



Construction Industry Institute®

A Standardized Approach to Identify and Define Owner Value Interests and Align the E&C Response

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A STANDARDIZED APPROACH TO
IDENTIFY AND DEFINE OWNER VALUE INTERESTS
AND ALIGN THE E&C RESPONSE

by

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A Report to
Construction Industry Institute
The University of Texas at Austin

Under the Guidance of
CII Research Team 266
A Standardized Approach to Identify and Define Owner Value Interests
and Align the E&C Response

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EXECUTIVE SUMMARY

One of the largest challenges that we face today in project execution is defining and sharing the value set that will best communicate the needs of all of the stakeholders in a project. Resulting problems are often the result of this miscommunication. These problems may occur because not enough information is conveyed, because incorrect assumptions are made by one or both parties (Owner/E&C provider), or because conflicting values have not been properly identified. While some project requirements such as budget, schedule, and physical specifications can be clearly defined and communicated as they are dictated by organizational decisions, market demands, and other constraints, other value interests in a project are often difficult to define and even more difficult to measure and communicate. As a result, the project values are often only partially identified and communicated without fully understanding why they are selected, how to measure them, and in which situations the project team needs to depart from set levels.

For this reason, CII commissioned Research Team 266 to develop a new method and tool that would assist the owners with the identification and communication of their values (value interests) as well as identify the appropriate Engineering & Construction (E&C) responses (focus points). The team was made up of industry professionals from both Owner and Contractor companies and Principal Investigators from academia. Through an extensive review of literature and existing practices, the contribution of years of professional experience of the team members, and a survey of the industry, the CIIValueShare tool was developed.

The CIIValueShare tool provides an operating environment for identifying owners' value interests for a particular project, a means to communicate the value interests within the owner's

organization and with the E&C and suppliers, as well as a decision-support process that can assist E&C in determining what should be their main focus in responding to a particular value interest. This tool was developed and validated based on industry survey data and research work process developed by Research Team 266.

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CHAPTER I: INTRODUCTION

1.1 BACKGROUND AND PROBLEM

Identifying and communicating a set of project values that best represents the needs and expectations of the owner and key stakeholders is critical to successful project execution. Every project has unique attributes that enable it to not only meet operational or regulatory needs but also to add significant value to the owner's organization. To capitalize on a project's value adding potential, these unique attributes must be identified and communicated among key stakeholders. Ineffective communication of value objectives can lead to misalignment both within the owner's internal project team and externally between the owner and contractor. Without a clear set of value objectives, the contractor may be left to assume what are the owner's value needs. All too frequently this results in a project that fails to deliver the most value and leaves stakeholders less than satisfied.

Identifying these value-adding attributes, or *value interests*, can be exceedingly difficult. This is because they are not always driven by engineering or operational requirements. Design attributes such as square footage or foundation specifications may be dictated by operational requirements or equipment needs; these are typically not difficult to define. However, value interests may not be driven by the same engineering or operational requirements. Instead, they may be driven by higher level strategic needs, such as the need to rush a project in order to gain market share or the desire to seize the competitive

advantage offered by development of a new technology. A delivered project that meets design and operational specifications is not necessarily a project that lives up to its value-adding potential. To achieve the most value from a project, it is first necessary to recognize all of the ways in which it *can* add value; only then, can the maximum value of a project, through exploitation of these attributes, be achieved.

The difficulty, then, arises of how to most effectively identify a project's value interests. Addressing this dilemma begins, first, with answering the question, *What drives these value interests?* Since a single owner may engage in many different types of projects and the value interests relevant to one project are not likely the same as those of another project, it is not the characteristics of the owner that drive them. It is, instead, characteristics of the project itself that determine which value interests are present on a project.

Once value interests have been identified, effective communication is critical to their achievement. Complete communication of value interests and what conditions constitute achievement of them will promote alignment of all parties, both within the owner's organization and externally between the owner and contractor(s), behind a common set of project value objectives. Without this communication, misalignment and conflicting objectives among internal stakeholders can result. Lack of communication also leaves the contractor to guess at what the owner's value interests are and, often, to implement a

broad or off-the-shelf response that wastes valuable resources and fails to meet the owner's expectations.

Currently, there is no method to assist an owner in identifying project-specific value interests and recommend an appropriate value interest response strategy. In response, the Construction Industry Institute commissioned Research Team 266 to develop this methodology. The research team consisted of seventeen industry and three academic members. Six of these members represented owner companies and the remaining eleven members were from engineering and/or construction and supplier companies. The industry members provided assistance in developing the major elements of this study, assisted in collecting data, and advised on the development of the functionality of the resulting Excel tool.

1.2 RESEARCH GOALS AND OBJECTIVES

The goal of this research was the development of a method to assist owners in identifying and communicating value interests and assist the engineering and/or construction (E&C) provider in identifying an aligned response. Specifically, this was accomplished through achievement of the following five objectives:

1. Enumerate and define the value interests and project characteristics to be included in this study.
2. Collect project data regarding the relationship between project characteristics and value interests.
3. Develop a mathematical model reflecting the relationship between project characteristics and value interests.

4. Enumerate and define value interest responses (focus points) and specify their relationship with value interests.
5. Develop and validate an implementation tool to identify value interests based on project characteristics and identify E&C responses specific to each value interest.

1.3 LIMITATIONS

This study was limited to the quantitative assessment of the relationship between value interests and project characteristics. This relationship was established through the collection and examination of industry survey data. Survey distribution was restricted to member companies of CII and the Construction User's Round Table and nearly half of the data came from the oil, gas, and chemical industries. In addition, contractor and supplier companies were included in the data collection. However, the value interest choices of both contractors and owners were compared to ensure inclusion of the former group did not skew the data. Finally, the relationship between value interests and focus points and the existence of conflicting pairs of value interests was established solely based on the expert opinion of the industry members of the research team.

1.4 REPORT STRUCTURE

This report is organized into eight chapters. Chapter I introduces the research problem and study objective. Chapter II provides an overview of current research into identifying and implementing value-adding project practices, as well as outlines applications of the

binary logit model. Chapter III outlines the research methodology. A detailed discussion of the enumeration and definition of value interests, project characteristics, and focus points and description of the industry survey and survey population are provided in Chapter IV. Chapter V describes how the value interest identification model was developed. The CII ValueShare Tool is introduced in Chapter VI. A Case Study is developed to demonstrate the tool in Chapter VII. Some suggested uses for the tool, including the appropriate project phases for implementation are provided in Chapter VIII. Finally, Chapter IX summarizes the work of this research team and provides suggestions for future work.

CHAPTER II: REVIEW OF LITERATURE

It is well known that meeting the budget and schedule objectives is only one facet of project delivery success. In fact, capital projects have a great potential to not just meet operational or regulatory needs but also to provide strategic organizational benefits. However, achieving these benefits requires recognition of the value adding elements and implementation follow through.

Though it seems the most basic part of project development, identification and communication of project objectives is not always a simple task as project objectives are tied to both the project requirements and strategic needs of the organization (Griffith and Gibson Jr., 1997). Part of the difficulty of developing and achieving objectives occurs because objectives are frequently ambiguously defined or specify unachievable goals. Lewis (2006) states objectives must be SMART: specific, measureable, attainable, realistic, and time-limited. Further, he warns that an objective should describe the result, rather than how to achieve it. Misalignment among project stakeholders can also create complications in the development and achievement of project objectives. Since project team members and stakeholders come from different divisions, it is natural that they bring with them the priorities or expectations relevant to their experience and functional area (Griffith and Gibson Jr., 1997). Thus, alignment of all members of the project team behind a common set of project objectives requires reconciling many different priorities and needs. Griffith and Gibson Jr. (1997) identified ten factors that influence alignment

during the pre-project planning phase and developed a tool, the *Alignment Thermometer*, to gauge the project team's success in addressing the ten factors.

Achievement of budget, schedule, and technical objectives is no longer the only criteria for evaluation of a successful project. Shenhar, et al, (1997) identified four dimensions which should be considered when assessing project success. One of these, naturally, relates to achievement of project constraints, including budget and time. However, the other three dimensions gauge success based on the impact of the project on the customer, end-user and organization (i.e., did the project meet customer needs and add value or improve the organization?), and whether the project positions the organization for future opportunities. Atkinson (1999) suggested there are at least three other aspects of project success criteria (beyond cost, schedule, and quality) that should be considered: the technical attributes of the project, the benefits to the organization, and the benefits to the stakeholder community. He argues, however, that these criteria can be evaluated only after project delivery. Thus, there has been a shift in how success is defined from simply meeting project constraints to delivering a project that meets organizational and stakeholder needs and provides the most value possible.

As a result of this shift, there has been significant recent research into identifying the project practices and management strategies that can add value and maximize the probability of project success. Berman (2006) developed the *Speed2Value™* Road Map, a comprehensive process designed to help organizations focus on and achieve the

strategic value of a project. The process is broad enough to be used in any industry and provides guidance on identifying the project's value drivers, documenting measures to gauge project success, and following through to maximize the project's benefits during its whole life cycle, among other activities. The Road Map does not provide recommendations of specific project values but, instead, provides guidance to assist an organization in developing their own. Cooke-Davies (2002) identified twelve factors essential to project success including those related to risk management and ownership, scope changes, alignment with corporate objectives, and continuous improvement through lessons learned, among others. The factors are grouped according to management success (achievement of time and cost), project success (achievement of stakeholder benefits), and corporate success (consistently successful projects).

Information technology and software development have also recognized there is significant benefit to moving away from the development of code, system architecture, or package solutions solely to meet requirements without regard to the added value these services can offer to the client, end user, or system process. Boehme and Sullivan (2000), Boehm (2003), Boehm and Huang (2003), and Biffl *et al* (2005), advocate replacing this “value-neutral” approach with a value-based approach in which the stakeholders' value expectations are translated into mutually compatible and achievable project objectives integrated into every phase of the project life cycle.

More specifically, in the construction sector, the Construction Industry Institute (CII) has sponsored several research projects aimed at identifying and incorporating value-adding practices into project development, design, and construction. *Planning for, Facilitating and Evaluating Design Effectiveness* research team (O'Connor, *et al*, 2007) developed methodology with which an owner organization could identify specific practices to maximize the ability of design activities to promote achievement of project objectives. *Maximizing Engineering Value* research team (O'Connor & Singh, 2009) identified 64 value-adding engineering strategies and combined their research with previous efforts to develop the *Maximizing Engineering Value & Design Effectiveness Toolkit*. *Owner's Role in Project Success* research team (Griffis & Bates, 2006) designed a tool with which an owner could identify where to focus their attention to ensure their project priorities are achieved. The *Cost-Schedule Trade-off Tool* (Gokhale, *et al*, 2006) assists a project team in classifying a project as cost- or schedule-driven and in identifying techniques (including CII Best Practices) to meet specific cost or schedule objectives at various project phases. The *Value Management Toolkit* (O'Connor, *et al*, 2003) is a comprehensive product that provides guidance on the implementation of value-adding practices, including recommending which ones may have a greater impact on the project and the optimal time for implementation.

When conducting surveys to capture choice data, the selections available to survey participants are often limited to a small number of discrete and unordered options. Frequently, this is the case with surveys on the usage of household products, choices of travel modes or routes, and preferences of news and media sources. These surveys can

generate valuable information for companies on the criteria people use to evaluate and choose among their products or allow them to tailor their advertisement to a specific audience. Analysis of past choice behavior can be used to *predict* future behavior such as how a consumer will respond to a new product or how likely people will be to use a new product or a project such as toll road.

Discrete Choice Analysis (DCA) is a method used to model ordered and unordered choices. The DCA outcome is the probability that a particular choice will be made. According to Ben-Akiva (1985), DCA was used as far back as the 1960's to examine binary travel mode preferences and its utilization expanded significantly in the 1970's to include multi-choice (more than two) modal preference, vehicle ownership, and other transportation related choices. This analysis technique was also used by Wassenaar and Chen (2001) to develop a demand model for integration into decision-based design framework. Rivers and Jaccard (2005) used DCA to analyze steam generation technology preferences among Canadian industrial companies and integrated the results into a hybrid energy-economy model to investigate the effects of different energy policies.

The numerical method used to perform the analysis depends on several factors including the type of dependent or the outcome variable. When the outcome variable is limited to a set of discrete or binary selections, ordinary linear regression is not a suitable option. This is because when the dependent variable is dichotomous, linear regression frequently

results in predicted probabilities greater than 1 and less than 0. Instead, the logistic regression model is a widely accepted alternative for this type of numerical analysis (Hosmer & Lemeshow, 2000). The logit model ensures realistic predicted probabilities, between 0 and 1, as well as has the appealing attribute of computational simplicity (Kennedy, 2003).

The logit model, or logistic regression, has been applied in a variety of disciplines. Schmidt and Strauss (1975), used a multiple logit model to analyze the effects of race, sex, education, and years of labor experience on the level of occupation attained and to show the presence of racial and gender discrimination in occupational opportunity. Jiménez and Salas-Velasco (2000) used the logit model to explore the relationship between a student's decision to pursue either a three- or four-year degree and his or her economic, social, and educational backgrounds. Logistic regression has also been used to predict the existence of a species of interest within a particular range for the purpose of wildlife and conservation management. Pearce and Ferrier (2000) demonstrated methods to evaluate the reliability and discrimination capacity of these models to predict the existence (or non-existence) of a species in a geographical region. The binary logistic regression model has applications in medical science. A ten year study performed at Hôpital Henri Mondor in Créteil, France, was able to conclude that stopping a causative drug at the first definitive sign of toxic epidermal necrolysis or Stevens-Johnson Syndrome (versus stopping later) decreased the chance of patient death after performing a retrospective binary logistical analysis of patient data (Garcia-Doval et al. 2000). King

and Zeng (2001) examined the application of logistic regression to rare events in which the occurrence (versus the non-occurrence) of the event is exceedingly uncommon (such as with epidemiological infections and war) and the resulting bias that occurs in coefficient and standard error estimates and predictions and demonstrates a computational and sampling strategy to correct for these biases.

The logit model has also been applied extensively in engineering and construction studies. Kenley and Wilson (1986) used logistic regression to develop a post-completion cash flow analysis model, as well as to show that it is the unique character of a project that creates variance from one project to another and not a systematic error. The implication of their study is that the generally accepted s-shaped cash flow models that reflect the industry average are not adequate for cash flow prediction of a unique project. Mohamad, *et al*, (1997) used a mixed logit model (i.e., one with discrete *and* continuous dependent variables) in a two stage approach to pavement performance that considered the interactive effects of maintenance and pavement condition. Using logistic regression, Phua (2005) showed the adoption of partnering or collaborating within the construction industry is largely influenced by whether the practice is encouraged by industry norms, rather than by the potential benefits of the practice perceived by individual firms. Weil (2001) used the modeling method to show how repeat site inspections influence compliance with OSHA safety standards and Seixas, *et al*, (2001) used it to identify the causalities (task, tool use, location characteristics, etc.) of noise levels exceeding OSHA permissible limits to which electricians are exposed. Li and Bai (2006) used logistic

regression to examine how different traffic control devices reduce the occurrence of crashes in construction zones.

CHAPTER III: RESEARCH APPROACH

3.1 FIVE PHASES OF RESEARCH APPROACH

The goal of this research was to develop a method to identify and communicate owner's project value interests and to identify and appropriate E&C response. This effort began with the assumption that project characteristics drive the presence of value interests on a given project. This assumption was validated with the development of a mathematical model showing that, indeed, value interests are significantly influenced by characteristics of the project. The five primary phases of the research effort, including development of the value interest model, are shown in Fig. 1.

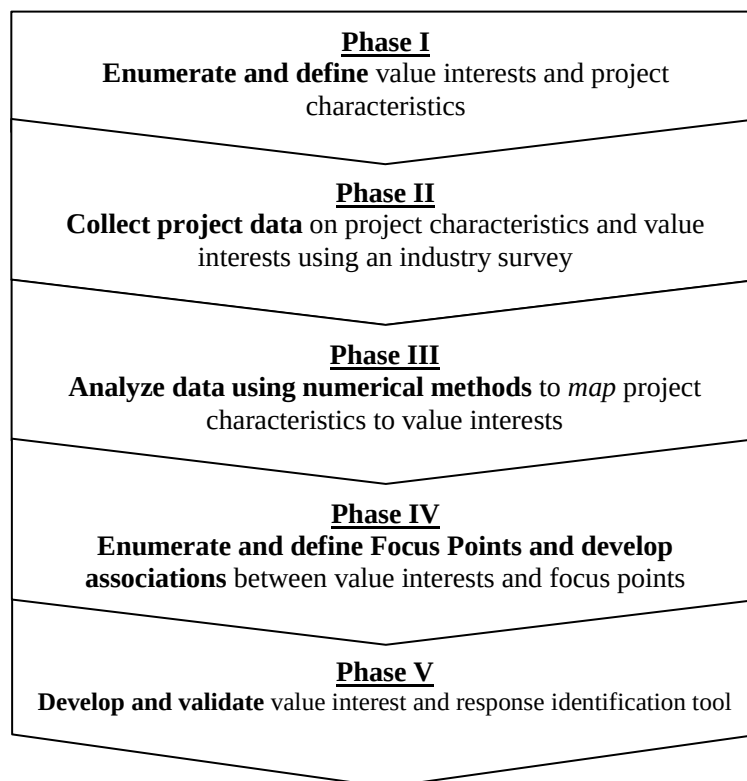


Fig. 1. Five Phases of Research Approach

In the first phase, the value interests and project characteristics to be included in the study were enumerated and defined. This was a critical step in the development process. It was important to include the core value interests that are present on most projects while also capturing the less common value interests that distinguish one unique project from another. It was equally important to identify the set of project characteristics most likely to be strong drivers of value interests. This phase is described in further detail in Chapter IV.

In the second phase of the project, the data needed to develop the value interest identification methodology was collected. This was accomplished through the distribution of a survey to CII and CURT member companies. The survey asked respondents to consider a completed project with which they have experience and provide information regarding the characteristics and value interests of that project. The survey and results are discussed in Chapter IV.

In the third phase, the survey data was processed and an appropriate modeling method was implemented. The project characteristics were tested individually to ensure only those that were significant in explaining the value interests were utilized and the model parameters were estimated using a binary logistic regression of the survey data. The resulting model was validated to ensure the value interest recommendations were realistic and reflective of the preferences expressed by the survey respondents. In addition, a 95% confidence interval was constructed for two cost and schedule value

interests and the effects of varying their parameter values was observed to determine how sensitive these value interests are to errors in the estimates. The modeling process is discussed in further detail in Chapter V.

During the fourth phase, the E&C focus points (responses) were enumerated and defined. The responses were then associated with the value interests so that each value interest has a variety of prospective responses and each response can potentially address more than one value interest.

In the final phase of the research approach, an implementation tool was developed to provide an interface for the value interest identification model and focus points identification method. In addition, the tool assists the user in prioritizing their value interests and establishing a system of measurement units, required levels, and trade-off strategies, as well as specifying how conflicts should be addressed should they occur. A report feature within the tool provides a summary of all project data, value interest selections, and user input. This report facilitates communication of the information critical to achieving alignment of all stakeholders, enabling the E&C provider(s) to develop an effective response strategy, and ensuring all parties are aware of how achievement of value interests will be evaluated. An overview of the tool from the perspective of the owner and E&C is provided in Chapter VI. Chapter VII outlines some of the potential uses of the tool and the project phases during which it can be

implemented. A detailed description of the tool can be found in *IR 266-2 CII ValueShare User Guide*.

CHAPTER IV: DATA COLLECTION

4.1 VALUE INTERESTS

4.1.1 What is a Value Interest?

Since no standard definition for the term could be found, a value interest was defined as an owner defined project attribute that adds some measure of value to their organization. These attributes may be common requirements found in nearly all projects, such as cost and schedule, or they may be project attributes specific to an industry or dictated by the owner's business strategies, such as the public image of the project or protection of intellectual property. The common thread among them all is that, in some way, they add value. For example, they may add value by minimizing the time or funds required to perform recurring operational activities, by increasing the usability or some other desirable attribute of the facility, or by facilitating the project development and execution process.

4.1.2 Enumerating and Defining Value Interests

The selection and definition of the value interests to be included in this study was a critical step. It was important to include value interests that are general enough to apply to any type of project or industry, as well as include a set of more specialized value interests to capture the unique requirements that make one project different from another. Therefore, substantial effort was put into selecting these value interests.

Initially, the project team enumerated a list of nearly 70 value interests. Existing literature was also reviewed to identify any concepts that may be applicable as value interests; however, those that were identified as potential value interests were already present in some form in the set already identified. After eliminating those that were redundant or far too specific to apply to more than just a few projects, the initial list of almost 70 value interests was reduced to 48. Since safety is always the most important value interest and should never be displaced by any other value interest, it was treated as a constant and not as a value interest that could be ranked or selected only for specific projects.

Since interpretation of the value interest terms may vary from one organization to another, it was critical to develop standard definitions for each. Definitions for the 48 terms were developed using the expert experience of the industry members of the research team. Preliminary definitions were developed and after several iterations of review and revision, consensus was reached among all members of the research team. In addition, it was important that the terms were defined in the context of the value they can add to the project or owner's organization. As a result, each value interest definition has essentially two parts. One part provides the meaning of the value interest and the other part expresses the potential benefits of the value interest. For example, the definition of *Flexibility to defer project* is

“The ability to phase project construction and delivery to allow an owner to stage funding or address uncertainties such as changing

scope or market requirements.”

What the value interest means is that it provides *the ability to phase construction and delivery*. How it benefits and why it is important to the project is that it *allows an owner to stage funding or address uncertainties*. Definitions for all 48 value interests are provided in Appendix A.

4.1.3 Value Interest Incompatibilities

In addition to identifying and defining the value interests, the team considered any pairs of value interests within the 48 that could potentially be correlated or in conflict with each other. For example, such “incompatibility between two value interests” could occur due to their competition for resources or because they have conflicting objectives.

The identification of incompatibilities was based on expert opinion of the research team. The result of the exercise was a 48 by 48 value interest compatibility matrix (provided in Appendix B). An ‘X’ in an intersecting cell means the value interest in the column may potentially conflict with the value interest in the row. Since this exercise was based solely on the experience and opinions of the industry professionals on the team, the identification of an incompatibility between two value interests would not guarantee there will be a conflict. The incompatibilities were provided simply to highlight the potential for conflict and the matrix was not intended to be exhaustive of all possible correlations and conflicts.

4.1.4 Levels of Communication

One benefit offered by the identification of value interests is the promotion of communication at a granular level. This is important, in particular, because historically value interests have been defined in somewhat broad terms. The level of detail of communication can be described as being in one of three levels of granularity, as shown in Fig. 2. At the macro, or broadest, level the overriding priority (excluding safety) of nearly every private sector project is return on investment (ROI) or, equivalently, for public sector projects is the benefit cost ratio (B/C). Every owner desires the highest possible return on project funds; however, this conveys nothing of the owner's project-level value expectations. Communicating cost, schedule, and quality as priorities, while somewhat more granular and descriptive than ROI or B/C, still does not communicate sufficient information to allow the E&C to formulate a successful response to a value interest.

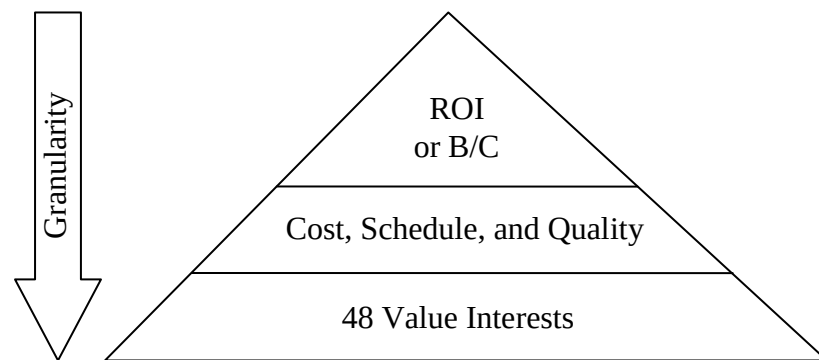


Fig. 2. Value Interest Pyramid

The 48 value interests developed, shown at the bottom of the pyramid, represent the highest level of granularity of information. This is the micro level of communication. At this level, value needs and expectations are more specific and unambiguous. They are well defined and achievement of them can be strategized and measured. Encouraging this level of communication is one of the primary benefits of the model.

4.2 PROJECT CHARACTERISTICS

4.2.1 Enumerating and Defining Project Characteristics

Identification of a set of recommended value interests is dependent on how the project is described. Since jargon varies widely among industry sectors, and even among owners and contractors in the same industry sector, it was important to establish a standard description language that is both specific enough to capture the fundamental characteristics of a project and broad enough to be applicable to all projects and industries. In addition, because a single owner may execute a variety of projects, the characterization should be limited to the project and not the owner.

Thus, selection of the appropriate project characteristics was a critical step. The research team considered not only what are the key features essential to understanding a project but also what are the features of a project that affect its ability to add value to a project and organization. Recognizing this important distinction, they defined a project characteristic as a feature that affects, governs, or determines a value interest(s). With the formal definition as guidance, twelve project characteristics were identified to

represent the fundamental nature of the project as well as the aspects of a project that are the strongest drivers of value interests. Although a few of these characteristics do include references to the owner, they are in the context of the project. The twelve characteristics are shown in Table 1.

Table 1. Project Characteristic Definitions

Project Characteristic	Definition
Industry	The owner or project industry type.
Location	The project location relative to owner's current operations and existence of infrastructure.
Size	The total cost of the project, expressed in US dollars.
Technology	The degree of technology maturity and complexity of implementation, including modifications required and the extent of owner and contractor experience.
Complexity	The degree of complexity of design, construction, and funding, including utilization of new/unfamiliar design or construction tools and methods, and level of scope definition, and funding source(s).
Project Nature	The nature of the work to be done and the extent of the change to the facility.
Type of Project	The scope of work/services for which the contractor will be responsible.
Owner's Involvement	The degree of owner participation and control of design.
Strategic Importance	The extent to which the project impacts the enterprise strategic drivers.
Cost Driven	The extent to which cost is the key value interest and is the prime consideration for project decisions.
Schedule Driven	The compression of project completion time relative to the typical completion times of other projects with similar scope.
Regulation	The impact of regulatory compliance on the project.

4.2.2 Project Characteristic Levels

Each characteristic was then defined using a specific set of choices, or levels. Eleven of the characteristics were given five levels and one, *Industry*, was given eight. For the eleven characteristics, the five levels represent an ordered, increasing scale from some

low or baseline degree to a high degree. For example, the five choices for the characteristic *Technology* are shown in Table 2.

Table 2. Five Choice Levels of Technology Characteristic

Choice Level	Choice Description
1	It is common and/or repeatable, the owner has extensive experience with it, and there are no anticipated complications.
2	It will require modification/scaling of existing technology, the owner has extensive experience with it, and there are no anticipated complications.
3	It has average maturity and/or complexity and the owner has some (but not extensive) experience with it.
4	It has limited commercialization and/or unknown scalability and the owner has limited experience with it.
5	It is ground-breaking with no previous commercialization and the owner has no experience with it.

The levels were chosen to capture the increasing complexity and effort necessary to meet the project's technology needs. The levels for the other ten characteristics are similar in their design. The *Industry* characteristic was given eight, non-ordered levels which represent eight different industry types. The levels for all twelve characteristics are listed in Appendix C.

4.3 FOCUS POINTS

4.3.1 Enumerating and Defining Focus Points

Another objective of this study was to provide recommended E&C responses to aid in achievement of the owner's value interests. A response includes the resources and strategies an E&C could implement during project execution. Since these resources and

strategies represent capabilities on which the E&C may want to focus when developing their Request for Proposal (RFP) response, they were named **focus points**, and formally defined as *an E&C defined delivery model that responds to owner value interests*. Here, E&C refers to any party contracted by an owner to perform engineering, architectural, procurement, supply and/or construction services.

The focus points were identified and defined using the expert opinion of the industry team members. The research team developed a set of 32 focus points. They were then defined through an iterative revise and review process. The defined focus points can be found in Appendix D.

4.3.2 Associating Focus Points with Value Interests

To establish which focus points represent a potential response to a given value interest, the team took a similar approach to the value interest incompatibility identification exercise. A 32 by 48 (focus points by value interests) matrix was constructed and an 'X' placed in an intersecting cell to indicate the focus point may be applicable to the value interest (matrix provided in Appendix E). A single value interest may be complex and require more than one focus point for a successful response or there may be multiple ways an E&C could respond in support of a single interest. A focus point may also be an appropriate response to more than one value interest. Therefore, in the matrix each value interest has more than one recommended focus point and each focus point is associated with more than one value interest. This means that for a given value interest

there is a group of recommended focus points and some of the focus points in the group associated with one value interest will overlap with the group associated with another value interest.

The focus points recommended by the research team reflect the experience of the industry professionals and are provided for consideration and as a starting point for dialogue between the owner and E&C. Certainly, the owner and E&C must consider their own organizational drivers, project-specific conditions, and capabilities when evaluating these recommendations.

4.4 INDUSTRY SURVEY

A survey was developed to collect the data necessary to establish the relationship between value interests and project characteristics. It was distributed to owners, contractors, and suppliers with the assistance of CII and the Construction User's Round Table (CURT) during the spring and summer of 2009. The survey was directed at project managers or executives that have experience with both the engineering and business requirements of a project. It was important to capture both the owner's and the contractor's perspective of what drives a project's values because an owner has insight into operations and strategic business requirements while a contractor may have insight into project delivery and execution requirements that an owner may not. It is important to note that the contractors were instructed to answer the survey questions from the perspective of the owner or, in other words, as if they were the owner.

There were three steps in the survey. The first step asked the participant to consider a project with which they have experience and then describe their project by selecting one of the five (or eight) levels for each of the twelve project characteristics. In the second step, they were presented with the 48 value interests (with definitions) and asked to select the ten they believed were the most applicable to the project they described. In the final step, the participant was asked to assign a weight to each of the ten selected value interests. The weights of all ten value interests were required to sum to 100 and individual weights represented the relative importance of each value interest to the project. Participants were asked to complete the survey for up to three projects. A copy of the survey is provided in Appendix F.

4.4.1 Survey Participation

The survey was sent to 100 CII companies. Of these, 22 companies participated and most had more than one individual respond. In fact, 81 responses were received and these provided data for 186 different projects. It is unknown how many surveys were sent to CURT members. Responses were received from two individuals from two CURT companies and they provided data for four projects. Combined with the 81 responses already received, the team received a total of 83 responses providing data for a total of 190 projects. Figure 3 shows the representation of participating industries among the respondents.

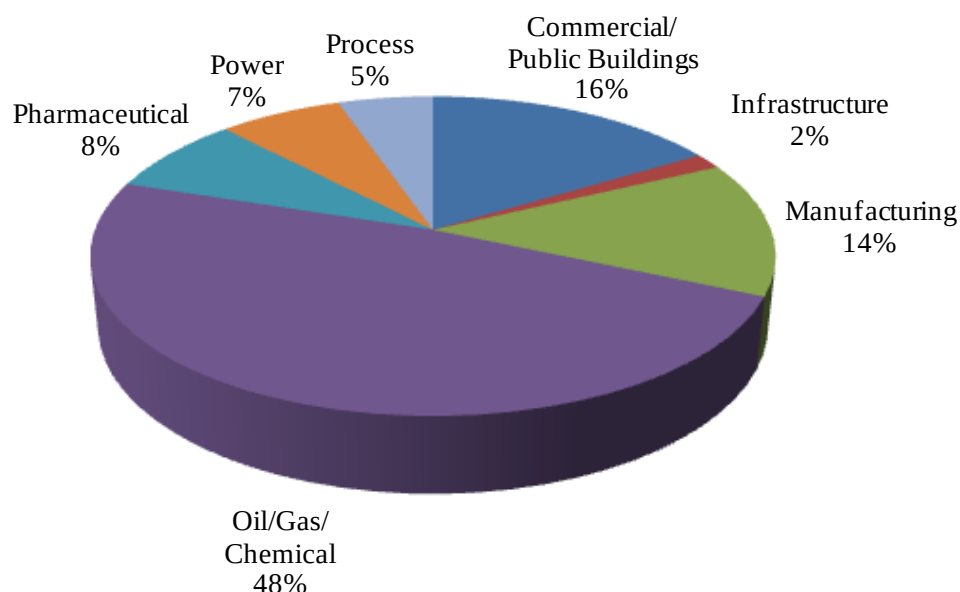


Fig. 3. Industry Representation of Survey Respondents

This does not include contractor participants, as a single contractor may engage in projects in many diverse industries. In comparison, the industry representation of CII owner company membership is shown in Figure 4. As can be seen, the representation of the pharmaceutical, commercial/public buildings, and infrastructure industries in the survey are the same or very similar to the CII membership makeup. The manufacturing and oil/gas/chemical industries, however, are over-represented while the power and process industries are under-represented when the survey responses are compared to CII membership.