ASPE – Richmond Chapter #82
CPE TRAINING
Don ‘D’ Daigle, CVS, CPE
April 5th, 2017 6:00PM – 8:00PM

introducing

Value Engineering

What is Value Engineering?

- Definition:

  An organized methodology applied to projects that may involve construction, manufacturing, administrative processes, etc., the purposes being to enhance project outcomes so that one gets the most “bang for the buck” in executing the project.

- Variously known as Value Engineering, Value Management and Value Analysis

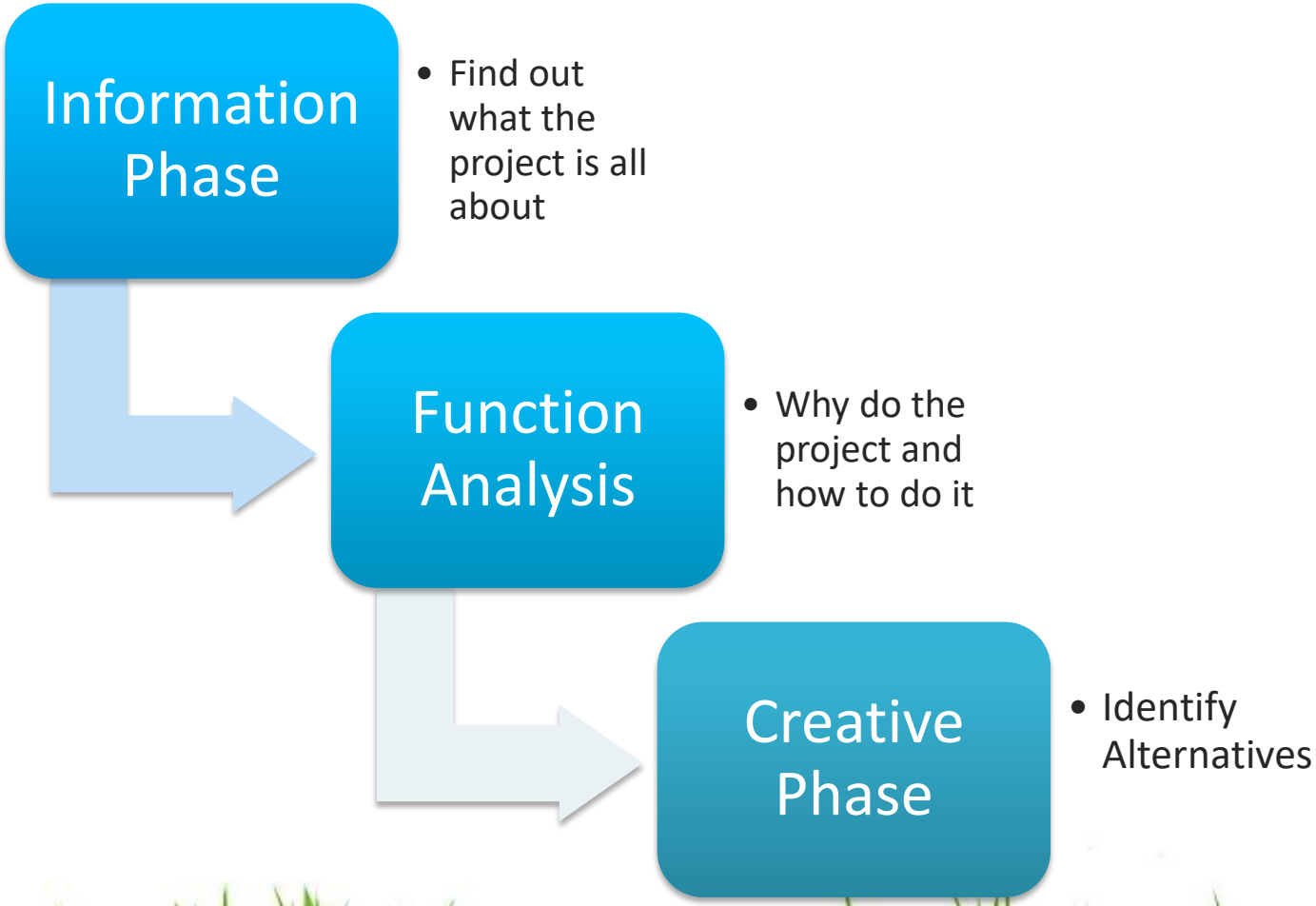
The Methodology

- The rigorous application of a well recognized series of problem solving steps – similar to the intuitive problem solving technique
- The methodology calls for following a six-step job plan that is promulgated by the SAVE International (SAVEI)
- The six-step job plan literally serves to define whether the workshop is actually VE/VM/VA

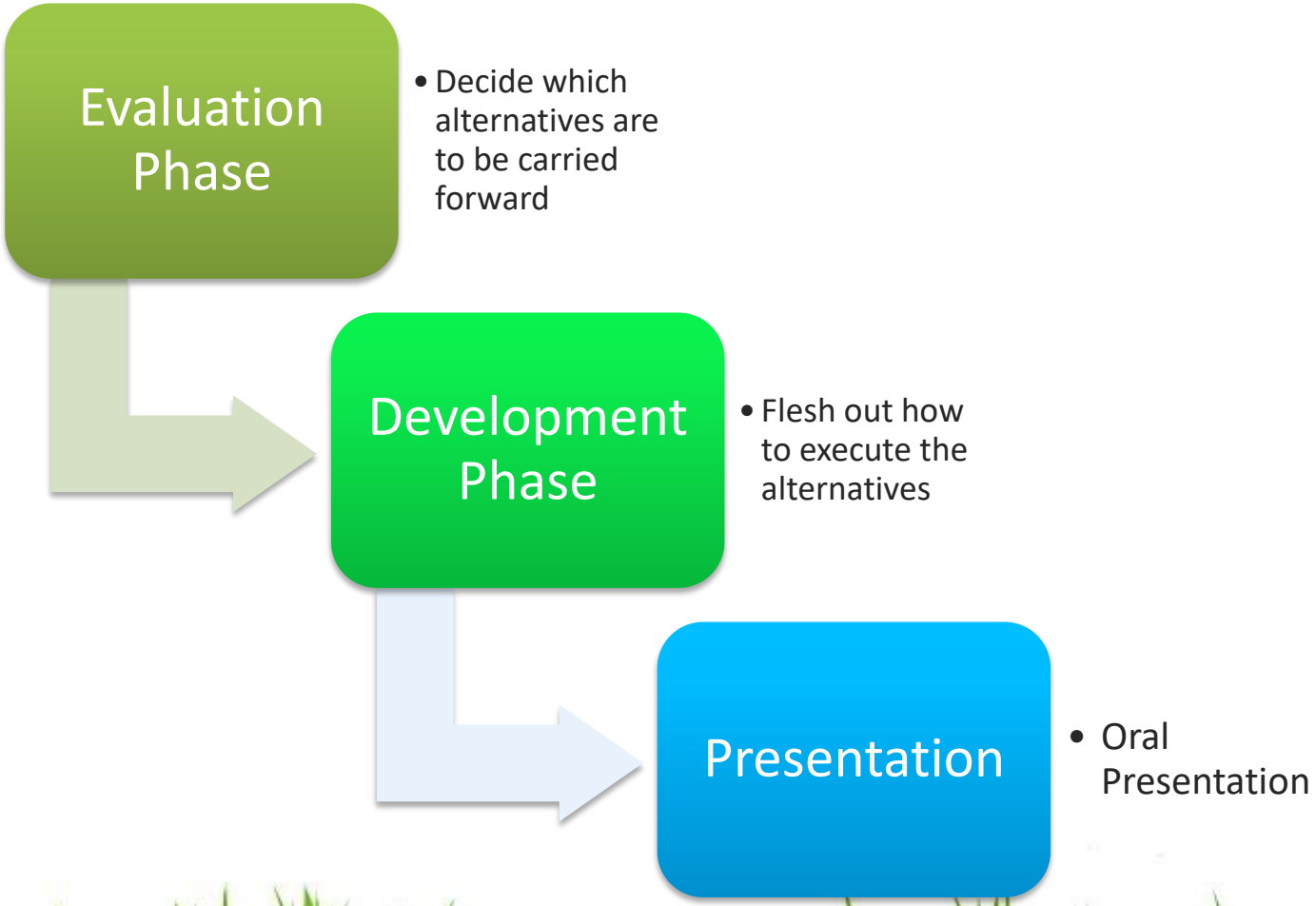
Larry Miles at General Electric

- Larry was a real pioneer in the development of what we now know as Value Engineering
- In his approach he learned that it works best to work through the identification of the required functions by asking:
  - What must it do?
  - How must it do it?
  - Why must we do this?

The Six-Step Job Plan



The Six-Step Job Plan (Continued)



INFORMATION PHASE

Depending on the nature of the project, we look at (in the case of a building or could be anything):

- The design development report
- Soil Borings/Geotechnical Information
- Cost Estimate
- Construction Schedule
- Contract Documents (plans, specs, etc.)

INFORMATION PHASE

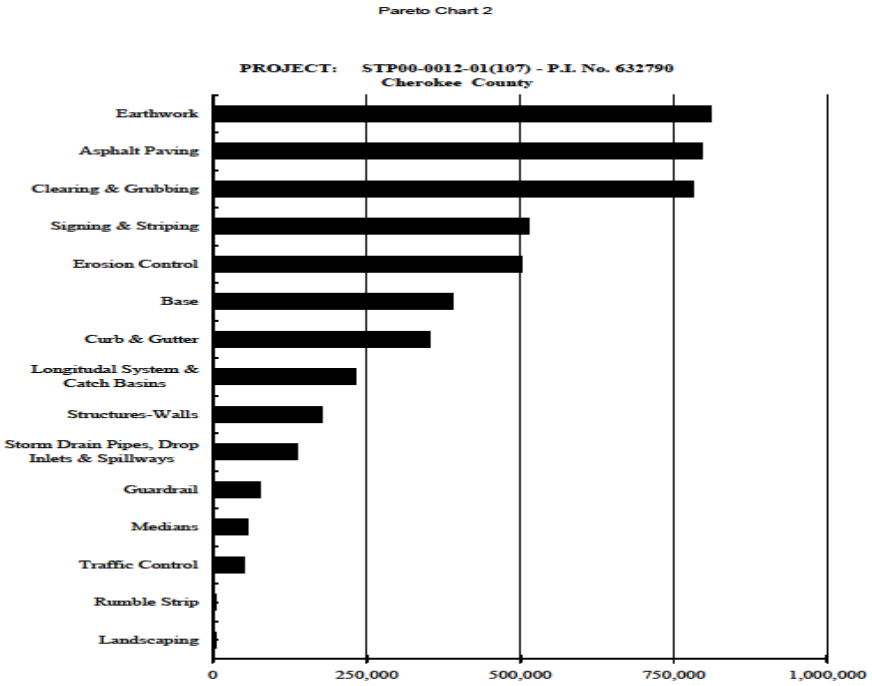
- In preparation for the kick-off meeting we may develop a set of cost models.
- The favorite type of cost model is the Pareto Chart
- This chart identifies the higher cost items that we must attend to if we are to be successful
- Why is this?
- The 80/20 rule (note – Pareto Example)

Pareto Chart

PARETO CHART - COST HISTOGRAM

PROJECT: STP00-0012-01(107) - P.I. No. 632790
SR 20 Widening & Truck Climbing Lanes
Cherokee County, Georgia

PROJECT ELEMENT		COST	PERCENT	CUM. PERCENT
Earthwork		808,000	16.60%	16.60%
Asphalt Paving		796,000	16.35%	32.95%
Clearing & Grubbing		780,000	16.02%	48.97%
Signing & Striping		512,300	10.52%	59.50%
Erosion Control		500,000	10.27%	69.77%
Base		390,000	8.01%	77.78%
Curb & Gutter		352,000	7.23%	85.01%
Longitudal System & Catch Basins		231,000	4.75%	89.76%
Structures-Walls		175,000	3.60%	93.35%
Storm Drain Pipes, Drop Inlets & Spillways		137,000	2.81%	96.17%
Guardrail		75,000	1.54%	97.71%
Medians		55,000	1.13%	98.84%
Traffic Control		50,000	1.03%	99.87%
Rumble Strip		4,500	0.09%	99.96%
Landscaping		2,000	0.04%	100.00%
	Subtotal	$ 4,867,800	100.00%	
E & C Rate @ 10%	INCL	$ 486,780		
Subtotal =		$ 5,354,580		
Total Construction Cost =		$ 5,354,580		
Right-of-Way =		6,800,000		
Reimb. Utilities =		0		
	TOTAL	$ 12,154,580		



Function Analysis

- Seeking the most straightforward statement of the functions of the project
- Use Active Verb/Measurable Noun to express functions – examples:

Lock Door	Lift Tree
Call Home	Contain Storm Flows
Support Load	Divide Spoils
Enlist Help	Print Booklet
Write Memoirs	Reward Success

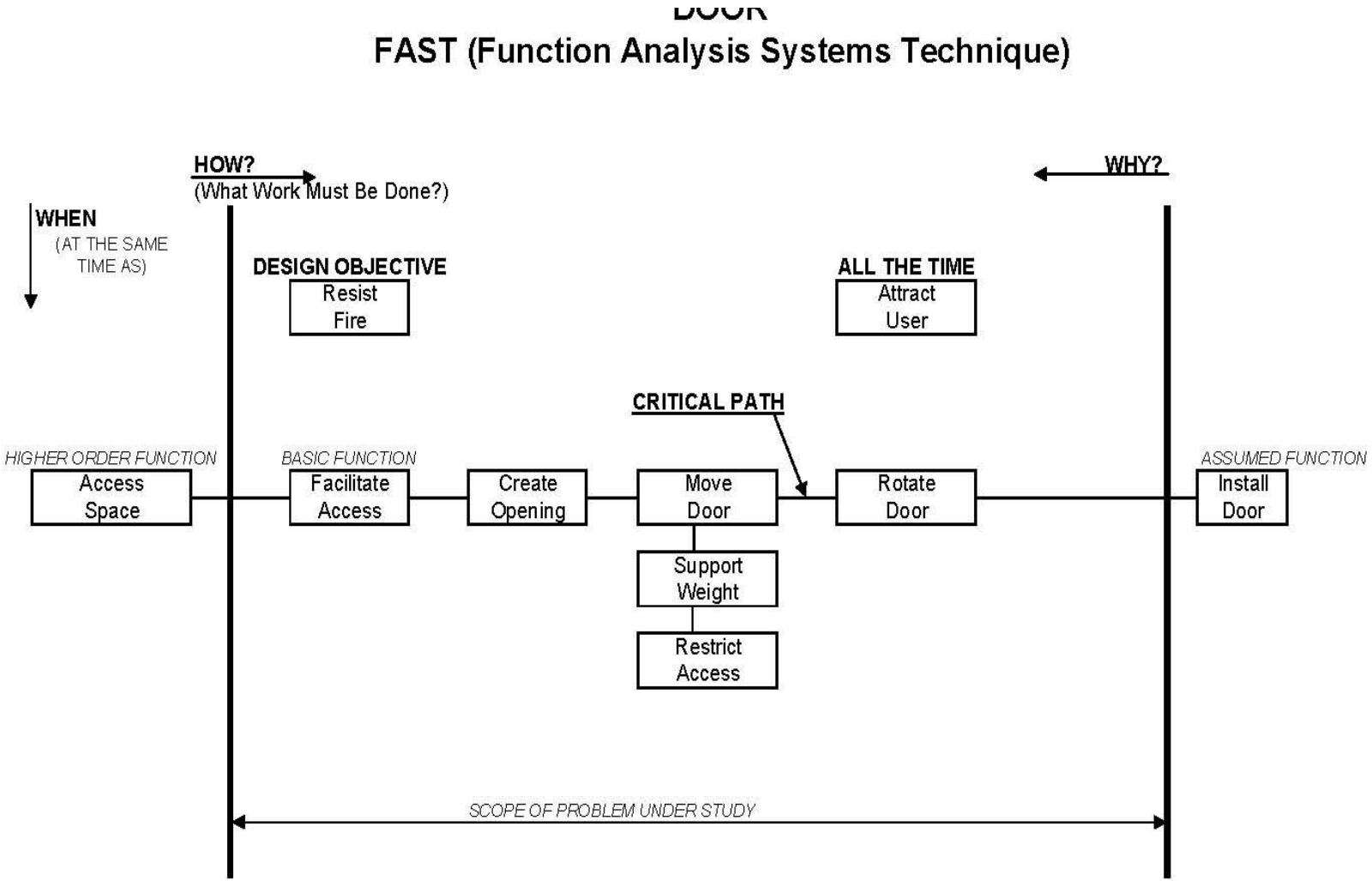
Function Analysis

- Two Types of Function Analysis
  - Random Function Analysis
  - Function Analysis System Technique (FAST) diagram
- Note that the Function Analysis must be done if there is to be a VE workshop – without it, you have a cost-cutting witch hunt
- Contractors and architects often go thru cost-cutting exercises (mostly cut scope or cheapen project)

Classification of Functions

- Higher Order Function
  - Defines the problem goal
  - Outside the scope of the study
- Basic Function
  - Defines a performance feature that must be obtained
  - Satisfies only user's need not desires
  - Answers "What must it do?"
- Secondary Function
  - Defines performance features other than those that must be accomplished
  - Are these the user's desires rather than needs – "What else can it do?"

FAST Diagram – Door



Creative Phase

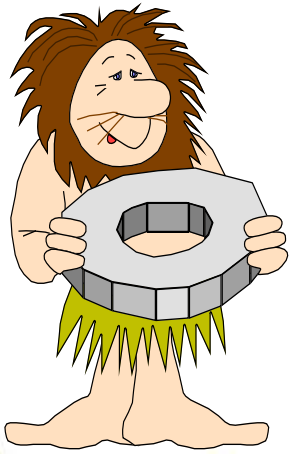
- Use the headings from the Pareto Chart as headings for the Creative Idea, brainstorming exercise
- Free-wheeling, open minded but with respect for the project stakeholders and the perceptions with which they may leave the VE experience
- Withhold judgment of ideas

Creative Phase

- The object of the creative phase is to generate as many ideas as possible
- Must not stifle VE team member creativity
- The results of the average VE study can usually be directly correlated with the number of truly creative ideas that were generated in the workshop

Creative Phase

A mind, stretched by a new idea, can never go back to its " original dimension".



Dr. Oliver Wendell Holmes

Evaluation Phase

- At the end of the Creative Phase we will have a lot of ideas – some good and some not so good
- We must cull out the not-so-good ideas and provide a short list of good ideas to first test then, develop as needed to generate useful results for the workshop

Evaluation Phase

Specific Work to be done :

- **Rank** ideas
- Evaluate ideas
- Select ideas

Questions to be answered :

- **How feasible is each idea ?**
- **Will each idea perform the function** ?

Evaluation Phase

CREATIVE IDEA LISTING (FOLLOWING CONCEPT 2)

PROJECT: **FY06 MCAF, MQNA 01-3004 – LAJES AIR FORCE BASE** SHEET NO.: Page 1 of 2
Fire/Crash/Rescue Station

NO.	IDEA DESCRIPTION	RATING
1	Do not apply 40% factor to site work	R
2	Make Alternate Control Tower a bid option	C
3	Take controllable Air field lighting out of project	B
4	Build only Admin and Sleeping spaces, Use existing bays	C
5	Use metal tile instead of clay tile on roof	C
6a	Selectively change concrete to asphalt	R
6b	Use pavers in lieu of concrete sidewalks	C
7	Use steel framed building	R
8	Use European products instead of US sourced products	DS
9	Eliminate one apparatus bay	R

Development Phase

- Object is to sell your ideas
- Should bring forward only those ideas that have a professional appearance and excellent technical reason for being included
- The developed alternatives should make a significant effect on the project
- Not nitpicking – or, waste people's time
- Does not set the project back

Presentation Phase

- Make it simple (See Summary Slide)
- Be humble and respectful
- No need to argue
- Two parts to the presentation
  - Last day of study – informal
  - Written report

In Summary

- Use the six-step job plan
- Have confidence that the methodology will work every time
- Work diligently within the study and serve up a smorgasbord of ideas for your client's consideration
- It is an honor to review the work or others so be humble while also being technically well founded and professionally in your approach

Important Elements

Value Engineering Change Proposal (VECP):

- Clearly describe the difference between the current design & the proposed.
- Provide justification for the change including the function / performance change
- Show potential A&E changes (drawings, specs, material, etc.
- Show cost & calculations for the Value Savings or Value Addition.

Questions

- What level of design would you do a study?
- Who determines the team and who participates?
- ?
- ?