INSTITUTE OF VALUE MANAGEMENT AUSTRALIA
Ensuring better value for money

THE VALUE TIMES

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President's Message

The value of building shared knowledge and understanding

Albert Einstein once stated that "information is not knowledge". We have known this for a long time, but even so, it is so easy to assume that if information has been disseminated then so has knowledge. Nothing could be further from the truth. We may be swamped with information, yet we tread on very dangerous ground if we assume that this information will be converted to knowledge. This requires intentional effort.

Most of us will probably have been taught that a first step in problem-solving is the "collection of information". This is, indeed, a very useful thing to do but I have rarely seen much-needed comments about *intentional efforts* to convert this information to knowledge, particularly in project teams. I see this as a crucial activity in just about any process, yet the literature is strangely silent, perhaps assuming either that information and knowledge are synonyms or, that the process of conversion always goes on regardless.

Frequently, there is an overwhelming amount of qualitative and quantitative information to deal with. A major risk, of course, is that, amongst all of this, something "important" will be missed – some important piece of "information" will not be converted to "knowledge".

When we wrote the Australian Standard on Value Management – AS 4183 (2007), we purposefully and intentionally named the first part of the structured workplan as "Build Shared Knowledge and Understanding". Historically, this first phase of a VM workshop has been named "Information Phase", and it should be clear from my brief comments above, that whilst we do require information, the challenge is to ensure that information is converted to knowledge.

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President's Message

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It is one thing to build knowledge and yet another to build understanding – again, this requires intentional effort. It is here that a facilitator can play a crucial role and explains, in part, why there is so much overlap between the role of a teacher and the role of a facilitator. Indeed, many teachers see their primary role as "facilitators of learning".

The skilled facilitator will create an environment over and above the formal structures that are in place (in the case of a Value Management workshop, this will be the prescribed work plan) in which information will be presented, knowledge built, and knowledge shared. Over many years in practice in this field, I have come to know and understand that building shared knowledge and understanding amongst the project team and group of stakeholders is crucial to delivering best value for money outcomes.

I mentioned in my opening paragraph that it is so easy to assume that since information exists, there will automatically be knowledge and not only that, but that such knowledge is shared. in planning Value Management and other events, I sometimes find resistance to spend time on this task. The "postbox" concept of project managers disseminating "information" to the project team is all too common with the implicit assumption that a widely distributed email will not only be read but understood.

I've had the privilege of running literally hundreds of workshops (many of these were Value Management workshops) and observing first-hand the positive consequences of building shared understanding of issues. The most common benefit is when one of the stakeholders participating in the workshop

It is one thing to build knowledge and yet another to build understanding

gains knowledge and understanding of the requirements of other stakeholders and, as a consequence, sees an opportunity to do things differently or even to change their own requirements. In a recent example, this kind of situation led to immediate cost savings of millions of dollars, also saving a lot of time, argument and effort.

One reason – and, surprisingly, perhaps the major reason – why the Value Management workshop has so much value is that it intentionally and purposefully builds shared knowledge and understanding amongst project players and stakeholders. Once the foundation of shared knowledge and understanding has been constructed, then, and only then, can we go on to explore opportunities to improve value for money.

Typically, projects are under so much time pressure that project directors and managers set aside no time for organisational learning – building shared knowledge and understanding – but they do this at their peril, introducing risks having significant time and cost implications.

In promoting value, value for money and Value Management, it is really essential to explain the value of "building shared knowledge and understanding", overcoming the common tendency to assume that it will "just happen" as long as there is information. Back to Einstein – "information is not knowledge".

I discuss this matter further on my blog http://www.roybartonblog.com

Dr Roy Barton
President, Institute of Value Management Australia (IVMA)

A reminder that the Society of American Value Engineers Conference celebrating 70 years of the value methodology (Value Analysis, Value Engineering, Value Management) is open for registration. Details at: www.valuesummit2017.org

SAVE
Adding Value. Enhancing Ideas.

Value Summit 2017
Philadelphia, PA ★ August 27-30
Sheraton Society Hill Hotel
Celebrating 70 Years of Value

Road infrastructure performance evaluation using function analysis method of value management

ABSTRACT

Infrastructure is provided to the user over a long project time and with a large operating and maintenance budget. Existing facilities age and deteriorate. Accordingly, effective and efficient maintenance is required and generally the maintenance cost exceeds the capital cost over the project life cycle. Therefore, a specific plan is needed that increases the value of facilities by evaluating performance whilst minimising the maintenance cost.

Value Management (VM) that increases the value of object by systemically analysing Life Cycle Costs and function is actively promoted during the design phase of projects and programs. These efforts can increase the performance of facilities at the maintenance phase of infrastructure. This study researches performance evaluation of roads using Function Analysis, as a core part of VM in the maintenance phase. To achieve this new evaluation criteria were proposed by adding evaluation items to the existing criteria by researching old documents recording the status of roadway maintenance and function analysis of VM. The results of this study may promote the effective performance evaluation to determine a resolution of roadway congestion in future. A succeeding study using the proposed evaluation criteria will be required to evaluate the results of the application of this research.

Keywords: Roadway, Performance Evaluation, Maintenance, Function Analysis, Value Management (VM)

1. INTRODUCTION

Provision of social infrastructure invariably involves a long-term commitment of capital and maintenance costs if users standards are to be met and maintained. Also, as facilities age, appropriate maintenance management is essential.

Generally, maintenance accounts for some 80%~85% of the total cost of a project. Therefore, the performance of facilities should be precisely assessed at the maintenance phase and the plan to raise value at minimum cost developed at that stage

Recently, value Management (VM), which is a technique to improve the value of facilities by analysing life cycle cost and function has been used at the design phase of project development. Based on the outcome, the purpose of this study is to search how to improve the performance of facilities by applying VM in the maintenance phase.

Roads are typical of other types of infrastructures. If VM is successfully applied to improve the effectiveness and efficiency of roads it can also be applied to improve the performance and availability of other major infrastructure.

Road maintenance costs increase annually and economic losses will occur unless these expenses are used to maximise benefits to road users. Applying the function analysis component of VM into the existing roadway performance evaluation criteria will lead to the efficient maintenance management that will improve the total value of the infrastructure with the minimum cost.

The objective of this study is to propose criteria for performance evaluation of road facilities improvement using the function analysis method of VM – hence delivering **best value for money**.

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2. METHODOLOGY

This study proposes performance evaluation criteria for road maintenance. The method is as follows:

1. Consider theory of Road Maintenance Management and VM
2. Study and Analyse the existing VM and Road Maintenance references
3. Understand the current situation of the existing Road Maintenance
4. Review evaluation criteria for road maintenance improvement
5. Derive evaluation items using the function analysis of VM and analyse
6. Modify evaluation criteria for road maintenance improvement.

3. BACKGROUND OF CASE STUDIES

3.1 Road Maintenance Management

The purpose of road maintenance management is to conserve its basic (transport) function as well as driver and passenger comfort and safety through regular repair and maintenance. It will also avoid traffic delays and disruptions in the case of case of accident or natural disaster.

The roadway maintenance management consists of two key activities: maintenance and management. Maintenance activities include an emergency recovery and facilities improvement such as road extension and layout modification. The procedure of roadway facilities improvement is as follows.

3.2 Function analysis of VM

Value Management is a systematic method to improve the value of goods or products and services by examining the functions that must be performed.

Figure1. Maintenance management chart

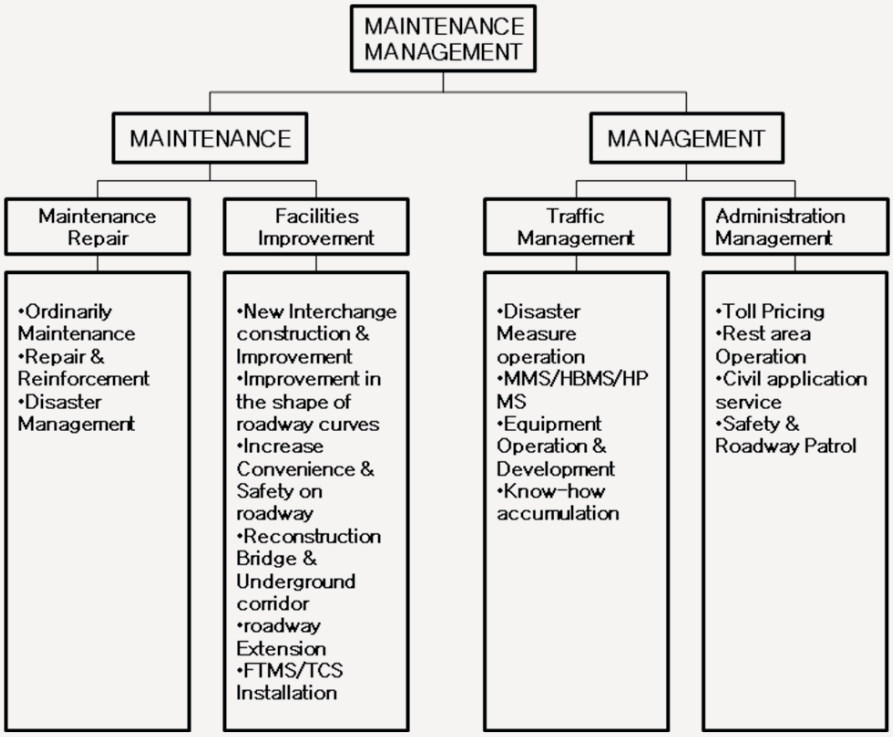
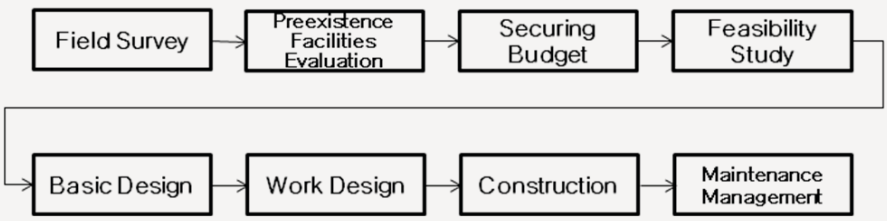


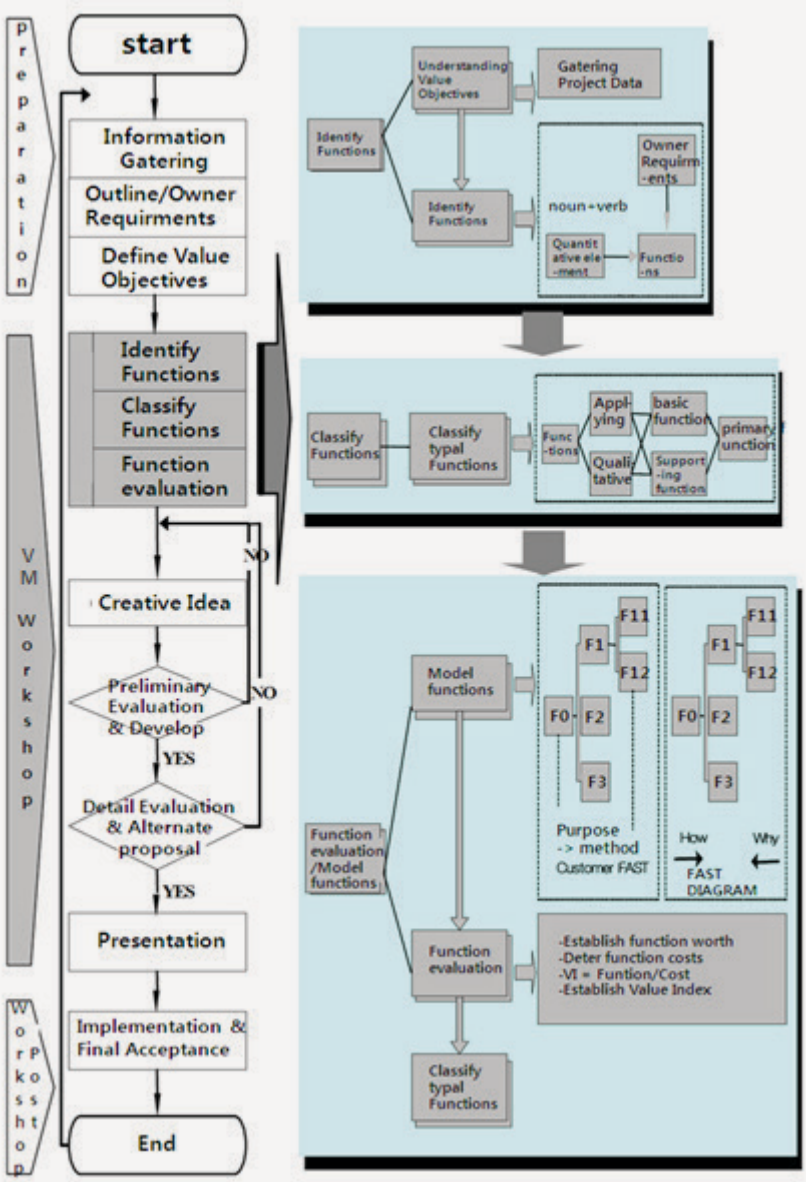
Figure 2. Facilities improvement procedure



Function Analysis is at the core of VM and forms the basis for creating a wide range of ideas. In addition, priority function required for improvement shall be listed as the result of the function analysis. In general, the analysis of the function is divided into three parts: Identify Functions, Classify Functions, and Quantify Functions.

It is noted that the function analysis is significant in the VM as follows.

Figure3. Function Analysis in VM



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With the analysis, decision makers are able to determine **why** the building, system or product are designed and configured and **how** the design process is driven.

Therefore, the function analysis should be carried out as it forms the basis of the performance level actually required by the users or buyers of the building, system or product.

3.3 Consider earlier studies

As pre-study related to Roadway Maintenance Management, in 2002, Jo Byung Wan developed economic and efficient pavement roadway maintenance system as the result of diagnosing pavement conditions precisely and analysing it. Byun Chang Hum studied in 2002 how roads and associated facilities in Seoul can be improved through maintenance. In 2008, Lee Sang Woo investigated the current road and railway conditions, analysed case studies of other countries, and studied infrastructure management systems.

As pre-study related to function analysis of VE, Choi Chang Hoon, Kim Soo Yung suggested the “Identify Function” method by converse conception method. In 2005, Lee Min Jae suggested the improvement plan of Seoul tollgate according to Caltrans’s design Value Engineering method. In addition, Park Ji Young, Min Kyung Seok proposed the design plan taking into account logistics center’s function in 2007.

Pre-study of VM function analysis are actively promoted at the design phase, but it is seldom studied in respect of the maintenance phase.

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4. ROADWAY PERFORMANCE EVALUATION CRITERIA BASED ON VE FUNCTION ANALYSIS

4.1 Existing roadway performance evaluation criteria

Road system performance evaluation is defined as a process to provide the required service performance by measuring the level of satisfaction experienced by users compared to the designed performance. Road service performance is divided into quantitative parts that shows driving performance such as density and the volume of traffic versus capacity (V/C) and qualitative part that shows the level of user's satisfaction such as driving environment performance, safety and roadway information.

In fact, any detailed method and procedure to evaluate the road performance is not yet available for the maintenance phase. This study researched and analysed the regulations and references in relation to the design standards for the road and related structures to derive the roadway performance evaluation items that are generally applied to maintenance and management. To gain a greater understanding the detailed **actual** conditions and opinions about the relevant performance evaluation items applying to road maintenance was also studied and analysed. The existing roadway performance evaluation criteria are shown in Table 1.

Table1. Existing roads performance evaluation criteria

Class	Category	Evaluation Items
1.Road Status	Facilities Standards	1.1.1 Fitness of existing Road Standards
		1.1.2 Underground Laying the investigation
	Facilities Safety Evaluation	1.2.1 Facilities Old age
	1.3 Road Condition	1.3.1 Fine view of Road
		1.3.2 Road area Natural situations
2. Traffic Flow	2.1 Traffic Stream	2.1.1 Traffic stream in standard Section
		2.1.2 Traffic stream in Weaving Section
		2.1.3 Traffic stream in Ramp
		2.1.4 Traffic stream in Tollgate
3. Transportation Safety	3.1 Traffic Accident	3.1.1 Traffic accident rate
	3.2 Safe Driving	3.1.2 Satisfaction index of Safe Driving
4. Convenience	4.1 Driving Convenience	4.1.1 Road Driving convenience
		4.1.2 Rest area Status
5. Traffic Information	5.1 Traffic Information	5.1.1 ITS Operation
		5.1.2 VMS installation
	5.2 Signal Operation	5.2.1 Signal lamp Installation
6. Society economy	6.1 Community Economy	6.1.1 Population and vehicle increment
	6.2 Local Development	6.1.2 Local development policy establishment
7. Maintenance	7.1 Maintenance	7.1.1 The fine view of roadway
		7.1.2 Efficient maintenance

4.2 Derive the additional items through the roadway VM case study

To derive a performance evaluation item available for the roadway facility improvement in the maintenance phase, we analysed the recently performed road Value Engineering case study including improvements to the shape of road curve and junction layout

As a result of function analysis phase of seven VM case studies, VM facilitators and experts at every discipline defined a total of **two hundred and eleven functions**. These functions are described in simple verb – noun terms following the Society of American Value Engineers International (SAVE) "Job Plan" and identified "basic" functions and "supporting" functions by distinctly clarifying the multi-relationship between the defined functions through Function Analysis System Technique (FAST). Defined main-functions were evaluated by using Force Decision (FD) and Improved Weight Decision Method (IWDM) resulting in a total of fifty target functions being prioritised as targets for improvement.

This study derived 30 functions from the already selected 50 priority target functions, for improvement excluding twenty functions that overlapped with existing roadway performance evaluation items.

Table2. Function Analysis in VM case study

VM Case	Identify Functions	Basic Function	Priority Improvable Target Function	Derived Function
A	44	20	9	7
B	47	21	7	4
C	30	13	9	6
D	25	17	8	3
E	21	11	5	2
F	25	16	9	8
G	14	8	3	3
Total	211	106	50	30

Table3. Additional performance evaluation of roadway facilities improvement

Class	Category	Evaluation Items
1.Environment	1.1 Noise Occurrence	1.1.1 Drive noise occurrence
		1.1.2 Soundproof facility installation
	1.2 Vibration Occurrence	1.2.1 Vibration occurrence
	1.3 Ecology Environment	1.3.1 Forest damage
		1.3.2 River pollution
		1.3.3 Animal protection
	1.4 Environment Administration	1.4.1 Environmental improvement countermeasure
2.Popular enmity (hostility)	2.1 Prospect Right	2.1.1 Adjoining land Prospect right conflict
	2.2 Traffic Congestion level	2.2.1 Popular enmity occurrence for traffic congestion
	2.3 Popular Enmity	2.3.1 Popular enmity occurrence for different reasons
3.Contiguity capacity	3.1 Local area Accessibility	3.1.1 Building area accessibility convenience
		3.1.2 Accessibility to adjoining amusement facility

These 30 priority improvable target functions were arranged to analyse the relationship per function. Table 2 (above) categorises them into the following types: environment, popular enmity, and contiguity capacity to derive additional applicable evaluation items to the roadway facilities improvement performance evaluation.

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4.3 Performance evaluation criteria for Roadway facilities improvement

Applicable performance evaluation criteria for the road facilities improvement in the maintenance phase were arranged by integrating the existing roadway performance evaluation in seven classes and three performance evaluation classes derived through the roadway function analysis in VE case study. These 10 evaluation classes verified the effectiveness through a performance evaluation of the road facility improvement through the second interview with the responsible members of staff. These were the same staff members who selected the existing roadway performance evaluation items and who finalised the 10-class, 20-category and 32 items in the road facilities improvement performance evaluation criteria. Thus there was a complete link between the initiation of the improvement project and the end results.

Table 4. Advanced performance Evaluation Criteria of Roadway

Class	Category	Evaluation Items	Specific evaluation list	Check	
				Road Extension	Improvement in the shape of roadway curves
1. Roadway Status	1.1 Facility Standards	1.1.1 Fitness of Existing Roadway Standards	Roadway Width/curves Length/Vertical Sloop/Turning Lane	☐	☐
		1.1.2 Underground Laying the investigation	Interference of Electric /GAS/Water Supply Pipe	☐	☐
	1.2 Facility Safety Evaluation	1.2.1 Facility Old age	Road surface Status/ Structure Safety/ Topographical survey		☐
	1.3 Road condition	1.3.1 Fine view of Road	Clean Well-Lighted Status of Roadway	☐	
		1.3.2 Road area Natural situations	Weather conditions		☐
2.Traffic Flow	2.1 Traffic stream	2.1.1 Traffic stream in standard Section	Traffic density/Average running Speed/V/C/ADT	☐	☐
		2.1.2 Traffic stream in Weaving Section	Average running Speed	☐	☐
		2.1.3 Traffic stream in Ramp	Flow rate	☐	☐
		2.1.4 Traffic stream in Tollgate	Approach Delay Time/ Delay rate	☐	☐
3. Transportation Safety	3.1 Traffic accident	3.1.1 Traffic accident rate	Traffic accident survey	☐	☐
	3.2 Safe Driving	3.1.2 Satisfaction index of Safe Driving	Visual field for Driving/safe distance/ Pedestrian traffic	☐	☐
4. Convenience	4.1 Driving convenience	4.1.1Roadway Driving convenience	Feasibility of Guide Sign		☐
		4.1.2 Rest area Status	Accessibility/utilization of Rest area		☐

Class	Category	Evaluation Items	Specific evaluation list	Check Road Extension	Improvement in the shape of roadway curves
5. Traffic Information	5.1 Traffic Information	5.1.1 ITS Operation	Traffic information Accuracy/CCTV	❑	❑
		5.1.2 VMS installation	VMS status	❑	❑
	5.2 Signal Operation	5.2.1 Signal lamp Installation	Delay rate in Signal section / Visual rate/ Signalized intersection	❑	❑
6. Society economy	6.1 Community economy	6.1.1 Population and vehicle increment	Population and industrial population, Industry, Utilization status of land, Number of vehicle possession, Factory distribution	❑	❑
	6.2 Local development	6.1.2 Local development policy establishment	City planning, Traffic and local development policy establishment	❑	❑
7. Maintenance	7.1 Maintenance	7.1.1 The fine view of roadway	Obstacles of the road, Cleanness of the roadway, Maintenance	❑	❑
		7.1.2 Efficient maintenance	Manual or person for maintenance, equipment possession status, archive administration	❑	
8.environment	8.1 Noise occurrence	8.1.1 Drive noise occurrence	Noise level (expectation) evaluation	❑	❑
		8.1.2 Soundproof facility installation	Soundproof facility(expectation) evaluation	❑	❑
	8.2 Vibration occurrence	8.2.1 Vibration occurrence	Vibration (expectation) evaluation	❑	❑
	8.3 Ecology environment	8.3.1 Forest damage	Contiguity forest damage level	❑	❑
		8.3.2 River pollution	Contiguity river pollution level	❑	❑
		8.3.3 Animal protection	Eco-bridge, Road Kill status	❑	❑
	8.4 Environment administration	8.4.1 Environmental improvement countermeasure	Environment preference policy adoption level and practice	❑	❑

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Class	Category	Evaluation Items	Specific evaluation list	Check Road Extension	Improvement in the shape of roadway curves
9.popular enmity	9.1 Prospect right	9.1.1 Adjoining land Prospect right conflict	Disturbance of roadway adjoining resident, Obstruction aspects for the beauty of the city	❑	❑
	9.2Traffic congestion level	9.2.1 Popular enmity occurrence for traffic congestion	popular enmity occurrence for traffic congestion	❑	❑
	9.3 Popular enmity	9.3.1 Popular enmity occurrence for different reasons	Occurrence and handling cases, Cause, Problem related facility status	❑	❑
10.Contiguity capacity	10.1Local area accessibility	10.1.1 Building area accessibility convenience	Distance between the city centre and the centre of local area, distance covered	❑	❑
		10.1.2 Accessibility to adjoining amusement facility	Distance from adjoining amusement park	❑	❑

5. CONCLUSIONS

Performance evaluation criteria for the roadway facilities improvement in the maintenance phase was derived from the existing literature and expert's verification. The existing performance evaluation criteria was divided into the following seven classes:

Road Status, Traffic Flow, Transportation Safety, Convenience, Traffic Information, Society and Economy, and Maintenance. By using function analysis this approach also delivered an additional performance function: "**Improve Value**" of the facility by investing **targeted** minimum maintenance expenses. Additional categories identified in the study were:

Environment, Popular Enmity, Contiguity Capacity.

10-class, 20-category and 32 items derived by utilising VM presented in clause 4.3 will be used as a performance evaluation criteria for the existing road facilities in cases where the road is improved in the maintenance phase.

This study derived the roadway facilities improvement evaluation items by analysing seven roadway VM case studies that had been performed recently. Performance evaluation is expected to be more frequently applied to road improvements made in the maintenance phase of projects and programs that have been the subject of a VM study. Further research and analysis is expected to deliver even greater benefits of the use of VM in roadworks maintenance.

Yongjang Lee
Member, Institute of Value Management Australia

Why value is so important

Helping a charity get a clearer direction and better value for its project

Context

Not all Value Management studies are about big, major or complex projects. Often there are many smaller, but still significant and yes still complex projects that value management can help.

My colleague Roy Barton and I facilitated a one-day workshop for the team running the Victims of Homicide Support Group.

They had begun plans for a new facility that would combine some accommodation and support programs for the children of homicide victims. It would also become the charity's new HQ. It will be called "Grace's Place" in honour of the mother of Anita Coby, so tragically murdered some 30 years ago and who with her husband formed the Victims of Homicide Group.

The group had already secured a voluntary architect's contribution, a builder was lined up and the local Blacktown City Council had provided them with a site that could be used.

But…as is so often the case, there were differences of views amongst the charity's team and people weren't always readily accessible to work through these and decide how best to proceed. Despite some objectives being clear there was no overarching and agreed statement of value.

Cleverly they were guided by Council to seek out someone who could help with a value management process.

A challenge still remained for the small team to be available at the same time – but nevertheless it was able to happen.

Workshop Focus

Even though they had a preliminary design for the new facilities the workshop's initial focus was on its value factors and to have these articulated amongst the group. The design was put aside until the value had been clarified.

By taking the time to have a conversation about purpose, benefit and important features a much clearer appreciation of value emerged that the whole team was able to both appreciate and endorse.

This "statement of value" was then used as the basis to review the current project scheme.

The step through of the design solution, with the value factors in mind, led the group to highlight some important opportunities to *value improve* the project

Outcomes

The group now has a clearly more *valued* design solution and is rapidly securing the required in-kind and financial support to make it become a reality.

If you want to help them with their project then please get in touch via email to: gracesplace2018@mail.com

Mark Neasbey
Director and Chair, Education Committee, IVMA

Benefits of adopting a collaborative approach to managing project delivery risk and value

By their nature project delivery teams are temporary organisations. Adopting a collaborative approach in the delivery of projects encourages the appointment of the best person for each role from the joint enterprise, encourages a collective approach to risk and value management and seeks to create win/win commercial outcomes. How does this improve risk and add value for the Client and Contractors and what are the benefits?

Benefit 1 – A joint team approach to risk and value management

Co-location of the team delivers the best results because it allows teams to pool ideas and build on them, which is vital for innovation and risk management. Being collocated, open and trusting means that the conversations flow and there is more openness in risk and value assessment. Joint discussion on risk in terms of threats and opportunities allow the team to take advantage of broader experience and knowledge to:

- address the interdependencies that exist between client and contractor teams,
- to ensure the correct risks are identified and robustly evaluated (both in terms of calculating the probability of occurrence and the cost/time impact.
- allocate the best person/team/resources across the collaborative venture to manage or mitigate that risk.

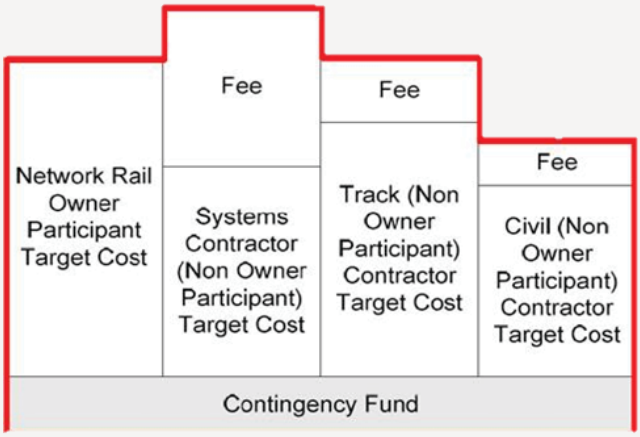
In fact these benefits are so fundamental to the benefit of collaborative working that one of Network Rail's three tests of a collaborative contracting strategy is a delivery arrangement that promotes shared risk identification and management as opposed to just risk allocation.

Through use of a collaborative risk and value management framework the total (transparent) cost of risk can be understood and communicated and contingency optimised. Adopting a collaborative contracting environment acts as a catalyst so these processes go further and faster. Network Rail has deep expertise in risk and value management and the contractor/ designer partner community has deep knowledge of the sharp end threats and opportunities and how to exploit these for the benefit of the collaborative venture. Unlike traditional contracting arrangements where the contract pushes the client and the contractor to demarcate and apportion risk, the collaborative approach incentivises a collective response. Most notably this addresses the interdependencies that exist between client and contractor teams.

Benefit 2 – Positioning win/win commercial outcomes for managing risk and value

Collaborative contracting brings risk and value management into the heart of the contract, in a way that is not possible in traditional contracts. Instead of apportioning risk, it is collectively assessed and valued which informs a joint contingency fund. Network Rail operates a number of different collaborative contracting strategies and whilst each has potentially different risk or reward regimes,

Position at Target Price Agreement
(everything within the red box describes the target price)



fee arrangements, actual cost definitions and payment procedures, the principle of deciphering a contingency which operates as a sinking fund for the collaboration is a constant. The total value of the participants fees, target costs and the total contingency to carry out the all the works described in the client's is described as the Target Price.

The Value of these benefits

The benefits of these collaborative approaches can be significant. For example in the Scotland North East Region the robust application of Value Engineering and Opportunity Management through collaborative enterprise on its control period 4 portfolio lead directly to a saving on the budget of circa £49m. In the main these were small savings in cost items, or risks that were mitigated or avoided but there were some notable contributors. Through Value Engineering on the GNGE Project, a change of technology saved the project in highways and civils/track works. In addition joint Value Engineering ensured this benefit was realised through closer stakeholder working and joint decision-making. On Finsbury Park to Alexandra Palace the collaborative approach helped optimise the use of Network Rail sourced materials ('free issue' in previous traditional contract) because this directly impacted the target price of the collaborative venture as a whole. On Hitchin Grade Separated Junction joint quantified schedule risk assessment identified a shorter design approval arrangement and more efficient construction processes that took 4 months off the construction phase. This saved significant preliminary costs (which were shared) but also brought the asset into use sooner, potentially saving costs Network Rail pay in times of perturbation. On North Doncaster Chord an inherent design issue that supported the development consent order, which was subsequently proven to be incorrect was successfully mitigated by the Alliance team saving significant re-design and construction delay.

Authors **Julie Warriner** and **Mike Pollard** are both members of the Institute of Value Management (UK) and of Network Rail's collaborative working academy that seeks to share best practice and thought leadership across the business.

This article was first published in the UK's Institute of Value Management Newsletter.