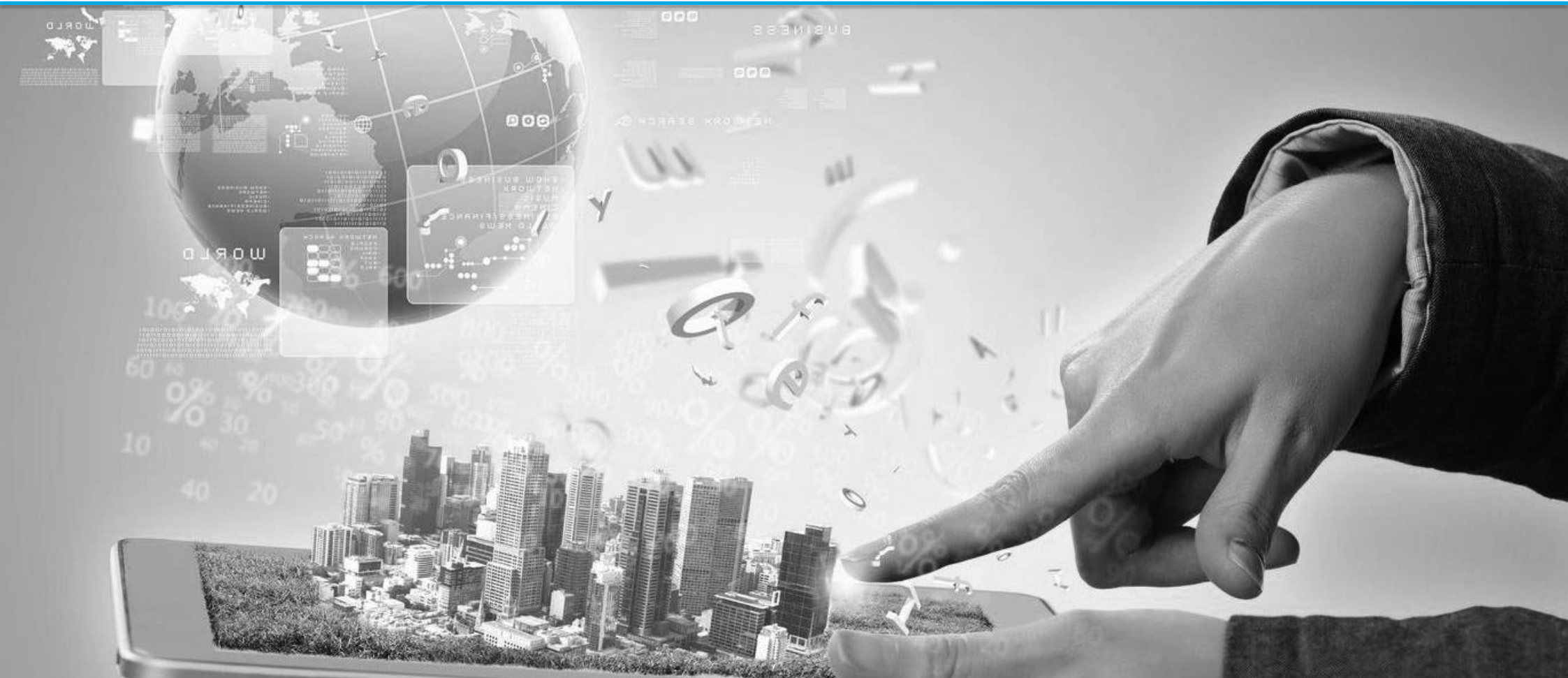


Lean in the Public Sector - 2016

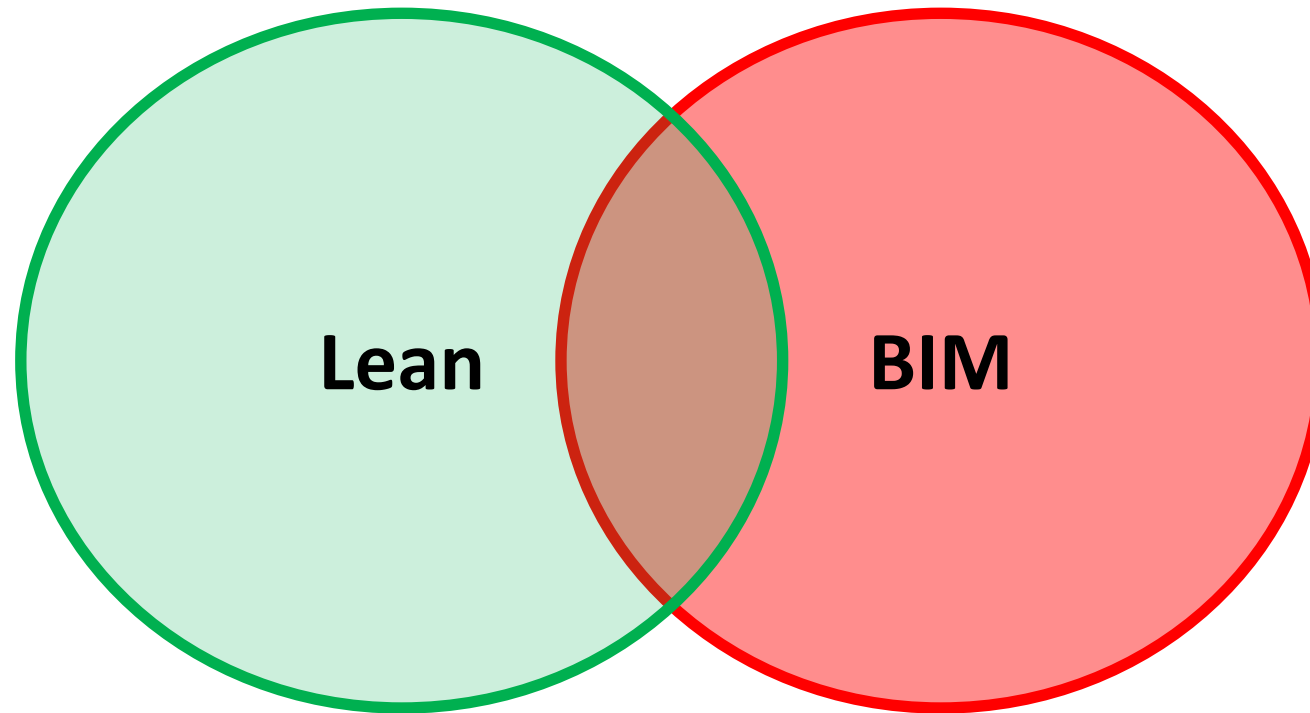
Lean & Building Information Modelling?



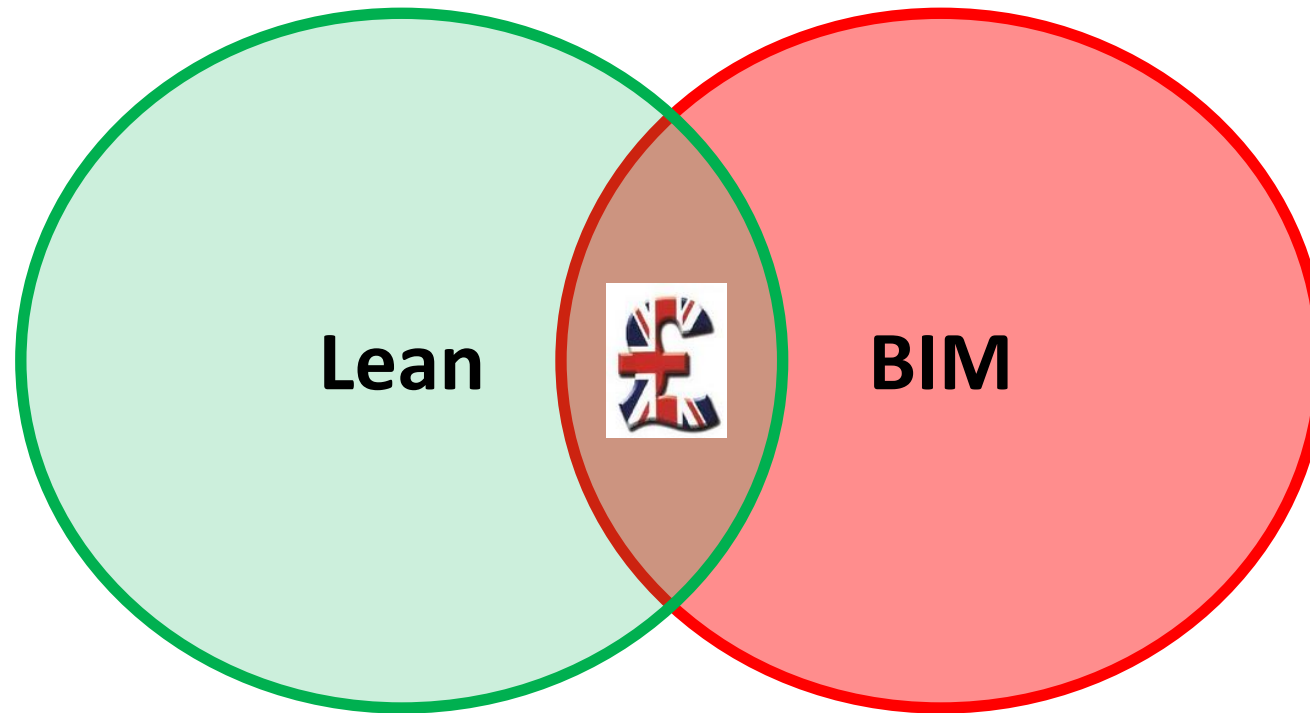
Agenda

- Introduction
- What is BIM
 - HMG BIM Programme
- What is Lean
- Lean & BIM Together?
- Lean & BIM – Opportunities?

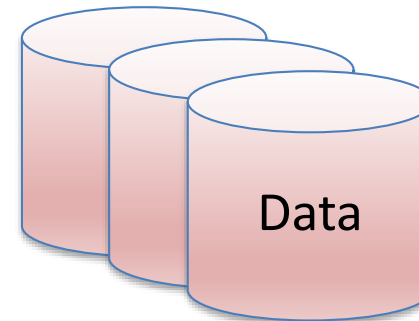
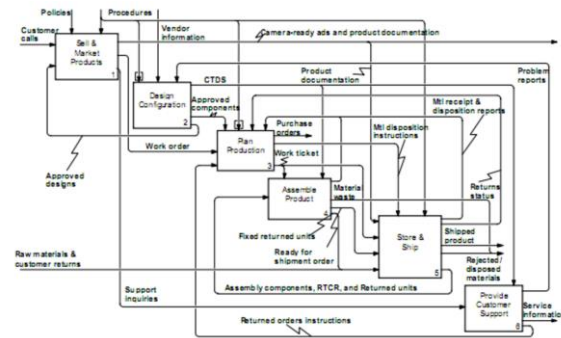
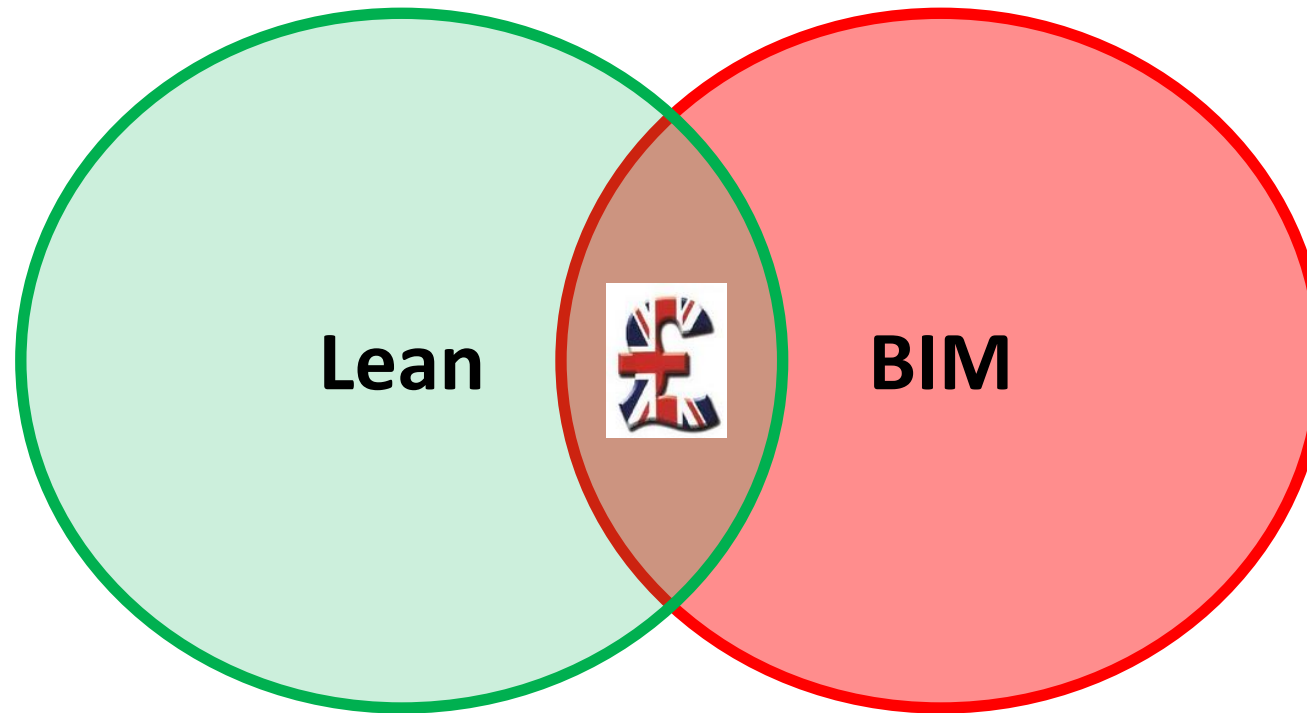
Introduction



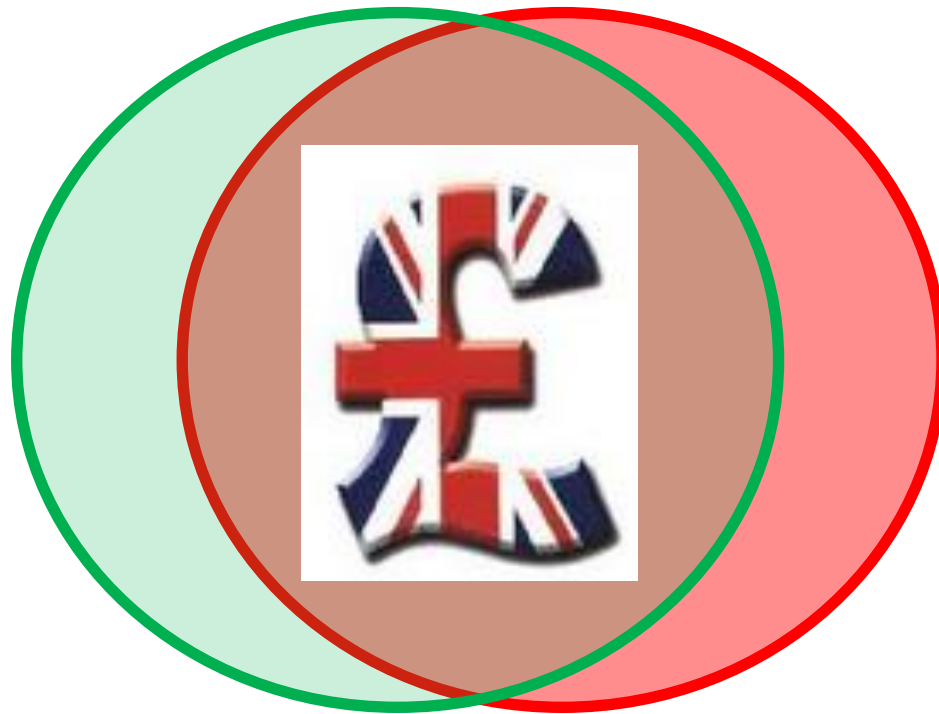
Introduction



Introduction



Introduction



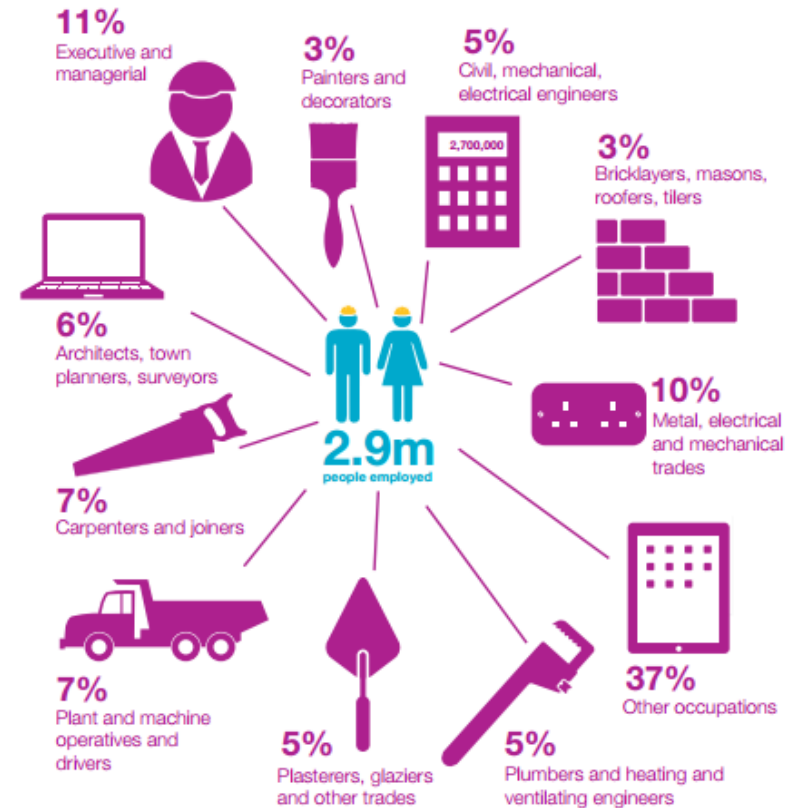
Introduction – UK Construction

UK BIM Programme



90bn

Construction contributes nearly **£90bn** to the UK economy, 6.7% of the total



There are **2.9 million** jobs filled in the Construction Industry, circa 10% of all jobs (in over 280,000 businesses)

Introduction – Industrial Strategy



Lower costs

33%

reduction in the initial cost of construction and the whole life cost of built assets

Faster delivery

50%

reduction in the overall time, from inception to completion, for newbuild and refurbished assets

Lower emissions

50%

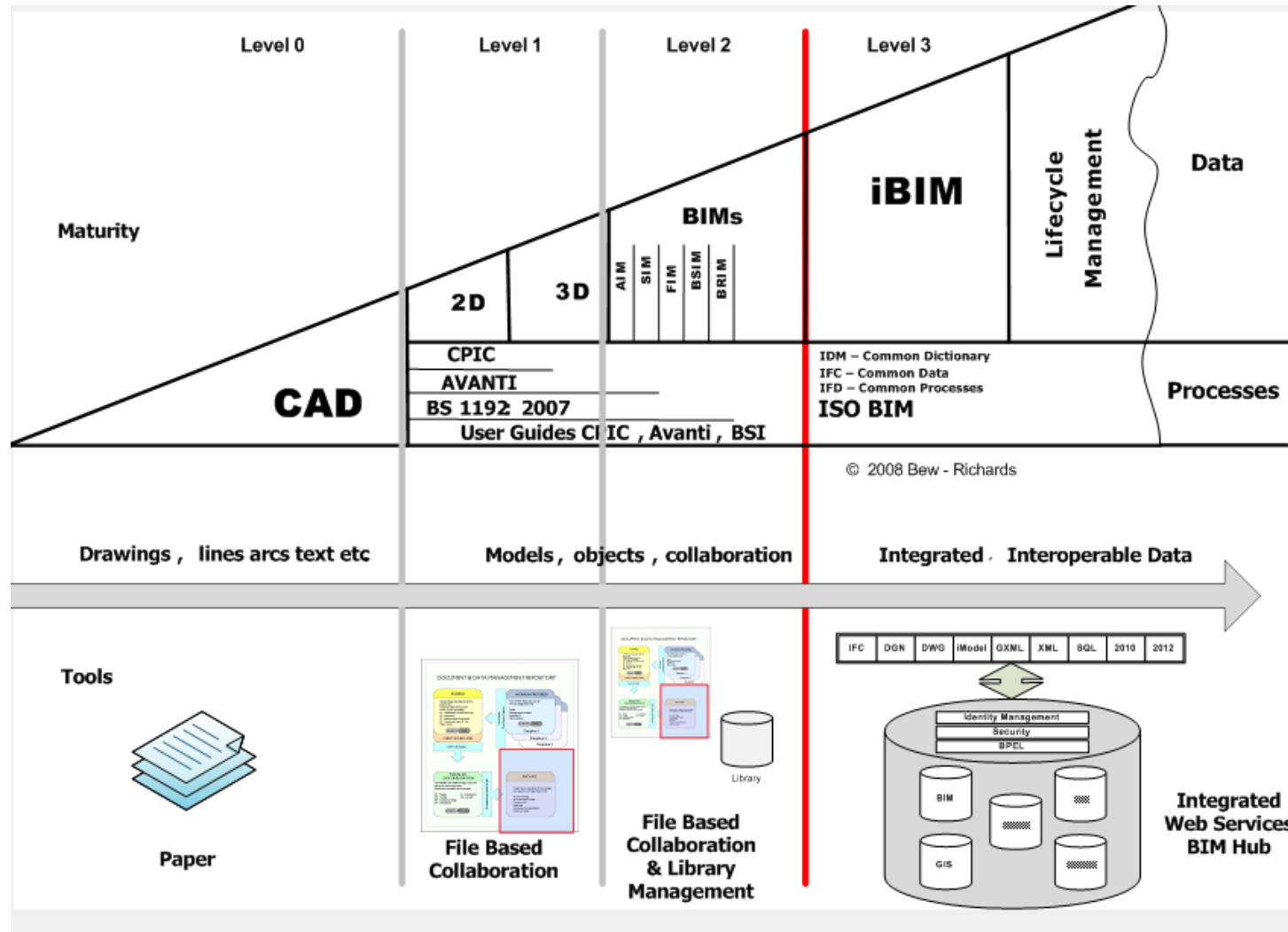
reduction in greenhouse gas emissions in the built environment

Improvement in exports

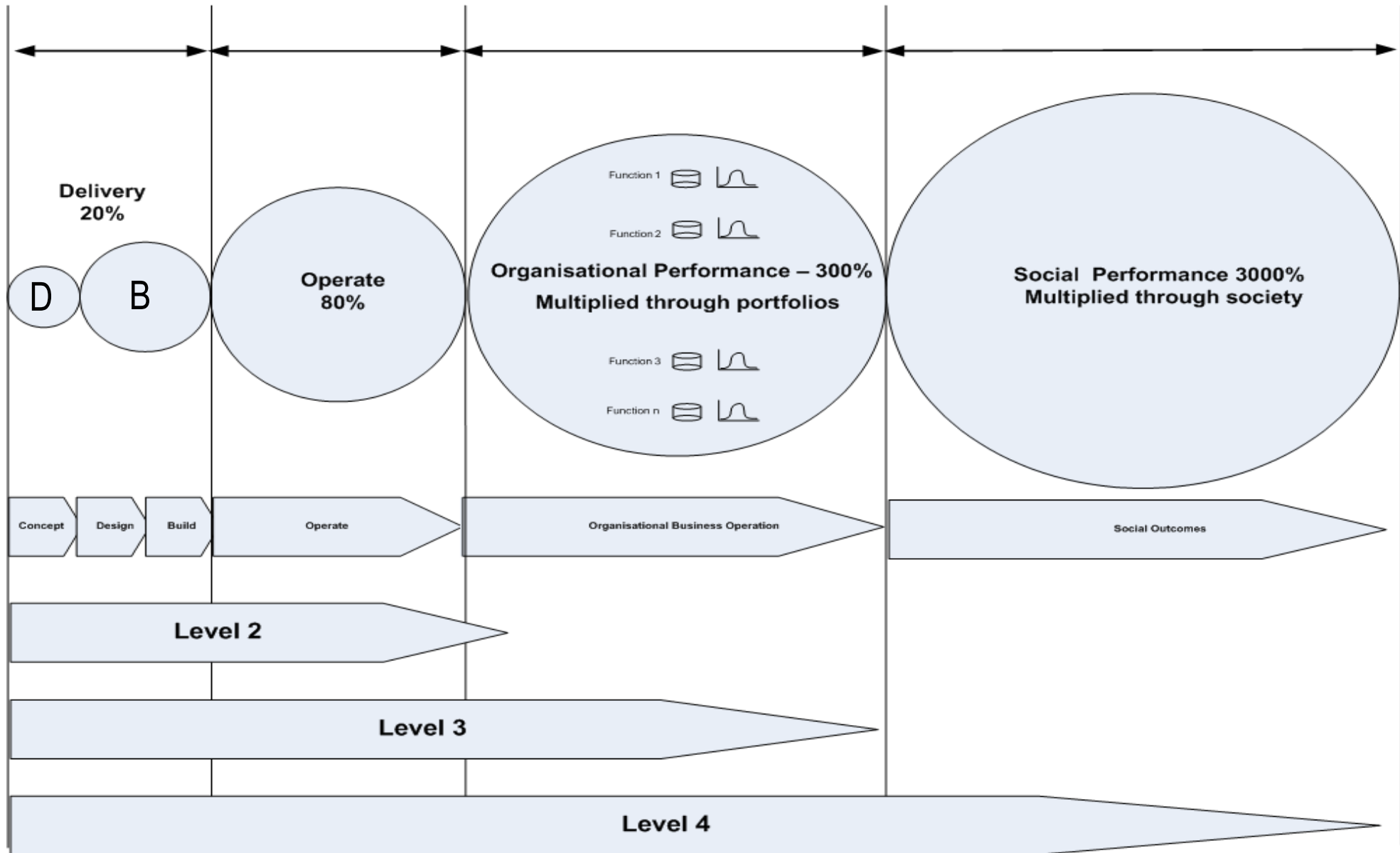
50%

reduction in the trade gap between total exports and total imports for construction products and materials

What is BIM & Data Management?

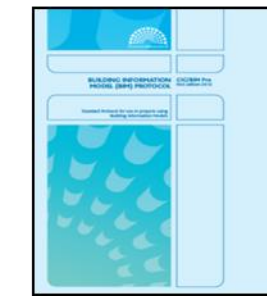


Value Generation



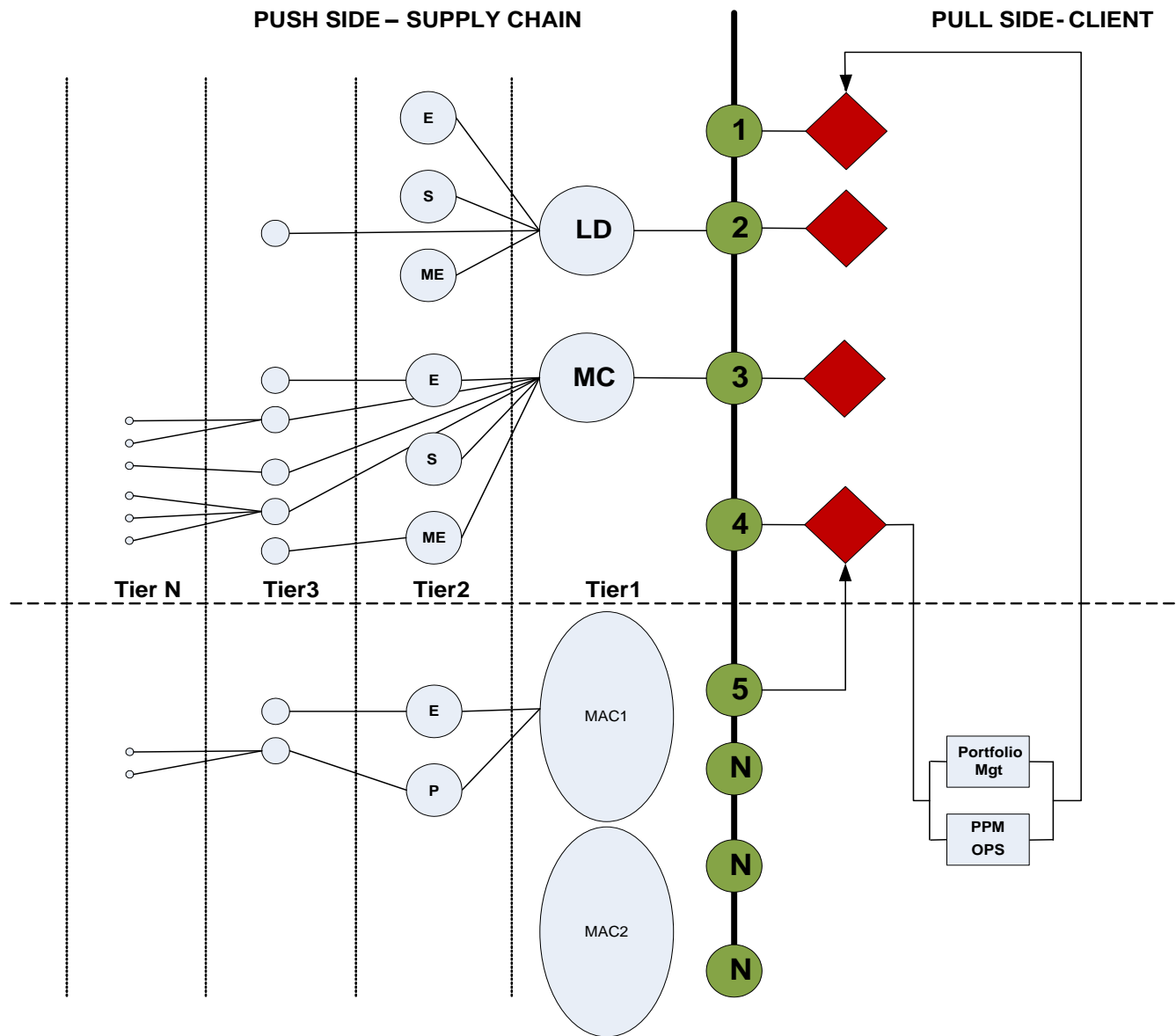
Level 2 “Package”

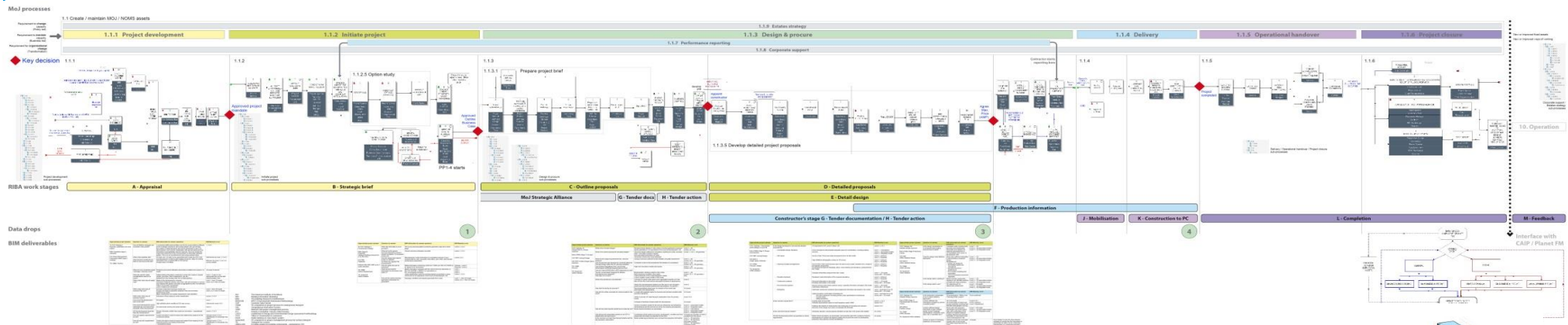
1. PAS1192:2 Capital Delivery
2. PAS1192:3 Operational Delivery
3. BS1192:4 Data Structure
4. Data Classification (Uniclass 2015)
5. Digital Plan of Works (Levels of Data Detail)
6. PAS1192:5 Security
7. BIM Contract Protocol
8. Government Soft Landings



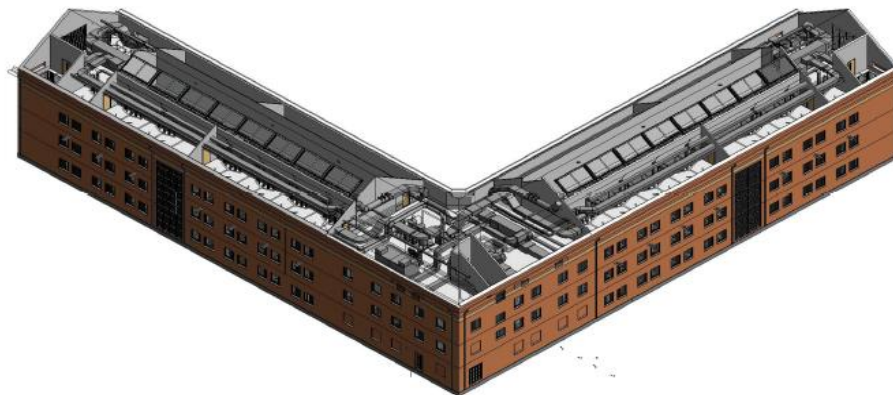
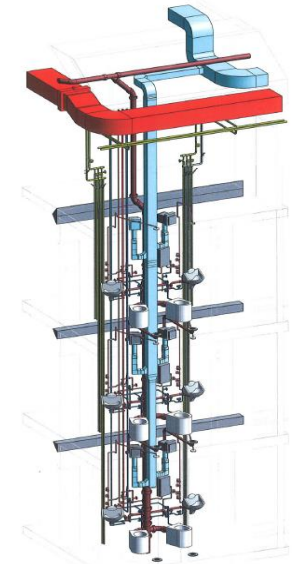
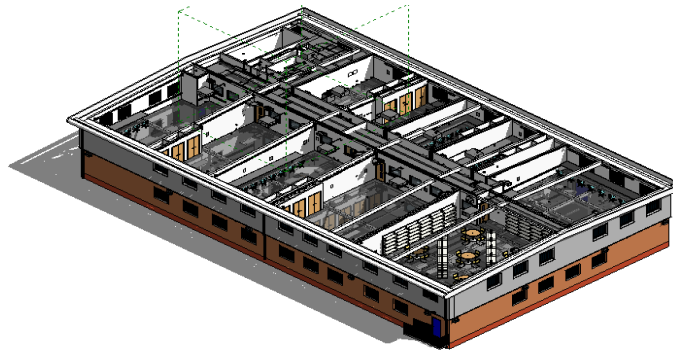
www.bimtaskgroup.org

Level 2 – Data Procurement

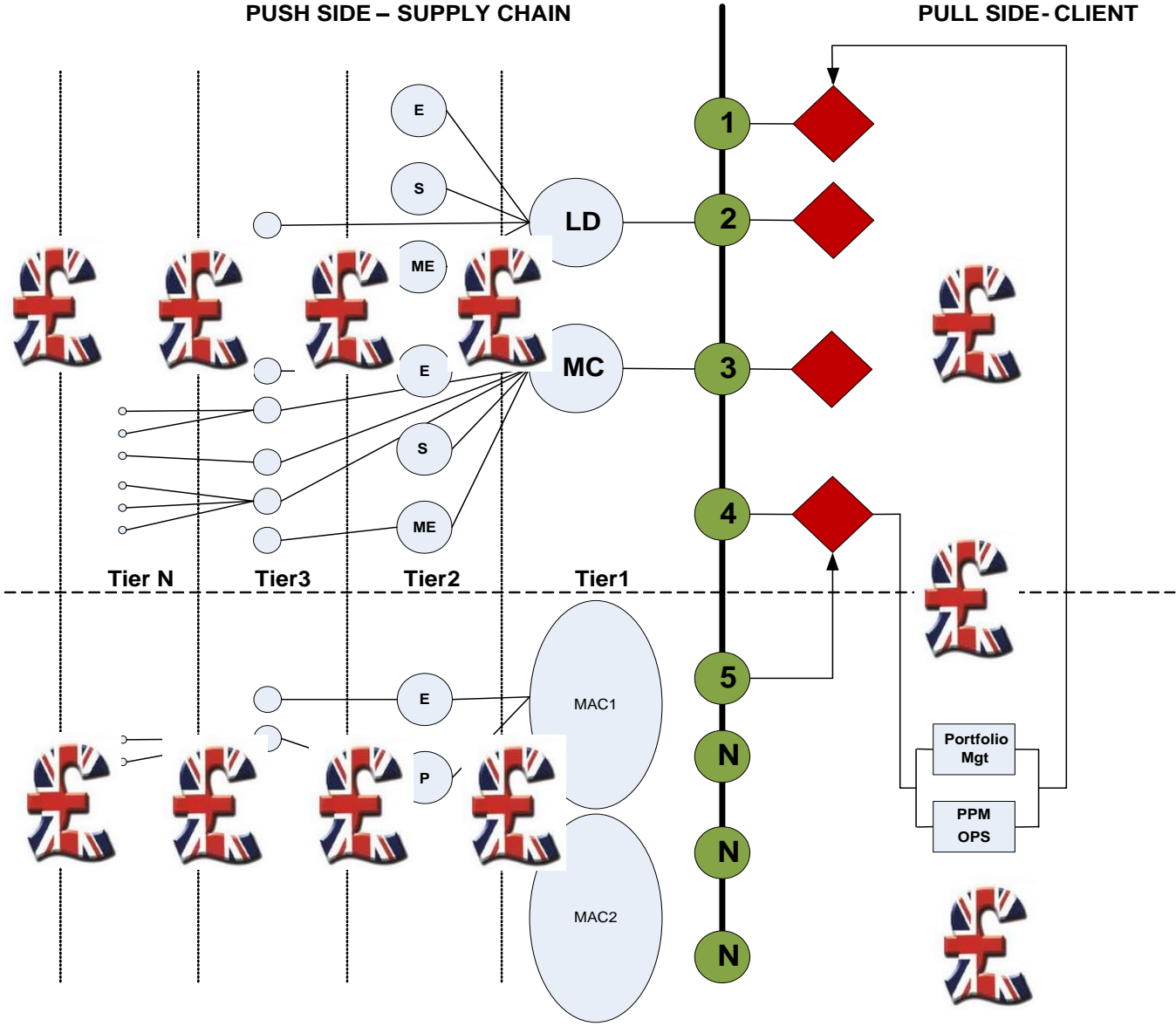




- Implementation Plan
- EIR
- Tender Documents
- Scoring Process
- Framework Training
- Framework Support



Benefits



What is Lean & Process Management?

What is Lean Design & Construction

Lean Design and Construction is a production management-based approach to project delivery -- a new way to design and build capital facilities. **Lean production management** has caused a revolution in manufacturing design, supply and assembly. Applied to project design and delivery, **Lean changes the way work is done throughout the delivery process.** Lean Construction extends from the objectives of a lean production system - maximize value and minimize waste - to specific techniques, and applies them in a new project delivery process. As a result:

- The facility and its delivery process are designed together to better reveal and **support customer purposes.**
- Work is structured throughout the process to **maximize value** and to reduce waste-at the project delivery level.
- Efforts to manage and improve performance are aimed at improving total project performance, because this is more important than reducing the cost or increasing the speed of any particular activity.
- "Control" is redefined from "monitoring results" to "making things happen." The performance of the planning and control systems are measured and improved.

The reliable release of work between specialists in design, supply and assembly assures value is delivered to the customer and waste is reduced. Lean Design and Construction is particularly useful on complex, uncertain and quick projects. It challenges the belief that there must always be trade-offs between time, cost, and quality.

What is Lean & Process Management?

- What is Lean Construction?
 - Creating value for clients
 - Removing waste
 - Smooth flow (process) of operations

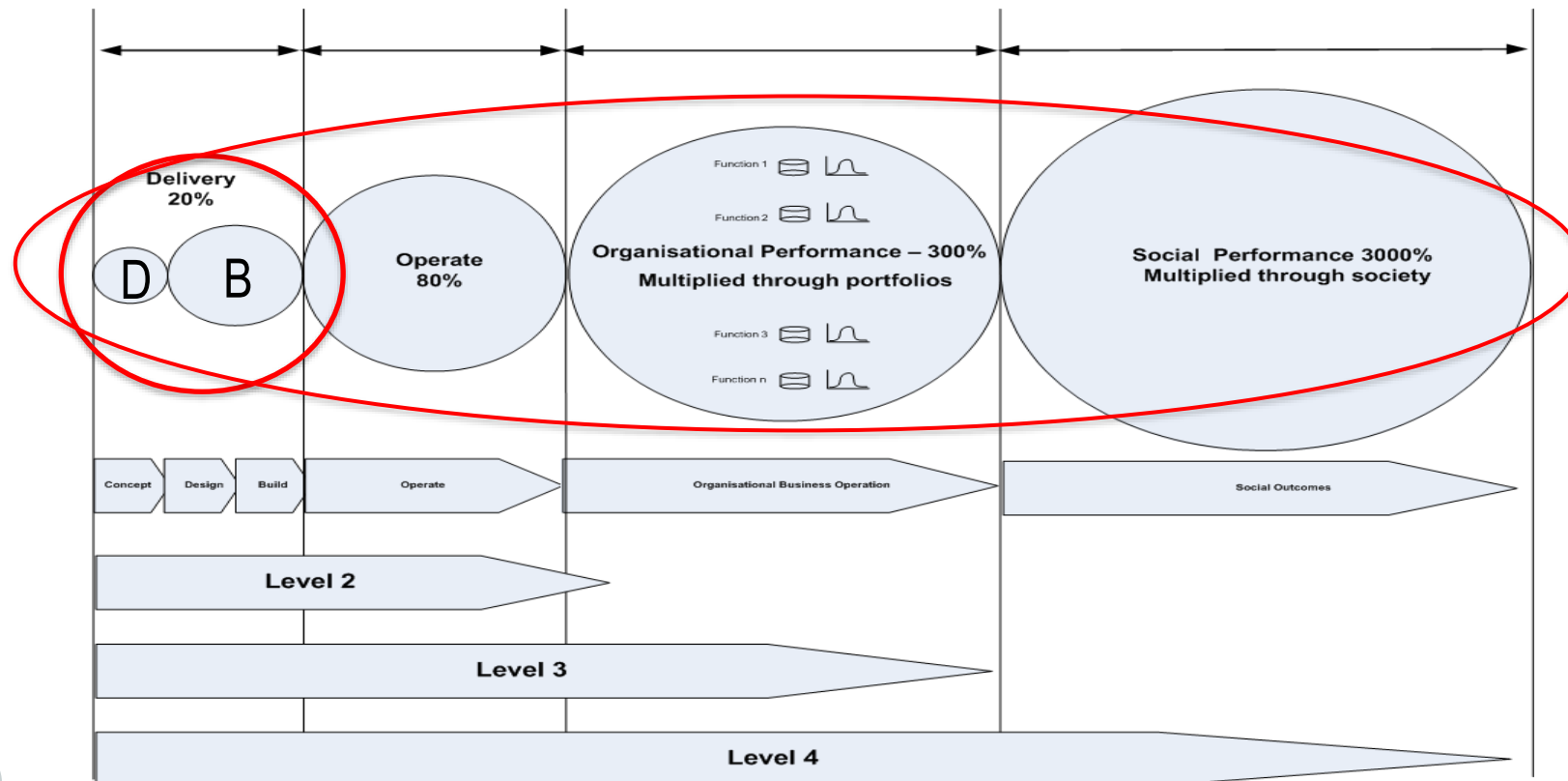
Prof Rafael Sacks – Technion, Israel Institute of Technology

Lean & BIM?

- What is Lean Construction?
 - Creating value for clients, through deploying good process
- What is BIM in Construction?
 - Creating value for clients, through managing good data

Lean & BIM?

- What is Lean Construction?
 - Creating value for clients, through deploying good process
- What is BIM in Construction?
 - Creating value for clients, through deploying good data



Lean & BIM?

BIM GOALS AND USES FOR THE PROJECT ENTIRE TEAM

1. Reduced errors and omissions.
2. To coordinate interdisciplinary design and trades within various model.
3. To provide better understanding for design and construction.
4. To reduce reworks.
5. To achieve better quality of design and construction.

BIM GOALS AND USES FOR RCC

1. To enhance productivity throughout the project.
2. To find out bigger advantage for the Contractor in 4D and 5D adoption.
3. To introduce at least one advanced new technologies for our own development.
4. **To educate Technical Staff and construction Staff in BIM Implementations**
5. **To initiate shop drawing creation in BIM for higher value of productivity.**
6. **To initiate combine services drawings in BIM for higher value of productivity.**

Lean & BIM?

BIM GOALS AND USES FOR THE PROJECT ENTIRE TEAM

1. Reduced errors and omissions.
2. To coordinate interdisciplinary design and trades within various model.
3. To provide better understanding for design and construction.
4. To reduce reworks.
5. To achieve better quality of design and construction.

BIM GOALS AND USES FOR RCC

1. To enhance productivity throughout the project.
2. To find out bigger advantage for the Contractor in 4D and 5D adoption.
3. To introduce at least one advanced new technologies for our own development.
4. **To educate Technical Staff and construction Staff in BIM Implementations**
5. **To initiate shop drawing creation in BIM for higher value of productivity.**
6. **To initiate combine services drawings in BIM for higher value of productivity.**

REMOVE WASTE

Lean & BIM?



Lean & BIM?



Lean & BIM?

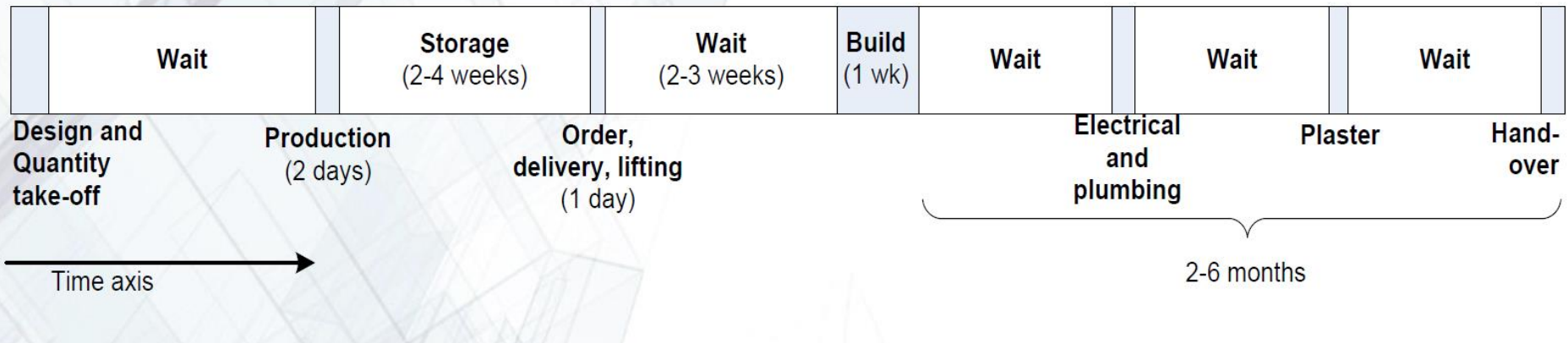
The workflow waste



Legend

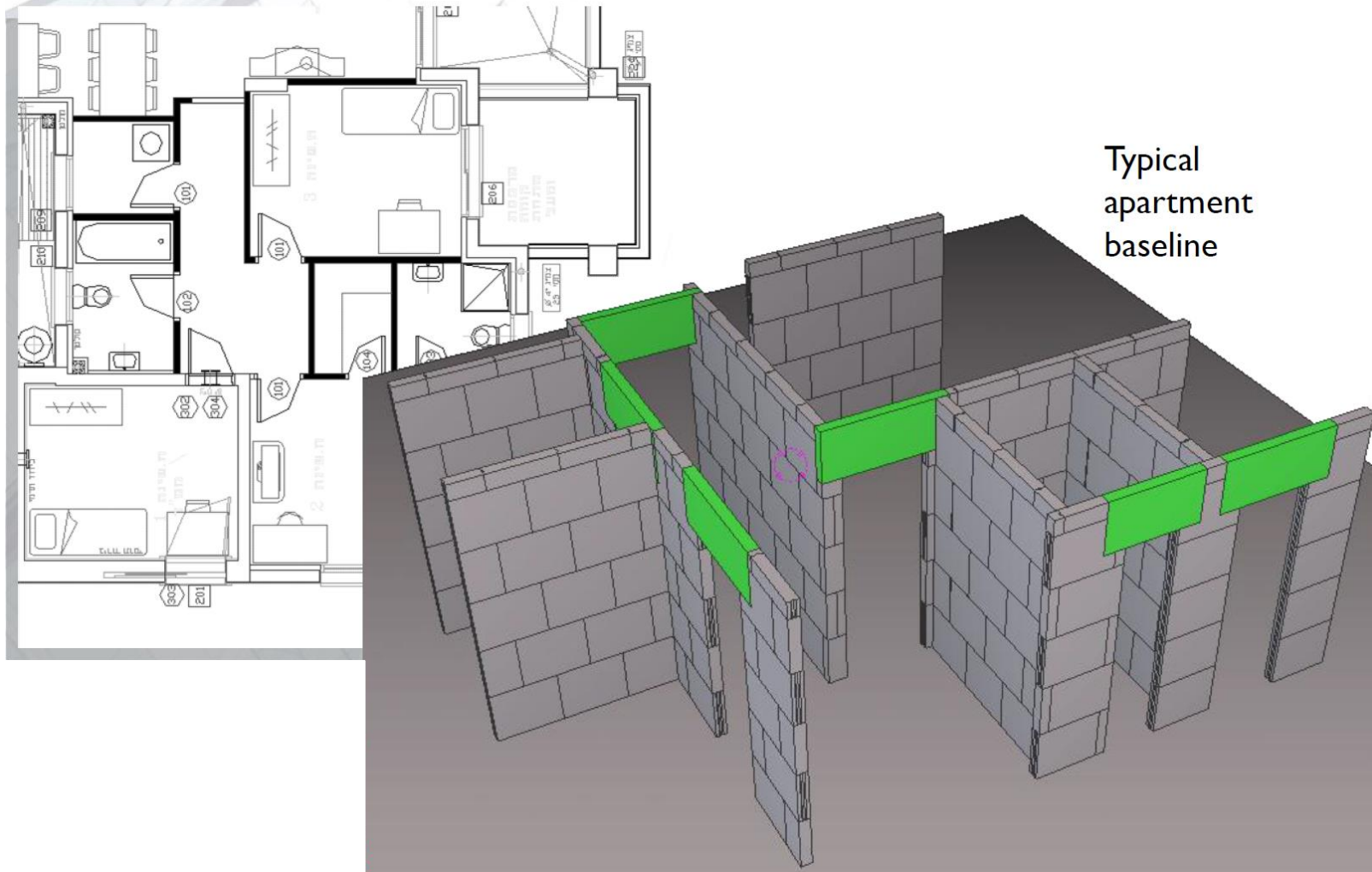
Value-adding activity	Non value-adding activity
-----------------------	---------------------------

(Typical duration)

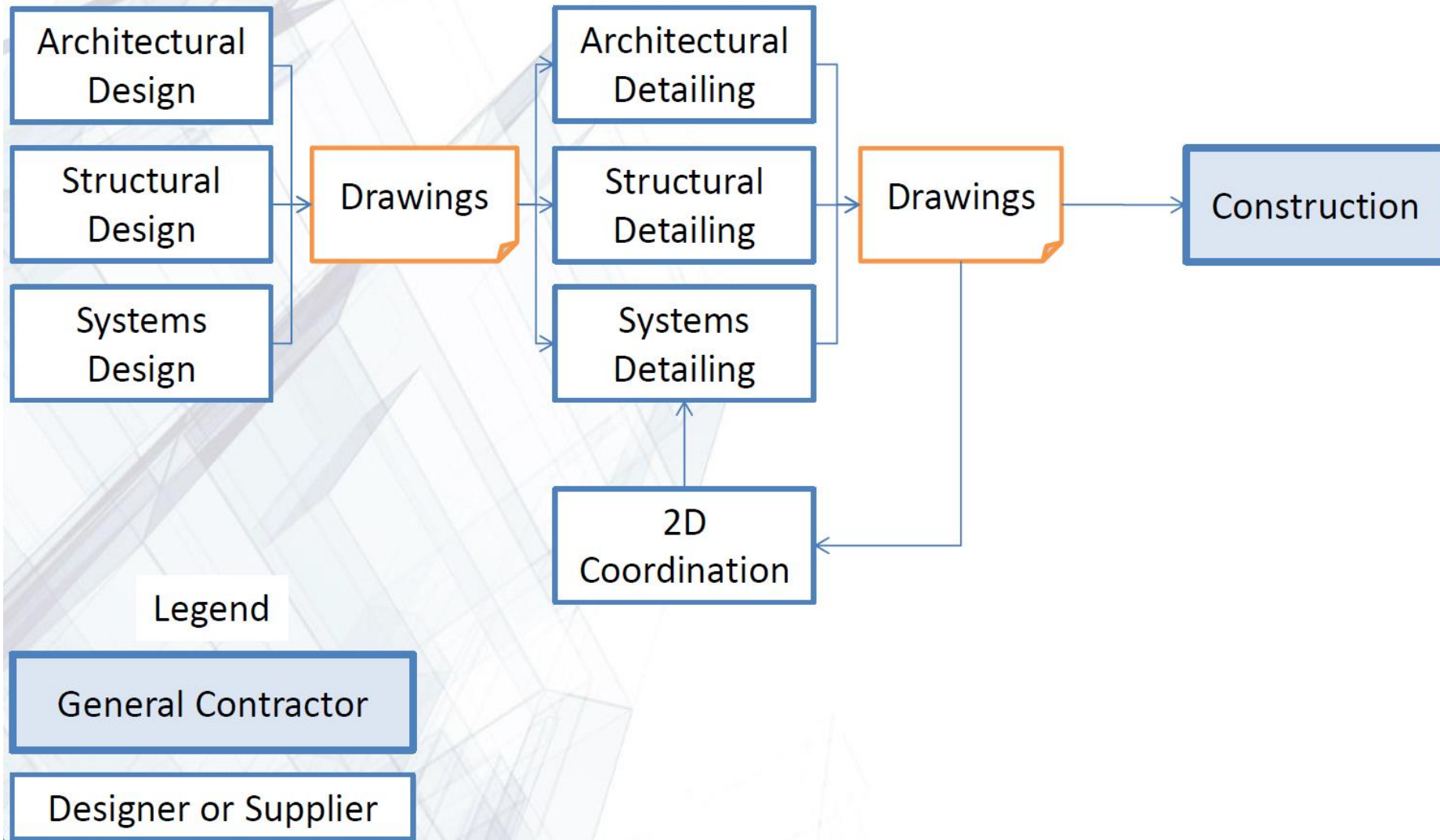


Lean & BIM?

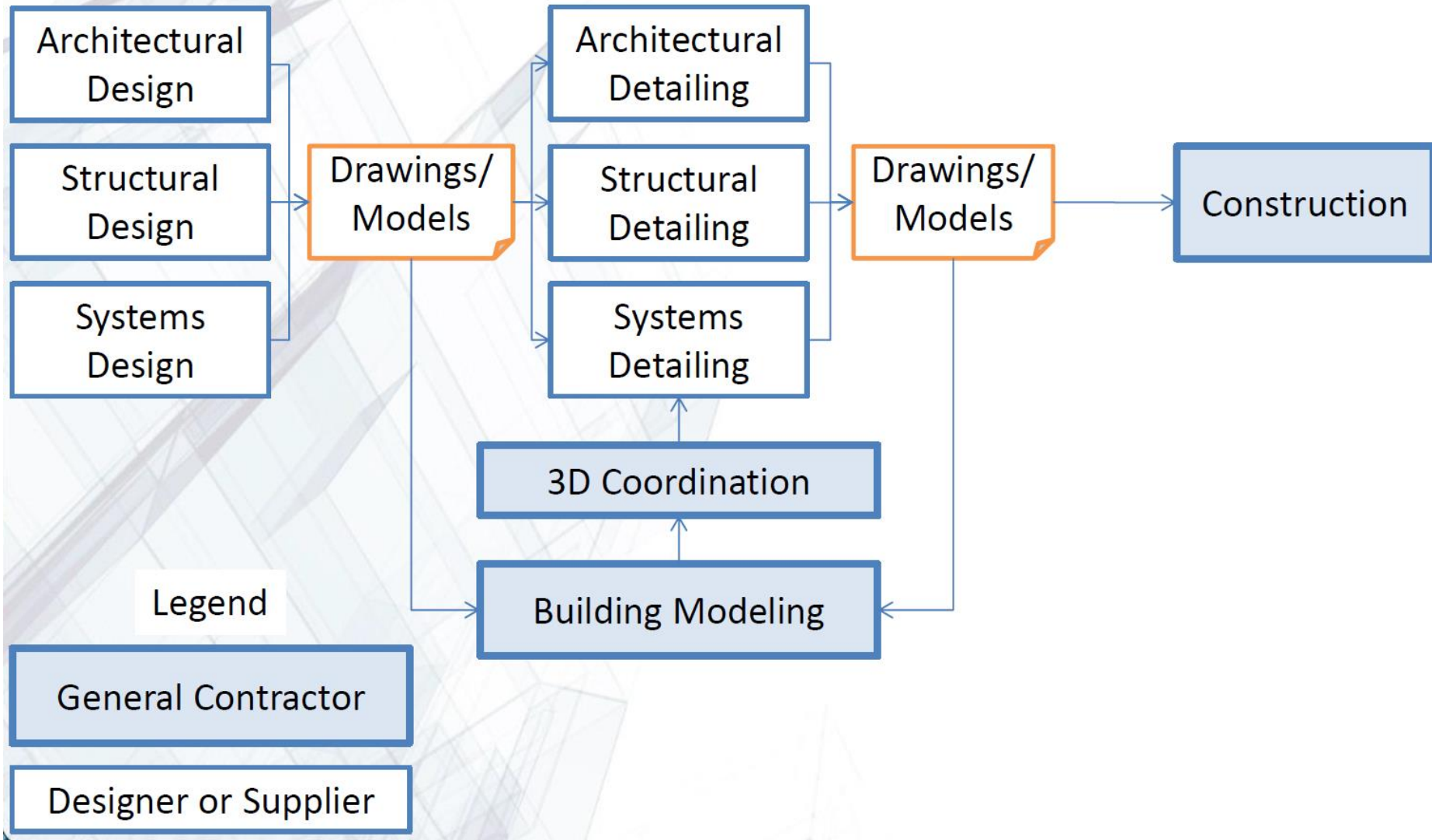
Quantifying the Waste



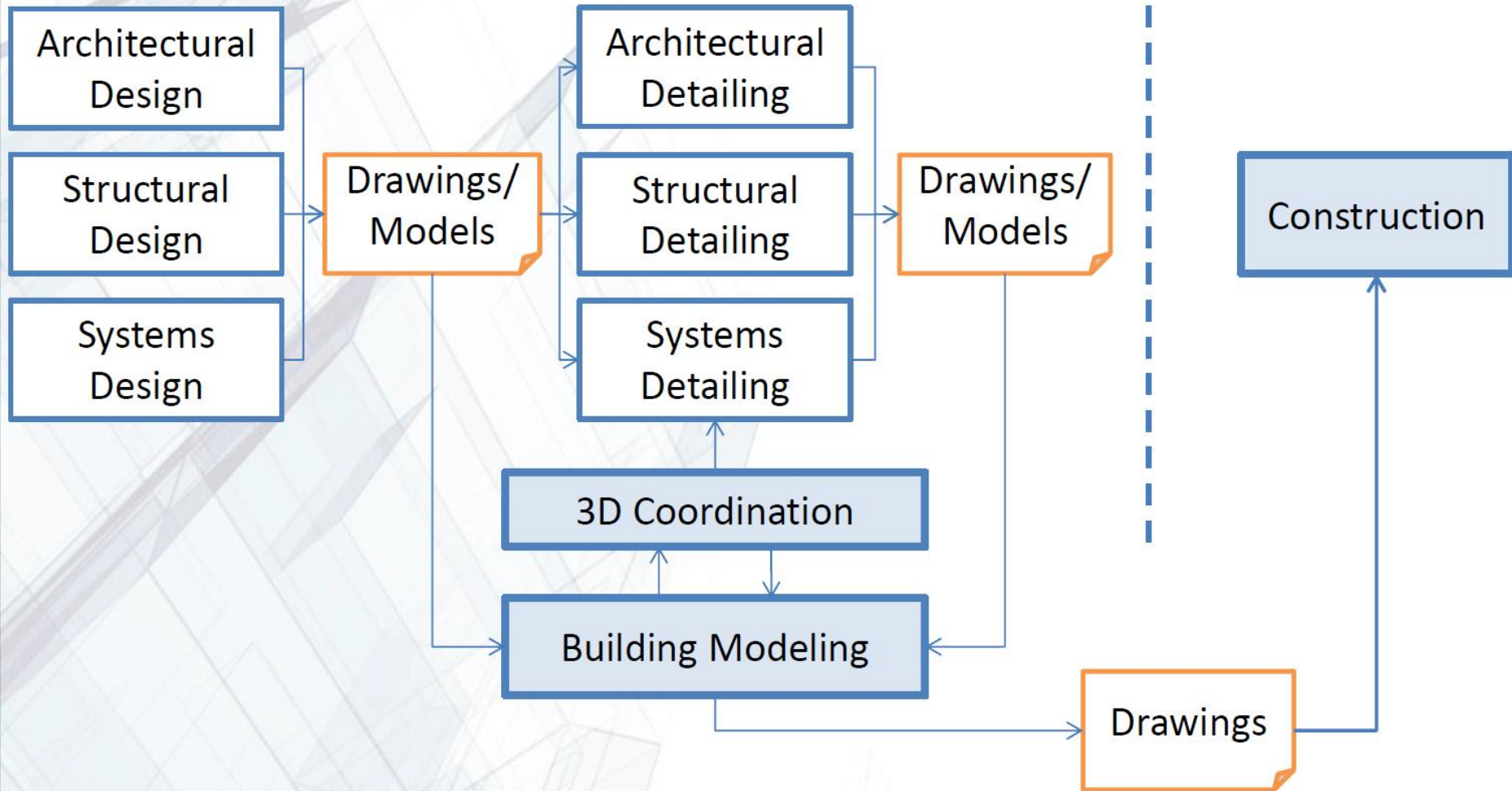
Traditional Information Flow



BIM Information Flow

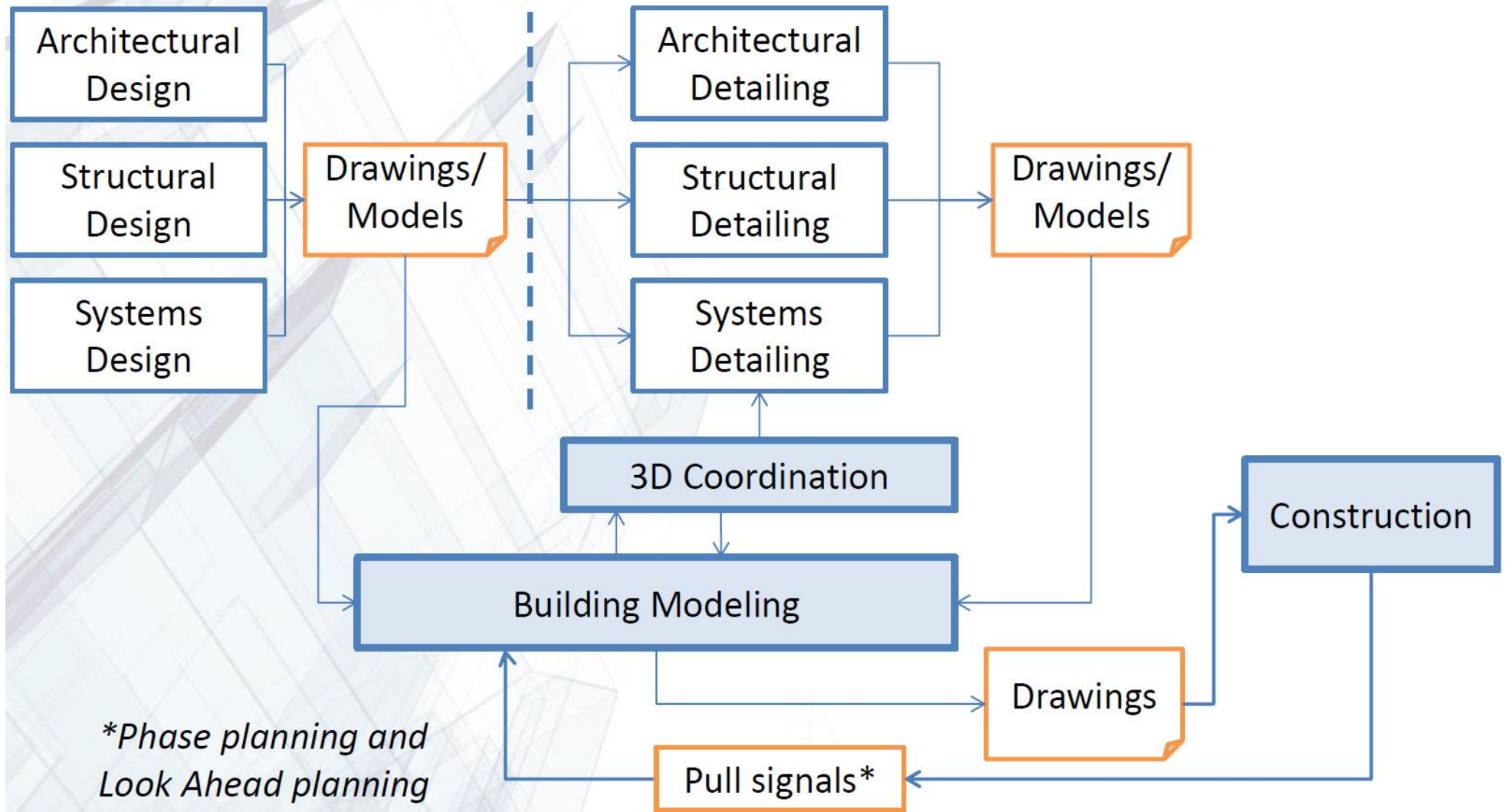


VDC* Information Flow

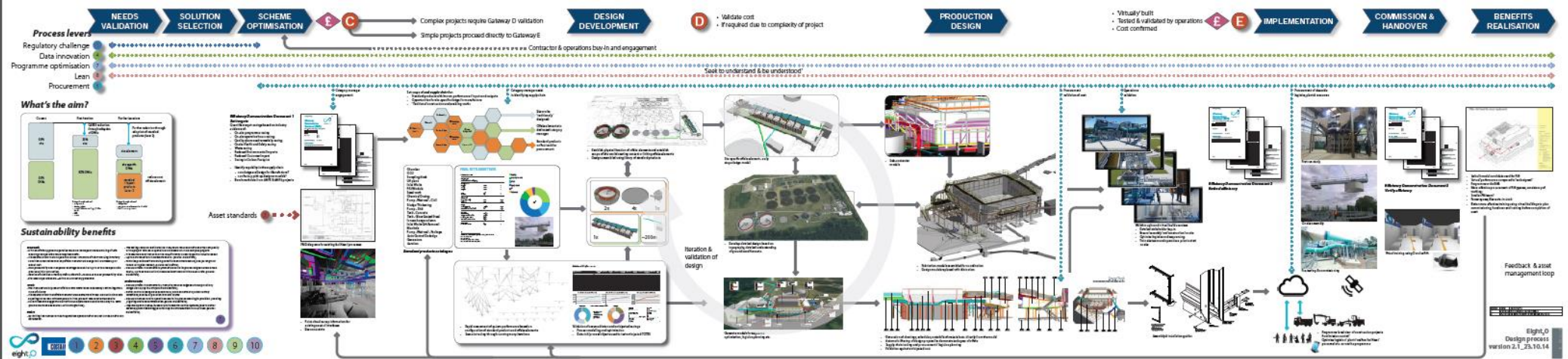


*Virtual Design and Construction

Lean (pull) VDC Information Flow



Lean to BIM?



Lean & BIM?

KanBIM?

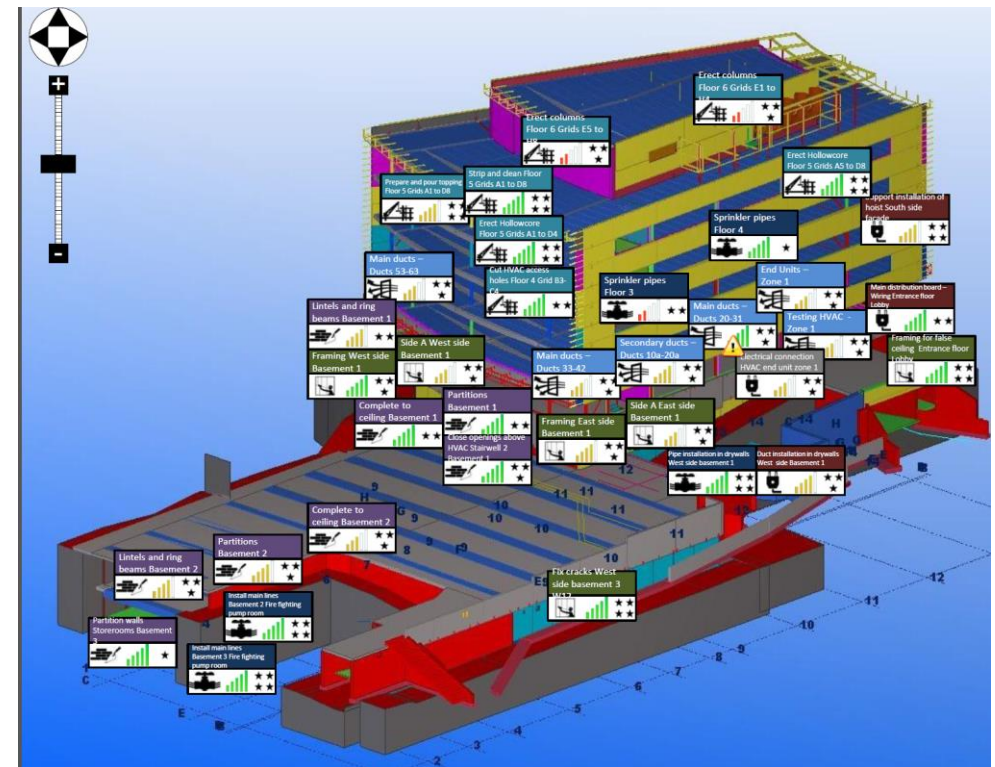
Kanban

(Pull flow control in lean production management)

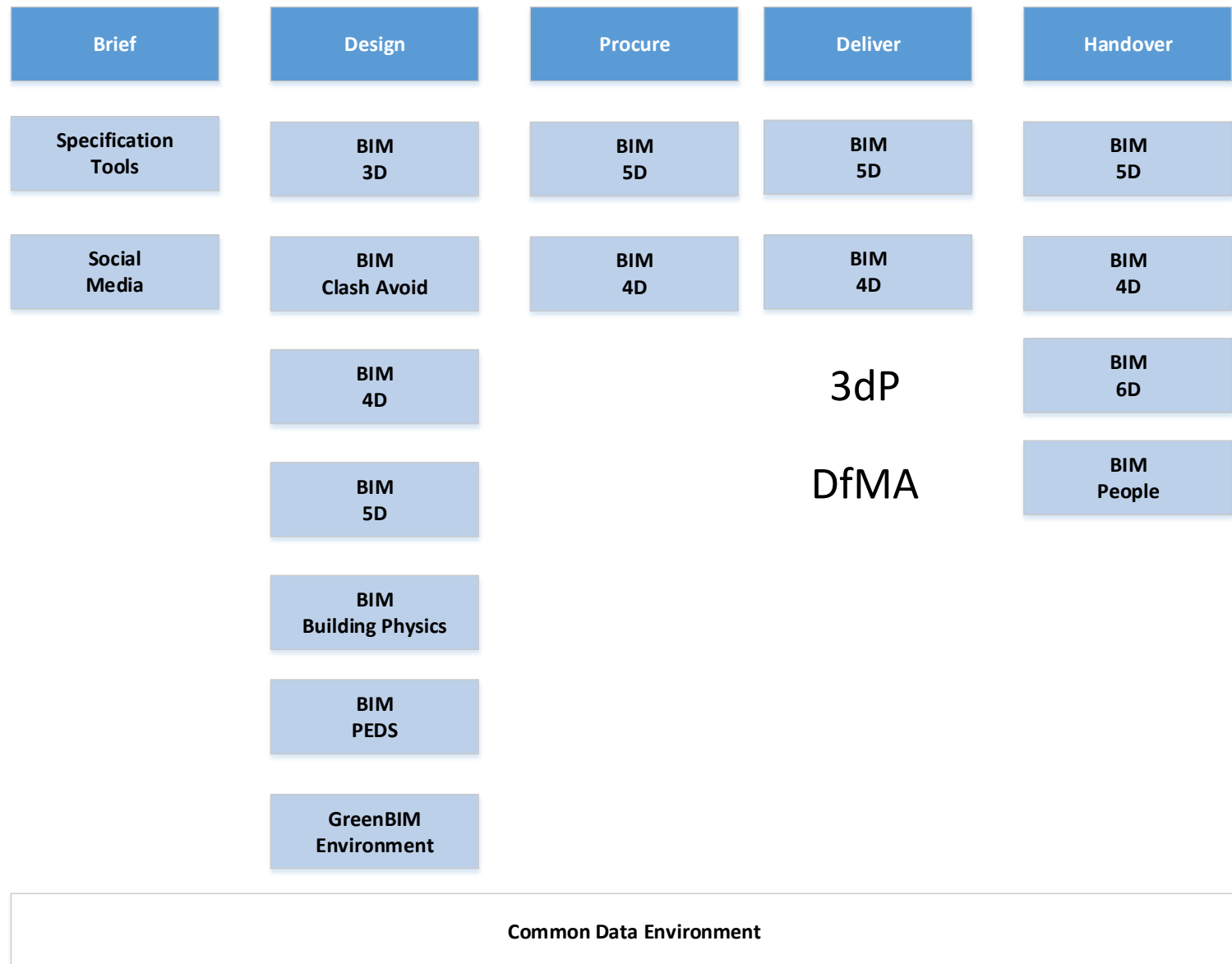
+

BIM

(structured, verified data)



Lean to BIM – Systems & Tools?



Lean to BIM – Systems & Tools?

Lean - BIM Interaction Matrix

BIM Functionality		Lean Principles																																									
		Reduce Variability				Reduce cycle time				Reduce batch size				Increase flexibility				Ensure comprehensive requirements				Apply on concept selection				Ensure requirements flowdown				Verify and Validate				Go and see for yourself				Decide by consensus				Consider culture in extended network of partners	
		A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X																		
BIM Functionality	Visualization of form	1	1,2												3				4		11	5	6	4																			
	Rapid generation and evaluation of multiple design alternatives	2	1		22								7	7		8																											
		3	9	9	22			51												1	16		5																				
		4		10	12												8				16		5																				
		5	1,2	1	12															1	1	1	5																				
	Maintain information model integrity	6	11	11																		11																					
		7	12	12	22																		12																				
	Automated design of components	8	11		22	(52)	53											54	54																								
		9			23						36						36																										
	Collaboration and coordination	10	2,13		24				33											43			46		49																		
		11	14		25	(29)	31									(41)					44																						
	Rapid generation and evaluation of construction alternatives	12		15	25	(29)				37						(41)					44		47																				
		13	2	40	25	(29)					17		40	40		40					44		47		49																		
	Online/electronic object-based communication	14		29	26	30	30			34				34				(42)					47	48																			
		15	18		26	30	30			34		38		38	34				(42)			45			49																		
		16	19		27			32																																			
		17		20	28					35														(42)		50																	
		18		21		30	30			34			39											(42)																			

Prof Rafael Sacks – Technion, Israel Institute of Technology

Lean & BIM - Opportunities?

Lean - BIM Interaction Matrix

BIM Functionality		Lean Principles																												
		Reduce Variability			Reduce cycle time		Reduce batch size		Increase flexibility			Simplify			Standardize			Ensure comprehensive requirements			Focus on concept selection		Ensure requirements flowdown		Verify and Validate		Go and see for yourself		Decide by consensus	
		A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X					
BIM Functionality	Visualization of form	1	1,2												3				4		11	5	6	4						
	Rapid generation and evaluation of multiple design alternatives	2	1		22								7	7		8														
		3	9	9	22			51												1	16		5							
		4		10	12												8				16		5							
		5	1,2	1	12															1	1	1	5							
	Maintain information model integrity	6	11	11																		11								
		7	12	12	22																		12							
	Automated design	8	11		22	(52)	53												54	54										
		9			3												36													
	Collaboration and coordination	10	2,13		4				33											43			46		49					
		11	14		25	(29)	31									(41)					44									
	Rapid evaluation of construction alternatives	12		15	25	(29)										(41)					44		47							
		13	2	40	25	(29)										40					44		47		49					
	Online/electronic object-based communication	14		29	26	30	30		34					34					(42)				47	48						
		15	18		26	30	30		34		38		38	37					(42)			45			49					
		16	19		27		32																							
		17		20	28				35											(42)								50		
		18		21		30	30			34			39							(42)				47	48					

Prof Rafael Sacks – Technion, Israel Institute of Technology

Thank You

mark.bew@pcsg.co.uk

