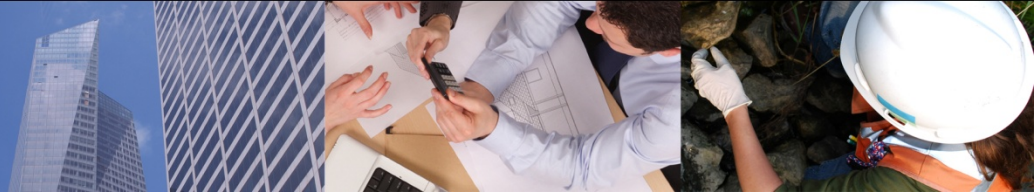


Value Methodology

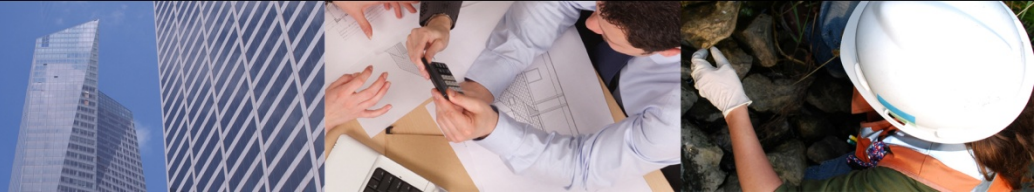
Job Plan Basics

Presented by Anna M. Bremmer, CVS®, LEED AP
2015 AASHTO VETC Peer Exchange Workshop
Washington, DC
August 4, 2015



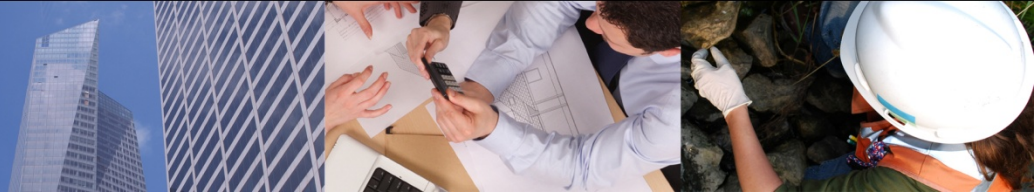
Questions for Participants

- Show of hands: Who here had heard of the VE job plan before this conference?
- Show of hands: Who here has participated in a value study?
- Volunteers:
 - What is the purpose of value engineering?
 - Why do we do it?



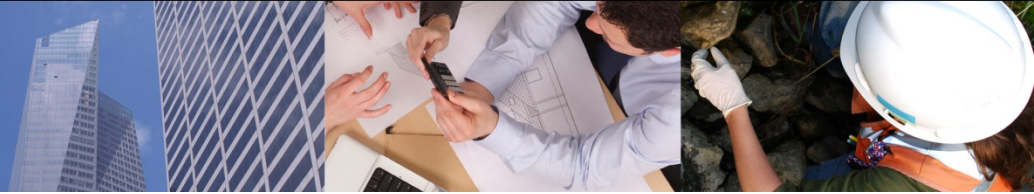
SAVE International® Six-Phase Job Plan

1. Information
2. Function Analysis
3. Creativity
4. Evaluation
5. Development
6. Presentation



VE Job Plan Definition—Code of Federal Regulations for Federal Aid Highway Projects (Closely Mirrors SAVE International®)

- **Value Engineering (VE) Job Plan.** A systematic and structured action plan for conducting and documenting the results of the VE analysis...The VE Job Plan shall include and document the following seven phases:



VE Job Plan Definition—CFR, Cont.

1. **Information:** Gather project information including project commitments and constraints.
 2. **Function Analysis:** Analyze the project to understand the required functions.
 3. **Creative:** Generate ideas on ways to accomplish the required functions which improve the project's performance, enhance its quality, and lower project costs.
 4. **Evaluation:** Evaluate and select feasible ideas for development.
 5. **Development:** Develop the selected alternatives into fully supported recommendations.
 6. **Presentation:** Present the VE recommendations to the project stakeholders.
 7. **Resolution:** Evaluate, resolve, document and implement all approved recommendations.
- Code of Federal Regulations—23 CFR Part 627 (Incorporates March 15, 2012 Final Rule). <http://www.gpo.gov/fdsys/pkg/CFR-2013-title23-vol1/xml/CFR-2013-title23-vol1-part627.xml>



Importance of Adhering to the Job Plan

- Each Phase of the Job Plan Must Be Completed in Order
- Rigorously Following the Job Plan Delivers a Higher Return on Investment for the Value Study
 - High Level of Innovation
 - Ideas Targeted to Project Needs and Scope
 - Avoids “Design Criticism” Perception
- Skipping or Weakly Applying Any Phase, Especially Function Analysis, Deteriorates Results



Value = Function ÷ Resources

- Value = [An Expression of the Relationship Between Function and Resources Where] *Function* is Measured by the Performance Requirements of the Customer and *Resources* are Measured in Materials, Labor, Price, Time, etc. Required to Accomplish That Function
- Value Methodology, A Pocket Guide to Reduce Cost and Improve Value Through Function Analysis, ©2008 Goal/QPC, p. vii; SAVE International® Value Standard, 2007 Edition, p. 30 includes portion in brackets.



1. Information Phase

A. Review Available Data

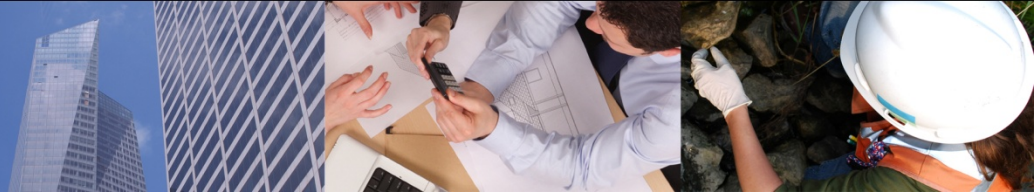
B. Kickoff Meeting

C. Site Visit (Optional)



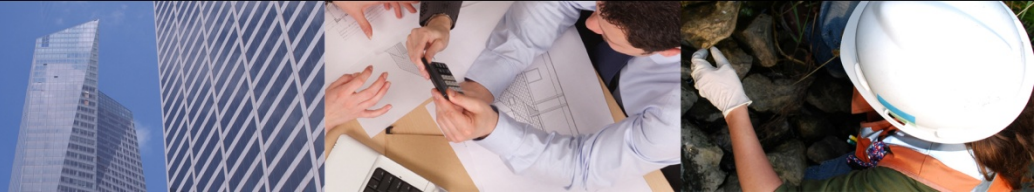
Information—Purpose

- Develop an understanding of the project, including its purpose, challenges, and constraints
- Develop a set of performance criteria by which the project will be deemed successful
- Examine cost and risk information
- Develop goals and objectives for the value study



Information—A. Review Available Data

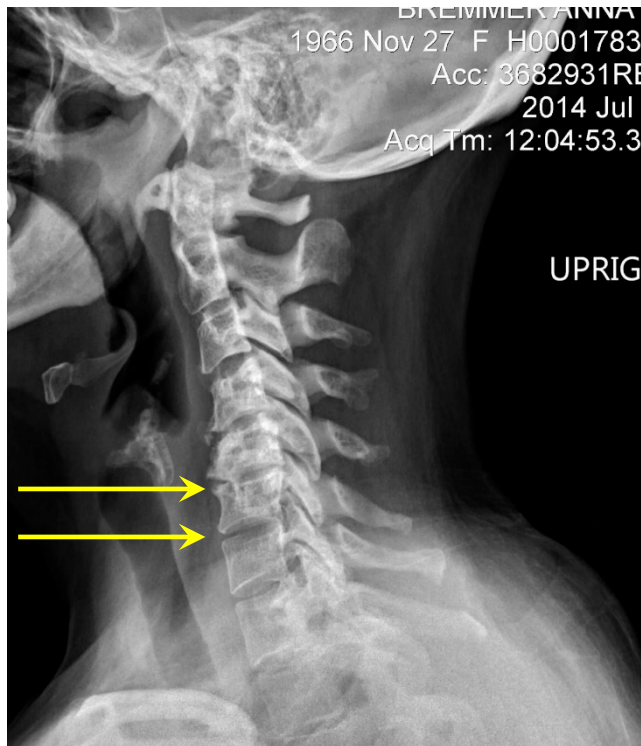
- Scope
- Designs
- Reports
- Estimate
- Space Models
- Cost Models (Cost Allocations by Systems/Components)
- Flow Charts
- Energy Models
- Life-Cycle Cost Models
- Schedule
- Risk (Complete a Risk Assessment)
- Constraints



Information—Anna's Spine, Before and After C5-6 and C6-7 Anterior Cervical Discectomy and Fusion

Degenerated Disks
Between C5-6 and C6-7, 7/7/14

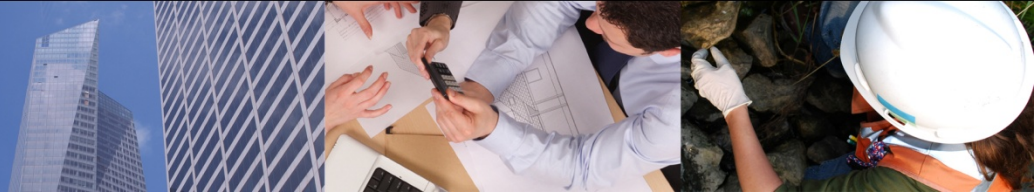
New Bone Growth Where Disks
Were Removed, 6/19/15



The Disks Hold
the Spine
Together

Bone Growth
Period: 6 mo.

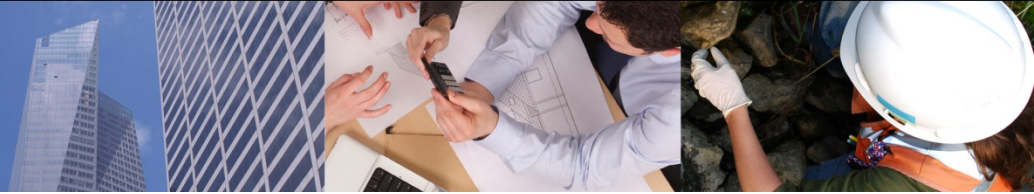
**Risk: Spinal
Cord Injury;
Paralysis**



Information—Subject of Study: Post-Spinal-Fusion Cervical Collar



- Demonstration of Wear
- Please Pass Collar Around the Room



Information—FHWA Performance Criteria

- **Safety**—Mitigation or reduction hazards on the facility
- **Operations**—Improvement of real-time service and efficiency of the facility; improvement of local, corridor, or regional level of service of the facility
- **Environment**—Avoidance or mitigation of impacts to natural and cultural resources
- **Construction**—Implementation of innovative techniques that enhance or expedite the project delivery or improve work zone conditions
- **Right-of-Way**
 - <http://www.fhwa.dot.gov/ve/2009/benefits.cfm>



Information—Post-Spinal-Fusion Cervical Collar Performance Criteria

- Correctly Positions Spine
- Minimizes Head Movement
- Comfortable
- Convenient
- Hygienic



2. Function Analysis Phase

A. **Identify Functions**

B. Classify Functions

C. **Model Functions (FAST Diagramming)**

D. Determine Function Cost and Worth

E. Correlate Risk With Functions

F. Select Functions for Study

Items in bold covered in this presentation.



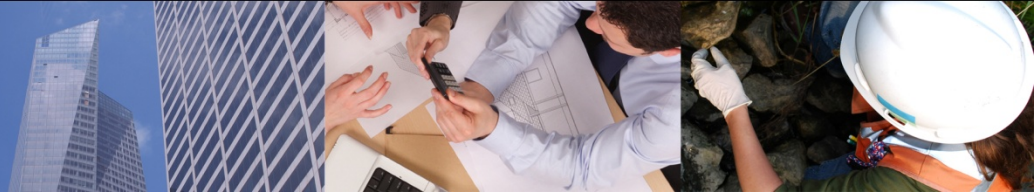
What Makes the Value Methodology Different from Other Project and Process Improvement Techniques?

1. **Function Analysis**
2. Multidisciplinary Team Approach
3. Formal Job Plan



Value Methodology, A Pocket Guide to Reduce Cost and Improve Value Through Function Analysis, ©2008 Goal/QPC, p. ix

Focus on Adding Value (Not Just Cost Cutting)



Which is the correct terminology?

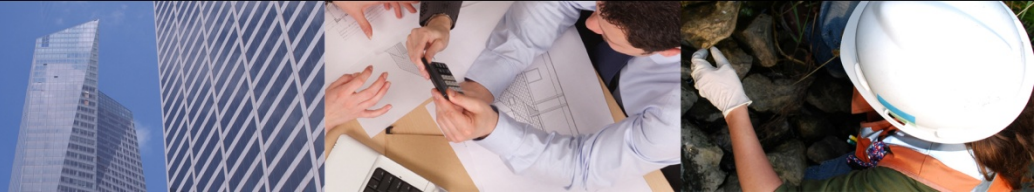
Functional Analysis

- analysis **that** functions

Function Analysis

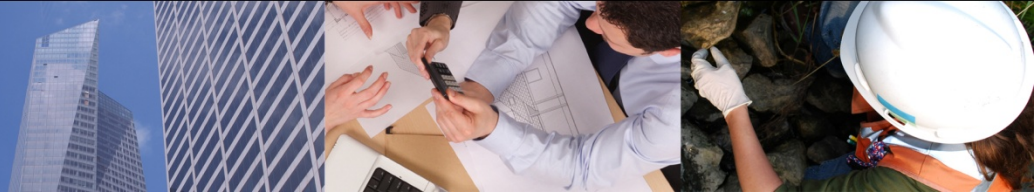
- analysis **of** functions

Note: SAVE International® does not refer to “functional analysis” in its official Value Standard, Certification Manual, or Exam Study Guide. Neither does the ASTM International Standard Practice for Constructing FAST Diagrams and Performing Function Analysis During a Value Analysis Study, E2013-12.



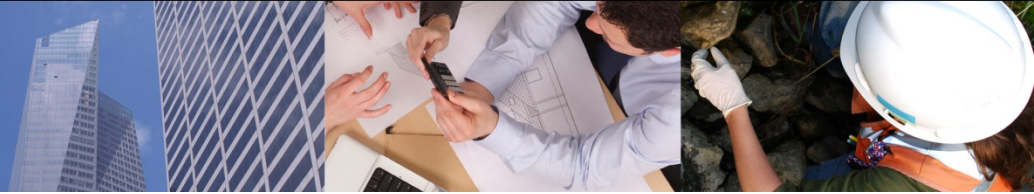
Function Analysis—Purpose

- Further develop project understanding and identify areas of the project or process with the greatest opportunity for value improvement
- Build team consensus relative to the scope of the project or process



Function Analysis—Why Identify Functions?

- Brings Team Members to a Common Understanding of Components in a System
- Removes Paradigms that Constrain Thinking and Forms a Basis for Focused, Solutions-Oriented Brainstorming
- Helps Teams Think Objectively



Function Analysis—What is a Function?

- Function = The original intent or purpose that a product, service, or process is expected to perform. It is expressed in a two-word active verb + measurable noun structure.
- This definition is missing from the Value Methodology, A Pocket Guide to Reduce Cost and Improve Value Through Function Analysis, ©2008 Goal/QPC, but was in the SAVE International® Value Standard 2007, p. 28.
- **Active Verb + Measurable Noun**
 - Verb: What does it do?
 - Noun: What does it do this to?



Function Analysis— What Functions Are **Not**

≠ Activities

≠ Operations/Tasks



Function Analysis—Identify Basic Function of a Hand Mixer

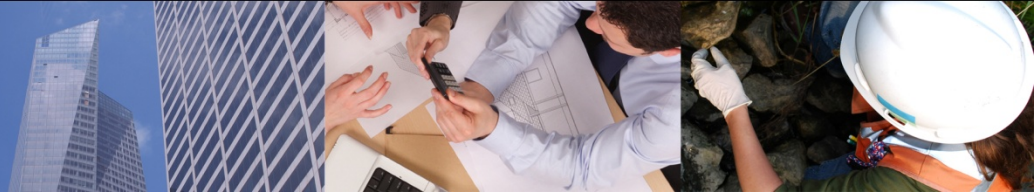




Function Analysis—Identify Basic Function of a Hand Mixer



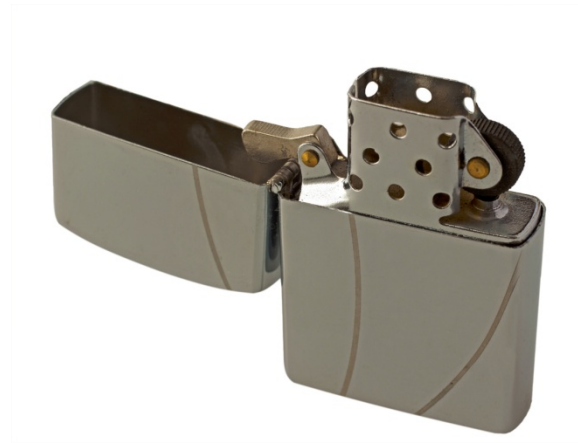
- Integrate Ingredients



Function Analysis—Identify the Better Basic Function



- Pencil
 - Communicate Information
 - Deposit Medium
 - Make Marks



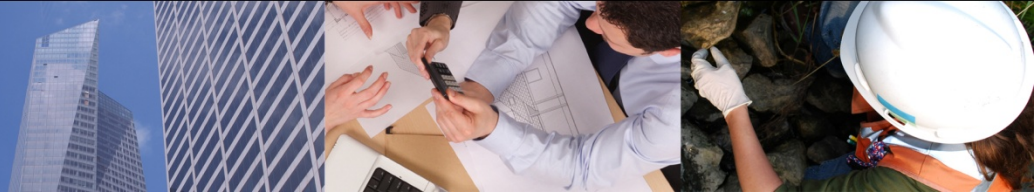
- Lighter
 - Light Cigarette
 - Produce Flame
 - Produce Heat



Function Analysis—Function Identification—Post-Spinal-Fusion Cervical Collar, p. 1 of 2

| Component | Verb | Noun |
|---------------|------|------|
| Whole Collar | | |
| Plastic Frame | | |

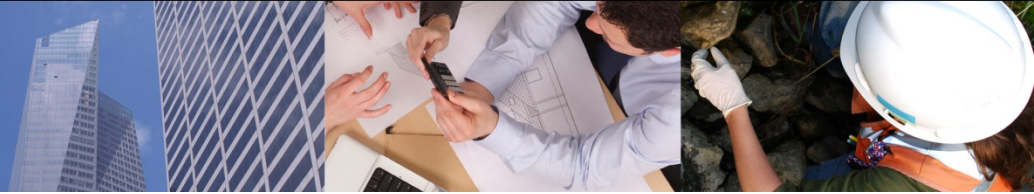




Function Analysis—Function Identification—Post-Spinal-Fusion Cervical Collar, p. 2 of 2

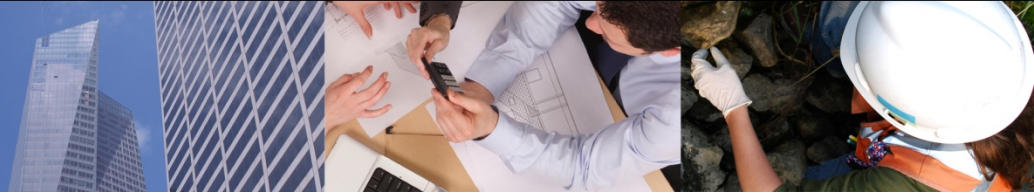
| Component | Verb | Noun |
|-------------------|------|------|
| Velcro Straps | | |
| Removable Padding | | |
| Labeling | | |





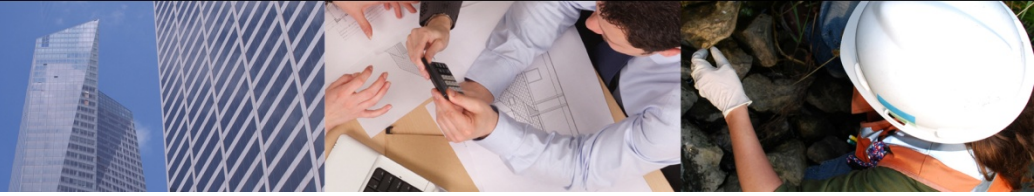
Function Analysis—VE Team Participation

- For This Presentation, We Are Quickly Skipping Forward
- For a Value Study, the **VE Team Must Participate in Function Analysis for It to Be Useful**
- Function Analysis is the Most Important Part and Should Take a Minimum of 1.5 Hours
- Studies Less Than 24 Hours Short-Change the Job Plan



Function Analysis—Why Use FAST Diagrams?

- Increases Understanding of Relationships Between Functions
- Identifies Functions That May Have Been Missed
- Often Skipped, Due to Time Constraints and Lack of Expertise



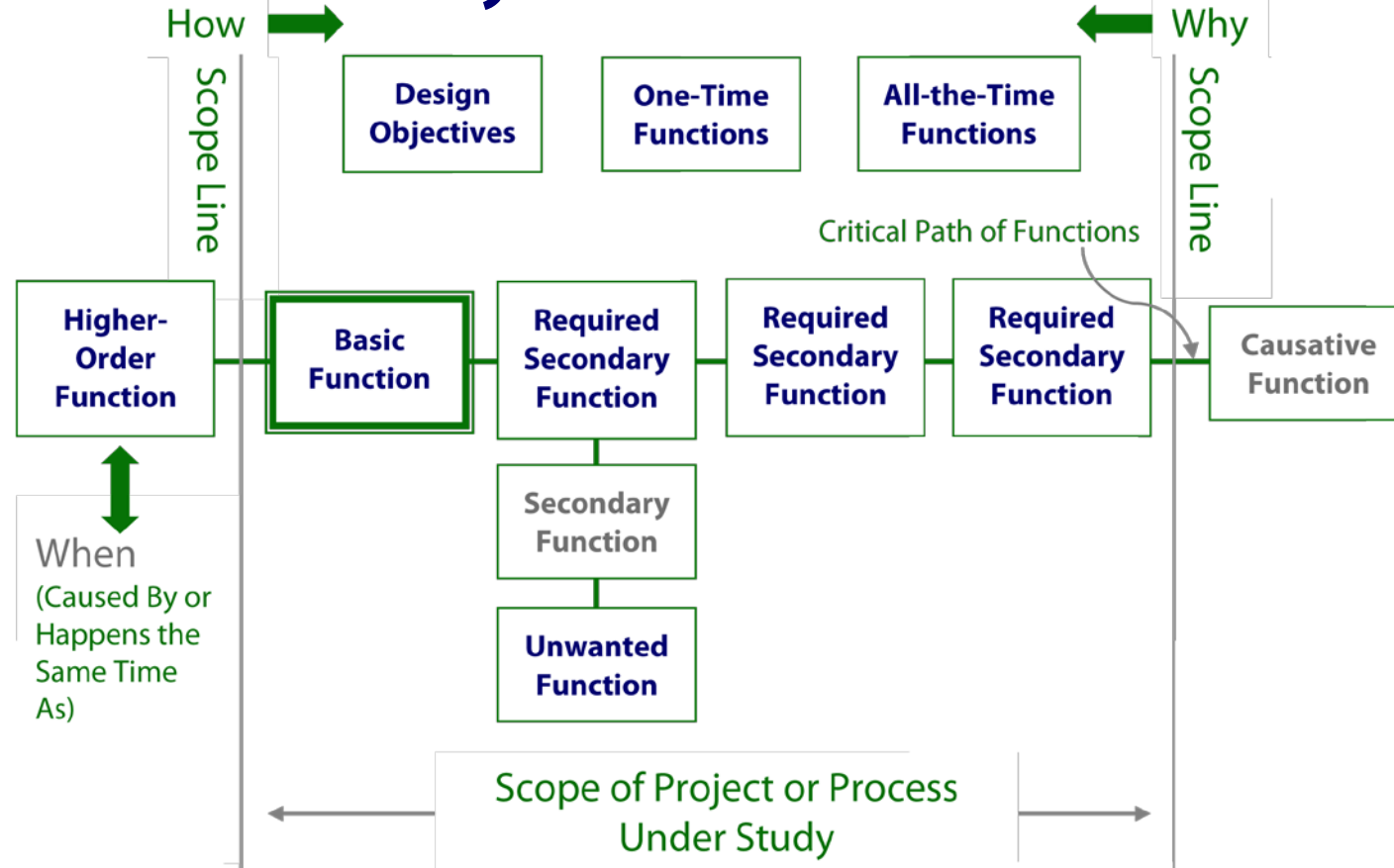
Function Analysis— What FAST Diagrams Are **Not**

≠ Schedule

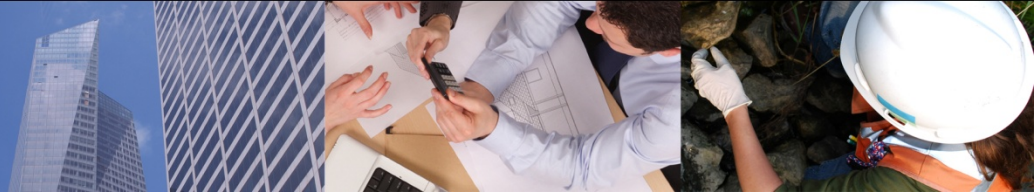
≠ Flow Chart

≠ Process Map

Function Analysis—Technical FAST



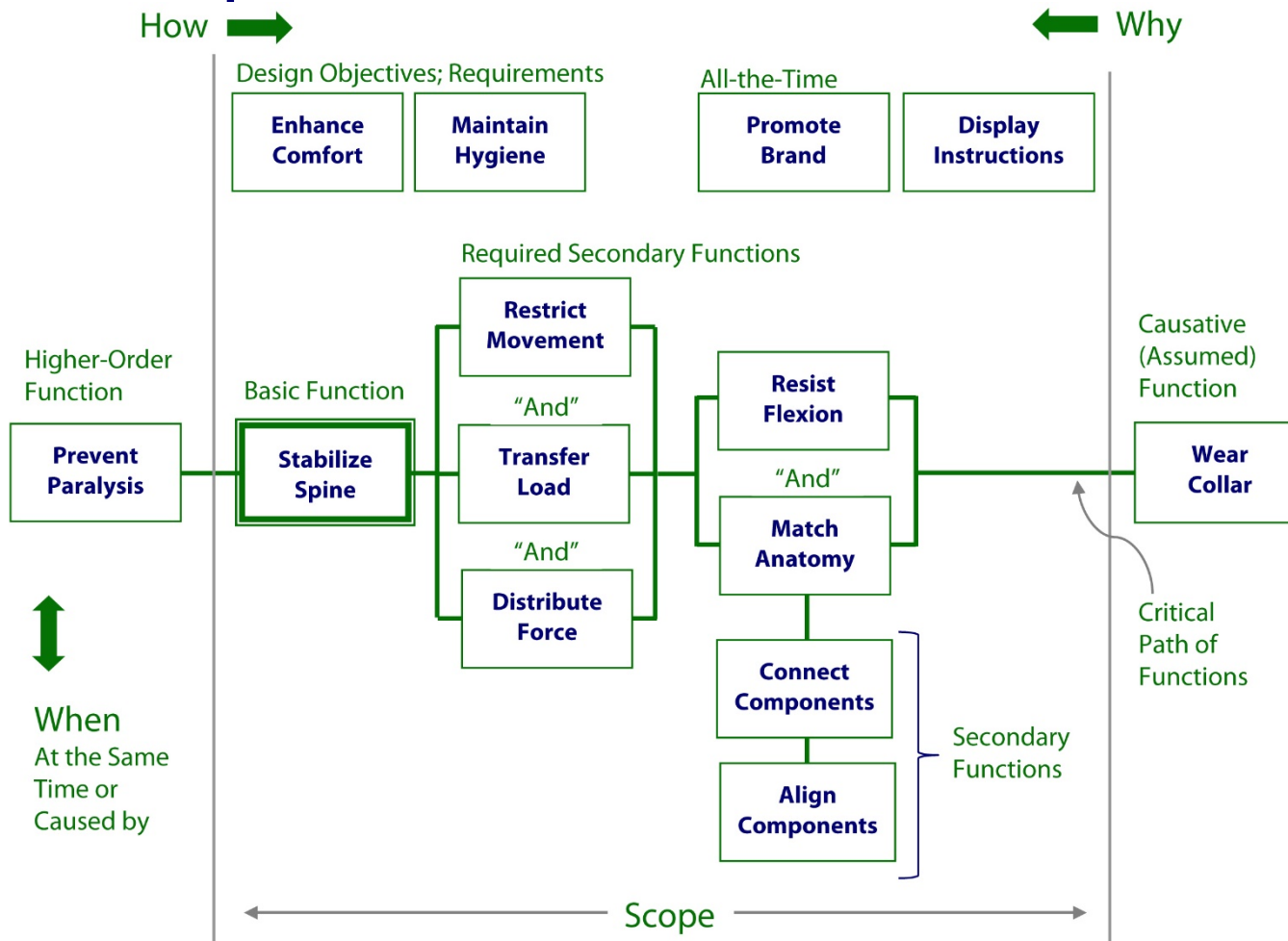
SAVE International® Certification Examination Study Guide 2011, p. 6, with corrections to include missing right-hand scope line, causative function, and "When" that were included on p. 33 of the 2008 guide. The Secondary Function has been added by the instructor to enhance comprehension. NOTE: Unwanted functions are not always present, but FAST diagramming may reveal them. Please see also ASTM International Standard Practice for Constructing FAST Diagrams, E2013-12, p. 2, which concurs with this illustration.



Function Analysis—FAST Diagrams: Intuitive Logic

- **How?** ➔ (Left-to-Right)
 - Starting With the Higher-Order Function, the Function to Its Right Answers, “How Does It Do It?”
- **Why?** ← (Right-to-Left)
 - Starting With the Lower-Order Function, the Function to Its Left Answers, “Why Does It Do It?”
- **When?** ⇕ (At the Same Time As)
 - Independent Functions That Occur at the Same Time; the Function (s) Above or Below Also Occur at the Same Time

Function Analysis—Technical FAST: Post-Spinal-Fusion Cervical Collar



3. Creativity Phase

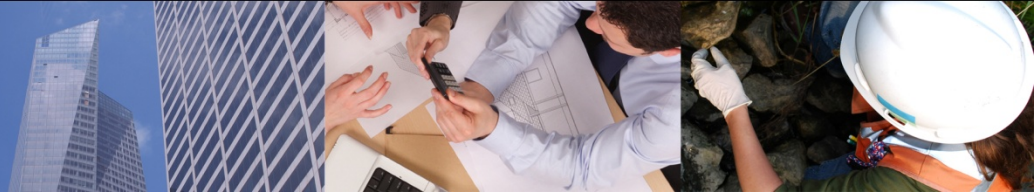
- **Brainstorm to Generate a Large Quantity of Ideas to Accomplish Functions in Alternative Ways**
- Purpose: Generate as many improvement ideas as possible
- No Evaluation or Criticism in This Phase!





Creativity—Function Challenges Require Unique Solutions

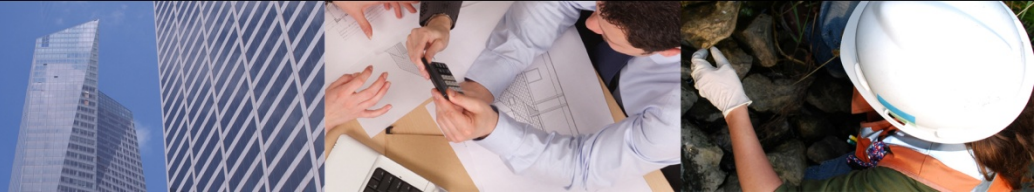




Creativity—Cervical Spine Collar Alternatives

- Remember the basic function of the cervical spine collar?
- What if the medical insurance company focused only on cost-cutting without considering performance or other supporting functions?
- What might be their least-cost alternative?

Note: The basic function is generally not brainstormed—we just need an example for this short course.



Creativity—Cervical Spine Collar Alternative

Baseline

ProCare Transitional 172 Cervical Collar
Cost: \$46.00



Alternative

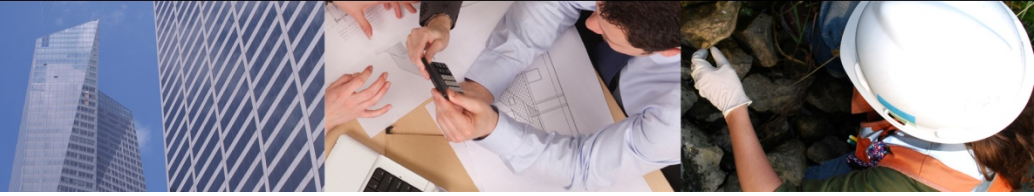
Foam Cervical Collar
Worth: \$15.00





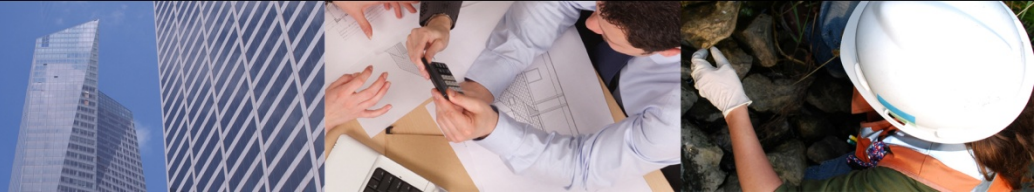
4. Evaluation Phase

- A. Discuss/Synthesize Ideas**
- B. Rate and Rank Ideas**
- C. Develop Scoring Consensus**
- D. Select Ideas for Development**



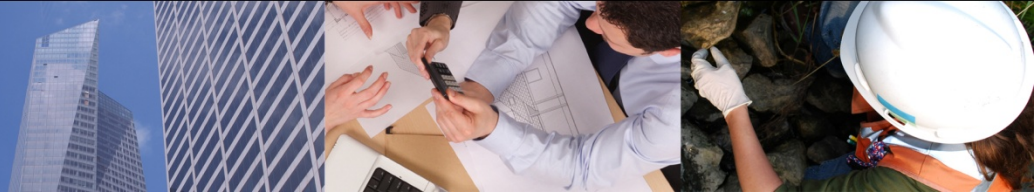
Evaluation—Purpose

- Rate ideas relative to performance criteria and rank them to prioritize which ideas should be developed



Evaluation—B. Rate and Rank: Voting Via Show of Hands/Number of Fingers



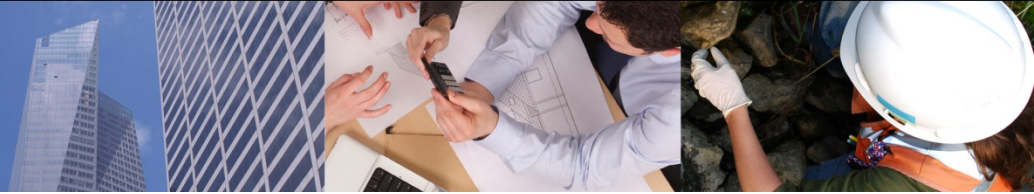


Evaluation—B. Rate and Rank: Scoring Via Show of Hands

Ask each VE team member to indicate his or her score by holding up the corresponding number of fingers with a raised hand.

Sample Function—Protect Environment

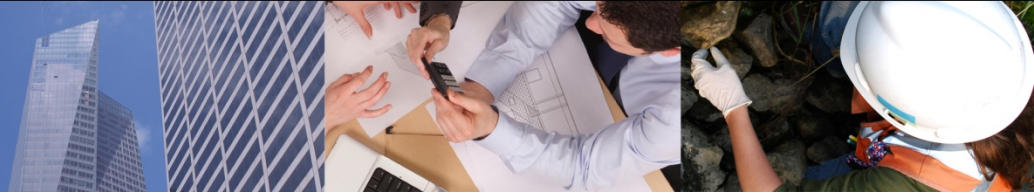
| | | |
|-------|---|-----|
| PE-01 | Provide Larger-Radius Track Near the Lake With Different Bridge North | 3 |
| PE-02 | Provide Larger-Radius Track South of McLaughlin Near Kellog Lake | 1 |
| PE-03 | Combine the Structures at Johnson Creek | 0 |
| PE-04 | Optimize Traffic Flow on Johnson Creek Blvd. to Minimize the Tacoma Parking Structure Footprint | 4 |
| PE-05 | Realign the Multiuse Pathway to Locate Adjacent to the Abutment, East Side of Willamette River | 0 |
| PE-06 | Use Driven Piles for the Willamette River Bridge Foundations | *DS |
| PE-07 | Drill Test Shaft for Willamette River Bridge to Reduce Foundations | DS |



Evaluation—Foam Cervical Collar Alternative Compared to the Baseline

- How Well Does It Perform?
 - Correctly Positions Spine
 - Minimizes Head Movement
 - Comfortable
 - Convenient
 - Hygienic
- Does It Perform Key Supporting Functions?
 - Match Anatomy
 - Resist Flexion





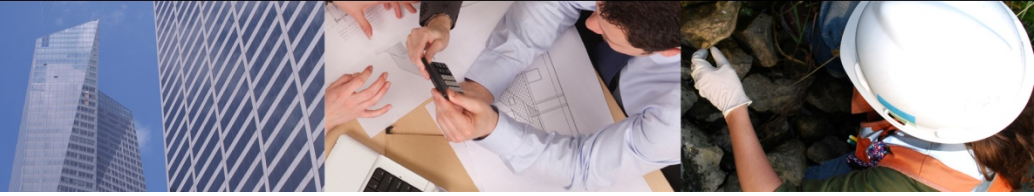
5. Development Phase

- A. Review Performance Criteria
- B. Describe Baseline (Existing Design or Process) and Proposed Alternative
- C. Describe Benefits, Risks/Challenges*, and Implementation Considerations
- D. Produce Support Materials (Charts, Graphs, Drawings, Images)
- E. Perform Analysis of Initial Cost (Baseline and Proposed)
- F. Perform Analysis of Life-Cycle Cost (Baseline and Proposed)



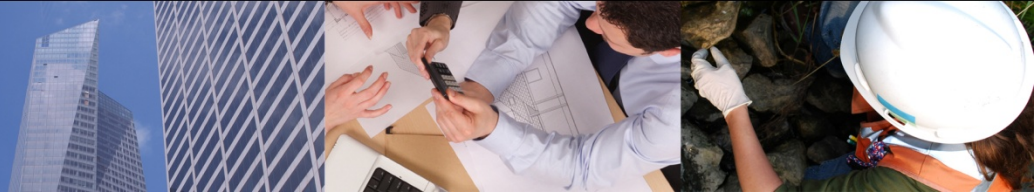
Development—Purpose

- Credibly document the details of value proposals/recommendations to facilitate informed decision making:
 - Provide side-by-side analysis of the baseline compared to the idea relative to
 - performance and cost;
 - benefits, risks, and challenges;
 - detailed discussion of the idea; and
 - what will be needed to implement the idea



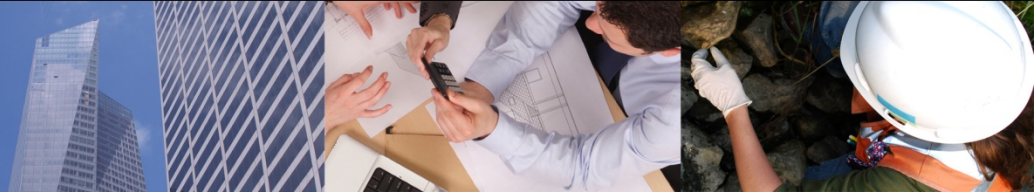
6. Presentation Phase

- A. Presentation Preparation
- B. Present Study Results
- C. Determine Next Steps
- D. Issue Report



Presentation—Purpose

- Aid the owner and design team in making informed decisions to move the project forward



Post-Study—Implementation

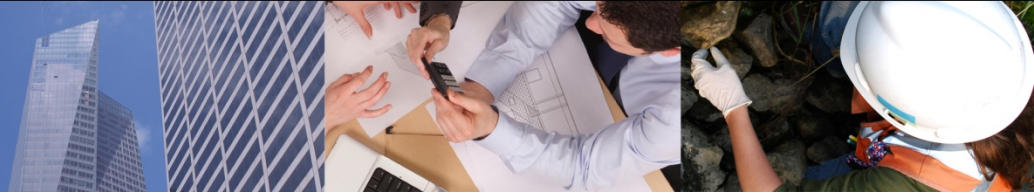


Implementation—Activities

- Incorporate Client Comments Into Final Report
- Monitor Status of Implementation

“If ideas aren’t accepted, what’s the point of the study?”

—Anna M. Bremmer, CVS, LEED AP



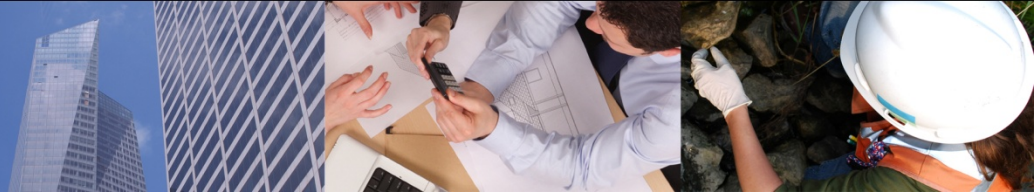
Implementation—FHWA Criteria for Acceptance of Recommendations

- Life-Cycle Cost (LCCA)
- Quality
- Environment
- Safety
- Operational Efficiency
- Federal Highway Administration 23 CFR Part 627 [FHWA Docket No. FHWA-2011-0046] RIN 2125-AF40 Value Engineering, Final Rule, March 15, 2012, <http://www.gpo.gov/fdsys/pkg/FR-2013-03-15/html/2013-6244.htm>



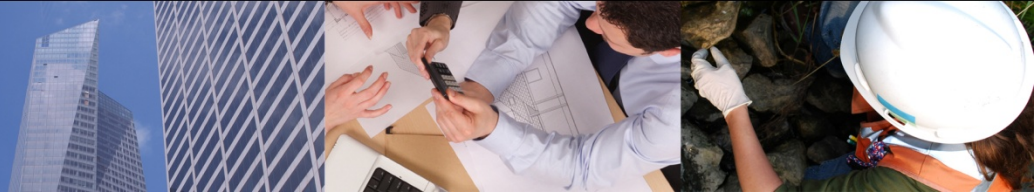
Implementation—Factors for Strong Implementation Rates (Study Level)

- Use the SAVE VE Job Plan, Especially Function Analysis
- Understand Study Priorities
- Apply Performance Criteria at Each Stage of the Job Plan
- Respect and Understand the Design Team's Approach and Constraints
- Involve Owner Project Manager in Mid-Point Review
- Develop Quality Value Proposals/Recommendations that Thoroughly Examine the Idea and Include Sound Information (LCCA, etc.) Such That Project Team Can Make Informed Decisions



Facilitator Qualifications—Esp. for Function Analysis

- The Value Team Leader is trained in value methodology techniques and is qualified to lead a study team using the Job Plan. The SAVE International® Certification Board certifies, with the designation Certified Value Specialist® (CVS®), those individuals who have met specified training requirements and have demonstrated competency in the application of the Job Plan. The Team Facilitator shall be a CVS®, or a VMP serving under the guidance of a CVS® as defined by SAVE Certification criteria, or shall be the holder of another active certification recognized by SAVE International®.
- SAVE International® Value Standard 2015, http://www.value-eng.org/pdf_docs/monographs/vmstd.pdf



Questions?