

# 價值方法論標準(稿)

## VALUE METHODOLOGY STANDARD



中華價值管理學會

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# VALUE METHODOLOGY STANDARD

## 價值方法論標準（稿）

### FOREWORD

#### 前言

This standard was originally drafted in May 1997, and it has been through a process of periodic updates to address changes in the business environment and technology, and to meet future integration with the International Standards Organization. The *Value Methodology Standard* is intended to provide a practical guide for use by practitioners and management to apply the principles of the value methodology (VM) in a consistent manner.

這個標準最初由國際價值協會（SAVE International, 以下簡稱 SAVE）在 1997 年 5 月草擬，中華價值管理學會（以下簡稱學會或 VMIT）將適時翻譯最新版本，並配合環境以及技術上的變化，編成中文版本，希望提供使用者一個實用手冊，得以用一致的方式去應用價值方法論(VM)的原理。

The VM process can be applied to a wide variety of applications, including industrial or consumer products, construction projects, manufacturing processes, business procedures, services, and business plans. For purposes of this standard, the subject of a VM study (a product, process or service) will be referred to as the “project”.

價值方法論可以廣泛應用在不同領域，包括工業生產、工程建設、製造流程、業務流程、服務業等，在價值方法論中，研析主體將稱為研析標的（Project）。

The value methodology is the systematic application of recognized techniques that identify the functions of the project, understand how the functions impact cost and performance and meet the user's wants and needs, and identifies different ways to perform key functions to order to improve project value. The value methodology is the basis for value analysis, value engineering, and value management.

價值方法論是有系統地應用既有技術去找出計畫的機能，瞭解這些機能對成本及成效的影響，並配合使用者的想法和需求，找出不同的方式來完成關鍵機能以增加計畫的價值。價值方法論是價值分析、價值工程及價值管理的基礎。

The *value methodology* is used to identify new improvement ideas and develop these ideas into new and alternate proposals to the project's base case (i.e., a pre-defined starting point) which will enhance these products and processes. The methodology is applied using a function based "VM Job Plan" and is supported by many business and quality improvement techniques. An organization's internal and external business environment provides the context in which the value methodology is applied.

價值方法論是要去發現新的構想，並將這些構想發展成新的替代方案，以改善計畫及流程。這個方法使用「價值方法論工作計畫」(以下簡稱工作計畫)作為基礎，並加入許多經營及品質改善的技術。

This standard has been prepared by the SAVE International Standards and Resources Directorship from within the Vice President of Education's team. It is approved by the SAVE International Board of Directors. It seeks to state the minimum expectations clients and providers should have of value analysis, value engineering, and value management, without limiting the development of VM itself.

價值方法論標準由學會授證委員會與推廣委員會共同完成，並經理事會核備，提供應用價值方法論一致的標準。

This standard should be used to assist senior managers, value program managers, practitioners, and trainers to apply VM in their organizations in a consistent standard manner.

# INTRODUCTION AND DEFINITION

## 緒論及定義

The value methodology (VM) is the systematic application of recognized tools and techniques by a multidisciplinary team to identify and categorize the functions of a project and to create, select, and develop alternative approaches to cost-effectively deliver the functions and/or improve performance. It is applied in a logical process known as the “Value Methodology Job Plan” or “VM Job Plan”. The purpose of the job plan is to assist a study team to identify and focus on key project functions in a systematic manner, in order to create new ideas that will result in value improvements. Value may be defined as the relative worth, utility or importance of the project to a user. The VM Job Plan consists of the following sequential phases:

- 1 Pre-VM Workshop Study Phase
- 2 Information Phase
- 3 Function Analysis Phase
- 4 Creative Phase
- 5 Evaluation Phase
- 6 Development Phase
- 7 Presentation Phase
- 8 Implementation Phase
- 9 Post-VM Workshop Phase

價值方法論(VM) 是業經證實有效的系統性應用工具和技術，藉由各種專長人員所組成的研析小組，將研析標的的機能進行定義與分類，然後去創造、選擇和開發替代方案，期能以最低成本達成/或改進效能。它應用一個邏輯程序稱作「工作計畫」。工作計畫的目的在協助研析小組以有系統的方式去辨認和歸納研析標的之關鍵機能，以創造價值改善的新構想，價值 (Value) 可以被定義為使用者所認知之產品相對價值 (relative worth)、重要性或效用。工作計畫包括以下連續階段:

- 1.價值研析前置作業階段
- 2.資料階段
- 3.機能分析階段
- 4.創意階段
- 5.判斷階段
- 6.發展階段
- 7.建議階段

## 8. 實施階段

## 9. 價值研析後續階段

A unique feature of VM is the function analysis phase. During this phase, functions of the project under study are identified and described using a verb-noun pairing. The functions that appear to show a value mismatch between “*the function’s cost*” and “*the function’s worth*,” or *with apparent deficiencies in the function’s performance, either technical or customer*, are selected for brainstorming in the creative phase. The ideas generated then are evaluated, and those with the most potential to improve value are developed into alternatives to the original concept or base case. Implementation of these alternatives will improve the value of the project under study.

價值方法論的特點是機能分析階段，在這個階段，計畫中的機能是使用動詞+名詞來配對、分析。那些造成「機能成本」與「機能價值」不登對的機能，或明顯的表現欠佳之機能，在創意階段將進行腦力激盪以產生構想。構想產生後將進一步評估，選擇有潛力增進價值的構想發展成建議案，以增進計畫的價值。

# VALUE METHODOLOGY HISTORY

## 價值方法論沿革

The value analysis concept was conceived by Mr. Lawrence D. Miles during the early 1940s. He worked for General Electric, a major defense contractor, which faced the scarcity of strategic materials needed to produce their products during World War II. Miles realized that if value and related innovation improvements could be systematically “managed,” then General Electric would have a competitive advantage in the marketplace. With that ambition in mind, Miles took the challenge and devised the function analysis concept, and integrated it into an innovative process that became known as value analysis (VA).

1940 年代初期，價值分析概念由邁爾斯（Lawrence D. Miles）先生提出。他為通用電器公司工作，在第二次世界大戰期間，因雇主是戰爭中防禦器材的主要供應商，而在戰略物資缺乏的年代，面對極大的需求，邁爾斯意識到如果價值和相關的創新改善能「有系統的處理」，那麼通用電器公司在市場上將會有競爭優勢。以此作為目標，邁爾斯設計出機能分析概念，並與創新過程結合變成價值分析（Value Analysis）。

Miles understood that products are purchased for what they can do. These products can either do work or provide pleasing aesthetic qualities. From this realization he focused on understanding the function of the component being manufactured. Then he questioned whether it could be improved. Using an *active verb* and a *measurable noun* to characterize the benefit that a part's function provides, he searched for other ways or methods to perform that intended function. Function analysis, the key foundation of VA, was developed and has become a tool to help individuals and teams manage the way a concept is understood. These teams typically address project-related issues such as increased sales revenue, improved product performance, and reduced resource usage.

邁爾斯瞭解，消費者購買產品，是因為產品能達到消費者的需求，包括工作上和美感上的需求。他透過對產品零組件機能的瞭解，進一步挑戰應該如何改進。使用一個及物動詞和一個可數的名詞敘述機能的特性，再由其它方式或方法來達成需求的機能。機能分析，是價值分析的主要基礎，研析小組經由價值分析，常常能使產品增加收入、增加效能以及減少資源使用等。

The success that Miles unleashed was quickly recognized by other companies and the U.S. Navy. The result was that value analysis began to gain in popularity, eventually

leading a group of practitioners to form a learning society to share insights and advance their innovative capabilities. Thus in 1959, the “Society of American Value Engineers” was incorporated in Georgia.

邁爾斯的成功經驗立即受到其他公司和美國海軍的認同，同時導致價值分析的普及，更促使一群實踐者共同組織團體分享心得，並藉以提昇彼此的創造力。於是1959年「美國價值工程師協會」在美國喬治亞州成立。

The change in context—from review of existing parts to improving conceptual designs – along with the different expectations of the new situations value analysis was arriving in, also marked the emergence of value engineering. Soon VM was used to improve value in government projects, the private sector, manufacturing, and the construction industry. VM spread out from the USA to North and South America, Europe, Australia, Asia, the Middle East, and parts of Africa. The international growth caused the membership of SAVE to reconsider the society’s name and was changed to “SAVE International” in 1996.

價值分析的應用，包括從現有零件的分析以改進概念設計，並且改稱為價值工程。很快地，價值方法論被使用於改進價值，應用在政府計畫、私營部門、製造業及營造業。價值方法論從美國傳播到南美、歐洲、澳洲、亞洲、中東及部分的非洲。1996年由於國際間應用的成長，致使美國價值工程師協會的會員重新討論組織的名字，並更名為「國際價值協會」（SAVE International）。

# PURPOSE AND SCOPE OF THE STANDARD

## 標準之目的及範圍

This standard defines a generic methodology, common terminology, and standard practices that will guide practitioners and managers to effectively apply VM to improve the value of their project. The standard describes when, in a project's life, VM should be applied in order to maximize the benefits of team innovation skills and maximize implementation of alternatives that add value to the project.

價值方法論訂定通用的方法，常用的名詞及標準化的做法，引領使用者及管理人員有效的應用價值方法論來改進計畫的價值。這個標準亦指出在計畫中何時需應用價值方法來擴大團隊創新，執行替代方案以增加價值。

The standard also contains a description of the composition of a value study team, the VM Job Plan, a body of knowledge, typical value professional and value manager expertise profiles, typical duties of a value program organization, a glossary, and an appendix of references. The standard is to be used by both practitioners and managers as a guide for the application of VM. The standard allows for the tailored application of VM and practices to suit the intended application.

此標準包含：價值研析小組的組成、工作計畫、知識主體、參加人員的應有知能條件、價值組織的責任、詞彙及參考來源。此標準將作為價值從業人員和價值經理應用價值方法論的指南手冊。

# VALUE METHODOLOGY AND APPLICABILITY

## 價值方法論及應用性

The value methodology is a collection of techniques that are arranged to guide a team through a structured job plan, with the goal of improving value. The standard VM Job Plan is designed to lead a team to a point where they understand the fundamentals of the project, and know the purpose and functions of the project.

價值方法論是技術方法的結合，可以引導團隊依據工作計畫改進價值，達成目標。標準的工作計畫可以帶領團隊去瞭解研析標的的重點、目標和機能。

VM may be applied as a “quick response” type of study or as a deeply integrated part of an overall organizational desire to stimulate innovation and improve quality. Similarly, VM may be an integral part of the quality assurance, quality control programs, new product development, “Lean” manufacturing processes, concept development and “Lean” office systems. VM enables the management of the team’s thinking so that the best use of the knowledge and experience they have can generate new ideas to perform functions and propose alternatives to the original situation.

價值方法論可以被應用作為「快速應變」的研析或整個組織需求的深度整合，刺激創意並提升品質，也可應用作為品質保證、品管計畫、新產品研發、精簡生產程序、概念發展及精簡辦公系統。價值方法論能統合研析團隊的想法，善加利用研析團隊的知識及經驗，產生新的構想以達成機能需求及提出替代方案。

The foundation of the VM technique is known as *function analysis*. The identification and naming of functions strives for clear thinking by limiting the reference to an *active verb* that operates on a *measurable noun* to communicate what an item or activity does. This naming exercise helps multi-disciplined teams to build a shared understanding of how a system is thought to work; and, as a result, it allows them to identify where conflicts and improvement opportunities may exist and where an investment in innovation would lead to significant improvement. This is achieved because the design of complex products evolve, often one component at a time, without the opportunity to assess the impact of an incremental improvement on the entire product, process, or program in an organized effort.

價值方法論的基礎是機能分析，機能分析必須用「及物動詞 + 可數名詞」來定義單元構件或活動，以釐清彼此的思緒，確認產品的效能。此種作法可使研析小組中不同的專業人才一起了解計畫的運作，進而指出何處有改善機會。之所以使用機能分析定義單元構件或活動，是因為複雜產品的設計通常是一次一個構件逐步發展成

型，沒有機會去評估對整個產品、程序或計畫做持續改善所產生的影響。

Function analysis may also be performed by using a graphical mapping technique is known as the *Function Analysis System Technique* (FAST), which is used during the study to understand how the functions of a product, product, or process are related to each other. FAST, developed by Charles Bytheway in 1964, added a new enhancement to the function analysis phase.

機能分析亦可以使用圖表技術來表示出各項目的相關性，這技術由Mr. Charles Bytheway在1964年提出。

This analysis of functions leads to the identification of functions and function applications providing poor or less-than-optimum value because the solution used to perform them could be improved, or perhaps be deleted. These are candidate functions for applying creativity techniques for new ideas that will yield better ways to perform the same function. Promising solutions are determined during evaluation and developed into alternatives for implementation. The VM study team leader facilitates the use of team skills and the expertise from many disciplines through an efficient and effective group decision-making process. A VM study provides a common understanding that yields practical solutions for users, stakeholders, sales, marketing, design, manufacturing, operations, and distribution organizations.

機能分析可指出不良或不理想的機能，因為它們仍可改進或取消。找出的缺陷機能可以利用創新方法，使同樣的機能以更好的方法作到或改進，可能的解決方案通常是在分析、發展階段中找到的，研析小組領隊利用各專業技能及經驗，經由團隊努力而提出有效的解決方案。

A fundamental tenet of the value methodology is that basic functions (the necessary purpose of the item) must be preserved. This is because the basic function reveals the usefulness of the project. For example, the basic function of a wristwatch could be “display time.” If ever the watch does not perform that function, then it has lost its usefulness as a watch. All other functions rely on the basic function for their justification. The other types of functions typically provide esteem value for the user. An example is a gold watchcase that performs aesthetic functions which please both customers and those whom they want to impress. Those other functions that build on the basic function are often used to distinguish product value or complexity, whether the product is feature-rich or a low cost, “no frills” solution.

價值工程最基本的要義是要保留最主要的機能，因它是計畫最主要的。例如手錶的主要機能是「顯示時間」，如果它不能做到這項機能即已失去它的用處。而所有其它機能都是建立在此主要機能之上，它們對使用者來說只是附加價值，例如金錶另有一些特別功能是用來取悅擁有者或來對他人炫耀，這些次要機能就是在主要機能上增加的特殊化產品價值而達成的。

The job plan can and does employ various tools and techniques such as cost modeling, strategic problem framing, Pareto analysis, paired comparison to weight, rank, and

prioritize, evaluation metrics, quality function deployment, voice of the customer, design for Six Sigma, target costing, synchronous and “Lean” concepts, idea management, and action planning, after study review, and learning techniques to assist the team during the VM process.

工作計畫可以確實運用各種工具與技術，例如成本模式、策略化問題架構(strategic problem framing)、柏拉圖分析、及求得權重並制定優先順序的成對比較(paired comparison)法、品質功能配置、客戶反應、六個標準差，目標成本，同步及簡化概念、創意管理、行動計畫、研析後檢討、和經由研析所學習的技巧等。

VM can be applied during any stage of a project’s development cycle, although the greatest benefit and resource savings are typically achieved early in the development and conceptual stages. This is a point in time where the basic information of the intended product is established, but before major design and development resources are spent. That is because the manner in which the basic function of the project is performed has not been established, and alternative ways may be objectively identified and considered. Some specific examples are noted below.

價值方法論可以應用在產品的任何階段，雖然最有效及省錢的時間是在開始發展及概念設計的階段，這階段正要發展產品的基本概念，但是主要的設計及發展還未開始，基本上這時主要機能及替代方案並還未完全建立。以下是價值方法應用的具體應用案例：

*Construction projects* may realize improvement during the concept development, preliminary design, final design, procurement, and construction phases.<sup>1</sup>

- 建設計畫可以在概念形成初期、初步設計、細部設計、招標、和施工初始階段進行研析。

*Products*, whether consumer, industrial, or defense, may be studied with a focus on either the design or manufacturing process of that product. A product may be the subject of a VM study at any time during the product’s life. VM can be used at the onset of the product to better understand the customer’s needs, identify the functions necessary to satisfy those needs, and develop the initial concept. Throughout the design development, VM can be used to refine and enhance the concept, based on the latest facts. Even after a product has been introduced and is in production, VM can be used to further enhance the product and respond to changing customer and economic conditions.

- 產品，無論是消費者、工業或軍用產品，均可在設計或製造階段應用。初始時可考慮消費者的需求，後來可以改良概念、設計及發展。即使產品已上市，價值方法論仍可改進產品以因應客戶需求，並且可使產品因應經濟景氣之變化。

Similarly, the manufacturing process, both macro and micro, along with the equipment and tools used to produce the product may be the subject of a VM

study. VM can be used to either develop the new manufacturing process or refine an existing process to improve quality, efficiency, and cost characteristics of the project.

- 在製造過程中，流程亦可以作為一個價值研析標的，價值方法可以變更或改進目前製程以提昇品質、效率及成本結構合理性。

*Business systems and procedures* may also be the subject of VM Studies. Any element of running a business or organization may be improved through the application of VM, from the development of business plans and organizational studies to improving existing business processes.

- 業務流程也可作為價值研析的標的，企業或組織經營上的各個步驟可以經由價值研析加以改進，更可進一步從營運計畫和組織分析去改進現有的業務流程。

VM may be applied more than once during the life of the project. Early application of VM helps to get the project started in the right direction, and repeated applications help to refine the project's direction based on new or changing information. It is important to note that the later that a VM study is conducted, the higher the cost of change will be to implement the improvements.

價值方法論在一個計畫當中有可能並不只運用一次。先期運用價值方法論幫助計畫從正確的方向開始運作，而重複的應用可以幫助計畫在納入新資訊後重新校正計畫執行方向。但重要的是需留意，價值研析的時程愈晚，將導致改善方案執行的成本愈高。

# MANAGEMENT'S ROLES

## 管理人員的職責

The aim of VM is to increase organizational value through a union of strategy, tactics, and operations with emphasis on the “customer need” and profitability. Senior management provides a clear leadership role when they make the strategic expectations explicit and in a purposeful and prioritized manner. The appointed value manager should confirm that VM activities are coordinated and performed effectively to meet the goals and objectives of the organization. Senior management should understand the potential benefit from a VM Study, approve the expenditure of resources necessary to support the study, and guide the implementation of approved and funded recommendations. The application of VM seeks to provide an organization with a competitive advantage by managing the practical intelligence that an organization possesses.

價值方法論的目標是藉由整合策略、戰術、強調「客戶需求」和效益的操作等，以增加組織價值。高階管理階層應擔任果斷的決策角色，使目標明確化，並在目的性與優先性的事件上訂定預期目標。被任命的價值執行經理，應該確認價值研析執行內容，與組織的目標和方向是相互融合且有效率的。高階管理階層應該了解價值研析所產生的潛在效益，支持研析所有必要的支出，和執行經核定的建議案所需的經費。任何組織應用價值方法論將擁有競爭優勢。

The use of VM will have an impact on the profitability of the business because the team develops ways to increase revenue, reduce cost, and optimize resources to ensure organizational success. The value methodology is also an excellent means to manage innovation within an organization, because it has a structured methodology that “demands” measurable results.

價值方法論可成為一個組織贏得較高競爭力，增加收益、降低成本、將資源做最有價值利用以確保組織成功的新技術，因它是非常有系統的方法，且均以量化型式估算效益。

The VM study team leader's role is to manage the study. The leader will plan, coordinate, conduct, and follow up the results of the study.

價值研析小組領隊的角色是管理研析計畫，他需要規劃、協調、引導及追蹤研析計畫的成效。

# VALUE STUDY TEAM

## 價值研析小組

A key to the successful application of a value program and value studies is the effective management of individuals on the study team. The VM study should be applied using an organized and structured team approach under the guidance of a qualified team leader. The VM study team facilitator will help the members through the job plan by employing group dynamic techniques, which result in an effective use of team member skills.

成功的價值研析關鍵在於小組成員的有效管理，價值研析應該是在一個合格的小組領隊指導下，使用有組織、有系統的方法。價值研析小組領隊在研析過程，經由小組互動，協助成員創造價值。

The team facilitator shall be adequately trained in VM techniques and be competent to lead and facilitate the team members through the Job Plan. This individual shall be a Certified Value Specialist (CVS) or a Value Methodology Practitioner (VMP) if the studies are to be referred to as value analysis, value engineering, or value management studies. A certified VMP shall work under the supervision of a CVS. This requirement is to ensure a minimum standard of structure, process, performance, and outcome that would match the expectations of a fully qualified SAVE International CVS and this standard.

小組領隊應受過價值方法的專業訓練，可以承擔領導責任及協助成員完成工作，小組領隊應是價值專家 (Certified Value Specialist, 簡稱CVS) 或副價值專家 (Associate Value Specialist, 簡稱AVS)，該執照是確保經過授證的人員，在研析程序、架構、與執行上能符合價值方法論的專業需求。

Both the CVS and VMP should be certified by the SAVE International Certification Board (or another value society which has affiliated membership to SAVE International and thus has had its qualification processes examined and approved by SAVE International). The team leader requirements include a command of strategic goals, strong leadership, facilitation and communication skills, an in-depth working knowledge of VM and its principles and their practice, and extensive experience helping organizations to achieve greater value.

CVS 和 AVS 應由 SAVE 或經 SAVE 授權的國際聯盟會員如中華價值管理學會授證。小組領隊必備條件包括：目標的掌握、堅強的領導才能、表達能力、對價值研析知識及實務運作的深入了解、廣泛的經驗等以協助團隊提昇價值。

A value study team should consist of the above-mentioned study team leader and an appropriate number of experienced professionals drawn from different disciplines. The team member disciplines are to be relevant, based on the topic of the VM study. They are to be chosen based on their expertise and experience with the subject matter of the project. During the pre-study phase, the VM study leader and/or the sponsoring organization should be responsible for the selection of the team members. The requisite disciplines and knowledge necessary for the study's objectives are key to the success of the study. The members must possess adequate expertise in those disciplines necessary to address the subject matter of the study. It often is beneficial to use expertise not directly involved with the specific project. These members are encouraged to assist in the free development of ideas. The increasing involvement of customers in the VM study is a feature that helps a better definition of success to be articulated early in the organization's "research design and development" process. Team members should be willing to accept change and be open-minded in order to identify and develop ideas that could be much different from the original concept of the subject under study. Team members may be internal and/or external disciplinary experts and may include individuals who are customers, users, investors, stakeholders, constructors, operators, suppliers, or who are from regulatory organizations.

價值研析小組應該包括研析小組領隊和不同領域的專家，小組成員的專長和價值研析標的是相關的。在價值研析前置作業階段，研析領隊或主辦單位將負責小組成員的選擇，具有專業知識是每項研析計畫的成功要項。小組成員必須具有研析標的相關的專門技術，成員被鼓勵創意及自由發展。研析小組成員應是可以接受改變，並具有寬容的性格，成員可由各方招募，包括客戶、使用者、投資者或政府機關管理人員等。

# VALUE METHODOLOGY JOB PLAN

## 價值方法論工作計畫

The value methodology shall be applied using a *VM Job Plan*. The job plan outlines sequential phases to be followed so as to achieve synergy by co-coordinating the times people think collectively within a structured process, as opposed to a collection of individual opinions. The activities conducted during each of the job plan phases will identify ideas and develop them into recommendations that are alternatives to the original concept or design. The job plan may be seen as a road map, through which a team's collective thinking and the theories it develops as a team are structured and developed.

價值方法論是應用工作計畫，藉由每階段相互整合團隊成員彼此之想法，而非只是收集個人意見，來達成工作。工作計畫各階段可找出創意，發展成建議案以取代原先的概念及設計，工作計畫可視為一個地圖，每人的想法及理論可以依序相互融合，依據架構逐步發展。

The underpinning theory is that the intended function of the project must be understood and, with respect to the current product, the basic and secondary functions must be identified and understood. Basic functions must be preserved; otherwise, the intended goals are not accomplished. Secondary functions are analyzed and evaluated with regard to their contributions to the project objectives. By making functionality explicit via function analysis and FAST, organizations can manage innovation to provide a sustainable competitive advantage that leads to success in the marketplace and that leads to product and/or concept progress.

研析須先決定何種機能需要調整，還能保持目前產品的主要機能。主要機能必須被保存，次要機能則被分析和評估他們對標的物的貢獻。經由機能分析及機能系統圖，研析小組可以創意出深具競爭力的建議案，並使產品/流程改善。

The functions of a product or service must be understood, in a collected and agreed sense, by the VM team. Basic functions must be preserved for they mark the core usefulness of a “thing”. Secondary functions should to be considered as candidates for elimination, addition, or innovation.

研析小組所有成員必須對產品或服務的機能達成一致見解。主要機能必須為被標記為事物的核心特性，次要機能則可考慮排除、增加、或創新。

Using function analysis and FAST, organizations can manage innovation as a capability

that provides sustainable competitive advantage that leads to success in the marketplace and competitive advantage at the national economic level.

使用機能分析及機能系統圖，任何組織可藉由管理將創新作為一種能力，提昇競爭優勢。

The VM Job Plan employs the phases and activities on the following pages. All phases are required and are performed sequentially. The activities performed in each phase may vary in number and rigor to fit the study topic or time constraints, but it is the outcome achieved at the end of each phase that marks the reliability and quality of the VM performance. During the conduct of a study, new data and information learned may require the study team to return to earlier phases or activities within a phase on an iterative basis to incorporate the new information. All VM phases should be performed in sequence—without skipping—because each phase provides information necessary for the next phase.

以下將介紹工作計畫各階段及其活動，所有階段必需及連續地執行，每個階段的工作內容可能因為研析標的的不同有些許變化，但是每個階段的結果將影響研析結果的可靠性和品質。研析過程中，新資料和資訊也許導致研析小組回到更早期的階段或活動。所有價值研析階段應該逐步執行，不可跳過，因為每個階段將提供下階段的必要資訊。

The standard VM Job Plan phases and related activities are as follows.

工作計畫各階段及相關活動說明如下：

## Pre-VM Workshop Study Phase

### 研析前置作業階段

**Fundamental Question: What strategically needs to be addressed by the value study?**

基本問題：價值工程研析策略上的需求為何？

**Common Activities:**

常見活動：

- 1 Obtain senior management concurrence and support of the job plan, roles, and responsibilities.
- 2 Obtain project data and information.
- 3 Obtain key documents such as scope of work definition, drawings, specifications, reports, and project estimate.
- 4 Identify and prioritize strategic issues of concern.
- 5 Determine the scope and objectives of the study.
- 6 Develop the study schedule.
- 7 Undertake competitive benchmarking analyses.
- 8 Identify Value team members.
- 9 Review the project costs.
- 10 Gather appropriate customer/user information about the project.
- 11 If appropriate, invite customers or stakeholders to participate in the VM study.
- 12 Distribute information to team members for review.
- 13 Develop informational models and diagrams about the project.
- 14 Clearly define, with senior management, the requirements for a successful VE study results.

- 1.取得高層共識及支持。
- 2.取得計畫所需資料及資訊。
- 3.取得重要文件，例如工作範圍、設計圖、規範、簡報及計畫估價。
- 4.找出關心的重點並排列其優先順序。
- 5.決定研析範圍及目標。
- 6.決定研析進度。
- 7.進行指標化競爭力分析。
- 8.確認參與價值研析的人員。
- 9.審視研析標的成本。
- 10.收集客戶與使用者關於研析標的的資料。
- 11.如果可能，邀請客戶或投資人參與研析。
- 12.分送資料給研析小組成員，請其審視相關資料。
- 13.發展相關模式及圖說。
- 14.與管理階層清楚定出研析預期要達成的目標及需求。

**Typical Outcome:** Clear understanding of what senior management needs to have addressed, what the strategic priorities are, and how improvement will increase organizational value. It is during this phase that a view is formed as to whether subsequent phases are likely to yield sufficient value to justify the cost of the study within the terms set. It may be appropriate to increase or decrease study parameters at this time.

標準結果：了解管理階層想達成的需求，優先性，以及對提升組織價值的影響。本階段將探討研析成本及其效益，同時可以決定適當的價值研析因子。

## Information Phase

### 資料階段

#### **Fundamental Question: What is really going on in the tactical and operational contexts?**

基本問題：本階段策略及運作的內容如何？

#### **Common Activities:**

1. Project Team presents the original and/or present design/product/process concepts
2. Identify program issues and constraints.
3. Seek out evidence to confirm opinions.
4. Confirm the most current project concept.
5. Visit site or facility.
6. Confirm success parameters.

常見活動：

1. 原計畫小組提出原設計、產品、或流程概念。
2. 找出計畫中的問題及限制條件。
3. 找出證據來證實相關意見。
4. 確認最新的計畫概念。
5. 參觀工地或產品生產線。
6. 確認成功的因子。

**Typical Outcome:** Brings all team members to a common, basic level of understanding of the project. That includes tactical, operational, and specifics of the subject. The functional understanding establishes the base case to identify and benchmark alternatives and mismatches, and set the agenda for innovation.

標準結果：使研析小組一致了解研析標的，包括決策、流程及特殊需求，找出主要問題及提供改進，設立議程進行創新。

## Function Analysis Phase

## 機能分析階段

### **Fundamental Question: What are the functions and how are they related?**

基本問題：機能以及機能間的關聯性為何？

#### **Common Activities:**

1. Identify functions of the project.
2. Classify the functions.
3. Develop function models.
4. Dimension the model with cost drivers and performance attributes.
5. Select functions to focus the creativity phase.

常見活動：

1. 定義研析標的機能。
2. 分類機能。
3. 發展機能模式。
4. 以機能成本及表現分析量化上述模式。
5. 找出要研析的機能，作為創意階段的重點。

**Typical Outcome:** Validation that the project satisfies the need and purpose of the project. Provides a more comprehensive understanding of the project. Identifies the function(s) on which to focus in order to improve the project.

標準結果：更清楚了解研析標的，找出可以改進的機能做為研析範圍。

## Creative Phase

### 創意階段

### **Fundamental Question: How else may the functions be performed?**

基本問題：機能可否有其他方法呈現？

#### **Common Activities:**

1. Creative warm-up exercises.
2. Explanations that establish rules that protect the creative environment being developed.

3. Generate alternate ideas that may improve value.

常見活動：

1. 創意的暖身活動。
2. 解釋規則來營造可以發展創意的環境。
3. 產生其他可以增加價值的替代構想。

**Typical Outcome:** A wide choice of ideas that provide a wide variety of possible alternative ways to perform the function(s).

標準結果：找出大量可以執行機能的替代構想。

## Evaluation Phase

判斷階段

**Fundamental Question: Of all these ideas, which are worth spending quality time to further develop?**

基本問題：所有替代構想中，哪些值得花時間做進一步的發展？

**Common Activities:**

- Build shared understanding of what each idea is
- Discuss how ideas affect project, cost, and performance parameters
- Select and prioritize ideas for further development
- Explain how ideas are to be written up as standalone risk-reward investment proposals

常見活動：

1. 使大家了解每個替代構想。
2. 討論替代構想對研析標的的影響，包括成本及機能表現。
3. 選擇可優先發展的創意構想。
4. 解釋如何將創意構想寫成建議案。

**Typical Outcome:** A focused list of ideas that warrant quality time so that they can be made into reliable propositions.

標準結果：列出要進一步發展的創意構想，規定時間完成可靠的建議。

## Development Phase

### 發展階段

#### **Fundamental Question: What is an informed description of each selected idea, and which ones are mutually inclusive?**

基本問題：要進一步發展的創意構想，其詳細內容為何？哪些是可以相互合併的？

The selected ideas are developed into proposals that are clearly written so that the owner and other project stakeholders understand the intent of the proposal and how it benefits the project, and also to identify any potential negative factors associated with the proposal. The proposal should include text, sketches, diagrams, assumptions, supporting calculations, vendor information, cost comparison work sheets, and other information which may be necessary to convey the intent of the proposal. The text should also identify other proposals which may be enhanced or complemented by acceptance of the proposal. Issues addressed include reliability, customer convenience, quality control, capital cost, O&M cost, life cycle cost, schedule, risk, availability, political ramifications, and perception.

將經過選擇的創意構想進一步發展成建議案時，必須詳細寫出各項內容，使業主及相關人員了解建議案之目的及效益，並列出可能的負面因素，建議案應有敘述、草圖、分析圖、假設條件、有意義的計算結果，供應商名單，成本計算表及其他資料來支持此建議案，並提出可靠性，客戶使用方便、品管、成本、營運維修成本、壽年成本分析、時程安排、風險、可取得性、政治上的效益及一般人對此的觀感。

#### **Common Activities:**

1. Present the study conclusions against the success requirements established during the *VM Workshop Study Phase*.
2. Prepare a written proposal of ideas selected for further development.
3. Assess and allocate risk judgments.
4. Conduct benefit analysis.
5. Generate sketches and information needed to convey the concept.
6. Confirm that a proposal should be further developed.
7. Finish initial proposal development.

#### 常見活動:

1. 現階段的建議案，應以研析前置作業階段建立的成功要素為背景。

2. 將上一階段所選擇要進一步發展的創意構想發展成建議案。
3. 進行風險分析。
4. 進行效益分析。
5. 畫出草圖並完成相關說明。
6. 確認建議案可以繼續發展。
7. 完成建議案。

**Typical Outcome:** Low-risk, medium-risk, and high-risk scenarios are created and are the minimum basis upon which senior management will be offered options that address the pre-Study strategic objectives.

標準結果：依據研析前置作業階段建立的成功要素為背景，發展出不同風險的建議案，以提供管理階層決策及選擇。

## Presentation Phase

### 建議階段

**Fundamental Question: How can we help the project team and senior managers make more informed decisions so that they can select ideas that fit their strategic plans?**

基本問題：協助原計畫團隊及高層決策人員作最佳的決策，以符合原訂的策略。

### **Common Activities:**

- 1.Prepare presentation and supporting documentation.
- 2.Offer management “risk-reward” innovation scenarios to select for implementation.
- 3.Exchange information with the project team.
- 4.Ensure management has full and objective information upon which they can make good decisions.
- 5.Outline an anticipated implementation schedule.

### 常見活動：

1. 準備簡報及必要的文件。
2. 提供決策人員風險與效益分析。

3. 與原設計團隊交換意見。
4. 確認決策人員全盤了解全部計畫，使能做出較佳判斷。
5. 列出實施建議案的預定時間表。

**Typical Outcome:** Ensure management and other key stakeholders understand the rationale of the VM alternatives. Also generate interest to sanction implementation.

標準結果：使高層決策及相關人員了解建議案，並核定建議案。

## Implementation Phase

### 實施階段

**Fundamental Question: What are the program changes, and how will the project team manage them?**

基本問題：原計畫有多少變更？未來應如何管理這些改變？

Following delivery of the VM preliminary report, management and the project team must digest and agree upon the VM proposals to be implemented, and then *how* and *by when* the implementation will occur. In some instances, additional study and information may be required. Implementation of alternatives is the responsibility of management with assistance from the project and VM teams.

依據研析報告，高階決策人員必須做出決定，同意建議案的實施，包括如何及何時施行。如果需要，有時應再做進一步研究分析並增加資訊。經由研析小組及原作業團隊的協助，管理人員的責任則是實施替代方案。

### **Common Activities:**

1. Review the preliminary report.
2. Conduct an implementation meeting to determine the disposition of each VM Alternative. Establish action plans for those alternatives accepted and document the rationale for the rejected alternatives.
3. Obtain commitments for implementation.
4. Assign a timeframe for review and implementation of each VM recommendation.

- 5.Track value achievement resulting from implemented alternatives.
- 6.Sign off deliverables.
- 7.Validate benefits of implemented change.
- 8.Ensure that new practices become embedded by establishing and managing an implementation plan.

常見活動：

1. 檢視價值研析初步報告。
2. 召開實施會議，決定每項建議案的處理方式，對接受的建議案，應訂定執行計畫，對不接受的建議案，應敘明理由並將相關文件留存。
3. 獲得實施的承諾。
4. 排定執行建議案的時間表。
5. 追蹤建議案的實施成果。
6. 標註已完成做到的部分。
7. 確認改變後的成效。
8. 確認建議案成為後續設計或生產流程的一部份。

**Typical Outcome:** What is changed in the project as a result of a VM study? These are usually alternatives to the original concept or base case of a study that the project development will incorporate as changes in future design or product development activities.

標準結果：價值研析成果會引起計畫何種改變？就是計畫或企業將建議案納入未來的設計或新產品。

## Post-VM Study Phase

### 研析後續階段

**Fundamental Question: What have we learned about how best to create or improve value of the subject under study?**

基本問題：從價值研析中我們學到什麼可以增進原計畫的價值？

### Common Activities:

1. Prepare a report of the results of the study, lessons learned, or other items to be recorded and/or tracked through implementation.
2. Identify where opportunities were missed.
3. Identify roadblocks to innovation and understand why they existed.

4. Debrief and record lessons learned.

5. Reflect on the value study and consider how the experience has developed new capabilities.

常見活動：

1. 提出執行成果報告，所得的經驗及其他研析過程中值得記錄的事項。
2. 提出在何處錯失良機。
3. 提出執行上的困難及為何存在。
4. 記錄所得的經驗。
5. 回想價值研析所得的經驗及因而產生的新能力。

**Typical Outcome:** Individuals become better value creators by reflecting on theories they held before the value study. Comparing the way things turned out, and ascertaining how that knowledge affects the way they believed their own theories in the first place, is a key step in learning that will help the organization become better at managing the way it manages innovation.

標準結果：研析成員因為此次經驗的影響，更能發揮創意、提昇價值，與參與研析前相比較，研析成員的改變將對組織產生好的影響，尤其是創新管理方面。

# CERTIFIED VALUE SPECIALIST REQUIREMENTS

## 價值專家需求條件

SAVE International maintains a certification program. Its purpose is to ensure that individuals who use the value methodology in their principal career have met approved education and experience standards. The requirements for certification can be found at the SAVE International Certification Board's website ([http://value-eng.org/education\\_certification.php](http://value-eng.org/education_certification.php)).

SAVE 會維持一個授證計畫，其目的是要確保以價值方法論作為主要工作的人，能符合專業教育與工作經驗的標準。該項授證需求可由 SAVE 或學會的網站獲得，其網址為 [http://value-eng.org/education\\_certification.php](http://value-eng.org/education_certification.php)

# BODY OF KNOWLEDGE FOR PRACTITIONERS OF THE VALUE METHODOLOGY

## 價值從業人員知識本體

A VM practitioner should be competent in the following topics to effectively implement a VM Program.

每個價值從業人員必須對以下知識有深入了解，以有效執行價值管理相關工作。

### I. Value management principles

- A. Historical development of the value methodology
- B. The relationship between an organization's strategies and the value methodology
- C. Fundamental value principles, methods, and job plans
- D. The relationship between value, functions, and solutions
- E. Function analysis
- F. Types of value
- G. Value drivers (e.g., cost, schedule, quality, risk, etc.)
- H. Investment appraisal techniques
- I. Key thought-provoking questions.

### I. 價值管理原理

- A. 價值方法論的歷史發展。
- B. 組織策略和價值方法論間的關係。
- C. 基本價值原理、方法及工作計畫。
- D. 價值、機能和解決方案間的關係。
- E. 機能分析。
- F. 價值型態。
- G. 價值動因（成本、期程、品質、風險）。
- H. 投資評價技巧。
- I. 令人深思的關鍵問題。

### II. Value Methodology Job Plan

- A. Value creation templates and the VM intervention points (i.e., VIPs)
- B. Major phases and activities in a VM Job Plan

- C. Objectives of each phase of the job plan
- D. Overview of techniques in a typical job plan.

## II. 工作計畫

- A. 創造價值的標準模式及價值方法的切入點。
- B. 工作計畫中的主要階段及活動。
- C. 工作計畫中每個階段的目標。
- D. 工作計畫中的方法技巧。

## III. Strategic Problem/Opportunity Framing

- A. Reviewing the business case
- B. Discounted cash flow modeling
- C. Analysis through key financial ratios
- D. Strategic models, decisions, choices, and uncertainties
- E. Identification of causal relationships and their modeling
- F. Identification of attributes and value drivers
- G. Analysis of performance attributes (non-monetary factors that affect value)
- H. Defining the base case and benchmarking
- I. Determining whether the remaining phases of the value study can justify the client's investment or whether what they have is good, as understood within the terms and references used.

## III. 策略性問題/機會架構

- A. 審查商業事件。
- B. 折換現值的現金流量模式。
- C. 分析重要財務指數。
- D. 策略模式，決策，選擇和不確定性。
- E. 因果關係和模式的確認。
- F. 確認屬性及其價值動因。
- G. 表現特性的分析（影響價值的非貨幣因素）。
- H. 定義基本案例和標竿。
- I. 決定價值研析的剩下階段可否證明委託人的投資是否值得，或使用共同認知的專門用語及引用文下，可知悉為什麼他們擁有的是好的。

## IV. Function Analysis

- A. Purpose and need
- B. A “thing” and its function
- C. Defining functions with active verbs and measurable nouns
- D. Function classification
- E. Levels of abstraction
- F. Function Analysis System Technique; customer, technical, and classical
- G. *How-Why* logic flow

- H. *If-Then* and *Caused-By* logic flows of classical and technical FAST models, often termed “*When*”
- I. The difference between various FAST diagrams and models.

#### IV. 機能分析

- A. 目標及需求。
- B. 產品及其機能。
- C. 用「及物動詞+可數名詞」定義機能。
- D. 機能分類。
- E. 機能層次。
- F. 機能系統圖 FAST, 顧客導向類、技術類、以及傳統類。
- G. 「如何」及「為何」邏輯流程。
- H. 技術類以及傳統類機能系統圖中, 「如果」和「原因」分析常成為「同時」的機能。
- I. 不同類別機能系統圖的差異。

#### V. Function-Worth and Cost and Customer Attitude

- A. Purpose and need
- B. Cost as resource expenditure
- C. Cost-to-worth relationships
- D. Cost-to-function allocation
- E. Function worth
- F. Cost-value relationship
- G. Cost-value mismatches
- H. Pareto analysis of cost drivers.

#### V. 機能價值、機能成本、以及客戶心態

- A. 目標及需求。
- B. 資源開銷。
- C. 機能價值與機能成本的關係。
- D. 機能成本分配。
- E. 機能價值。
- F. 成本與價值關係。
- G. 成本與價值不匹配處。
- H. 透過柏拉圖分析找出影響成本的重大因素。

#### VI. Creativity

- A. Purpose and need
- B. Managing divergent thinking
- C. Brainstorming techniques
- D. Unrestricted idea generation setting
- E. Large quantity of ideas is the goal
- F. Suspending judgment

G. Other idea generation techniques.

VI. 創意

- A. 需求及目標。
- B. 不同意見管理。
- C. 腦力激盪法。
- D. 營造能產生不同意見的環境。
- E. 目標是大量的創意。
- F. 暫時不做判斷。
- G. 引發創意的其他方法。

VII. Evaluation

- A. Purpose and need
- B. Managing convergent thinking
- C. Building greater understanding of other people's ideas
- D. Techniques.

VII. 判斷

- A. 目標及需求。
- B. 管理收斂創意。
- C. 深入了解其他人的創意。
- D. 技術。

VIII. Proposal Development

- A. Writing up standalone proposals
- B. Investment appraisal
- C. Technical implementation feasibility
- D. Political implementation feasibility
- E. Initial and subsequent revenue impacts
- F. Initial and subsequent cost impacts
- G. Initial and subsequent schedule impacts
- H. Life cycle cost analysis (LCC)
- I. Initial and subsequent impacts on other key attributes
- J. Sketches and other communication aids.

VIII. 發展建議案

- A. 寫成建議書。
- B. 投資分析評估。
- C. 技術上可行性。
- D. 政策上的可行性。
- E. 初期及後來的收入影響。
- F. 初期及後來的成本影響。
- G. 初期及後來的進度影響。
- H. 壽年成本分析。

- I. 對其他因素初期及後來的影響。
- J. 草圖及其他的溝通工具。

## **IX. Presentation**

- A. Purpose and need
- B. The relationship between VM and the needs of senior management decision makers
- C. Presentation skills
- D. Content organization
- E. Implementation plan
- F. Change management strategies
- G. Explanation of value tracking process.

## **IX. 建議**

- A. 目標及需求。
- B. 價值方法與高階管理決策人員的需求之間的關係。
- C. 簡報技巧。
- D. 內容的整體性。
- E. 實施計畫。
- F. 管理策略改變。
- G. 解說價值建議案後續的追蹤方式。

## **X. Management of value programs**

- A. Management roles and responsibilities
- B. Reporting responsibilities
- C. Establishing links between Value Study outcomes and organizational results
- D. VM training
- E. Facilitation skills training
- F. Organizing and implementing VM programs
- G. Team Leader skill development
- H. Strategic diagnosis and problem/opportunity identification techniques
- I. Selecting and leading VM Studies
- J. Coordinating VM Study logistics
- K. Facilitator skills
- L. Tracking VM Study implementation results and other reports as necessary
- M. Coordinating with other organization or client quality improvement programs
- N. Educating the organization in the VM methods
- O. Recognizing VM's success and failures and how to learn as a team
- P. Sharing VM's insights with the community and stakeholders
- Q. Periodic VM Program review for continuous improvement.

## **X. 價值計畫的管理**

- A. 管理人員的目標和職責。

- B.報告責任。
- C.建立價值研析成果與組織目標間的關係。
- D.價值方法訓練。
- E.領導技巧訓練。
- F.組織及價值管理計畫。
- G.研析小組領隊技巧訓練。
- H.策略分析與問題/機會評估技巧。
- I.選擇及領導價值研析。
- J.協調價值研析的邏輯。
- K.協助發展的技巧。
- L.追蹤成果。
- M.與業主或其他組織的品質改善計畫相協調。
- N.於組織內辦理價值方法論訓練。
- O.價值管理成效及失敗分析。
- P.與相關人員分享價值管理經驗。
- Q.定期檢討價值管理計畫，以便做持續性改進。

## APPENDIX A - GLOSSARY

### 附錄A 辭彙

**AFTER STUDY REVIEW:** An activity conducted after a value methodology study to determine lessons learned to improve the conduct of future value studies.

研析後檢討(AFTER STUDY REVIEW)

執行價值研析後的動作，其目的是檢討研析過程的收穫與學習，以便下次研析可以做得更好。

**COST:** (1) The expenditure of resources that are necessary to produce a product, service, process, or structure; (2) The sum of manufacturing, general and administrative, and selling cost; (3) The total expense to produce a product; (4) The transfer of money, labor, time, or personal items to achieve an objective; (5) One component of price of an item; (6) monetary expense needed to acquire materials of construction.

成本(COST)：

1. 生產一產品、服務、程序、或結構的必要支出。
2. 製造、管理、與銷售成本的總和。
3. 生產產品的所有成本。
4. 達成目標所付出的金錢、人力、時間、或其它的支出等。
5. 產品價格的組成因子。
6. 營建工程中獲得材料所需支付的費用。

**COST, DEVELOPMENT:** (1) The amount spent on product research, design, models, pilot production, testing, and evaluation, (2) Cost normally considered product overhead and distributed as fixed cost over an estimated number of products to be produced.

### 發展成本(COST, DEVELOPMENT)：

1. 產品研發、設計、造型、原型生產、試驗、和評估所需支付的費用。
2. 可以產品生產成本的固定比例加以估計。

**COST, LIFE CYCLE:** (1) The sum of all acquisition, production, operation, maintenance, use, and disposal costs for a product or project over a specified period of time; (2) The sum of all costs for the development, procurement, production, and installation of a product, as well as its financing, taxes, operation, logistical support, maintenance, modification, repair, replacement, and disposal over the period of its useful life; (3) In manufacturing, it is also referred to as the sum of development, production, and application cost; (4) The economic measure of value. Life cycle cost is often expressed in terms of net present value.

### 壽年成本(COST, LIFE CYCLE)

1. 一產品或專案於一特定時期，所有購置、生產、操作、維修、使用及棄置成本的總合。
2. 在產品使用期間，所有因發展、採購、生產、安裝、財務、稅捐、操作、支援、維修、修改、修理、置換、及棄置成本的總合。
3. 製造工作中，發展、生產、和使用等成本的總合。
4. 經濟評估價值的方法，通常以現值來表示。

**COST MODEL:** A financial representation such as a spreadsheet, chart, and/or diagram used to illustrate the total cost of families of systems, components, or parts within a total complex system or structure.

### 成本模式(COST MODEL)

一種財務上的圖表，用於說明一複雜系統或複雜結構之全系統總成本、零組件成本及其分佈。

**COST/WORTH:** The ratio used to determine the maximum opportunity for value improvement. It is usually identified in the function analysis phase and used as a benchmark for value change during the study.

### 機能成本/機能價值(worth) 比例(COST/WORTH)：

這項比例可決定最有潛力做價值改善的機能，通常在研析過程之機能分析階段，當成選擇研析機能的基準。

**FUNCTION:** (1) The natural or characteristic action performed by a product, process, or facility; (2) In VM, a function is defined using a two-word, verb-noun context; e.g., a pencil will *make marks*; a light will *illuminate area*.

### 機能(FUNCTION)

1. 由一產品或服務所表現出的特質。
2. 價值方法中，機能係由「動詞+名詞」兩個字加以定義，例如鉛筆的機能是「註記符號」，電燈的機能是「照亮區域」。

**FUNCTION ANALYSIS SYSTEM TECHNIQUE (FAST):** A graphical representation of the dependent relationships between functions within a project. Key elements of the FAST diagram include:

The sequence of functions on the major logic path proceeding from left to right answer the question “How is the function to its immediate left performed?”

The sequence of functions on the critical path proceeding from right to left answer the question “Why is the next function performed?”

Functions occurring at the same time or caused by functions on the critical path appear vertically below the critical path function.

The basic function of the project anchors the FAST diagram and the major logic path. It is located farthest to the left on the major logic path within the scope of the study.

### 系統化機能分析技術、機能系統圖(FAST) (FUNCTION ANALYSIS SYSTEM TECHNIQUE, 簡稱FAST)

為一敘述專案內機能及其相互關係的圖形，圖中主要的組成元素如下：

1. 主要邏輯路徑上由左至右回答「在其左方機能如何執行？」的問題。
2. 主要邏輯路徑上由右至左回答「為甚麼執行在其右方機能？」的問題。
3. 同時發生的機能或由邏輯路徑上的機能所產生的機能，置於該要徑機能垂直下方。

4. 研析標的的主要機能總是置於圖上範圍線內主要邏輯路徑上的最左邊。

**FUNCTION, BASIC:** The specific purpose(s) for which a product, facility, or service exists and conveys a sense of ‘need’. In ‘continuous innovation’ projects the basic function must always exist, although methods or designs to achieve it may vary. In ‘discontinuous innovation’ projects which seek to create new industries the existence and persistence of the basic function is itself the focus of challenge.

主要機能(FUNCTION, BASIC)：

由一產品或服務所表現的主要目的，通常為「需求」，對於「持續創新」計畫，主要機能須一直存在；儘管達成的方法或設計可能變更，然而「非持續創新」計畫時想要創造全新的產品，主要機能仍須一直存在並作為創新的焦點。

**FUNCTION, HIGHER ORDER:** Any function to the left of another on the critical path is a “higher” order function.

較高階機能(FUNCTION, HIGHER ORDER)

在主要要徑上，任一機能左側的機能，即為較高階機能。

**FUNCTION, HIGHEST ORDER:** The specific goals (needs) for which the basic function(s) exists to satisfy. It answers the “why” question of the basic function, and is located immediately to the left outside the study scope on a FAST diagram.

The objective or output of the basic function(s) and subject under study, is referred to as the highest order functions, and appears outside the left scope line, and to the left of the basic functions.

Note: Any function to the left of another on the critical path is a “higher” order function.

最高階機能(FUNCTION, HIGHEST ORDER)

為主要機能存在的原因或目標。可回答「為甚麼要有主要機能」的問題，置於緊鄰於研析範圍線外之左方。

為目標或主要機能的研析主題，即謂最高階機能，一般出現於研析範圍線外的左側，同時也是在主要機能的左側。

**FUNCTION, LOWER ORDER:** Any function to the right of another function on the critical path is a “lower” order function.

較低階機能 (LOWER ORDER FUNCTION)

在主要要徑上，任一機能右側的機能，即為較低階機能。

**FUNCTION, LOWEST ORDER or ASSUMED:** The function that is selected to initiate the project and is depicted farthest to the right, outside the study scope. For example, if the value study concerns an electrical device, the *supply power* function at the electrical connection would be the lowest order function. Also referred to as an “assumed function.”

These functions to the right and outside of the right scope line represent the input side that “turns on” or initiates the subject under study and are known as lowest order functions.

最低階機能或起因機能(FUNCTION, LOWEST ORDER or ASSUMED)

為開始專案需要的機能，在機能系統圖的最右方，通常置於研析範圍線外之右方，也是「起因機能」。例如假若價值研析電力設備，「供給電力」機能在電力的連接上為最低階機能。

在研析範圍線外右側，為「啟動」或開始研析主題者，即謂最低階機能。

**FUNCTION, SECONDARY:** A function that supports the basic function and results from the specific design approach to achieve the basic function. As different ways or design approaches to achieve the basic function are changed, secondary functions may also change. There are four kinds of secondary functions:

*Aesthetic:* A secondary function describing esteem value.

*Required:* A secondary function that is specified by the customer as a condition of acceptance or a preference.

*Sell:* A function that provides primarily esteem value. For marketing studies it may be the basic function.

*Unwanted:* (1) A negative function caused by the manner or way used to achieve the basic function, such as the heat generated from lighting that must be cooled. (2) Also referred to as an “undesirable function”.

### 次要機能(FUNCTION, SECONDARY)：

次要機能為支撐主要機能和完成主要機能所產生的特殊設計。當不同的方法或設計方式使得完成主要機能方式能改變時，次要機能也會跟著改變，次要機能有下列四種：

1. 美學的次要機能-描述魅力(esteem)價值的機能
2. 必要的次要機能-顧客指定必須接受或偏愛所產生的機能
3. 銷售的次要機能-提供原來魅力(esteem)價值的機能。對市場研究來說它可能是主要機能
4. 不需要的次要機能-由達成主要機能的方法所產生的負面機能，例如由照明產生的熱必須予以冷卻。也就是所謂”不受歡迎的機能”

**FUNCTION MODELS** — (See FAST diagram) A graphical depiction of the relationships between functions within a project. There are several commonly used styles:

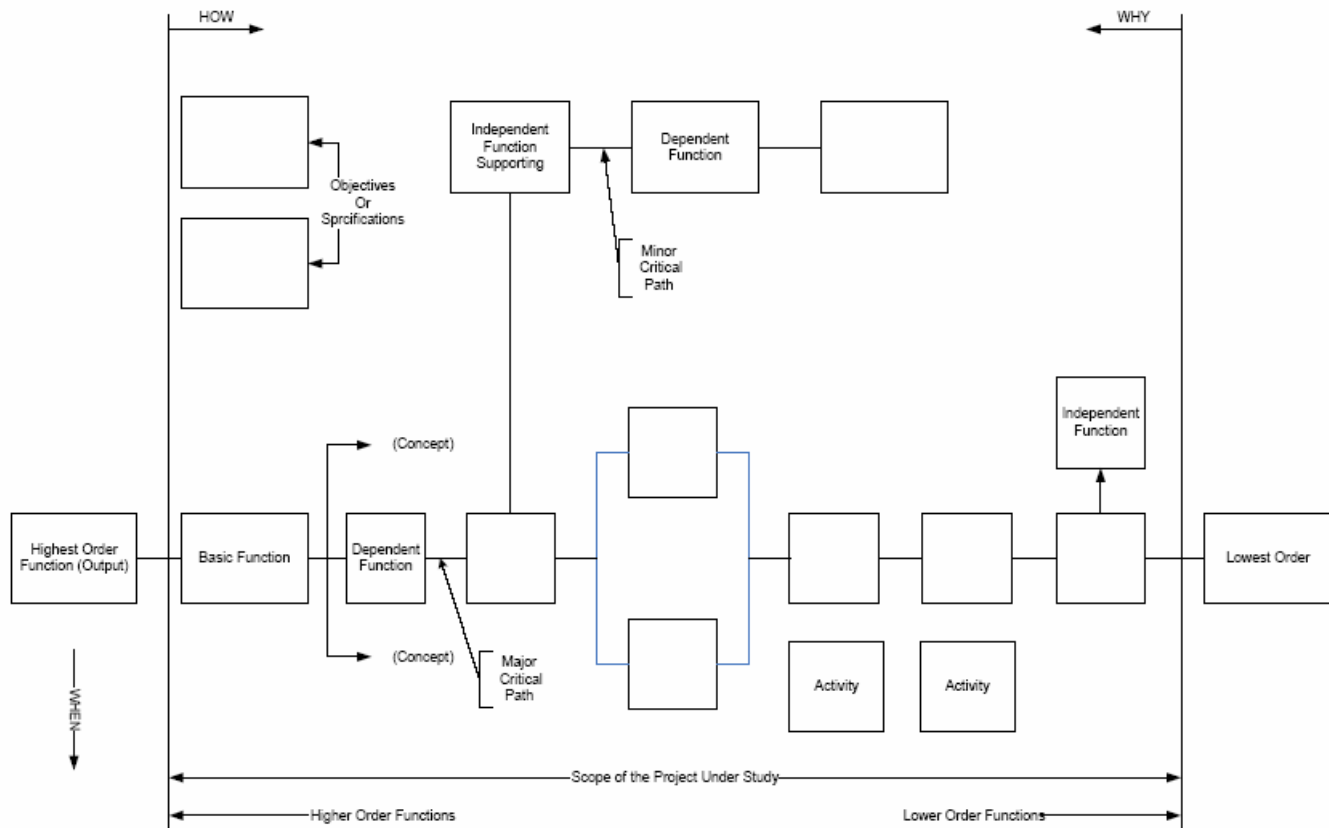
**機能模式(FUNCTION MODELS)**

敘述專案內機能關係的圖形，一般而言有如下幾種常用類別：傳統式機能模式 (Classical FAST Model)、階層式機能模式 (Hierarchy Function Model)、技術導向式機能模式 (Technical FAST Model)、顧客導向式機能模式 (Customer-Oriented FAST Model)。

*Classical FAST Model:* A function displaying the interrelationship of functions to each other in a “how-why” logic. This was developed by Charles Bytheway.

**傳統式機能模式 (Classical FAST Model)**

以「How-Why」邏輯表示機能間的關係，Mr. Charles W. Bytheway於1964年首度發表於美國價值工程師協會之研討會。



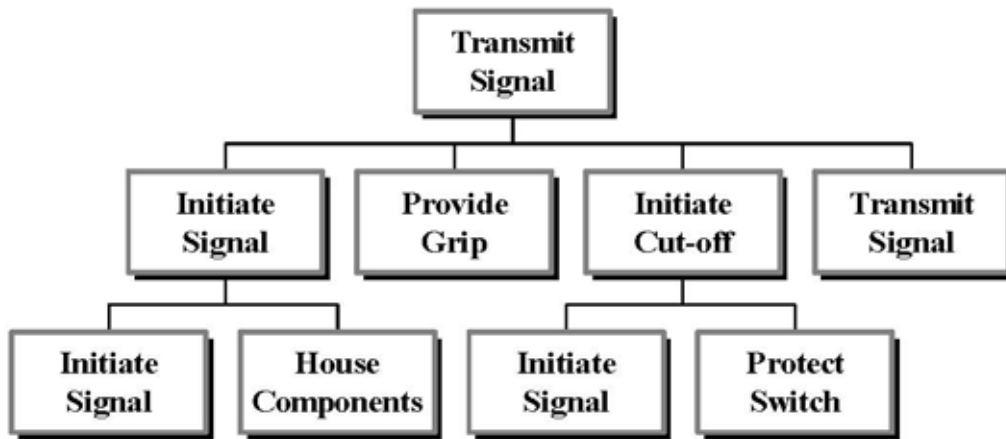
**傳統式機能模式 (Classical FAST Model)**

*Hierarchy Function Model: A vertical “tree” chart of functions. Recent practice has been to include within one branch user-oriented functions such as assure convenience, assure dependability, assure safety, and attract user.*

階層式機能模式 (Hierarchy Function Model)

為一垂直的機能「樹狀」圖。最近的實例包含了一組使用者導向機能諸如「確保便利」、「確保可靠性」、「確保安全」、及「吸引使用者」。

### Walk Around Control Station

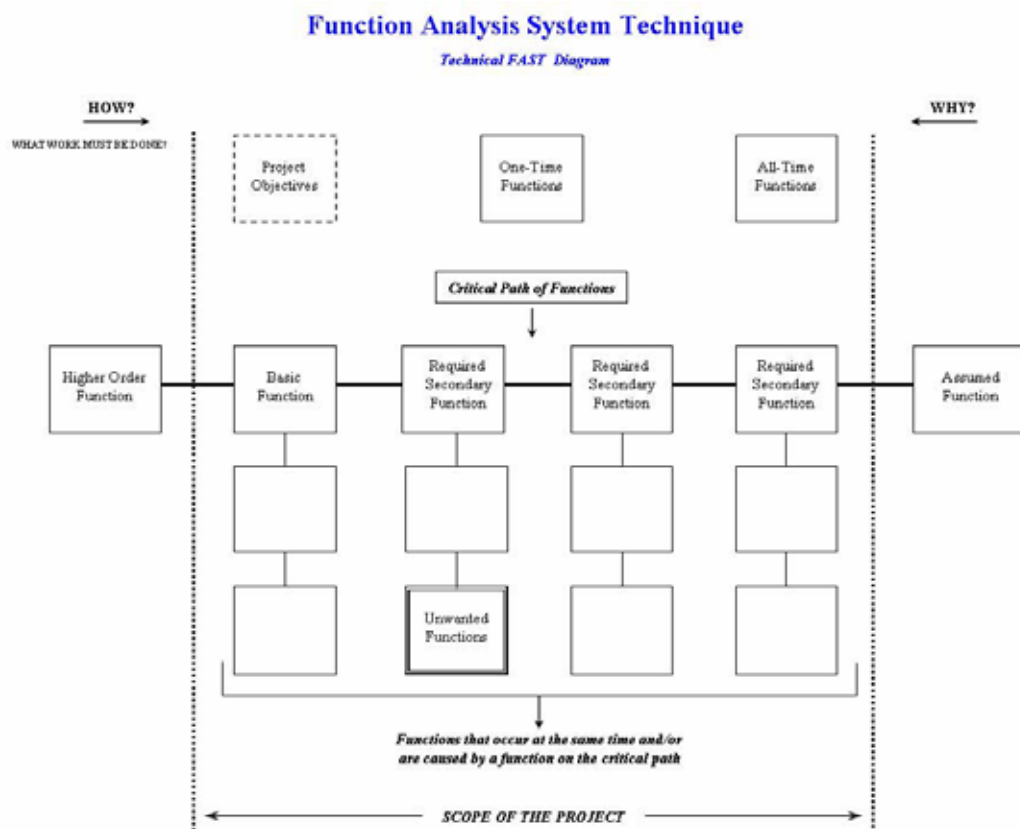


階層式機能模式例 (Hierarchy Function Model)

*Technical FAST Model:* A minor variation to the traditional FAST developed by “Doc” Ruggles incorporates the concept of separating and displaying supporting functions, such as “One Time Functions” and “All Time Functions.” Technical FAST also includes key project criteria that affect how the functions are to be performed.

### 技術導向式機能模式 (Technical FAST Model)

由“Doc” Ruggles自傳統式機能模式做少許變更發展而成，其觀念是將支援機能分開排列，例如「發生一次的機能」、「全時機能」與「計畫規範」等，技術導向式機能模式亦涵蓋影響機能性能之主要的計畫準則。

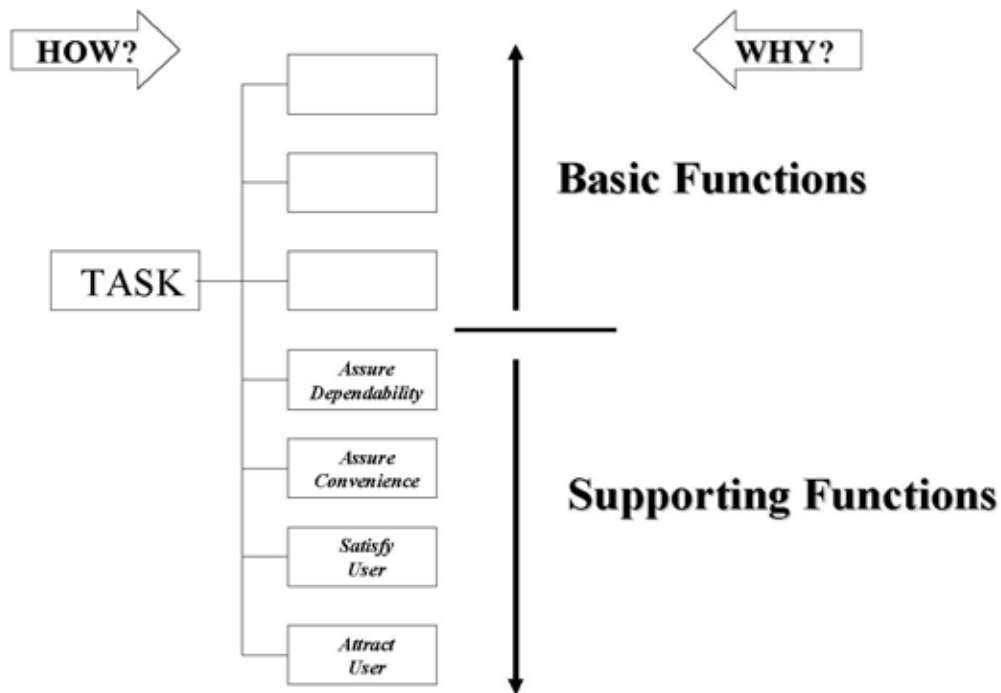


### 技術導向式機能模式 (Technical FAST Model)

*Customer-Oriented FAST Model:* This variation of the FAST diagram was developed by Thomas Snodgrass and Theodore Fowler to better reflect that it is the customer that determines value in the function analysis process. Customer-oriented FAST adds the functions: *attract users*, *satisfy users*, *assure dependability*, and *assure convenience*. The project functions that support these customer functions are determined by using the how-why logic.

顧客導向式機能模式 (Customer-Oriented FAST Model)

由Thomas Snodgrass和Theodore Fowler所發展，增加下列4個支援機能「吸引使用者」、「滿足使用者」、「保證可靠」、「保證方便」，如何達成前列四個支援機能，則使用「如何-為何」的邏輯加以探討。



顧客導向式機能模式

(Customer-Oriented FAST Model)

**JOB PLAN:** A sequential approach for conducting a value study, consisting of steps or phases used to manage the focus of a team's thinking so that they innovate collectively rather than as uncoordinated individuals. The steps include:

*Pre-VM Study Phase:* Where “problem framing” and value are defined

*Information Phase:* Where functionality is understood and innovative ideas are identified as candidates for innovation.

*Function Phase:* Where product or process functions are identified in an active verb-measurable noun context. These functions are usually (but do not have to be) assembled by the team into a function diagram. The functions are sometimes dimensioned with cost or performance (non-monetary) success factors.

*Creative Phase:* Where alternative ways to perform functions are generated.

*Evaluation Phase:* Where individual ideas are assessed to cull poor prospects.

*Development Phase:* Where ideas are researched and written up as possible investment proposals.

*Presentation Phase:* Where a collection of risk-reward investment proposals are presented to senior management for budgetary approval.

*Implementation Phase:* Where the accepted changes are implemented into the project and the benefits of the changes validated and tracked.

*Post-VM Study Phase:* Where implementation is undertaken and value is captured and recorded, along with lessons learned.

### 工作計畫(JOB PLAN)

一個執行價值研析的連續性方法，其步驟包含如何管理研析小組思考的焦點，使創新優於個別進行研析，包含下列幾個步驟：

1. 價值研析前置作業階段：將問題結構化並定義價值目標。
2. 資料階段：了解資料，促使研析小組成員思考提出創意化構想。
3. 機能分析階段：將產品或程序的機能以「及物動詞+可數名詞」加以定義，本項工作可由（不一定必要）研析小組整理成機能系統圖，有時候亦可將機能以成本或各項執行性成功因子加以表示。
4. 創意階段：產生可以達成機能的替代構想。
5. 判斷階段：透過評價以挑選各替代構想。
6. 發展階段：將替代構想進一步研究後寫成可行的建議案。
7. 建議階段：將建議案的風險與效益向管理階層進行簡報，以取得最後決策。
8. 實施階段：將接受的建議案加以執行，確認並追蹤改變所造成的效益。
9. 價值研析後續階段：建議案已經執行，效益價值已經加以記錄，並經由檢討獲得經驗與學習成效。

**PAIRED COMPARISON:** A method used to determine the relative importance among several non-monetary factors. Each attribute is compared to each other attribute to determine which of the two being compared is most important. The number of times an attribute exceeds another is determined. Then this number is compared to the total number of comparisons to determine the relative percent weight for each attribute.

#### 成對比較(PAIRED COMPARISON)

決定很多非貨幣因子相對重要性的方法，透過因子與另一因子的相互比較，可以決定重要程度的數目，然後將各因子的數目小計與所有因子的數目合計相除，即可求得每個因子的權重。

**PARETO ANALYSIS:** An investigation of the factors of a product or process to separate the “vital few” from the “trivial many.” This analysis is based on economic theory and principles noted by Italian economist Vilfredo Pareto. It is used in VM to determine the key cost drivers of a product or process.

#### 柏拉圖分析 (PARETO ANALYSIS)

一個探討產品或程序中「關鍵重要的少數」與「無關緊要的多數」間關係的研究，該研究係依據義大利經濟學家Vilfredo Pareto提出的經濟理論及原理，該研究成果常用於價值研析以決定產品或程序中主要的成本因子。

**PERFORMANCE or PERFORMANCE MEASURES:** The capacity of a product to fulfill its intended function. Ideally, performance should be defined by the intended customer or user. Appropriate performance requires that the product, facility, or service have a predetermined level of quality, reliability, interchangeability, maintainability, producibility, marketability, and deliverability. These performance levels must match the customer’s requirements and may vary, depending upon the nature of the project.

#### 性能 (PERFORMANCE or PERFORMANCE MEASURES)

產品達到其預期機能的能力，理想的情況下，性能是由顧客或使用者加以定義，適當的性能需要產品或服務能夠預先訂定其品質層次、可靠度、可交換性、可生產性、市場性、交貨性等。性能應該符合顧客的要求，且能夠隨著產品的種類而變化。

**PERFORMANCE ATTRIBUTE:** Specific characteristics that are essential in achieving a product's performance objectives. Performance attributes may possess a range of values and can be measured either objectively or subjectively.

性能特徵 (PERFORMANCE ATTRIBUTE)

達成產品特性不可或缺的特質，該特質可經由主觀或客觀的方式給予一定範圍的價值。

**PRICE:** The sum of money expended by the user/customer to purchase the product under study.

價格(PRICE)

使用者/顧客所支付以購買產品之金額。

**PROJECT:** (1) A temporary endeavor undertaken to create a unique product, service, or result; (2) For the purpose of value studies, a project is the subject of the study. It may be a physical product such as a manufactured item, or a structure, system, procedure, or an organization.

專案、研析標的、計畫 (PROJECT) :

1. 生產產品、服務、或結果的暫時性努力。
2. 針對價值研析，PROJECT代表的是研析標的，它可以是產品、結構、流程、或組織。

**PROCESS:** A sequence of activities that delivers a product.

程序(PROCESS)

生產產品的序列性動作。

**SAVE INTERNATIONAL CERTIFIED PROFESSIONAL:** For the purpose of a value methodology study, the job plan shall be facilitated by a Certified Value Specialist (CVS), or a Value Methodology Practitioner (VMP) working under the supervision of a CVS. SAVE International Certification requirements are identified by the SAVE International Certification Board, which maintains a list of currently

certified individuals.

#### 國際價值協會專業授證(SAVE INTERNATIONAL CERTIFIED PROFESSIONAL)

價值研析中，工作計畫應由價值專家 (CVS) 完成，或由價值專家 (CVS) 協助副價值專家 (AVS) 完成，SAVE專業授證規定是由SAVE授證委員會頒布，並會公佈目前合乎規定的授證人員。

#### 中華價值管理學會專業授證(VMIT CERTIFIED PROFESSIONAL)

價值研析中，工作計畫應由價值專家 (CVS) 完成，或由價值專家 (CVS) 協助副價值專家 (AVS) 完成，VMIT專業授證規定是由SAVE授權，可以在台灣地區以中文辦理AVS考試及授證工作，VMIT網站上將會頒佈授證規定，並公佈目前合乎規定的授證人員。

**SCOPE:** The portion of the overall product that is selected for the value study. The analysis accepts everything within the defined scope in order to focus attention on the functions within those limits.

#### 範疇(SCOPE)

研析標的中選擇作為價值研析之範疇，分析時接受該範疇內之所有想法以便集中注意力在限定機能上。

**STRATEGIC PROBLEM FRAMING:** A method to improve a project by defining it in terms of the strategic problems and opportunities associated with the project.

#### 策略性問題架構 (STRATEGIC PROBLEM FRAMING)

透過將計畫定義為策略性問題與機會以進行改善的方法。

**VALUE:** (1) The relative worth, utility, or importance of a product, process, or service to a user that allows individuals to prefer one solution over another; (2) The lowest life cycle cost to reliably accomplish a function that meets the expectations (or requirements) of the customer.

#### 價值(VALUE)

1. 使用者在比較產品、程序、或服務時，擇優選擇某一方案時，對於另一方

案相對的價值、效用、或重要性。

2. 以最低的壽年成本，可靠地提供符合使用者所需要的機能。

**VALUE, MONETARY:** There are four classes of monetary value:

*Use Value:* The monetary measure of the functional properties of the product or service which reliably accomplish a user's needs.

*Esteem Value:* The monetary measure of the properties of a product or service which contribute to its desirability or salability. Commonly answers the "How much do I want something?" question.

*Cost Value:* The monetary sum of labor, material, burden, and other elements of cost required to produce a product or service.

*Exchange Value:* The monetary sum at which a product or service can be freely traded in the marketplace.

貨幣價值(VALUE, MONETARY)

貨幣價值有四類:

1. 使用價值:為可靠完成使用者需求機能，所需支付購買產品或服務的費用。
2. 魅力(Esteem) 價值: 產品或服務受顧客渴望或願意負擔的費用。
3. 成本價值: 生產產品或服務所需的勞力、材料、管銷等費用。
4. 交換價值: 產品或服務可於市場上自由交換的貨幣總額。

**VALUE METHODOLOGY:** The systematic application of recognized tools by a multidisciplinary team to identify and categorize the functions of a project, product, or process and to create, select, and develop alternative approaches to cost-effectively deliver the functions and/or improve performance.

價值方法論(Value Methodology)

為一業經證實有效的系統化技術，透過不同專業組成的研析小組，確認並分類產品、服務、或流程之機能，發揮創意、選擇並發展替代方案，以有效的成本提供機能，並提升性能。

**VALUE METHOD PROPOSAL:** A proposal by the value study team to management to provide one or more functions for financial and/or performance improvements

and which is within acceptable terms and conditions.

#### 價值方法建議案(Value Methodology Proposal)

價值研析小組於現有合約條款內，提送給管理階層之建議案，以提供單一機能或多機能之改善建議案。

**VALUE STUDY:** The application of the value methodology by SAVE International certified professionals using the job plan.

#### 價值研析(VALUE STUDY)

由具有國際價值協會 (SAVE) 或中華價值管理學會 (VMIT) 授證之價值專業人員，應用工作計畫所執行之研析。

**VALUE METHODOLOGY TRAINING:** There are two levels of SAVE International approved training specifically designed to provide the minimum knowledge of VM practice. It is expected that VM professionals, as in all professional fields, will continue to keep themselves current through seminars, conferences, and associated educational opportunities.

*Value Methodology Workshop:* The objective is to provide VM education to the degree that participants will be able to successfully participate in future value studies under the guidance of a qualified Certified Value Specialist with minimum additional training. This is called the Module I program.

*Value Methodology Advanced Seminar:* The objective of this seminar is to extend the knowledge base of those wishing to become professionals in the VM field. Topics include both advanced methodology and areas of management. This seminar is referred to as the Module II Program.

Appropriate training is a prerequisite to SAVE Certification Examinations.

#### 價值方法論訓練(VALUE METHODOLOGY TRAINING)

國際價值協會(SAVE International) 核可以下兩級訓練課程，該課程特別設計為提供最低限度的價值管理知識。期許價值管理專業及其它專業領域之人士能透過研討會及其它教育機會保持最新技術。

1. 價值方法訓練研習會：由合格的價值專家引導，目的為提供學員參與未來價值研析所需能力的價值方法訓練，本訓練稱為第一級訓練(Module I)。

2. 價值方法進階研討會：目的為提供有意成為價值管理專業之學員進階的知識，研討主題包含進階方法及管理，本訓練稱為第二級訓練(Module II)。

適當的訓練是參加國際價值協會或中華價值管理學會授證考試不可或缺的。

**VALUE ANALYST:** Synonymous with value practitioner, value professional, or value specialist.

價值分析者(VALUE ANALYST)

為價值執行者、價值專業人員、價值專家的同義辭。

**VALUE ENGINEER:** Synonymous with value practitioner, value professional, or value specialist.

價值工程師(VALUE ENGINEER)

為價值執行者、價值專業人員、價值專家的同義辭。

**VALUE ENGINEERING CHANGE PROPOSAL (VECP):** A formal proposal submitted by a contractor to a governmental agency or an owner that documents a process or design change and the related savings from the original contract. The VECP requires agency or owner review approval before implementing the change. If accepted, the result will be a modification to the submitter's contract. Typically the savings are accrued to the government and contractor on a 50%/50% basis, but each owner establishes its own sharing arrangement.

價值工程變更建議案(VECP)( VALUE ENGINEERING CHANGE PROPOSAL)

由承包商提送給政府機構或業主的正式建議案，該建議案將比合約內容有相對的節省，也需要政府機構或業主核可後方能執行變更。建議案如果被接受，成果將做為提送者合約修改之一部份。典型的情況，節省金額將由政府機構與承包商各分享50%，但不同業主將有不同規定。

**VALUE PROFESSIONAL:** (1) One who applies the value methodology to study and search for value improvement; (2) Synonymous with value analyst, value engineer, value practitioner, or value specialist.

價值專家(VALUE PROFESSIONAL)

1. 應用價值方法以執行研析及研究價值改善者。
2. 為價值分析者、價值工程師、價值專業人員、價值專家的同義辭。

**WORTH:** A comparison between one cost and the lowest overall cost to perform a function without regard to criteria or codes.

價值(worth)

不考慮標準或法規之前提下，執行機能之最低總成本。

## 辭彙中文/英文 對照表

	中 文	英 文	頁
1	工作計畫	JOB PLAN	
2	主要機能	BASIC FUNCTION	
3	成本	COST	
4	成本模式	COST MODEL	
5	成對比較	PAIRED COMPARISON	
6	次要機能	SECONDARY FUNCTION	
7	技術導向式機能模式	TECHNICAL FAST MODEL	
8	系統化機能分析技術、機能系統圖	FUNCTION ANALYSIS SYSTEM TECHNIQUE(FAST)	
9	性能	PERFORMANCE OR PERFORMANCE MEASURES	
10	性能特徵	PERFORMANCE ATTRIBUTE	
11	柏拉圖分析	PARETO ANALYSIS	
12	研析後檢討	AFTER STUDY REVIEW	
13	問題結構化策略	STRATEGIC PROBLEM FRAMING	
14	國際價值協會專業授證	SAVE INTERNATIONAL CERTIFIED PROFESSIONAL	
15	專案、研析標的、計畫	PROJECT	
16	貨幣價值	MONETARY VALUE	
17	較高階機能	FUNCTION , HIGHER ORDER	
18	較低階機能	FUNCTION , LOWER ORDER	
19	最低階機能	FUNCTION , LOWEST ORDER	
20	最高階機能	FUNCTION , HIGHEST ORDER	
21	發展成本	DEVELOPMENT COST	
22	程序	PROCESS	
23	階層式機能模式	HIERARCHY FUNCTION MODEL	
24	傳統式機能模式	CLASSICAL FAST MODEL	
25	壽年成本	LIFE CYCLE COST	
26	魅力價值	ESTEEM VALUE	
27	價值	VALUE	
28	價值	WORTH	
29	價值工程師	VALUE ENGINEER	
30	價值工程變更建議案	VALUE ENGINEERING CHANGE PROPOSAL (VECP)	
31	價值分析者	VALUE ANALYST	
32	價值方法建議案	VALUE METHODOLOGY PROPOSAL	
33	價值方法論	VALUE METHODOLOGY	

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34	價值方法論訓練	VALUE METHODOLOGY TRAINING	
35	價值研析	VALUE STUDY	
36	價值專家	VALUE PROFESSIONAL	
37	價格	PRICE	
38	範疇	SCOPE	
39	機能	FUNCTION	
40	機能成本/機能價值 比例	COST/WORTH	
41	機能模式	FUNCTION MODELS	
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## 辭彙英文/中文 對照表

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1	AFTER STUDY REVIEW	研析後檢討	
2	BASIC FUNCTION	主要機能	
3	CLASSICAL FAST MODEL	傳統式機能模式	
4	COST	成本	
5	COST MODEL	成本模式	
6	COST/WORTH	機能成本/機能價值 比例	
7	CUSTOMER-ORIENTED FAST MODEL	顧客導向式機能模式	
8	DEVELOPMENT COST	發展成本	
9	ESTEEM VALUE	魅力價值	
10	FUNCTION	機能	
11	FUNCTION , HIGHER ORDER	較高階機能	
12	FUNCTION , HIGHEST ORDER	最高階機能	
13	FUNCTION , LOWER ORDER	較低階機能	
14	FUNCTION , LOWEST ORDER	最低階機能	
15	FUNCTION ANALYSIS SYSTEM TECHNIQUE(FAST)	系統化機能分析技術、機能系統圖	
16	FUNCTION MODELS	機能模式	
17	HIERARCHY FUNCTION MODEL	階層式機能模式	
18	JOB PLAN	工作計畫	
19	LIFE CYCLE COST	壽年成本	
20	MONETARY VALUE	貨幣價值	
21	PAIRED COMPARISON	成對比較	
22	PARETO ANALYSIS	柏拉圖分析	
23	PERFORMANCE ATTRIBUTE	性能特徵	
24	PERFORMANCE OR PERFORMANCE MEASURES	性能	
25	PRICE	價格	
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27	PROJECT	專案、研析標的、計畫	
28	SAVE INTERNATIONAL CERTIFIED PROFESSIONAL	國際價值協會專業授證	
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34	VALUE ANALYST	價值分析者	
35	VALUE ENGINEER	價值工程師	
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37	VALUE METHODOLOGY	價值方法論	
38	VALUE METHODOLOGY PROPOSAL	價值方法建議案	
39	VALUE METHODOLOGY TRAINING	價值方法論訓練	
40	VALUE PROFESSIONAL	價值專家	
41	VALUE STUDY	價值研析	
42	WORTH	價值	

## APPENDIX B - REFERENCE SOURCES

### 附錄B - 參考來源

- 1 VALUE METHODOLOGY STANDARD, SAVE International.
- 2 授證及重新認證手冊，中華價值管理學會(VMIT)
- 3 中華價值管理學會網址：<http://www.vmit.org.tw>
- 4 SAVE International website: <http://www.value-eng.org>