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VALUE MANAGEMENT IN CONSTRUCTION

PRESENTED BY

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INTRODUCTION

These notes are primarily aimed at construction professionals within Local Government. Nevertheless Value Management (VM), is a generic process of problem analysis and decision making that is applied in most spheres of management decision making.

The notes are intended to give a brief outline of Value Management and there are references for those who wish to understand more about Value Management.

Within the construction industry the techniques and procedures of Value Management have tended to be used to support project decision making. Increasingly organizations are adopting VM in a range of wider management and boardroom issues, such as strategic planning, scenario planning, business process improvement, business continuity, stimulating innovation, change management etc; whilst Local Authorities and other Best Value Authorities defined in the Local Government Act of 1999 are turning to Value Management to help deliver Best Value across the full range of their services.

TERMINOLOGY: VALUE MANAGEMENT VERSUS VALUE ENGINEERING AND VALUE ANALYSIS

Value Management differs from Value Engineering (VE), in that whilst VE is concerned with achieving defined functions at minimum cost (or whole life cost), VM is concerned with defining what value actually means within a particular context, agreeing a clear statement of objectives and ensuring that solutions are consistent with those objectives.

Where Value Management addresses the WHY questions such as what is the need for this project or process, Value Engineering is concerned with HOW. Also, Value Management is not a single method, but a framework within which proven methods are systematically brought together to identify better value from projects, products and services. In this context, VE is regarded as a sub set of VM. The basic methodology for a VM and a VE study are similar.

The British and European Standard on Value Management (3a), states:
"Value Management is distinct from any other management approach in that it simultaneously includes attributes which are not found together in any other system. It is the only system that brings together within a single framework:

- *management style;*
- *positive human dynamics;*
- *consideration of external and internal environment;*

- effective methods and tools "

It defines Value Management as: *"a style of management, particularly dedicated to mobilise people, develop skills and promote synergies and innovation, with the aim of maximising the overall performance of an organisation.*

Value Engineering is concerned with the achievement of necessary functions at minimum cost without detriment to quality, reliability, performance or delivery.

VE is a tight, technical discipline with a very clear focus on cost. Dr Stuart Green of Reading University (7) says that that the two underlying assumptions are that:

- function is an objective characteristic waiting to de revealed; and
- all solutions have the same level of functional performance and can therefore be compared on basis of cost alone.

Whilst these assumptions may be justified when the subject is an individual component, they tend to fall when the subject of study is a whole project.

Value Management is about **getting the right project,** whilst Value Engineering is done to **get the project right.**

The Standard (3B), uses the terms Value Engineering and Value Analysis almost interchangeably. It distinguishes between the terms by saying that Value Engineering is sometimes used where the process is applied to a new product being developed, whereas the term Value Analysis is used for when the process is applied to a an existing process or product.

To avoid confusion some practitioners just use the term Value Management to cover all applications but a simple illustration of the application of VM, VE and VA to a project might be:

Value Management – decision to invest – do we need a project, project concept and scope – what form of project de we need; outline design – what should be the major elements.

Value Engineering – project design; design of project elements

Value Analysis – Improvement of a construction, manufacturing or management process; post project review.

THE VALUE MANAGEMENT PROCESS

Value Management (VM), is a systematic and structured process of team based decision making. It aims to achieve best value for a project or process by defining those functions required to achieve the value objectives and delivering those functions at least cost (whole life cost or resource use), consistent with the required quality and performance.

VM is undertaken as a series stakeholder workshops held at key stages during the development of the project or review of a process or service. It is a flexible, team-based activity, planned and directed by an independent VM facilitator and driven by consensus. The workshops are short duration (usually 6 hours to two days), intense and highly structured.

The process works top-down, starting with needs and strategic goals and focusing on root causes, not symptoms. An early consensus is developed between the key stakeholders about the need for the project or service, the scope, deliverables, key functions and risks, in the context of the wider business objectives. Opportunities for innovation are explored and the most cost effective means of implementation developed, consistent with desired time and quality requirements. VM considers the whole project rather than components and the process is underpinned by consensus. Team selection for the workshop is crucial to success; to ensure that the full range of influences are properly addressed by people with the right balance of knowledge, skills, experience and judgment. Where particular stakeholders are not able to take part, or it is not politic to involve them, specific team members should be tasked as champions of those stakeholder interests.

There are no imposed solutions, the outcomes and decisions are those of the team, resulting in total ownership by the team; improving the prospects for implementation and avoidance of scope creep.

A typical Value Management study has the following characteristics:

- A systematic, staged approach
- Clear definition of objectives and scope at the outset - focus on the customer requirements
- Consideration of the organisational environment - internal and external influences
- Multi-disciplinary team effort - positive human dynamics
- Function analysis
- A workshop format with a structured job plan that separates creativity from evaluation and development.
- Effective use of methods and tools - independent facilitation

Stakeholders

The stakeholders are the people who have a real interest in the project outcome, such as: promoter, owner, financier, supervisor, planner, engineer, planning supervisor, technical specialists, constructor, operator, user, neighbours, etc. The objectives of the project should reflect the entire principal needs and interests of all the stakeholders**.** All the key stakeholders should be involved or *have their views represented* in the study.

The principal stages of a Value Management study (the Work Plan - Fig 1), described below, are:

Preliminary phase -client briefing

I

Strategic diagnosis , study planning

I

The workshop(s)

I

De-briefing or wrap up meeting

I

Final report / close.

Preliminary phase	(2-3 people) The Project Manager and Client meets with the VM Facilitator to discuss whether and how VM could assist a particular project. The PM outlines the circumstances and particular issues or problems of the project, the nature of the decisions to be made, stage in the procurement process and programme. The Facilitator advises on appropriate VM techniques, and possible format, time-scale for a VM study and information requirement.
Strategic Diagnosis - Study Planning	(4-8 people) A Strategy Meeting brings together the key stakeholders to the project to: agree the project objectives, workshop objectives, scope and constraints; the information required for the study; workshop team members - what particular skills and knowledge are required to address the key issues to be dealt with in the workshop. The Facilitator proposes the format for the workshop, plans the workshop and prepares a timetable and workshop handbook to be distributed in advance.
The Workshop	Using procedures specifically selected for the workshop and Client's needs, the Facilitator leads the workshop through a highly participative group decision making process, to achieve the workshop objectives set out at the Strategic Diagnosis meeting. The phases

	are: team briefing; function analysis; option selection and improvement; idea evaluation; idea development; decision building and implementation. Workshops generally last from 1 to 2 days but may be longer. A VM workshop might have up to 16 people (max). Value Engineering workshops tend to require less people; 8-12 usually.
Audit	(At the end of the Workshop and of the study) The effectiveness of a workshop and the study is reviewed to determine if the aims and expectations of the participants were met and to provide feedback for other studies.
De-briefing/ Feedback	(4-8 people) The project team presents the results of follow up actions arising from the workshop, and which are to be reflected in the final report
Final Report	The Facilitator presents a draft report for discussion by the key stakeholders. This may take several forms, from a brief summary of the key points at each phase, decisions and actions, to a comprehensive document suitable for the public domain containing all the working material and background to the decisions, and providing a complete audit trail.

THE STAGES OF A WORKSHOP (THE JOB PLAN)

These are:

Information
I
Function analysis
I
Speculation
I
Evaluation
I
Development
I
Decisions/
Implementation

See Fig 1.

Information	This phase is to bring everyone to the same level of knowledge of the most important aspects of the project. The facilitator first gives a brief overview of the value management process; consensus; project and study objectives; roles and rules of the game. Information will be gathered & presented on the objectives, critical issues and constraints identified at the Strategic Diagnosis meeting. Prior to the workshop participants will have received general briefing on the project, the Value Management process and arrangements for the Workshop.
Functional Analysis	The stage at which the full workshop converts information into understanding. Function Analysis is a technique that assembles the functions of a project in a hierarchical diagram, (sometimes called the value tree), that shows what each of the project elements actually does and how they collectively achieve the project value objectives. The team analyses functions to identify wastage, duplication, unnecessary cost and opportunities for improvement.
Speculation or creativity	Where fresh ideas are unlikely to alter the relative value of the options, option selection would take place at this stage, using a decision matrix that reflects the decision criteria and importance weights developed in the function analysis. This then allows the workshop to concentrate upon improving the selected option. Where improvement ideas could alter the relative value of options it would be appropriate to defer option selection until after the idea development phase. The group generates ideas for achieving the functions, without pre-judging their consequences and without evaluation ideas. Risks are also identified at this stage if appropriate. Techniques that may be used at this stage include: brainstorming, checklists, reasoned debate, prioritised function model, multi attribute rating technique etc.). Generated ideas are arranged by the workshop, using agreed evaluation criteria. This process aims to focus the workshop only on the "winning" ideas - which promise the greatest benefits associated with the team's defined objectives. Approximate values are assigned to the benefits or savings associated with each idea.
Idea Development	The workshop, individually or split into a number of study groups review the technical detail of the ideas generated by the group. Participants will assess each of the individual proposals in terms of feasibility, consequence, risk and value. (Usually, the process of idea development continues after the workshop, with tasks allocated to named individuals, for reporting back at a decisions meeting).

Decision Building	The workshop develop a preliminary decision by assembling the surviving proposals by category, into practical, achievable and cost-beneficial combinations to constitute the final solution that forms the workshop's recommended solution for the approval of the decision makers.
Implementation	The decision is then disaggregated once again into its constituent parts, to identify follow-up tasks and further development necessary for reporting back at the wrap - up meeting. Responsibilities, due dates and required resources are estimated and assigned. The final decision is taken at the wrap-up meeting.

PHASE 1 **BEFORE WORKSHOP** (Planning Meeting)	**INITIATION AND INFORMATION** Agree Project & Study Objectives Identify constraints and issues Agree workshop team members Agree timetable for study Identify and assemble information
WORKSHOP	
PHASE 2	**INFORMATION** Overview of the Value Process Identify Constraints and Opportunities, Strengths and Weaknesses Align project team's understanding Identify Workshop targets
	FUNCTION ANALYSIS Agree a Value Tree using Function Analysis System Technique. Apply importance weights Allocate costs to functions
PHASE 3	**SPECULATIVE (CREATIVE) STAGE** Identify targets for improvement Stimulate creativity. Generate ideas for improvement Defer evaluation
PHASE 4	**EVALUATE THE IDEAS** Agree evaluation criteria. Rank the ideas Allocate the best for development Action Plan
PHASE 5 (for 1 day workshops, this may be undertaken after the workshop)	**DEVELOP PROPOSALS** Develop the best ideas into proposals State advantages, disadvantages, risks, Quantify cost, time & performance impacts Draft Risk Management Strategies Agree recommendations
PHASE 6 **DECISIONS MEETING**	**PRESENT RECOMMENDATIONS** Present proposals to Decision ,Makers. Make recommendations. Agree implementation Strategy
PHASE 7	**REPORT** Inform Management, Provide formal record of study; underpin basis of decisions

Fig 1: VM Study Process

VALUE

In Value Management, Value is the level of importance that is placed upon a desired function, or combination of functions.

$$\textbf{Value} = \frac{\textbf{Function}}{\textbf{Whole Life Cost}} \quad \text{or} \quad \frac{\textbf{What you get (or want)}}{\textbf{What you pay}}$$

Value is improved by increasing the worth of the functions relative to the cost.

The stakeholders make value explicit through the agreement of a clear statement of project objectives. The achievement of value is addressed through the process of Function Analysis and which lies at the heart of Value Management.

Value Management aims to increase value, not to reduce cost. Whilst it is quite usual for cost savings to be identified, it is also common for a study to identify value improvements that may increase project cost. A VE or VA study is more likely to identify cost savings once the project scope and primary functions have been clarified. Best value is the best possible compromise that can be achieved between all the competing objectives of the various stakeholders to the project.

FUNCTION ANALYSIS

Function analysis is part of the information phase of the Value Management Job Plan. Function Analysis involves identifying clearly what each of the individual elements of a project actually **do,** rather than focusing on what they currently **are.** It takes the technical language in which descriptions of function initially are offered, strips it of terms which pre-suppose accepted or standard solutions, and reduces the language to simple and easily understood statements, expressed in simple verb - noun form. Preferably an active verb and a measurable noun. These verb - noun statements are assembled into a logical hierarchy to form a diagram, (termed a FAST diagram) that shows how the project objectives are achieved.

Functions are split into primary and secondary functions and detailed as such. Primary functions are those that are critical to success. Secondary functions support the primary functions. Weightings can be applied to show the relative importance of the project functions or value objectives and the allocation of project costs to the functions identifies the areas of the project that present the best opportunity for achieving value improvements.

Through the strict analysis of function, it is possible to identify wastage, duplication and necessary expenditure: providing the opportunity for value to be improved. The power of the technique lies in the team discussion that leads to the development of the diagram. It improves understanding of the perspectives of others and highlights any misconceptions amongst the team. Further, by separating functions from specific solutions and from other functions it aids clarity of thought and enables individuals to consider a wide range of solutions.

FUNCTION:
WHAT NEEDS TO BE ACCOMPLISHED
DEFINE IN TWO WORDS:
NOUN - QUANTIFIABLE
VERB - ACTIVE

At the Value Management stages the function diagram is a representation of values and objectives and is often termed a Value Tree. For Value Engineering / Value Analysis reviews the analysis concentrates on detailed functions and is extended (to the right) to the component functions and beyond, as necessary.

Function analysis can be undertaken in a variety of ways. There is no absolute procedure or right or wrong way. The power of the technique lies in the team doing it.

Function cost analysis

In VM cost alone is not seen as an adequate means of identifying areas of poor value. Costing of functions allows a comparison of the value of functions and their cost, indicating potential areas for cost savings without detriment to function. Excessive costs are revealed by identifying disparities between cost and worth.

Worth is defined as the lowest cost to achieve a function. In practice worth is ascribed by the team from experience and is an approximate guide to highlight significant areas of poor value..

The ratio of cost to worth is known as the value index.

TIMING OF VM STUDIES

The greatest benefits from applying VM to a project are when it is integrated into the project development plan, with workshops programmed to take place at, or just before key decision gates For construction Treasury Procurement Guidance Note No 2 (5), makes this particularly clear. Across the construction industry as a whole however, VM tends to be applied on an ad-hoc

basis although there are some notable exceptions, mostly among the major clients, including Highways Agency, Defence Estates and some Water Companies.

The timing of VM interventions in the development of a construction project depends upon the particular circumstances of the project. Typical stages within project development are:

- Asset Management stage; Project Identification - VM
- Feasibility - VM
- Options Development - VM
- Outline Design - VM/VE
- Choice of procurement route - VM
- Detail Design of project and elements - VE
- Pre construction - VE (May be combined with a Partnering workshop)
- Operation and Maintenance - VE, VA
- Post project review - VA

Each stage presents an opportunity for value management. But the earlier in the life of the project it is done the greater are the opportunities for influencing the project, controlling the objectives throughout the project development stages, maximising value for money and for "getting it right first time".

The number of workshops that would be appropriate depend upon the nature and size of the project. For large or complex projects VM workshops held at the feasibility and options development stages are often termed VM1 and VM2, followed by Value Engineering , VE1 and VE2 and Risk workshops. The early VM workshops consider strategic risk. Specific risk workshops are integrated into the plan at design phases.

The cost of workshops is reduced by substituting workshops for team meetings that would otherwise occur at the key decision gateways.

RISKS

The best ideas for value improvement can sometimes be the most risky and therefore risks should always be considered within a Value Management study. This can be done in a number of ways:

- In the evaluation of ideas for improving value
- As a separate phase of the VM workshop, to identify and assess the likelihood and impact strategic risks.
- A full risk workshop.

Risks may be included in a decision matrix for the selection of options, or where appropriate, would be represented in a separate risk decision matrix, to be considered along side the output from the value decision matrix.

The procedure for a Risk Workshop is similar to that for a VM study, the main stages being:

- Information stage
- Risk identification and assessment
- Describe and quantify risks
- Set risk strategy
- Develop risk response plan.

The VM process is itself a risk management process by developing mutual understanding between the stakeholders, developing project learning earlier in the process, challenging assumptions, generating alternatives and promoting synergy between the whole team. The creative processes of VM are also likely to identify "up-side" risks.

Other aspects on the integration of value management and risk management:

- An early VM workshop should plan to identify strategic risk
- Sequence the VM/VE and risk workshops so that VM/VE precedes Risk at any given decision phase and plan the workshops to be complementary
- The risk register and management schedule and the value opportunity register and schedule should be managed by the same person

IMPLEMENTATION - CRITICAL SUCCESS FACTORS

For a successful VM study certain pre-requisites need to be in place:

Attitude of key stakeholders

Client support, sponsor enthusiasm and direction particularly important

Quality of information - distributed in advance
- taken to the workshop

Clarity of objectives - Project and VM Study objectives consistent with higher management / business objectives

Independent, qualified facilitator

- a trained facilitator from within the organisation, but not of the project team
- an external facilitator
- evidence of training and appropriate experience (eg PVM, TVM, SAVE)

Team structure and skills

Multi-disciplinary structure; all key stakeholder groups represented, plus independent experts in critical or high cost areas; brief the workshop team members in advance

Positive team building and human dynamics during the study

Part of the skills of the facilitator; but the Project Manager and Senior Management can support this.

Careful planning - do at the right time; integrate workshops into the project development plan, at or just before key decision gates.

Time for the workshop

Enough time needs to be made available; for the team to gel and for the process to work, the participants also need time, free of external distractions to do the quality work.

Sticking to the VM Work Plan and Job Plan; but not as a mechanistic process

Additional points:

- When specifying the requirement for VM in tender documents, refer to BS EN 12973: 2000
- Ensure implementation of value opportunities by maintaining a Value Register as well as a Risk Register.

Independent Facilitation

In facilitated decisions, the facilitator is responsible for providing a structure that will enable the team to be successful. Value Management is a group decision making process, critically dependent upon the skill of the facilitator.

For a successful outcome to a VM study it is essential that the facilitator is strong, independent and experienced. He/she must work with a group of individuals from different professional backgrounds and disciplines, with different levels of authority, different personal traits and overcome the influence of established relationships and company politics.

True independence is guaranteed when the facilitator is from an external, specialist Value Management constancy. Where an organisation prefers to use someone on their staff who has been trained in facilitation skills it is imperative that the workshop participants should not doubt the independence and objectivity of the facilitator.

OBTAINING A FACILITATOR

Across the EC there are common standards for the training and certification of Value Management facilitators. Qualified facilitators hold the qualification "Professional in Value Management", (PVM), which indicates that the individual has been trained to the European standard and has satisfied an independent panel of VM peers on his or her knowledge, experience and skills. Certified trainers of VM facilitators are designated TVM, "Trainer in Value Management".

In the UK the Institute of Value Management IVM is the independent certification body appointed by the European Governing Board.

There are debates on whether it is better for the facilitator to be experienced in the industry or business sector, or not. My personal view is that it is preferable for the facilitator to be familiar with the specific industry or sector, but it is essential that the facilitator is independent of the project or subject under review. This means that a facilitator may be drawn from an internal pool of trained VM facilitators, "loaned" from another authority or an external appointment.

A list of PVMs and TVMs can be accessed on the IVM web site –www.ivm.org.uk

The Construction Best Practice Programme web site also hosts a list of Partnering facilitators, some of whom are also qualified Value Management facilitators.

The other internationally recognised qualification is that of the US Society of Value Engineers, (SAVE).

COSTS AND BENEFITS

Value Management is a very low cost, high benefit exercise. If integrated into the project management methodology early in the project development the cost can be almost negligible, because of the reduced need for subsequent reviews and opportunities for substituting VM for some of the routine appraisals and quality audits that are always necessary.

For projects the benefits of a Value Management review are often perceived in terms of improved quality and reduced cost. However the "invisible" benefits can be just as, or more valuable. Consensus and mutual understanding between stakeholders, clear objectives, reduced risk of changes in scope and improved communications will help ensure that the project meets the business plan objectives of the Client and is delivered on time.

The Value Management report and action plan, endorsed by senior management and all key players, provides the Project Manager with a solid base on which to construct the project management plan and implement the project. It also gives independent project assurance and an audit trail to senior management and key stakeholders.

Further benefits are:

- any ambiguities and misperceptions are resolved
- clear definitions of roles and responsibilities
- improved team and client relationships
- improved communications
- enhanced value culture

When applied to operations the VM process provides a firm structure on which to shape new practices, procedures and organisation by:

- demonstrating the true cost of operations
- highlighting non productive / high cost elements
- reducing time
- improving customer support by identifying “right first time” practices
- enhances understanding by all of the true costs and functions of operations
- improving the ability of all to contribute to cost management
- increasing competitiveness

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CIRIA http://www.mutelibtech.com/users/bm37/96-53.htm

Department of Trade and Industry http://www.dti.gov.uk

Harry Hammersley
Facilitator

Qualifications
- Diploma in Civil Engineering (1964)
- MSc (Birmingham University 1970)
- Member of the Institution of Civil Engineers (1967)
- Fellow of the Institution of Highways and Transportation (1996)
- Member of the Institute of Value Management (1996). Professional in Value Management (PVM); Trainer in Value Management (TVM).

Key Points
- Seasoned Value Management Value Analysis, Risk and Partnering Facilitator
- Experienced Project Manager
- Certified Trainer in Value Management with registered courses leading to the European PVM qualification.

Associates
- Associated with leading Consultants, Facilitators and Trainers in most professional and business sectors, working for clients in Central and Local Government, Contractors, Developers and in Manufacturing.
- A two facilitator approach to provide the best combination of skills and knowledge for the workshop eg Team Building plus Buildings Value Engineering

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Personal Profile
Harry is a Chartered Civil Engineer and an experience Project Manager, with a background in client side project management and has worked in Central and Local Government and the private sector. He became a Value Management Consultant in 1996 and before then was a Grade 6 Project Director and Value Manager with the Highways Agency and Department of Transport.

Since becoming a consultant Value Manager he has facilitated a wide range of Value Management, Value Engineering Risk and Project Partnering / Team Building workshops for major public and private sector clients in the construction industry.

In addition the VM methodology and skills are regularly applied in such areas as scenario and strategic planning, business process improvement and contingency planning.

Harry is an approved training provider for the *Value for Europe* Professional in Value Management (PVM) qualification and provides a range of training courses in Value Management, from basic awareness to registered professional courses leading to the PVM qualification; also risk project management creativity, facilitation, report writing and presentation techniques. He is a speaker on Value Management for the Construction Productivity Network and an Honorary Research Fellow at Birmingham University.

Professional activities include membership of the Public Services Special Interest Group of the Institution of Value Management, Chairman of the institute's Midlands Branch member of the Audit panel of the Institution of Civil Engineers.

Selected Experience
MOD, Defence Estates: new junior ranks accommodation at Carver Barracks, Wimbish. A series of Value Management and Value Engineering workshops involving the Client, key stakeholders and Prime Contractor(Laing), to develop the Client Brief, the project brief, and select the best option and optimise the design of the chosen option and manage risk.

Highways Agency: procurement strategy workshop for the £130m A303 Stonehenge Improvement. The only exceptional environmental project in the HA programme. This was a 1 day workshop structured along value management lines to select the procurement strategy for the tunnel and road scheme to protect the environment of the World Heritage site. It was followed a year or so later by a two day Partnering workshop involving the Contractor, Designers, other specialists, The HA and their advisors.

Ministry of Defence; Defence Estates Organisation: Buildings new build and refurbishment £11.5m. Value Management scoping study identified strategic options and selected the best option for further development

Post-award Partnering and team-building workshops - align objectives of Client, (and Client Groups), Designer, Contractor and Suppliers and agree principles and procedures for maintaining mutually supportive, non-confrontational working relationships. Clients include West of Scotland Water, North of Scotland Water, Highways Agency; and a number of different contractors, using various contract conditions. *Workshops may be stand alone partnering workshops or combined with Value Engineering and Risk.*

University of Highlands and Islands: Lews Castle College Value Engineering. £8m. A one day Value Engineering workshop identified cost savings of £200K - £500K on a remaining budget of £3.1m.

English Heritage: Whitby Abbey Project. One day Value Engineering workshop clarified Stakeholder brief and priorities and identified potential savings of £0.5m on a £5.4m project .