



Mike Tozer P.Eng., VMA

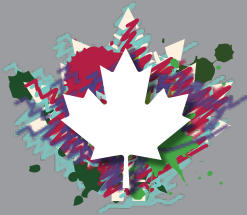
Value Management Specialist, Enbridge Inc.



- Held various positions in three different business units at Enbridge over the past 17 years
- Pioneering the company's Value Management Program since 2016
- Elected to the VAC Board of Directors in 2019



Distress Call



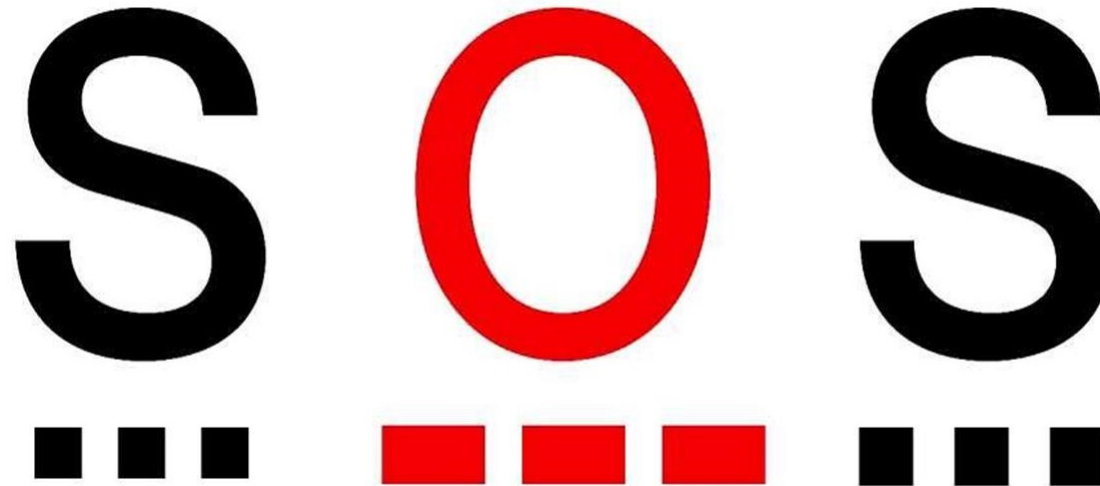
“Hello, my name is...”

“Can we do it remotely?”

“How much time do you need to prepare?”

“Are you available?”

“I’m a project manager for...”



“We would need to move fairly quickly...”

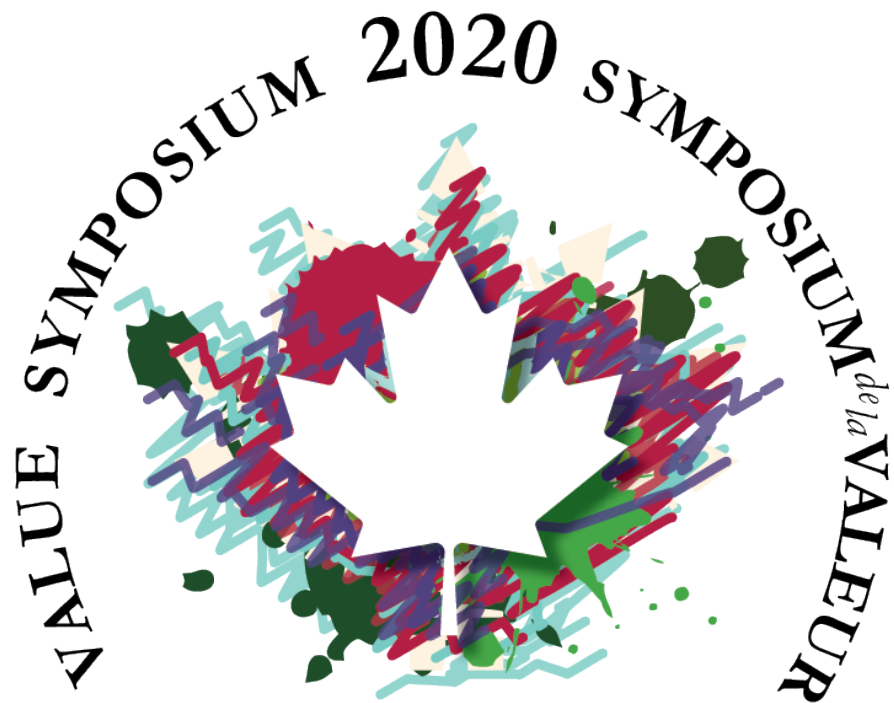
“I’m looking to do a value engineering study for one of my projects...”

“The customer financing the project allowed the operators to specify most of the design requirements...”

“The construction estimate is a lot higher than they originally budgeted for...”

“We want to construct next year...”





Value Analysis Canada



Analyse de la Valeur Canada

Rescue Mission:

Applying VM at the Late Stages of a Project





1. **The Project**
2. **The Challenges**
3. **The Workshop**
4. **Success Factors**



1. The Project

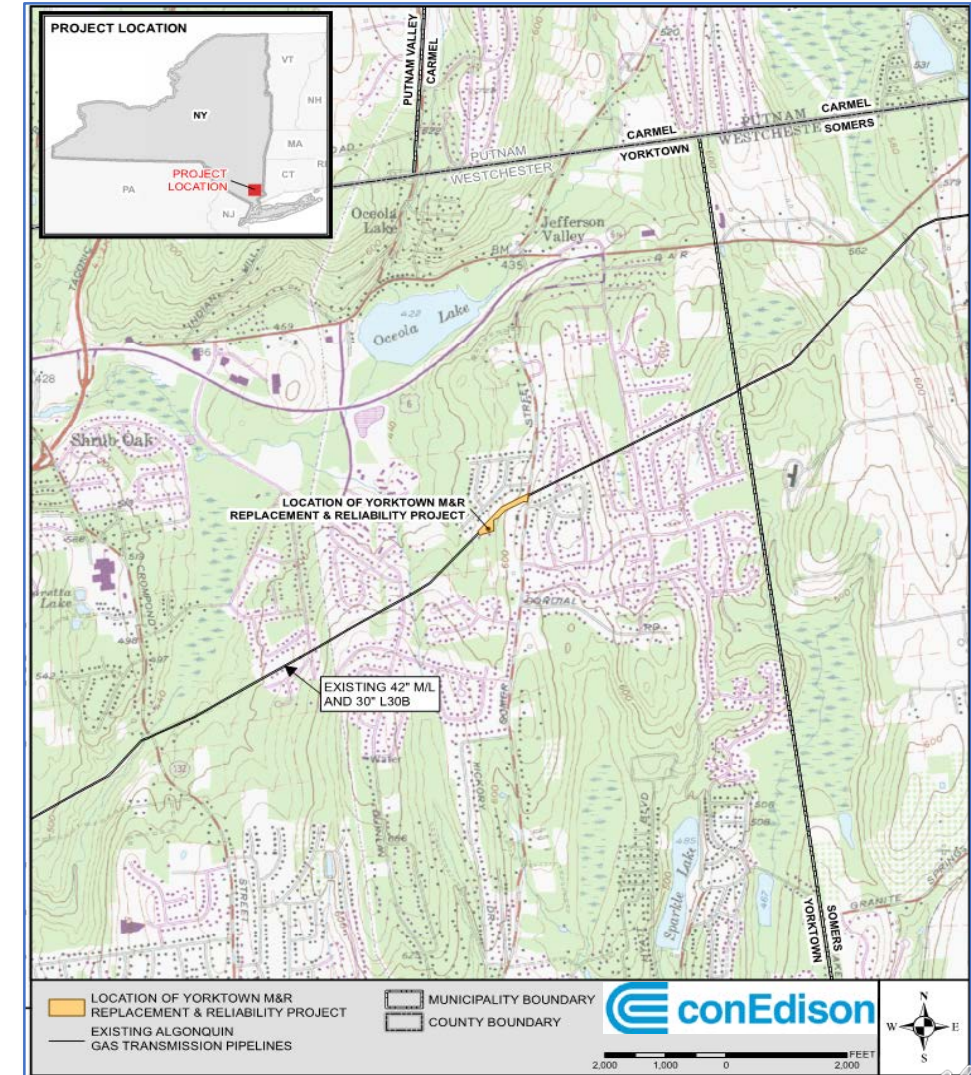


A Natural Gas Metering & Regulation Station...
that needs to look like a house

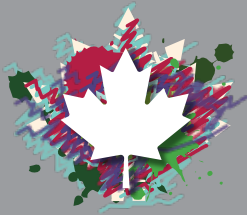
Project Background



- Part of a larger initiative by Con Edison to upgrade the three M&R stations in Westchester County, NY
- The project drivers included:
 - Creating redundancy amongst the three stations for enhanced system reliability
 - Accommodating future demand for natural gas;
 - Modernizing the facilities and bringing them up to current codes / standards; and
 - Enhancing security features of the facilities



Existing Metering & Regulation Station



- Located on a cul-de-sac in a suburban, residential neighbourhood
- Building concealed as a 1970's split-level house similar to the neighbouring residents



Project Status



- Engineering

- Issue for Bid (IFB) drawing package completed

- Construction

- Construction bids received

Construction bids
significantly exceeded budget

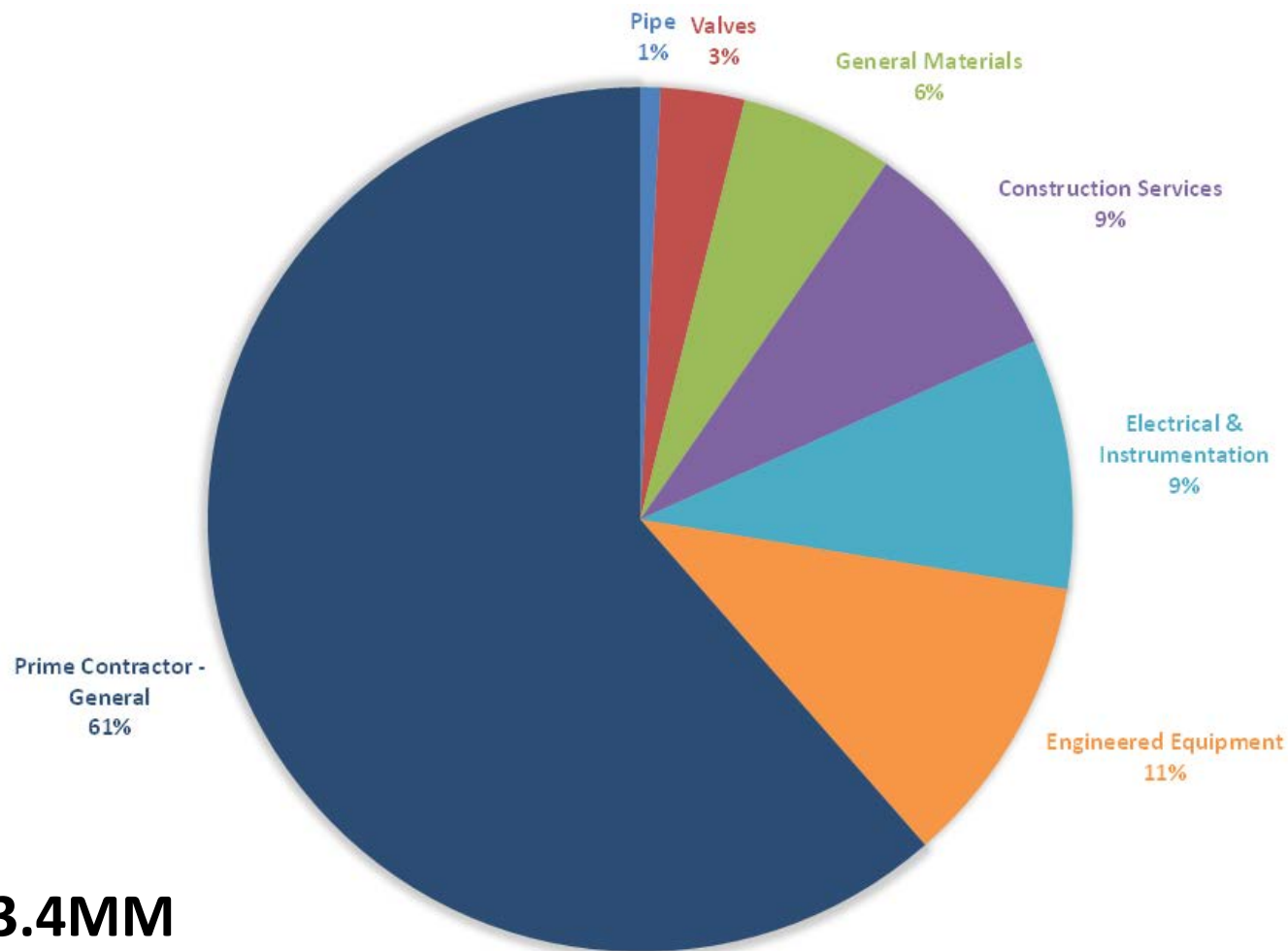
- Procurement

Long lead materials had been purchased and were being received:

- Heaters
 - Meters
 - Regulators
 - Actuated Valves
 - Filter-separator
 - Manual Valves
 - Auxiliary Generator



Breakdown of Relevant Direct Costs

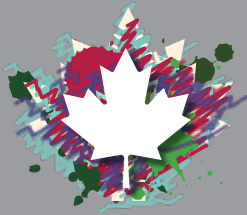


Total: **\$13.4MM**

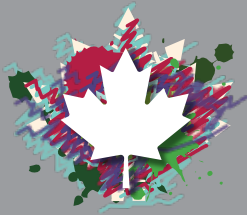
Note: Engineering & Design is not included in direct cost breakdown



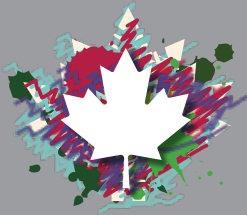
Conceptual Rendering – Original Design

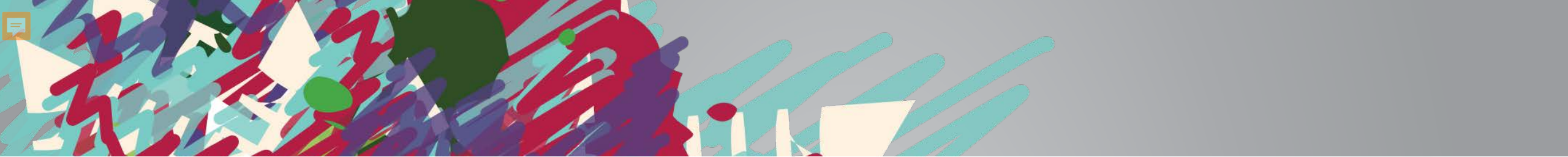


Conceptual Rendering – Original Design

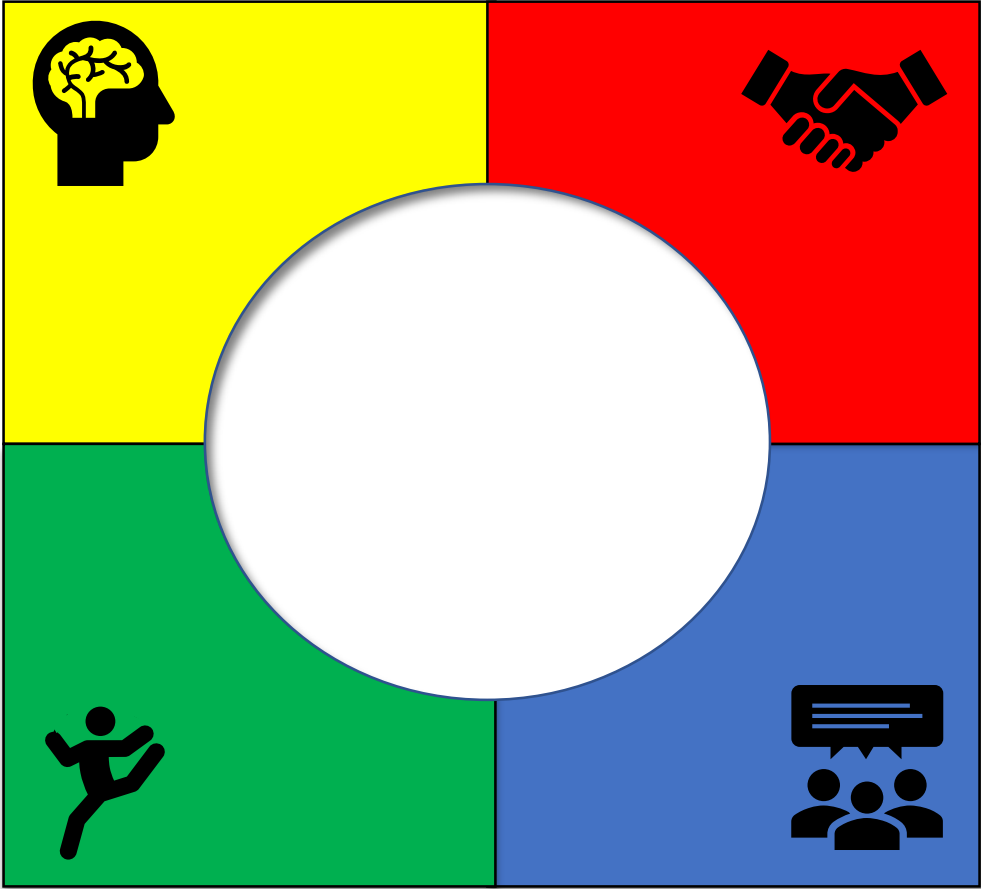


Conceptual Rendering – Original Design



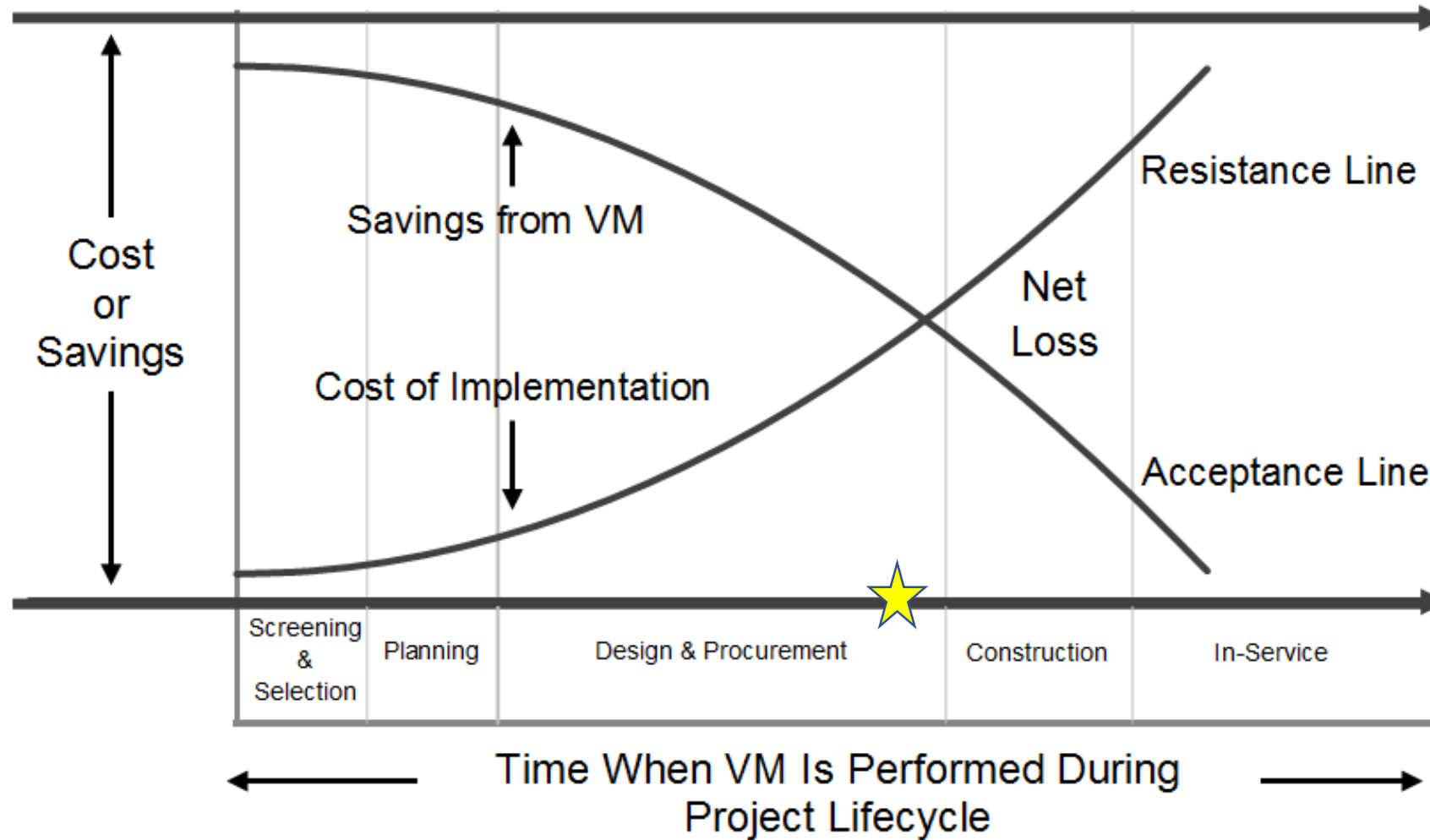


2. The Challenges





Value Study Timing





Virtual Value Study





Team Attributes

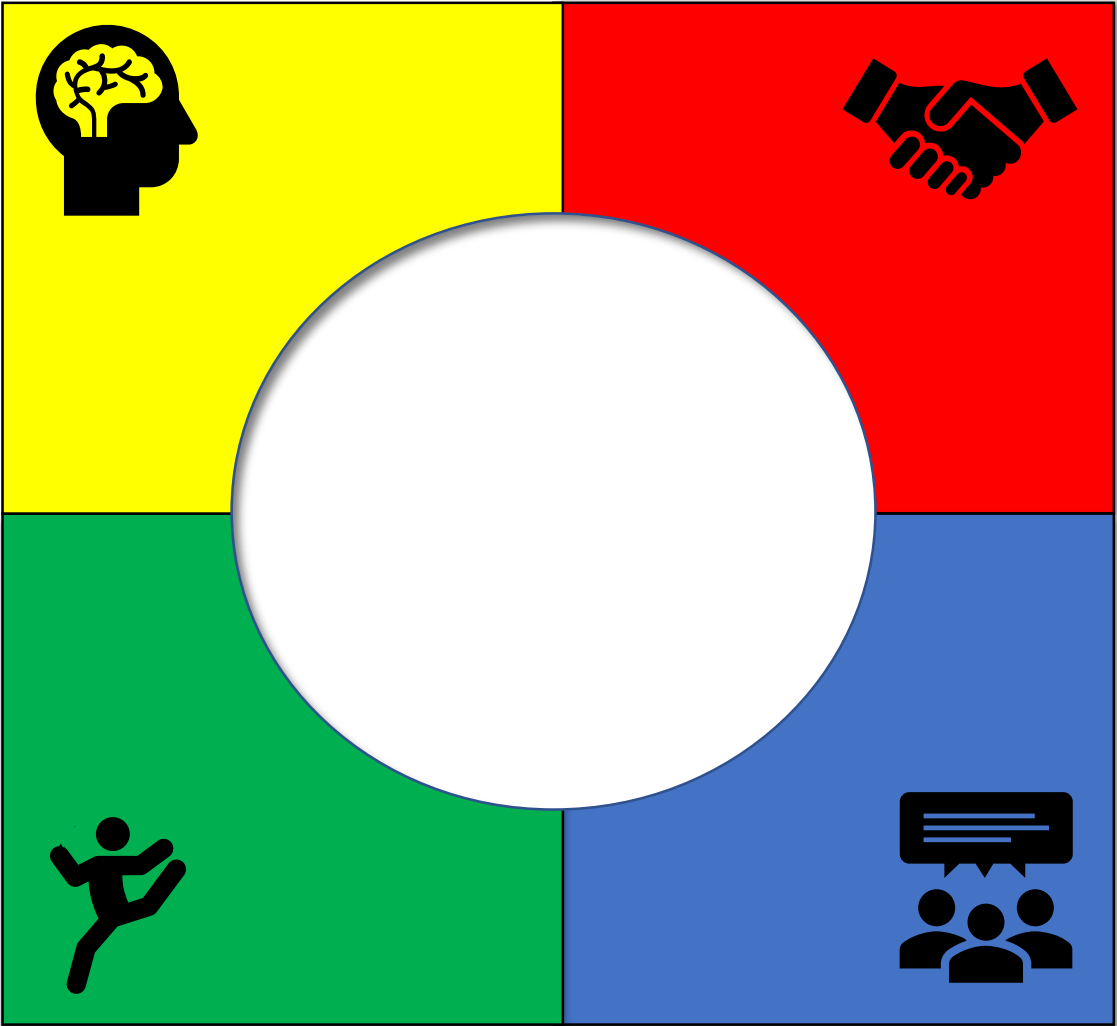


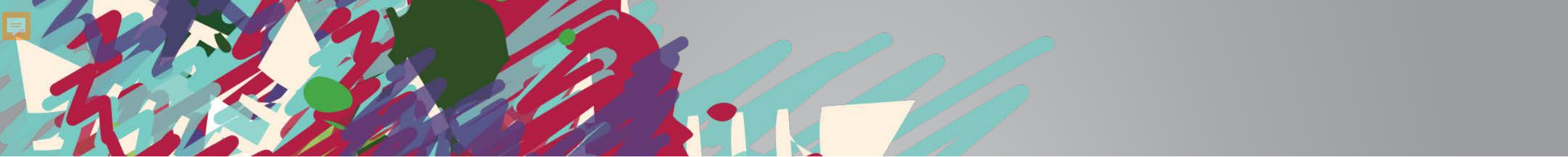
Open Minded

Committed

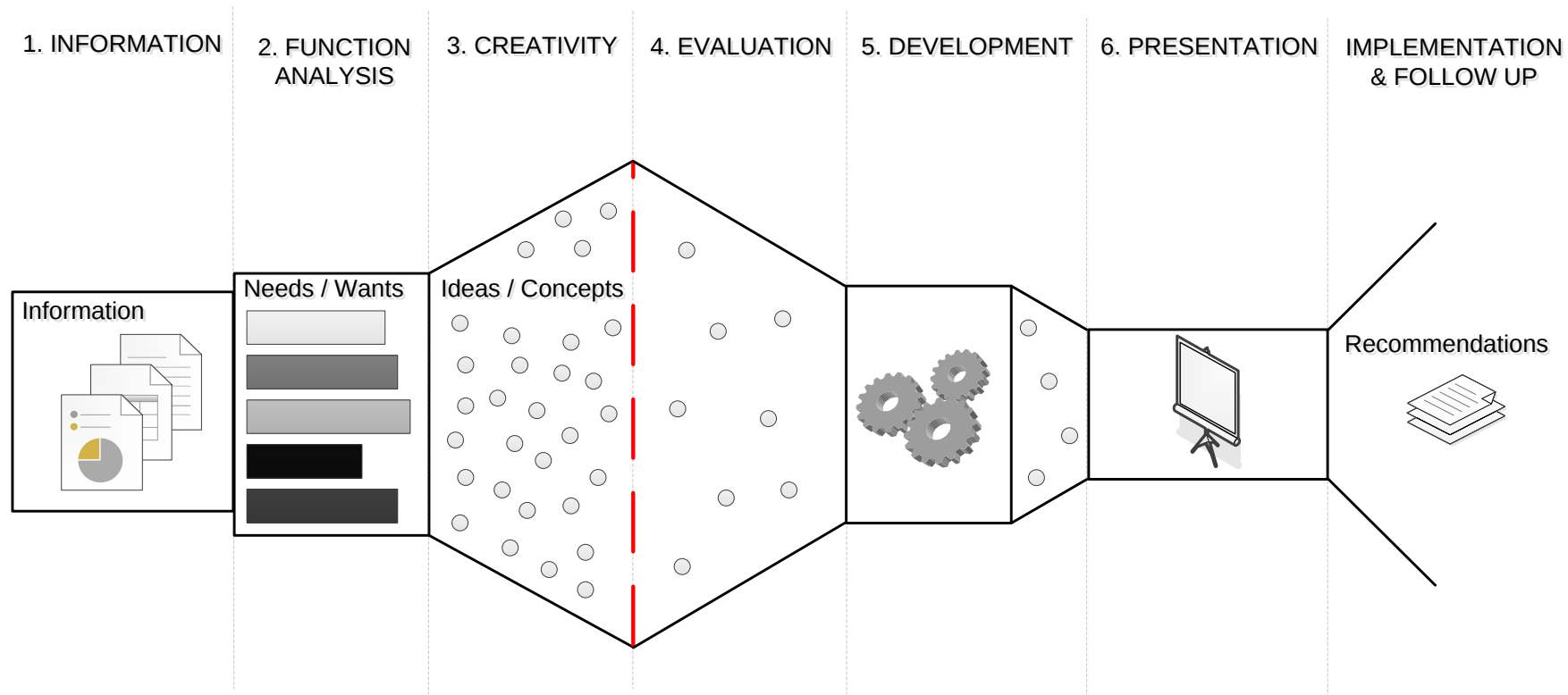
Flexible

Engaged





3. The Workshop



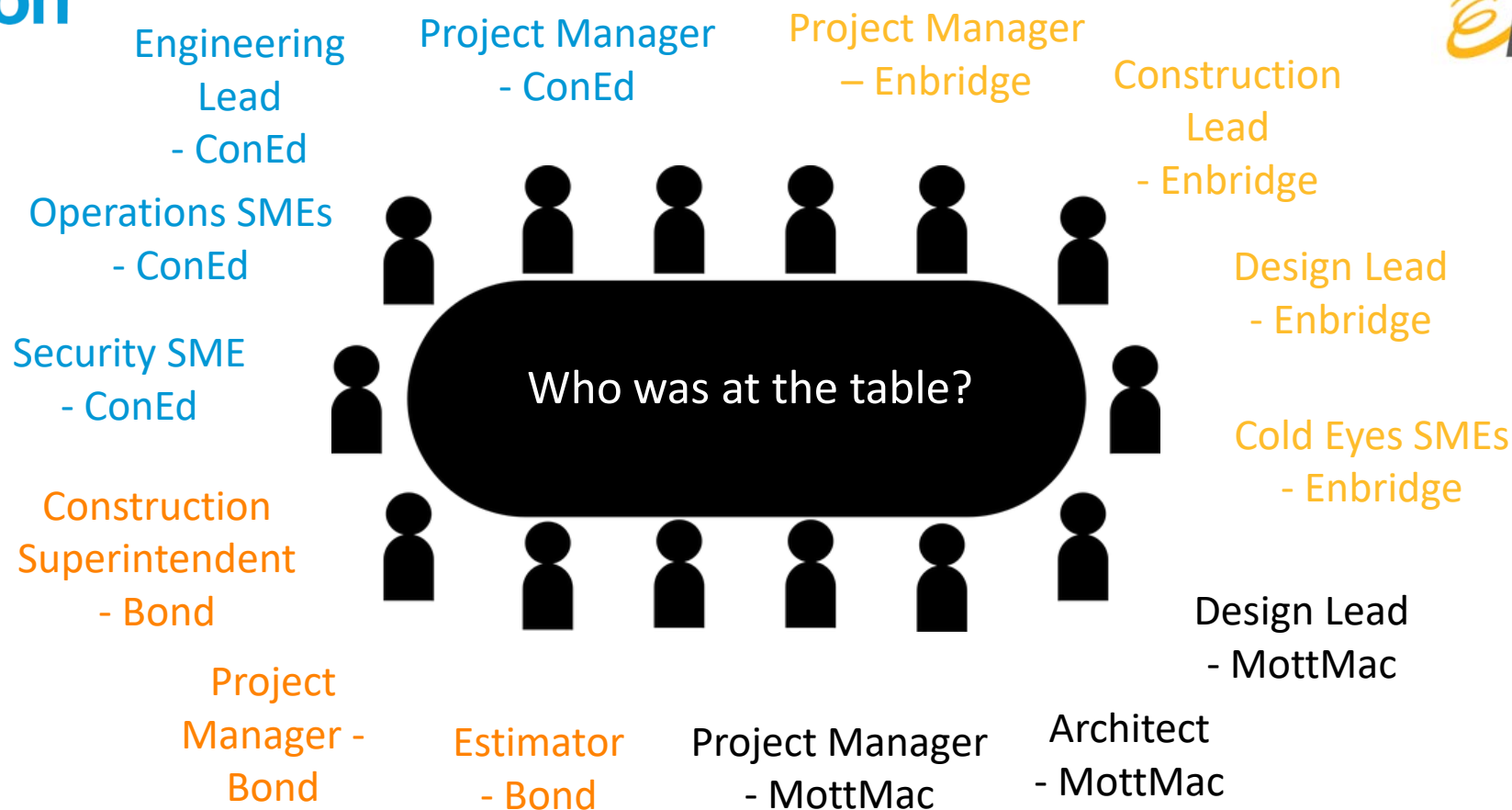
Objective of the Value Study



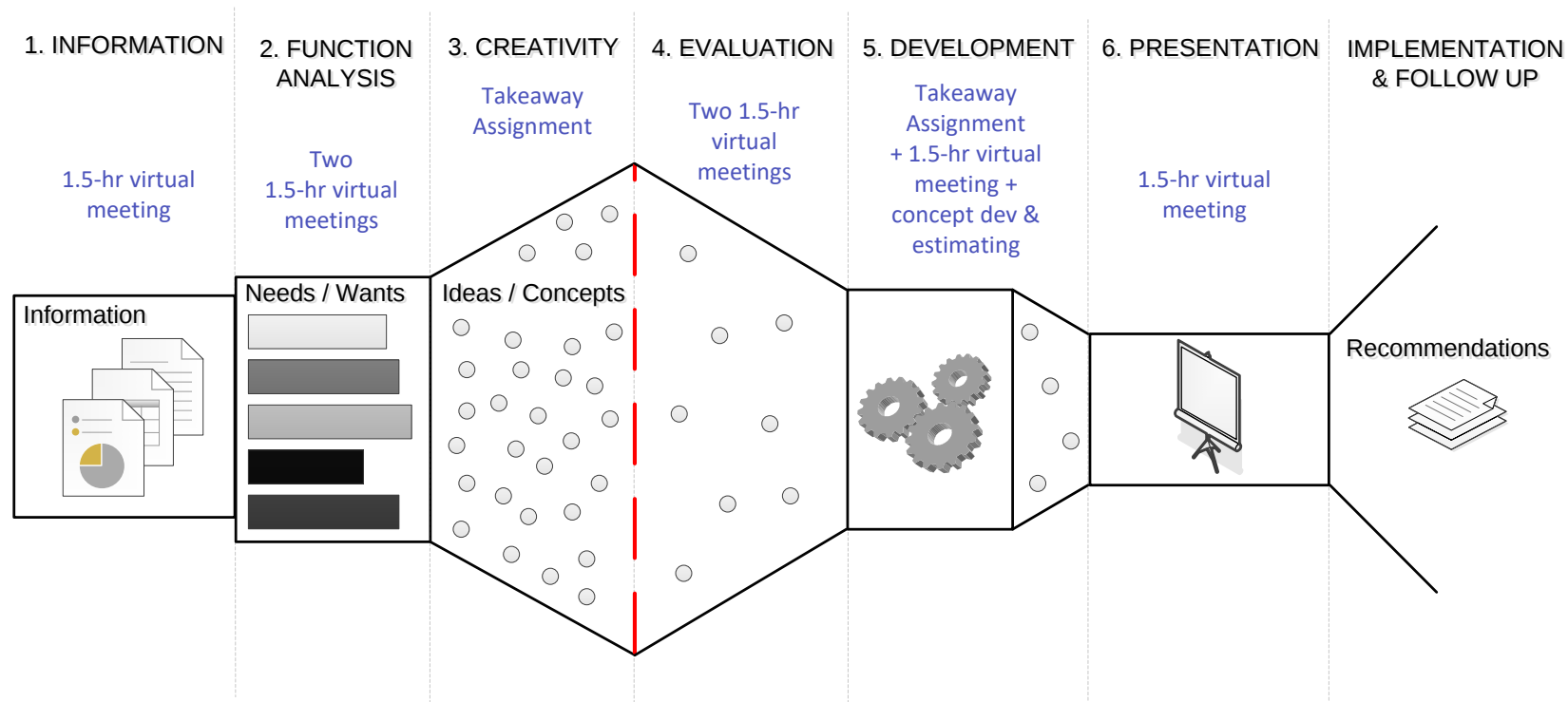
To utilize a **cross-functional team** approach following the six-step Value Methodology to **develop recommendations** for the design & execution of the M&R Station project that will **support** efforts to **reduce** the estimated project cost.



Our Multi-Disciplinary Team



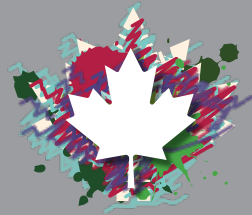
Virtual VM Process



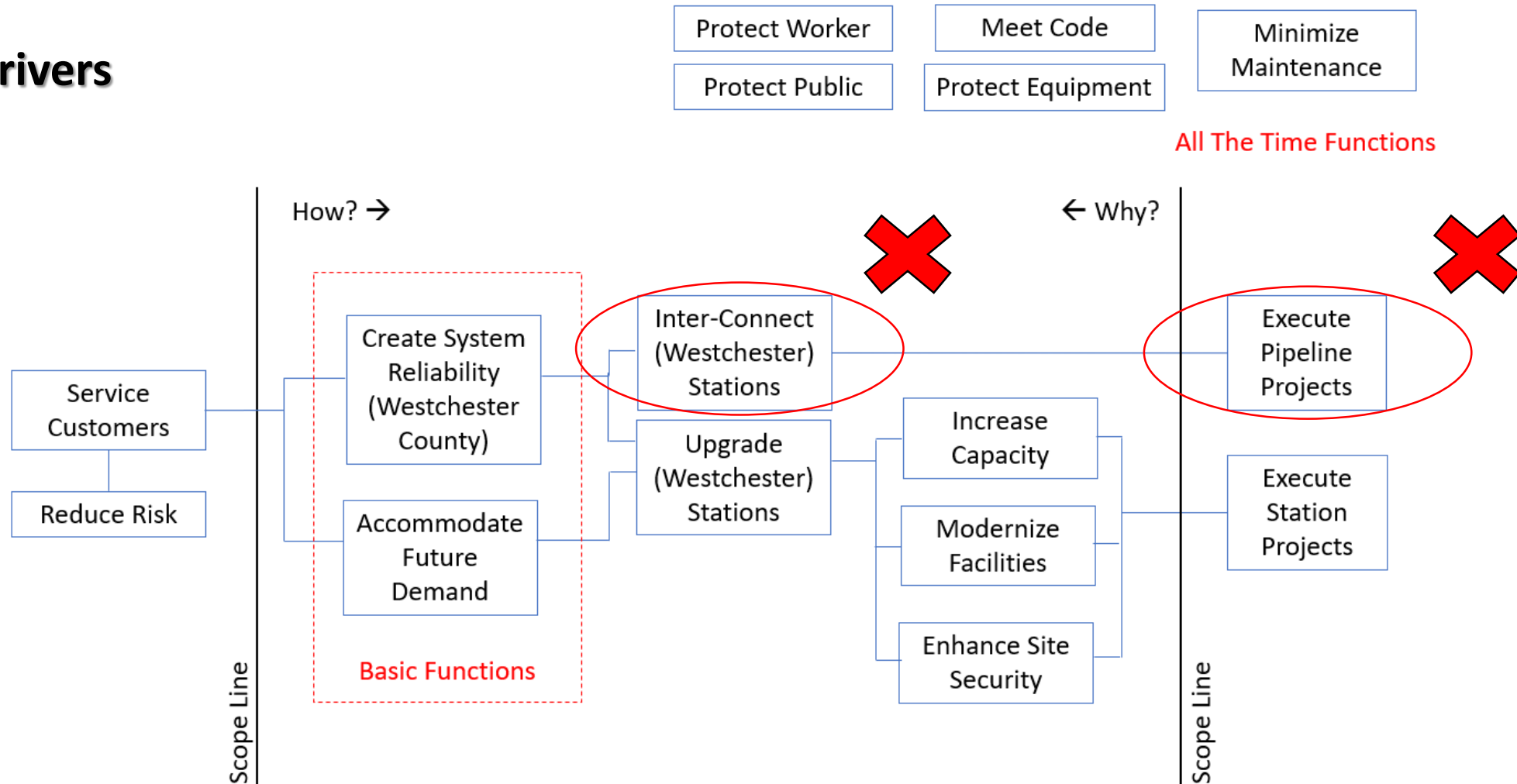
Collaborating Remotely Using Microsoft Teams



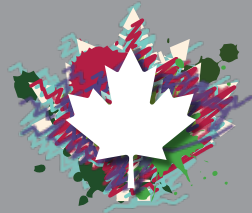
Function Analysis: FAST Diagram (Project)



Project Drivers

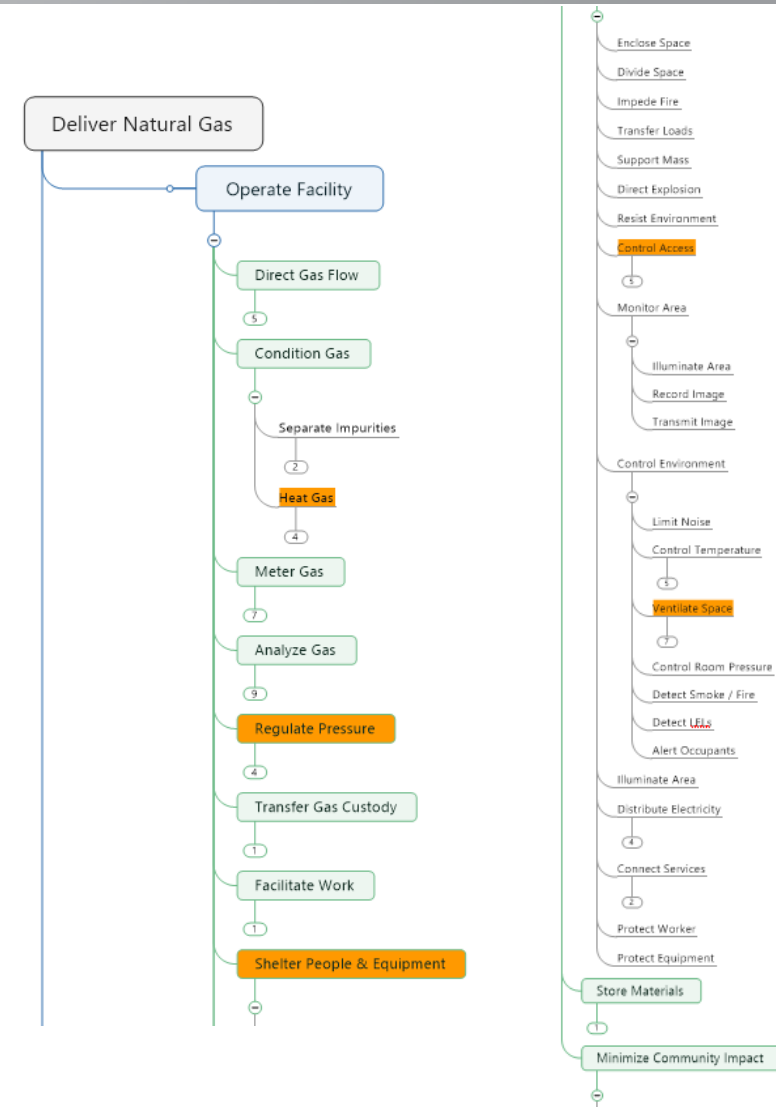


Function Analysis: FAST Diagram (Station)

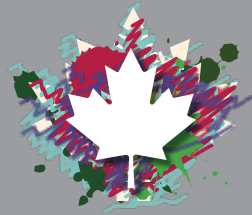


Target Functions (Areas of Focus):

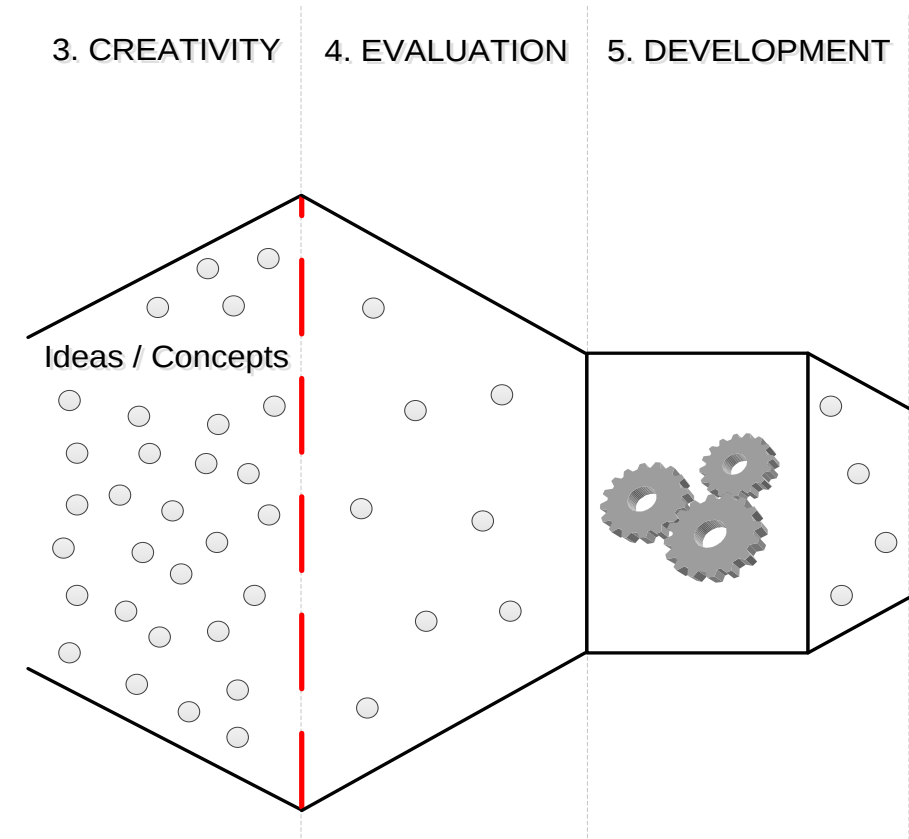
- Shelter People & Equipment (SPE)
- Heat Gas (HG)
- Regulate Pressure (RP)
- Ventilate Space (VS)
- Conceal Appearance (CA)
- Control Access (CoA)
- Execute Project (EP)
- Miscellaneous (MISC)



Idea Generation, Development & Evaluation



- **50+ ideas** generated during **Creativity Phase**
- **21 ideas** shortlisted for further development during the **Evaluation Phase**
 - Group 1: Building & Yard Related Ideas (9)
 - Group 2: Process Related Ideas (8)
 - Group 3: Other Ideas (4)
- **Initial Group Recommendations:**
 - Implement: 10 ideas
 - Reject: 6 ideas
 - Further Study: 5 ideas
- **13 complementary ideas** combined as one viable design alternative in the **Development Phase**
 - Mott Mac established design assumptions and prepared drawings mark-up
→ Bond prepared revised estimate
 - Two ideas still required Further Study





Proposed Design Alternative

Combined Ideas to Form a Viable Alternative to the Original Design

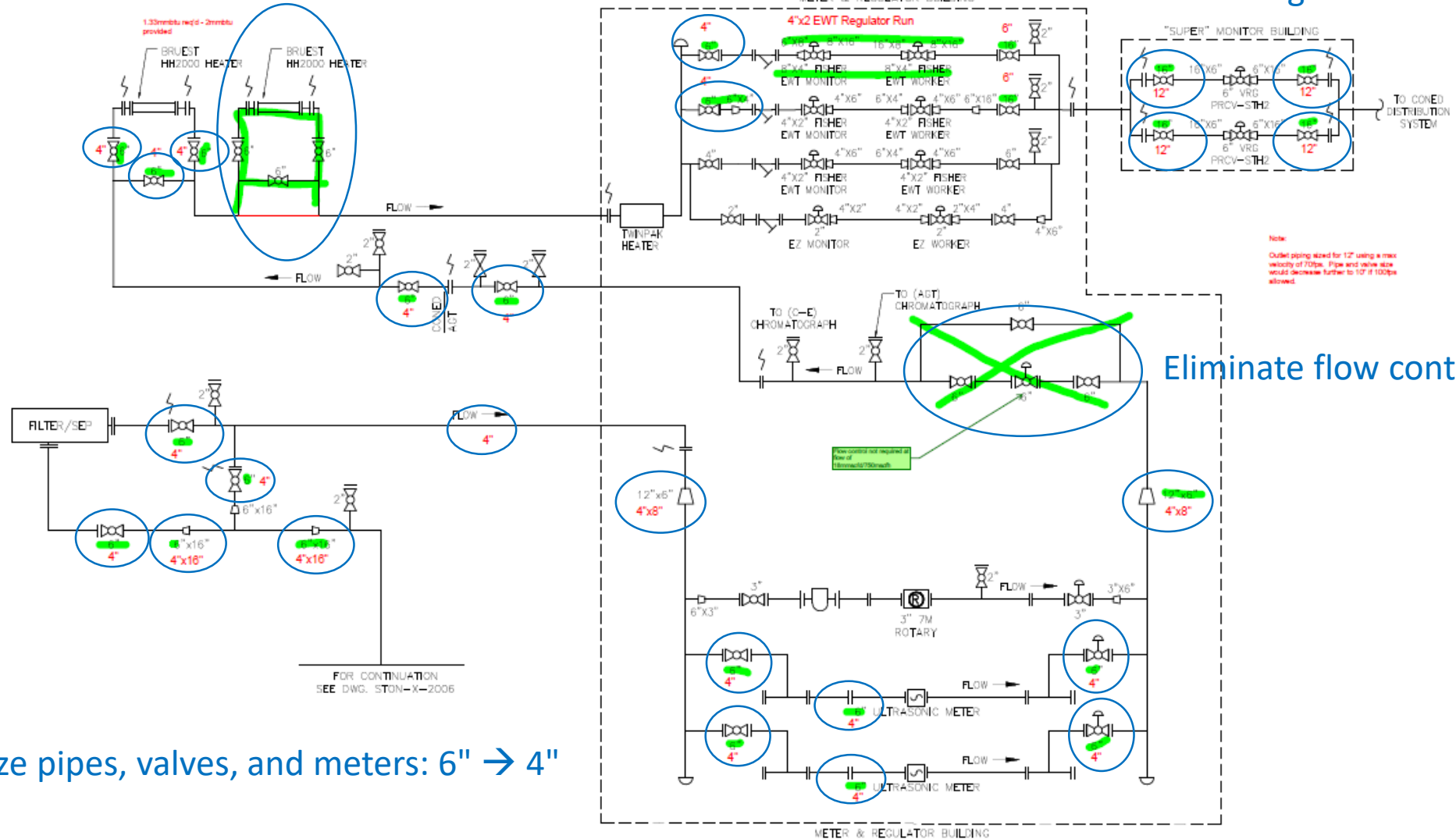




Gas Piping / Process Changes

Eliminate second heater

Downsize outlet piping at
OPP building: 16" → 12"



Eliminate flow control

Downsize pipes, valves, and meters: 6" → 4"

PROPOSED

CONCEPTUAL EQUIPMENT SIZING
FOR 750MSCFH PEAK FLOW

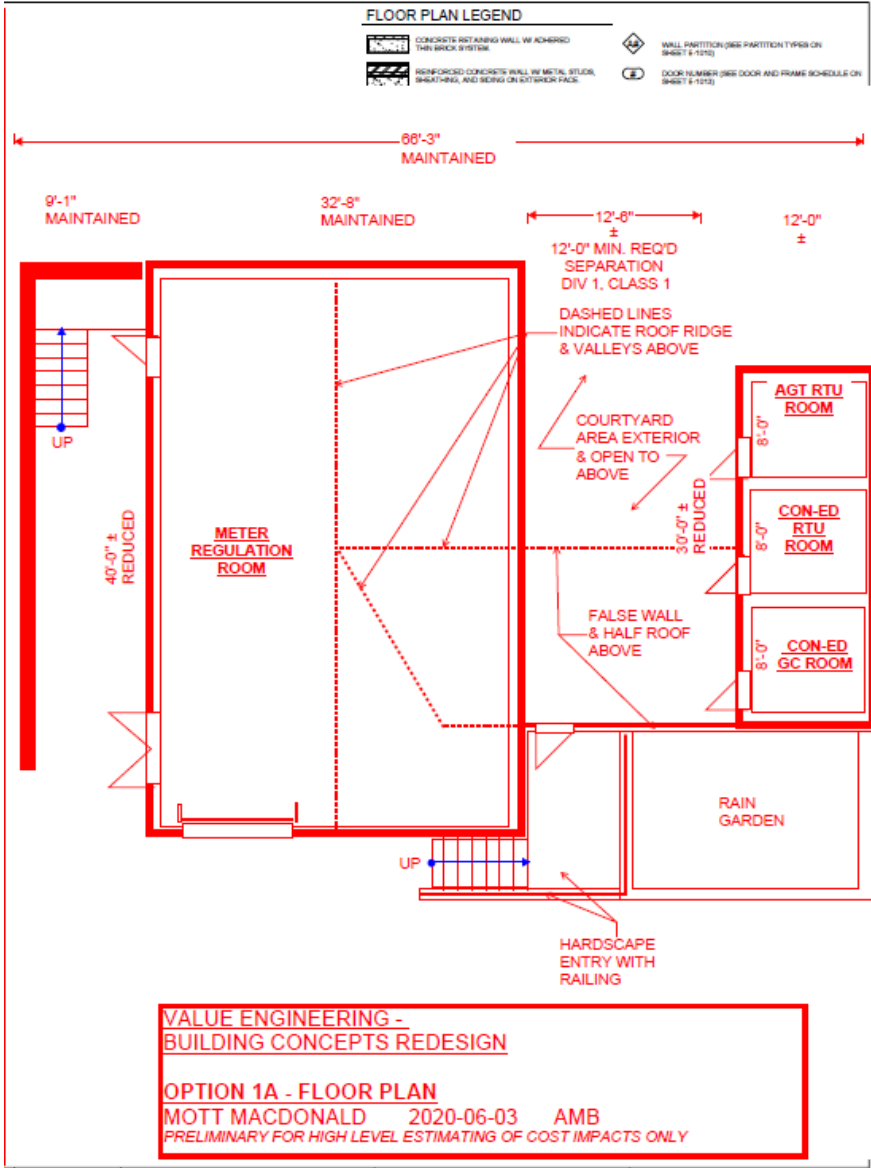


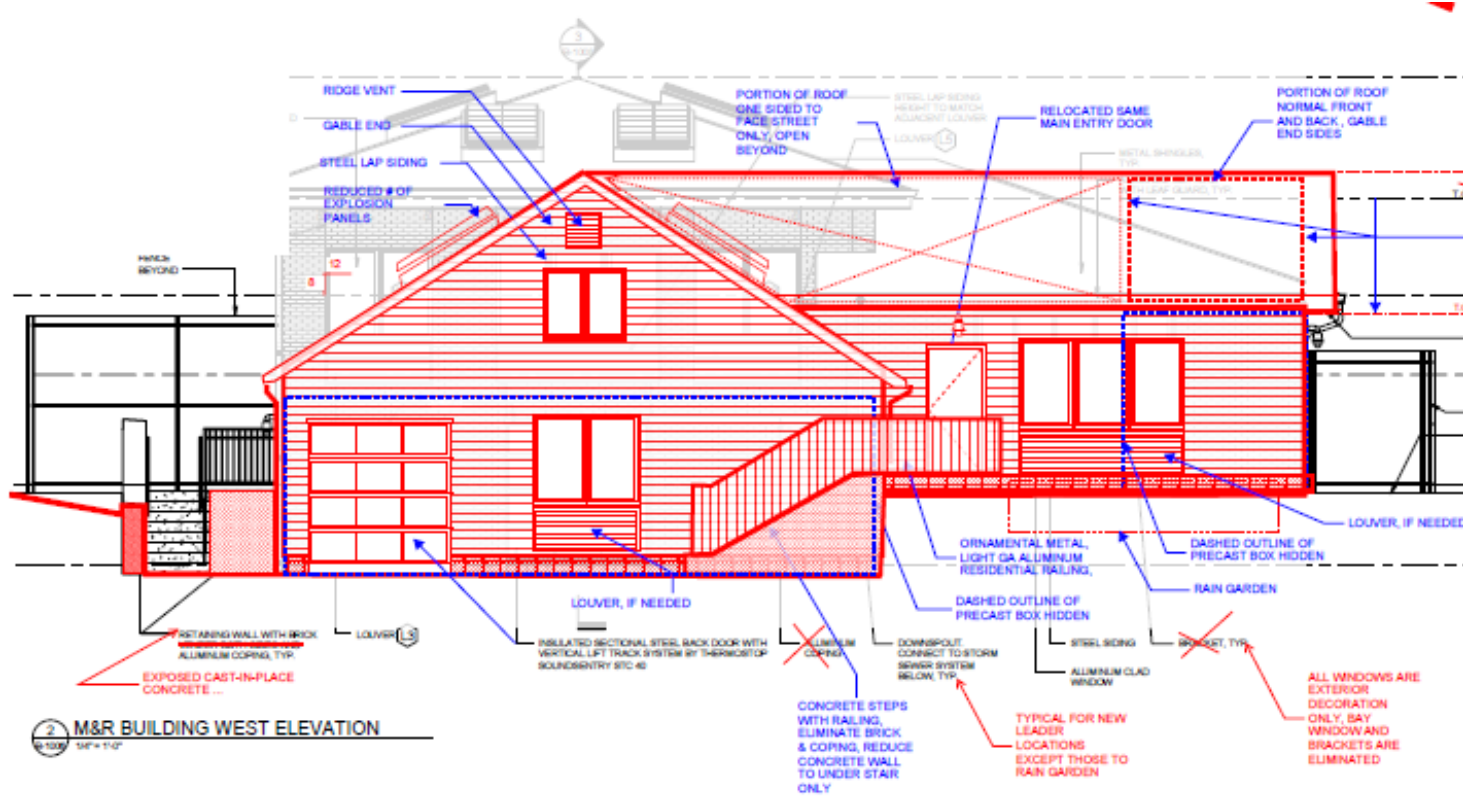




Proposed Layout

- Reduce building length by 12'
- Smaller 3-room DAC building
- Eliminated mechanical room & service corridor
- New partially covered / enclosed courtyard area between buildings with false wall and roof above
- Reconfigured stairs, entry and garden





Reduced relief panels
from 10 → 4

Removed all brick from
building; used steel lap
siding from original design
throughout

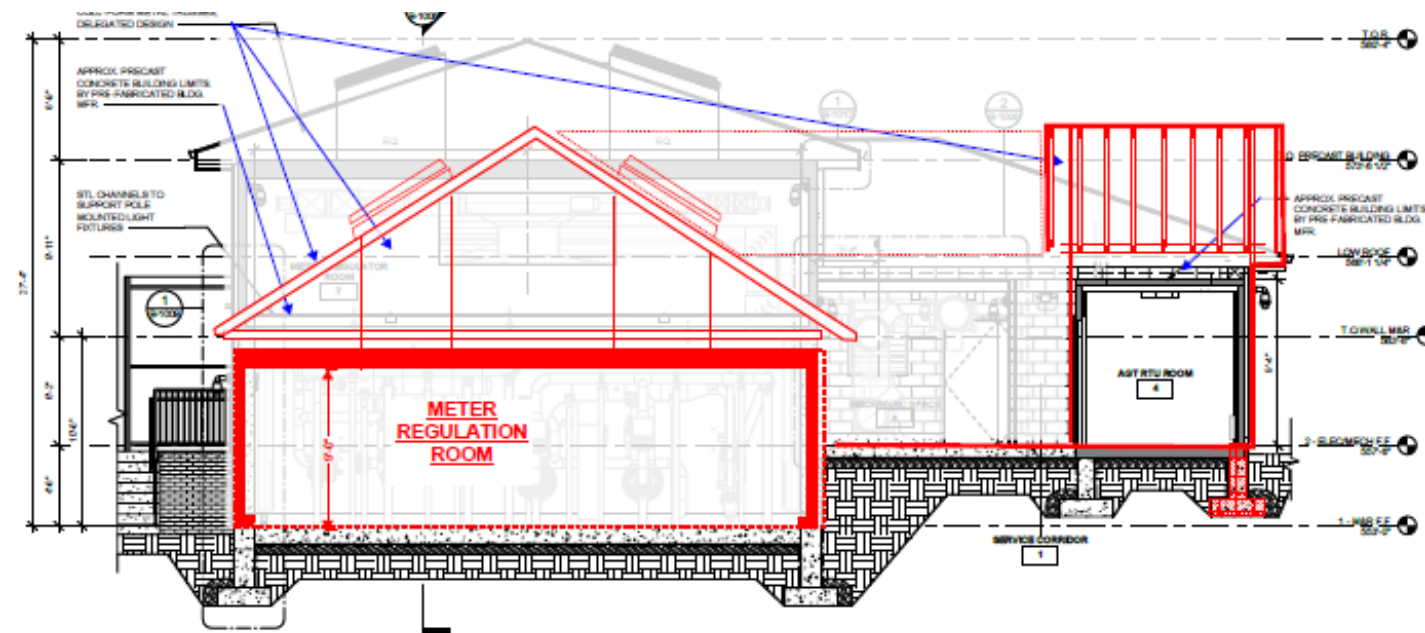
Hip Roof to Gable Ends,
throughout

Reconfigured Window &
louver layout to reflect single
floor + gable ends

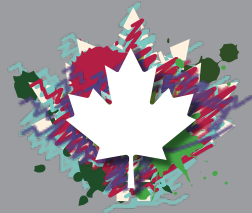
Added gable end vent(s)

"single floor" M&R building
- precast structure lowered
down to lowest original
elevation level

DAC building precast -
remains at same elevation
level, roughly similar size in
width; eliminated second
precast structure for AGT CG
room on other side of
hallway



Value Opportunities



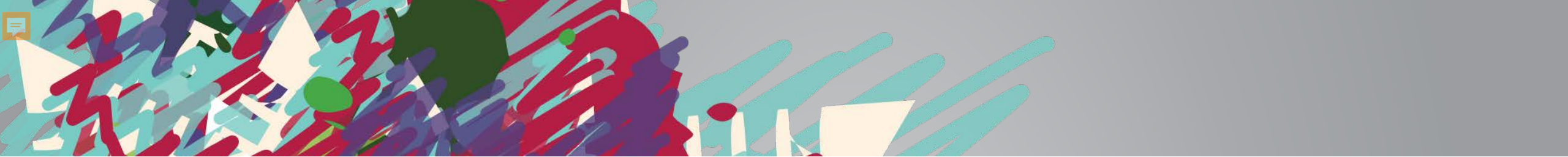
	Proposed Change	Cost of Original Concept	Cost of Proposed Concept	Savings Opportunity
M&R Building Ideas	Replace HVAC with Louvers & Fans	\$320,000	\$35,000	\$285,000
	Eliminate Mechanical Room	\$109,000	\$40,000	\$69,000
	Reduce Explosion Relief Panels (10 to 4)	\$86,000	\$35,000	\$51,000
	Reduce Windows (no bay window)	\$101,000	\$75,000	\$26,000
	Reduce FRP/Siding/Flashing/Brick Veneer	\$145,000	\$95,000	\$50,000
	Reduce M&R Building Footprint	\$135,000	\$103,000	\$32,000
	Downsize Piping/Valves/Meters	\$387,000	\$345,000	\$42,000
	Easier Roof Design (Gable vs. Hip)	\$160,000	\$140,000	\$20,000
	Reduce DAC Building Rooms (4 to 3)			\$20,000
Independent Ideas	Reduce Retaining Walls	\$246,000	\$178,000	\$68,000
	Eliminate OPP Building (Direct Bury)	\$330,000	\$160,000	\$170,000
	Eliminate & Re-purpose One Heater	\$740,000	\$370,000	\$370,000
	Assign ConEd Full Ownership of Station (Reduce FIT)	\$996,000	\$500,000	\$496,000
Engineering	Additional Engineering / Re-design Costs	\$0	\$300,000	-\$300,000
Totals:		\$3,755,000	\$2,376,000	\$1,399,000

NOTES:

- Functionality maintained
- Conservative estimates
- Lifecycle cost benefits exist, but not quantified
- Additional indirect cost reductions will apply

Potential Savings Totalled \$1.4M
 >10% of remaining cost that could be influenced





4.

Success Factors



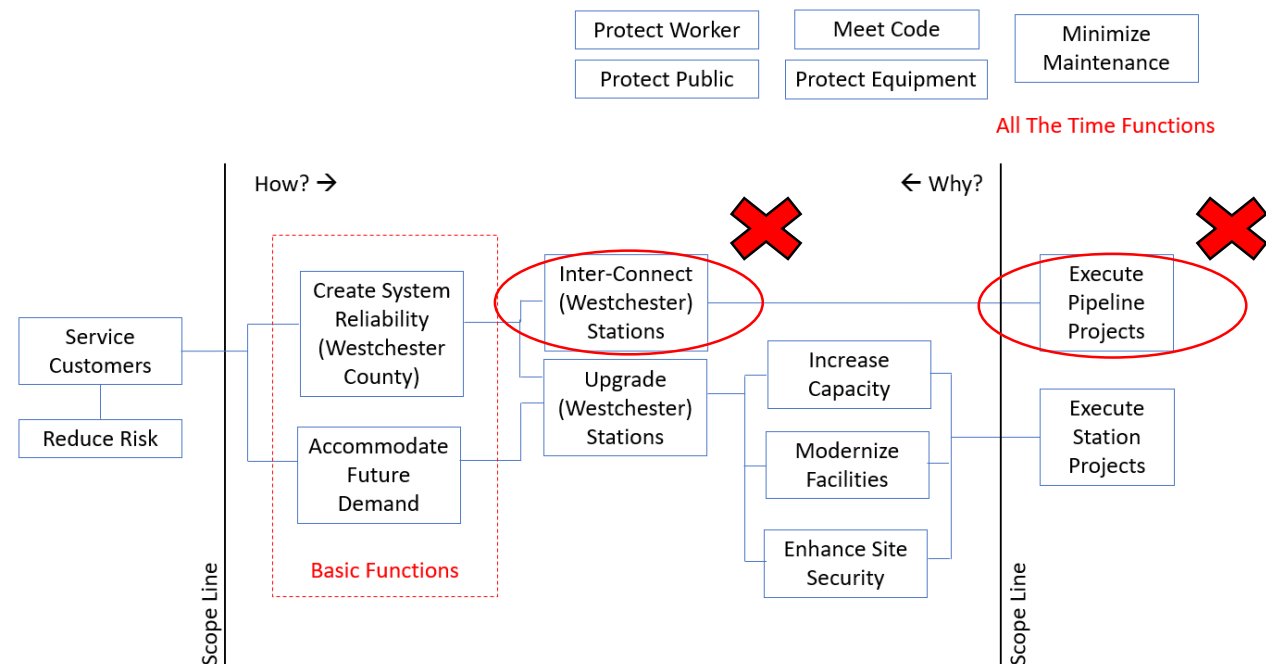
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- ☐ _____
- ☐ _____
- ☐ _____



Success Factors



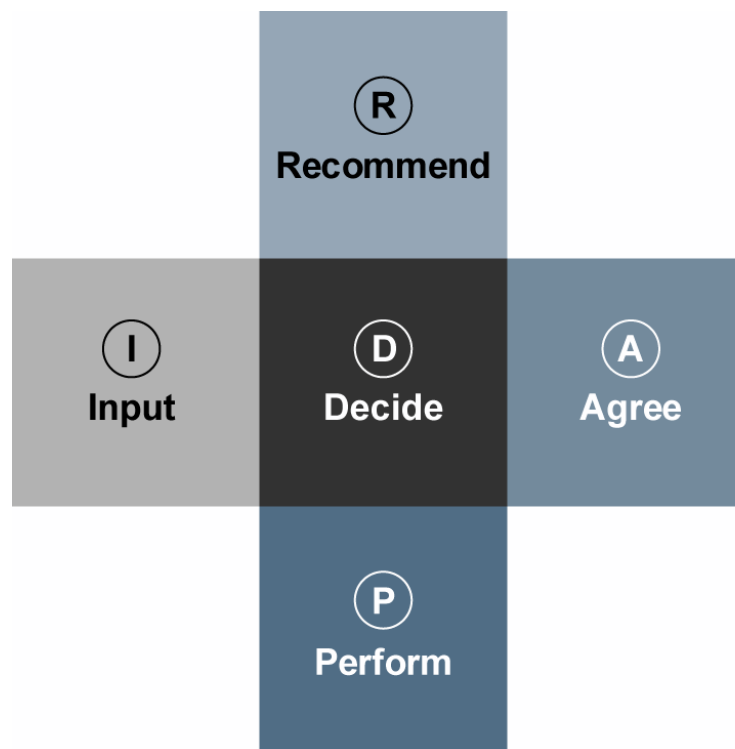
- Understanding Needs vs. Wants
-
-
-
-



Success Factors



- ☐ Understanding Needs vs. Wants
- ☐ Decision Effectiveness
- ☐
- ☐



- R** Makes a recommendation for a decision (80% of work happens here)
- A** Individual who must be consulted in the development of a recommendation (cannot be ignored)
- P** Accountable for executing the decision, once it is made
- I** Provides critical expertise, experience, information that helps develop recommendation (information used at discretion of R)
- D** Commits the organization to action

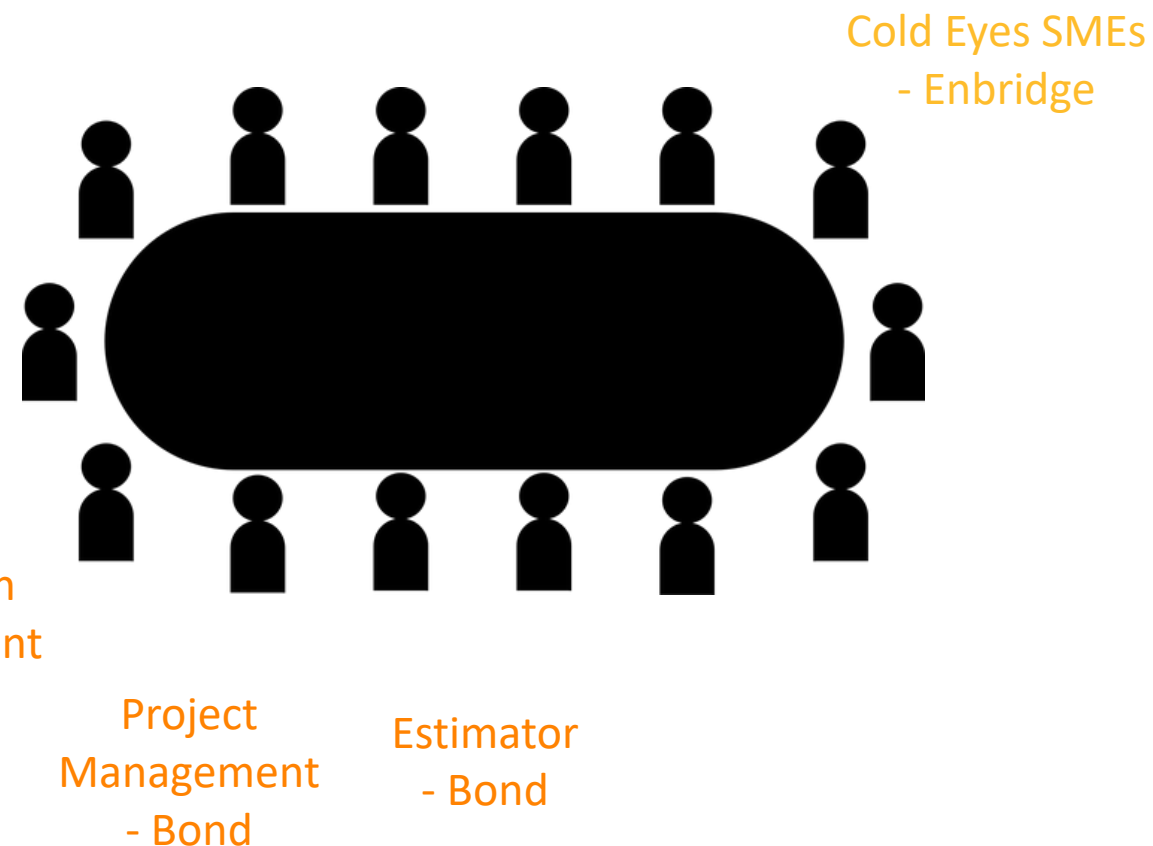
Note: RAPID® is a registered trademark of Bain & Company, Inc.



Success Factors



- ☐ Understanding Needs vs. Wants
- ☐ Decision Effectiveness
- ☐ Cold Eyes SMEs & Contractor Input
- ☐

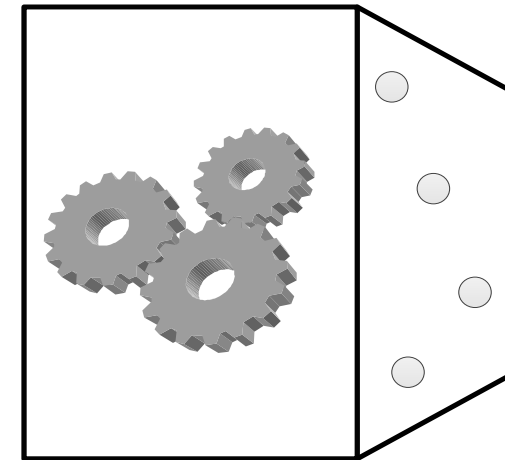


Success Factors



- ☐ Understanding Needs vs. Wants
- ☐ Decision Effectiveness
- ☐ Cold Eyes SMEs & Contractor Input
- ☐ Extended Development Time

5. DEVELOPMENT





Thanks for Listening!

