The Value in Value Engineering

MSBA Roundtable

March 22, 2021

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Introductions

Anthony Dunams

Value Management Team Lead

Arcadis Value Management Program Lead, Licensed Value Management Associate (VMA) and Professional Engineer (PE)

Howard Greenfield

Value Management Team Lead

Licensed Certified Value Specialist (CVS) trained as a structural engineer. Senior VE Facilitator with Arcadis

Brian Oblon

Vice President

Area Operations Leader for Massachusetts and Connecticut OPM Group

Vikas Nagardeolekar

Senior Project Manager

Western Massachusetts and Connecticut OPM Project Director

Steve Brown

Senior Project Manager

Eastern Massachusetts OPM Project Director

Arcadis Overview

Places - Mobility - Resiliency

Impact through Sustainable Solutions

Embedding sustainability across everything we do, with a focus on competitive, resilient and effective solutions for our clients within planetary boundaries

North America

5,500+ staff

100+ offices

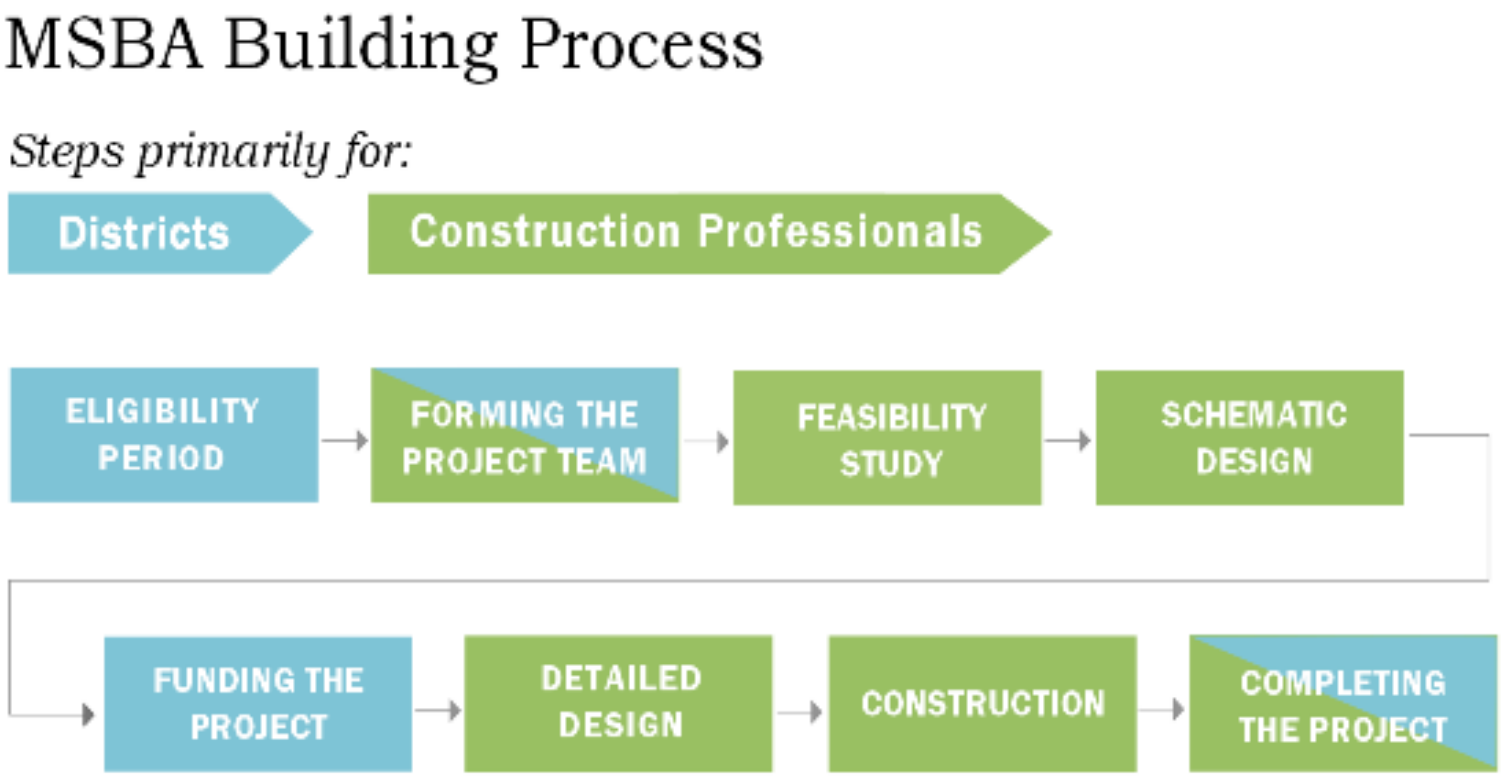
Massachusetts

75+ staff ma staff

5 offices

$2B Northeast Education Projects as OPM

MSBA Building Process



VE

Overview

Value Engineering Defined

Let’s get on the same page!

What most may think it is

- A means to reduce cost of the project at a point in time during the project, most often prior to bidding or worse once a project comes in overbid to meet the client’s budget.

Acceptable terminology

Value Methodology

Value Engineering

Value Management

As Defined by SAVE International

- *A systematic **process** used by a multidisciplinary team, led by a qualified facilitator, to improve the value of a project, product, process, service or organization through the analysis of functions*

- It is a process in which
  - Unnecessary cost are identified in a project
  - Alternatives are offered while assuring that quality, reliability, life cycle cost, and other critical factors meet or exceed the customer’s expectations

Making the Case– Hospital Renovation

Project Manager Interview

- Question: Why no VE study?
  - VE study would have added to much time to the already tight schedule
  - Would have tied up too many resources who were already very busy
  - The budget estimate was not too extreme
- Question: How did the project end up?
  - Late
  - Over budget
  - With many change orders increasing the project cost
- Question: In hindsight, do you believe a VE study would have helped?
  - Maybe

From Dr. Brandon – Director of the Army Continuous Process Improvement Program Office

This provides a common overview of the challenges with value engineering

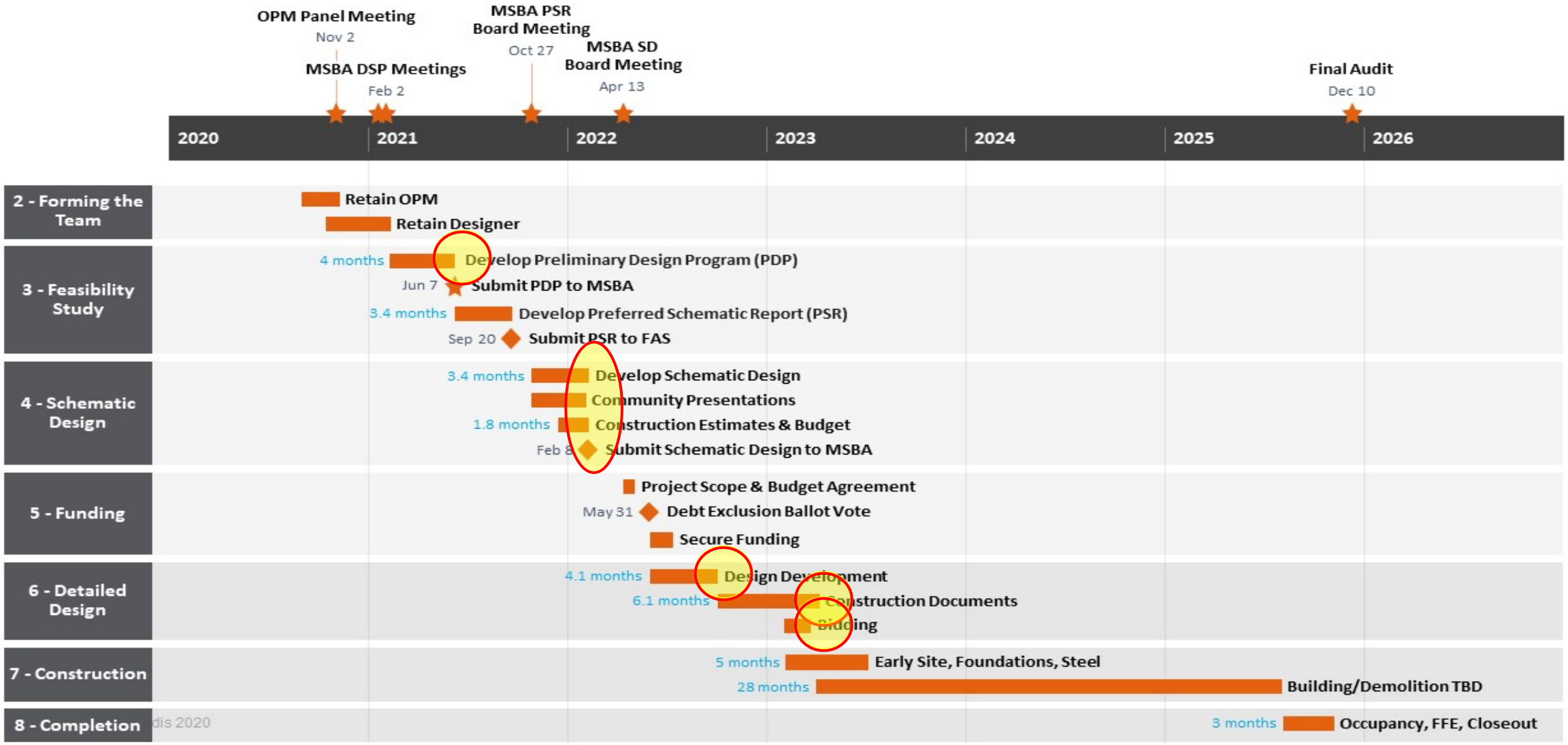
Value Engineering Background and Purpose

A systematic approach to mange value though innovative change

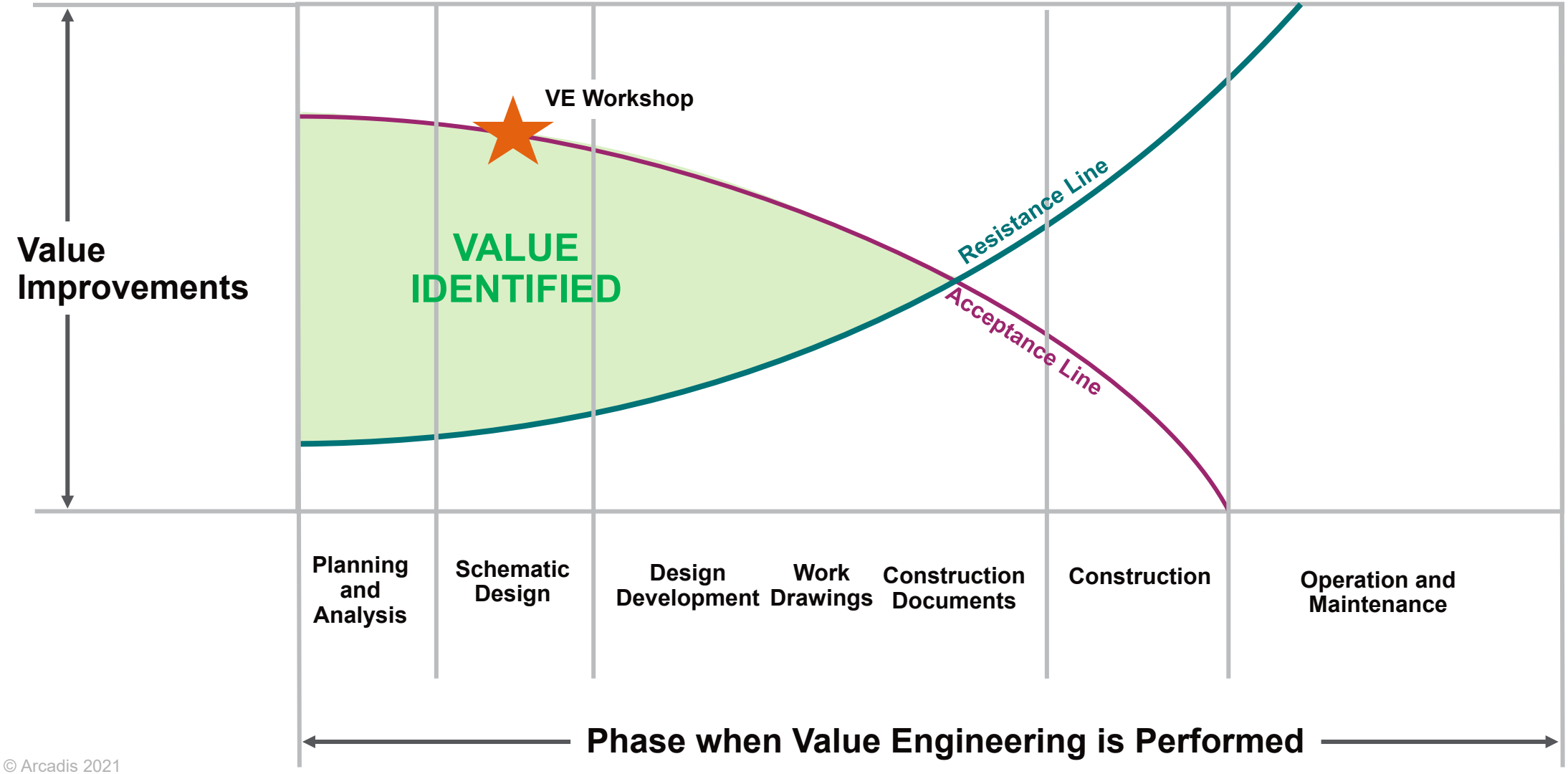
- Created in the 1940s by Larry Miles with GE (addressing labor and material shortages)
- Function Analysis – breaking down the project to the basic core functions and extricating value within each function
  - Gets to the root reason of the problem faced
  - Costs linked to functions not components
- Multidisciplinary team of SMEs tackling each project
- Uses a Job plan – six step workshop process (divergent and then convergent thinking)
- Incorporates sustainability, asset management, lifecycle costing, reliability centered maintenance/design, design thinking, etc …

$$Value = \frac{Function\ or\ Performance}{Cost/Time/Resources}$$

VE Opportunities



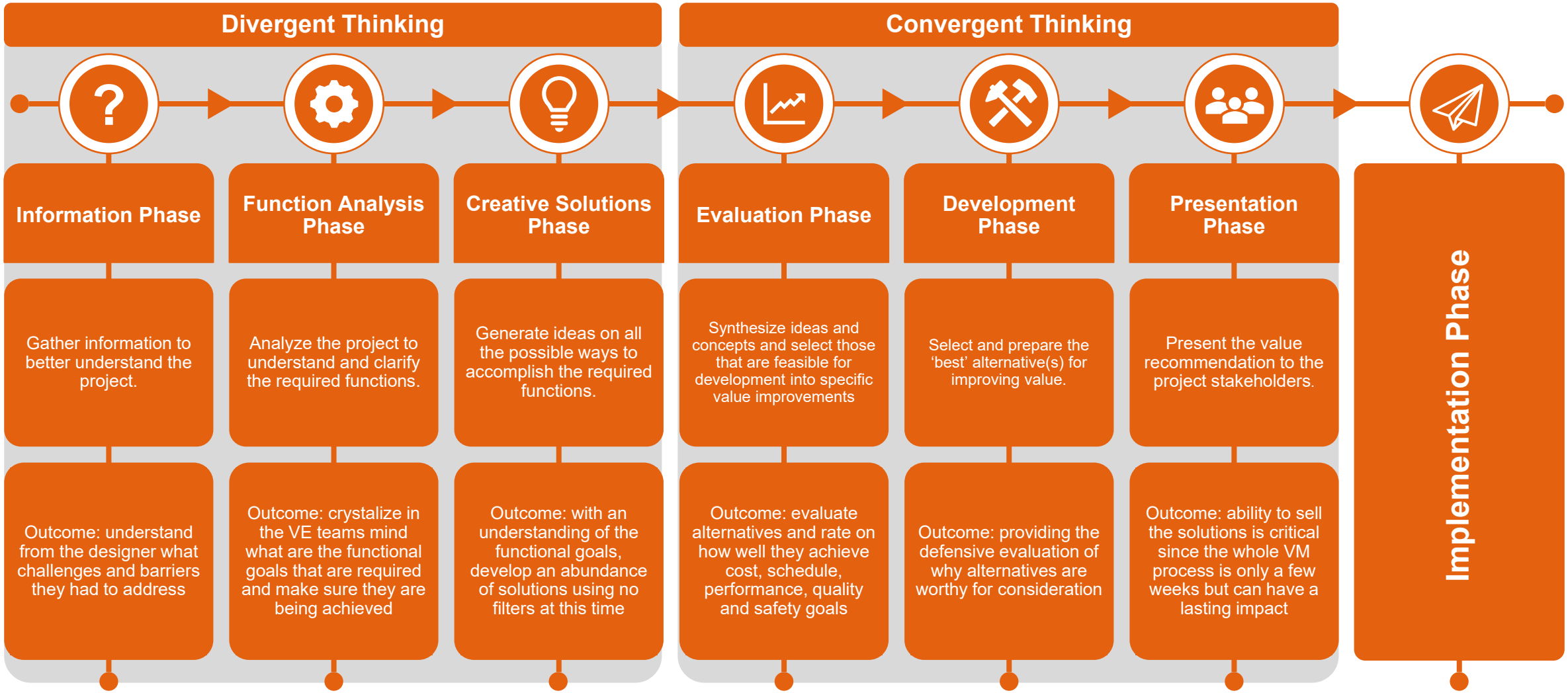
When Value Engineering is more impactful for the Client



Comparison of Value Engineering

	Solution Approach	Formal Value Engineering Study	Informal VE or Cost Cutting
	**Process**	Workshop addressing functional improvements to the project that occur early on as a Value Planning exercise or as early as the 30% design level as a Value Engineering exercise	11th hour informal meeting to figure out how to cut costs to meet MSBA/school system budget after bids come in
	**Schedule**	3 to 5-day planned workshop evaluating and developing solutions achieving the desired function of the school construction covering information gathering, defining goal functions, brainstorming solutions, evaluating solutions, developing recommended proposals, and presenting findings. Value is increased as cost decreases or functionality increases	After cost estimate comes in high an informal meeting is scheduled to cut cost de-valuing the impact and desired scope of the project. Value is decreased and cost is decreased.
	**Involved**	Independent team of seasoned and experienced subject matter experts in school design and construction, MEP engineers, structural engineers, architect, cost and constructability engineers	A vested and guarded team usually consisting of the designer and the contractor
	**Inputs**	Review project materials including project drawings, project reports, project cost estimate, and a presentation by the design team and stakeholders on the current design concept	Page turn through CD documents looking to remove scope to address cost issues
	**Outputs**	Value-inducing proposals developed that support the desired function of the project without compromising the scope of the project	Removal or replacement of construction elements deemed expensive

VE Workshop Process




VE
Outcomes

Value Engineering Outcomes and Evidence

1. Options Selection

2. Optimizing Space Utilization

3. Incorporating New Technologies

4. Incorporating sustainable thinking and materials

5. Confirms design direction

6. Accelerates the design process

7. Managing rising project costs

8. Maximizing life-cycle value

9. Mitigating risks

10. Optimizing construction schedule

11. Incorporating reliability-centered design and maintenance concepts

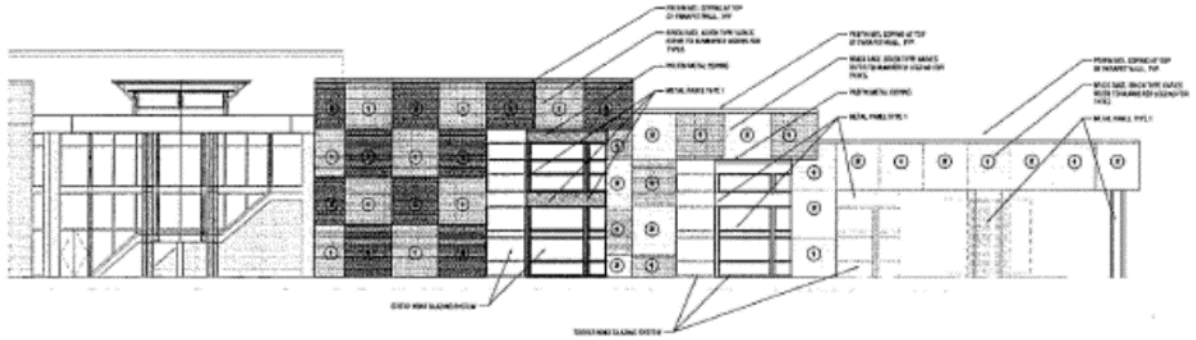
12. Right-sizing project costs with project budget

Public Schools Rehabilitation Example

Middle School – Virginia

The Problem:

This project partially rehabilitates the auditorium and gymnasium of the existing Middle School and adds a new three-story classroom wing, cafeteria, kitchen, technical education laboratory, media center, locker rooms and other support spaces to create a 130,850 square foot facility. The base building will accommodate 750 students with alternatives to add additional classrooms and an auxiliary gymnasium to support a student population of 900.



Elevation

The VE Solution:

20-hour face to face VE study addressing cost reductions and function enhancement meeting schedule constraints.

COST HISTOGRAM

PROJECT: CAVE SPRING MIDDLE SCHOOL, ROANOKE, VA (Schematic Design)

SIZE OF PROJECT (sq.ft.): 130,290

PROJECT ELEMENT	COST	PERCENT	CUM. PERCENT	COST PER SQ. FT.
HVAC	4,286,895	21.66%	21.66%	32.90
Structural System	2,602,102	13.15%	34.81%	19.97
Electrical Power	1,808,340	9.14%	43.94%	13.88
Site Work	1,533,083	7.75%	51.69%	11.77

The Result:

- Key improvements address the simplification of the building design, modifying the structural design and electrical requirements, and reducing excess removal of excavated material. Design suggestion also provided isolation treatments for areas under the existing and proposed auxiliary gymnasiums to provide a less disruptive environment for those spaces below the gym floors.
- ECC is $24.3M with potential recommended savings of $0.7M

Public Schools Rehabilitation Example

Middle School – Virginia

Specific Outcomes:

Options Selection

- Class placement optimization – locate disabled learning area away from noisy auxiliary gym to eliminate unnecessary noise for students with heightened sensory concerns

Space Utilization Optimization

- Simplify shape of cafeteria – square up cafeteria and simplify roof design for $100K in CAPEX savings

Manage Rising Project Costs

- Utilize bar joists in lieu of rolled beams – economical approach to constructing a concrete elevated slab system saving 1/3 the cost of the elevated slab construction
- Utilize a bioretention filter for stormwater management water quality improvements in lieu of Filterra Units – reduces the capital costs of SWM in half

Public Schools Rehabilitation Example

Elementary School – Massachusetts

The Problem:

Arcadis served as the OPM for this $28M project constructed on the fully occupied site of the existing school. The new elementary school is based on a team-teaching model with clustered classroom designs and accommodates special education requirements through additional teaching spaces.

The Solution:

In addition to OPM services, Arcadis provided informal VE services as the project went from a feasibility to a constructed project.

The Result:

- Project came in below budget with no safety issues encountered.
- VE solutions targeted 1) utilization of unused parcel of land; 2) employed healthy building materials and initiatives such as integrated BMS systems, grey water harvesting, and emergency generator fueled by natural gas; 3) construction phasing minimized disruptions and material selection avoided long lead times; and 4) incorporation of sustainable materials to reduce future maintenance costs.


KEY
Take-aways for MSBA projects

Key take-aways for MSBA Projects

Track record of benefits, project improvements and ROI (as high as 300:1)

Alignment of client goals with design team effort driving program level decisions

Opportunity to reduce / manage costs while ensuring scope and / or adding project functionality

Solutions cover cost of study (100% of the time) with project savings of 5 to 15 percent