

Value Engineering 101

INTRODUCTION TO VALUE ENGINEERING

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A ship in port is safe, but that's not what ships are built for.

Grace Hopper

There is as much risk in doing nothing as in doing something.

Trammell Crow

No one ever achieved greatness by playing it safe.

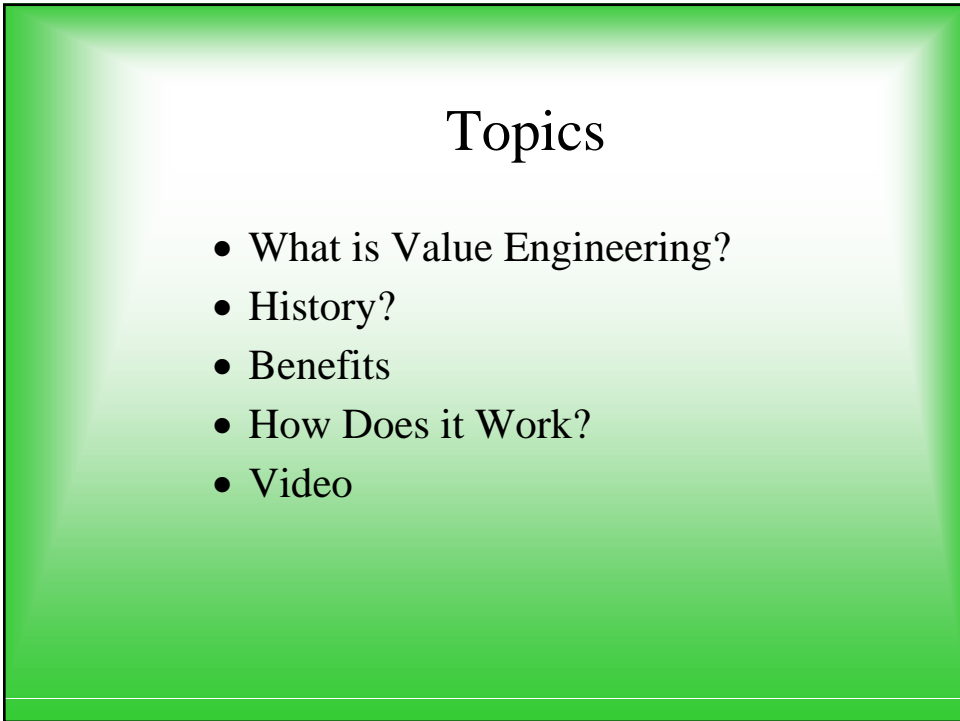
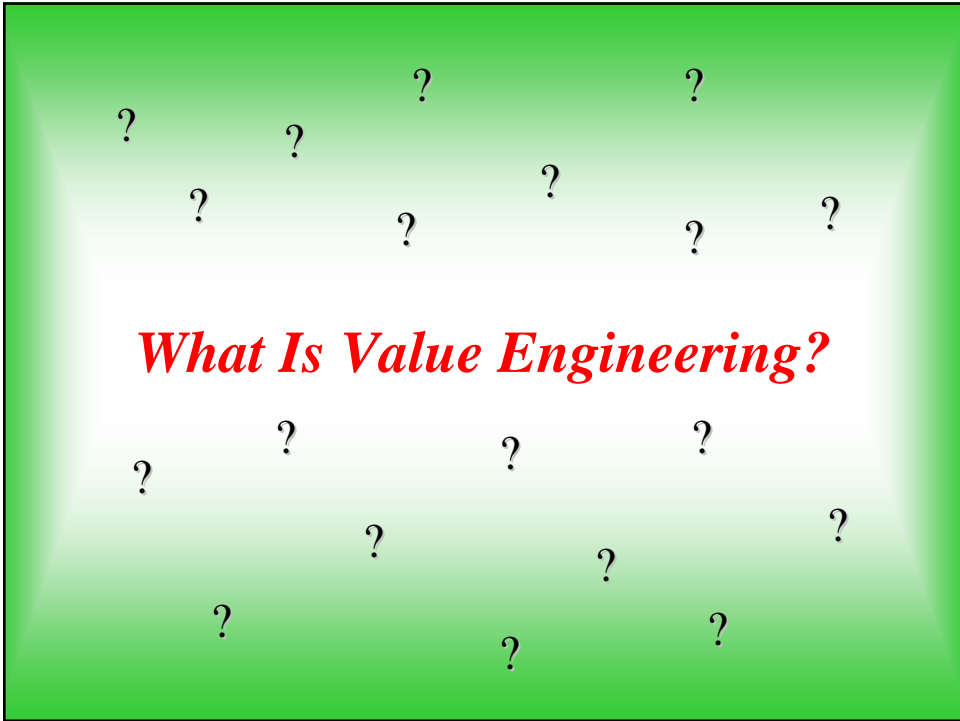
Harry Gray

You can't steal second with your foot on first.

Chuck Noe

Cost and Quality have no direct relations

Larry Miles



Value Engineering Definition

The systematic application of recognized techniques which:

- Identify the function of a product or service,
- Establish a value for that function, and
- Provide the necessary function reliably at the least overall cost.



Value Engineering Definition (con't)

In all instances, the required function should be achieved at the lowest possible life cycle cost consistent with requirements and/or performance, maintainability, safety and aesthetics.

Questions, Questions...

- **You're probably thinking:**

Why use Value Engineering?

Don't we do it all the time?

How can it help me? Really?

What's it all about?

Value Engineering is:

- A structured and systematic problem solving methodology
- A process designed to find creative alternative solutions
- Applied in a workshop environment by a Multidisciplinary team



Value Engineering is: (continued)

- Concerned with life cycle costs
- A flexible set of techniques
- Function oriented
- Focused on



*How Can We Improve
Value?"*

What VE Is Not:

- Not just good engineering
- Not a suggestion program
- Not a routine project or plan review
- Not a cost reduction exercise

Value Engineering is also known as:

- Value Analysis,
- Value Planning,
- Value Management



Value Engineering Definitions

Value comes in more than one form.



Money



Environment



Family



Time

History of VE

- Larry Miles (1904-1985)
- Purchasing Engineer for General Electric
- During WW2 a problem arose regarding scarce materials for superchargers for B-17 and P-47.
- Larry did not solve the problem, he solved the function



The First VE Study

- Larry and his team determined the function of each part in the turbocharger.
- Found more cost effective materials to achieve the necessary functions.
- Pratt&Whitney Canada still have a VE program for development of engines.



History of Value Engineering

VE Timeline

1940's	Miles develops VE at General Electric
1950's	U.S. Navy adopts VE
1960's	VE spreads in various government and industrial bodies – Military Construction, U.S. Manufacturers, Department of Defence, Europe and Australia
1970's	Japan, Federal Highway Association, GSA, and EPA adopt VE
1980's	Federal laws mandating use
1995	MTO's First VE Study: Hwy 69
1997	MTO's first Module 1 training was hosted in Kingston
1998	Ontario Ministry of Transportation Initiates VE Program for Capital Projects

Who Uses VE?

Value Engineering is used anywhere

Value for money is a concern:

- Purchasing
- Construction,
- Manufacturing
- Engineering
- Services Industry
- Health Care
- Government

Who Uses VE?

Organizations who have a climate that accepts change, have problems, and a concern for value for money:

- Pratt&Whitney
- Magna
- Canadian tire
- Shell
- MTO, Manitoba, Alberta, BC, Quebec
- Halton, Niagara, Peel, York, Durham
- DND, Transport Canada, Public Works
- United States – Parks, Highways, Interior, State, Defence, Army Corps...

Why Use VE?

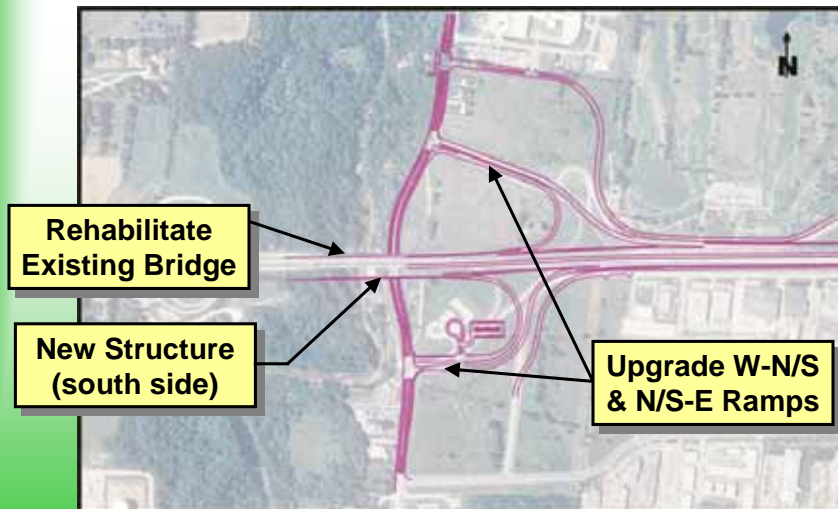
- Knowledge of Value Engineering will improve your ability to manage projects, solve problems, innovate, and communicate.
- A VE program in your organization will provide your staff with a definitive tool to improve value in any product, project or process.
- Cost savings, risk reduction, schedule improvements and even improved job satisfaction can and have been the outcomes of VE studies.

Why Does VE Work

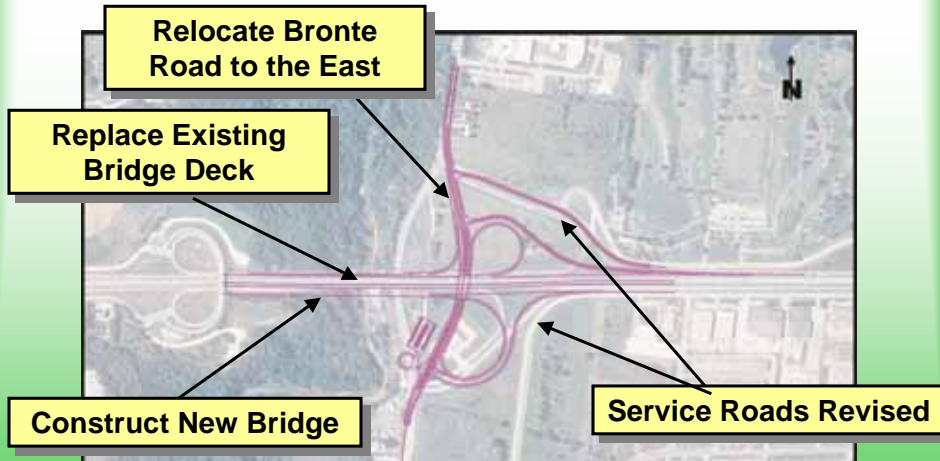
- All Projects Have Unnecessary Costs
- Decisions Are Often Made Without Knowing The Cost Impact
- The Design Process Focuses On Expected Solutions
- Function Analysis



Expected Solutions



VE Solution



Move Bronte Road east, provide a better interchange

Challenge Paradigms...



Why Does VE Work

- Function Analysis Ensures Compatibility Between Capital Decisions And Program Requirements
- Focus Of A VE Study Is

“How Can We Improve Value?”



Function

Function:

*is the fundamental concept
underlying Value Engineering.*

Function

Function Analysis

- “Heart” of VE Process
- A New Way of Thinking
- A Catalyst to a Paradigm Shift

VETF

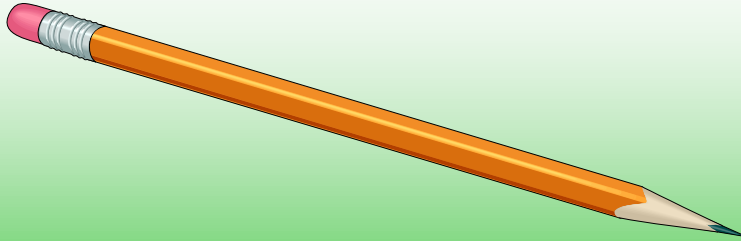
Function Analysis

The Two-Word Definition

- Verb - Noun
- Forces Conciseness
- Separates Functions
- Fosters A Mutual Understanding
- Gets to *What must be done?* Rather than *How it is being done*

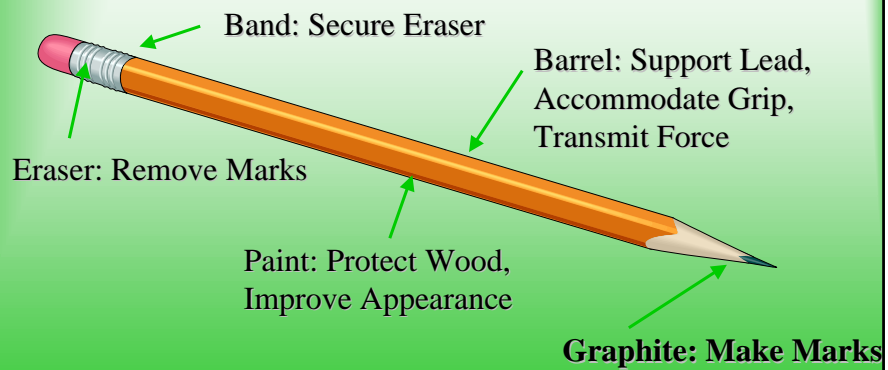
Pencil Example

- **What is the function of a pencil?**



Function Analysis Example

Pencil: Makes Marks



Pencil Example make marks

Pencil

•eraser	S	remove marks
•band	S	hold eraser
•barrel	S	hold graphite
•paint	S	protect wood/add beauty
•markings	S	identify product
•graphite	B	make marks

B – Basic Function

S – Secondary/Supporting Function

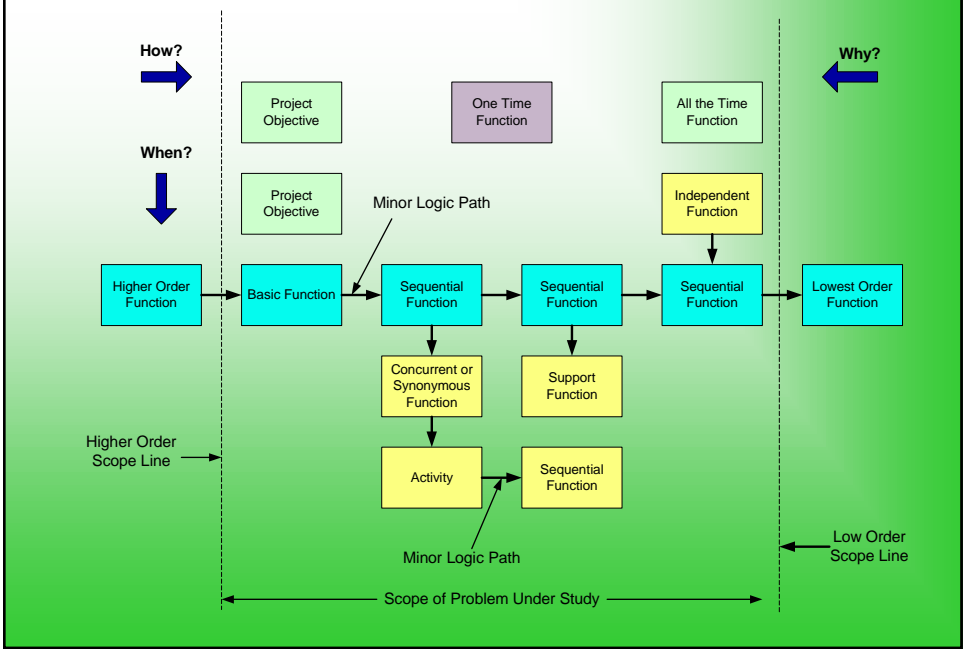
FAST Diagrams

- Function Analysis System Technique
- Invented by Mr. Charles Bytheway c. 1964
- Depicts “How” and “Why”
- Focuses VE study on the critical path functions
- Common myth

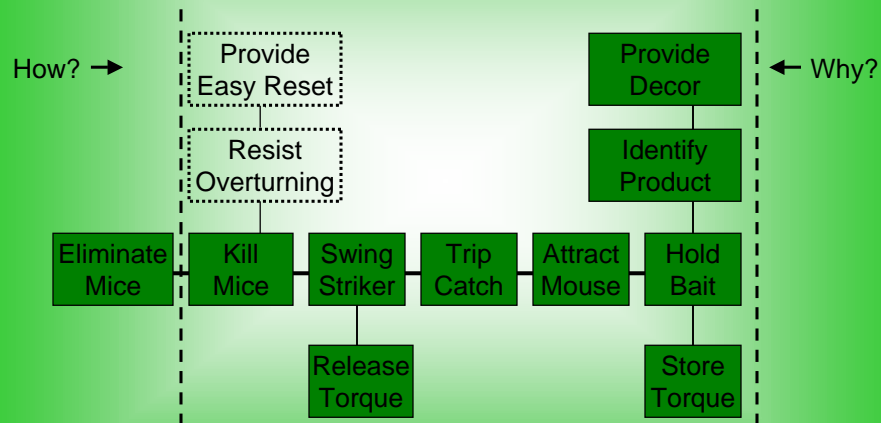
The First FAST Diagram



Function Analysis Phase



Mousetrap FAST Example



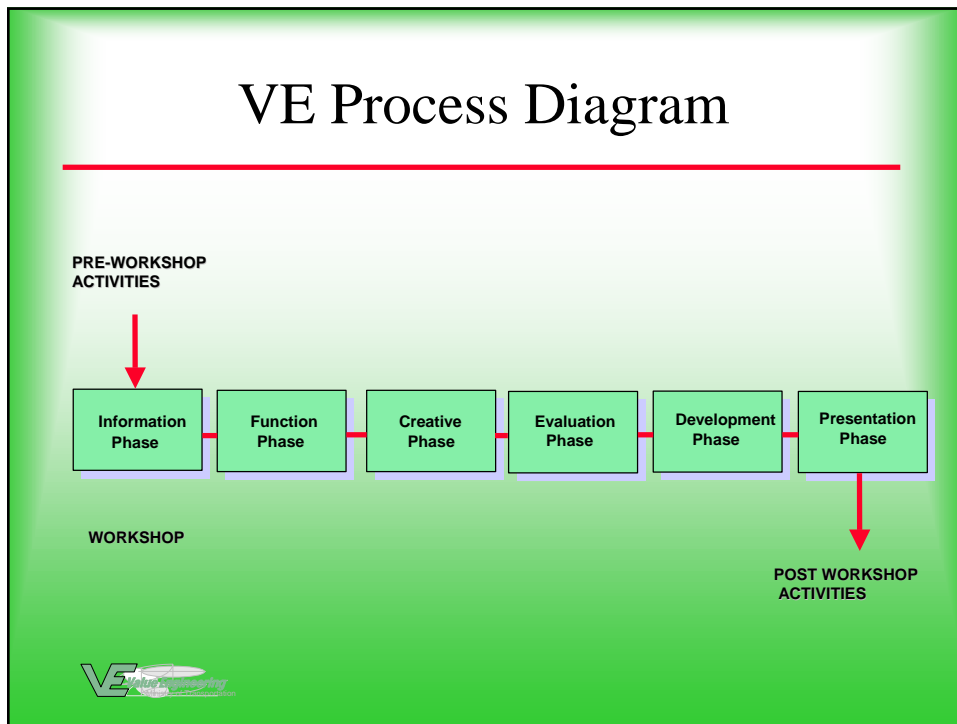
The VE Workshop

The Setting:

- A room with tables, phones, walls and project information,
- Three to five days,
- Experienced study leader,
- Multidisciplinary team of 5 to 8.



VE Process Diagram



Information Phase

Key Questions

“WHY”

- What Is The Problem?
- Why Is It A Problem?
- Why Must It Be Solved?
- Why Was It Solved As Proposed?
- What Does It Cost?

Pre-workshop

Pareto's Law of Distribution: The 80:20 Rule



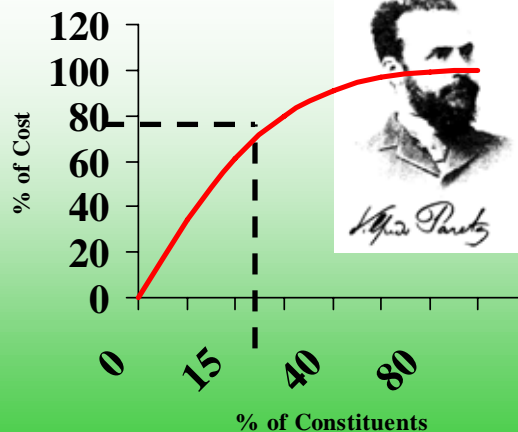
- 20% of the cost is made up by 80% of the items while 80% of the cost is only made up by 20% of the items!
- A VE team should attempt to isolate and reduce the pricey 20% of the items

Pareto's Law of Distribution

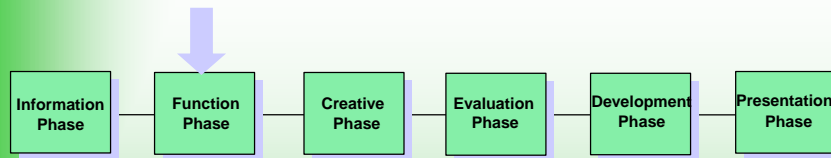
Vilfredo Pareto, 1848-1923

“The 80 / 20 Rule”

20% of the items in any complex thing account for 80% of the cost.



Workshop - Function Phase

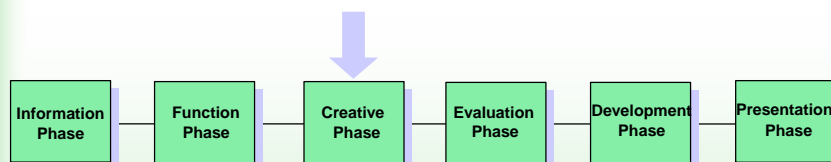


*What must be done
versus how is it
being done?*

Techniques

- Function Analysis
- Categorize Functions
- Function Logic FAST diagram
- Value Index (Worth to Cost)

Creative Phase

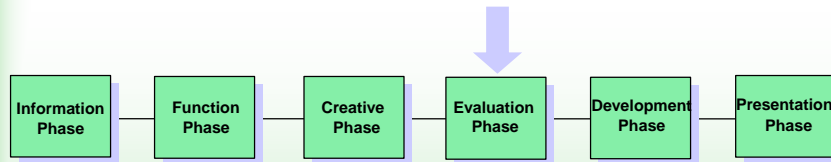


*What Else Will
Accomplish the
Basic Function(s)?*

Techniques

- Creative Thinking -
Brainstorming
- Set aside policies & rules
- Depart from the Norm
- Good Human Relations

Evaluation (or Judgement) Phase



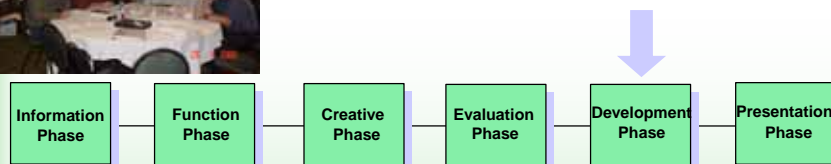
*Select the Best Ideas
for Development”*

Techniques

- Analysis Matrix
- Voting
- Voting with Discussion
- Consensus



Development Phase



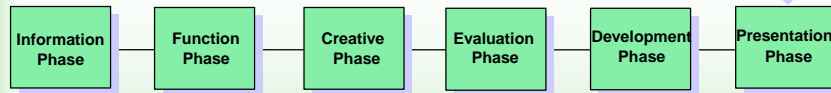
*Turn Ideas into
Supported
Recommendations
for Change*

Techniques

- Explain & Validate Concepts
- Develop Scenarios to compare to base case
- Make Comparisons – measure performance & cost of scenarios and base case



Presentation Phase



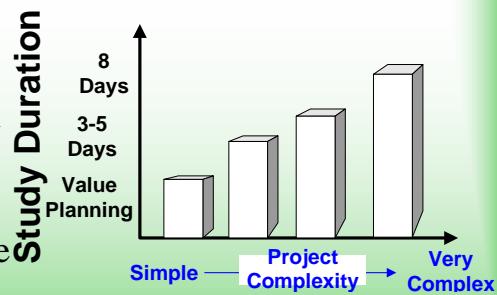
*Present Results of
Study to the Owner*

Techniques

- Oral Presentation
- Written Report
- Answer Questions
- Discover Oversights

What Does it Cost?

- Typical Study 3 -5 days
- Study costs depend on team size & preparation requirements but range from \$40,000 to \$100,000
- Easily Recover Costs



Value Societies

Canadian Society of Value Analysis (CSVA)

<http://www.scav-csva.org>

SAVE International <http://www.value-eng.org/>

More Information

- **MTO -**
www.mto.gov.on.ca/english/transtek/ve
- SAVE International www.value-eng.org
- Canadian Society of Value Analysis (CSVA)
www.scav-csva.org
- Institute of Value Management
www.ivm.org.uk



SAVE Certification Program

3 Levels

Associate Value Specialist

Value Management Practitioner

Certified Value Specialist

Certified Value Specialist Manager

VE Training

- SAVE Certified Module I course
 - 5 day course that combines 20 hours of training with 20 hours of live project work
 - Course certified by SAVE International
- SAVE Certified Module II course
 - VE practitioners
 - Facilitation skills

Where can VE help?

VE can help where there is scope for change:

- Difficult or contentious projects – cost – schedule – scope
- Projects and processes where communications are difficult (silos) and horizontal integration is desired.
- Projects or products where innovation is required.
- High value projects – capital – labour – services

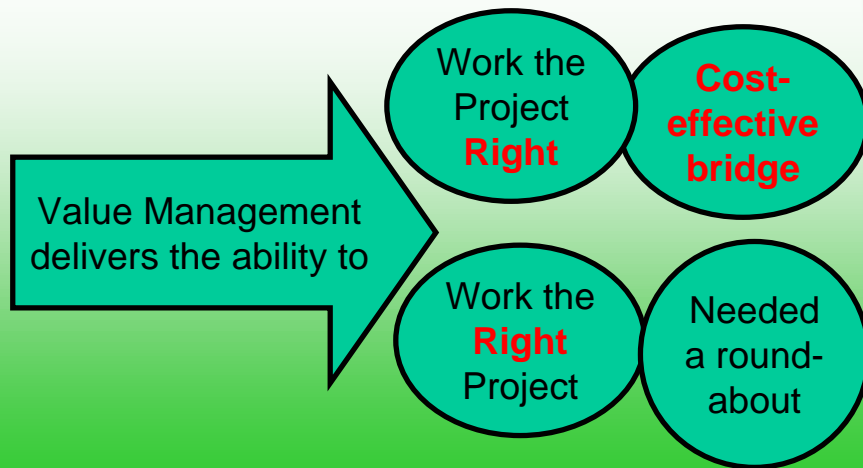
Benefits of a VE Program?

- Accomplish more projects for the same money
- Validate that capital expenditures are appropriate for program needs
- Validate planning & design decisions
- Validate project costs
- Improve project designs, function, performance & safety



What are the Benefits of a VE Program?

- Save money and time



Project Selection

- Projects with Construction cost greater than the \$10 million
- Expansion Projects
- New Interchanges
- Projects with complex designs
- Projects with complex staging
- Route Planning projects
- Projects with construction concerns

How to Support the VE Program

- Make Yourself and Staff available to Participate on VE Studies
- Make Yourself and Staff available for VE Training
- Make sure You are Planning the VE Efforts as Early as Possible



How to Support the VE Program

- Participate in the Decision Making Process with a Positive and Open Mind
- Don't Reject Concepts just because....
- Be Supportive and Lead by Example



Video Presentation

Abilene Paradox



? Questions ? ? ?
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