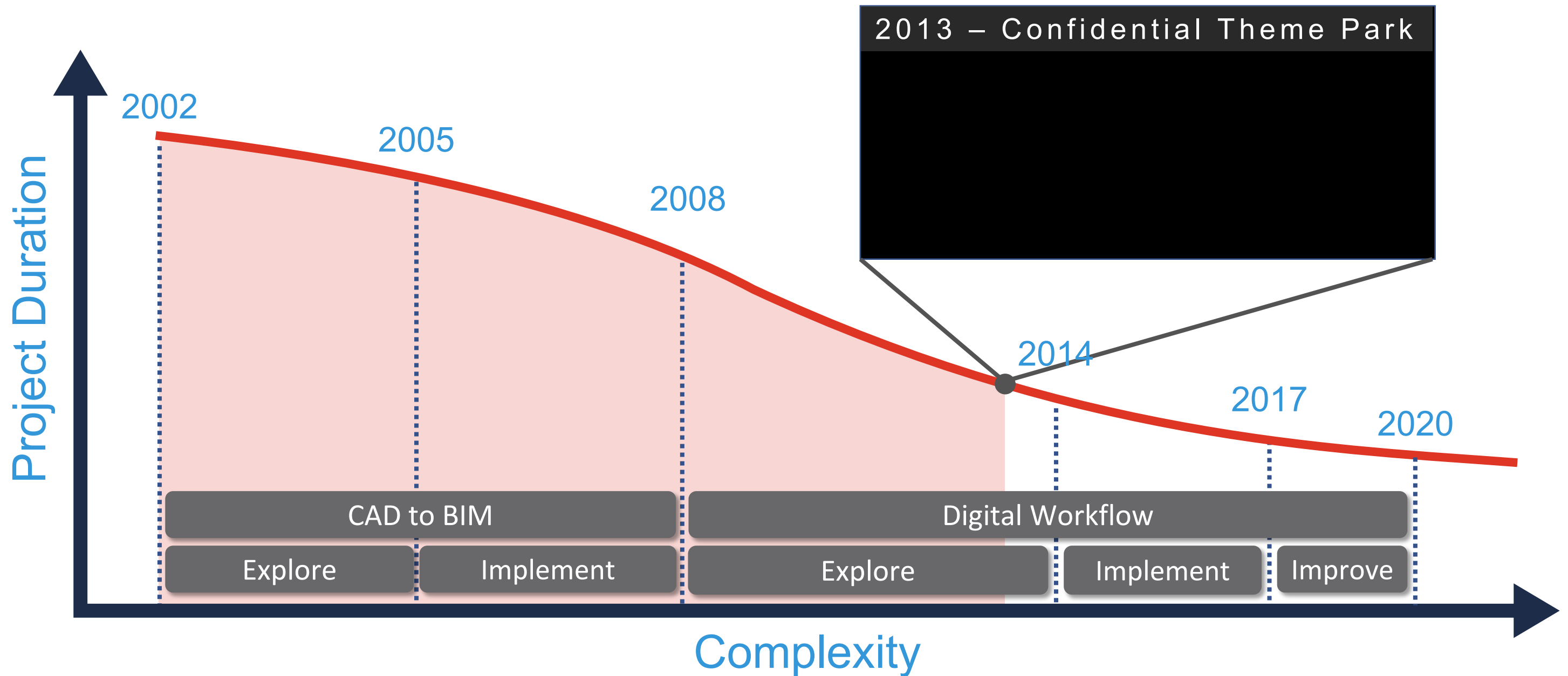
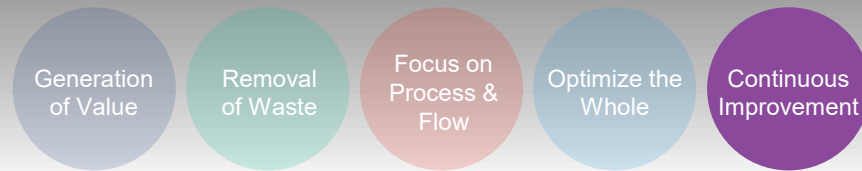
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Continuous Growth

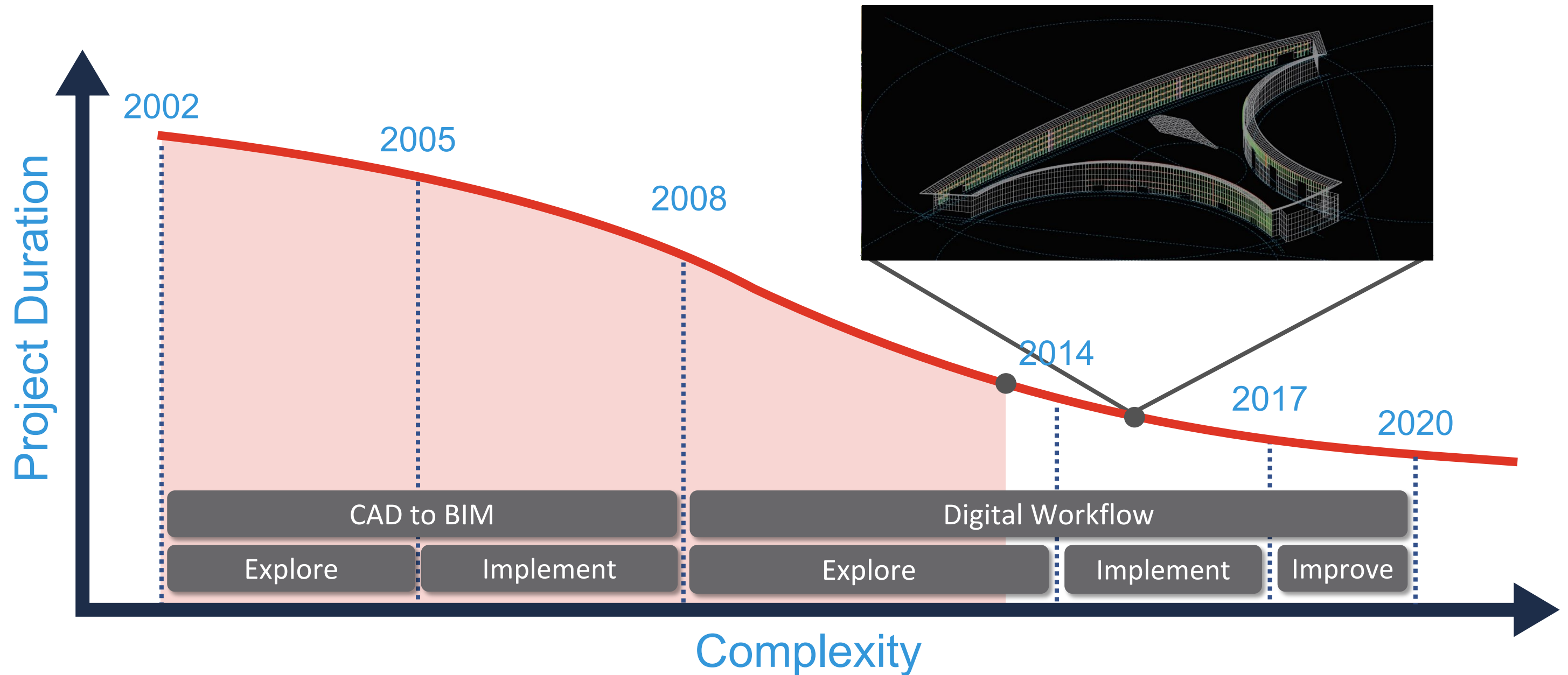
- Generation of Value
- Removal of Waste
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Parametric Integration - Tekla

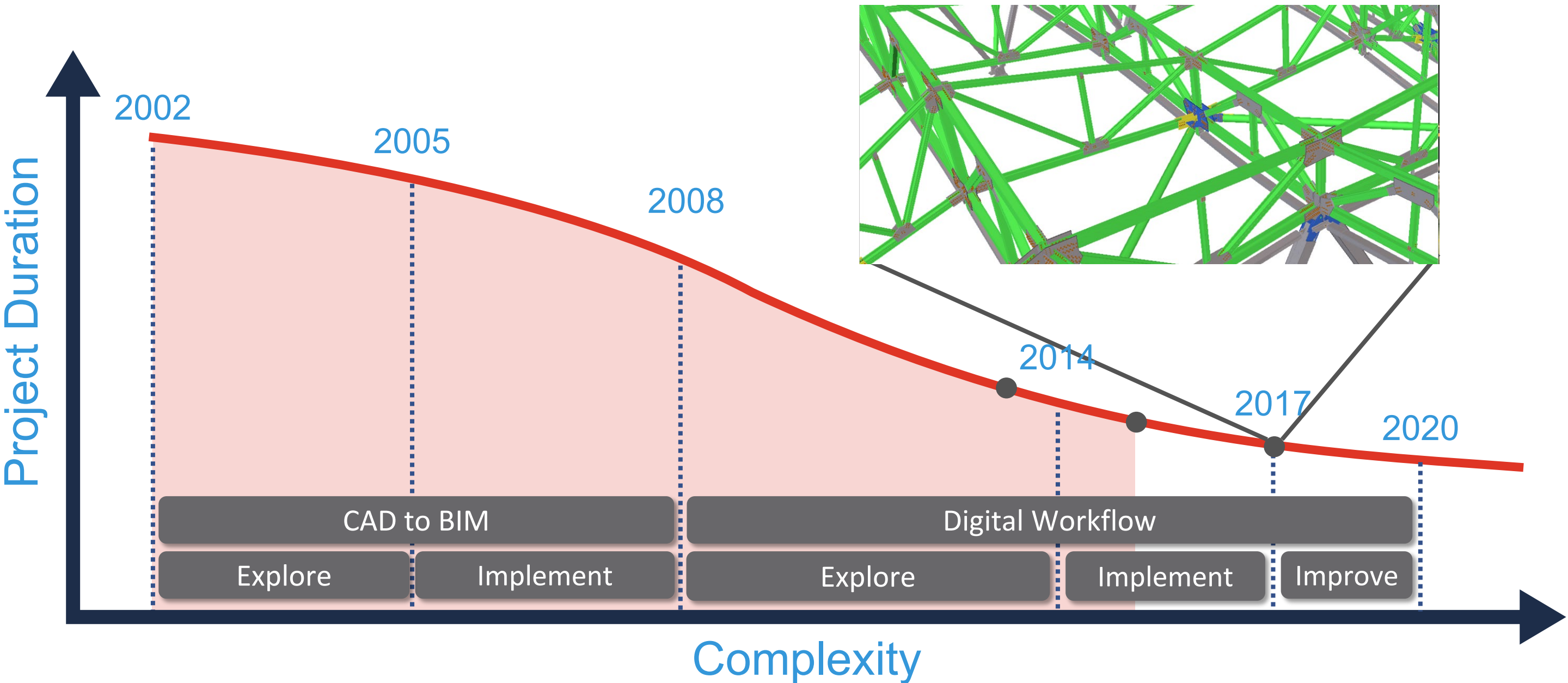


Parametric Integration - Facades



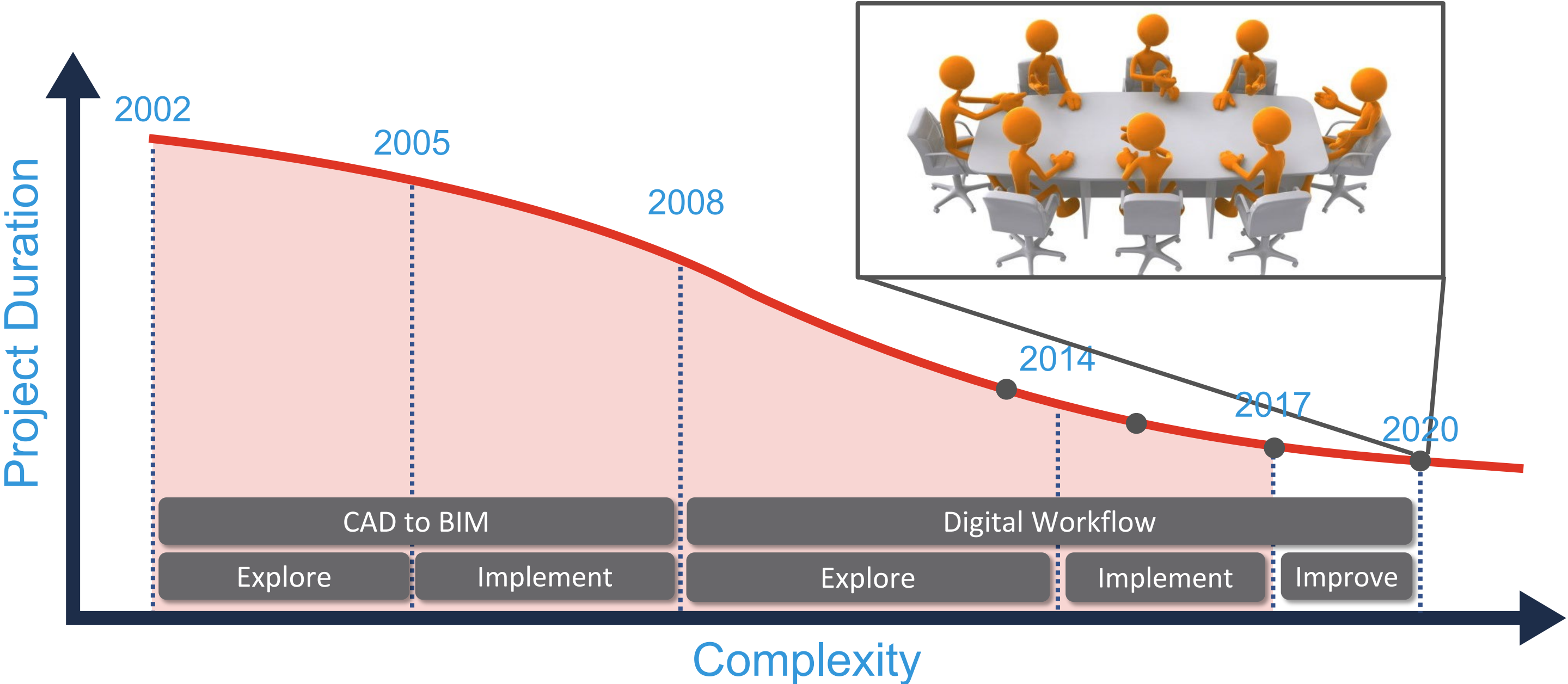
Parallel Delivery – 19 Weeks

- Generation of Value
- Removal of Waste
- Focus on Process & Flow
- Optimize the Whole
- Continuous Improvement



Increased Communication

- Generation of Value
- Removal of Waste
- Focus on Process & Flow
- Optimize the Whole
- Continuous Improvement



Lessons Learned from Scaling Change

- Change Takes:
 - Communication
 - Iterations
 - Team Alignment
- Change Doesn't Happen Overnight





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OCTOBER 19-23



In the spirit of continuous improvement, we would like to remind you to complete this session's survey in the Congress app! We look forward to receiving your feedback. Highest rated presenters will be recognized.



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OCTOBER 19-23

Thank you for attending this presentation. Enjoy the rest of the 22nd Annual LCI Congress!

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