WORKSHOP TITLE: VALUE ENGINEERING

Workshop Duration: Typically 5 days

Typically Used: During the Front-end Development Phases of a project

Overview of the Workshop

Value Engineering (VE) is one of the oldest Value Improving Practices, dating back to around 1947. The technique is used by a huge number of successful companies in many diverse industries. It is even mandated by rule in some countries (e.g. the Federal Highway Administration of the Department of Transportation in the USA requires Value Engineering on all Highway projects over US$ 50 mill that involve federal funding). There is a wealth of material and books available relating to Value Engineering (and Value Management) and a professional society in the USA (Society of American Value Engineers - SAVE) promoting the techniques.

VE works by breaking down a system design into functional blocks and then brainstorming alternative ideas to achieving each block's functionality at reduced cost. Within the workshop, the best ideas are selected through peer-challenge and the selected ideas are developed into more detailed descriptions together with an estimation of their quantified benefits against value drivers that are set by the Sponsors prior to the workshop.

When applied to Oil & Gas and other construction projects during early design phases, VE will typically achieve around 10% to 20% cost saving whilst retaining, or even improving, the key functionalities of the project. Its origins, though, lie in the manufacturing industries where its application to business processes of a repetitive nature also typically achieve around 10% efficiency improvement.

Value Engineering is mostly applied in Oil & Gas development projects during the early design phases (latter stages of 'Select' to early 'Define').

The duration of a VE Workshop depends somewhat on the scope of the system being examined, but a typical workshop is 5 days.

When to Use a Value Engineering Workshop

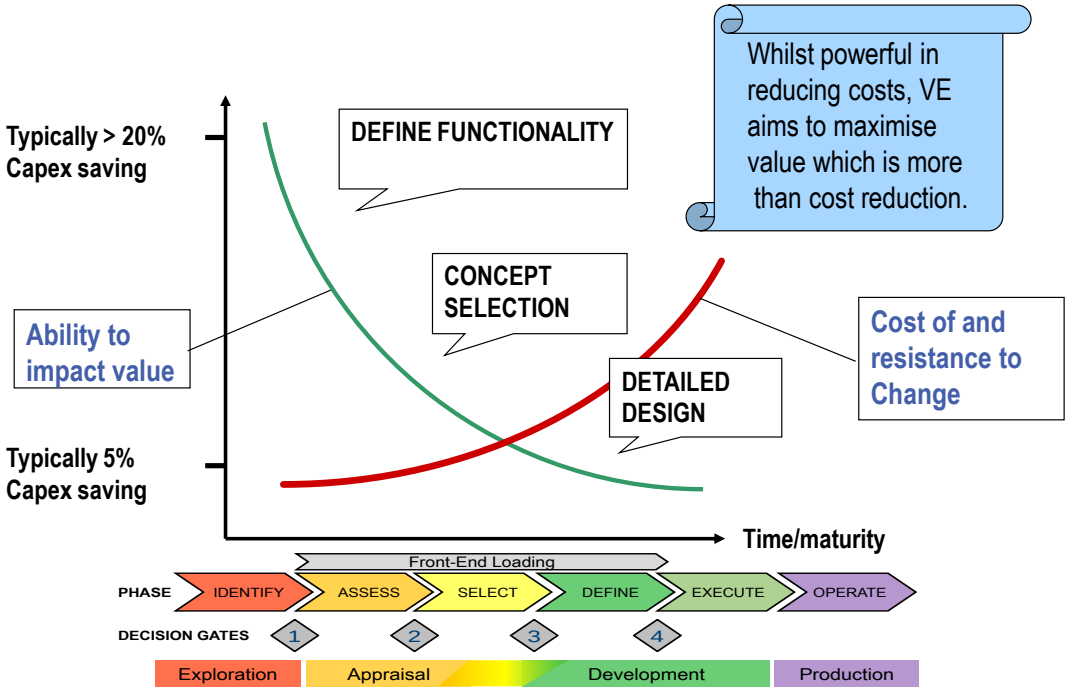
The first VE Worksop for a project can be conducted in the Assess Phase while there are still a number of distinctly different Concepts being examined. A VE Workshop in this phase will be specifically designed and use techniques that can add value in this phase.

The main VE workshop for an Oil & Gas development project would usually be conducted towards the end of the Select Phase.

However, the VE technique is very flexible and it has also been successfully applied during the Execution (construction) Phase of a development. It can also be applied to 'Business Processes' rather than specific hardware designs. Examples include processes such as 'Project Materials Procurement', 'Onshore Drilling Rig Moves', 'Prepare Plant for Shutdown'.

The key to successful use of the VE technique in each of the possible phases of a development lies in the design and preparation of the workshop. Each workshop needs to be designed to address the specific value drivers that are relevant to the project.

Value Engineering Timing



Although typically directed towards cost reduction, considering VE purely as a 'cost-cutting' tool is a great misrepresentation of the technique. Indeed, one of the great strengths of VE is that it enables a rational examination of the trade-offs between a number of Value Drivers. Most projects are faced with a set of 'wishes' such as 'Low cost', 'fast execution', 'high production capacity'. Value Engineering enables ideas for effecting changes to be rationally measured against all the key Value Drivers in order to determine if they add overall value or detract from it.

How the Workshop is conducted

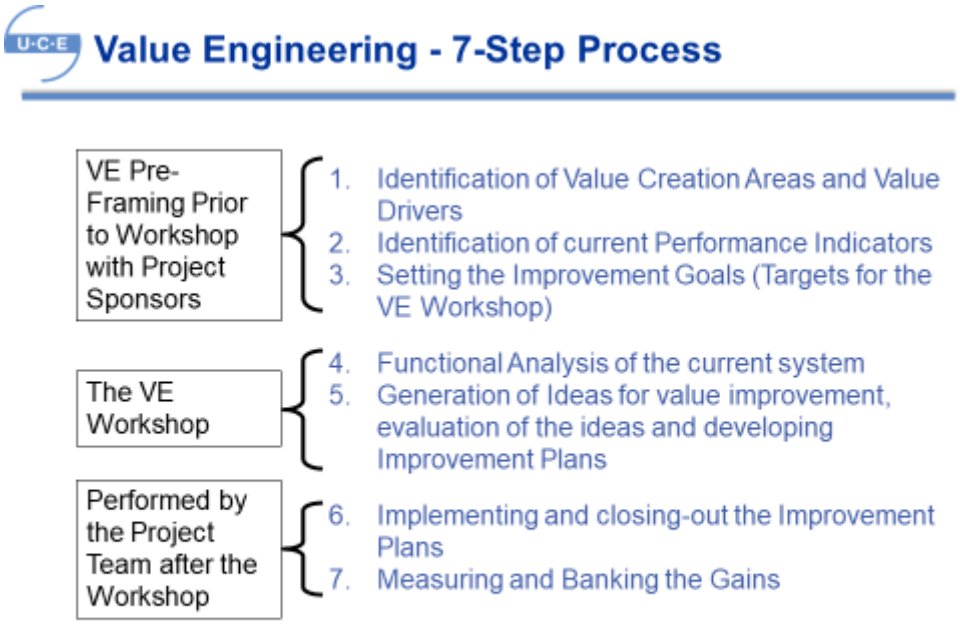
VE workshops are conducted with an integrated, multi-disciplinary, group of staff. The disciplines required in any particular workshop will depend very much on the plant/asset being examined. Typically, for an Oil & Gas development project, VE workshops involve Reservoir Engineers, Well Engineers, Production Technologists, Process Engineers, Facilities Engineers, Electrical Engineers, Instruments Engineers, Cost Estimators, Maintenance Engineers and Operators.

An important contribution to a VE workshop is to have expertise added from outside the project, either from within the same organisation but a different project or Asset Group or from outside of the company.

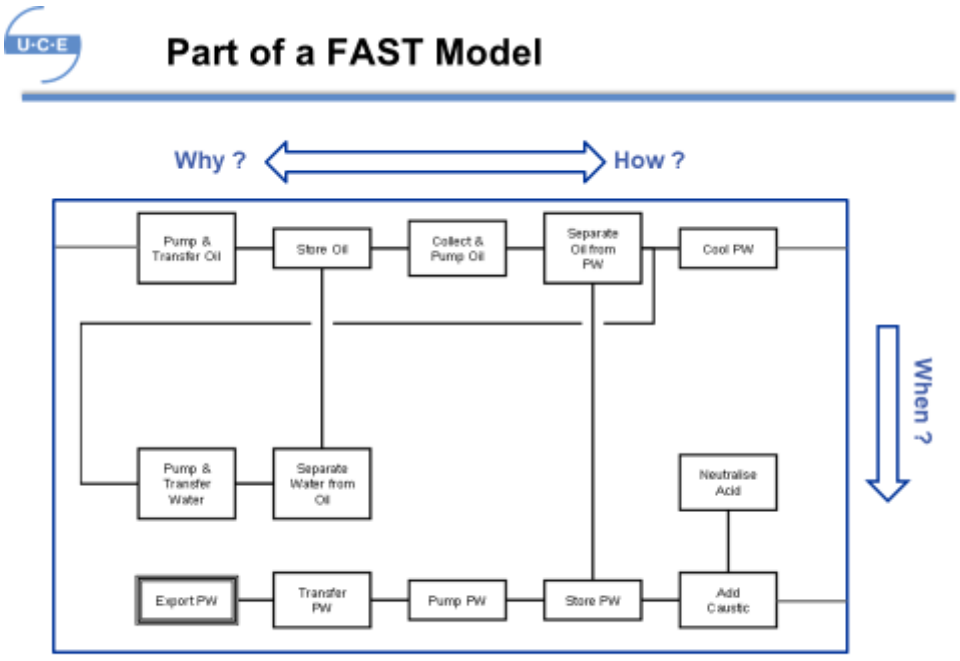
VE is a facilitated process and requires normally 2 experienced facilitators to conduct the workshop.

The design of the workshop involves a formal 'VE workshop pre-framing' event which the facilitators will conduct with the workshop sponsor and key stakeholders. In this pre-framing, the scope of the

workshop is set and the Value Drivers for the project are established and ranked in importance. The logistical plans are also agreed (which includes the workshop team, outside expertise, the location, timing and administrative arrangements).

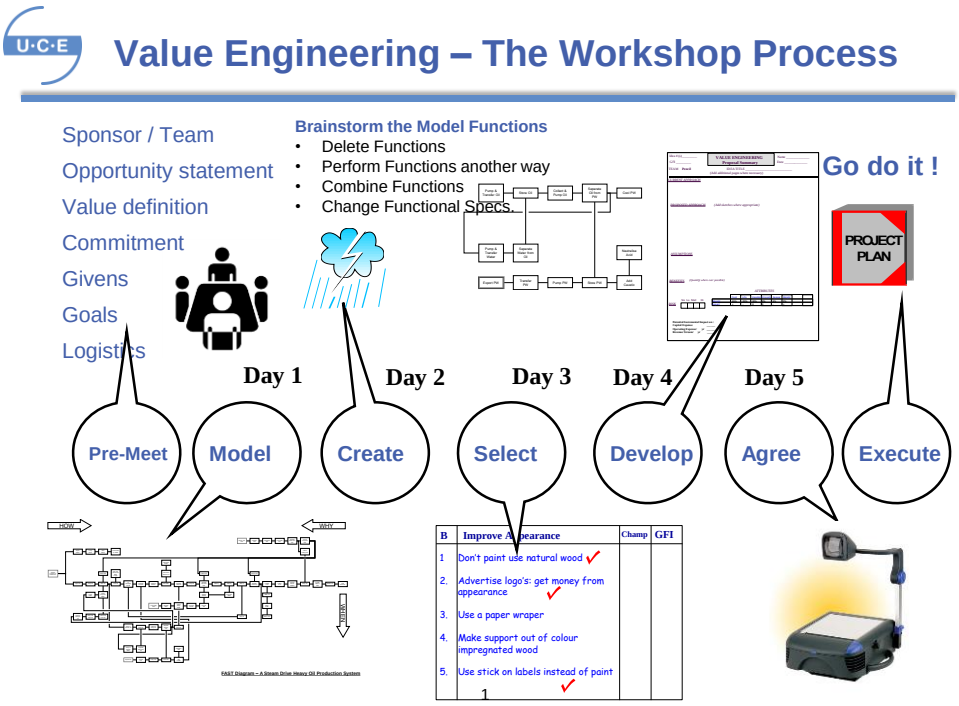


During the VE workshop the system being examined is considered on the basis of a 'Functional Model'. Functional Modelling is a fundamental technique which is an important part of Value Engineering. The classis VE technique uses what is termed 'FAST' modelling (Functional Analysis System Technique). The FAST methodology utilises a diagram which shows the functional relationship between components of the system.



Whilst a powerful technique for analysing systems and component designs, experience for Oil & Gas projects has shown that it is not necessarily the best technique for looking at the scope of a complete Oil & Gas project. The scope of the systems on such a project tends to be too wide to apply FAST modelling to all the parts of the project. It is therefore common to adopt an alternative technique to 'model, the various systems in a scope of the VE workshop. Typically, a form of 'Paint-the-Picture' is used to describe the various components in the project scope and to set down the measures of function to value for each of the key Value Drivers.

After the Functional Modelling (or Paint-the-Picture) introduction, the VE workshop proceeds to the



Idea Creation phase where a very large number of ideas for improvement are normally gathered. All these ideas are then examined, filtered and ranked. Those ideas which are considered in the team to be of value to pursue are developed in more detail within the workshop. For each of these, the workshop participants will develop a description of the idea and a quantification of how the idea will impact each of the set Value Drivers (whether positively or negatively).

Towards the end of the VE workshop, the team gather ideas into themes or groups that are complementary (or can be combined) and estimate the overall potential gain from the totality of the ideas generated in the workshop. These are used to compile a workshop feedback presentation that is presented to the Sponsor and key Stakeholders at the close of the workshop.

Typical Agenda for a PtL Workshop

A typical Workshop agenda might be :

Day 1

- Welcome & HSE Procedures
- Introduction to VE
- The Case for Action / Sponsor Message

- VE Example
- The VE Pre-Framing
- Functional Modelling / Paint the Picture

Day 2

- Functional Modelling / Paint the Picture cont.
- Introduction to Create Phase {Set Up Brainstorm Stations}
- Brainstorm Ideas

Day 3

- Introduction to Select Process {Set up room for Championing}
- Championing {Set up room for GFI voting}
- GFI Voting {Set up spreadsheet for Cut off & Authoring}
- Cut off & Authoring

Day 4

- Introduction to Development Phase
- Write up Development Sheets
- Sign Off Sheets
- Group Development Sheets into Themes
- Develop Theme Summaries in Teams
- Feedback & Agree Theme Summaries

Day 5

- Prepare Management Presentation
- Deliver Management Presentation
- Workshop Close

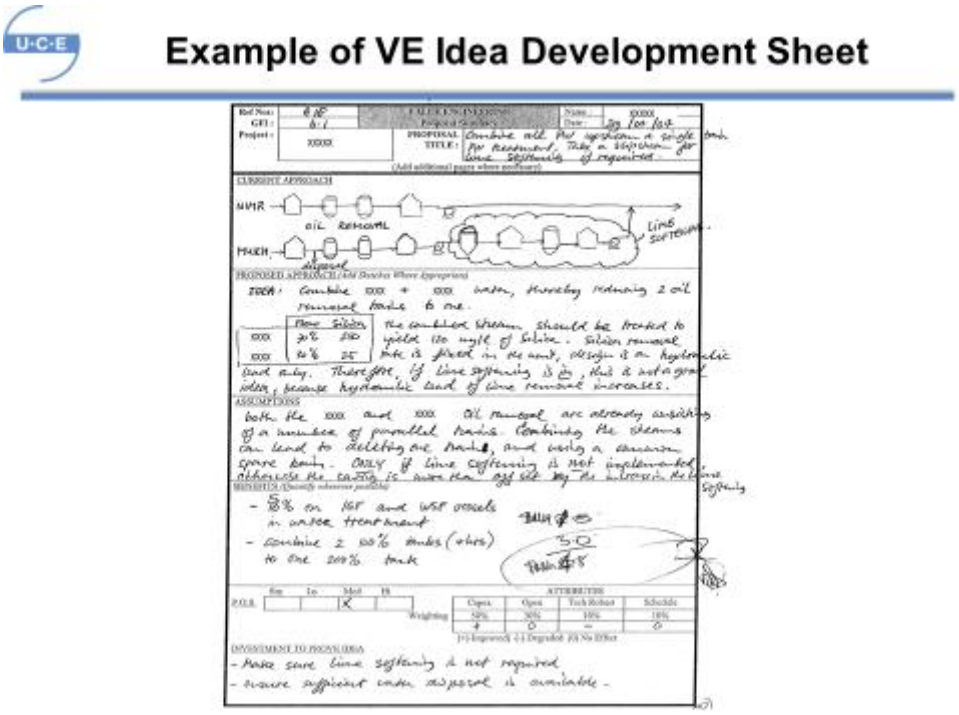
The deliverables from a VE Workshop

A Feedback Presentation is normally the last activity in the workshop. This is a key deliverable to help garner senior management support for the proposed follow-up plan which will undoubtedly require resources to further evaluate and quantify each idea and take it to the level required to obtain execution budget approval or approval for the design change.

In addition to the Feedback Presentation, the output from the Workshop includes the full set of ideas that are each developed and quantified to a sufficient level of detail to enable them to be followed up outside the workshop.

UCE will normally also offer to generate a Workshop Report in Microsoft Word format that documents the full workshop process and results.

Example : Idea Development Sheet



Facilitator

Phil Tudhope is currently Director of a consulting company, specialising in technical and project management training for graduates and more senior technical staff. He has a first class honours B.Sc. in Mechanical Engineering from Bristol University and is a Chartered Engineer, Fellow of the Institution of Mechanical Engineers and Associate Member of the Institution of Chemical Engineers.

Phil has 40 years' experience in Project Management, Technical Development and Change Management in the oil & gas industry and proven technical and managerial capabilities to achieve results with a strong business focus and to effect significant positive change. He is a specialist in front-end (feasibility & concept selection) phases of upstream oil & gas developments with midstream (LNG) experience and project execution experience and has the ability to perform analysis and development work as well as lead and motivate teams.

Amongst other roles, he was Specialist Front End Advisor at Petronas Carigali, Chief Process Engineer at BG Group and Head of Upstream Engineering at Shell Technology India. He has experience worldwide in differing political, social and remote environments, having worked overseas for 28 years including the Far East, USA, Europe, the Middle East and India.

Phil is an experienced instructor and has designed and facilitated over 50 workshops including; Opportunity Framing, Concept Identification and Selection, Value Engineering, Risk Management, Contract Management and Produce-the-Limit.