

Starchitects and Jackhammers

Fiona Cousins

Construction – and the built environment

© HG Esch Fotografie/Gale International Korea (GIK)



© Thomas Graham

© Prakash Patel/Gensler



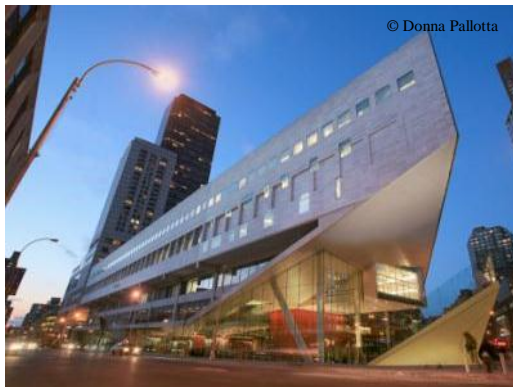
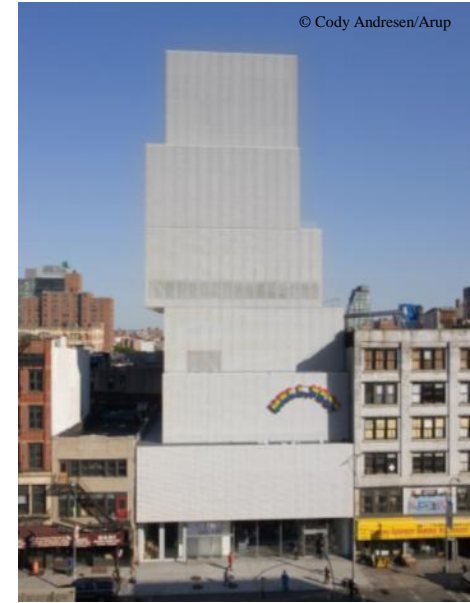
© Luca Vignelli HRPT



© Arup



Buildings or ‘Vertical Infrastructure’



What is this space for?



Initial requirements



Developing requirements...



Developing requirements...



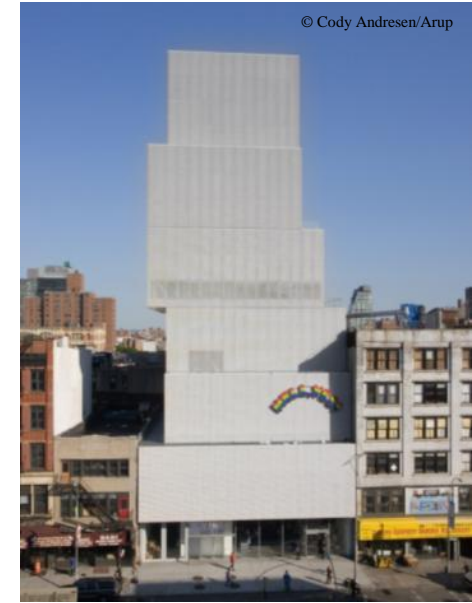
Developing requirements...



Developing requirements:



Buildings or ‘Vertical Infrastructure’



“Requirements engineering (RE) encompasses all the **interdisciplinary** activities involved in **determining, documenting and maintaining** an agreed set of requirements for a system, and for **tracing** these through to implementation. A specific concern is the development of practical techniques, methods, and tools to support these activities.”

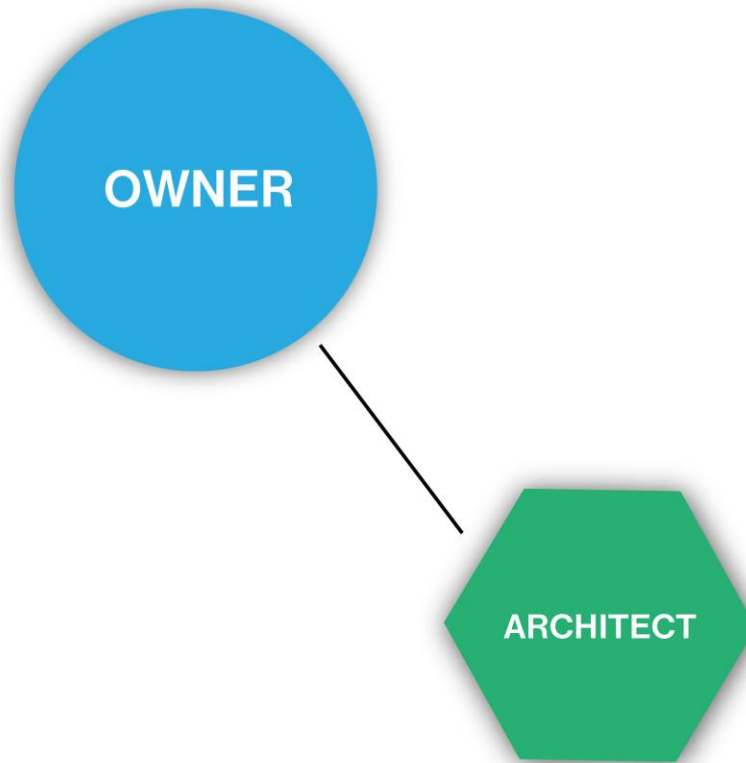


“Requirements engineering (RE) encompasses all the **interdisciplinary** activities involved in **determining**, **documenting** and **maintaining** an agreed set of requirements for a system, and for **tracing** these through to implementation. A specific concern is the development of practical techniques, methods, and tools to support these activities.”

I have an idea!



But what is that idea? Really?



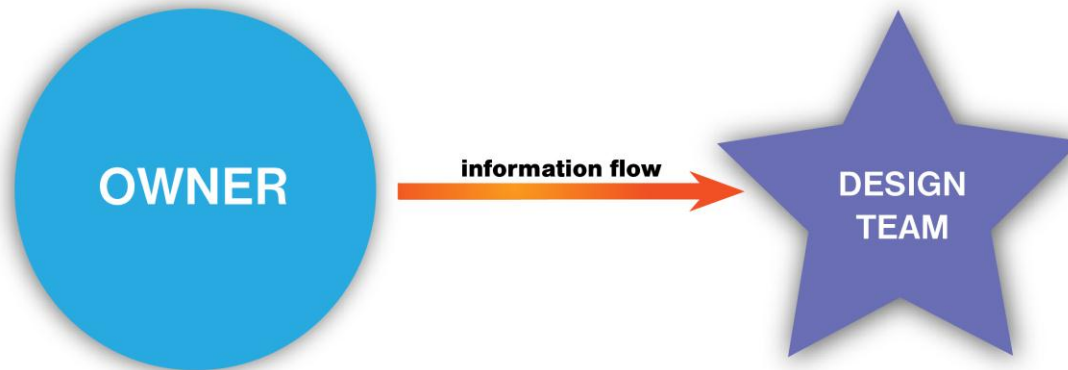
But what do I really want?



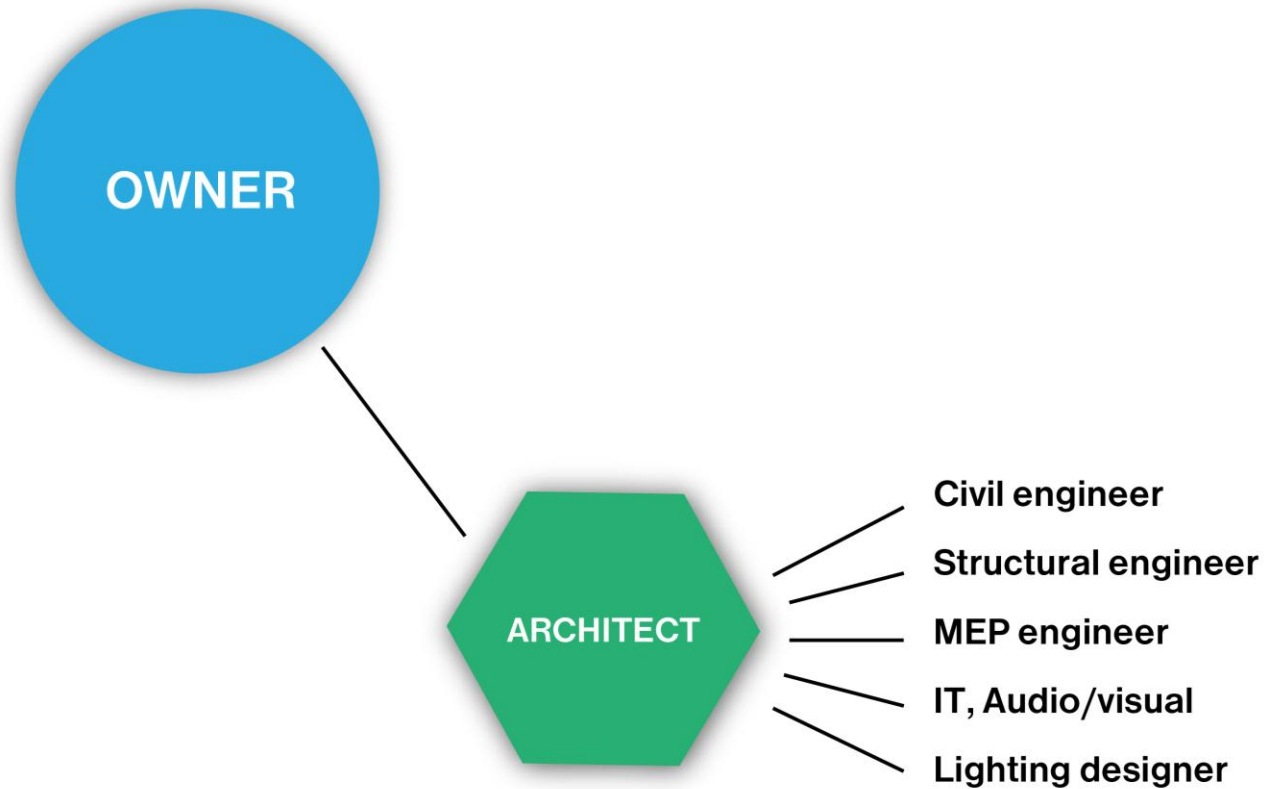
But what do I really want?



Information flow



I need a team!





Room Data Sheet

Status: From SR.025

Room name	Patient area, Patient single	Placement:	99 • Revit sync demo / 01 • Patient monitoring
Categorization	Areas		Status
Drawing no:	Programmed	10.00	Created by Jerving, Rolf,
Drawing name	Actual	15.16	juni 17, 2011
Geo. Room no.	Height:	2.44	1:58 PM
User room no	Perimeter:	15.59	Changed by Johansen, Asmund,
			februar 10, 2012 11:23 AM

Description

Description of activities and functions

Monitoring, treatment, nursing of critically ill pat. in open or closed incubator. Care given from both sides simultaneously, 1-2 nurses.
Optimal monitoring of several patients on one screen. Access to pat. from all sides. Sample drawing/bedside analysis. Occasional X-ray. Bedside reading/entering of EMR. Space for 1-2 relatives in bed/recliner by the incubator.
Preparing of some medicines. Storing some consumption goods.
Visual contact with work station as well as between NICU rooms.

Human traffic	Value	Specification
Persons, normally	3	
Persons, maximum	5	

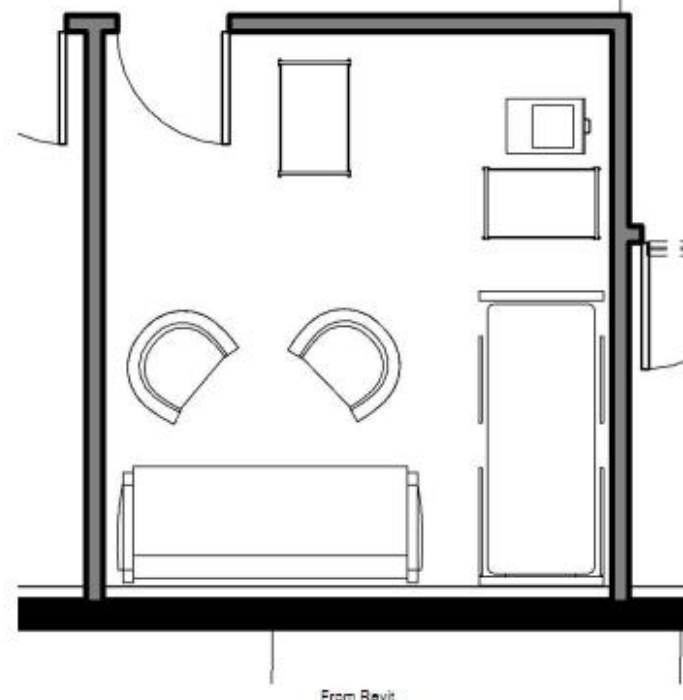
Design/building

Walls	Value	Specification	General for the room	Value	Specification
Wall mounted equipment	✓	See equipment list	Special surface requirements	✓	Smooth surfaces, easy to clean
Floor/top	Value	Specification	View/insight to other functions	✓	Visual contact between work station and room, with possibility to shield
Electrostatic protection	✓	elektromediskinsk utstyr hjerterør			
Other		Aesthetics and acoustics should be emphasized.			

Windows and doors

Doors	Value	Specification	Windows	Value	Specification
Door openings	✓	bed			
Glass in doors	✓	glass between rooms			
Sliding doors	✓	towards corridor and between 2 and 2 rooms			
Openings without thresholds	✓				
Daylight	✓				

Room function no: 99.002





© David Pear's Blog







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Support



Power

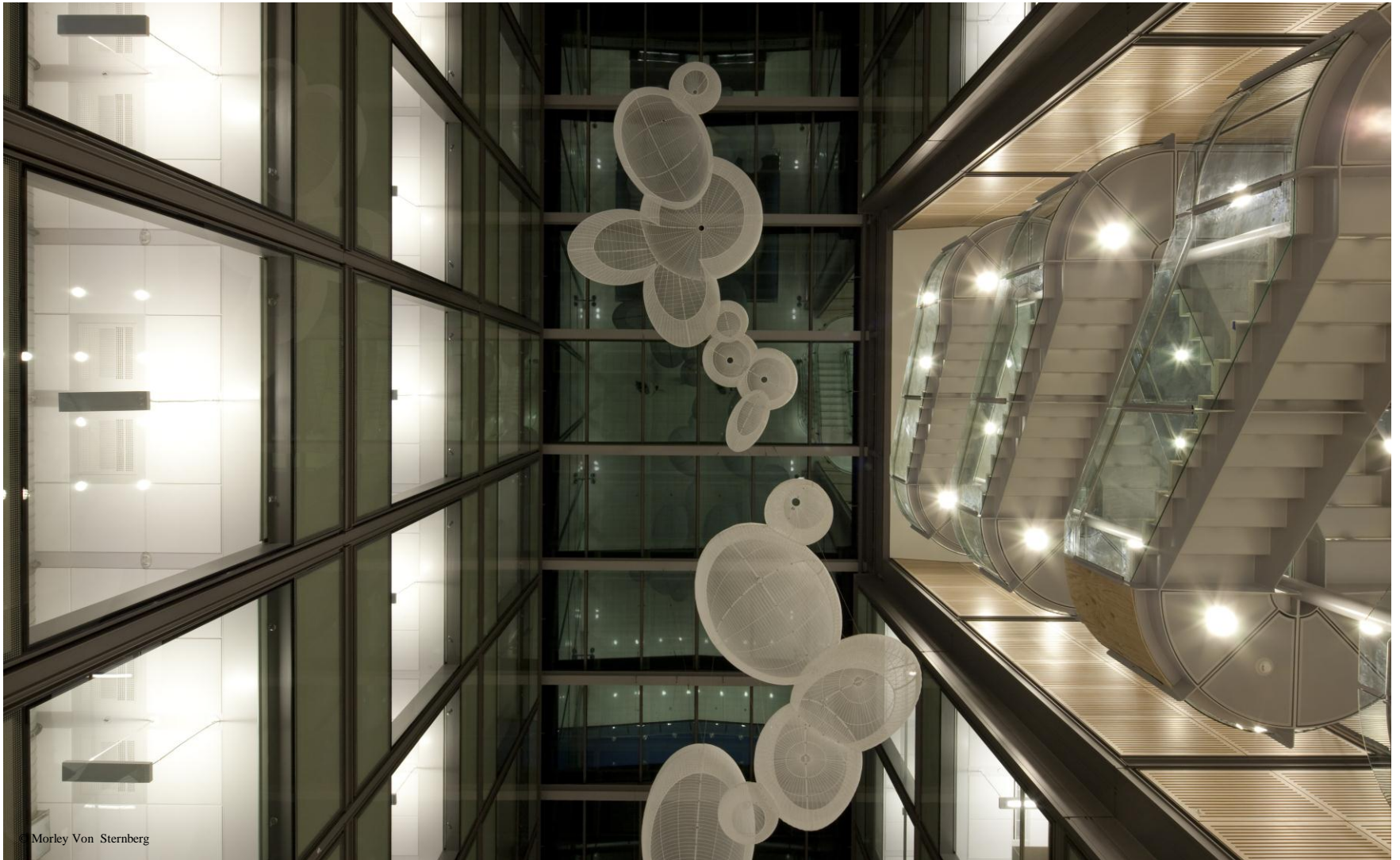
© Christian Richters



Comfort

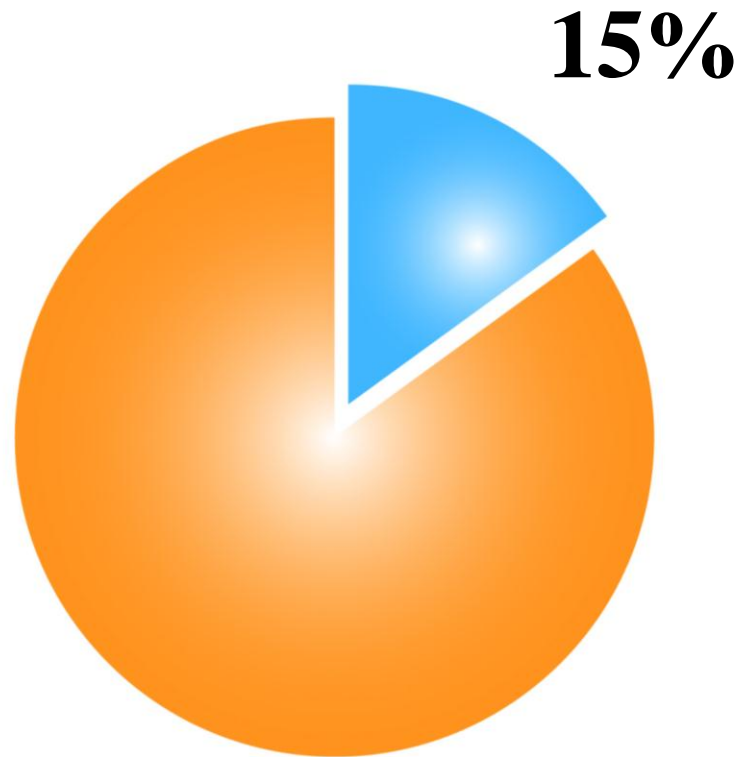


Inspiration



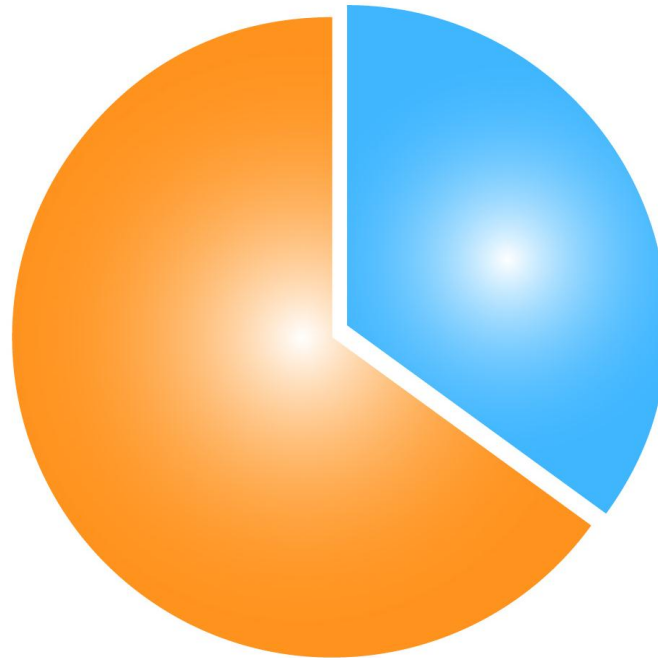
© Morley Von Sternberg

Space for Services

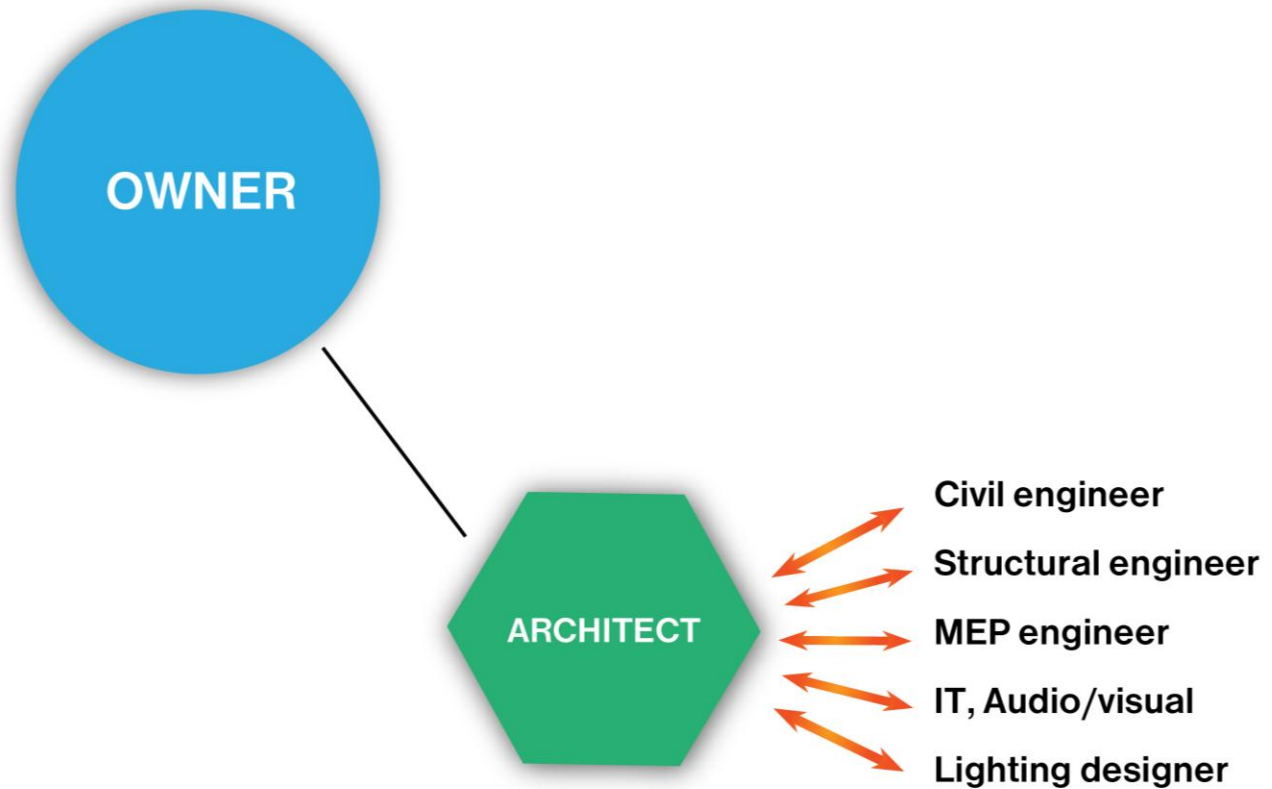


Space for Services, Circulation and Support

35%



Information flow

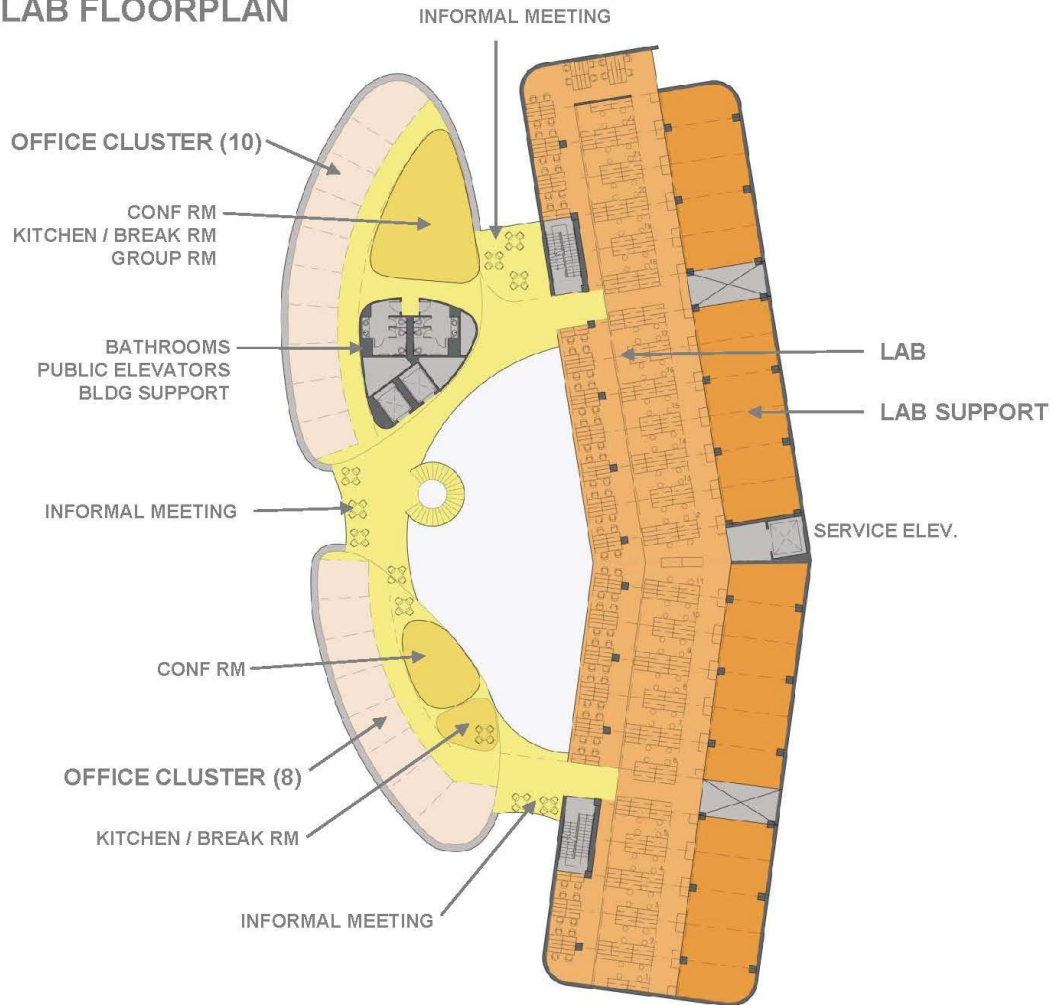


Concept Design - Massing



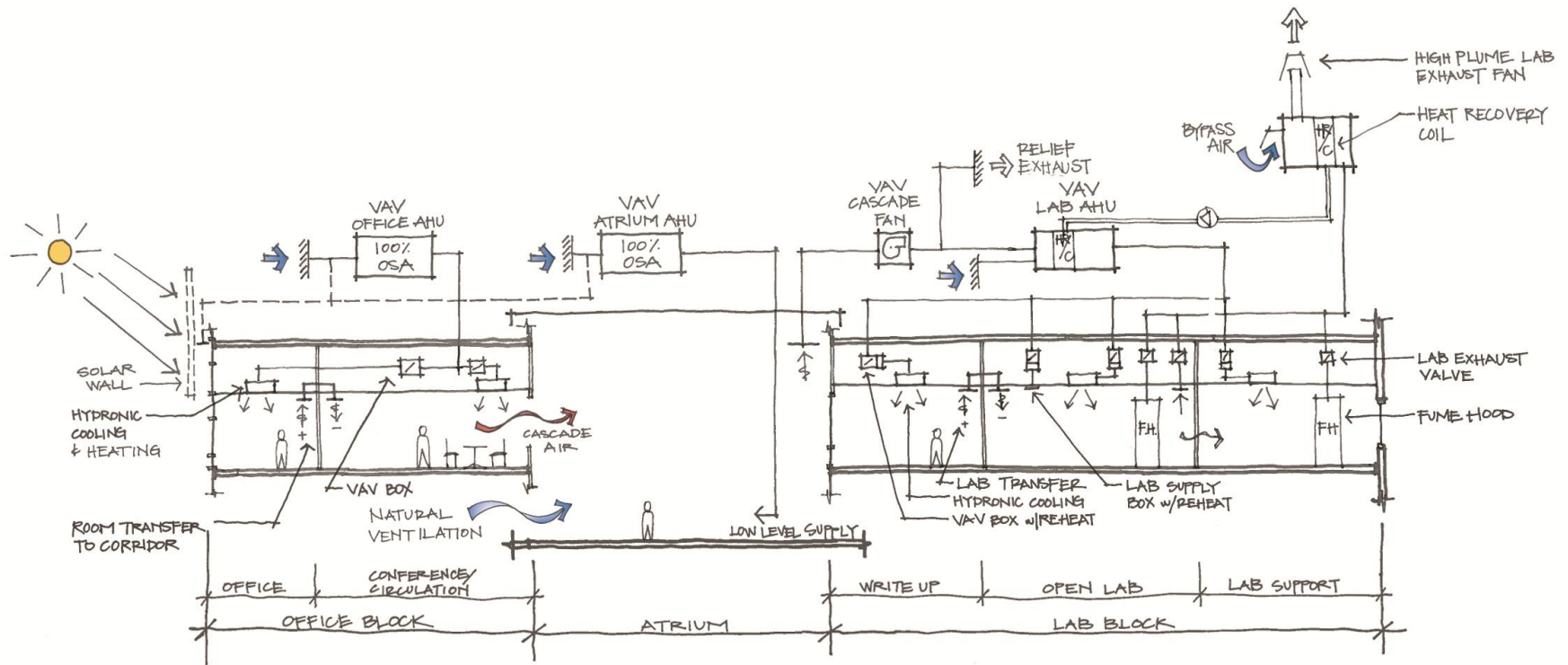
Concept Design – test fit

TYPICAL LAB FLOORPLAN



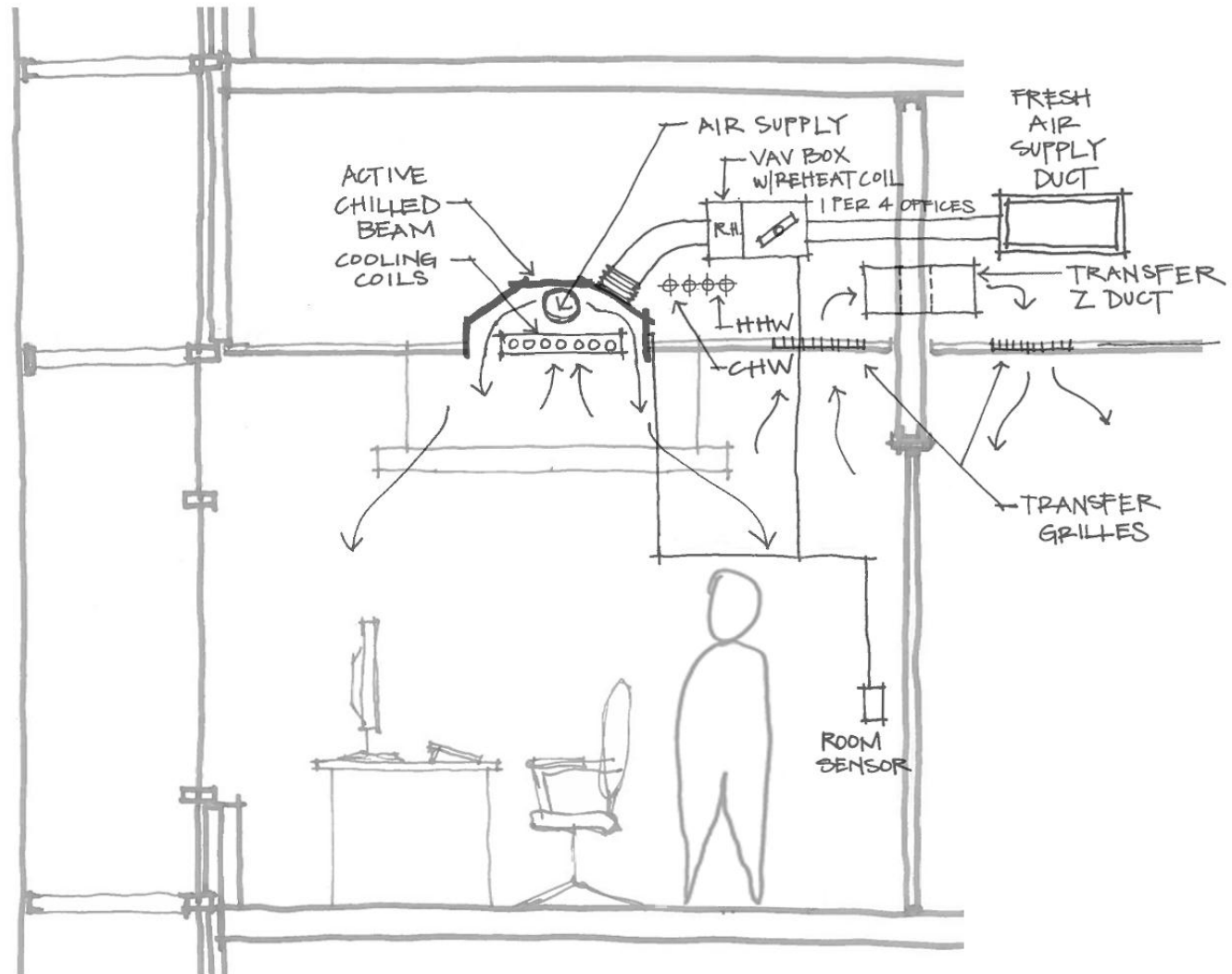
© Payette Associates

Concept Design – Mechanical System sketch



© Arup

Concept Design – Mechanical System Sketch



© Arup

Concept Design – Rendering



© Payette Associates

Interdisciplinary Activities

- Not all requirements come from the owner
- Not all requirements can be put into words
- Interdisciplinary conflict supports the design.

Requirements conflicts

© CAREservice/Torino



Requirements conflicts



Concept Design



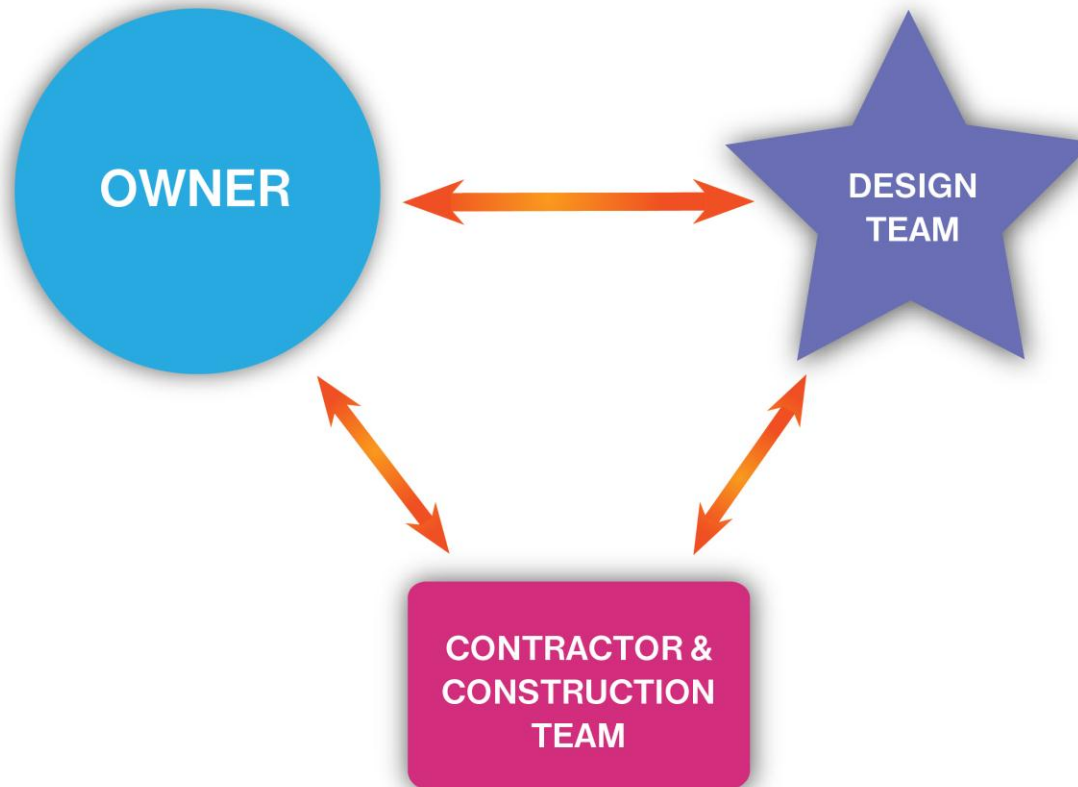
“Requirements engineering (RE) encompasses all the **interdisciplinary** activities involved in **determining, documenting** and **maintaining** an agreed set of requirements for a system, and for **tracing** these through to implementation. A specific concern is the development of practical techniques, methods, and tools to support these activities.”

Value Engineering... Vision

© Noah Sheldon



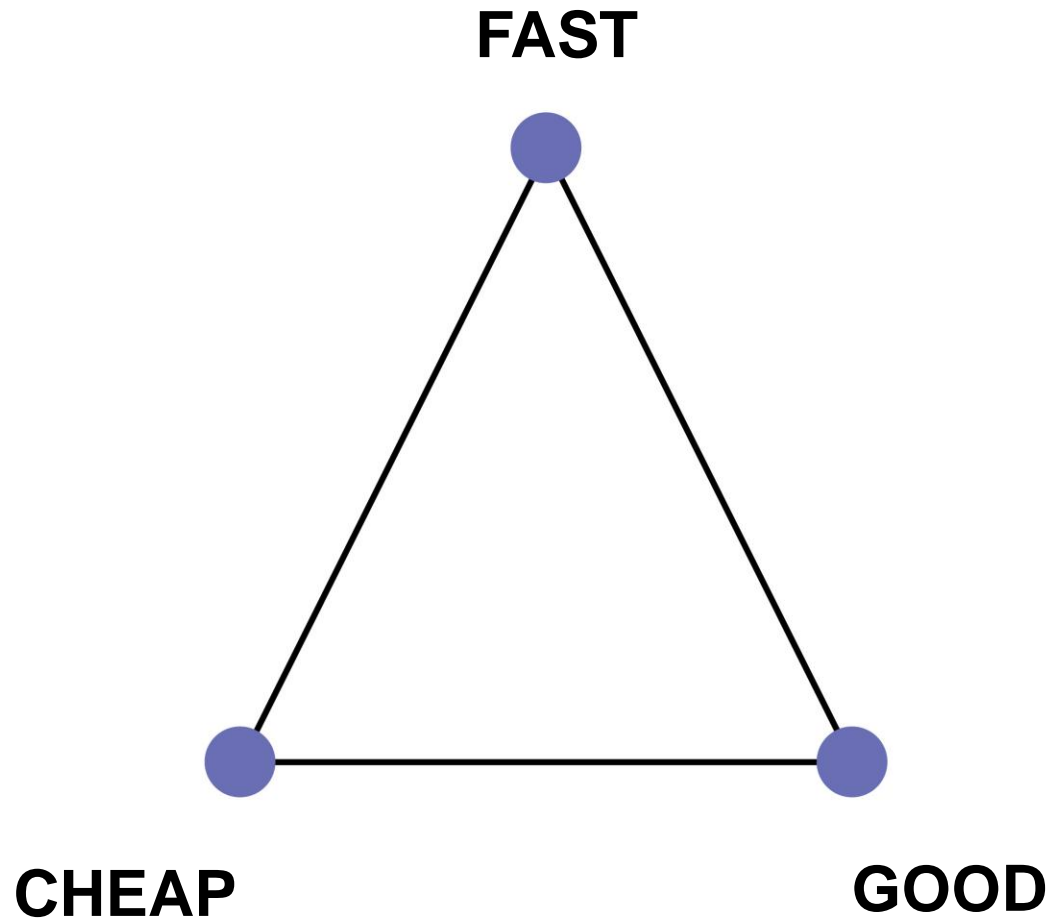
Value Engineering – Information Flow

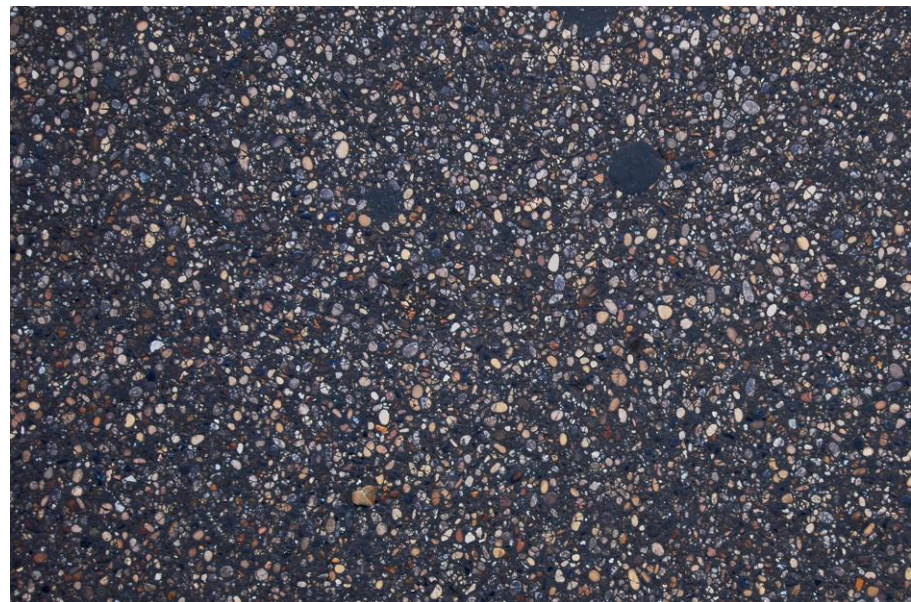


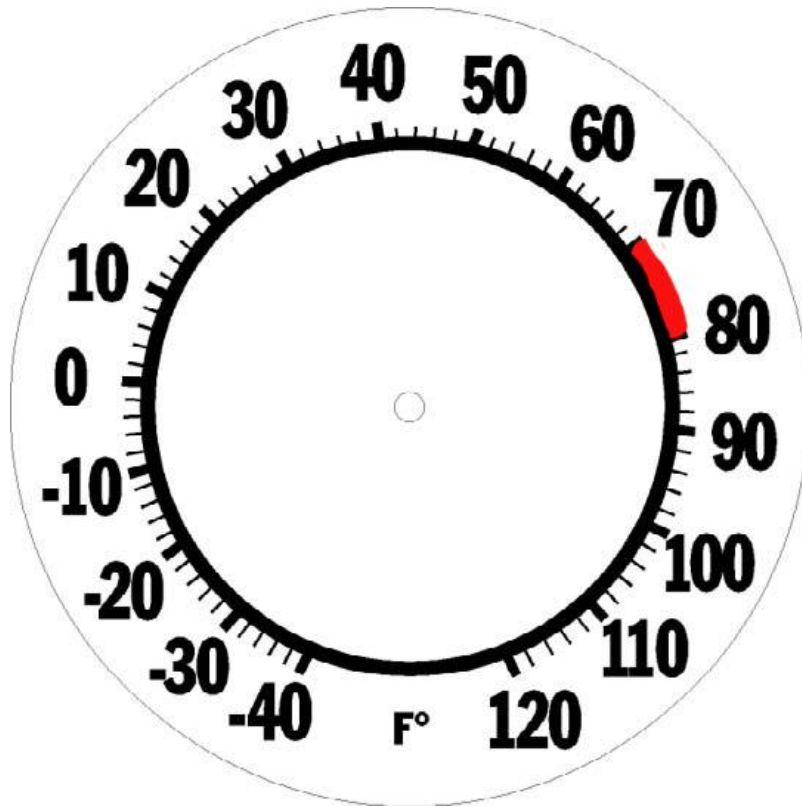
Value Engineering... Reality



Getting back to budget





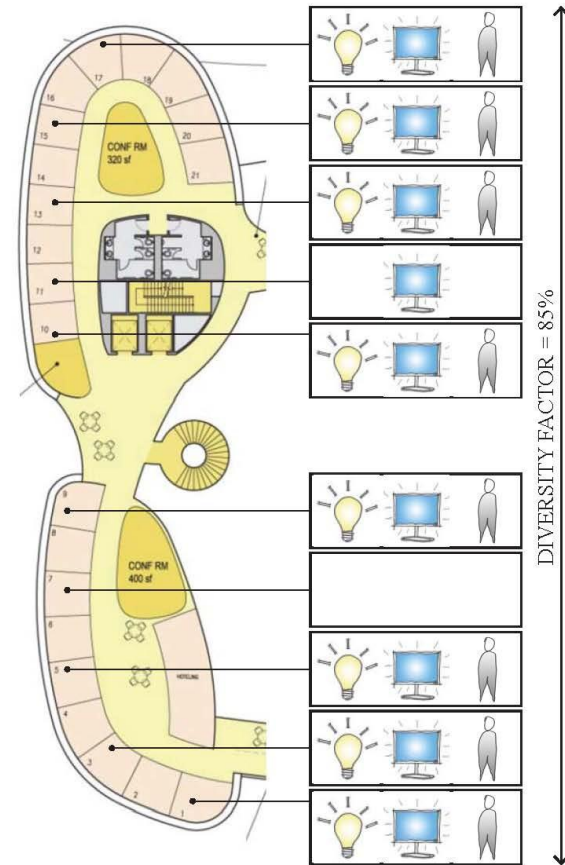
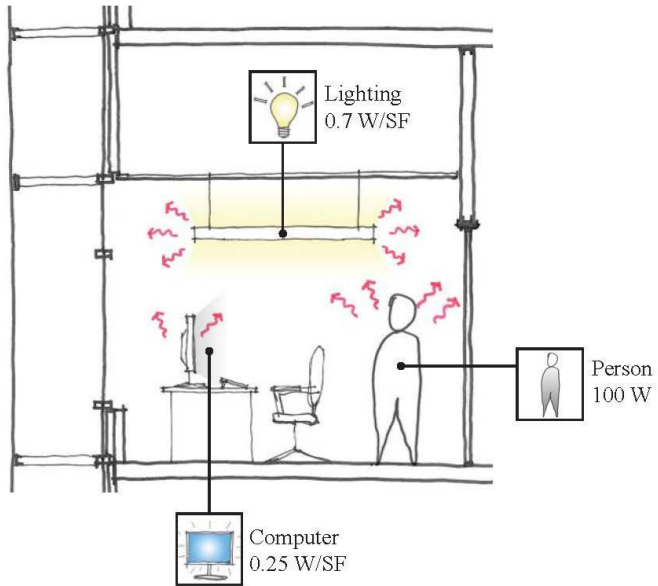


70F/21C Winter
74F/24C Summer

Diversity

TYPICAL OFFICE AREA

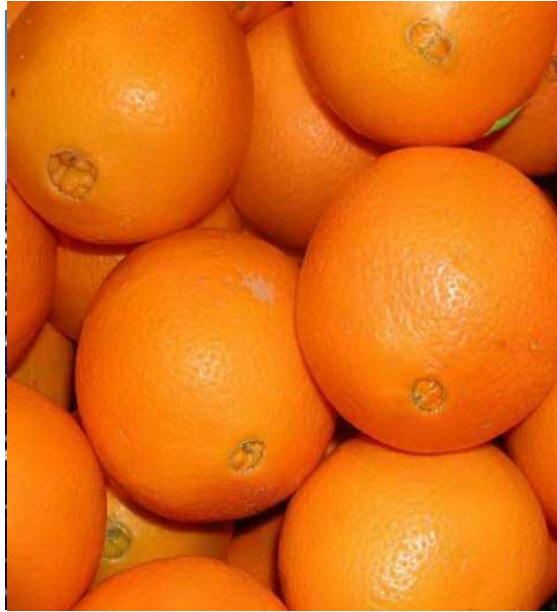
OFFICE LOADS = 1.5 W/SF



Making trade-offs



Making trade-offs

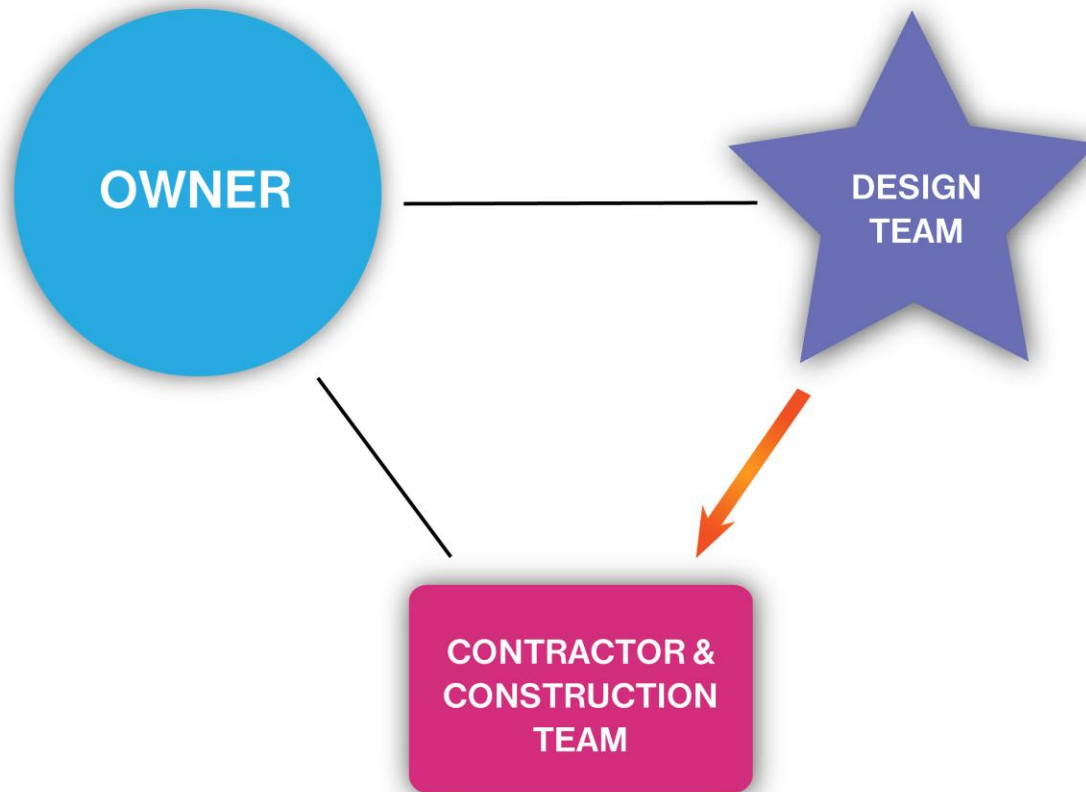


Project Progress



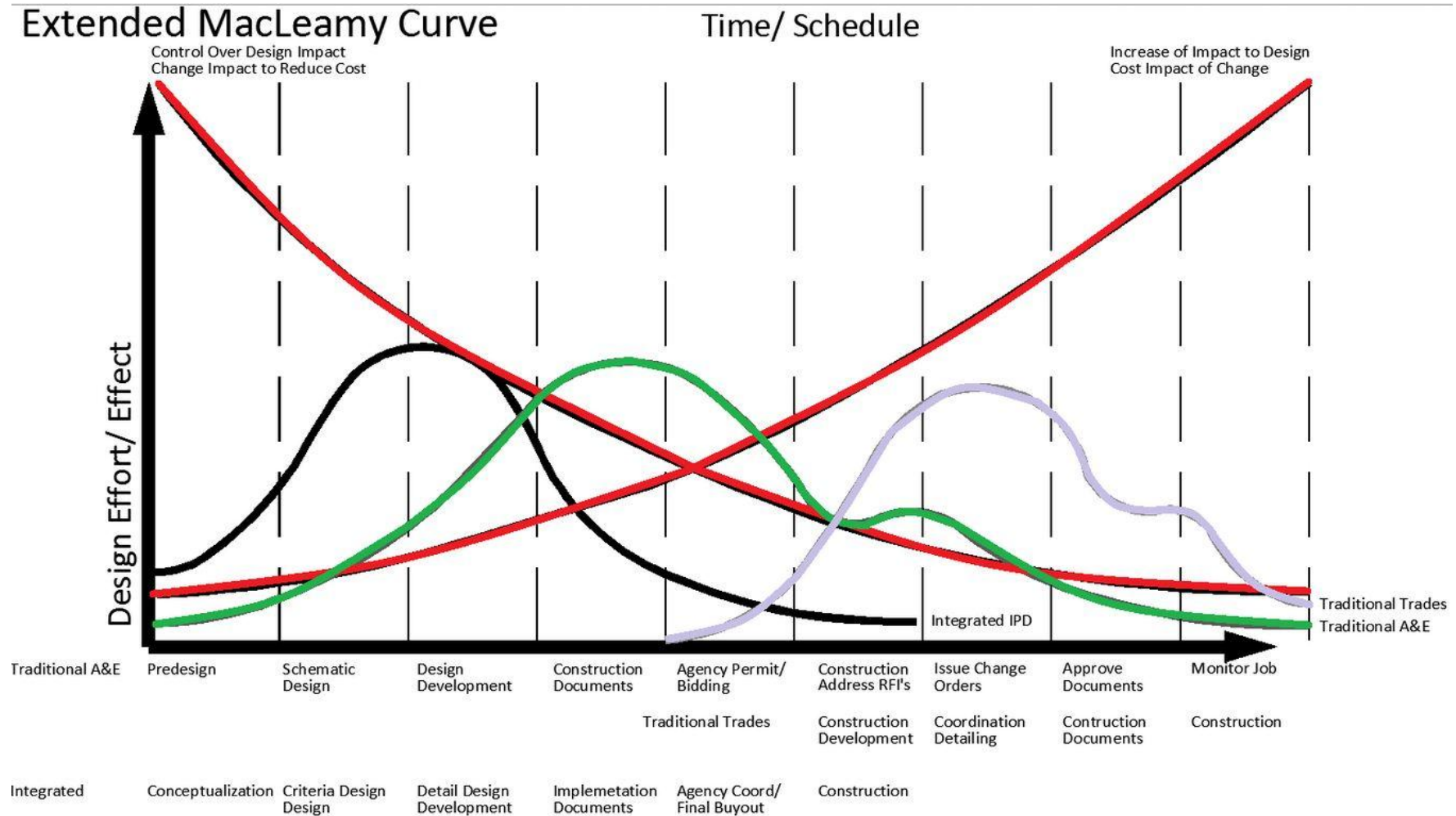
“Requirements engineering (RE) encompasses all the **interdisciplinary** activities involved in **determining**, **documenting** and **maintaining** an agreed set of requirements for a system, and for **tracing** these through to implementation. A specific concern is the development of practical techniques, methods, and tools to support these activities.”

Information transfer

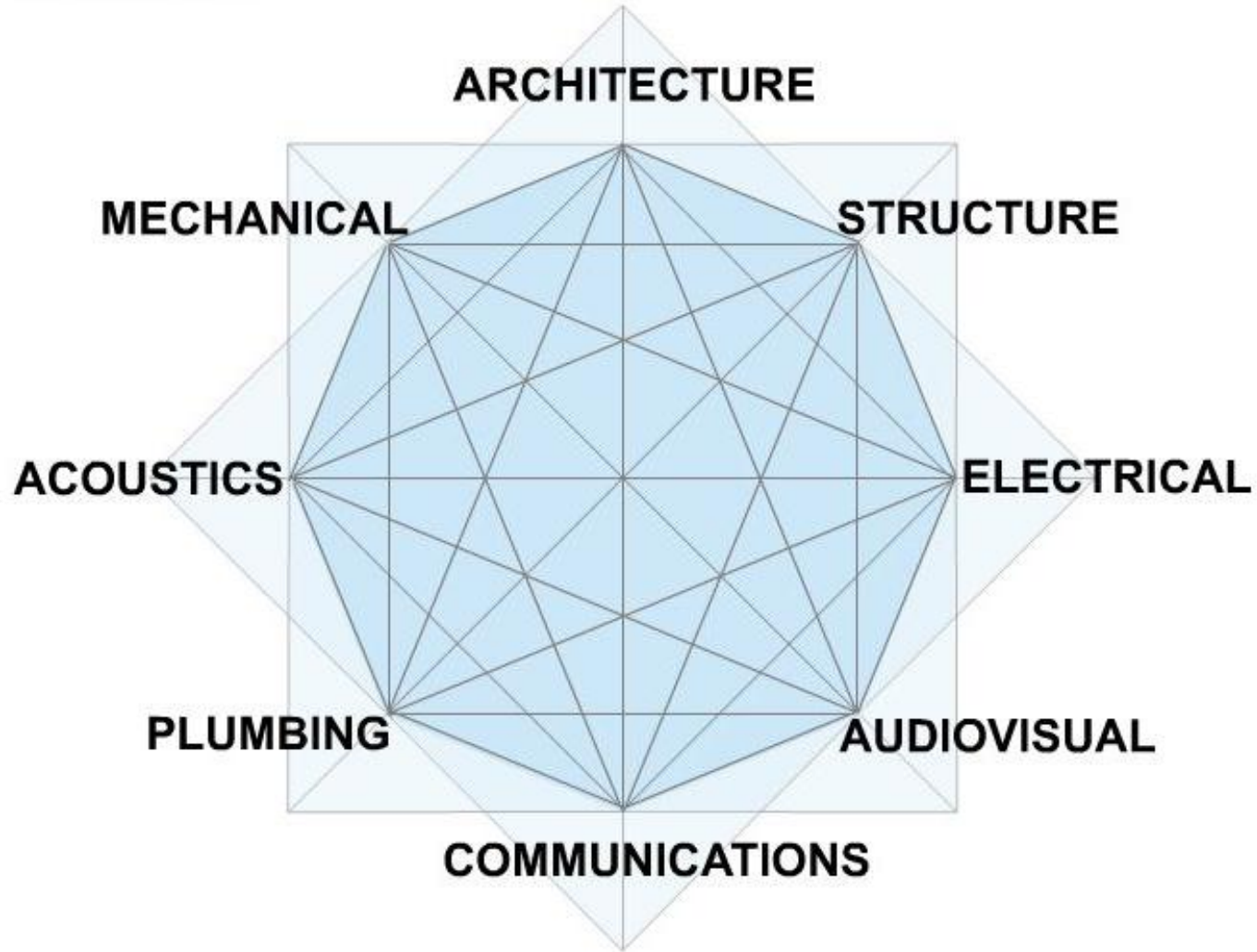


[illegible]

If you're going to change your mind...



Interdisciplinary coordination



© Erin McConahey

Documentation goals

- A bid at the expected price
- Tight enough to maintain quality, loose enough to allow competitive pricing
- Documents are not ambiguous or in conflict with each other

Specifications

CIVIL WORKS MASTER SPECIFICATION FOR CONSTRUCTION OF PROVINCIAL WATER MANAGEMENT PROJECTS

1. INTRODUCTION

- .1 Civil Works Master Specification (CWMS) is part of Alberta Transportation (TRANS) Master Specifications and Standards documents. The structure is based on the Construction Specifications Canada (CSC) and Construction Specifications Institute (CSI) publication "MasterFormat."
- .2 CWMS is the standard specification to be used by consulting engineers when developing TRANS contracts for the construction of medium to large water management projects that are owned by the Province. The construction contracts are between Alberta Transportation and contractors.
- .3 Although use of CWMS is mandatory, the consultant remains fully responsible for the contract specifications. Appropriate use of CWMS requires personnel who are experienced in the design and construction of water management projects, and qualified to judge and edit its content and to ensure the specification is suitable for the contract requirements. The consultant should appoint one person to co-ordinate the interdisciplinary review and assembly of the specifications and drawings.
- .4 Provincial water management projects may involve dams, spillways, canals, control structures, erosion abatement works, and flood control dykes.

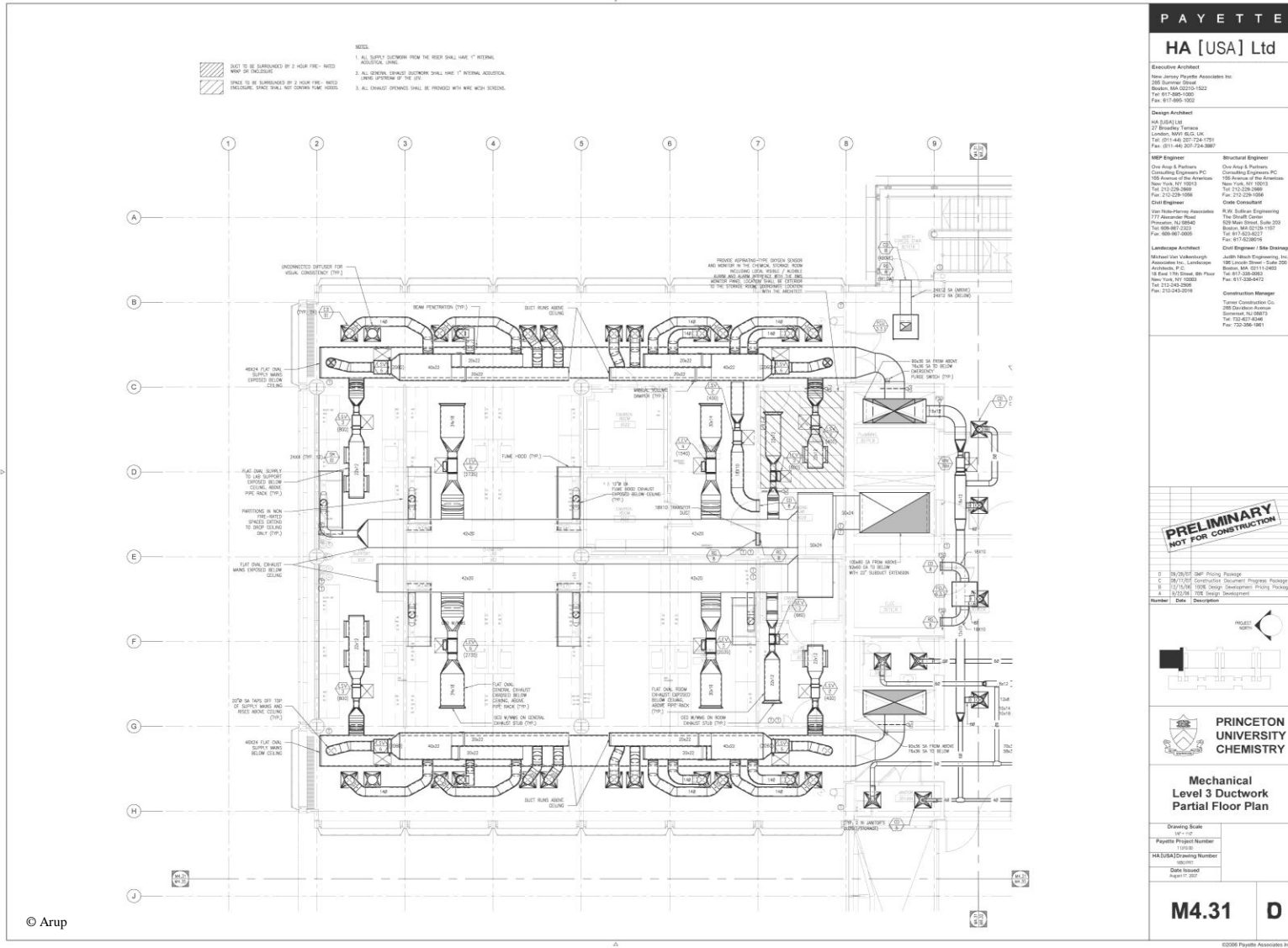
2. PURPOSE OF CWMS

- .1 CWMS was developed to:
 - .1 ensure consistency in the content and quality of contract specifications,
 - .2 establish TRANS's bidding, contracting, technical standards and contract administration procedures,
 - .3 provide TRANS's design consultants with a "production tool" for the preparation of contract specifications, reducing contract development and review time, and
 - .4 serves as part of TRANS's corporate memory on water management work .

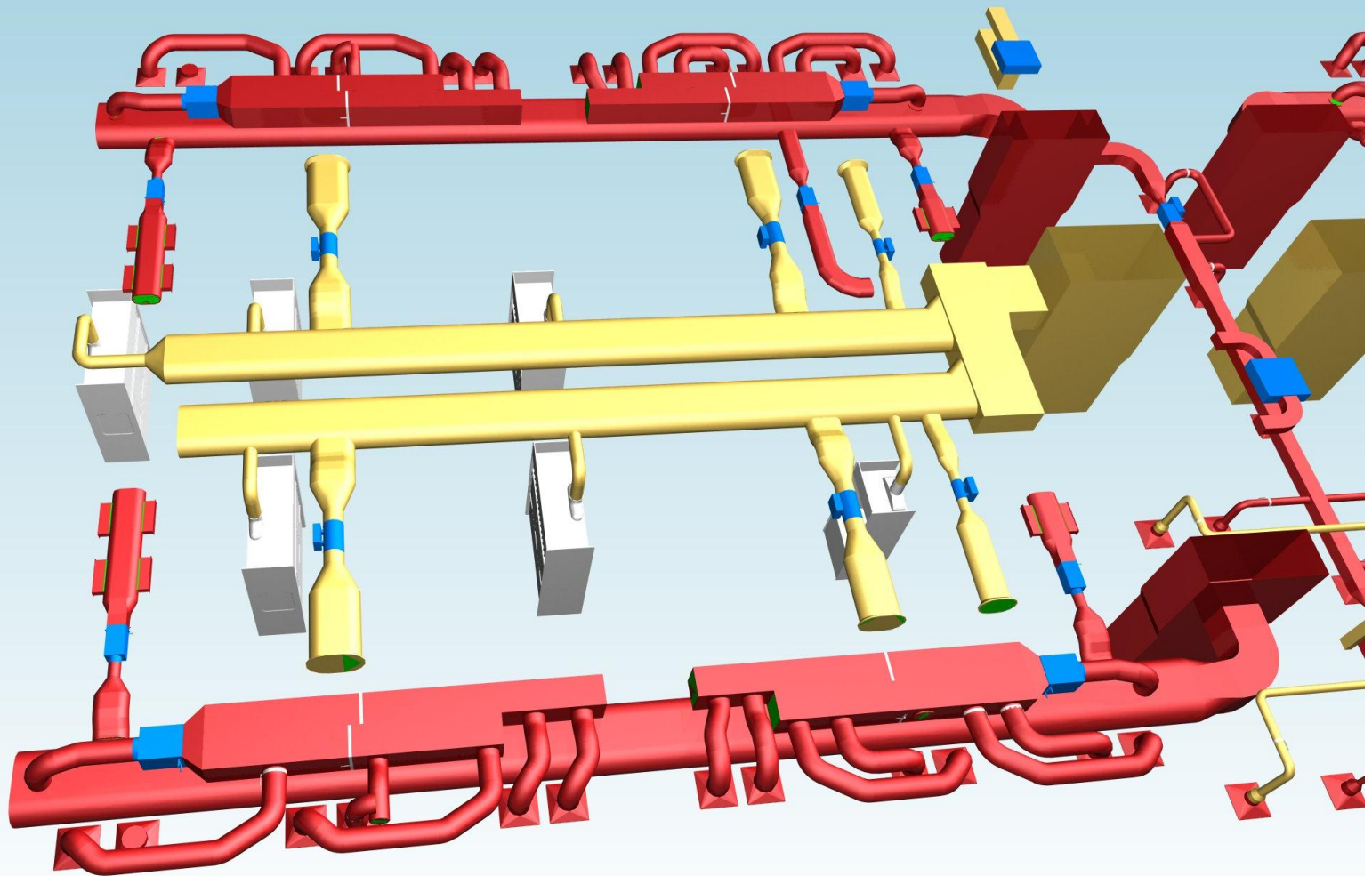
Visualizations and mock ups



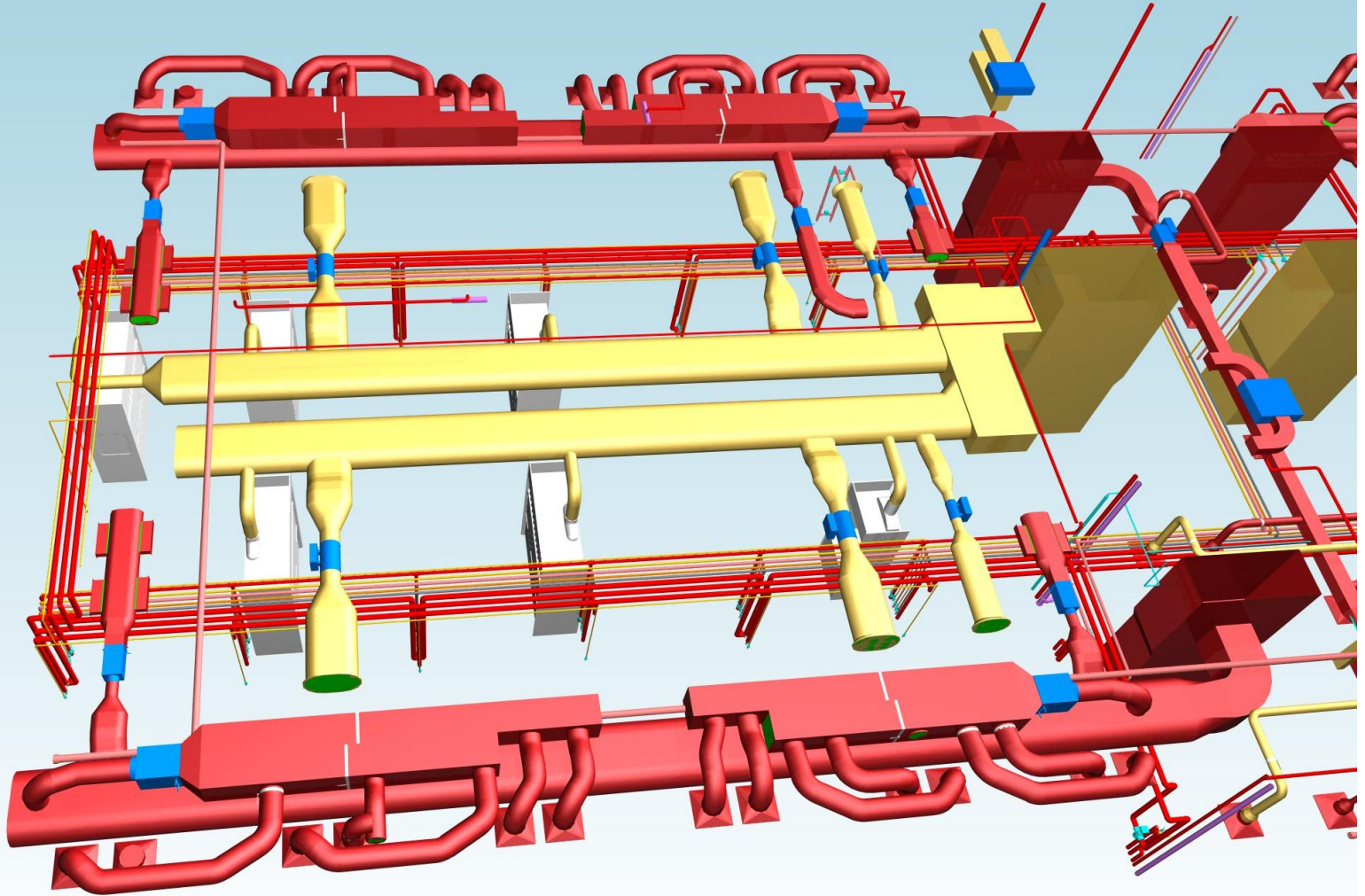
Drawings



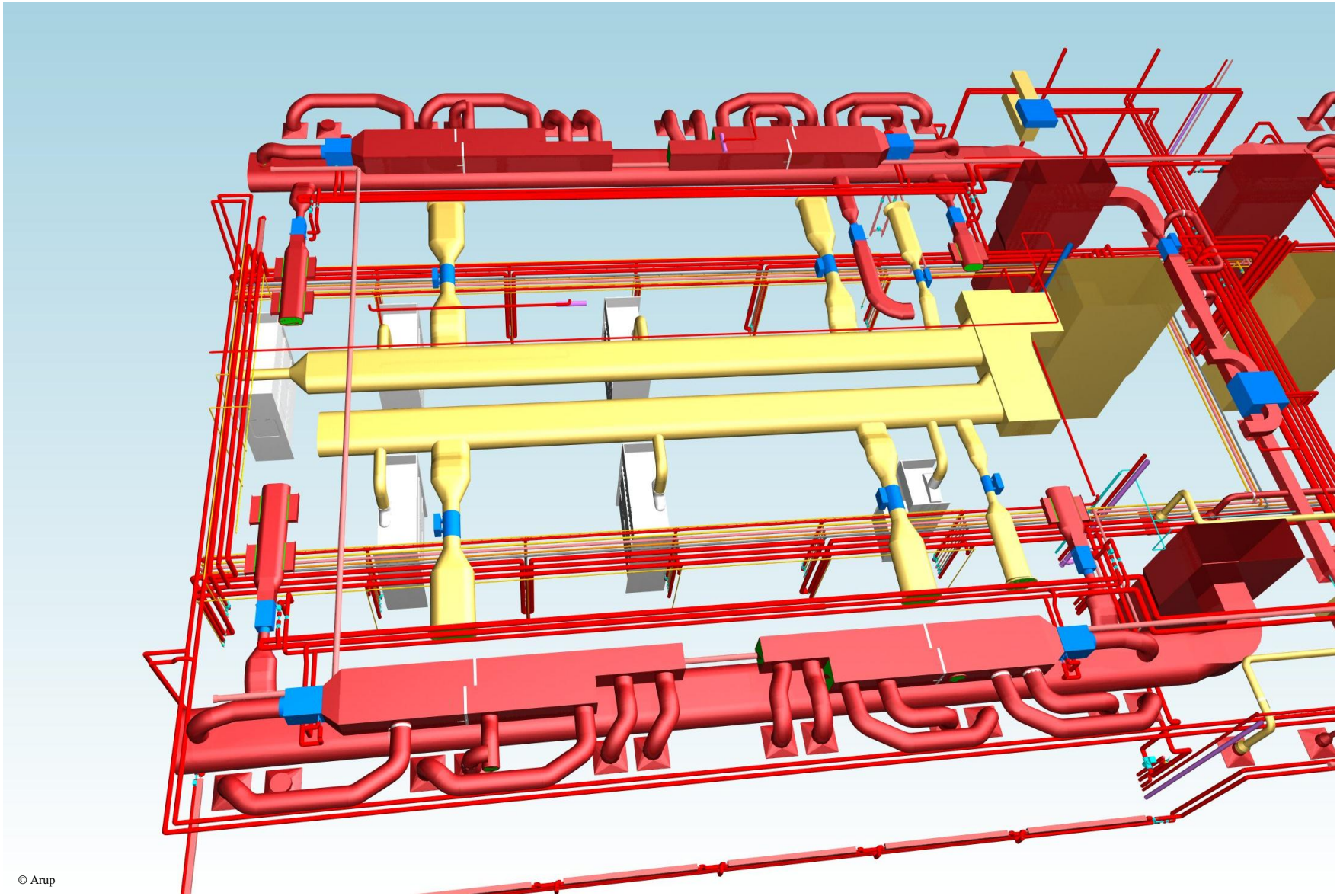




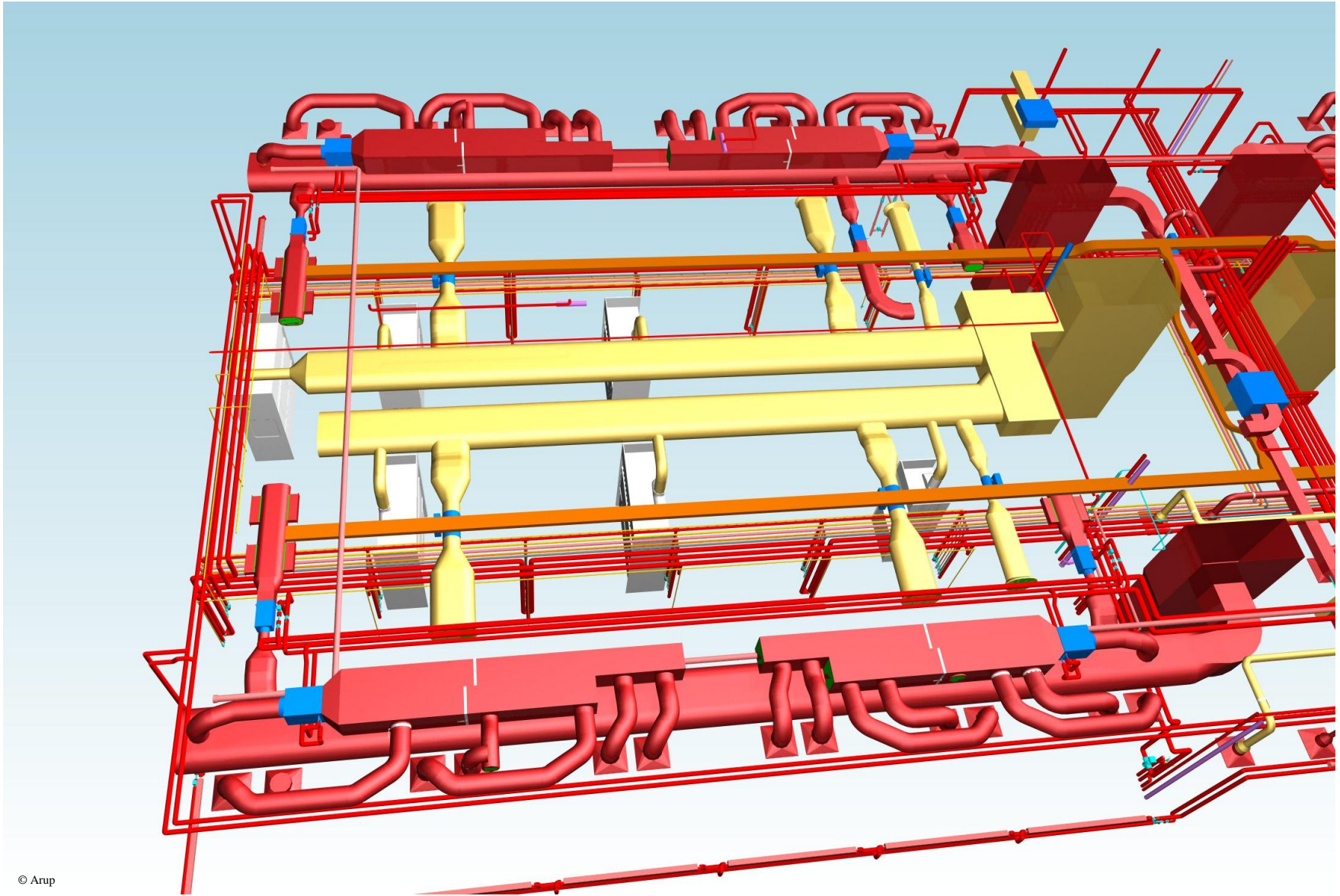
© Arup



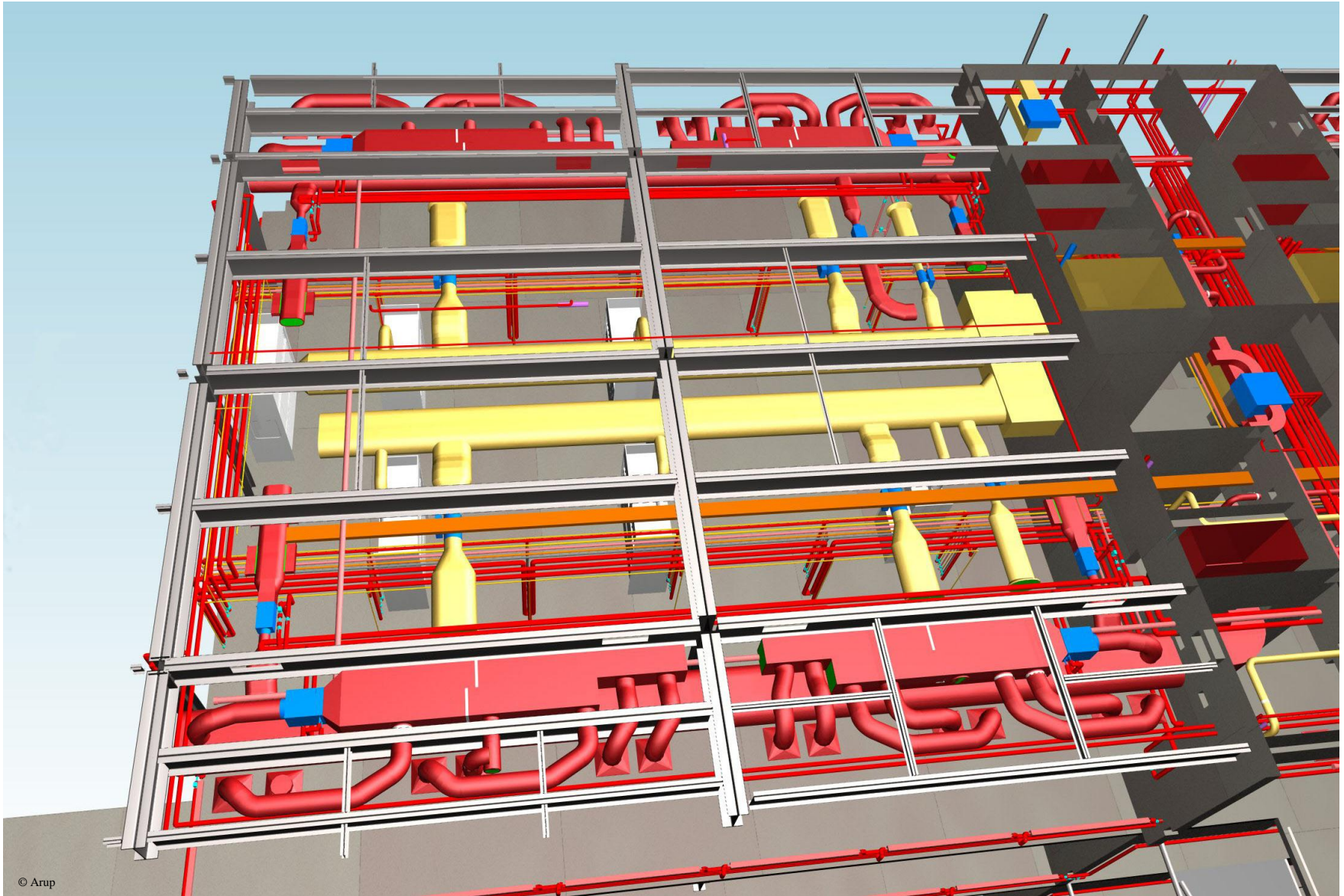
© Arup

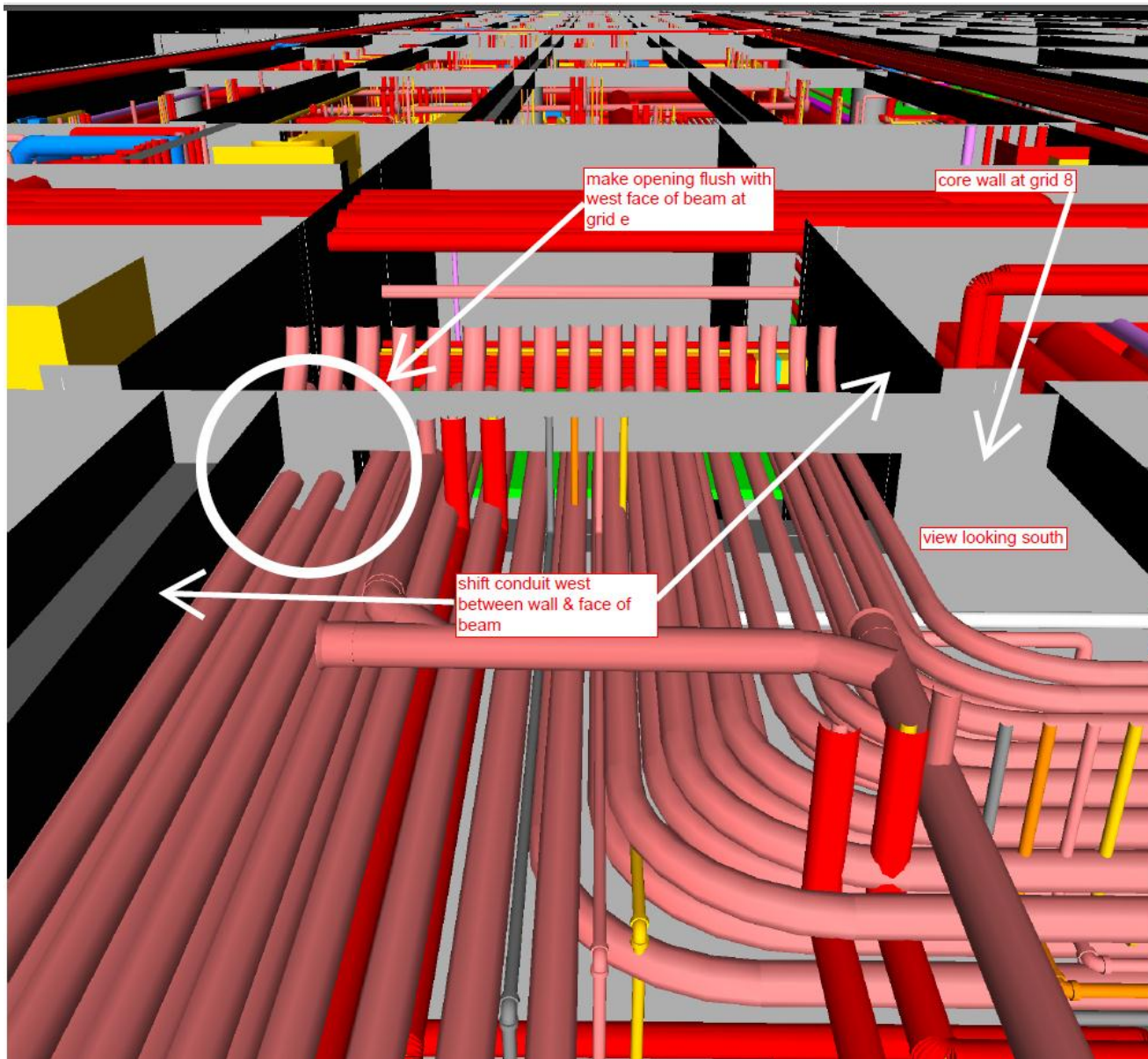


© Arup



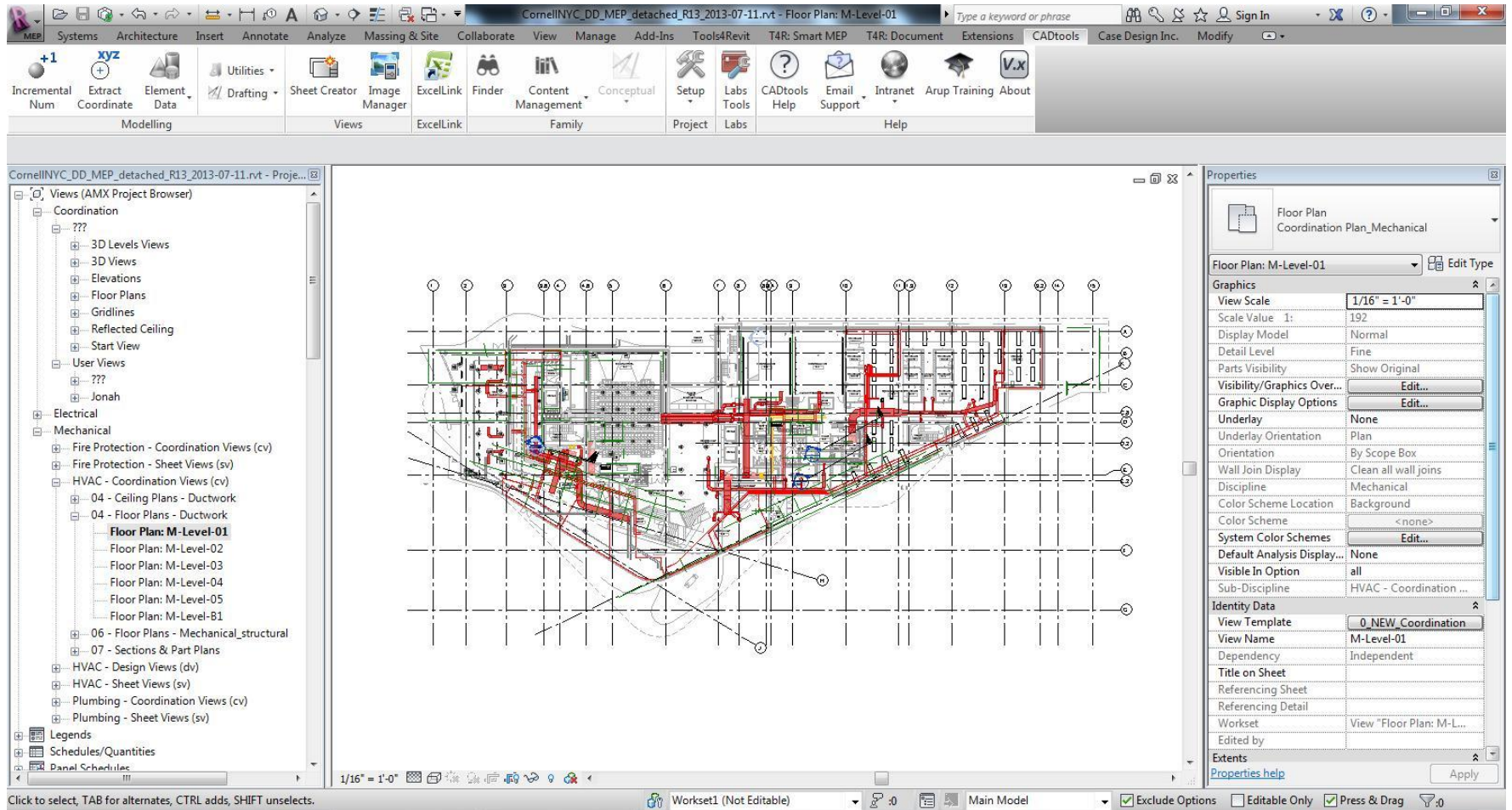
© Arup





© Arup





Documentation

- Documentation uses standard formats and model language
- Goal is to provide both clarity and opportunity for savings
- Checking is key

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Project Progress



Whose requirements?



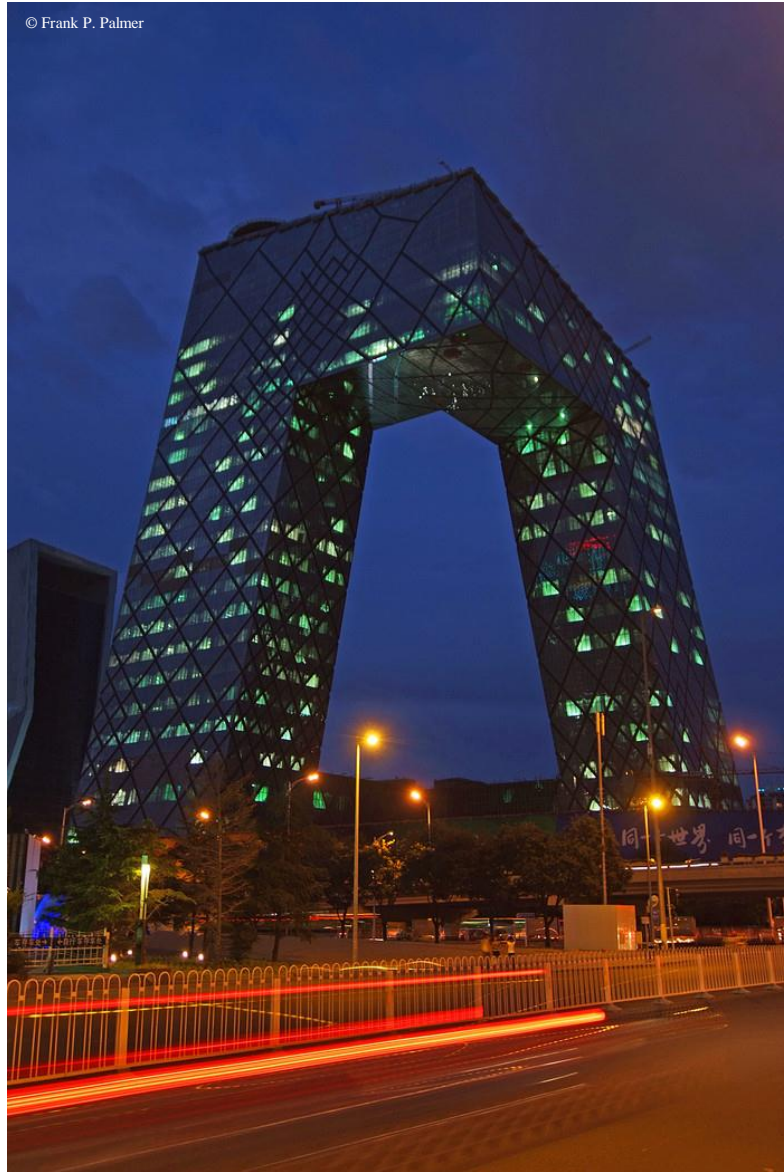
Whose requirements?









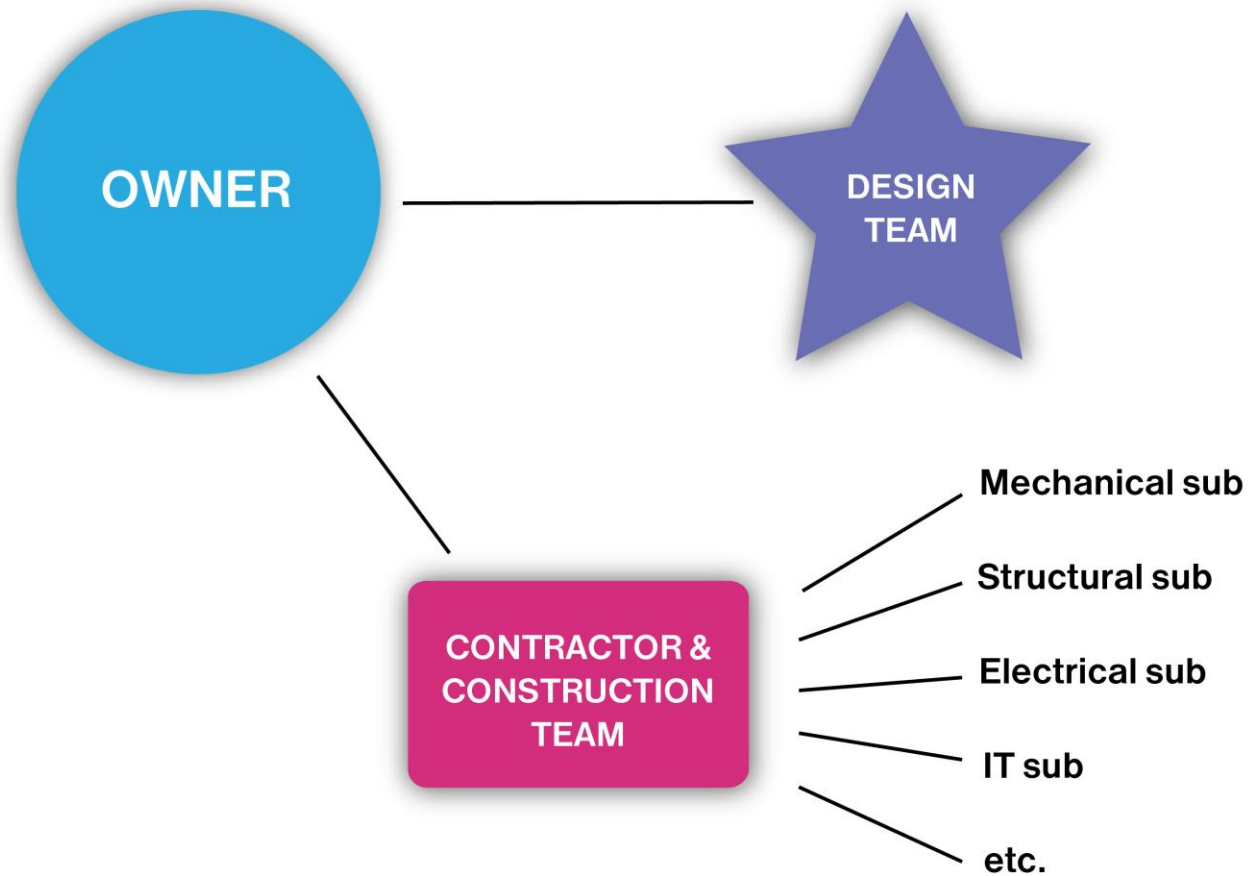




© Nacasa & Partners



Moving into Construction



Project Progress



“Requirements engineering (RE) encompasses all the **interdisciplinary** activities involved in **determining, documenting and maintaining** an agreed set of requirements for a system, and for **tracing** these through to implementation. A specific concern is the development of practical techniques, methods, and tools to support these activities.”

What we wanted

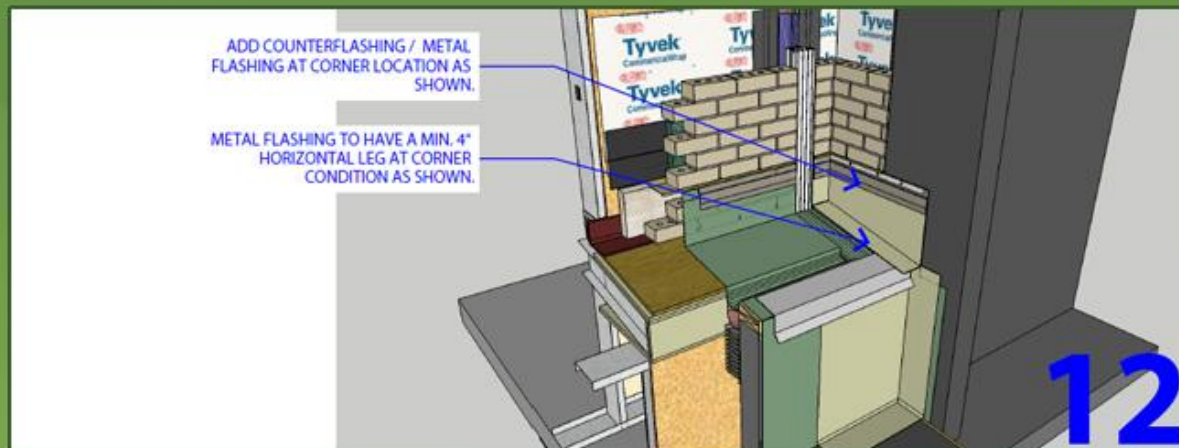
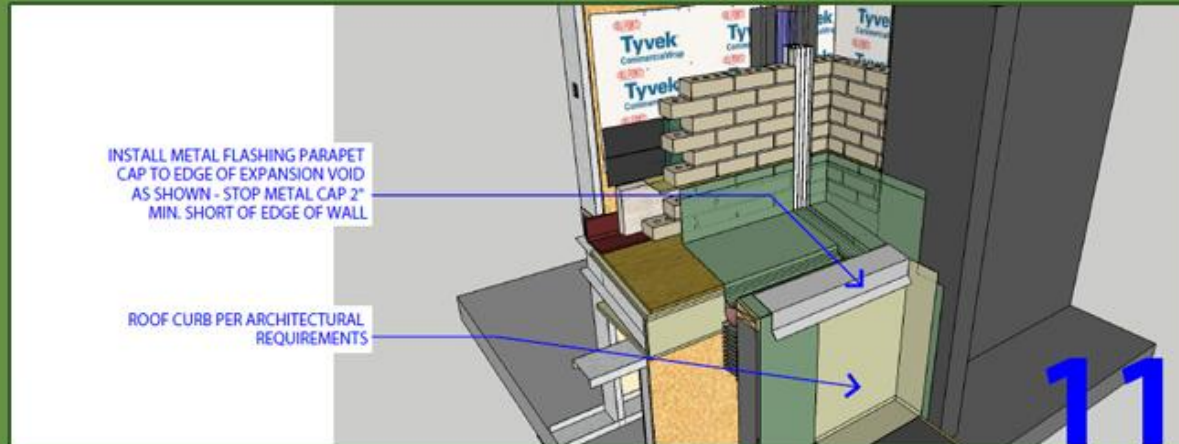


JetBlue Terminal 5i
 Submittal Report
 1 July 2013

Submittal Number	Title	Discipline	Status	Returned On	Received On	Working Days in Office
2636-0001-263600-0	Automatic Transfer Switch	Electrical	open		20 Jun 2013	7
2632-0001-263213-0	Generator	Electrical	open		26 Jun 2013	3
2628-0002-262813-0	Enclosed Circuit Breakers	Electrical	open		25 Jun 2013	4
2624-0002-262413-0	Distribution Switchboard	Electrical	open		26 Jun 2013	3
2624-0001-262416-0	Panelboards, Circuit Breakers	Electrical	open		26 Jun 2013	3
2605-0025-260500-0	Upper Concourse Level Zone B Sleeve Layout	Electrical	open		27 Jun 2013	2
2605-0024-260500-0	Departure Sleeves EJ05.03C.SLV	Electrical	open		21 Jun 2013	6
2605-0021-260500-0	Backbone Feeder Conduit Distribution Layout Zone-C	Electrical	open		26 Jun 2013	3
2605-0015-260500-1	Under slab Level Zone B - Conduit Layout Plan	Electrical	open		27 Jun 2013	2
2382-0002-238239-1	Cabinet Heaters	Mechanical	open		21 Jun 2013	6
2381-0001-238123-1	Computer Room Air Conditioners CRAC 1-3	Mechanical	open		21 Jun 2013	6
2373-0007-237413-0	Sesimic and Wind Analysis	Mechanical	open		01 Jul 2013	0
2373-0006-237413-0	AH Factory Test Procedures	Mechanical	open		21 Jun 2013	6
2373-0001-237413-2	Roof Top AHU	Mechanical	open		11 Jun 2013	14
2334-0001-233416-1	Exhaust Fans, Transfer Fans and ALW Fans	Mechanical	open		27 Jun 2013	2
2333-0002-233300-2	Louver Penthouse	Mechanical	open		27 Jun 2013	2
2331-0013-233113-0	Departure Zone A and B Slab Openings	Mechanical	open		01 Jul 2013	0
2331-0012-233113-0	Mezzanine A4-1	Mechanical	open		28 Jun 2013	1
2331-0011-233113-0	HVAC Ductwork Departure Zone C Slab Openings	Mechanical	open		20 Jun 2013	7
2331-0006-233113-0	HVAC Ductwork Arrival Zone A	Mechanical	open		11 Jun 2013	14
2305-0009-230500-0	Sleeves in Fixed Bridges	Mechanical	open		20 Jun 2013	7
2305-0008-230500-0	HVAC Piping Chill Water and Heating Glycol Riser	Mechanical	open		20 Jun 2013	7
2240-0003-224000-0	Plumbing Fixtures P1-B and P-11	Plumbing	open		20 Jun 2013	7
2211-0005-221119-0	Vacuum Breakers	Plumbing	open		20 Jun 2013	7
2211-0004-221116-1	Above Ground Copper	Plumbing	open		20 Jun 2013	7
2207-0001-220700-0	Knauf Pipe Insulation	Plumbing	open		27 Jun 2013	2
2205-0023-220500-0	Upper Concourse Piping Area C	Plumbing	open		27 Jun 2013	2
2205-0022-220500-0	Upper Concourse Zone B	Plumbing	open		20 Jun 2013	7
2205-0021-220500-0	Upper Concourse Zone A	Plumbing	open		20 Jun 2013	7
2105-0007-210500-0	Snorkler Heads	Fire	open		01 Jul 2013	0

Where it's going

A Collaborative Solution between Design and Construction Teams



What we wanted, where we want it



TAA-Y8400-05

Level 2 Area BD Bathrooms CBN-2082 & CBN-2083 - Above Ceiling
In Progress

☐ Hide Closed Items

☒ Turn Images On

[Run](#) [Reset](#)

Row No	Room Number	Room Name	Item Description	Contractor	Date Opened	Opened By	Status	Attachments	Date Closed	Closed By	Contractor Comments/ Engineer's Response	-
E-002	CBN-2083	Women's toilet	Junction box missing cover.	Unity	2/28/2013	Nancy Camacho	Deficiency				CC: --/--/-- ER: --/--/--	Edit Delete Close CC/ER
M-001	CBN-2082/2083	Toilets	Fix duct insulation.	United	12/7/2012	Andrew Heiser	Deficiency				CC: 2/22/2013 Item Complete ER: --/--/--	Edit Delete Close CC/ER
T-001	CBN-2082	Men's Toilet	DAS Incomplete.	Unity	12/7/2012	Marta Lee	Non-Conformance Contract				CC: --/--/-- ER: --/--/--	Edit Delete Close CC/ER
E-001	CBN-2082	Men's toilet	No lighting ballasts installed.	Unity	12/7/2012	Nancy Camacho	Deficiency		2/28/2013	Nancy Camacho	CC: 2/6/2013 completed ER: --/--/--	Edit Delete Close CC/ER
F-001	CBN-2082/2083	Toilets	Maximum unsupported sprinkler head branch shall not exceed 12".	Sirina	12/7/2012	Reynaldo Espiritu	Deficiency		5/14/2013	Andrew Heiser	CC: 2/4/2013 Completed ER: --/--/--	Edit Delete Close CC/ER

Different goals



Managing Change

Create new Request for Information - Windows Internet Explorer provided by Arup Usa

File Edit View Favorites Tools Help

ARUP AMERICAS JetBlue Terminal 5i
Add new unanswered RFI

This form is to be used to enter new open RFIs into the system. Once entered, the system can be used to track the status of the RFI and, if necessary, collect responses from the appropriate individuals before a final response is made. If the RFI that you are entering has already been answered and you are entering it to enter it into the system, click [add](#) to use the log completed RFI form.

load RFI file as received (incoming):
J:\N\FI\000021387-007 Construction Administration\7-06 RFI [Browse] [Delete]

RFI number: [] Related by: email [v]
subject: []

facilitator: no default defined [change](#)
The facilitator is the person who currently has responsibility for answering this RFI or seeing that it is forwarded to the right person for response.

dates:
Due on: 5 days [v]
Received on: 11 July 2013 [] [see valid formats](#) [v] [help](#)

The information requested below is being collected to help tracking and reporting of RFI's for the project. It is required that you enter the number the drawing and section numbers for this log will be. Information can be added at a later date by choosing the edit RFI option.

Requested on: [] [see valid formats](#) [v] [help](#)
Originated on: [] [see valid formats](#) [v] [help](#)

category:
☐ True Request for Information
☐ Contractor Coordination
☐ Contractor Means and Methods
☐ Contractor Re-Work / Non-Compliant Work Proposal
☐ Document Clarification
☐ Duplicate or Redundant RFI
☐ Incomplete or Unclear Request
☐ Information in Contract Documents
☐ Outside of Arup Scope
☐ Request for Substitution / Alternate Design Proposal
☐ RFI in lieu of Submittal
☐ Unforeseen Condition
☐ Category Unknown

discipline:
select a discipline [v]

specification section:
enter or select from log or search []

info requested:
[]

drawings referenced:
[]

returned to:
[]

[load defaults](#) [cancel contact information](#)
 Genier - NY [change company](#)
 1230 Avenue of the Americas Suite 1000 [change address](#)
 New York, NY 10020
 attention: Ty O'Saugh [change contact](#)
 question origin:
 of [] [select from contacts](#)
 Create this RFI

preview of incoming file to be uploaded

RECEIVED
Jul 03, 2013
ARUP

RFI

JetBlue Terminal 5i Expansion
Project # 120061
Van Wyck Expressway
Jamaica, NY 11430
Telephone: [] Fac: [] July 03, 2013

RFI #	Date Created	Date Required
0407	7/3/2013	7/10/2013

TO:	FROM:
Ty O'Saugh Genier 1230 Avenue of the Americas Suite 1000 New York, NY 10020 Phone: 1 212 454 2440	Latoya Stephens Turner Construction Co. 375 Hudson Street 6TH FLOOR New York, NY 10014 Phone: 646-556-6136

Subject	Discipline	Category
Product Specification for VFD's	Mechanical	Specification Clarification

Draw No.	Rev No.	Revision Date	Title
Drawing References:			

Spec Section References:
Sketch References:

Question:
On drawing The specification 230900 and 14M05.04 detail 5 through 8 requires each exhaust fan to have a motor starter or VFD. Please provide the product specification for VFD's and motor starters to match what is already required for the control drawings.

Suggestion:
[]

Answer:
[] Date Answered: []

Signature: [] Date: []

CC:	Company Name	Contact Name	Copies	File Number	Notes
[]					

12000-RFI Individual File\RFID_V401.rpt
RFI Received: 3/1/2013

Turner Construction Co.
Page 1 of 1

8.50 x 11.00 in []

67%

A single source of truth

Tech Team Review Log

☐ Don't automatically refresh Show: (All) Maximum number of items to display: 250

Tech Review Log (250 of a possible 250 entries)

Index	Subject	Originator	Responsible Users	Status	% Complete	Submitted	Closed
(All)	(All)	(All)	(All)	(All)	(All)	(All)	(All)
455	Submittal 1233: 15901-003-R1 Flow Meters	Elliott Croll	Art Murphy	Closed	100	Jun 10, 2013	Jun 27, 2013
454	Submittal 1228: 16132-006-R1 Event Power Box	Elliott Croll	Jim Kane	In Process	0	Jun 10, 2013	
453	Submittal 1227: 16431-001-R1 Metering & Switchboard Instruments	Elliott Croll	Jim Kane	In Process	0	Jun 10, 2013	
452	Submittal 1229: 15182-003-R1 Pressure Reducing Valves	Elliott Croll	Scott Sepsy	Closed	100	Jun 10, 2013	Jun 25, 2013
451	Submittal 1230: 15224-002-R2 Reverse Osmosis for Clean Steam Generator	Elliott Croll	Scott Sepsy	Closed	100	Jun 10, 2013	Jun 18, 2013
450	09300-006-R0 Schluter Systems Floor, Wall, & Counter Profile	Steve Hancock	Anthony L Pezzicola	Closed	100	Jun 3, 2013	Jun 5, 2013
449	08710-002-R0 Door Hardware Schedule & Product Data	Steve Hancock	David Olsen	Void	0	May 17, 2013	
448	02350-050-R0 Continuous Deflective Separator	Steve Hancock	Sean Gallagher	Closed	100	May 15, 2013	Jun 18, 2013
447	Submittal 1180: 15052-023-R0 Coordinated Plumbing Shop Dwg - A2 Lvl 005	Elliott Croll	Cynthia B. Keith	Closed	100	May 13, 2013	May 21, 2013
446	Submittal 1179: 15052-022-R0 Coordinated Plumbing Shop Dwg - A2 Lvl 004	Elliott Croll	Cynthia B. Keith	Closed	100	May 13, 2013	May 21, 2013
445	Submittal 1177: 15053-019-R1 Coordinated HVAC Sheet Mtl Shp Dwg - A2 Lvl 004	Elliott Croll	Scott Sepsy	Closed	100	May 13, 2013	May 21, 2013
444	Submittal 1175: 15053-017-R1 Coordinated HVAC Sheet Mtl Shp Dwg - A2 Lvl 001	Elliott Croll	Scott Sepsy	Closed	100	May 13, 2013	May 21, 2013
443	Submittal 1178: 15052-021-R0 Coordinated Plumbing Shp Dwg - A2 Lvl 002	Elliott Croll	Cynthia B. Keith	Closed	100	May 13, 2013	May 21, 2013
442	Submittal 1176: 15053-018-R1 Coordinated HVAC Sheet Mtl Shp Dwg - A2 Lvl 002	Elliott Croll	Scott Sepsy	Closed	100	May 13, 2013	May 21, 2013
441	Submittal 1163: 15053-021-R0 Coordinated HVAC Mechanical	Elliott Croll	Scott Sepsy	Closed	100	May 13, 2013	May 21, 2013

Actions>>

Trusted sites | Protected Mode: Off

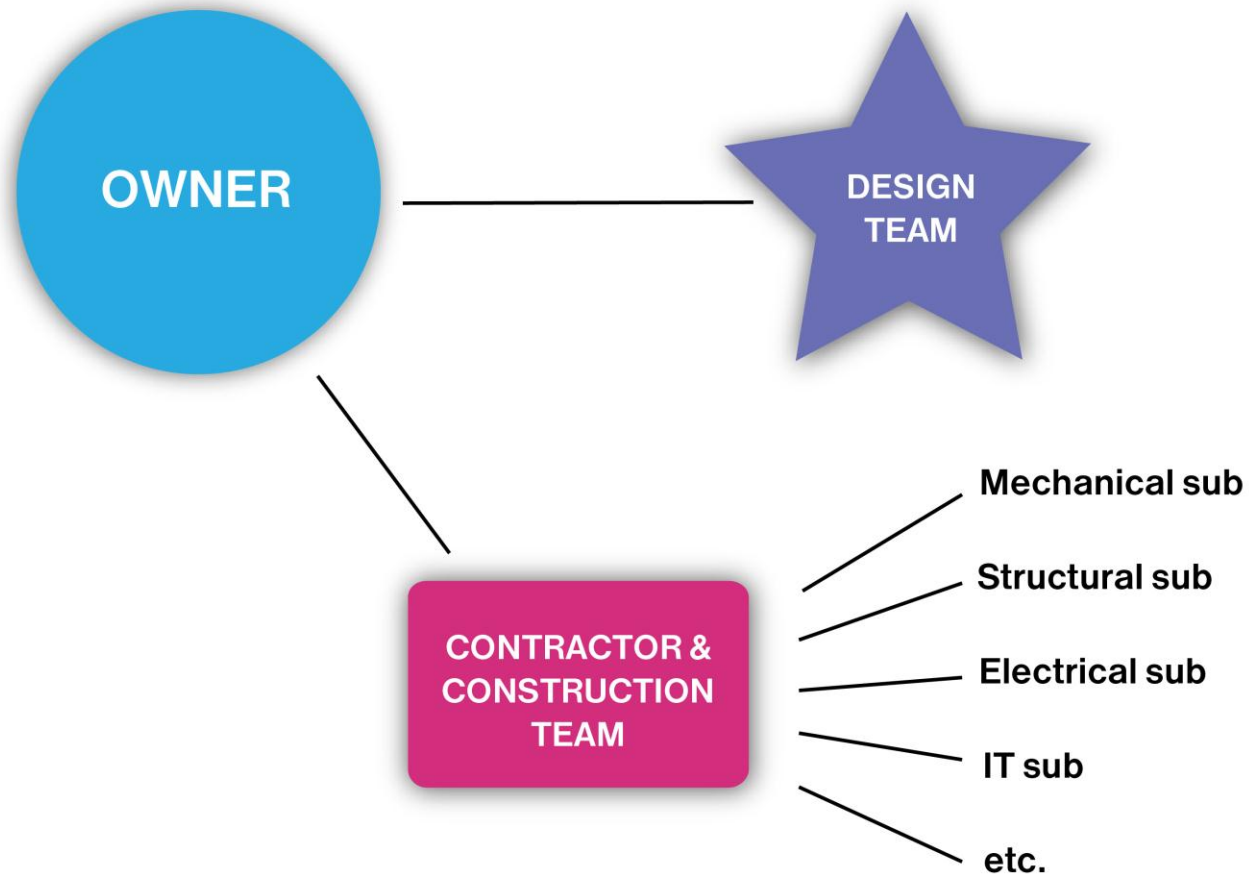
Construction

- Regimented
- Process driven
- Cooperation is not the natural state

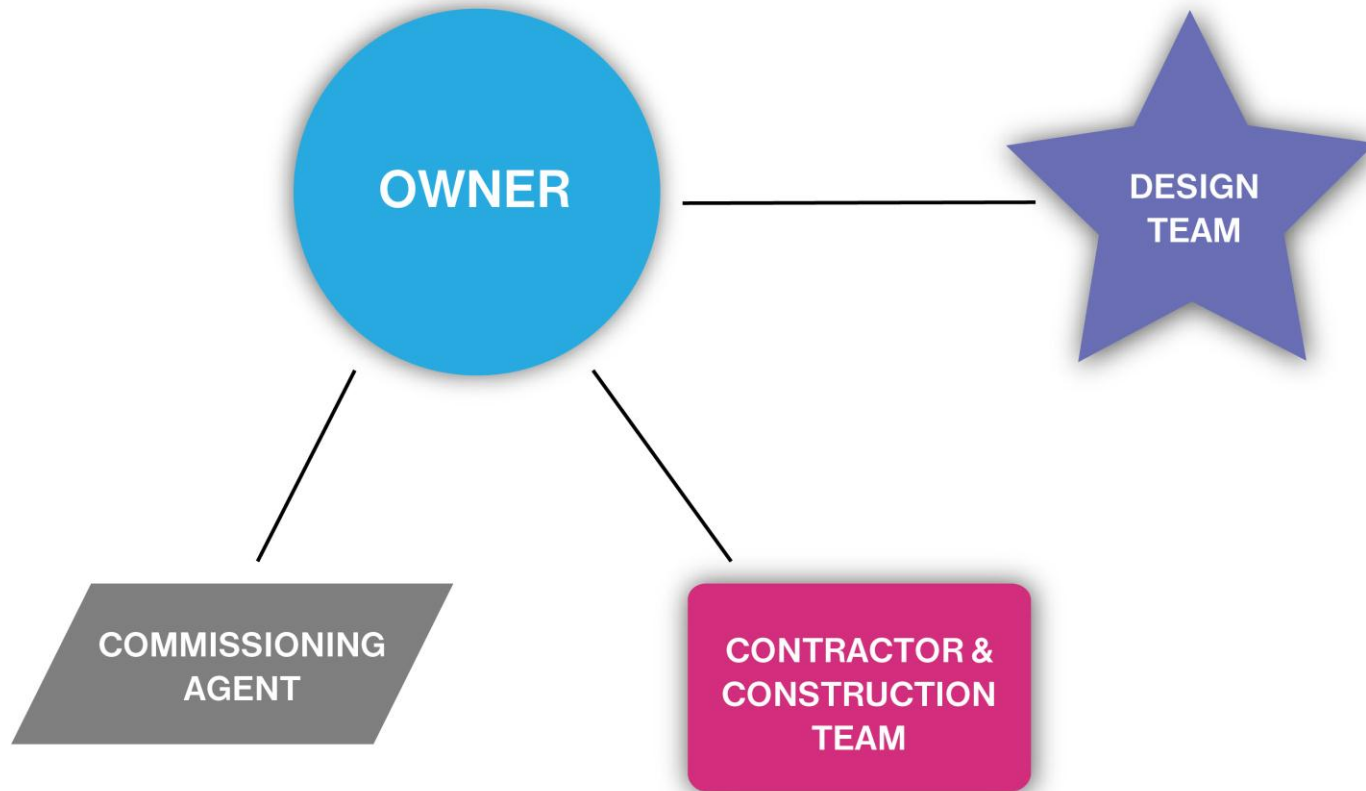
What does the owner see here?



Moving into Construction



Handing over



Admin
Asset Mgr
Calendar
Contacts
ContractsV1
CX Docs
IRS
MSG
Reports
Survey
TrackV1
Trials

Logged in as: Andrew.Heiser - [My Settings] [Log Out]
Current role: SURVEY You have 460 new messages.

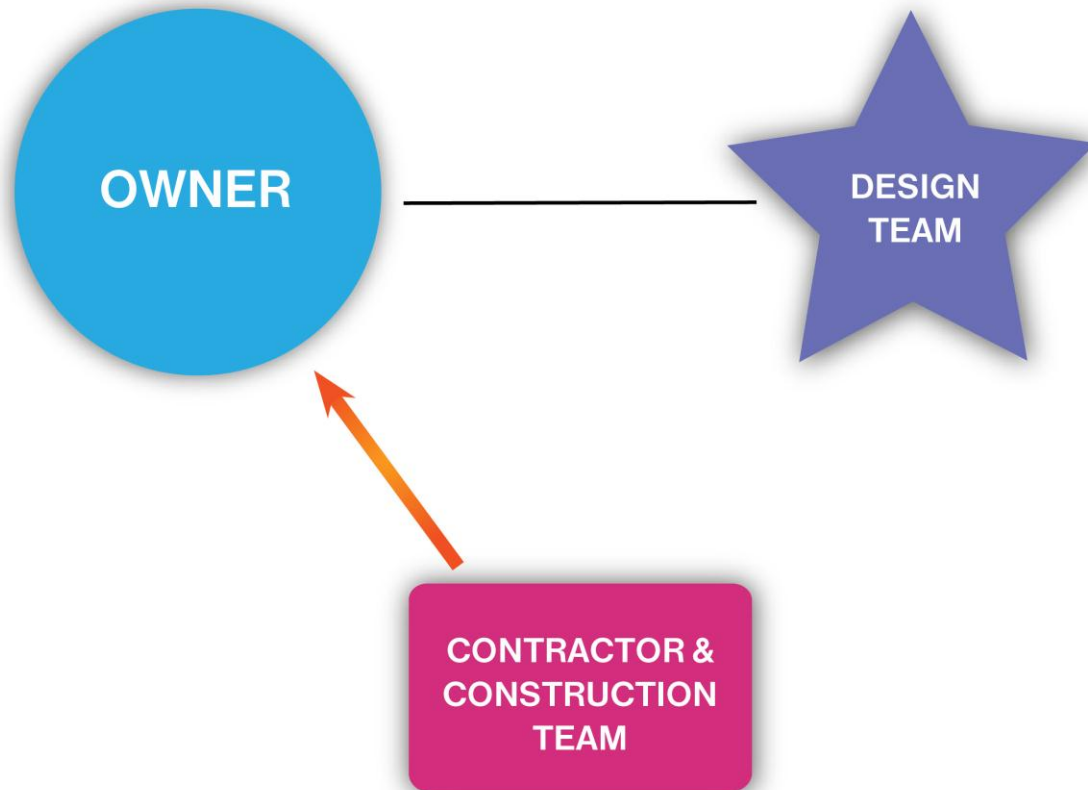
e-Facilities Activation Support Tools
T4 HEADHOUSE AND CONCOURSE B
New Releases Feedback Help

Site: TAA-Y8400-05
Dashboard
Report

Site : TAA-Y8400-05
Survey List

Gen	Name	Lead Inspector	Area Status	Obv	Open Def	Closed Def	Open NCR	Closed NCR	% Resp		
Rec	Test WeWork										
ted Within Past Week											
► Building Automated Systems					18 Survey(s)	22	36	7	4	0	34%
▼ Building Enclosure					4 Survey(s)	6	170	0	4	0	0%
Building Enclosure	Exterior Masonry and Doors	Petra Pearsall	In Progress	3	123	0	3	0	0%	Add View CSV	
Building Enclosure	Exterior Wall - 1/A-224, CL BBA - BAX.5	Petra Pearsall	In Progress	1	14	0	0	0	0%	Add View CSV	
Building Enclosure	Exterior Wall - FB 41	Petra Pearsall	In Progress	2	14	0	1	0	0%	Add View CSV	
Building Enclosure	Roof	Petra Pearsall	In Progress	0	19	0	0	0	0%	Add View CSV	
► Delta Remote (Area Q)					1 Survey(s)	0	7	21	6	18	38%
► Existing Building					7 Survey(s)	7	34	25	11	1	4%
► Fixed Bridges					22 Survey(s)	4	128	225	21	20	14%

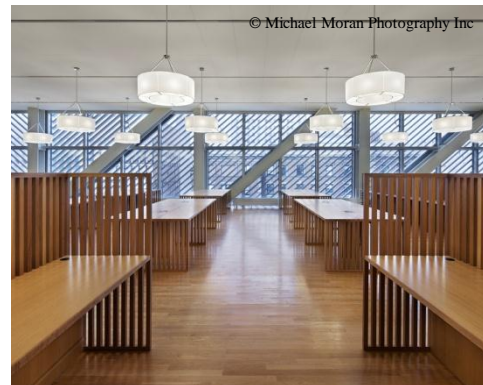
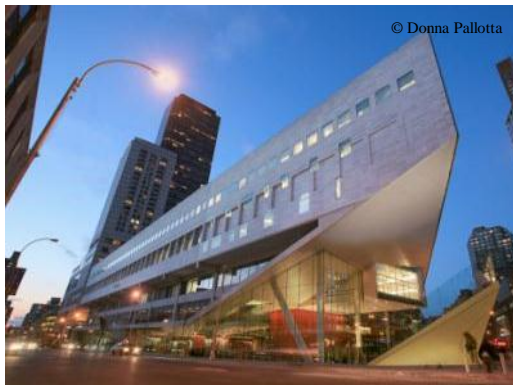
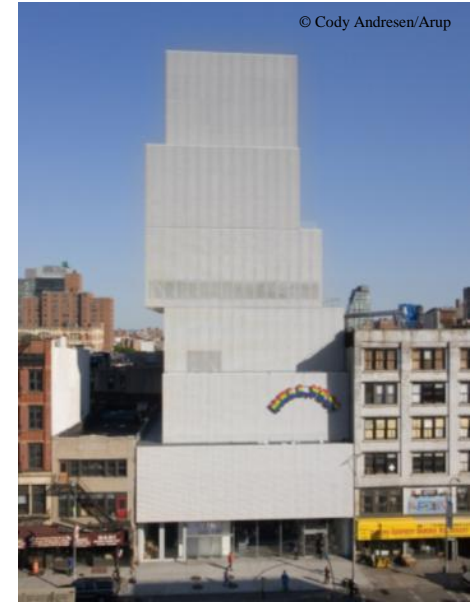
Handing over



In Summary...

“Requirements engineering (RE) encompasses all the **interdisciplinary** activities involved in **determining**, **documenting** and **maintaining** an agreed set of requirements for a system, and for **tracing** these through to implementation. A specific concern is the development of practical techniques, methods, and tools to support these activities.”

Buildings or ‘Vertical Infrastructure’



Starchitects and Jackhammers

Fiona Cousins