SAVE International 2011 Annual Conference Technical Program Abstracts

Analysis on the System Interaction of VE in Public Works

By Koji Saito, VES (Wednesday, Track 2, 1:00 PM)

The functional analysis method which has been used in VE studies for public works was applied only to the components of the project itself, as it does to VE studies for products. However, as public works do not work autonomously but they work while having interaction with the communities surrounded and the places where the infrastructures are being developed, the functions required for public works should be defined considering these interactions. We need to define functions for public works in the future giving thorough consideration of interaction with a vast system of local community. At the same time, it means we are evaluating the "impacts" on which being affected simultaneously among various systems. In that case, we regard the composition of public works as a collection of small systems.

The interactions can be classified as either "beneficial function" or "harmful function". By defining these two functions, we can capture the potential problems which we could not have determined by the traditional functional definition. Enhancing "beneficial function" and eliminating "harmful function" as much as possible would lead to improving users' satisfaction. We must note that the "impacts" on which being affected simultaneously among systems are not constant, but they are variable according to the changes over time or status of utilization.

The Application of a Value Assurance System to Oil & Gas Development Projects

By Franca Marini, Ph.D. and Guido Mattu, PMP (Tuesday, Track 1, 1:30 PM)

The oil and gas industry performs considerable investments in very complex and risky environments to develop projects.

To improve the capital effectiveness, the major oil and gas companies assess the project value performing reviews at specific milestones during project development.

Most of the companies' management systems foresee a project subdivision in phases with some intermediate decision points. The project team presents to the management the obtained results and the plans for the following phase; these data are evaluated and decisions on if and how to afford the next project phase are taken. The decisional process is supported by the recommendations arose during the reviews performed by multidisciplinary, independent, expert teams.

This practice assures both value and governance of projects presenting a high risk level from both a technical and economical point of view.

This paper will present:

- The methodology of Value assurance Checks;
- Different types of project reviews;
- How to prepare and conduct a review with a double perspective: the preparation by the project team, the execution by the review team;
- Some techniques and practices for planning and executing the reviews; and,
- The working experience and application of the project reviews in a major oil and gas company.

Applying Lean Concepts to the Construction Design and Build Process

By Jim Rains, CVS-Life, FSAVE (Tuesday, Track 1, 10:30 AM)

Lean construction is a translation and adaption of lean manufacturing principles and practices to the end-to-end design and construction process. Unlike manufacturing, construction is a project based-production process. Lean construction is concerned with the holistic pursuit of concurrent and continuous improvements in all dimensions of the built and natural environment: design, construction, activation, maintenance, salvaging, and recycling. This approach tries to manage and improve construction processes with minimum cost and maximum value by considering customer needs. (Koskela et al. 2002).

Said another way, lean construction is a "way to design production systems to minimize waste of materials, time, and effort in order to generate the maximum possible amount of value (Koskela et al. 2002)". Thus lean construction integrates perfectly with value engineering, since both have the objective to improve value.

A simple definition of lean is the identification and elimination of waste. Waste is anything that does not add value to the end user. All systems, products and processes have waste.

There are seven types of waste:

1. Waste of overproduction
2. Waste of correction
3. Waste of material movement
4. Waste of processing
5. Waste of inventory
6. Waste of waiting
7. Waste of motion

Lean construction takes on two forms. The first is to design the facility knowing that the facility needs to support various processes for the life of the facility. Thus a detailed knowledge all expected processes that will occur in the facility is necessary to insure the facility itself will support a lean application of those processes. The key ingredient in facility design is to minimize "life cycle waste". This is accomplished by optimizing the flow of people, information, equipment and materials (PIEM). When we review the function "create shapes," we would be looking at the master plan flow of PIEM in the initial stages of design and as the design gets more detailed the exact size, shape and proximity location of each "shape" entity in the design.

The second is to identify and eliminate waste in the construction process. This starts with a detailed building project plan and schedule. Each step is analyzed for the opportunity to generate waste, first by identifying the functions of that step and then brainstorming alternate ways to perform those functions. As potential waste is identified, ideas are created to insure that the waste does not occur. We call this "waste avoidance". Then the functions of each step are identified. A time to function relationship is created. Effort is made to then analyze the functions that have the greatest opportunity to improve value (cost and time). All functions are looked to identify and eliminate life cycle waste. When I do lean projects I always use value analysis at the same time. I call this "LeanVE".

Behavioral Considerations for Improved Performance in Value Analysis

By Howard B. Sole, AICP, CVS-Life (Tuesday, Track 3, 10:30 AM)

Similar to the way cross discipline team members bring added value to the workshop creative process so do works from writers in various fields to the value analysis process. Two such authors are Nassim Nicholas Taleb, author of *The Black Swan* and Dan Ariely who wrote *Predictably Irrational.* From the concepts presented in these two books there are several ideas which emerge for our consideration in the improvement of our value analysis process and ultimate service to our clients. In this paper we will review certain of these derivatives.

Build to Order: The Challenges and How VAVE Methodology Can Still Be Applied in Industries Where Design Is Heavily Restricted

By Oscar E. Villegas, AVS (Tuesday, Track 2, 2:00 PM)

In value management we can say that change is needed 99.9% of the time. In order to implement a VAVE project, there may be a change in design, manufacturing, supply chain or related aspects of a product or process. I have found that the biggest impact on product cost comes from material. However, what do you do when your product design is heavily restricted by the governing standards of your industry?

On the other hand, another big challenge is the variation in volume of a built to order industry which makes it more difficult to take advantage of economies of scale and long term planning. This paper explains different alternatives that can be utilized to counteract such challenges and maintain the value management spirit in the company.

Criticality of Sponsor Actions to Business Value Capture

By Robert H. Orlean, CVS (Tuesday, Track 2, 4:30 PM)

Senior management sponsorship of value engineering workshops is a critical and often overlooked element of the process—yet proper sponsorship leads directly to superior business results.

While a VE team creates innovative ideas, it is the VE workshop management sponsor's actions and behaviors that are the #1 factor in capturing actual business results from these efforts. As value engineering professionals, it is critical that we have a clear picture of what sponsorship really means so that our client's VE efforts can be consistent and highly successful.

This paper describes the importance of sponsor actions relative to other variables in the VE process, and then articulates the ideal sponsor actions and behaviors that maximize value capture. It spells out specific sponsor actions in three key areas: providing motivation and direction; participation in the process; and resourcing and prioritization.

Develop a Web-based Tool to Advance the Function Analysis in Value Management

By Mei-Yung Leung, Ph.D., Ph.D., MICIOB, MHKICM, MRICS, MHKIS, CVS, MHKIVM (Tuesday, Track 1, 2:00 PM)

Value management (VM) has been widely employed in the construction industry, while function analysis is one of the major techniques in the VM study. To allow a flexible working environment for the application of FAST diagram among VM team members, an interactive VM web has been developed at the City University of Hong Kong. The web-based VM system named "iVMi" (interactive Value Management internet) aims to facilitate function analysis techniques from the behavioral perspective. The internet program seeks to enhance the team discussion and the FAST diagram establishment in a VM workshop. Based on a trail run in a real construction project, we found that the iVMi program is beneficial to VM participants for stimulating functions, allowing discussion, identifying key functions, developing the FAST diagram with free of time and location limitations.

Developing a Value Management Approach at the Institutional and Organisational Levels for the Saudi Public Sector

By Mohammed A. Alalshikh, Ph.D., AVS and Steven Male, Ph.D. (Tuesday Track 1, 3:00 PM)

Value management (VM) has been adopted by the public sector in many countries in order to optimise public projects, to ensure that they achieve their objectives and to achieve value for money invested. Although the Saudi Ministry of Finance launched a resolution encouraging organisations of the Saudi Public Sector (SPS) to apply VM to projects with budgets higher than SR 20m, most of these organisations have not yet adopted VM. This paper is part of a research project that aims to develop a suitable VM approach for the SPS, bearing

in mind the obstacles that hinder the diffusion of the methodology in the SPS and the benefits from adopting its approach used in other countries.

A mixed methods research approach was used to conduct this study, which exploits the synergy between quantitative and qualitative data. The study concluded that it is crucial to develop a VM approach that addresses in the SPS VM at three levels: the project, organizational, and institutional. Having investigated VM at the project level in the first part of the research, the authors developed a VM approach suited to the SPS at the institutional and organisational levels. This is presented in this paper.

The Ministry of Finance should play a vital role to lay a strong foundation for promoting VM in the SPS at the institutional level. It should support and monitor SPS organisations to establish their VM programmes. Additionally, this paper points out the measures that SPS organisations need to take in order to set up successful VM programmes—mainly, establishing a VM policy and allocating sufficient resources help VM flourish in an organisation. Furthermore, VM needs support from senior management within particular Ministries if it is to be implemented successfully. Finally, training would help to promote a VM culture in an organisation, in order to overcome resistance to change. These and other important measures elicited from the data are discussed in the paper.

Diagnosis and Study of VE Development in Korea

By Young Joo Suh, Ph.D., CVS-Life and Yong Su Kim, Ph.D., CVS (Tuesday, Track 3, 1:00 PM)

This document presents how VE has developed in Korea.

Regular VE activity in Korea began in Samsung Electronics Co., Ltd. in 1979. Since then VE has expanded to electronics, automobile, shipbuilding, construction, and public service industries.

The authors' study of the roles of VE activity level and Certified Value Specialists in modern Korea led to the introduction of this VE development process and the future of VE in Korea, development of the history of VE in Korea, and studies on VE's practical use and the roles it played in Korea

A Brave New World: Public–Private Partnerships, Design–Build Delivery, and Value Engineering

By John E. Sloggy, PE, CVS (Tuesday, Track 1, 11:00 PM)

Is the value methodology any different from other popular value improving practices? How is it different and what results can I expect? As organizations continue the search for improvements to profitability and performance the light shines on value engineering.

The need exists for a process that both generates real innovation and achieves that with a measurable and sustainable improvement in the organizations performance.

Innovation is what separates high performing organizations from the rest of the pack. A hierarchy of the impact on an organizations performance exists and the design function to a large degree drives both the organizations innovation and performance. The greatest impact is achieved by altering the design of a product or project. Organizations that pursue innovation as a competitive strategy need to inculcate it into the core organizational competencies. Innovation can be pursued as both long term strategies (R&D) and short term strategies. The value methodology is a highly effective short term innovation strategy that produces real long term increases in an organizations performance.

Effective VE achievement that utilize Expert Choice

By Chan-Ho Shin, Ph.D., CVS (Tuesday, Track 3, 1:30 PM)

At each job plan stage in performing VE work, functions, ideas and proposals are appraised with various techniques like FD, IWDM and MATRIX methods. Performing VE work with objective and effective methods has some validity.

This case will introduce an application process and method of the expert choice (AHP) in a function, idea and proposal stage. Expert choice is a great method to secure a reliability of decision making through the comparison each appraisal standard which composes a level structure of decision making. The greatest advantages of expert choice are detection of decision making errors in appraisal stage and handling its errors quickly.

Empirical Cases on Software Value Engineering in Samsung Electronics

By Hyo-Chin Kim, AVS, SPICE (ISO/IEC), VE-MBB (Tuesday, Track 3, 3:30 PM)

Software is a critical core asset. But all software has not equal value. Value-driven approach is quite effective in software development as well as hardware field. VIP center has known for the bootstrap of innovative VE activity; VIPc has introduced inceptively value engineering into software development life cycle since 2005 in Samsung Electronics. Software VE has applied successfully into core software projects for last several years through VIPc. Software value program (SVP) provides better quality and high productivity under the same conditions. In the paper, present SVP's concept and empirical cases including methodologies on how to apply software VE into software development in Samsung Electronics.

Energy Simulation in Facility VE Studies: A Paradigm Shift

By Benson Kwong, CVS, CEM, LEED AP, BEMP (Wednesday, Track 1, 3:30 PM)

Energy efficiency for buildings is becoming more crucial in value engineering (VE) studies as owners are looking for ways to reduce utility cost, achieve LEED, meet regulations, and be more eco-friendly. Free software developed by the U.S. Department of Energy, eQUEST makes it possible to calculate energy savings for multiple alternatives within the duration of a VE study. This energy simulation software, based on DOE2, can be as detailed and powerful as desired when used for LEED and ASHRAE compliance calculations. Yet in the "wizard" modes it can quickly simulate energy savings resulted from changes in building envelopes, lighting and controls, and HVAC systems. The graphic feature offers opportunities to visualize building geometry as well as HVAC system configurations. The use of eQUEST will make VE studies "greener" both for the environment and for owner's utility budget.

Establishing Direction for Success in Manufacturing, Government, and Construction Value Studies

By Thomas M. Cook, CVS (Tuesday, Track 2, 1:00 PM)

Value studies are performed for a wide range of products, processes, and projects in a variety of manufacturing, government, and construction environments. It is sometimes thought that the use of some value methodologies are confined to certain situations and their focus is limited to those applications. Some common examples of conventional thought: User input is most effective for consumer product studies or Technical FAST is best used for construction studies.

The paper will focus on those methodologies that are thought to be unique to a specific value study application, but have been used to achieve success in distinctly different environments. The perspective of this paper will be to provide examples of tools value team leaders can use to focus a team's direction in function analysis, to enhance creativity, and evaluation of proposals in all value study situations—without constraint to industry, process, or construction application.

Function Analysis: Creating Value by Stimulating Innovation

By M. A. Berawi, Ph.D. (Wednesday, Track 3, 1:00 PM)

This paper outlines the articulation of a theory of idea generation by differentiating "ideas as purposes", "ideas as outcomes", "ideas as processes", and "ideas as functions". This paper shares insights and offers a theory of ideas opening the way for researchers and practitioners to explore the ability to manage invention as a capability. In the context of innovation, functions must be formulated in order to achieve the target of a system that has been designed. Identifying functions enables us to propose alternative ways to implement

those functions and led us to a shared understanding and better ability to produce new ideas to stimulate innovation and add product value.

Functional Approach to Event/Workshop Planning

By Lori A. Braase, AVS and Jodi Grgich, AVS (Wednesday, Track 3, 3:00 PM)

Function analysis provides the foundation for comprehensive event planning (e.g., workshops, conferences, or meetings). It has been used at the Idaho National Laboratory (INL) to successfully plan events and capture lessons learned. As a result, the "INL Guide for Hosting an Event," was developed. The guide is a systematic approach that combines function analysis, project management, teamwork, and lessons learned to form a comprehensive philosophy of customer service. It is a living document that can be tailored by the user to apply a "systems approach" to planning from simple to highly complex events. It guides the user from the initial event idea though the closeout activities. Event planning is expensive and resource intensive. Using a guide and a functional approach to planning utilizes resources efficiently and reduces errors that could be distracting or detrimental to an event.

The Function Wheel

By Jeff Rude, CVS (Tuesday, Track 2, 3:30 PM)

Adapted from a French function tool called the "pieuvre" or octopus, the Function Wheel is an approach to function analysis that has proven useful on complex projects to clearly present and lead the transition from information phase "What is it?" type discussions to function analysis phase "What does it do?" type discussions. Additionally, the tool has proved helpful in workshops at eliciting strong function based discussion from teams where "speaking in function" is a challenge.

The tool is effective at capturing a complete picture of the project under study and at illustrating the functional relationships of the project and the elements or factors that make the project. As it has been adapted and used, the Function Wheel has shown the ability to:

- Build clear connections between the element under study and the factors interacting with that element
- Show relationships and interactions between the factors themselves
- Build clear functional connections between the element and the factors.

This paper is an exploration and discussion of the tool's theoretical use, real world applications, points of adaptation, challenges and successes with the progression of this tool towards a fully usable tool following the more rigorous SAVE International definitions of function. Finally, as the tool is still being adapted, the paper is an invitation for others to explore the Function Wheel, use and improve it for the benefit of the value methodology practice.

How Can TRIZ Improve the Outcome of a Value Engineering Workshop?

By Sanjay S. Gaikwad, AVS (Tuesday, Track 2, 10:00 AM)

Value engineering and TRIZ have been perceived as two powerful, independent tools to solve specific problems or issues. Traditionally the value engineering job plan is focused on delivering value five different ways: a) improving function while reducing cost, b) reducing cost while maintaining function, c) improving function while maintaining cost, d) improving function while increasing cost by a proportionally smaller amount; and e) reducing function while reducing cost by a proportionally greater amount.

TRIZ has always been understood to be an inventive problem solving tool for specific problems or issues. Teams are able to be more innovative with abstracted knowledge than with knowledge based upon your own limited experience. TRIZ utilizes basic concepts of ideality, resources, and inventive principles derived from millions of patents to resolve contradictions which might have required system comprises between useful results and harmful effects if TRIZ was not employed.

Each methodology has its own strengths and weaknesses. When employing value engineering, the creativity phase uses brainstorming as the primary method which generally yields a high quantity of ideas. One of the

disadvantages of this methodology is that it may not come up with inventive solutions outside of the team's specific area of expertise. However, when employing the TRIZ methodology with the same team, many different inventive principles are used to come up with out of box or innovative ideas which go beyond the team's specific area of expertise. The FAST diagram principle employed during the VE function phase can be utilized as a starting point to generate a TRIZ functional model. However, the TRIZ function model also defines useful functions, harmful functions, and contradictions to improve the definition of the problem or scope of the project.

A value engineering workshop was held in November, 2010, with a cross-functional team of 14 people in Evansville, Indiana using the value engineering methodology. A FAST diagram was created and used to generate a TRIZ functional model with useful, harmful and contradiction functions to define a water delivery system for a side-by-side and a French door bottom mount refrigerator. This TRIZ functional model approach generated 120 ideas where the group thought that 25 – 30 percent of the ideas would not have been generated if this TRIZ methodology had not been used. Of 120 ideas, at least 22 were considered easy to implement and would provide quality improvements as well as deliver cost saving and added value to customer. Nine business cases were developed by the team requiring $500,000 in investment with an annual risk weighted estimated savings potential of $2.5 million.

This paper will demonstrate how VE's FAST diagram can be leveraged to build a TRIZ functional model in order to reduce cost and improve quality and thus give better value to our customers.

How Can Value Methodology Connect the Product and Technology Design in Different Firms of a Supply Chain?

By Ferenc Dr. Nádasdi, Ph.D., CVS-Life, FSAVE and Dr. Tünde Kitanics Bokorné (Tuesday, Track 2, 1:30 PM)

In the past few years we have been doing continuous research work in the supply chain (SC) field together with the teachers and the students of College of Dunaújváros. Volunteer company experts have also joined the project, which shows great interest in our work. The research we have carried out so far focused on the production of disposable goods.

Our work primarily may be considered value analysis and value control. The company experts came up with the idea that we should coordinate the product and technology design within SC with higher efficiency. Our research work has pointed out that in some industries (car manufacturing, information technology) the SC is not firm enough. This loose structure makes the innovation novel and product and technology design incidental.

During our research work we bumped into the problem that a new product or technology design should be preceded by the coordination of innovation. Presently, partnership creation at small and medium sized enterprises (SMSes) is really incidental. In addition, the fact that the suppliers provide only those parameters which are favorable for them make purchasing suitable products, technological components, and equipment more difficult. Besides purchasing problems, comparison of rival products with individual products is usually missing.

To solve the problems, we have tried out different methods. Using the available results, we defined the most important product components, parts and/or technological elements by Pareto analysis. Afterwards, we examined what technical, technological novelties became known which could promote to produce more competitive products. Being aware of innovation results, the question was given: what parts should the company produce continuously in the future or whether is it important to involve other suppliers in the production.

During comparing analysis of rival products and supplier products we applied COMBINEX method successfully. The comparison was based on function analysis. The COMBINEX method can give a prompt answer in what function parameters the individual product is left behind from the rivals. Moreover, the COMBINEX method can point out in what extent the products of certain suppliers meet the requirements given by the suppliers themselves. It frequently occurs that from a single product, a wide range of other products can be produced in accordance with the buyers' demand. The traders frequently push the product

and technology designers into such technical solutions which still keep the price of the product within the agreed limit. Later, this will consequently lead to a lot of huge conflicts. Applying morphology makes it possible to handle the quality levels and costs together by defining the competitive quality and price during the process of bargain. We are presenting the research results gained in certain fields through partial solutions of different projects.

Recently, in Hungary several huge projects were endangered due to the neglect of the given principles. In our opinion, applying the methods and procedures suggested by us can prevent a lot of inconveniences and waste of cost.

How DFV Process Can Improve Split AC Installation Process

By Cintia A. Lopes, AVS (Tuesday, Track 2, 10:30 AM)

The split air conditioning product has become very popular in Brazil in recent years. The system consists of two units physically separated: the indoor unit contains the evaporator and the outdoor unit contains the condenser. Copper tubes connect both units which transfers the refrigerant fluid from the indoor unit to the outdoor unit. The main benefit of this system over a traditional single unit system is the lower sound level combined with the improved thermal comfort.

The customer concern about purchasing this product is the installation process. It requires a specialist to install it and the cost can reach 30 to 40 percent of the product's price. Consumers are dissatisfied with the installation cost and the need to depend on a technical specialist. Most customers wish they could install it by themselves if the product would allow it.

A value engineering workshop was held in February, 2010, with a multi-functional team of 14 people in Joinville, Brazil, to discuss the issues and generate solutions to improve this complex installation process using the Design for Value (DFV) methodology. This function analysis approach generated 64 ideas, where at least 27 were considered easy to implement with high saving or value increasing. Seven business cases were developed by the team, requiring $147,000 in investment with an annual risk weighted estimated $21.5 million of savings for the company and consumers.

This paper will demonstrate the success of using the value engineering approach to improve the design of a product for simpler installation.

How to Streamline Your Activity Time through Functional Approach

By Hisaya Yokota, PE, CVS (Wednesday, Track 3, 3:30 PM)

This paper will help those people who have many things to do and need more time to do them. Although we are promoting business improvement activities as value practitioners, we may not feel that we are conducting our businesses with enough time to spare. This paper proposes a method aimed at improving the value of our daily business activities using functional approach. It introduces a concept and analysis method of achieving more successful results within tight time constraints. The author has applied this method in several client companies and results were more than satisfactory. The idea is to reduce working time in order to enrich our business and personal lives.

How VA Improved the Automation Strategy at the City of Calgary

By Mushtaq Rabbi, AVS and Don Stafford, PE, CVS-Life (Wednesday, Track 2, 1:30 PM)

In the late 20th century, the business value of most wastewater control technology investments was very clear and measurable by reducing the number of operators required to run the plant. Over the last decades, however, staffing reductions were not enough to cover the cost of the technology. In many organizations a major challenge is the "replacement technology" mindset. When new automation systems are required to replace aging systems, an RFP is issued specifying a system that does exactly what the system being replaced did. Project teams are then measured by on-time, on-budget delivery of the project as defined in the specification—not on the incremental value improvement resulting from the project. The largest opportunity for improved business value is often missed.

The City of Calgary's wastewater operation group under Water Services has the need to replace aging and obsolete distributed control systems (DCS) at two of its three wastewater treatment plants. This situation presented with a unique opportunity to use the business value approach. The value methodology was used to bring together industry experts, management, operational leaders, and in-house technical experts to share a common value perspective and craft a function-based solution approach. The study established a clear understanding amongst the stakeholders of how business value creation will improve the planning and budgeting of the full range of automation activities thereafter, including the DCS project. An automation strategy will bridge the gap between Water Services' business plans and its range of previously separate technology implementation plans. The process helped to take a more holistic and integrated approach towards instrumentation, SCADA-DCS, and electrical subsystem planning based on a clear understanding of operational need to ensure business value is created and sustained.

This paper will explain how the VA process was applied to the refinement of the Calgary waste water automation strategy to accomplish the above goals.

Improving the Performance of Highway Construction Project by Systematic VM Approach

By Jingyu Yu; Caijiang Zhang, Ph.D.; and Mei-yung Leung, Ph.D., MICIOB, MHKICM, MRICS, MHKIS, CVS, MHKIVM (Wednesday, Track 1, 11:00 AM)

Value management (VM) emphasizes the systematic and logic process which includes information, function analysis, creativity, evaluation, development and presentation. A case study was conducted to explore the feasibility of systematic VM approach in an actual highway, the Meihe Highway project in Guangzhou, People's Republic of China. The results indicated that systematic VM assisted participants to bring forward creative proposals which could enhance the values of the project and help construction managers to control the construction period, minimize the total project cost and reduce the construction risks in the real situation.

Improvement of Construction Value Engineering Process through Web-Based Group Decision Support System

Dong-Koo Kawk, Ph.D. (Tuesday, Track 3, 3:00 PM)

Recently in Korea, despite such increasing interests of an ordering body, construction managers, architects and engineers, the characteristics of each stage of construction VE activities still tend to end up with superficial performances or to be ignored in the workshop process. Thus, this research was launched to maximize VE effects after a cause analysis and improvement of processes are carried out and to further automate and DB-lize many decision making processes that occur in the design and construction process through the implementation of system.

The results of this study can be summarized as follows:

1) Through system developing process, a project, functional definition, FAST, DBMS of IDEA were set. The group decision support system was completed through demanding level measurements, weight calculation, and the development of three analysis modules of alternative evaluation.

2) As the group decision support system, which was developed by this study, was applied to more than ten projects, the performance analysis verified its validity. This output was built as an actual DB and its effectiveness was verified in a quantitative way through a survey conducted by system users.

As all VE workshop performance processes were computerized through the development of group decision support system, temporal problems caused by surveys and statistics that were performed repeatedly at each step were resolved. As a result, the efficiency of workshop can be increased. By making products that occurred at each step into the form of database, it is expected to have possible effects of accumulation of technology.

Integrated Project Risk Management

By Armand Della Monica, AVS, PMP and Michael Propen, AVS (Wednesday, Track 3, 1:30 PM)

Every capital project faces tangible risk across the spectrum of political, technical, and contractual concerns, regardless of how well-conceived or planned by the project stakeholders. The original bases of scope, cost, and schedule estimates are often sketchy and subject to interpretation, and as the project moves from inception to execution, it is almost inevitable that it will experience difficulties that the owner didn't envision, the designer didn't calculate, and the contractor didn't bid. These difficulties often result from uncertainties that could have been predicted, managed, and if properly addressed, avoided entirely.

The classical value engineering process is a powerful tool for identifying innovative and cost effective ways to minimize the uncertainty in achieving key project functions, but it does not explicitly address associated risk management. However, by integrating basic risk management techniques into the value engineering process, the outcome is a set of alternatives that address project functional needs and reduce a significant portion of the project risk. This is accomplished through the proactive application of two fundamental risk management practices:

- Risk Assessment: A qualitative approach to identifying both upside and downside uncertainties that the project faces, i.e., opportunity risks and threat risks, and evaluating their significance in terms of the likelihood and potential impact of occurrence.
- Risk Mitigation: A creative thought process to develop alternative strategies and concepts to capitalize on identified opportunity risks and minimize the likelihood of occurrence and potential impact of known threat risks.

The value professionals of SVS have pioneered, developed, and implemented the integration of risk management seamlessly into the value engineering process, as a way to anticipate a project's uncertainty, helping to avoid budget overruns and costly delays in schedule. During the critical Function and Idea phases of the typical study, functional risks and alternatives are identified and qualitatively evaluated in terms of their risk profile. Notable among the benefits of project risk management is its ability to qualify such difficult issues as design quality, appropriateness for bidding, constructability, and contract ambiguity in the context of budgets and schedules. It highlights project elements most likely to cause problems and gives owners the actionable information they need to focus on their mitigation.

SVS integrates project risk management into the value engineering process in the following manner:

1. Perform Information gathering, Function analysis, and Idea development phases as prescribed by the VE process;
2. Brainstorm and identify project functional risks that either enhance or jeopardize delivery of the project scope at the target budget and schedule;
3. Develop and prioritize alternative project concepts and strategies and assess their potential impact on project scope, budget, and schedule, as key criteria for selection;
4. Wherever possible, with client approval and support, perform quantitative risk analyses using statistical tools to determine the most probable and best value outcome.

The successful implementation of integrated project risk management by SVS is illustrated by several examples drawn from actual case studies. The presentation will also discuss the economic sensibility, in terms of return on investment, of enhancing the value methodology to encourage the use of currently available statistical tools to manage project risk.

Leading Accelerated Projects

By Lon Roberts, Ph.D. (Wednesday, Track 2, 10:00 AM)

Project cycle-time compression is a critical value-added factor in our on-demand society. Yet, according to repeated national surveys, a majority of technology-intensive projects overrun their schedules—many by 100 percent or more. Faced with the reality that pressure will continue to intensify to compress project schedules,

and that conventional project management tools can only deliver conventional results, this condition is certain to worsen—unless significant changes are made in the way projects are supported and planned, but more importantly in the way they are executed.

In this thought-provoking presentation, Dr. Lon Roberts will describe the challenges that today's project managers face as they are asked to meet "unrealistic" deadlines—challenges that are magnified by unrelenting demands to "do more with less" in a society that expects instant results. He will elaborate on the multi-dimensional aspects of the problem and why it is immune to one-dimensional solutions, pressure tactics, and tools designed to aid in managing conventional projects. He will also provide an overview of the 8 Project Acceleration Opportunity Levers™ used to help his clients compress their project cycle times. Following this, he will describe a diagnostic tool that pinpoints environment-specific improvement areas associated with each Opportunity Lever, but with primary emphasis on the pivotal "Leadership Lever".

A LEAN Approach for Delivering GREEN Building Projects

By Murray Guy, MBA, P.Eng, PMP, LEED AP (Wednesday, Track 1, 3:00 PM)

The Integrated Designs Project Management Group has been pioneering a new "Lean to be Green" approach to project delivery that incorporates lean thinking and relational contracting to achieve significant improvements in value and performance.

In traditional transactional contracting methods like Design-Tender-Bid, Design-Build, and Construction Management, contractors are forced to compete on price. This low first-cost method forces contractors, owners, and designers into an ineffective and often confrontational business relationship that is wasteful, stressful, and not effective at optimizing value.

The new lean project delivery system Integrated Project Delivery (IPD) is based upon a relational contracting methodology. The IPD system enables the hiring the best team based upon qualifications and the ability to work together in a spirit of trust and collaboration to deliver the best value. For the same budget this approach will enable our industry to build better buildings and do our part to offset the 40 percent of greenhouse emissions that come from buildings. By eliminating 10 percent waste in the process it will be possible to build "Net 0 buildings for Net 0 additional capital cost."

With experience on six IPD projects, Integrated Designs has been able to work with some excellent designers and contractors to deliver exceptional value projects. Some of these projects were started using traditional methods and needed to switch to IPD to save the project. Relational contracting is the key change required to enable lean thinking teams to create more value.

By adopting the IPD methodology, the U of W will achieve what is expected to become "North America's Most Energy Efficient College Laboratory Facility". The amazing thing about this LEED Gold facility is that it will be delivered at a much lower cost and to a "True Fixed Price" with less risk. The construction contingency will be less than 2 percent.

On the next projects, the IPD process will include the use of Building Information Modeling to take project optimization and collaboration to a new level. BIM will enable our team to have real time quantity take-offs to do better life cycle cost analysis and to significantly improve the effectiveness of developing and costing the design.

Management of Value (MoV)

By Michael F. Dallas, AVS, TVM, PVM, FIVM (Wednesday, Track 1, 4:00 PM)

The UK Office of Government Commerce (OGC), part of the Cabinet Office, has developed a number of best management practice guides for the program and project management community. These include Managing Successful Programs (MSP), Project Management Methodology (PRINCE2), Management of Risk (M_o_R) and Portfolio Programme and Project Offices (P3O). In 2010, they commissioned the development of a new guide, Management of Value (MoV). This paper, prepared by the lead author of MoV, outlines the development, approach and content of this guide, the qualifications related to it and progress since its launch in November 2010.

Management of Value (MoV) is the first guide to address the application of value management across all sectors of the economy and across all levels of management and is aimed at an international audience. It should be viewed as an evolution of value management rather than a departure from tried and tested practice. It provides a fresh view of the subject with inputs from an international review panel comprising some 20 individuals from a broad range of disciplines in the programme and project management communities, including government agencies, IT, telecoms, transportation, management schools, management accountants, and construction.

The current economic conditions in Europe and USA make the launch of this new guide particularly timely, coming two weeks after the UK government's comprehensive spending review.

The paper will include examples of the use of MoV at all stages of programmes and projects, particularly where these relate to reducing public expenditure, enhancing service efficiency, and eliminating waste. It will, of course, also include some examples of increasing competitiveness in the private sector.

The guide describes the principles that underpin MoV, without which best practice is not being followed. It goes on to describe the fundamental processes that should be applied, regardless of the level of application or the subject being addressed. It details key techniques and tools that may be used to achieve results and introduces the components of an approach applying MoV in practice. The guide also includes advice on taking account of the business environment within which MoV is applied. There are further sections on undertaking organisational health checks and improving both individual competence and organisational maturity in the use and delivery of MoV.

One chapter is devoted to introducing and embedding MoV into an organisation. The author will touch on his past experience of doing this within Davis Langdon and, now that it has joined AECOM, the challenges of extending best practice across this global company.

A Method for Applying TRIZ to Enhance Brainstorming

By John S. Borza, PE, AVS, TRIZ MBB (Wednesday, Track 3, 2:00 PM)

Value management is a function-based methodology focused on improving value (defined as function ÷ cost). Its function-based analysis and traditional brainstorming approach to problem solving share a number of characteristics with TRIZ, creating a unique opportunity to apply TRIZ principles into the value methodology. The synergy between these approaches results in enhanced brainstorming output (quantity of high quality ideas). This paper will examine a way to integrate key ingredients of these two approaches, and the benefits that can be realized from the combination of the value methodology and structured innovation.

Pardon My French … Value Engineering Is All About the F-word!

By Sid Anwar, MS, CVS-Life (Wednesday, Track 2, 10:30 AM)

This paper uses a novel approach to attract, educate and motivate an audience that is new to the value engineering methodology by examining the VE job plan using among others the "F" words. It intends to communicate in a unique and creative way the fundamentals of value engineering and how it would assist them in optimizing the cost and performance of their projects and give them a competitive advantage in a global economy.

This unique approach could serve as a constant remainder to apply it on a regular basis, especially when a project is not going well and they may use the "F" word.

It has been difficult to generate a lasting interest in the value engineering process. I hope this would give a new meaning to the terms *Function*, *FAST*, *Function Analysis*, etc. and enhance the application of this proven value technique at the trail's end.

Popularising Value Engineering for Wider Applications

By Pawan K. Aggarwal, CVS, FINVEST (Tuesday, Track 3, 11:00 AM)

VE is used in much smaller proportion to its potential. The presentation is aimed at bringing out changes in the current administration and organisation of VE programs, certification methodologies besides broad based online information base to popularise value engineering for wider applications.

Line managers often find it difficult to carry out function-cost-worth analysis or to understand and appreciate the value gap. There is a tendency to jump to the creativity phase and retrofit evaluation tools. There is an urgent need for the VE specialists to develop some additional user friendly tools/models enabling everyone to use VE. Case studies are known to speed up the learning process. VE professionals may develop a platform to provide complete VE job plan, step by step outcomes for a new practitioner to understand the nuances of VE .

Further, introduction of users' updatable website would enable a free database of VE personnel and a global report card of applications and accrued benefits of VE. All this would go a long way in popularising VE and make it a widely used technique for eliminating unnecessary costs and achieving organisational objectives at least cost.

More Efficient VE Workshops & Superior Results: The Advantages of a Streamlined Workshop and Early Change Effect Analysis

By Brent J. Burris, AVS and Miguel Sanchez, CVS (Wednesday, Track 1, 4:00 PM)

The last couple of years in the automotive industry have been some of the worst years on record. Although this year has shown some improvements, overall the industry is still struggling to make a profit. This includes the OEMs, their suppliers, the suppliers' suppliers, and so on. Many of these companies have filed for bankruptcy and some have even closed their doors. This has forced companies to look at the way they do VA/VE and try to get more out of what they are doing. Autoliv North America is no exception and has continued to look at their VA/VE activities/process and modify them to meet the changing environment. At the same time, quality, competitiveness, and due care has increased significantly to assure the end customer safety and highest consumer value is being delivered through the products. The value of these activities needs to be increased, which we all know means increasing the function or decreasing the cost, while at the same time maintaining or increasing quality. Since costs are not going down, and in most cases increasing, this forces us to increase the function of our workshops.

This paper will show some of the more dramatic changes that have been made to the Autoliv VA/VE process in order to improve the value. The first thing that will be discussed is the importance of pre-workshop meetings and the information that is covered. The second discussion point is the adaptation of "user-friendly" forms and worksheets in the workshop. Thirdly, the presentation will cover how due care investigation and analysis is conducted by the team early in the stages of the value engineering workshop to ensure full understanding of the effects of the change (Change Point Analysis), leading to smoother and more efficient project implementation.

Post-Occupancy Evaluation for Added Value at Trail's End

By Stephen J. Kirk, PhD, FAIA, FSAVE, CVS, LEED and Chad Stirrett, LEED AP, CSI, CDT (Tuesday, Track 1, 1:00 PM)

Post-occupancy evaluation (POE) is an excellent opportunity to add value at trail's end. This case study presentation includes recommendations for the Wharton Center for the Performing Arts addition and renovations project for Michigan State University in East Lansing, Michigan. They stem from a POE initiated by MSU and held at the main campus in East Lansing during the summer of 2010.

The POE program was initiated in the spirit of the MSU strategic framework of boldness by design to emphasize value (quality) and being the best at what MSU does. Post-occupancy evaluation is a method to continuously review and improve infrastructure processes and projects. The MSU POE program was

originated through research performed by the Center for Construction Performance Process Assessment and Improvement in the School of Planning Design and Construction. The program is currently being administered by Campus Planning and Administration and a formal program is in the development stages. The intent is to emphasize moving forward as a learning organization with a continuous improvement mindset to feed forward lessons on value learned from completed projects.

Revealing Hidden Economic Externalities in Major Projects with Value Methodology

By Munsell D. McPhillips, Ph.D., AVS (Tuesday, Track 2, 3:00 PM)

An economic externality is a cost or benefit that is not reflected in the price of a project or product. It is borne by those who were not willing parties to the transactions of producing the project. Economists tell us that economic externalities are distortions of our marketplace because some costs or benefits fall outside the project and are not accurately reflected in its costs. As VM practitioners, we pride ourselves on our clear-eyed understanding of costs. However, if we cannot articulate the effects of our projects or products on the larger community, we cannot accurately analyze or cost them. By properly examining and eliminating external costs, our adverse impacts on the larger world are reduced and our projects become more sustainable. VM may provide a mechanism for revealing and ameliorating these hidden costs. This paper will address how externalities arise in engineering design, a method for integrating externalities in VM, some approaches to applying economic measures to services provided by nature and how the process influences team member selection.

"Rocky Road" No Match for the VE Team

By Warren A. Knoles, PE, AVS (Wednesday, Track 2, 2:00 PM)

The Indiana Department of Transportation (INDOT) was gearing up to initiate the detailed design of 27 miles of a new interstate highway following completion of the preliminary route/location and environmental studies. Because of the magnitude of the project and federal-aid highways funding, a value engineering (VE) study was required by the Federal Highway Administration. The baseline estimated cost per mile was considerably higher than normal because of the extreme ridge/valley terrain and presence of various types of rock throughout the project limits—a truly "rocky road". Therefore INDOT decided to conduct a VE study on the project before detailed design was initiated.

A 23-person VE team was formed, which included DOT, consultant and FHWA representatives, along with subject matter experts (SMEs) from other states with extensive rock terrain, and a construction contractor representative with extensive rock excavation experience. In a 3-day VE workshop, the VE team developed and recommended 16 VE proposals totaling $57 million in savings (15% of construction cost), 13 design suggestions for further consideration by the design team, and a preliminary risk response plan. Nearly 60 percent of the recommended VE savings addressed the rock excavation cost items. The construction contractor representative was not able to be present during the workshop, but communicated with the VE team via technical memorandum, email, and cell phone. The VE savings yield for the study was significantly enhanced by the out-of-state SMEs and construction contractor's contributions during the workshop, as well as during the disposition phase of the study.

This presentation describes how the 23-person VE team functioned, how the SMEs applied value analysis to the rock terrain cost items, how the preliminary risk response plan was developed, and how several key VE proposals contributed to reducing the cost of the project. This presentation affirms the effectiveness of the VE methodology in reducing project costs and enhancing value. So it can be said that the "rocky road" faced by INDOT was no match for the VE team on this project.

Self-Assessment Using FAST

By Abdullah A. Khojah, CVS (Tuesday, Track 2, 4:00 PM)

Self-assessment is a tool that is used by organizations to recognize their areas of strength and areas of weakness and to discover the causes and identify the opportunities for improvement. In value engineering, the VE specialist can use self-assessment to measure the results of a VE/VA workshop. For example, he or she

can assess the satisfaction of the key stakeholders, including VE/VA team, and identify the areas that need improvement.

In a multidisciplinary workshop, such as VE/VA workshop, self-assessment allows the team leader/facilitator to get feedback from the key stakeholders and identify the enablers/causes that will help achieve the required results and identify champions who will embrace the VE proposals towards implementation.

In this paper, the author is introducing a tweak to the Function Analysis Systems Technique (FAST) that will allow using the "How – Why" logic in self-assessment. This will help convert FAST to a new tool for self-assessment and thus can be used to measure the results/effects and identify the enablers/causes needed to achieve the results required from a project such as VE/VA workshop by using the logic embedded in FAST.

The paper will explain about the vocabulary and the logic that is used in FAST and in self-assessment. It will also highlight the necessity for the VE/VA leader/facilitator to listen to the voice of the customer and obtain feedback from other stakeholders in order for him to identify and eliminate the areas that could hinder the success of the value engineering workshop.

A Streamlined Value Planning Process for Small Proscriptive Projects on a Budget

By Paul T. Johnson, CVS (Tuesday, Track 1, 3:30 PM)

Numerous projects such as military facilities (Army Reserve Centers) are proscriptive in nature. There is some variability allowed in systems selection, but not in square footage which cannot vary from program requirements. Functional adjacencies are spelled out very clearly to the design team. Where are the opportunities for value engineering? The owners typically are not willing to pay for a full-fledged VE study, even if one is technically required. How can a VE, or value planning, study still achieve value on such projects? There is a way to achieve value by focusing on optimal building systems and space configurations by involving the VE team leader early on in the design charrettes.

The Study of CDP (Cost Design Program) Action

Gi-Yeun Lee, CVS (Wednesday, Track 3, 3:00 PM)

This paper introduces a program that contribute to enlarge enterprise's profit. It establishes a target for profit and develops and operates an executive program that continues until the target profit is achieved. This is the executive system that developed at Samsung Electro-Mechanics is called CDP (Cost Design Program).

This study will be a profitable program development to any company that wishes to achieve on-target earnings.

Typical Engineer Learning Styles and Their Implications for the VE Workshop

By Gary R. Myers, PE, CVS (Wednesday, Track 2, 11:00 AM)

The investigation phase of the value engineering job plan is vitally important to the VE process. In a brief period, the study team must quickly grasp not only the current design for the project, but also the needs which it is designed to meet, the conditions under which it will be constructed, and the commitments that have been made to the public, elected officials, and regulatory agencies. If the phase is effective, the team can generate insightful ideas. But, if it is not, the team's ideas may be naïve and unimaginative. Pressed to show results for its efforts, the team may resort to common cost cutting measures that are of little value as they merely sacrifice performance to save money.

With so much on the line, VE facilitators pay close attention to the design of the information phase, employing a number of techniques that include function analysis, the hallmark of the VE process. However, few have considered whether their techniques are optimal with respect to the learning styles of their team members.

This paper will examine this topic in the context of the approximately 300 studies that are conducted each year by various agencies under the auspices of the FHWA VE program. In these workshops, the predominant team member is the engineer.

Engineers do, in fact, show strong tendencies toward particular learning styles. This paper will examine how this knowledge can be used to make the investigation phase more effective not only for typical engineers, but also for a complete spectrum of learning styles.

Uncertainty Modeling in Multiple Dimensions for Value Methodology

By Robert B. Stewart, CVS-Life, FSAVE, PMP and Gregory Brink, CVS, PMI-RMP, CCEIA (Tuesday, Track 3, 10:00 AM)

Traditional VM has focused on the relationship between function and cost in assessing value. Today, many VM practitioners are basing value comparisons on trade-offs between outputs (i.e., performance) and inputs (i.e., cost and time) relative to the performance of functions. In both cases, these expressions of value are generally deterministic in nature and do not factor in the inherent uncertainties of performance, cost, and time. In a world where uncertainty is prevalent and the ideal conditions are often only statistically the most likely to materialize, it is important to acknowledge the multiple sets of outcomes that may occur. By introducing uncertainty into facets of performance (which seeks to quantify how well a function is being performed), cost (how much a function costs), and time (how long it takes to deliver the function) within the context of the value equation, one can acknowledge the inherent uncertainty present within the dimensions of the value equation.

Taking performance, cost, and time as dimensional inputs into the calculation of value, the value equation may take the form of:

$$V\_f\ 〚(P,C,t)〛\_total=(\sum(P\cdot\alpha)/(\sum[(C\cdot\alpha)+(t\cdot\alpha)])$$

Where V = Value, f = Function, P = Performance, C = Cost, t = Time, α = Uncertainty.

In this sense the multiple scenarios for performance, cost, and time can be modeled such that the range of possible outcomes for value can be forecasted versus a single point estimate that assumes the ideal conditions. Incorporating factors of uncertainty such as event risk, estimating variance, and the range parameters of the underlying data being utilized to estimate value yields a more robust approach to finding the optimal set of value alternatives that offer the most efficient value strategy for any project, product or process. Overall, this allows for decision making and selection of developed value alternatives in a value study to be implemented with respect to observations of relative riskiness and varying ranges of outcomes instead of a one dimensional estimate of the ideal conditions.

Understanding the Advantages and Potential Pitfalls of Quantifying Performance Measures

By Robert D. Prager, PE, CVS (Wednesday, Track 3, 4:00 PM)

Numerical expression of performance is an integral part of some value analysis programs. This paper examines the role of establishing numerical values of performance measures and the different processes that are available to determine the numerical values. The difficulty of assigning quantitative values to qualitative measures of function performance further increases the complexity of the task. The advantages and limitations of the different processes and methods are discussed as are variations of different decision making processes and their applicability in value analysis.

The paper describes the most commonly used approach for quantifying performance measures, analytical hierarchy process (AHP). AHP is a multi-criteria decision analysis tool used to assign numerical values of performance measures. In AHP, decision makers establish a hierarchy of performance criteria which can be considered independently. Decision makers systematically evaluate each criterion by comparing them to one another two at a time. The process converts the evaluations into numerical weights for each criterion. Value alternatives are then rated against each criterion using a scale. Total performance of each value alternative is determined by the sum of the products of the rating for each criterion and the weight of that criterion. Total performance of each alternative is then compared to the total performance of the original concept to determine the percent of increase or decrease in performance.

The paper also addresses the necessity for our professional society to develop and adopt a scientifically rigorous standard for incorporation into the SAVE International value methodology.

Using Value Engineering in Construction Manager at Risk or CMGC Projects

By Renee L. Hoekstra, CVS, RH & Associates, Inc. (Tuesday, Track 1, 10:00 AM)

Since both the contractor's and designer's contracts are held by the owner, why wouldn't we bring the three factions together and hold a formal VE workshop to gain the insight and experience of the construction team? Currently, the Arizona Department of Transportation (ADOT) has been applying a formal risk analysis and value engineering process to the CMAR process. This has been done for the Cordes Junction TI and the Loop 303 projects, and has been met with great satisfaction. The workshop is a 3-day workshop where the first one-half day is dedicated to a formal risk analysis and then the VE session is held for the remainder of the time. This process includes the contractor's team, consultant team, and ADOT personnel (design and construction), as well as FHWA as necessary. Key is that the ideas and opportunities are documented and at the end of the session and decisions are actually made as to what ideas will be integrated into the design. This process is an important step in the overall CMAR process as well as documenting the benefits of the entire team working together to focus on adding value to a project and the success of the CMAR as a process.

Value Engineering—A Sure Step towards Product Innovation

By Rangaswamy Chandrashekar, AVS and Raghavendra H. Rao, AVS (Tuesday, Track 4, Manufacturing Forum [begins 3:00 PM])

Innovation is a key requirement for most product manufacturers to stay ahead in the competitive market scenario. Product innovation is largely driven by yet unfulfilled customer needs and the process of realizing them in a cost effective manner. Project teams working in Value Engineering for product development, adopt a systematic approach that analyzes the functions required of the product, generates and develops alternatives to achieve those functions and validates those alternatives for implementation that meets innovation and product development goals. In this paper, we present how if the Value Engineering activities are focused on analyzing functions that address the unfulfilled customer needs, developing the possible alternatives to achieve them more cost effectively and evaluating the feasibility and viability of implementing these solutions, it is possible to adopt VE for product innovation scenarios. A few examples in which TCS teams were closely associated with their clients in developing innovative products through the systematic Value Engineering approach are also presented.

Value Engineering the Construction of Bored Tunnels in Competent Rock

By Christopher Laughton, Ph.D. (Tuesday, Track 1, 4:00 PM)

Recent years have seen a distinct move towards the adoption of mined tunnels for the renewal and construction of new urban infrastructure projects. Tunnels can be designed to accommodate a wide range of city services, including those required to house pipe, cable, water and wastewater conveyance, and transportation networks.

Tunnel construction technologies, notably the use of Tunnel Boring Machines (TBMs), have now been developed to a point where excavation work can be reliably accomplished in most types of ground. However, the tunneled option is not always the project manager's preferred solution. Although an underground site may offer significant technical and aesthetic advantages over alternate surface-based construction options, such as cut-and-cover, at-grade, or elevated structures, other factors, notably higher capital cost and risk, may result in a decision to reject a tunnel.

The paper will discuss studies that were performed to assess opportunities for value engineering during the concept development of a large particle physics accelerator, sited in the sedimentary bedrock of northeastern Illinois. Two core studies were undertaken in series. The first was undertaken by Kenny Construction, an experienced tunnel contractor, to estimate tunnel costs based on the use of conventional, bored-tunnel construction practices. The second study was undertaken by The Robbins Company, an experienced TBM

manufacturer, to identify and assess the opportunities for cost reduction through equipment innovation and improved operational practices. The primary cost drivers associated with TBM tunneling in the region will be noted and the proposals for value engineering the tunneling activities discussed.

VE Activities for Reducing Construction Duration: Focused on the Activity on the Critical Path

By Myung-Sub Son, CVS and Ki-Chul Kim, AVS (Tuesday, Track 1, 4:30 PM)

Recently, a lot of efforts were attempted to evaluate the economical and construction efficiency by VE techniques during the design phase. The evaluation of the economical efficiency helped to achieve the most suitable alternatives by systematically considering quality and cost reduction in terms of life cycle cost by VE techniques.

However, the evaluation of the construction efficiency must consider quality and schedule, but when we achieve VE activities, the review of schedule is required because quality is just conducted.

This study aims to show how VE activities were planned and achieved in the evaluation of the economic efficiency, which considered quality and cost reduction and the evaluation of the construction efficiency, which considered quality and schedule simultaneously.

Especially, when we evaluate economical efficiency, reduction of working period was selected for a main evaluation item and the authors suggest procedures for maximizing effects of reducing the working period of the project through VE activities. The authors also review CP on the network schedule of CPM techniques for selecting targets and carry out VE activities which considered the economical and construction efficiency simultaneously.

VE Introduction Plan and Future View of Environment

By Choong-Heui Ahn, Ph.D.,AVS and Sung-Ho Jin, AVS (Tuesday, Track 3, 2:00 PM)

In Korea from 2000, VE activity has become mandatory for public construction work and is being implemented. Having been designated in 2009 as a professional institution for design VE review regarding civilian investment projects of the government, the Korea Environment Corporation required the construction of various infrastructures for efficient VE work support.

As such, an exclusive VE organization which can secure independence, reliability, and professionalism has been set up. By developing a VE manual and work procedure that are right for the facility characteristics of the water and sewage facility and for the institutional characteristics, we sought to clarify the implementation procedure per order form and VE activity method. Also, by suggesting an analysis method for LCC analysis, cost configured item, discount rate, endurance period, etc., we specified the criteria of value judgment that considers the life cycle cost, and for internally stabilized VE activity. We developed a training program for fostering VE professionals in the company.

For consolidating the capacity of VE activity regarding the specialist area of environmental facility in the future, we sought to prepare a foundation of budget reduction and value enhancement by establishing an effective and systematic VE activity via developing a VE activity basic model appropriate for waste, energy, water ecology, and soil area and a web based VE operations system.

The Value Management Approach in Germany: General Overview and Practical Examples

By Marc Pauwels, CVS, PVM, TVM and Sebastian Meindl, PVM (Wednesday, Track 3, 4:30 PM)

In Germany, value management has been well established in industry for more than 40 years. The author is the president of the German Value Management Organization and also president of Krehl & Partner, the leading consultancy for value management in Germany. With this background, a lot of projects in industry have been performed and the results are excellent. Not only has cost reduction up to 40 percent been achieved, but also optimizations in functionality and quality are some of the results. This presentation shows

the development and status of the value methodology (VA/VE & VM) in Germany and brings some examples of successful projects to the audience. Mostly, value management in Germany is performed as long-term projects with a duration of at least three months and up to nine months. In this relatively long time, the ideas and concepts are not only named and roughly evaluated, but already backed up by quotations from suppliers, first prototypes and tests, and, in some projects, also by the first pre-series.

Worker Allocation to Improve Value in Product Manufacturing

By Rogelio Guzman, AVS (Tuesday, Track 2, 11:00 AM)

In recent years, globalization of U.S. firms has been largely driven by outsourcing their manufacturing to low-cost countries. While this process still has considerable growth opportunities, the long-term viability of shipping products across the Pacific Ocean is questionable given the high logistics costs, delays, and rising wages in Asian markets. Global firms have dealt with these issues for years now and many have adapted lean manufacturing techniques; however, today lean manufacturing is no longer an exclusive competitive advantage. In order for global companies to become ultimately competitive, a combination of product design optimization along with manufacturing optimization will have to be achieved within the region of distribution and thus the advantage of utilizing the DFMA process.

This technical paper will demonstrate how the DFMA process is capable of bringing high value to any global manufacturing organization through a unique application of this process which the author has developed in recent years, called "Worker Allocation". The definitions, tools employed, and exact details of this value enhancing process will be clearly explained in this presentation with examples. If you are interested in learning how to add true value to a manufactured product, then you will not want to miss hearing the presentation of this paper at the 51st SAVE International Conference in Portland, OR.