USING VALiD TO UNDERSTAND VALUE FROM THE STAKEHOLDER PERSPECTIVE

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ABSTRACT

A "value agenda" has arisen in the UK's cultural development in recent years. In the construction sector, a desire to make worthwhile building investments that are socially beneficial as well as commercially successful has become commonplace. This value agenda has become embodied in government policy which has, in turn, shaped the investment strategies of public bodies. Construction projects are becoming concerned with engaging directly with stakeholders to understand and reflect their attitudes, opinions and values in the final solution. In the private sector, the value agenda has stimulated business and societal debate to the stage where fulfilment of stakeholders' expectations is seen as a precursor to commercial success. It is increasingly held that people seek to use buildings and facilities that reflect their values and which, therefore, they feel at ease with.

In response to the above, VALiD (Value in Design) has been developed as a flexible framework that helps construction project teams explore and understand stakeholders' values as a precursor to delivering value. Within this framework, VALiD defines value as the relationship of stakeholder benefits sought, sacrifices accepted, and resources expended. It is defined individually for every stakeholder in recognition that each has different underlying values and, therefore, a different perception of value.

The use of VALiD to define project objectives and assess value delivery performance is described. The paper presents a summary of construction organisations' response to this treatment of value, including the status of its development through continuing industry and academic research in the UK.

INTRODUCTION

Current social and political debate in the UK is characterised by the discussion of "value" in a broad sense as the UK is questioning the cultural value of its activities and the artefacts it is creating (Holden, 2004; Adams, 2004; Mulgan, 2004). In the buoyant construction sector, these issues have been synthesised into a "value agenda" which advocates that construction projects consider and demonstrate the cultural value of their outcomes. This need has been sustained through a series of public sector initiatives over the last six years and has been readily embraced by the private sector in which demand for meaningful (either in their own right or in the mind of consumers of the functionality they provide), well designed buildings is growing. Within this context, cost and functionality are seldom the only drivers in the project design dialogue and routinely comprise one part of each project's value equation. This "soft" view of value is highlighted by the c. £1bn (1.78bn US$) infrastructure investment required for the 2012 London Olympic Park (Mathiason, 2006); a project that exemplifies the role of construction industry output in shaping the quality of life of those they influence.

This paper presents selected findings from an applied research project undertaken by a collaborative team of academic and industrial organisations to establish theoretically-sound, but practical and usable methods of addressing the above issues. The "Managing Value Delivery in Design" study was undertaken at Loughborough University, Loughborough, UK. The work was conducted in the Innovative Manufacturing and Construction Research Centre (IMCRC) and was funded by the EPSRC and the DTI under grant numbers GR/R64490/01 and 39/12/16 cc2323 respectively. The authors acknowledge the extensive support of the Department of Civil and

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Key findings were launched to industry in July 2005 and are available at www.valueindesign.com. The principles described in this paper continue to be actively developed by ongoing research at Glasgow Caledonian University and Loughborough University in the UK. Enquiries are welcomed.

THE VALUE AGENDA IN THE UK CONSTRUCTION INDUSTRY

Led by the Office of the Deputy Prime Minister, UK central government is advocating that public and private sector construction investments improve the quality of life by shaping an urban environment that people value: that is, one which reflects their values. A desire to consider the long term consequences of construction is central to this policy (Department for Culture, Media and Sport, 2000; Office of the Deputy Prime Minister, 2002). Government departments have interpreted this policy and have, alongside key practice sector construction clients, fostered a "value agenda" that considers value in a broad sense which includes address of social issues. For example, value is placed upon hospital buildings that make patients want to get well (Centre for Healthcare Design, 2002) and school buildings that stimulate the child's interest in learning (CABE Education, 2004). To achieve this, value has to be considered from the perspective of all project stakeholders.

In its current state of development, the value agenda is founded on a belief that value arises from "good design." For example, when forwarding the argument that "good design produces better value" CABE (2003) merely states that "a little time, money and effort spent on design and construction can have a big effect" but lacks further comment on what this effect is or how it can be achieved. CABE further typifies the industry's current position by using anecdotal evidence of broad improvements to the quality of life to advocate the value agenda without detailing the form that these improvements take (CABE, 2002). In the industry debate surrounding the value agenda, value is considered to arise from the qualities of buildings: it is seldom explicitly associated with the interaction of people with those buildings. Despite its saliency in industry thinking, the ongoing value agenda debate is yet to agree a definition of value, "value for money" (Davis Langdon and Everest, 2004) and "design quality" (Office of Government Commerce, 2004) have been adopted as construction-specific surrogates for a thorough understanding of value. The problem of what "value" means to the construction stakeholders is yet to be tackled.

Despite their conviction that value must be *demonstrably* delivered to project stakeholders, and that value itself also encompasses intangible aspects, construction industry members and clients find the discussion of "value" difficult as a common understanding of what it is and how it relates to the design, construction and use of buildings has not yet been established. This issue is compounded by the lack of a common language of value and the absence of methods of helping stakeholders express what they each consider value to be on a particular project. Saxon (2002) summarised the current situation by commenting "the industry knows little of how it adds value to customers or society."

In the absence of means to address value directly, the industry is relying on design rules of thumb (CABE, 2004) that, when followed are thought to establish value by replicating successful design patterns from previous projects. However, this approach ignores the views of the project stakeholders who ultimately judge the value of the project outcome. As was the case with Alexander's original pattern language (Alexander et al., 1977), in the absence of analysis the relevance of generic design patterns to project-specific stakeholders can never be determined and "value" cannot, therefore, be guaranteed. To overcome this, value itself must be deconstructed on every project from the point of view of each stakeholder so that designers can synthesise disparate views into a satisficing solution.

VALiD (VALue in Design) responds to this issue by structuring stakeholders' engagement in design. It helps each project stakeholder to express what they consider value to be, helps to set project objectives that reflect stakeholders' expectations of value, and – recognising that design processes in construction are elongated and iterative (Koskela, 2000) – provides meaningful feedback on design performance by gathering and summarising stakeholders' judgements of value. This paper outlines the framework established by VALiD to structure these activities and summarises the methods used to define value and judge value delivery performance from each stakeholder's unique perspective.

ADDRESSING THE SUBJECTIVE NATURE OF VALUE

Construction projects can be characterised by their elongated delivery process, their development of bespoke products without a prototyping stage, and by their involvement of multiple stakeholders: those people or organisations influenced by the construction project and resulting product. When faced with the same object, or the same information describing it, stakeholders will seldom evaluate it identically. They typically have different judgements of the object because they are each influenced by their own set of unique *values*. These values, in turn, give rise to different stakeholder expectations.

Values underpin everything we, as individuals, organisations or societies, do. Even though we might not be aware of them, our values – the ideas and concepts we adhere to – fundamentally influence how we judge people, processes and products. Because values are fundamental ideas about what is desirable and good they dictate how we spend our time and effort (Vickers, 1968). The tacit nature of most values (Rokeach, 1973; Fischhoff, 2000) creates substantial difficulty in expressing them, although their effect can be observed in the actions and opinions of individuals and organisations (Guth & Tagiuri, 1965; Hofstede, 2001; Peat, 2003). Values frame our value judgements regarding courses of action and our judgements of value regarding the merits of attributes of products or services. They form value systems that are held at the individual and organisational levels. Any meaningful attempt to deliver value to multiple stakeholders involved in the same project must consider their values. Value and values are intimately linked and the action of one upon the other must be considered.

VALiD distinguishes between Objective Value and Subjective Value (Figure 1). The objective view of value considers value to be an observable (and, therefore, measurable) attribute of products or processes. It is considered to be a consequence of the qualities (i.e. physical, monetary, functional, and so forth) of the product alone and exists independently to people. Repeated measurements of a product with constant attributes will yield the same characterisation of value, causing value to effectively become a further attribute of the product. The SAVE Value Methodology (SAVE International, 1997) exemplifies this objective view. It underpins the approaches that have been used in the construction industry prior to the emergence of the value agenda, including value engineering and value management.

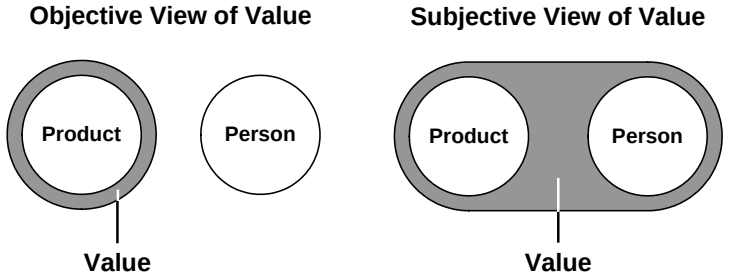

FIGURE 1: Objective and Subjective Views of Value

In commenting "not everything that counts can be counted and not everything that can be counted counts," Dodds (2006) clarifies the need for the subjective view of value which considers the interaction between person and product. In this view, value does not exist independently of one or the other, but is a product of both. This provides the flexibility required to model the unique perception of value formed by each stakeholder in light of their framing values (acknowledging that individuals representing a stakeholder group do so in light of their common values). The components (that is, the desirable and non-desirable aspects) of value will differ from stakeholder to stakeholder, yet must be simultaneously addressed in multi-stakeholder environments. In manufacturing, the insight that stakeholders will value a product that reflects their values more highly than one that does not informs product development and marketing (Gale, 1994; Huber & Herrmann, 2001). In construction, VALiD helps stakeholders embed their values in the single product during its elongated, iterative design process.

VALiD adopts the principle of user-centred design (Mitchell, 1995) to operationalise stakeholder engagement around a common understanding of basic components of value, complemented by methods to help each stakeholder express their expectation of value during briefing as well as their ongoing judgement of its delivery. VALiD guides design dialogue (Gedenryd, 1998; Newton, 2004; Mathieson, 2006) by externalising stakeholders' expectations and helping designers (Coyne, 2005) to resolve conflicts between their expectations so that a satisficing solution can be achieved (Simon, 1957; Coyne, 2005).

DEFINING AND MODELLING VALUE

This section summarises the steps taken to model stakeholders' common understanding of value to provide a basis for developing the methods used by VALiD to inform the delivery of value during the construction project process.

Cognitive Modelling Principles

To help designers and stakeholders discuss value, it was first necessary to understand how they understand this issue. While value engineering provided a view of value related to the *purpose* of artefacts, it was necessary to extend this understanding to determine stakeholders' collective cognition of the term and, in doing so, the language with which they describe its constituent components. To this end, the cognition of value was modelled to identify the concepts that stakeholders commonly associate with it in a construction context. The modelling process reflected Leung and Liu's (2003) view that value has an affective dimension that accommodates the values of those perceiving it. A subjectivist premise was accordingly adopted, facilitating the address of value as an attribute of the relationship between people and objects (recall Figure 1). Stakeholders' perception and understanding of value was investigated to characterise common elements of their cognitive models. This modelling process was required to define value in a prescriptive and descriptive manner. On the one hand, the definition was required to prescribe the issues that comprehensive design dialogue should address to fully consider value. On the other hand, the definition had to be sufficiently descriptive to facilitate customisation by stakeholders to reflect their understanding of value with regard to a specific project.

By adopting the definition of a mental model as an internalised representation of a device or idea held in the mind of one *or more* persons (Johnson-Laird, 1983; Gentner & Stevens, 1983; emphasis added), the modelling activity sought to synthesis stakeholders' internal models into a collective generic model. Modelling was verbose and descriptive in nature and sought clarity and consistency of language because, as Rose (1997) points out, "one person's verbal logic is another's alphabet spaghetti." In response to Rose's (1997) recommendation that "successful modelling ... involves the negotiation of meaning between stakeholders" the modelling process undertook social enquiry. It was implemented as a series of iterative workshops in which stakeholder representatives progressively resolved a shared concept of value.

Modelling was implemented as extended delphi survey over a series of iterative workshops engaging senior representatives of construction industry clients, government bodies, design chain consultants and professional institutions. Modelling commenced with prior extensive literature review which examined prior treatments of value in value management, value engineering, value theory, industrial product design, design theory and design management, customer value management, general business management, and architectural design theory. Although many fields were considered, their definitions were deconstructed to extract common elements. Trischler (1996), for example, typified the imprecise nature of many existing definitions by defining stakeholder value as "the perceived balance between the things people receive in exchange for the things they must give up to get them." This lack of clarity is compounded by variability in the term's general usage. The Oxford Dictionary (Simpson & Weiner, 1989) provides 16 alternative usages covering both value as a noun and as a verb, with diversity ranging from "medium of exchange" to "worth or importance."

Most definitions of value were found to consistently exhibit three components which described the consequences of a transformation process or an exchange. One component consistently described positive (or desired) consequences of the transformation or exchange, while a further consistently described its negative (or undesired) consequences. Throughout the literature review, value was found to be conceptualised as the trade-off of one against the other. With regard to the transformation represented by a construction project, Thomson et al. (2003) previously labelled

desired consequences as "benefits" and undesired consequences as "sacrifices." This more extensive review identified "resources" as a further attribute representing the effort expended to accrue value. This was incorporated into the outline definition resulting from literature.

$$\text{Value} = \frac{\text{Benefits - Sacrifices}}{\text{related to}\ \ \text{Resources}}$$

FIGURE 2: The VALiD Value Pseudo-Equation

Overall, value was defined as the perceived sum of the benefits (things they seek from the project) and sacrifices (things they are willing to give up to get the benefits they seek) incurred by each stakeholder as a consequence of the project, related to the resources (the effort they are willing to expend by being in the project) they consume in participating in it (Figure 2). Note that stakeholders *affected by*, rather than *participating in*, the project would not have any resources. This initial pseudo-equation provided the premise for modelling workshops which populated a generic model of value with stakeholders' common views of "benefits", "sacrifices" and "resources."

The Modelling Process

Workshops were undertaken iteratively, with the findings of one workshop informing the next to progressively refine a model of value (Figure 3). Participants were guided through the first stage of brainstorming by asking them to identify possible benefits, sacrifices and resources that they associated with value. This process was facilitated by card sorting in which the benefits, sacrifices and resources defined by the preceding workshop were presented and delegates asked to accept, modify or reject these. They were also asked to identify any additional issues they associated with value.

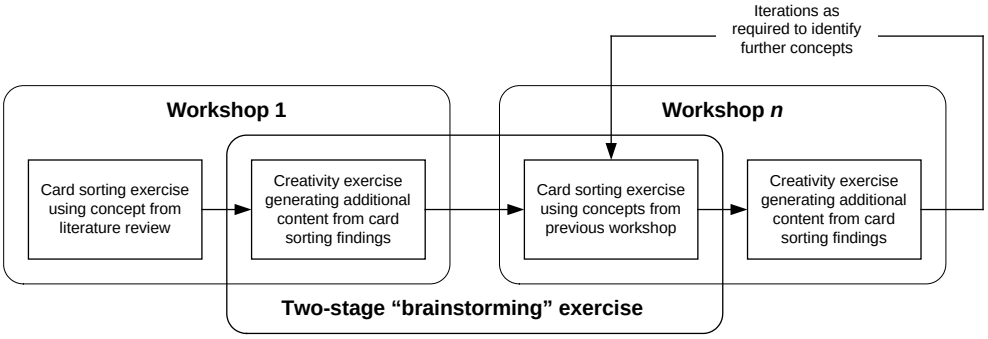

FIGURE 3: Iterative Modelling Workshop Process

Workshops implemented the second, structuring second stage of brainstorming by asking participants to assemble an affinity diagram arranging the benefits, sacrifices and resources from the first stage into logical groupings. Participants were asked to verbalise their decision making throughout so that the logic underlying the diagrammatic arrangement could be monitored. Over time, the workshop affinity diagrams were found to exhibit consistent classifications. These were adopted as the formal model hierarchy. The delphi process concluded when further workshops did not significantly alter the model of the benefits, sacrifices and resources from the preceding workshop. In total, 11 workshops were required before the model coalesced on 133 components within the collective mental model of value and the classification structure presented in Table 1.

Component	Dimension	Category
Benefits or Sacrifices	Product Functionality	Use
		Access
		Space

	Product Build Quality	Performance
		Engineering
		Construction
	Product Impact	Build Character
		Form, Materials and Product Innovation
		Internal Atmosphere
		Urban and Social Integration
	Delivery	Project Management
		Process Improvement
		Provider Benefits
	Business Operation	Business Case
		Building Management
Resources	Total Cost of Ownership	Acquisition Costs
		Capital Costs
		Costs in Use
		Life Cycle Repairs & Replacement
	Time	Acquire / Construct
		Ready for Use
		Required Life

TABLE 1: Components of Value, as Perceived by Construction Stakeholders

THE VALiD FRAMEWORK

Modelling clarified that sufficient commonality exists in stakeholders' cognition of value to provide a reliable basis for articulating value on construction projects. The model is used by VALiD to help stakeholders address the benefits, sacrifices and resources they associate with value on a given project in its design dialogue. VALiD also incorporated established models of values to help stakeholders understand their influence over judgements of value. This is facilitated by the VALiD Framework, which is intended to guide stakeholders' discussions of value in a project. The resulting three-part VALiD Framework (Figure 4) helps stakeholders to:

1. understand each others' values so that compromises can be made when reaching a single solution;
2. inform project design by setting targets for value delivery in the form of benefits, sacrifices and resources; and
3. judge value delivery performance throughout the project life cycle, from inception through to obsolescence.

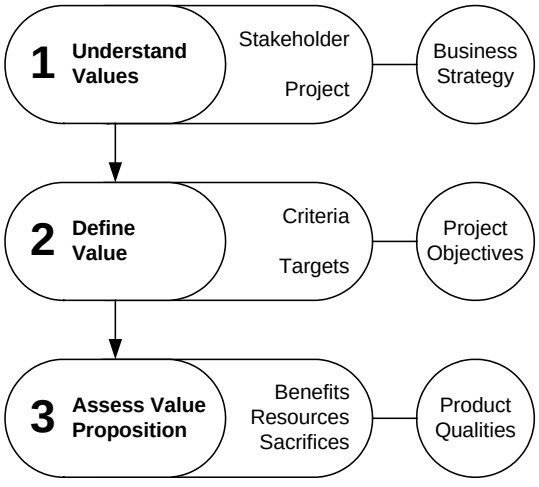

FIGURE 4: The VALiD Framework

The latter judgement process provides continuous feedback which designers, constructors and operators use to monitor project whole-life value delivery performance. The framework was developed to be flexible in use so that a project team can use all three parts, or focus on the most problematic issues in a project.

USING VALiD TO UNDERSTAND STAKEHOLDER VALUES

The first part of the VALiD framework helps stakeholders to identify and understand their values. While this element of the framework helps stakeholders understand the influence of values on their judgements of value, it has also proven particularly insightful when helping stakeholders to understand the influence of values over their *actions*. When an individual's values are shared at the organisation level, strategies can be formed to direct actions to reflect them in practice. Accordingly, VALiD helps stakeholders explore their values to inform the development of business strategy. Cross-stakeholder strategies can be similarly developed at the project level using the same methods to explore commonalities in project stakeholders' values to provide an informed premise for building project culture.

Schwartz' (1994; 1997) generic model of cultural and individual human values underpins this part of the VALiD Framework. The model can be applied at varying levels of complexity. At its simplest level, an adaptation of Schwartz' (1992) questionnaire survey instrument characterises alignment of individual stakeholders against generic human values. The profiles for each stakeholder (which may be complied at the individual level, or aggregated into organisational profile from those of several individuals) can be compared to expose discontinuities that require address through discussion. If further sophistication is required, factor analysis can be used to identify the components explaining variation between the extents to which individuals relate to generic values. This latter approach is particularly insightful at revealing underlying causes of values prominence among organisation members, although it is exposed to the surveyor's bias.

USING VALiD TO HELP STAKEHOLDERS DEFINE VALUE

At the project level, VALiD provides helps stakeholders to set targets for value delivery. Each stakeholder compiles a limited number (usually around ten) of benefits, sacrifices and resources that they associate with value on a given project. This initial expression of their view of value is informed by the generic cognitive model from which benefits, sacrifices and resources are extracted and adapted to more accurately describe the stakeholder's expectations. Stakeholders can also add benefits, sacrifices or resources to their definition of value by introducing them from outside the model: this facilitates tighter linking to their supporting business case.

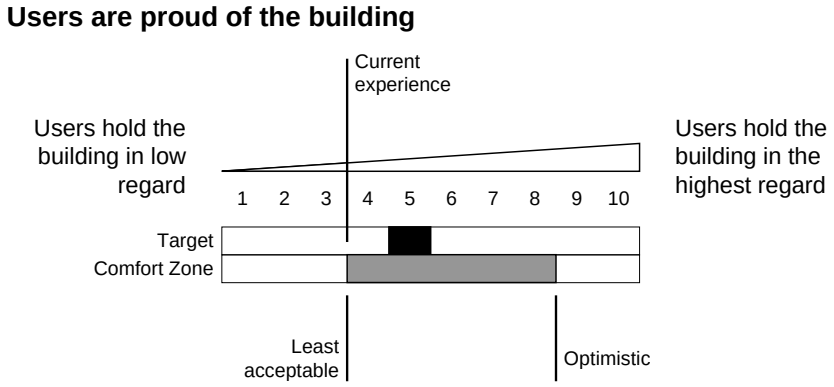

FIGURE 5: Structure of a VALiD Value Metric (Benefit Illustrated)

Each chosen benefit, sacrifice and resource provides a metric for monitoring value delivery performance which comprises five elements (Figure 5):

1. An *arbitrary 1 to 10 scale* helps stakeholders express their views. This scale is retained for all benefits, sacrifices and resources irrespective of their quantitative (i.e. with units) or qualitative (i.e. without units) nature as its purpose is to assist stakeholders in expressing views, rather than providing a quantified measurement.
2. The 1 to 10 scale is treated as a semantic differential scale due to the addition of verbose statements at each end (Finan & Hurley, 1999; Loeser, 1972). The left end of the scale represents the "worst possible" outcome with regard to the benefit, sacrifice or resource described, while the right hand statement represents the "best possible" outcome. Stakeholders are free to alter these statements or the title of the benefit, sacrifice or resource ("Users are proud of the building", in this example) to ensure that the concept is anchored in their understanding and that they will, therefore, judge it consistently (Chapman & Johnson, 2002) throughout the project process.
3. Stakeholders express their expectation for value delivery by positioning a *target* describing the extent to which they seek the benefit, sacrifice or resource to be represented in the design solution and project process.
4. To reflect the imprecise nature of judgements, the target is complemented with a *comfort zone*, expressing the tolerance with which each stakeholder will accept variation in performance around their target before requiring corrective action to be taken. In its current state of development, VALiD assumes that every stakeholder is willing to be involved in the project and, therefore, the target will always represent an improvement in their current position.
5. The fifth element of each metric arises when stakeholders periodically assess the value proposition formed by the emerging design solution. This is described below.

USING VALiD TO ASSESS THE VALUE PROPOSITION

In response to the qualities of the emerging design solution, stakeholders periodically express their *judgement* of the extent to which their benefits, sacrifices and resources are reflected in the current solution. Ideally, their judgements will align with their targets however corrective action is not required unless their judgements fall outside of their comfort zone, in which case the issue is flagged to designers for attention. If the stakeholder judges an excess of the metric in the current solution it is flagged as over-represented, whereas a judgement that falls below their current experience prior to commencing the project (i.e. falls to the left of the comfort zone) causes the metric to be flagged as under-represented.

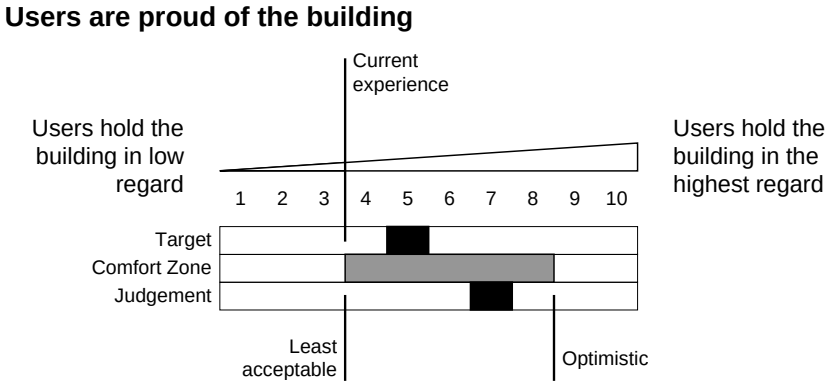

FIGURE 6: Structure of a VALiD Value Metric (Benefit Illustrated), with Stakeholder Judgement

Throughout the design process, there is a need to ensure that stakeholders' judgements of the value of the emerging solution can be fed back to designers in a meaningful and structured way as this comprises their evaluation of project value delivery performance. VALiD facilitates this process by maintaining a series of *dashboards* at the whole project, aggregated 'customer' stakeholders (i.e. those creating the need for the product), aggregated 'provider' stakeholders (i.e. those responsible for designing and delivering the solution), and at the individual stakeholder levels. These dashboards summarise each stakeholder's current judgement of the extent to which the emerging design solution reflects each of their chosen benefits, sacrifices and resources. By comparing these judgements with the comfort zone defined around the target for each of these metrics each stakeholder's judgement of value is decomposed for sharing with others.

Each stakeholder dashboard also facilitates the calculation of an overall indication of value delivery performance by entering the numerical scale position of stakeholders' judgements of each benefit, sacrifice and resource into the value pseudo-equation established by literature review and validated by cognitive modelling. This indicator – the "value ratio"– is not numerically meaningful as it has no measurement units (recall the 1 to 10 scale is arbitrary and many of the issue described are qualitative). It does have significance, however, as it indicates whether each stakeholder's expectation of value is being fulfilled (value ratio = 1), whether they are judging the design solution to insufficiently reflect their expectation of value (value ratio < 1), or whether they perceive an excessive representation of their values in the solution (value ratio > 1). Individual value ratios are aggregated to summarise all-provider, all-receiver, and all-project performance and provide an insight into the balance of value delivery within the project. The skill of the design remains in the role of arbitrating conflicting in the expectations of value expressed between stakeholders. Designers continue to be responsible for resolving situations where one stakeholder's sought benefits are mutually exclusive with another's. VALiD therefore provides a complementing beefing process that adopts Barrett & Stanley's (1999) view of briefing as an ongoing process that continues throughout the project life cycle.

CONCLUSIONS

This paper has summarised the UK construction industry's value agenda and has highlighted the need to consider value individually from the perspective of every project stakeholder in broad, social terms. The influence of each stakeholder's unique set of values over their expectation and judgement of value has been outlined and VALiD (VALue in Design) has been forwarded as a practical framework for addressing the resulting complexity.

Common elements of the cognition of value have been determined by extensive modelling with typical project stakeholders. This has resulted in a three-element articulation of value that helps stakeholders to discuss the "get" and "give" of value as the *benefits* they seek from the project, the *sacrifices* they are willing to make to get those benefits, and the *resources* they are willing to consume in doing so. An extensive model of generic benefits, sacrifices and resources has been created from which stakeholders can assemble their expectation of value as well as communicate their ongoing judgement of its delivery. Use of the VALiD Framework to operationalise this model of value by guiding stakeholders' judgements of value delivery performance in terms of the fulfilment of their expectations has been outlined. The use of dashboards to summarise these multiple stakeholder views via calculation of an arbitrary "value ratio" for each to provide feedback to designers has been summarised.

VALiD is in use in the UK construction sector and continue to be actively developed. Examples of use are provided in the accompanying presentation materials. For more information, visit www.valueindesign.com or contact the authors directly.

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