Using Value Engineering To Guide Organizational Design Studies - Use Case For Knowledge Management Organization

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About Authors

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Abstract

Companies, small and large, are continuously faced with the need to realign themselves to ever-changing markets, competitions and ways of working. Evaluating the suboptimum and failed organizational design efforts we can observe that organization structures are rarely designed through systematic planning and proper organization design studies. Lack of clarity in responsibilities impacts activities and reduces the efficiency of the teams and prevents collaboration and knowledge sharing.

Value Engineering (VE) is a valuable tool for organizational design practitioners and helps the study teams in clarifying what needs to be done, how well it is done, where gaps exist and improvements are required, and how the four enablers of Role, Process, Technology and Governance should be designed to get the functions satisfied. In addition, the functions identified through VE studies can be used to clearly design the organization's roles and define the collaborations required between those roles, as well as define metrics for the evaluation of the performances across the organization for monitoring and continuous performance improvement.

At Fluor, we have utilized Value Engineering for the redesign of the company's Knowledge Management organization and observed its benefits first hand. In this paper we introduce the Value Engineering exercise conducted which we believe can be replicated by organizational design practitioners.

Introduction

Companies, small and large, continuously face the need to realign themselves to ever-changing markets, competitions and ways of working. Research by McKinsey & Company surveying a large set of global executives suggests that many companies are in a nearly permanent state of organizational flux (Reference 1). However, without the proper structure in place an organization may fail to function efficiently or even collapse. As the executive coach Gill Corkindale notes in her Harvard Business Review article, "poor organizational design and structure results in a bewildering morass of contradictions: confusion within roles, a lack of coordination among functions, failure to share ideas, and slow decision-making bring managers unnecessary complexity, stress, and conflict" (Reference 2). Evaluating the unsuccessful organizational design efforts, we commonly observe that organization structures are rarely designed through systematic planning and proper organization design studies. As a result, the lack of clarity in responsibilities impacts activities and reduces the efficiency of the teams that hinders collaboration and knowledge sharing.

We believe that Value Engineering is an effective and valuable framework to guide organizational design studies through the process of understanding the needs of the organization and coming up with appropriate roles and structures to satisfy those needs properly. At Fluor, we have utilized Value Engineering for the redesign of the company's Knowledge Management organization and observed its benefits first hand. In this paper, we introduce the value engineering exercise that we have performed which we believe can be replicated by organizational design practitioners.

Introduction to Knowledge Management

The goal of Knowledge Management (KM) is to enable employees to make the best decisions they can, with the full understanding of the organization's knowledge base at the time. Therefore, KM is about maximizing business benefit by leveraging the operational knowledge of employees. When properly implemented, KM can support better and faster decision making, avoiding previous mistakes, and reducing learning curves. It also supports innovation and the creation of new products and services.

Long gone are the days where a performing worker could rely solely on their own knowledge. Today our work is complex and depends heavily on effective communication between local and remote teams, each with their own knowledge and understanding. Without a common operative platform collaboration is hampered and with it our ability to effectively learn and make the best decisions.
We therefore liken Knowledge Management to an operating system. A stable and performing operating system is required to enable new products and services to also perform optimally. A weakness or deficiency in any piece of the operating system will cause all products and services that depend on that piece to under-perform.

The KM Operating System (OS) is a complete system that encompasses Role, Process, Technology and Governance. Roles must be established to ensure that someone identifies, validates and stores knowledge. Processes must be in place that informs how knowledge is to be captured, validated and stored. Roles and processes must be supported by technology which allows this knowledge to be effectively stored and accessed. Finally, appropriate governance that appreciates the value of knowledge capture and re-use needs to exist. A weakness (or absence) in any of these elements will cause KM to fail.

While it is relatively common for organizations to declare themselves "a learning organization", or one that "has a culture of knowledge sharing", it is much harder to prove in practice. Embedding a consistent learning mechanism into the flow of work is not trivial and articulating the value of knowledge sharing

remains a constant challenge for KM organizations.

It is this issue of measuring and communicating value that has driven the need to seek out a methodology that can better explain the inter-related components of the KM organization, without over-simplifying or diluting them. With a richer understanding of what is required for knowledge to flow we can develop better solutions targeted at specific KM problems.

Case Study — Designing the Knowledge Management Organization

As described above, we consider KM as the operating system within organizations on which information sharing and collaboration activities can run. This is, similar to computer systems in which the operating system provides a platform on which software programs run. It is crucial for the operating system to be able to support the running programs effectively. Therefore, the required functionalities by the applications should be designed into the operating system and the interactions between the applications should be properly defined and optimized to maximize the performance of the applications. As such, when we design the KM organization we need to have a clear and comprehensive understanding of who the stakeholders of the KM organization are, what they need, and how they collaborate with each other.

With that understanding we initiated a study to design the complete KM OS for Fluor, with the goal to improve the performance and effectiveness of the KM organization at Fluor. The required outcome was the complete design of the KM organization identifying and clarifying the roles, processes, interfaces, performance metrics and continuous performance improvement mechanisms. The study objectives were identified as:

- Enable the KM functionalities required by the company
- Ensure the harmonious operation of all the four enablers of Knowledge Management (Role, Process, Technology, and Governance)
- Design the mechanism for continuous performance monitoring and improvement

Considering the diversity and complexity of KM operations and understanding the needs that it should satisfy, we used the Value Engineering framework and Function Analysis technique for this study. Figure 1 shows the work plan that we developed for the KM OS VE study based on the standard value methodology work plan promoted by the Society of Value Engineering (SAVE).

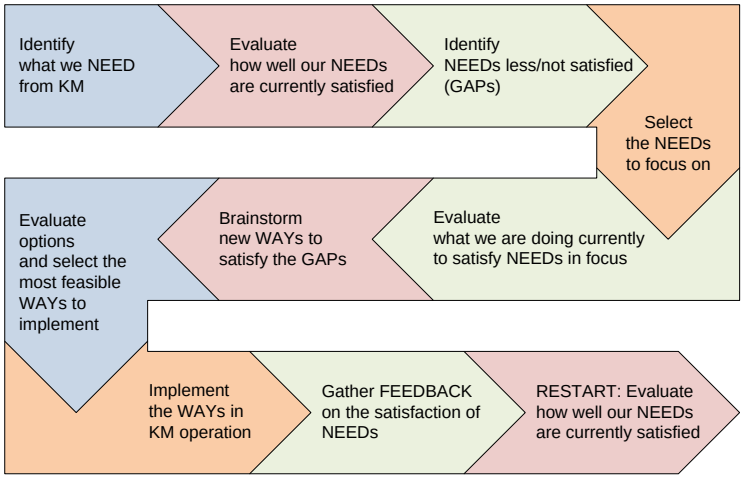

FIGURE 1: KM OS VE Study Work Plan

The KM OS VE study started by building a thorough understanding of the knowledge management operation by identifying the requirements of stakeholders and studying how well these needs were satisfied. Based on that evaluation we identified deficiencies and proceeded to the brainstorming phase. This involved the development testing of different solutions to resolve the gaps and improve the value of the operation.

This work plan is a continuous cycle where feedback from each cycle results in the re-evaluation of the current state and gaps, continued by developing new solutions to improve value, implementing the solutions, getting further feedback and so on.

Stakeholder Analysis
A crucial step in the design of any organization is to establish what needs the operation should satisfy to be able to create value for its stakeholders and customers. To be able to perform this study we first needed to identify the different stakeholders of the organization. For the KM organization stakeholders are the different roles that deal with the KM operations and perform a specific activity or function needed for knowledge to flow between stakeholders.

The following list shows some of the stakeholders that we listed for the KM operations at Fluor.

- Management / Business Line Presidents
- Subject Matter Experts (SME) / Fellows
- Fluor Employees
- Clients
- Project Managers
- Knowledge Managers / Knowledge Coordinators

Supply Chain Model for Stakeholder Collaborations in KM
By studying the stakeholders of KM we realized that we could categorize them into three distinctive groups: Information Buyers, Information Brokers and Information Sellers. This form of categorization describes the knowledge flow process as a supply chain where brokers are responsible for connecting those who need knowledge with those who have it.

The *Information Buyer* is one who does not have the specific information they need to hand. Instead, they must seek out the information either by locating and asking others (*Information Sellers*) or searching the various known repositories (*Knowledge Banks)*. The Information Buyer's primary goal is to use the information they are seeking.

The *Information Seller* is one who possesses Information or Knowledge. Through different means the Seller can share that information with Buyers or Brokers, but for a price.

The *Information Broker* is any means that connects the Information Buyer with the Information Seller. If the Buyer calls the Seller then it is the phone (or email, instant chat, etc.) that performs the Broker functions. If the Buyer searches a database then it is the database that performs the Broker functions. If the Buyer and Seller are discussing face-to-face then it is simply the means of communication (speech) that performs the Broker functions.

A key component of effective knowledge flow is the ability to log and store the results of knowledge transactions. If this is done well the Buyer does not always need to communicate with the Seller.

Instead, the Broker can simply supply either previously recorded Information from the Knowledge Bank, or identify who the relevant Seller is based on the Seller's previously declared knowledge.

Using a supply chain analogy for knowledge flow has been discussed by some experts in the KM space (e.g. Nick Milton Reference 3). We have used this analogy throughout the KM Operating System study. Table 1 provides an example for the categorization of the KM stakeholders as per the supply chain analogy. Note that stakeholders can move between Information Sellers, Brokers, and Buyers categories depending on the activity they perform as part of the knowledge flow process.

TABLE 1: Sample categorization of KM Stakeholders as Information Sellers, Brokers, and Buyers

Information Buyers	Information Brokers	Information Sellers
Business Line Presidents Project Managers	Knowledge Managers Knowledge Coordinators	Subject Matter Experts (SME) Fluor Employees

Needs Function Analysis of Stakeholders

After identifying the stakeholders we analyzed the needs of these stakeholders with the goal to satisfy these needs through proper design of the organization. In the context of Value Engineering satisfaction of a need is achieved through performing a certain *Function* as is defined in the Value formula given below.

$$\text{Value} \propto \frac{\text{Satisfaction of Need}}{\text{Use of Resources}} \quad \text{or} \quad \text{Value} \propto \frac{\text{Function}}{\text{Cost}}$$

Needed functions can be identified through function analysis and FAST Diagramming. For our KM OS VE study we first started with the random identification of all functions that we can see in a knowledge flow process without focusing on who is responsible for that function, or how the function is satisfied. Through this exercise we determined all possible verb-noun combinations that could describe the functions of a knowledge flow process (e.g. submit request, obtain information and provide feedback).

Random function identification is the first crucial step of the Function Analysis phase and is the fundamental technique used to identify functions. We ensured adequate time and effort was spent to perform this step as rushing through function identification could have biased the rest of the study. We were determined to avoid this as incorrect or poorly articulated functions could have resulted in misleading our thinking process with poor outcomes.

We also used the FAST Diagramming and Why-How questioning technique to ensure that we listed all the functions for logical and complete mapping of the functions involved in a knowledge flow process between stakeholders.

As we have three categories of stakeholders with each satisfying a set of functions, we then divided the overall KM FAST diagram into three sub-diagrams, one for each stakeholder. We then populated the FAST diagrams of each stakeholder through Why-How questioning and selecting the proper functions from the list we developed during the random function identification exercise. When a function was not available in the list to answer the Why-How questioning we brainstormed the missing function and added it to the FAST Diagram. Through this exercise, and by using rigorous Why-How questioning and evaluating the logic, we developed a complete FAST diagram that can describe and map the flow of knowledge between the stakeholders.

A compact version of the FAST Diagram developed for the three stakeholder groups is provided in Figure 2. The complete FAST diagram goes three levels deeper in the identification of functions and provides clear description of the functions and their relationships within and across stakeholders.

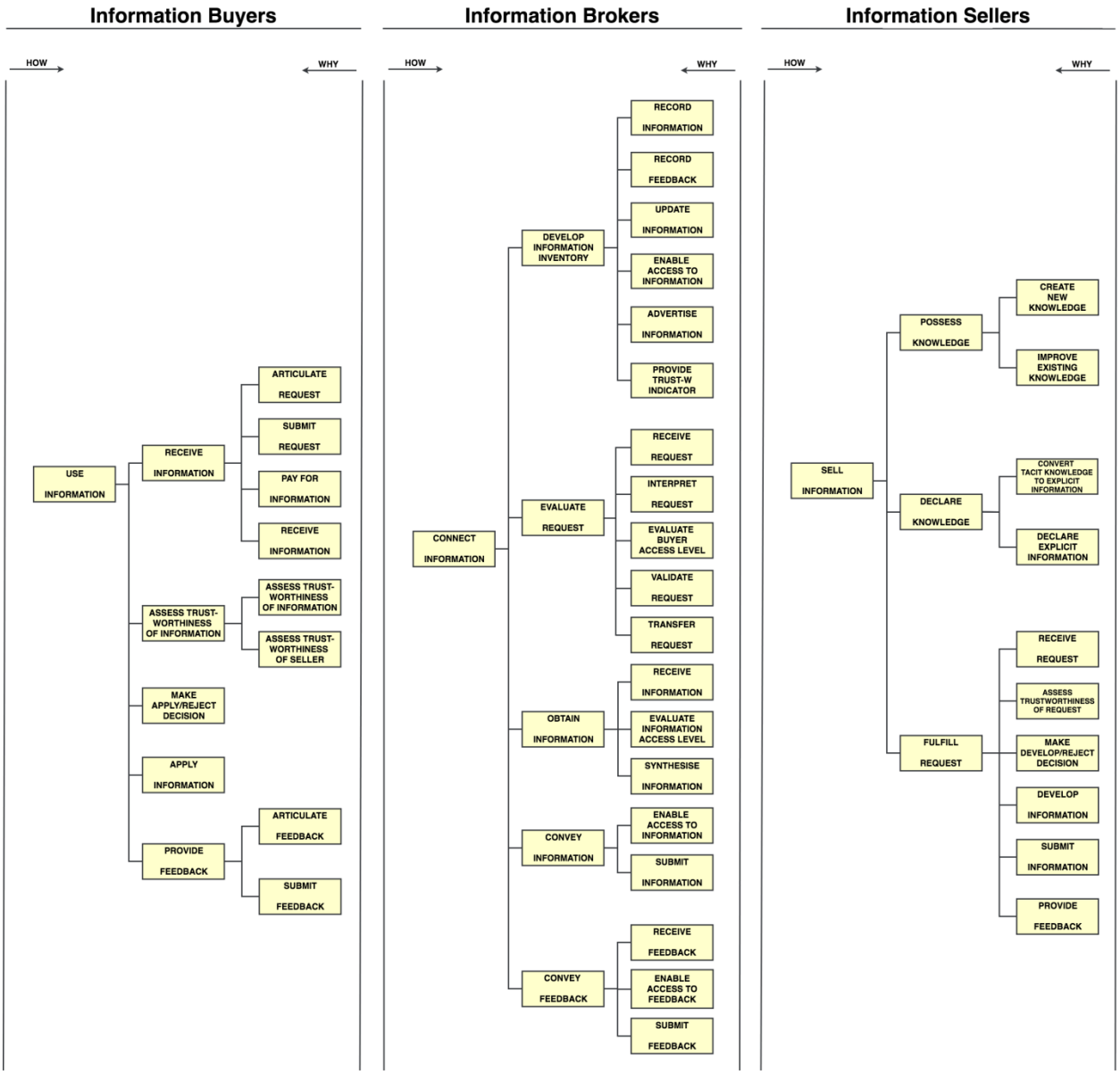

FIGURE 2: KM OS Needs FAST Diagram – Compact Version

Needs Functions Gap Analysis

After identifying the needed functions we then evaluated how Fluor was performing in satisfying each of the needs. This study revealed the gaps in the organization model and helped the team to redesign different aspects of the organization to resolve these gaps. For our KM OS study we performed a comprehensive Gap Analysis to clearly understand how successful we were in satisfying the KM needs in Fluor and identified the gaps where we should focus on to improve.

Role, Process, Technology and Governance are the four enablers that are required within an

organization to properly perform a certain activity. A deficiency in any of these can impact the overall performance of the KM organization. Thus we used these four elements as the evaluation criteria and evaluated *each function* against these four criteria to identify the level of satisfaction of the function.

- Role: Is there a role available to satisfy this function?
- Process: Is there a clearly documented and understandable process to satisfy this function?
- Technology: Is there appropriate technology to satisfy this function?
- Governance: Are there consequences for not performing this function?

For each function we then assigned a rating of 1 to 5 to each of the four enablers based on the following levels:

- 1: Non-existent
- 2: Unsatisfactory
- 3: Neutral
- 4: Satisfactory but room for improvement
- 5: Excellent, there is no room for improvement

After rating each of the four enablers within each function we calculated the overall rating to determine the Overall GAP Score for the functions. We used two methods to calculate the overall score:

- Total Sum: We summed up the scores against the four enablers.
- Weighted Sum: We argued that the four criteria do not necessarily have equal importance. Instead we assigned a weighting against each and then used that weighting to determine a weighted total score for each gap.

For our study these two methods produced very similar scores.

Table 2 provides an example of the exercise to rate the functions against the four enablers. Color coding used is as follows:

- Rating less than 5: Red
- Rating between 5 and 7: Orange
- Rating higher than 7: Green

TABLE 2: Rating Functions against Four Enablers

Need Function	Role	Process	Technology	Governance	Normalized Weighted Score
Store Information Package	3	3	4	4	8.8
Enable Access to Info Package	4	4	4	4	10.0
Promote Knowledge	4	2	3	2	6.9
Declare Knowledge	2	2	3	1	4.2

Figure 3 provides an example of the Needs Function Gap Analysis diagram produced by superimposing the overall gap score of each function on the KM OS FAST Diagram

Applying the supply chain analogy for knowledge transfer we understood that collaboration is required

between the Information Buyers, Broker and Seller in order for knowledge to flow properly. We also understood that functions provided in the FAST diagram are *inter-related*, and to satisfy a certain function we need to also satisfy other functions related to it. Therefore, we do not see functions as isolated but as different pieces of a chain which we call a *value chain*. Just as a chain is as strong as its weakest link, so the level of satisfaction of a value chain is affected by the least satisfied of its functions.

By studying the gaps identified in the satisfaction of functions, we can identify the value chains that are weak and develop solutions to improve them. As an example, our gap analysis revealed weaknesses in three distinct value chains which were hindering knowledge flow:

- Lack of feedback loops / assessing trust-worthiness
- Deficiency in developing our knowledge inventory
- Not receiving information requests from knowledge buyers

These three weak value chains are distinguished with clouds in the Figure 3.

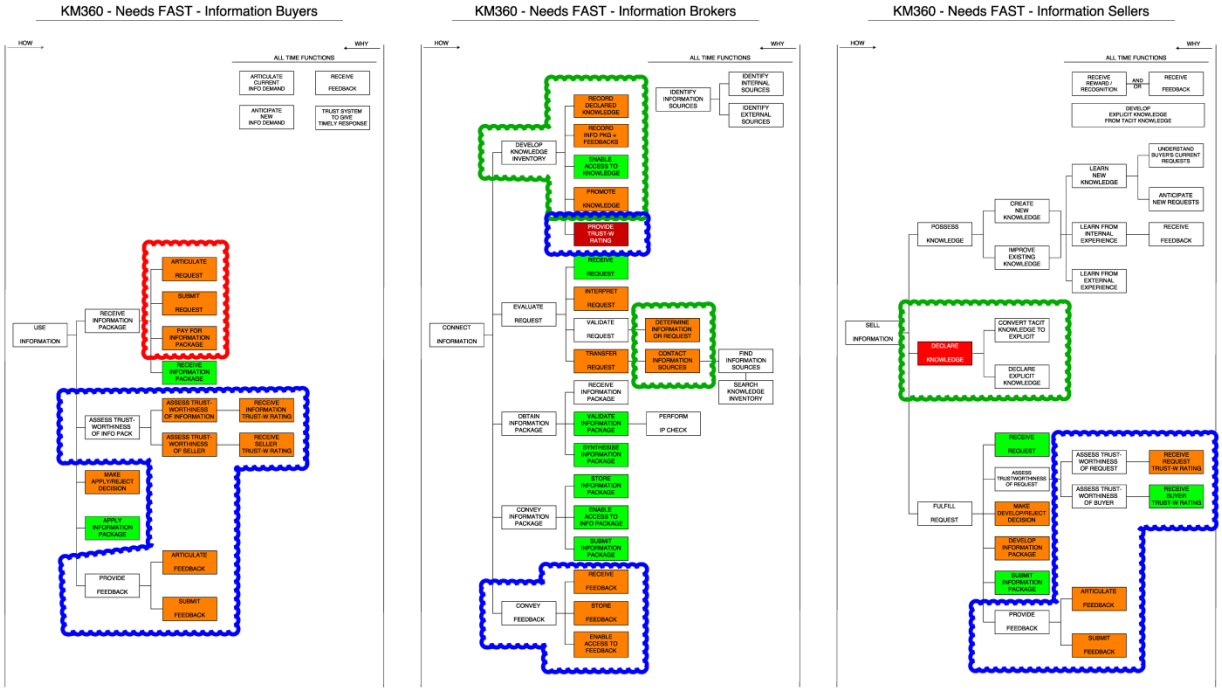

FIGURE 3: Function Gap Scores Superimposed on KM OS FAST Diagram

Role Definition based on Functions

One of the main challenges in organizational design is to clearly define the roles and their interfaces in such a way to enable effective collaboration. By understanding all required functions, we can then design roles by distributing functions between them and defining the interfaces. As a result, each role knows exactly which functions they need to satisfy and how they should work with other roles to satisfy them. The functions are derived from the FAST diagram making their definitions clear (i.e. using the verb/noun combination). This will ensure that the function's Role and Process is clear and will help to determine if any technology and tools should be used to satisfy the function.

Furthermore, to be able to satisfy the function's Governance we must be able to measure the

performance of the roles. We use the functions to define how we can satisfy the function, and then define metrics for the levels of satisfaction of the functions. These metrics become the performance metric or key performance indicators (KPIs) for the roles.

As an example of this exercise, Figure 4 provides a sample for the KM Roles identified in our KM OS VE study superimposed on the FAST Diagram. This clearly identifies who is responsible for each function and where they need to collaborate with other roles.

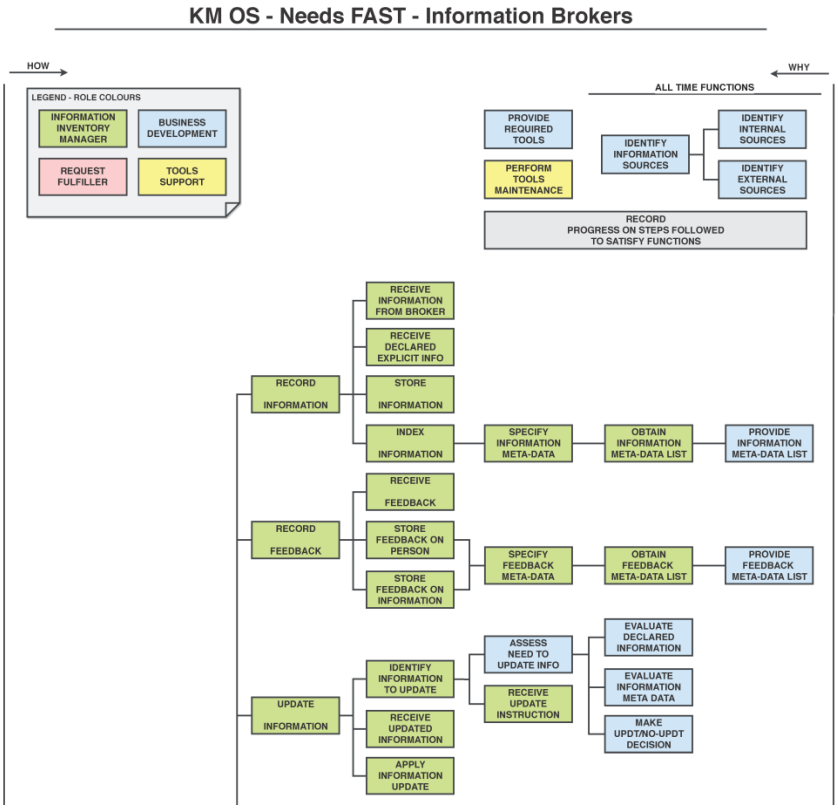

FIGURE 4: KM Roles Superimposed on KM OS FAST Diagram

Conclusion

Value Engineering is a valuable tool for organizational design practitioners and helps the study teams in clarifying what needs to be done. It assists to evaluate, how well it is done today, where gaps exist and improvements are required, and how the four enablers of Role, Process, Technology and Governance should be designed to get the functions satisfied. In addition the functions identified through VE studies can be used to clearly design the organization's roles and define the collaboration interfaces required between roles. Finally, metrics can be defined for the evaluation of the performances of those roles allowing for monitoring and continuous performance improvement.

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