A Structured Approach to Innovation in Infrastructure, IT, Business Processes and Change Management with VA in the Ontario Government

Stephen Holmes, P.Eng, CVS

10/17/2012

Abstract:
The Ontario Ministry of Transportation is the leading government proponent for Value Engineering in Canada. The expanding use of and advocacy for Value Engineering by the Ontario Ministry of Transportation has occurred because Value Engineering meets 3 key business goals:

1. Maximizes use of resources
2. Establishes common understand of business needs
3. Delivers Innovation

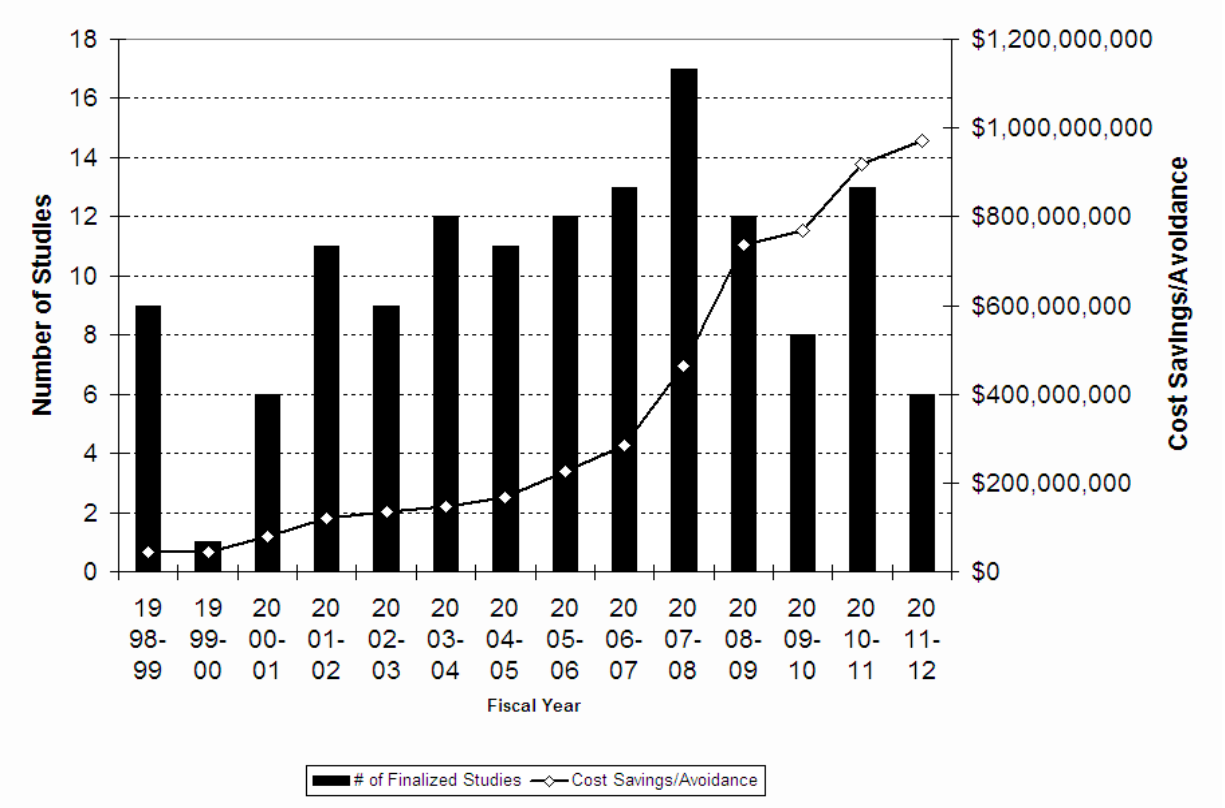
This paper will highlight how the Ontario Ministry of Transportation uses value management to achieve innovation in infrastructure projects, improve the effectiveness and efficiency of business processes, define the requirements of IT systems, and support organizational change.

Contents

Introduction

The Ontario Ministry of Transportation (MTO) leads Canadian agencies in the use of VA/VE/VM. Ontario's Ministry of Transportation has seen an expansive growth in the use of VE from an early focus on policies and standards to a robust program that uses the Value Methodologies (VM) to improve value in projects, products, services and organizational structure. This paper provides insight into how the VE program was developed and grown in Ontario without the aid of government legislation.

MTO has had a formal VE Program since 1998. The program has grown from a focus on policies and standards to VE studies on all manner of projects, processes and products. By the end of fiscal year 11/12, the VE program has achieved a cumulative cost savings/avoidance[1] of $$969,924,070[2] since the inception of the program. There has been a steady progression in the use of VE in increasingly more complex projects, with Ontario now undertaking Value Management studies on all aspects of the business.



[1] Cost savings/avoidance are defined as the difference in cost between the proposed design and the design that results from the VE study. Savings are attributed to the project if the changes from the VE study are carried forward to the end of the design phase.

[2] Cost savings/avoidance from 1998 until the end of FY 11/12.

Figure 1 Cumulative Cost Savings/Avoidance

Building Study Demand

It is almost trite to say that "improving value" or "doing more with less" is a key objective for any business. But when these expressions are translated into the following business needs;

- Maximize use of resources;
- Reach common understanding of need;
- Deliver Innovation;

then demand to use Value Management in new and innovative ways can be realized. To expand the use of Value Management at MTO the needs of the senior management team, mid level management, staff, and stakeholders in achieving their business goals needs to be understood.

The best incentive to use Value Management in a new or challenging way is to identify significant business challenges and offer to help through Value Management. Building a structured approach to increase the use of Value Management at MTO was accomplished by motivating staff through three key factors:

1. Evidence of success.
2. Confidence in the VM process.
3. Competence in achieving useful outcomes.

Evidence of Success

There are many ways and processes to realize value in an organization. To demonstrate that Value Engineering contributes to the organization's success, evidence matters. Significant effort is undertaken to gather evidence of success documented in Table 1. Results for each study and each recommendation are tracked and annual results are documented in an annual report as shown in Figure 3 Annual Reports.

Table 1 Return on Investment

	Fiscal Year Study Finalized			
	2009-10	2010-11	2011-12	Grand Total
Service Provider Fees – Capital Projects	$958,320	$769,413	$1,155,246	$2,882,980
Cost Savings/Avoidance	$39,248,769	$35,226,000	$120,699,695	$195,174,464
Number of Finalized Studies of Capital Projects	9	9	9	27
Return on Investment	41	46	104	68

Table 1 Return on Investment, from the annual reports provide evidence of:

- Almost $1B in Cost Avoidance since 1998.
- A 68:1 Return on Investment over the past 3 years as shown in Table 1 Return on Investment. The ROI is calculated for VE studies on capital projects.
- Acceptance of more than 600 individual VE recommendations.
- A study effectiveness rating on how well the VE study helped achieve project objectives and bring about change. To date as shown in Figure 2 Study Effectiveness , 78% of the VE studies have been rated as excellent or good. A detailed de brief is undertaken for all studies that are rated as poor.

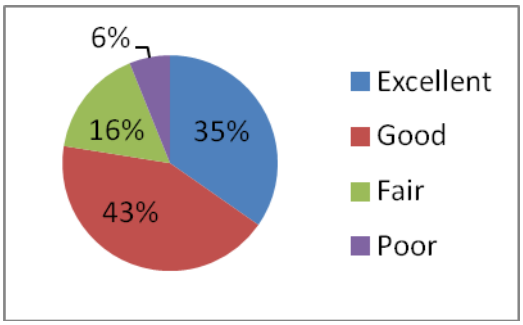


Figure 2 Study Effectiveness

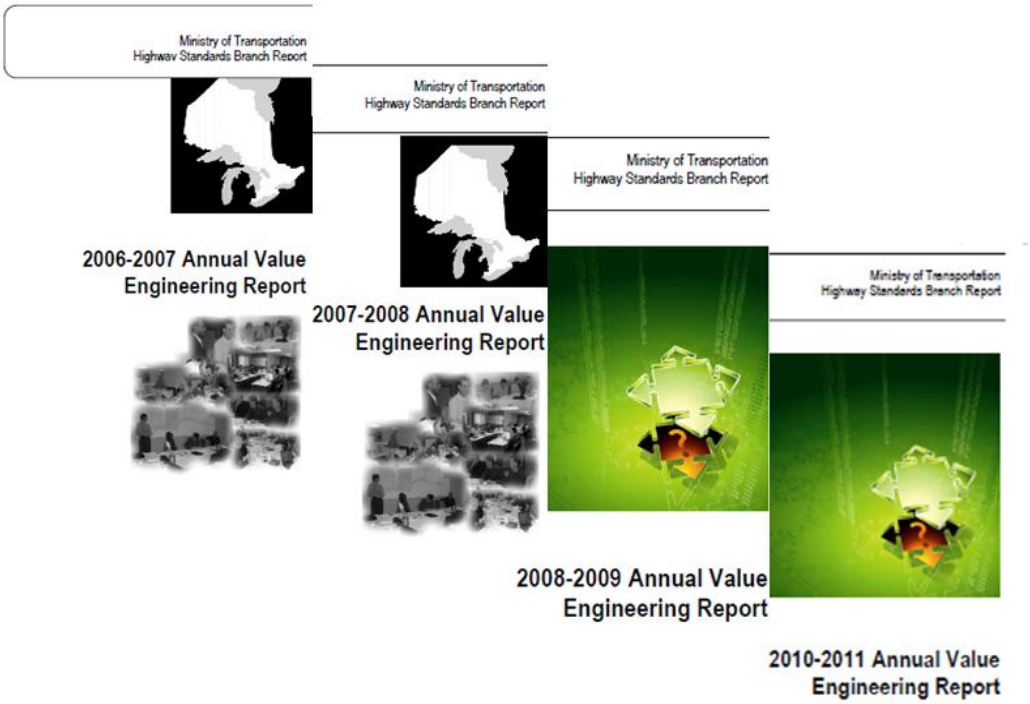


Figure 3 Annual Reports

Marketing

Knowledge of the benefits of applying VM encourages use. Awareness of Value Management is promoted to MTO and its partners through:

- Participation and sponsorship of the Canadian Society of Value Analysis conference. At these conferences a large number of staff without previous VE experience are exposed to studies undertaken on infrastructure, services, and products from MTO, other jurisdictions, and industry. This helps create awareness and belief in the process.

- A 1 day experiential learning course, Value Analysis in Action, that enables staff from any background to:
  - Define Value Analysis (VA)
  - List and describe the phases of VA
  - Identify and describe VA techniques
  - List benefits of VA
  - Develop an action plan to apply VA

- Value Analysis in Action has been extremely successful, with 99% of participants who completed a course survey, recommending the course for others.

- Publishing Technology Transfer Articles in RoadTalk about VE. These articles highlight the outcome of particular studies

Specific RoadTalk Value Engineering articles are referenced through hyperlinks throughout this paper to illustrate different aspects of how MTO uses VM.

Confidence in the VM process

Lessons learned on each and every study undertaken by MTO have also enabled the coordinators of MTO's VE program to learn from shared experiences. Confidence in the Value Engineering process has been gained by:

- >120 Studies on Projects
- > 20 Studies on business processes, services and procedures including:
  - Problem Identification in business processes.
  - Development of Policies and Standards.
  - Characterization of Business Needs.
  - Using Value Analysis for acquisition of software solutions.
  - Using VA to allocate staff resources.
  - Use of VA to develop and compare service delivery options.
  - Use of elements of the VA process in day to day decision making.

Confidence is also built through demonstrated competence. A mandatory VE study implementation meeting involves decision makers in the disposition of VE study results. Since management is involved in approving the successful recommendations they become aware of the changes that resulted from the VE study. Witnessing success builds confidence in using the process on other projects.

Competency

Competency in Value Management has been founded on understanding of the study scope or problem, selection of the right mix of competent team members and wild cards, extensive workshop preparation and a flexible approach to workshop plans.

VM is not a "text book" learned subject or the result of a mathematical equation. The critical ingredients for a successful study include:

- Selecting projects that have an opportunity for change.
- Identifying the right team members for a study.
- Workshop timing and duration.
- Defining the study scope.
- Workshop preparation.

One of MTO's early great successes in using Value Engineering in a business process study was the use of VE to examine the cause and effects of claims made by contractors for extra money related to the amount of rock removed and moved during highway construction. At the time MTO was negotiating about $40M in claims for payment, with the problem premised on the belief that we needed a mechanism to protect MTO from contractor claims. The study used an innovative cause and effect functional diagram and determined there were opportunities for improvement in pre-engineering activities. The study resulted in substantive changes in data collection, design, and contractual items. To this day, management remembers the changes made from this study and resulting reduction in contractor claims.

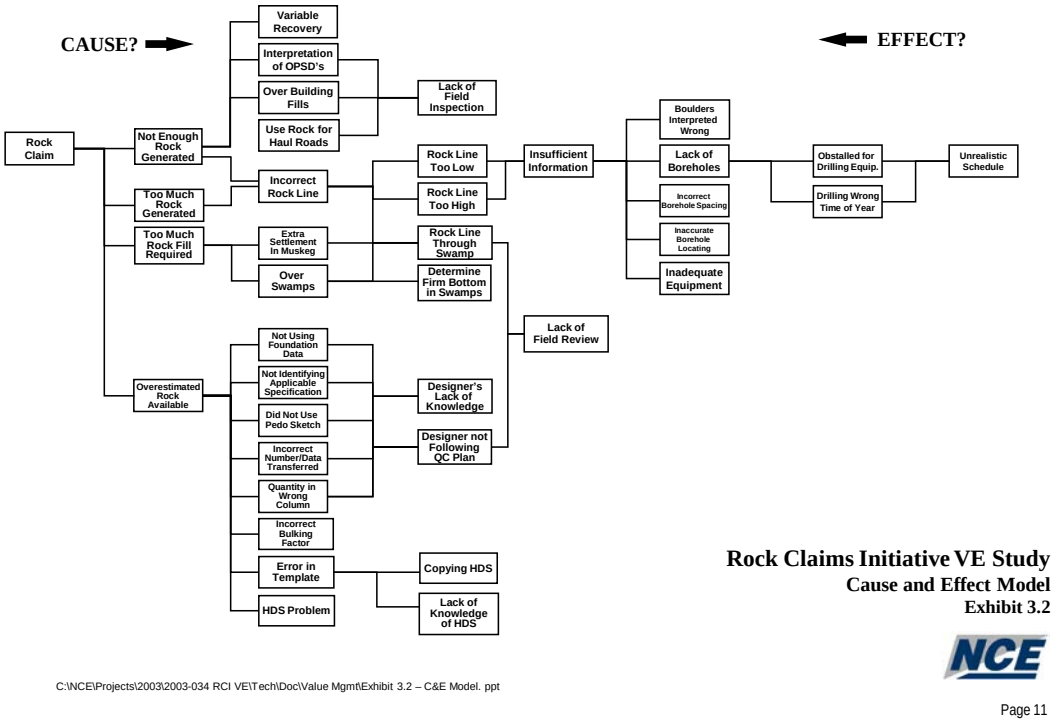


Figure 4 Rock Claims Study Cause and Effect Function Diagram

Success breeds success. The rock claims study was founded on knowledge gained about how to get change through an organization from earlier studies on policies and standards, and from openness to innovative workshop techniques.

MTO and individual staff have also received awards from SAVE International, Canadian Society of Value Analysis, AASHTO Value Engineering Technical Committee, Canadians Society of Training and Development . External awards demonstrate to staff and management that our peer groups respect the work that we do.

Market Growth

A value management program interacts with an organization in many ways as shown in Figure 5 Value Management Interactors.

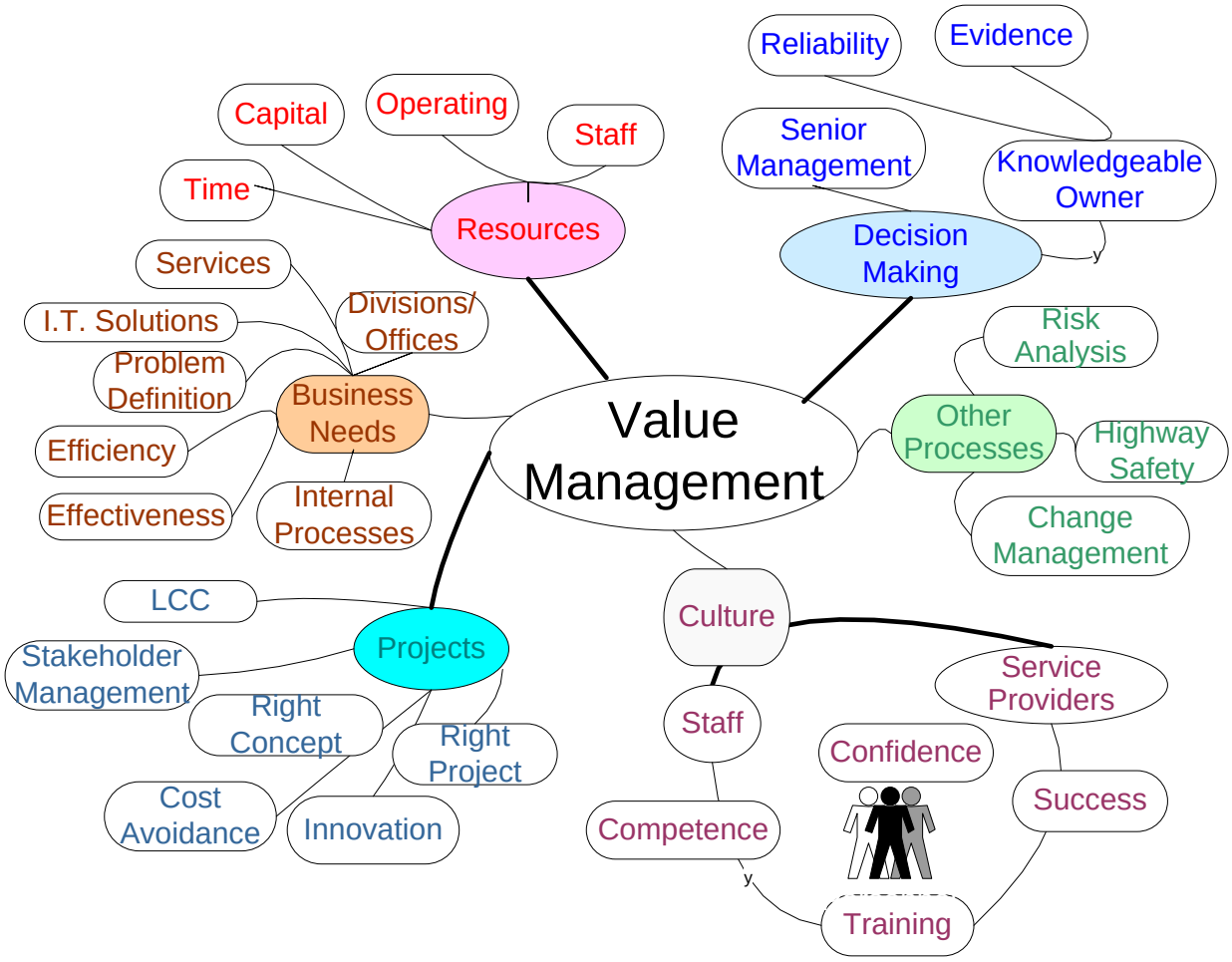


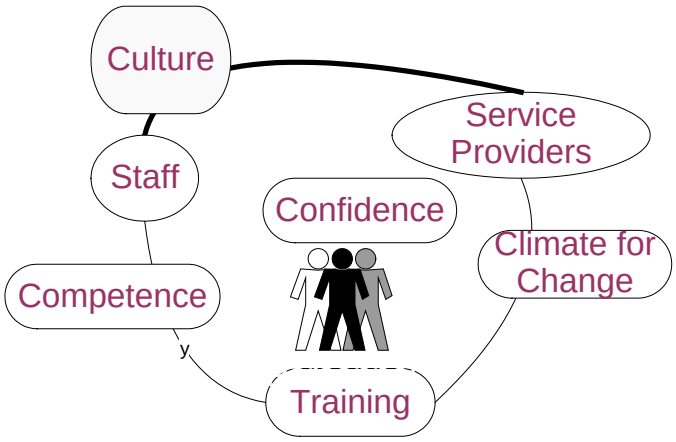
Figure 5 Value Management Interactors

At MTO Value Management interacts with:

- Decision making & decision support
- Organizational Culture and openness to new ideas
- Available Resources including staffing, time and fiscal.
- Business Needs and processes, and services of different divisions, offices and Regions
- A wide variety of projects, in planning, design, and sometimes construction
- Other processes applied to improve value and opportunities such as risk analysis.

Culture

Building demand for VM at MTO was accomplished by focusing on how VE interacts with all aspects of the business.



An organizational culture was created that welcomed and expected new ideas from VE studies. Confidence in the process was developed through the development and training of staff who developed expertise in coordinating studies and shepherding VE recommendations through the decision making process and in developing knowledge in our consultant service providers. Further information on how MTO achieved this is available in the paper, Growing VE at the Ontario Ministry of Transportation. MTO's Value Engineering coordinators have also been involved in supporting and coordinating 5 Canadian Society of Value Analysis conferences in Ontario over the past 12 years. This involvement both increased the knowledge of the staff involved in supporting the conference and generated enthusiasm for the value analysis in the participants who attended.

Growth in Projects

As MTO became more experienced with applying VE on traditional capital engineering projects, the use of VM was expanded to non engineering divisions. The Road User Safety Enforcement branch and Engineering had not been able to develop a roadside commercial vehicle inspection facility to meet current and future enforcement practices. As noted in the Teamwork Delivers New Design Concept, applying VE to the problem successfully delivered the first major

innovation in these inspection facilities in 30 years. Exposure to this use of VE by enforcement staff led MTO to apply similar techniques on other enforcement projects.

Expanding the use of VE on projects was accomplished through success in solving difficult problems. For example, stakeholder interactions were improved through Value Engineering when a VE study was carefully planned with the participation of the Red Rock Indian Band. As noted in the article, Sharing Ideas with First Nations through Value Engineering, MTO achieved a win-win solution through careful workshop preparation and because the structure of VA workshop leads to results. MTO has also worked with municipal partners and private sector stakeholders to improve value in projects as documented in Value Engineering, the Value of Partnerships

Business Needs

Business Needs were another area of growth. Identifying software solutions for business needs can be problematic. MTO introduced an innovative Value Engineering technique that helps stakeholders communicate their requirements to designers called "Functional Performance Specifications" (FPS). This approach was first applied to a traffic volume data collection and storage system to clearly define the features of the project in order to compare the business needs to commercial off the shelf products and internal development. A number of other business process studies followed using the FPS technique, providing MTO will experience and confidence in using FPS to identify business needs and problems and develop efficient and effective solutions.

Support for Decision Making

Management, stakeholders and the public are often interested in how effectively the government makes choices and whether good value is achieved. Value depends on perspective and at MTO the VE program pioneered the use of performance measurements to meet the challenge of measuring project value. Connecting across boundaries highlights how techniques such as performance measurements help support decision making. Another key aspect of VE from a management perspective is that participation in these studies helps maintain the organization as a knowledgeable owner.

Integration with Other Processes

Integration of the Value Methodologies with other processes is critical to delivering innovation. One of the more prevalent interactions with Value Engineering is Risk Analysis. As noted in the article, Transportation Risk Analysis, risk based cost and schedule analysis is an ideal complement to MTO's Value Engineering and Risk Management processes. The structured VE process integrates well with other processes that involve developing alternative solutions as shown in **Error! Reference source not found.**. VM provides the structured framework that combines both creative and analytical techniques, and the other processes provide analysis and value judgements that help support decision making. The common elements are:

1. The need to understand values. Value depends on perspective and is not simply a representation of cost. Performance measurement, risk analysis, activity based costing, and highway safety analysis and other analytical techniques help the VM team assess the value of alternative solutions.

2. The VM process through function analysis helps the team think differently. Risk analysis coupled with VM supports creative thinking as significant risks are often selected as brainstorming targets.

3. The understanding of the business needs gained from VM and other analytical perspectives and processes enables the VM to generate credible alternative solutions.

4. By following the VM process, the multi disciplinary VM team reaches a common understanding of the business needs and buy in to the proposed solution. The VM team is able to champion new ideas through the roadblocks because they develop credible alternative solutions through a structured process.

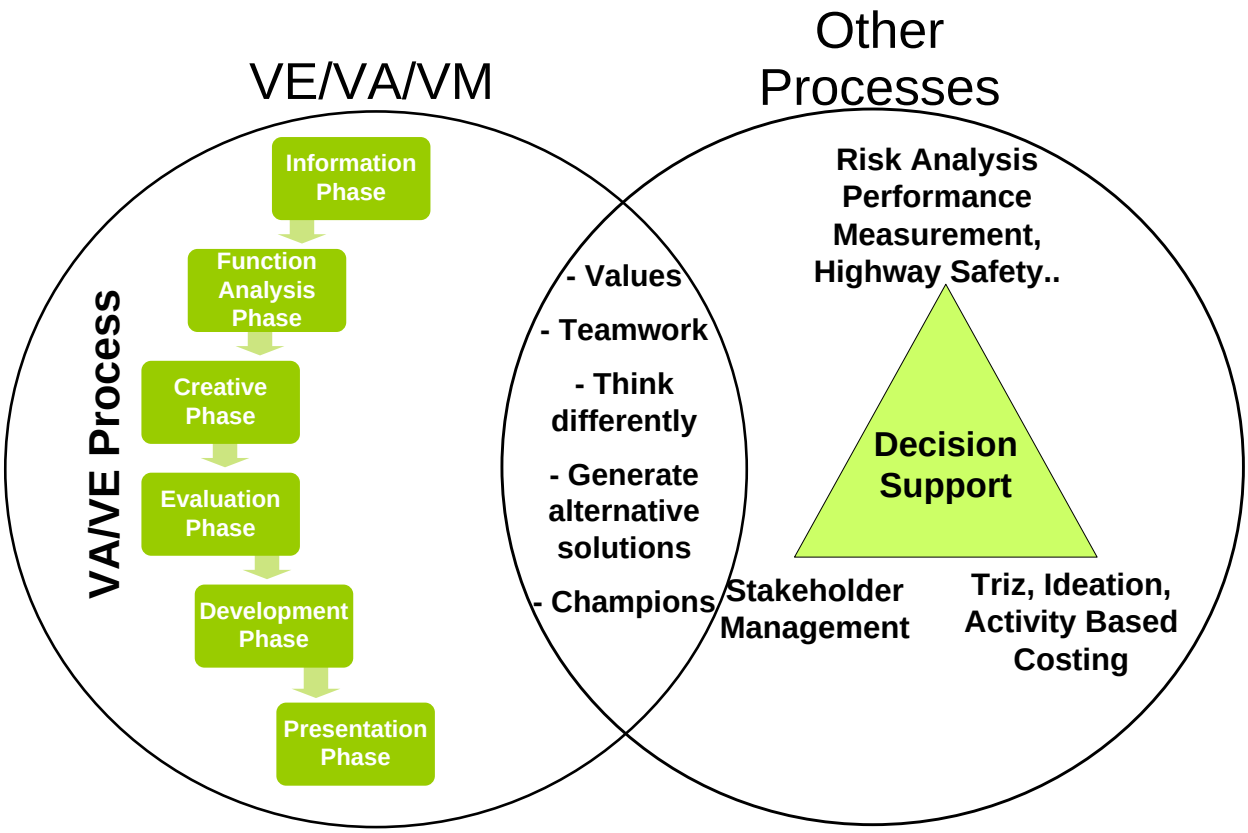


Figure 6 Interaction of VM with Other Processes

The Pinnacle

Perhaps the pinnacle of use of VM at the Ontario Ministry of Transportation was the use of Value Analysis to strategically allocate staff resources. Value Analysis was used to help a Division within MTO define their business and document how resources are currently used to deliver that business. The objective was to develop the ability to strategically deploy available resources (staff) to be consistent with the priorities of the division now and into the future. A snapshot of the process is shown in Figure 7 VA Study for FTE Resource Allocation and further explained in Aligning staff resources with business priorities at MTO; a First-Timer's Experience with VA through Functional Performance Specifications (FPS). Of special note is that the process involved all of the senior management team in developing a function diagram for the organization, and 17 different workshops with different business area managers to define the size of the business through Functional Performance Specifications and a Function Resource Table. MTO undertook this ambitious task because our experience, confidence and talent with the VM process convinced us we could.

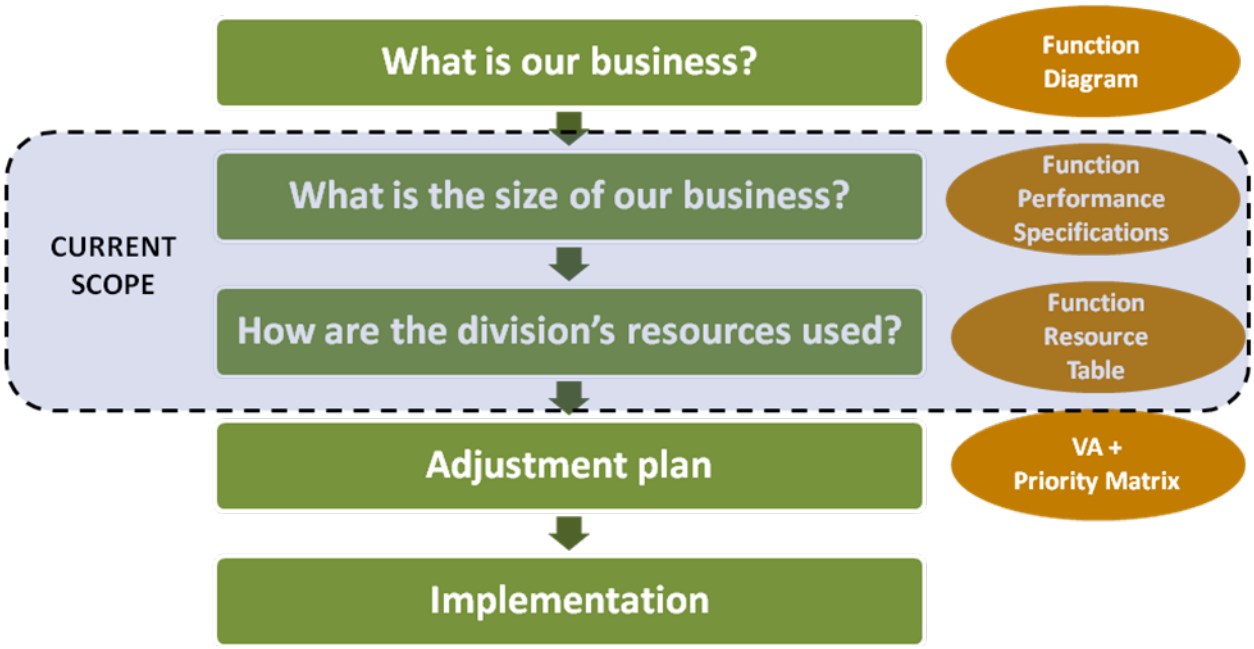


Figure 7 VA Study for FTE Resource Allocation

Conclusion

MTO has achieved innovation through Value Engineering, Value Analysis and Value Management through demonstrating how the Value Methodologies meet key business needs. The ability to use VM in a wide variety of areas was developed through confidence and competence in the process. MTO now uses VM in all aspects of the business, from developing software solutions through to organizational change.