

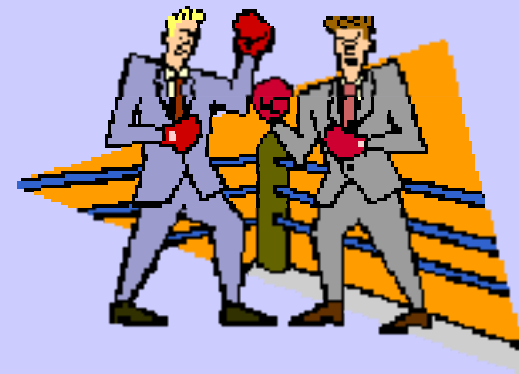


Value Engineering

What is it?

What Value Engineering Is Not!

- Cost Cutting
- Design Review
- Project Elimination
- Scope Reduction
- Quality Reduction
- Detailed Cost Estimating
- Redesign



What Value Engineering Is!

**An organized study of FUNCTIONS to
satisfy the USER'S NEEDS with a
QUALITY PRODUCT at the LOWEST
LIFE CYCLE COST through APPLIED
CREATIVITY**

Definition of Value Engineering

- **Terms used to describe “Value Engineering”**
 - **Value Methodology**
 - This is the “official” term used by SAVE International. It describes the overall body of knowledge.
 - **Value Analysis**
 - This was the first term used when the process was originally developed for manufacturing
 - **Value Engineering**
 - The term “engineering” was used to identify the process as it is applied to design and construction
 - **Value Management**
 - This less commonly used term refers to its application to business processes

Definition of Value Engineering

- The value of a function is defined as the relationship of cost to performance

$$\text{Value}^{\text{max}} = \frac{\text{Performance}^{\text{max}}}{\text{Cost}^{\text{min}}}$$

Definition of Value Engineering

- “Good” Value is the lowest cost to reliably provide the required function with essential performance.
- Value is always increased by decreasing costs while maintaining essential performance.
- Value may also be increased if the customer needs, wants, and is willing to pay for greater performance.

Range of Application

- VE applies to everything because every project or process has a function
- VE can be applied at any point of the design or process
- VE is a problem solving technique
- VE can be used as a technique for developing design criteria

Reasons for Poor Value...

- Lack of and/or poor coordination among designers
- Failure to network with customer – poor definition of needs and wants
- Design based on habitual thinking or mistaken beliefs
- Not enough time for project formulation and/or design
- Failure to utilize latest technologies
- Negative attitudes

More Reasons for Poor Value...

- Poor communication in developing project scope
- Lack of consensus among project stakeholders with regard to project scope
- Outdated or inappropriate design standards
- Incorrect assumptions based on poor information
- Fixation with previous design concepts
- Honest wrong beliefs

Common Misconceptions

- **“VE is something we do all the time.”**
 - No it isn't. VE requires the application of a specialized body of knowledge at the right time with the right people.
- **“VE degrades project performance.”**
 - If applied properly, it should maintain or improve project performance.
- **“VE is just another management fad.”**
 - VE was developed in 1943. It is required by federal and many state laws. It has a professional society and maintains professional standards and accreditation.
- **“VE is really just cost cutting.”**
 - Really?

VE vs. Cost Cutting/Reduction

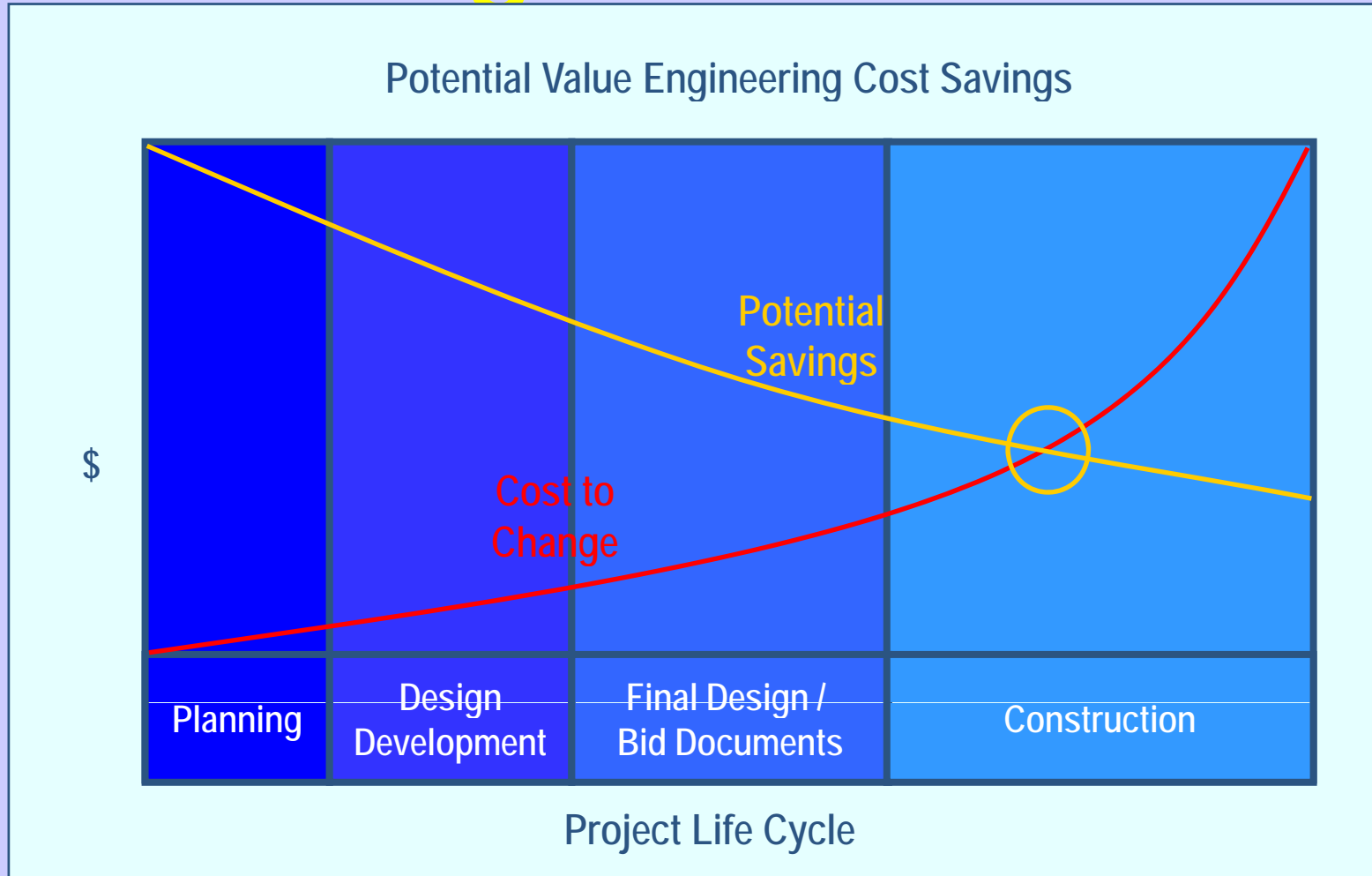
- VE seeks to maintain or improve performance while reducing TOTAL costs.
 - VE is a pre-planned allocation of time and effort.
 - VE is a highly structured process using a formal methodology.
 - VE utilizes an objective, multi-disciplined team and a trained facilitator.
 - VE provides an organized follow-up, implementation and reporting program.
- ⇒ ■ Cost reduction seeks to cut INITIAL costs, often at the expense of project quality.
 - ⇒ ■ Cost reduction is usually a reaction to budget overruns.
 - ⇒ ■ Cost reduction is an informal process.
 - ⇒ ■ Cost reduction generally involves only a few management personnel.
 - ⇒ ■ Cost reduction does not.

Value Engineering Quality

Value Engineering is a
tool/method to enhance
QUALITY



Timing the VE Effort



Some VE Study Objectives

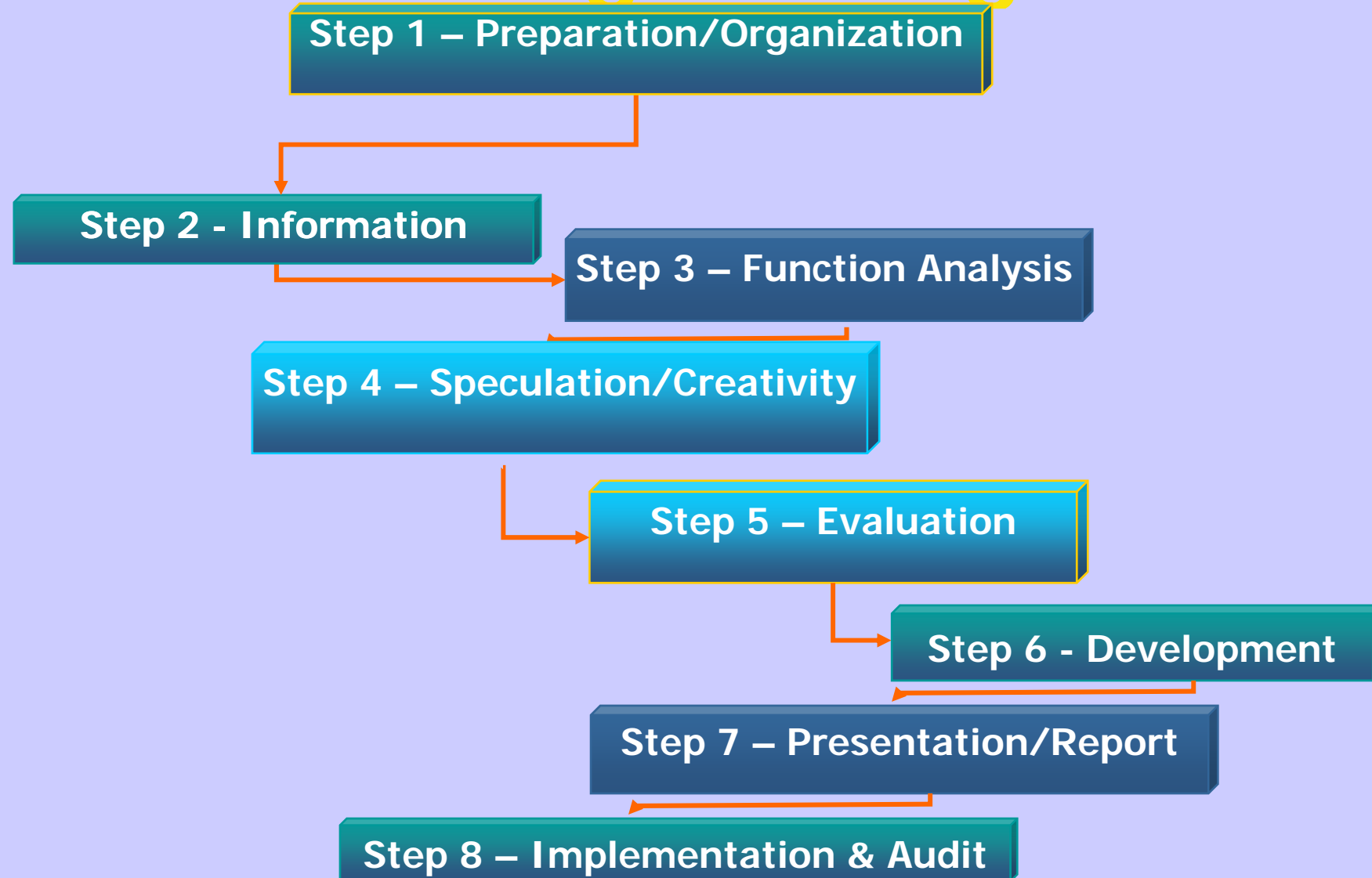
- Performance Improvement
- Significant Cost Savings/Avoidance
- Optimization of Resources (Time & Money)
- Review (Technical, QA) — Optional Objective
- Coordination (In- House & Users)
- Transfer Innovative Technologies
- Have Fun!

The Value Engineering Job Plan

- Provides a systematic approach
- Divides the study into distinct work elements

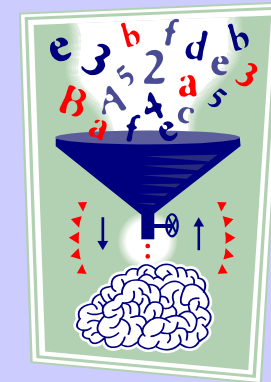


Value Engineering Is:



Information Phase

Purposes



- To determine user needs
- To gather and tabulate information concerning the item as presently designed
- To build team knowledge and understanding of the project
- To completely understand the specific use of function requirements of the item
- To visit the site (preferable)
- Process continues throughout remainder of the study

Information Phase

Techniques



- Get all the facts from the best possible sources (e.g. design team)
- Develop cost models
- Determine and evaluate the function(s) of the present design
- Prepare a *FAST* diagram
- Identify & define project Performance Criteria
- Develop project Performance Ratings
- Determine present design objectives & constraints
- What does the customer want?

USE GOOD HUMAN RELATIONS

Why is Functional Analysis Important?

- You can't always get what you want!
- You can't always get what you want!
- You can't always get what you want!
- BUT – if you try, somehow you just might , from time to time, get what you need!
- Function Analysis defines user's needs through verb-noun pairings

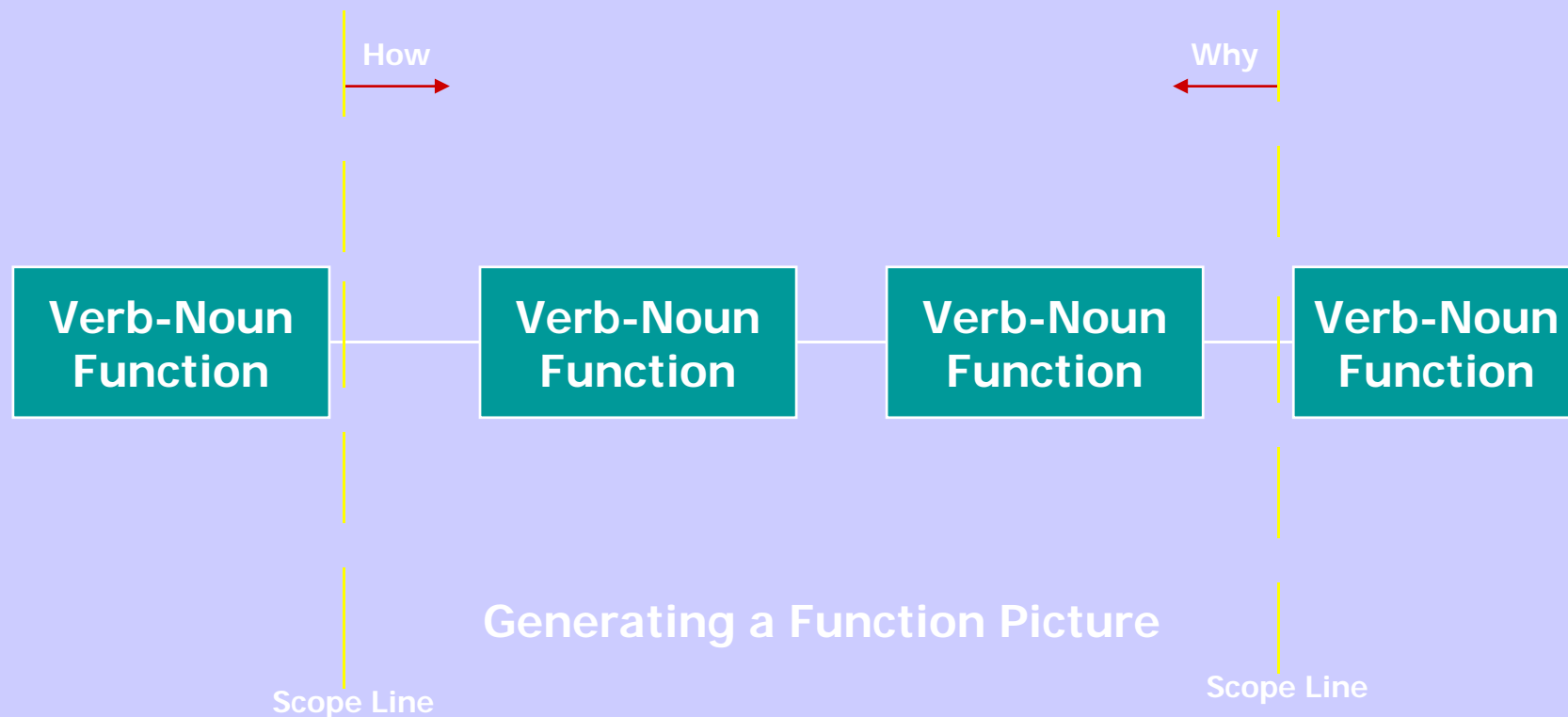
Function – The



- Specific purposes or intended use of an item (What is this? What is it supposed to do? What else can it do?)
 - Function is that which makes a product, process or project work or sell.
 - All cost is for function.
 - Primary functions possess value and are required to make a product work or sell.
 - Secondary functions have no value and are present due to the current design of the product.
- That characteristic that makes a product or service have value
- Determine by considering the user's actual needs

FAST Diagram

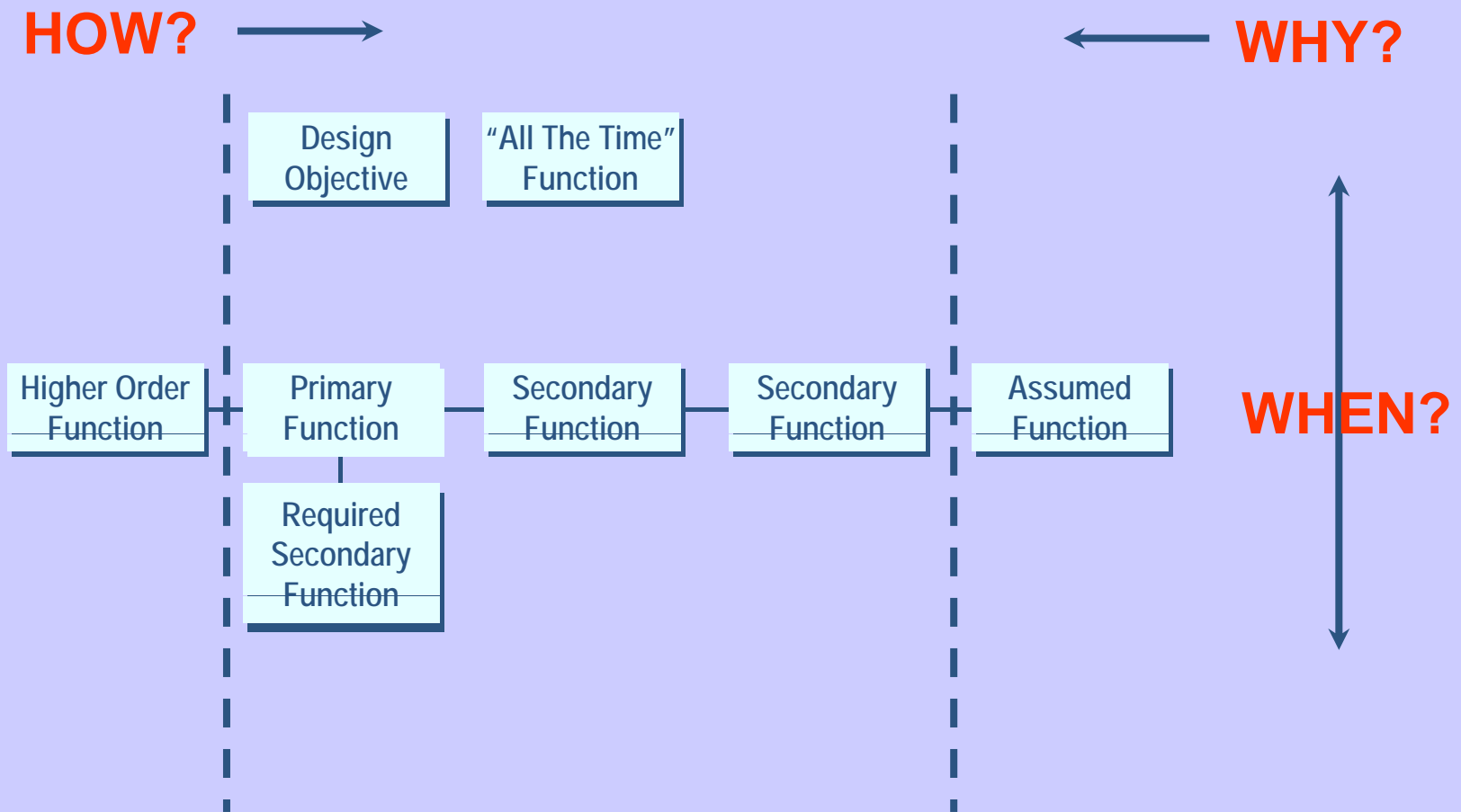
Function Analysis System Technique



The Purpose of a *FAST* Diagram is

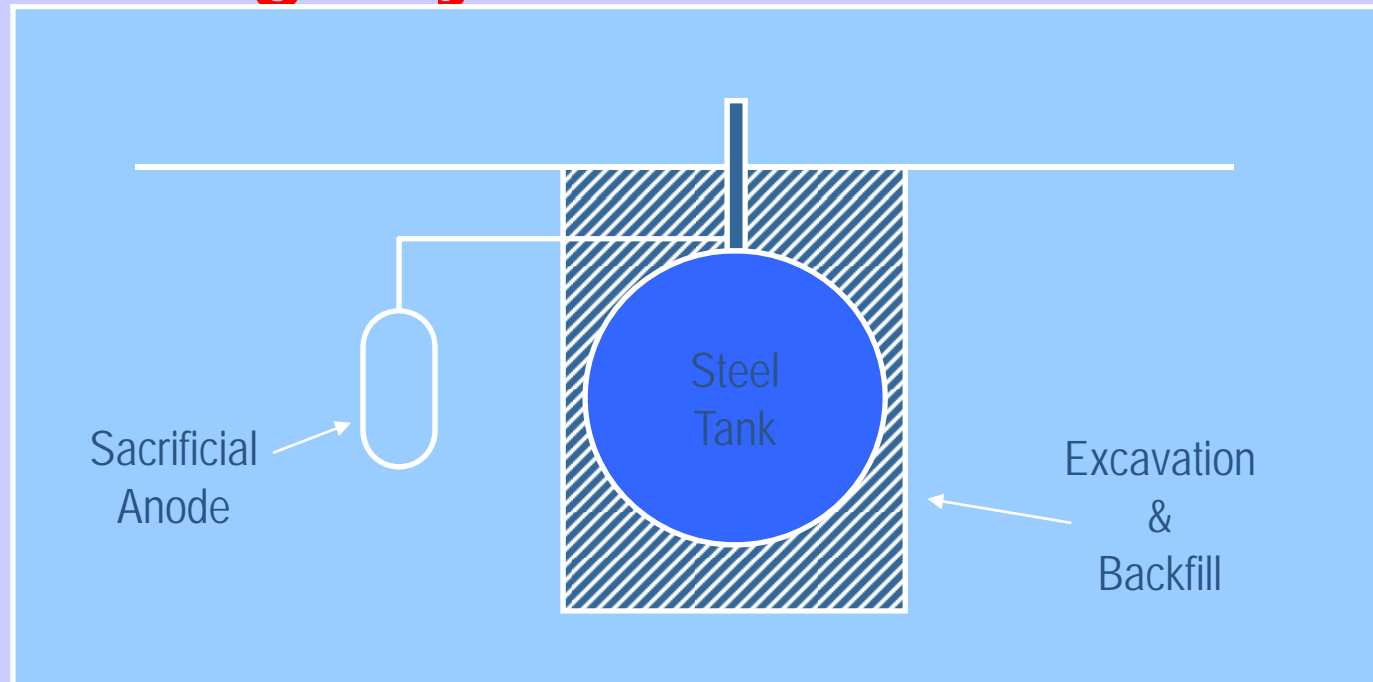
- Show specific relationships of all functions with respect to each other
- Deepen the understanding of the problem to be solved
- Promote discussion and information gathering – team building
- Support the process of creativity

FAST Diagrams



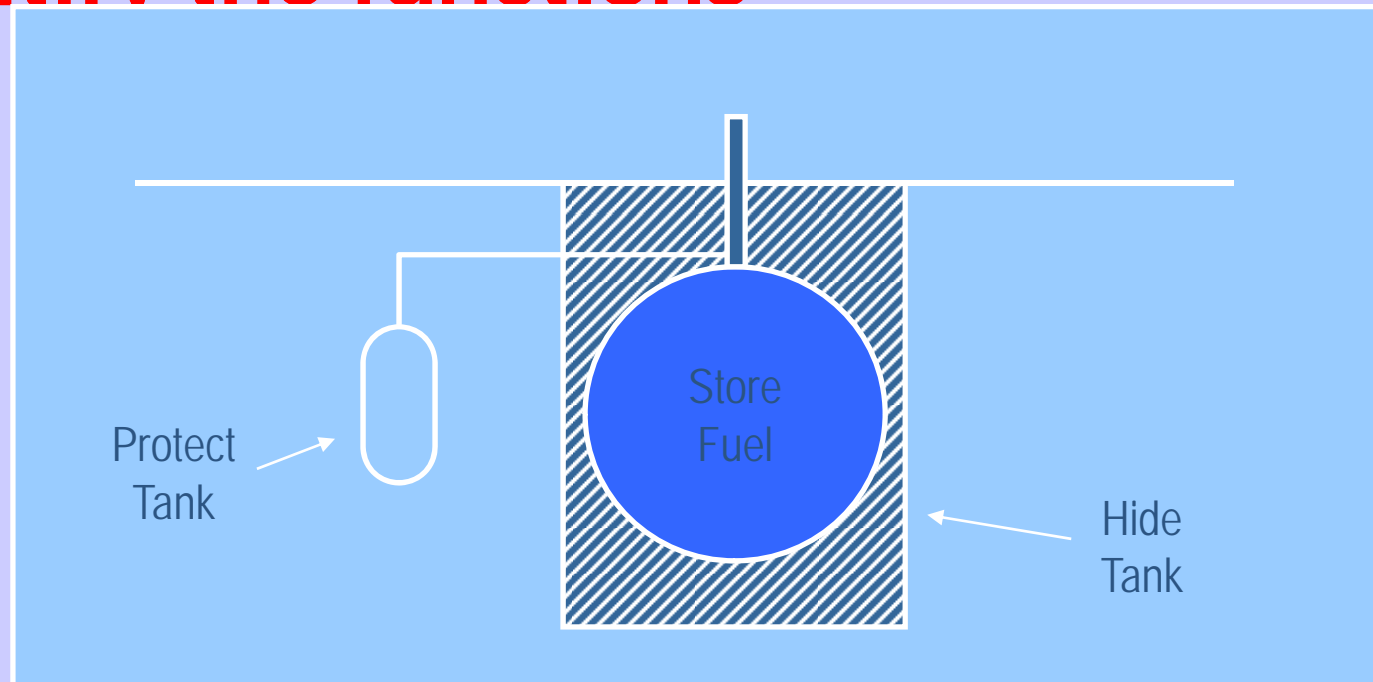
Function Analysis

■ Fuel Storage System



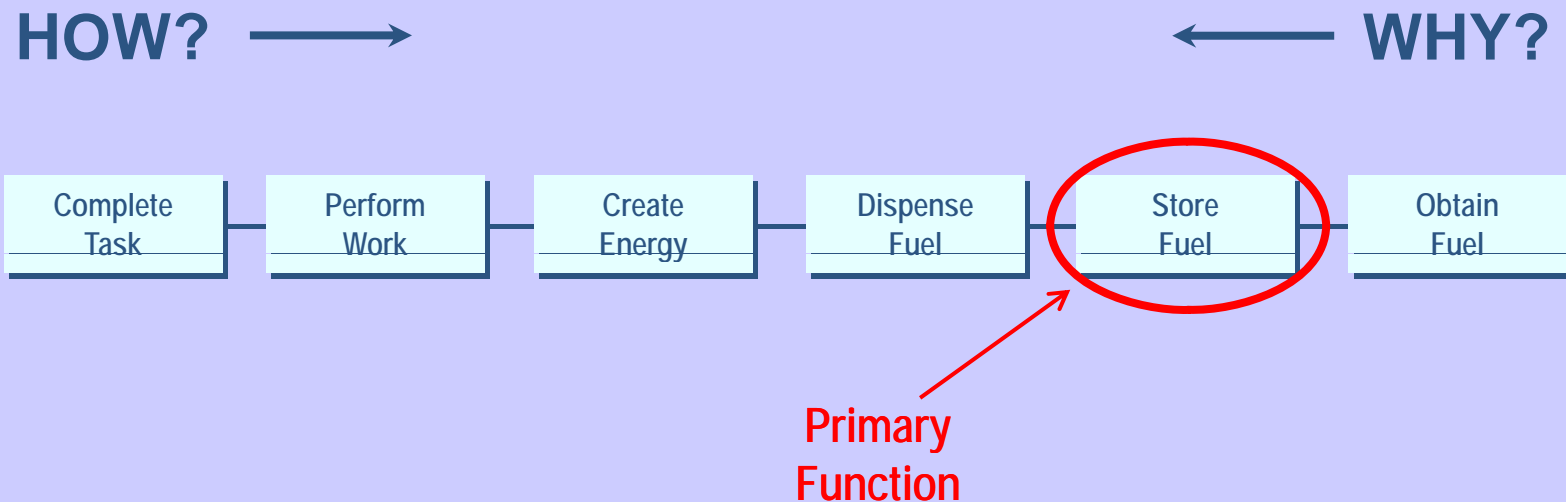
Function Analysis

- **Identify the functions**



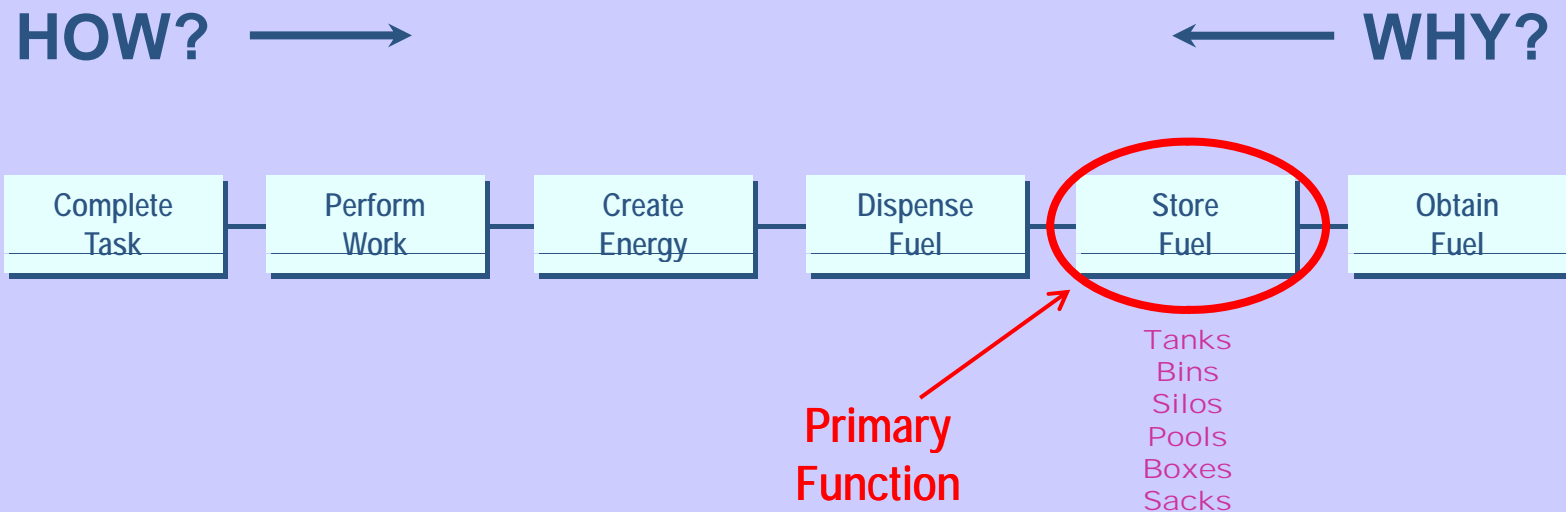
Function Analysis

- Identify the "scope"



Function Analysis

■ Identify the "scope"

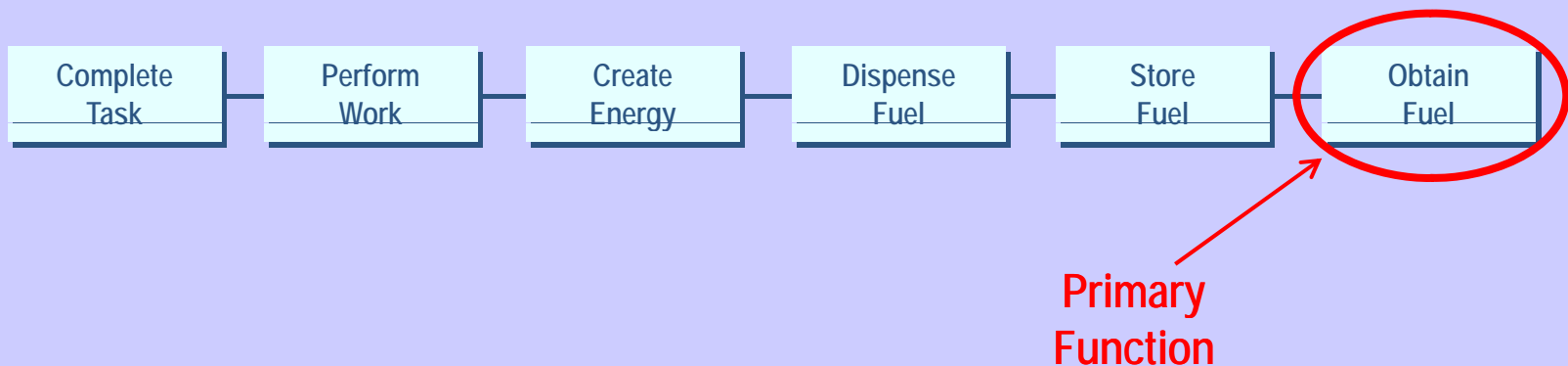


Function Analysis

- Identify the "scope"

HOW? →

← WHY?

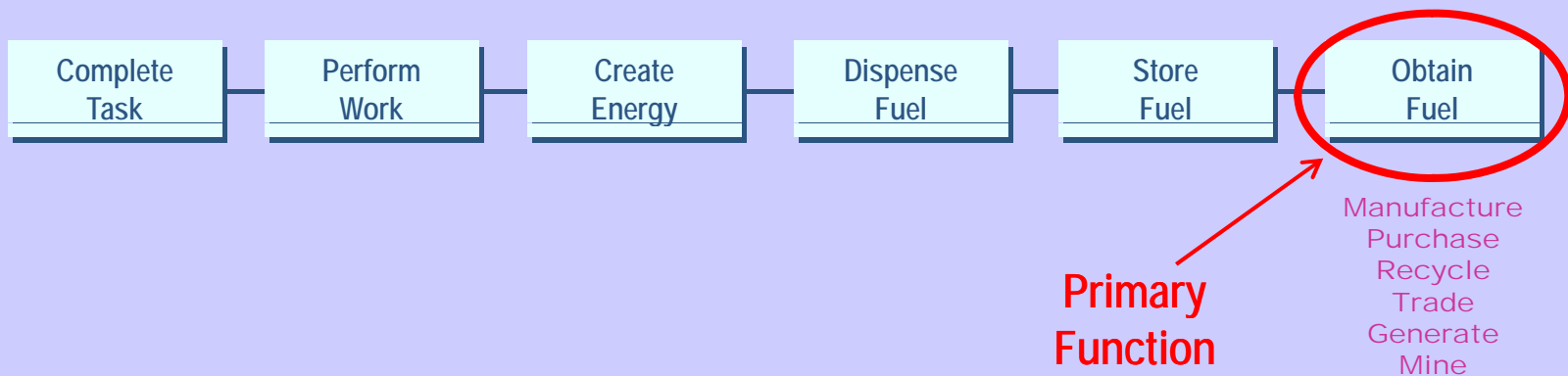


Function Analysis

■ Identify the "scope"

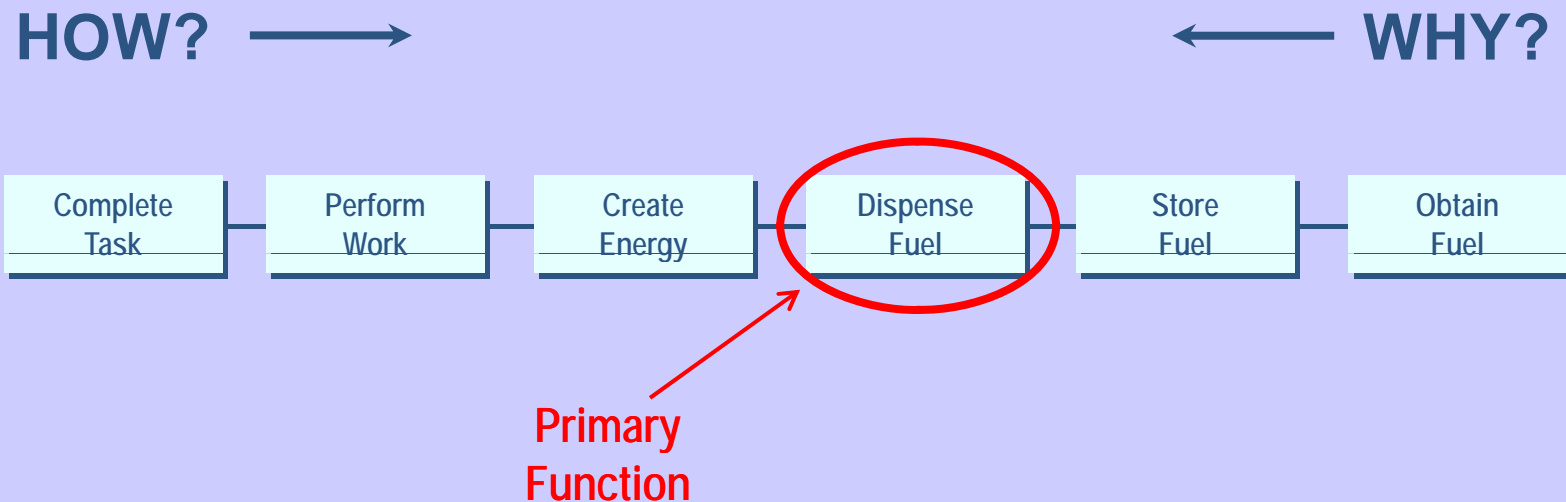
HOW? →

← WHY?



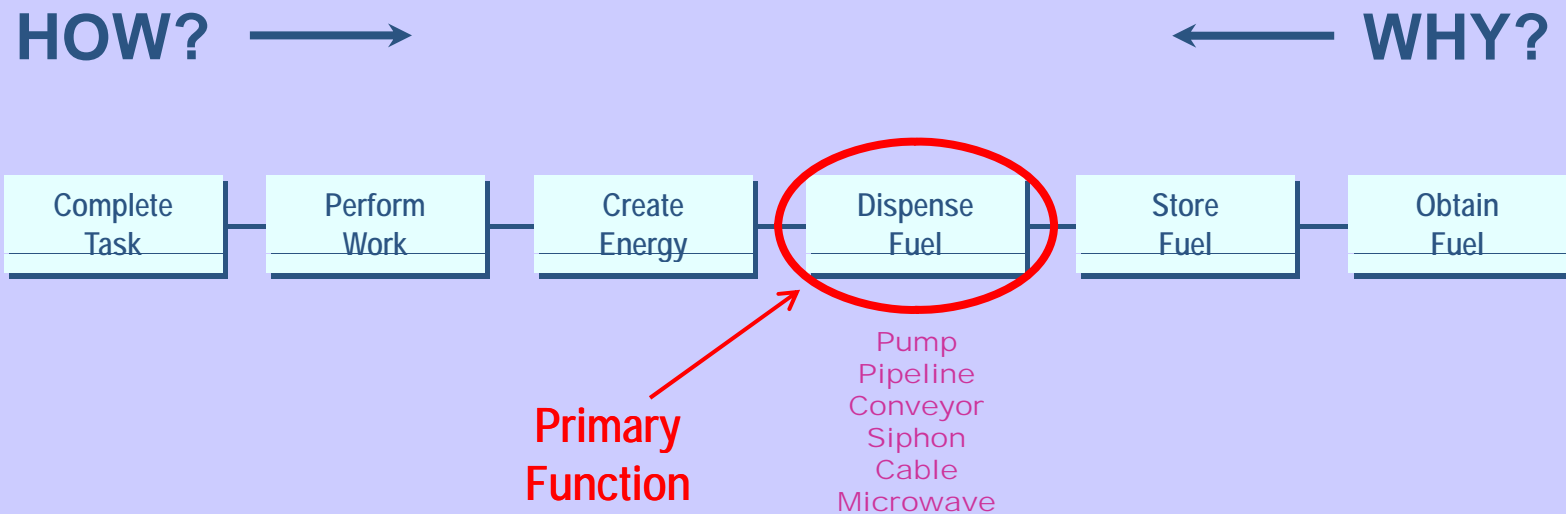
Function Analysis

- Identify the "scope"



Function Analysis

■ Identify the "scope"



Speculation Phase

Purposes



- To generate a large number of alternatives that provide the item's basic function(s) without considering their practicality

Speculation Phase

Techniques



- Use creative thinking
- No rules – no limits
- Forget about scope, speculate on the FUNCTION - not on the item
- Don't let regulations or people control your thinking
- If you don't look for the *second* right answer, you won't find it
- Eliminate/simplify: modify and/or combine alternatives
- Think – get out of the comfort zone and enjoy it!
- Keep talking, keep generating, let the juices flow!
- Its about **CHANGE!** **USE GOOD HUMAN RELATIONS**

**We'all'in's never done it that
way before!!**



Regulations
and
Guidelines
are sacred!



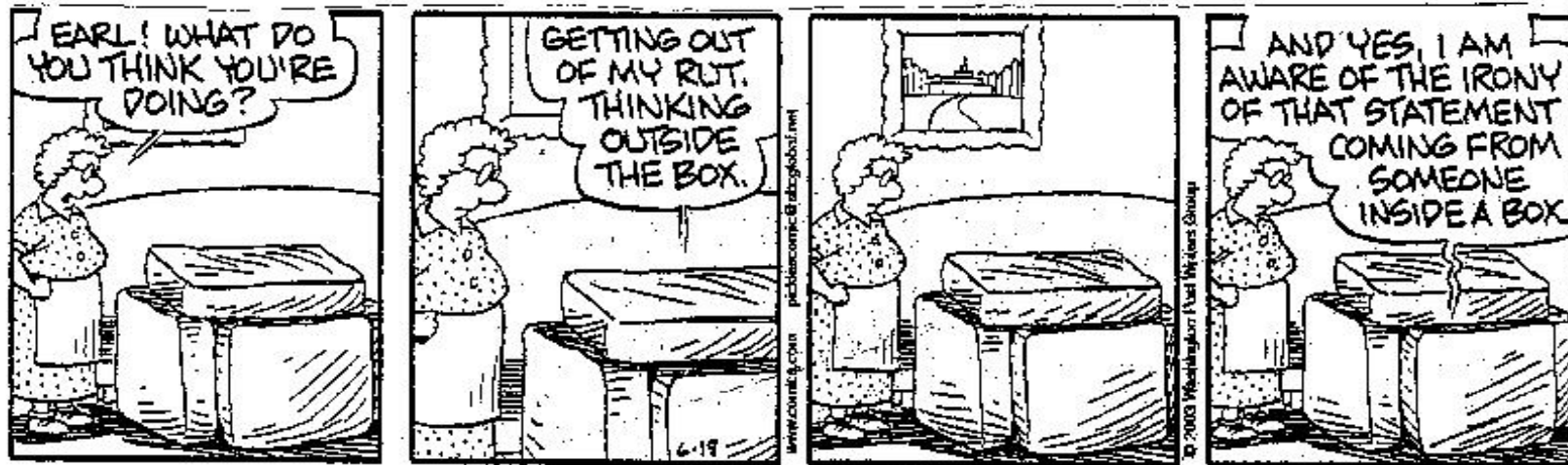
What will
my boss
think?



What if it doesn't work?



Creativity



Creativity

Brainstorming Rules & Objectives...



- Criticism/evaluation is prohibited (at this time)
- Free-wheeling is welcomed and encouraged – be uninhibited and think as a child
- Be spontaneous – rapid fire 'gut feels'
- Quantity is desired over quality – cover the walls
- Combine and add to ideas
- Build upon another person's ideas
- How do others solve similar problems
- Record all ideas

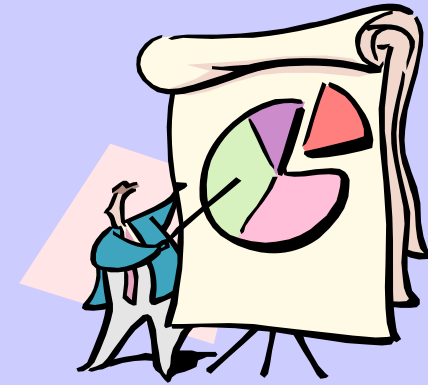
There Are No Dumb Ideas!



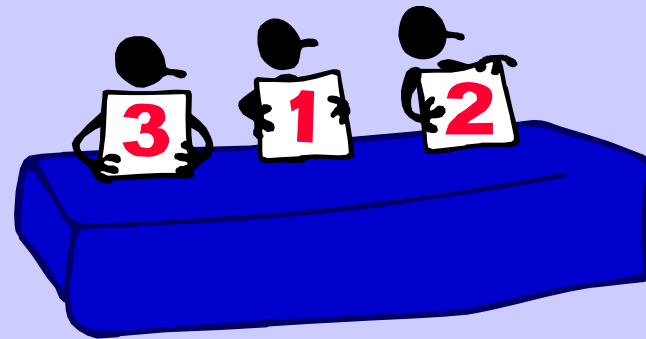
OK, so some of the ideas were dumb!
Which leads us to.....

Analysis Phase

Purposes



- To evaluate, criticize, and rank alternatives
- Identify advantages and disadvantages as compared to the baseline project
- Which alternatives offer the best combination of:
 - Design-ability
 - Construct-ability
 - Operational ease
 - Quality assurance
 - Customer satisfaction
 - And... low life-cycle cost
- To develop alternatives that offer the greatest increase in value



Analysis Phase

Techniques

- Prior experience
- Collective 'Gut' feels
- Stakeholder input
- Use cost references
- Apply matrix techniques
 - Define performance measures
 - Weight and rank measures
 - Evaluate alternatives
- Make sketches
- Consult experts
- Use your own judgment

USE GOOD HUMAN RELATIONS



You gotta also consider...
Life Cycle Cost Analysis!
(LCC)

- **A definition...**

“The systematic evaluation of alternative designs and the comparison of their projected development/design, construction, operation/maintenance and disposal costs or salvage value over a specified time period.”

In other words, LCC is...

- Simply put... Consider all the costs!
- $\text{Total LCC} = \text{Initial Cost} + \text{Ownership Cost} + \text{Salvage value/disposal costs}$
- Deceptive... For example, security was typically a minor cost, but can now be a major consideration.
- LCC gives decision makers a complete awareness of Big Picture

Development Phase

Purposes



- To select the best alternative(s)
- To develop complete written and oral proposals

Development Phase

Techniques

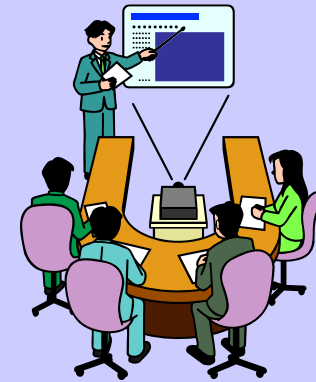


- Recommend specifics, not generalities
- Make sure your report describes the disadvantages as well as the advantages
- Gather convincing facts
 - Assure technical adequacy
- Spend your client's money as you would your own
 - Complete order-of-magnitude cost estimate w/LCC
- Prepare Proposal
 - Finalize *FAST* diagram for proposal
 - Sell the idea through the justification
 - You are selling something uncomfortable to most people – **CHANGE!**
- Mistakes will cast doubt on your validity

USE GOOD HUMAN RELATIONS

Presentation Phase

Purposes



- To present value engineering study proposal(s) to the decision makers/stake holders
- To obtain approval/support
- To enhance potential implementation

Presentation Phase

Techniques

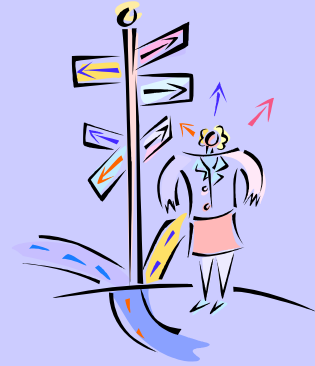


- Again, you are selling **CHANGE!**
- Your enthusiasm will sell your proposal
- Use *FAST* diagram as a communication tool – Are the most important functions satisfied?
- Be brief, pertinent and convincing
- Keep it simple

USE GOOD HUMAN RELATIONS

Presentation Phase

Techniques



- Anticipate/remove road blocks – understand their point of view
- Network with people and gain support
- BUT – you can't please everybody
- AND – don't overload with too much information

USE GOOD HUMAN RELATIONS



How to find out more about VE...



- A Value Engineering Professional Society
- Information about becoming a Certified Value Specialist
- Professional journals, annual conference
- Web site lists local chapters
- Also lists VE consultants and specialists

Important Links

- **SAVE International**
 - www.value-eng.org

Questions

Don't be shy!

