Eras of Value Production in the Built Environment: Extracting Principles from Past Practice

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Abstract

This paper reviews historical approaches to the consideration of value in the built environment. It identifies the central tenets of chronological eras of value consideration that highlight shifts in its understanding and articulation to synthesis a premise for the comprehensive consideration of value in any socially-complex, single-product project environment. The review identifies a shift in institutional logics framing the consideration of value, with early logics seeking value in product qualities, before evolving to consider value within the processes of product or organisational design. Current dominant logics seek value by synthesising mutual understanding of value within groups of people, while future logics are starting to adopt an intergenerational, protectionist perspective. This sequence of logics is characterised as: product, process, people, protection.

Keywords:

Built Environment; Satisficing; Value Management; Social Forum; Value Judgement.

Approaches to Value in the Built Environment

The built environment – that is, the artificial space in which we live – fundamentally influences our quality of life. It is the space in which most people experience value (or, rather, value shortfalls) in gaps between expectation of ‘ultimate’ lifestyles and those experienced and facilitated by the environment (Mulgan et al., 2006). As Churchill noted, “We shape our buildings and afterwards our buildings shape us.” Streets, buildings and places are heavily value-laden, conveying important and often subtle messages about how we see ourselves (CABE, 2003, 2005). We readily form affective connections with buildings and places exhibiting qualities that reflect our values, as they make us feel at ease (see, for example, Clapham, 2011), even though we do not know what those values are, we sense their presence.

The understandings of value mobilised when creating the built environment have progressed through distinct eras. Yet, each had a moral obligation to protect those living in the built environment (Fewings, 2009) by instilling collective, affectively-positive perceptions of value from multiple actors, each seeking something different. Institutionally short-circuiting reconciling debate by prioritising a rigid process or one stakeholder group over another will fail. As Prince Charles highlighted in his infamous “carbuncle” critique (The Prince of Wales, 1984), by designing to their own values, architects were harming the communities their buildings were meant to serve.

Creators of the built environment have made significant mistakes in past attempts to realise value. Architects have previously positioned themselves as Plato’s ‘special’ people, existing

on an elevated plane to decree what is best for the wider populace. Starting with Le Corbusier's city masterplans prescribing one view of an 'ultimate' lifestyle, their UK interpretation as Brutalist architecture attempted to operationalise a firm belief that buildings could improve life by shaping its patterns (Lees and Baxter, 2011). This failed because occupants' affective value was not considered. Instead, a production-dominant logic systematised building construction resulting in the catastrophic failure of Ronan Point and the social failures of 'Streets in the Sky' (Church and Gale, 2000). Yet, some buildings previously considered social failures are now considered successes. London's Trellick Tower and Sheffield's Park Hill Estate for example are now judged differently because society's values have shifted across generations (de Graff, 2015).

The built environment's imperfect and evolving attempts to operationalise value offer insights to other sectors where: clients are fluid and pluralistic; projects must reconcile multiple professional perspectives and; where a single product design solution must satisfice multiple stakeholders, each with unique framing values. In these situations, designing-to-market cannot work. Product users must be directly engaged to elicit their expectation of value through a discursive, often iterative process that, due to the intangible nature of framing values usually debate value via a surrogate: functionality.

The below summarises seven distinct ages. Building on western philosophical views of of ideals, the built environment adopted analytical techniques from value engineering in systematised mass manufacturing (Mudge, 1971). On becoming aware that people define and judge value, value management then became the dominant paradigm (Palmer, 1992). This eventually diversified into the value methodology and servitised offerings with new understandings of service-dominant contexts: namely, organisational design and the operation of concession agreements. In the current century, the value agenda articulated value as intangible benefits resulting from appropriate product qualities. The more recent social value era recognises value emerging from design and production processes as well as the building products that result, while emerging digital production era promotes value by improving a building's ability to reflect individual consumers' values through easier customisation. Finally, the circular economy considers value an intergenerational construct, using service-dominant logics to move products between functional applications. Throughout all eras, functionality provides a tangible surrogate for the discussion of intangible value.

Premise: Pre-engineering, Philosophical Foundations and Economic Perspectives

The foundations of value operationalisation can be found in Western philosophy. Aristotle's Four Causes helps us consider why objects are what they are (Falcon, 2015). The material cause considers the extent to which an object is characterised by its materials of production; the formal cause considers the extent to which an object embodies the characteristics of what is supposed to be; the efficiency cause considers the way in which the object came into being; and the final cause considers the ability of the object to be used for its intended purpose. Of these, the formal cause establishes an ideal definition of the object, the creation of which would yield and 'ultimate' form of value.

The notion of an ideal also exists in Plato's Theory of Forms. It suggests that all objects have an abstract ideal form that exists independently to physical form. When creating an object of a specific type, the goal should be to create its ideal form (Macintosh, 2012). Any failure to represent ideal form in physical form embodies a shortfall in value creation (Figure 1). This principle is the foundation of axiology (Hartman, 1967). Plato argues that only 'special'

people recognise the forms. Because most people are not special, they need a process or systematic approach to reveal the true nature of value for the object they are attempting to create (c.f. the Job Plan below). Aristotle, his final cause suggests that this abstract definition may be found by associating functional performance (i.e. what an object is for) with the creation and presence of value (c.f. value analysis below).

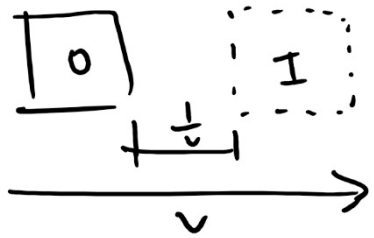

Figure 1: Value Shortfall (1/v) between Ideal Form (I) and Realised Object (O)
(v = value delivery performance)

The 'Austrian School' (for example, Böhm-Bawerk, 1973) of economics considers value the 'measure' of effective utility offered by a good or service. It recognises that individuals judge value independently of measurement, accepting representing subjective and objective forms respectively. Objective value is determined by the market, whereas subjective value is determined by an individual's perception as framed by their values and, therefore, their expectation of an ideal form (Figure 2). The Austrian School also differentiates 'value-in-use' (functionality) from 'value-in-exchange' (market price), with the latter prioritised because it yields utility (Thomson et al., 2013).

Figure 2: Subjective, Esteem Value as the Interpretation of Object Qualities

An object's (i.e. a good, service or building) ideal form may be prescribed by specifications or standards or it may reside within individuals' minds as an embodiment of their values. The notion of an ideal form is operationalised as quality control in production paradigms, wherein measured deviation from ideal, specified product qualities constitutes a defect condition. Measurement, in turn, decomposes the ideal into its constituent qualities so that their presence, or otherwise, can be determined. Thus, qualities of a product or service evidence value delivery. Because the ideal cannot be realised, the production goal is to minimise the value shortfall gap between the ideal and the specific (Figure 3). A further insight from Aristotle's causes is that qualities cannot be defined arbitrarily: the final cause relates them to desired functionality.

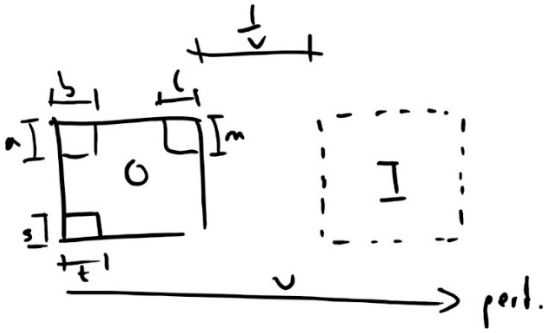

Figure 3: Measurement of Object Qualities to Evidence Value Delivery Performance
(a,b,l,m,s,t = qualities; O = Object; I = Ideal; 1/v = value shortfall; v = value delivery performance)

Era 1: Value Engineering

Focused on the value creation process, value engineering became a foundational approach to value creation in mass manufacturing. The technique of value analysis was developed by Lawrence D. Miles, a General Electric Company engineer, in response to supply shortages after the Second World War. When faced with an unavailable component, Miles found that analysing its functionality helped him identify suitable alternatives to perform the same purpose (Miles, 1972). Value analysis optimises design and production to ensure that value, in terms of expected functional performance, is delivered by specifying that performance rather than object qualities. Value engineering therefore aligns the functional perspective of Aristotle's final form with the Austrian School's value-in-use perspective. Objective value is represented by measurable product qualities and subjective value by judged expectation fulfilment. Ideal forms are not described, leaving the designer free to innovate with optimisation minimising resources consumed in product manufacture.

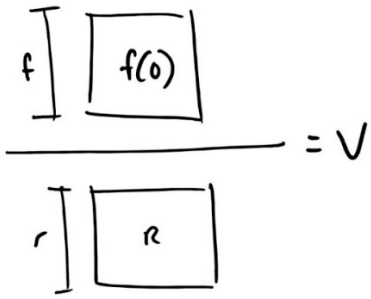

Figure 4: Conceptualisation of Value within Value Engineering
(O = Object; f(O) = functionality of Object; f = provided functionality;
r = consumed resources; R = Resources; v = Value)

Returning to Plato's theory of forms and the implication that non-special people need a process to reveal an object's ideal form (or a functional analogy thereof), Miles' also contributed the Job Plan. The Job Plan is a systematic analysis process (Miles, 1972). Within it, Bytheway's (1965, 2005) FAST Diagramming illustrates the relationships between, and precedence between, functions. Value engineering therefore considers value in two ways: design effectiveness by ensuring functionality; and production efficiency by minimising resource consumption. Per Figure 4, value is therefore conceptualised as residing in the relationship between the functionality of an object and the resources consumed in its production (Dell'Isola, 1997).

Era 2a: Value Management

Value management emerged when European project managers adopted and adapted value engineering during the 1980s (Palmer, 1992) to address the social complexity of projects (Rowlinson and Cheung, 2008). Value management focuses on helping diverse users of products (project stakeholders) express their functional requirements (Kelly et al., 2015). The technique helps diverse users express otherwise-tacit requirements while building consensus about common elements. The intent of value management is the same as value engineering: to provide functions with minimal resource consumption, but social complexity is recognised. It inherited many processes from value engineering, but considers the people that define requirements and judge resulting products more than dogmatic process compliance.

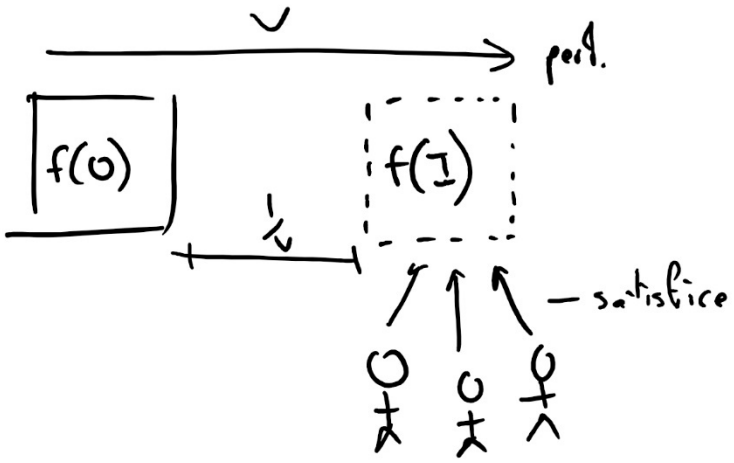

Figure 5: Negotiation of a Mutual Ideal via Satisficing, and Orientation of Project Performance towards that Goal
f(O) = functionality of Object; f(I) = functionality of Ideal

Value management operationalises satisficing. Value analysis and the Job Plan structure facilitated workshops to provide social forums for stakeholders to co-construct a shared understanding of the functional performance of an ideal project outcome (Thyssen et al., 2010) recognising that a satisficing outcome is suboptimal for individual stakeholders but optimal for project collectively (Figure 5). Value shortfall remains the gap between the collectively-negotiated ideal and the achieved result. A key difference to Plato's Theory of Forms is that the ideal (or a functional surrogate) can be revealed by facilitate social discourse, without requiring the special purpose status of, say, an architect.

Satisficing recognises that individuals' judgement of value is framed by their unique values. Because these values are tacit and can therefore only be revealed through discourse and action, value management provides social forums to socially-construct

mutually-acceptable definitions of required functionality. This negotiated process of satisficing is required because, with products such as buildings produced traditionally, a single solution must satisfy multiple stakeholders. This is impossible, so the single solution must, instead, satisfice these stakeholders within the bounded rationality of production resources and technology (Simon, 1957). Rather than a value shortfall, value management considers satisficing essential to resolve conflict between individuals' expectations (caused by incompatibility of their underlying values) and which would otherwise cause dissatisfaction.

Value management makes two distinct contributions to the consideration of value. It recognises that the judgement of value is framed by the judger's unique values. It also recognises that salient, collective 'values' must be negotiated via social discourse. Values themselves always remain tacit, so functionality provides a surrogate for debate, per value engineering.

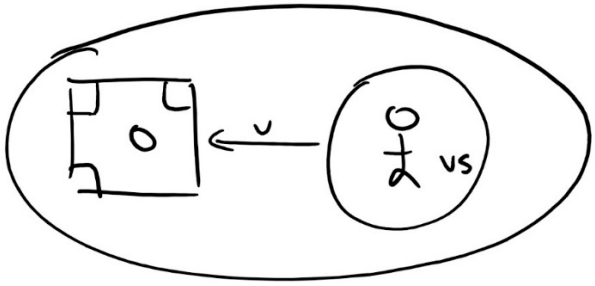

Figure 6: The Presence of Value in the Affective Relationship between Person and Product
(O = Object; v = value; vs = observer's value system)

Value management recognises that products with qualities that reflect an individual's values will be valued more highly by them: there will be stronger affective connection between that person and the product (Medway and Clark, 2003). Value management therefore considers value a quality of the person and the product, yet a quality of neither alone. It exists in the affective relationship between the individual and the judged or experienced product (Figure 6). Value management therefore conceptualises value as an attribute of both people and their values and of products and the functions they perform and the qualities they possess (Thomson et al., 2003).

Era 2b: Value Methodology

After value management practice became salient within project management, the Society for American Value Engineers rebranded itself as SAVE International. With this, came a repositioning of value engineering, with its use of function analysis and the Job Plan, as the 'Value Methodology" (SAVE International, 2007) so that organisations could be also optimised through a process of considering their core functionality. This widened remit was introduced in the era of business process reengineering and total quality management. The value methodology differentiated itself with its position that (business) value accrued by only performing functions appropriate to business intent within an organisation. Other organisational analysis techniques merely sought to reorganise the existing without fundamentally questioning what each part of the organisation was for and whether it should exist in a given value chain tier.

Introduction of value methodology represented a shift of value management from tactical projects to strategic change programmes; transforming it into a business rethinking and improvement tool. These applications adopted a broad interpretation of value, with it being considered anything that improves business performance. However, the interpretation of performed function remains central to organisational analysis.

Era 3: Value as a Service

The shift towards organisational design typified by the value methodology revealed new business models with functionality at their core. These new models were associated with servitisation and service-dominant logics. Manufacturers transformed themselves into service providers, retaining ownership of physical assets and working with customers to co-create new models of access to the functionality that those products provide (Grönroos, 2011).

Per the Austrian School, these co-created business models prioritised value-in-use over value-in-exchange. With a philosophical perspective, a product's final cause became more important to consumers than the previously-critical formal cause. Depreciation of the formal cause meant that any product whatsoever could be used to provide the sought functionality. The provision of value via service wrappers allowed new, reconditioned or even remanufactured products to be deployed, so long as the service provider – within which the manufacturer became a subsidiary element – could assure functional performance.

Servitisation (aka 'value as a service') creates value through two mechanisms: by allowing functionality to be consumed without owning enabling physical assets new, co-created forms of value become possible; and, by allocating risks associated with asset ownership to value chain members best able to manage them, over all cost of functional performance is minimised. Within each specific service definition, the level of performance assurance required was also co-created between manufacturer, consumer and other organisations such as maintainers and logistics companies, co-branding their offering within the functional service definition (Payne et al., 2007). Examples of servitisation abound, from "power by the hour" aircraft engines to "documents per quarter" office equipment, to automobiles and, increasingly, housing in additional to the more traditional built environment examples of PFI/PPP concession agreements.

Era 4: The Value Agenda

At the turn of the century, UK Government policy (Department for Culture, Media and Sport, 2000) promoted the intangible benefits of 'good design' in the built environment (Thomson et al., 2013). This initiative embodied the political belief of the then-Labour government that infrastructure investment would improve quality of life if implemented appropriately (c.f. Brutalism above). The resulting 'value agenda' framed an era of broad, industry-wide discourse concerning the value associated with building design, use and, as second-order benefits, improved quality of life and business performance (CABE, 2006). The agenda responded to poor quality buildings associated with the expansive 'value engineering' of PPP/PFI schemes over the preceding decade. That 'value engineering' had forgone the preservation of functionality to simply minimise resource consumption and thus did not justify the moniker (which continues to be attributed to such analyses).

Rather than advocating functionality per the above understandings of value, the value agenda merely sought 'good design', leaving understanding of 'goodness' amorphous and poorly defined, but loosely related to building qualities. Without a theoretical underpinning, the agenda articulated value as the attainment of second-order, contingent (Allen et al., 2004) and mainly intangible (Macmillan, 2006) benefits from well-designed buildings and public spaces. Many benefits were intangible such as schools that stimulated children to learn (CABE 2007, 2010), hospitals that motivated patients to get well (Architecture and Design Scotland, 2010), increased worker productivity, reduced absenteeism, improved corporate image, and so forth. The value agenda can be considered an attempt to debate the multiplier

effect of investment. This multiplier was often articulated as a "1:5:200" ratio of construction (production) cost, to asset operation cost, to asset staffing cost, extended by Saxon (2002) to 0.1 : 1 : 5 : 200 : >250 to include design and business income at the terminals.

As well as benefits, sacrifices were considered part of value (Thomson et al., 2013). This balancing of benefits with sacrifices is an articulation of value often found in wider business texts (see, Järvi et al. (2018) for example). Within the value agenda, benefits synthesised functionality with wider, intangible gains. Resources were tangible, such as money and materials, and also intangible, such as emotional and psychological investment. 'Good' design was articulated via the 'Design Quality Indicator (DQI)' (Gann et al., 2003) as a heavily-operationalised form of Vitruvius' Ten Books. The DQI was used to stimulate dialogue between stakeholders, per value management, rather than to prescribe required qualities, per the 'how-to' schools of architecture.

Era 5: The Current Age of Social Value

The UK's Social Value Act (Public Services (Social Value) Act, 2012) requires public bodies to demonstrate the 'social value' of investments that should generate social good. Social value can result from a procurement process (such as a construction project) as well as from product created (such as a public building) (Figure 7). Social value comprises benefits accrued by communities when buildings are created within them (Watson et al., 2016). These benefits include several non-market goods such as employment and training for local workers (Loosemore, 2016), causing social value to often align with the corporate social responsibility concerns of many commercial organisations.

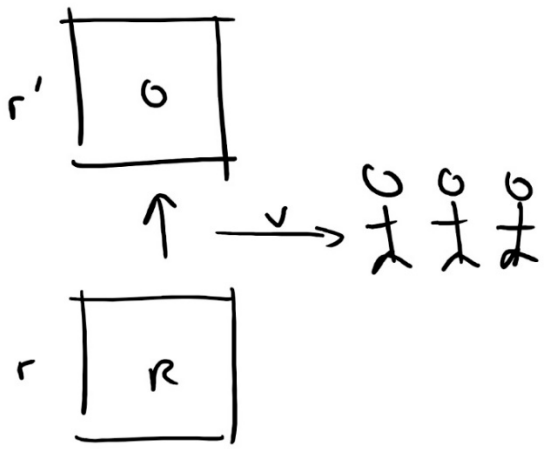

Figure 7: Extracting Social Value from the Process of Resource Transformation
(O = Object; R = Resources; r = consumed resources; r' = transformed resources; v = value)

The Social Value Act requires public clients to evaluate a commercial provider's ability to generate social value as a selection criterion. When tendering for work, providers will quantifiably estimate the social value they anticipate creating. If appointed, they must then auditability demonstrate the creation of that value. This requires intangible benefits to be translated into quantifiable metrics. This difficult and reductionist task is simplified by widespread adoption of third-party financial quantifications of common intangible benefits using convenient metrics (such as reduction in crime or hours of training provided). The HACT database (Trotter et al., 2014) of benefits associated with housing (as a service) provision is a typical example.

Many providers adopt third party quantifications of non-market benefits as measures of delivery of social value without acknowledging criticisms that they are not robust (Berry-Moorcroft, 2015). The principles of value identified above, such as the focus on functionality and eliciting the values (via functional surrogates) of individual people are not present within quantification of social value, with the task being couched in economics terms using established techniques such as shadow pricing to quantify non-market goods. This raises the question of whether value is being meaningfully delivered at all. Although performance of the activities from which intangible benefit is claimed to result can be established, the perception of their value by specific members of the communities that should be enjoying the value of those benefits is not captured.

Era 6: The Emerging Digital Age

New information technologies, and agile yet mass manufacturing platforms provide sufficient configuration freedom and production flexibility to customise products for individuals. Uniquely-configured products exhibit the individual's expected qualities, promoting the perception of reflected values (Benros and Duarte, 2009; Noguchi, 2015). Thus, perceptions of value become salient and the affective bond between consumer and mass-customised product is formed (Figure 8). Mass manufacturing is replaced by mass customisation.

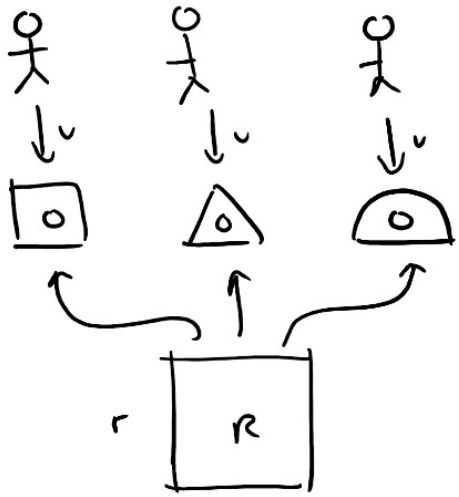

Figure 8: Promoting the Perception of Individual Value by Transforming Resources into Mass-customised Objects
(O = Objects; v = value; R = Resources; r = consumed resources)

In the built environment, this era is particularly evident in international housing construction. Toyota Home Aichi, for example, produce manufactured buildings that customise standard floorplans to each customer's requirements. The qualities of the resulting manufactured home uniquely reflect each customer's values. Skanska's Götenehus system offers a similar, albeit less granular, approach using modular volumes in the Scandinavian market. In the UK, new vertically-aligned suppliers, such as Legal and General, are developing similar market offerings in response to the recent Housing White Paper (Department for Communities and Local Government, 2017) that advocates the production of high quality, manufactured homes in response to the UK's housing crisis.

Conceptually, the digital era shifts value creation from the manufacturing process to the specification process. Because digital manufacturing and digital production technologies

(such as 3D printing of custom parts to fit the agile platform) allow each product to be uniquely customised for each customer, satisficing is no longer required. The affective connection between person and product is stimulated by the incorporation of qualities uniquely demanded by each unique customer. Yet, economies of scale persist with an underlying product platform developed with sufficient and appropriate customisation affordances. The product is still mass customised, gaining attendant production efficiencies in stark contrast to the piecemeal organisation of traditional, work-package based procurement of bespoke buildings. Effectively-bespoke products become mainstream.

This production-to-the-consumer rather than production-to-the-market may cause problems for resale of heavily-customised buildings. Fortunately, as noted below, the circular economy creates opportunities to capture the capital embodied (recall the Austrian School's value-in-exchange) in building components by disaggregating them from the whole product for reuse elsewhere. The required modular design also eases re-customisation of the buildings (within platform affordances) in the aftermarket, when ownership changes. This approach requires component interoperability (Farmer, 2017): a challenge currently being addressed.

Synthesis

The above reviews identify four thematic dimensions: the theoretical constructs operationalised in each; the operationalised context; the operationalisation methods; and the operationalisation medium. These are synthesised in Table 1.

Table 1: Synthesis of Salient Dimensions of Eras of Value Production in the Built Environment

Value Delivery Era	Theoretical Constructs	Operationalisation Context	Operationalisation Method	Operationalisation Medium
Philosophical origins	Gap between ideal and realised form represents value shortfall.	n/a	n/a	n/a
Value engineering	Value represented by functionality. Job Plan provides evaluation process.	Post-War era, leading to mass manufacturing.	Facilitated designer workshop.	Product design optimisation.
Value management	Satisficing understanding of value is socially constructed	Adoption of value engineering by European project managers.	Facilitated stakeholder workshop.	Product use.
Value methodology	Functional examination of business model and organisation design.	Business reengineering initiatives.	Consultancy or internal review process.	Service consumption.
Value agenda	Value found in intangible benefits, as related to sacrifices.	UK government policy.	Design review. Public debate.	Experience of building use or impact.
Social value	Intangible value results from production as well as product.	UK government policy. Corporate Social Responsibility.	Construction project.	Impact of project in community.
Digital Age	Mass customisation represents individuals' values in product qualities	Mass consumerism.	Specification process.	Customised products.

Era 7: The Emerging Circular Age

The emergence of the circular economy, specifically in its stock (rather than material) flow form, creates further opportunities for value delivery by keeping physical products in use, albeit by changing their application. Enabled by servitised provision of functionality (The Ellen MacArthur Foundation, 2015), the abstraction of the customer from physical components used to provide consumed functionality allows components of any type to be used. They may be new, reconditioned or remanufactured. So long as functionality is assured, the customer can benefit from that functionality without need to consider the physical components used: they could be new or reconditioned (Figure 9). Examples of such circular economies already exist in the remanufacture of document copying equipment and many types car components: wherever sufficient numbers of compatible functionality-redundant or physically-failed cores can be recovered from field deployment. In this era, value to the consumer is considered to arise from the consumption of functionality in a given functional application (Figure 9). However, further forms of value also emerge. Original equipment manufacturers or new industry entrants can recover value from the component recovery, reconditioning and redeployment cycle. Further, a form of intergenerational value is also created by protecting the natural resources otherwise embodied in the manufacture of new components.

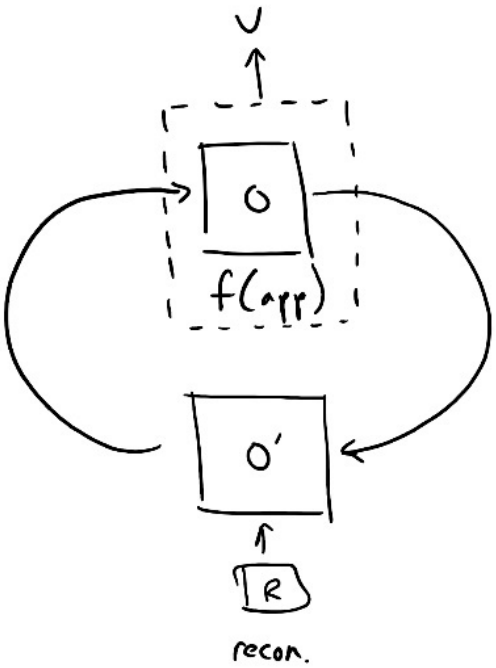

Figure 9: Transfer of an Object between Functional Applications, enabled by the Performance Specification of a Servitised Wrapper.
(v = value (of functionality consumed); f(app) = functional application; O = Object; O' = functionally-equivalent alternative object; R = Resources)

As observed in the automobile industry, a carefully designed product platform will ensure that significant customisation can be achieved by deploying standardised, interoperable components in alternative configurations. Although the configuration of those components is unique to each customer and is therefore perceived by that customer as offering a unique form of value to them, the underlying components are standardised, allowing sufficient volume of cores to support a reconditioning and redeployment industry. The unfettered

customisation of the digital age cannot continue. Mass customisation must be tempered by the need to standardise modular building components for interoperability and to maximise the opportunities for redeployment into a further functional application (Niemeijer et al., 2011).

In the built environment, building services installations - the mechanical and electrical equipment that makes buildings habitable (such as air conditioning) and useful (such as data communications) – are ideally suited to a circular economy. They are co-located in plant rooms which are often assembled from modular components. These plant rooms are usually physically isolated from consumers of their functionality, making their physical form irrelevant to these end users, so long as functional performance is maintained. Skid-mounted air handling units, pumps, and modular power distribution switchgear and the like can be readily swapped in and out of functional application, moving between buildings and owners via a reconditioning or remanufacturing intermediary (Thomson, 2000). Moreover, these components have a high capital value are relatively technologically inert and have a physical life that exceeds their likely functional application (such as data communication equipment), or ideally suited to reconditioning when they wear (such as pumps and air handling units).

In moving components between functional applications through a circular economy, consumers gain value from continuity of functional service (replacement before failure) and low cost of service provision. Value to the service provider is realised in long term working relationships, and opportunities for manufacturers to create new forms of commercial value by recovering and reconditioning components that – due to the servitisation wrapper – have remained in their ownership throughout deployment.

Ultimately however the value realized by the circular economy is intergenerational with minimisation of natural resource consumption being the ultimate goal in this era. This requires an altruistic perspective of value or a regulatory obligation in the absence of a clear commercial case. The sacrifice made in return for the intergenerational benefit is the opportunity cost of the profit associated with new product manufacture. However, this is offset to some extent by the opportunity created for original equipment manufacturers to adopt reconditioning remanufacturing roles.

Conclusion: Reflection on Shifts in Institutional Logics

Reflecting on the above, the conceptualisation of value has clearly changed with time. Concurrent to this is a shift in focus of the form of value considered from objective perspectives, initially focused on product and then on process, to more subjective views that initially focused on value in relation to individual people and latterly focused on providing value to groups of increasing size and diversity. The medium through which value is delivered has also changed over time, evolving from considering value to arise from product ownership to arising from access to product functionality without need ownership.

The earliest, product-dominant logics of value found in the philosophical origins of practice consider value to be entirely bound up in the ideal definition of the object and its realised physical form. This perspective persisted into the ‘how-to’ schools of architecture of the likes of Vitruvius and Palladio. Process was not considered beyond Aristotle’s efficient cause which acknowledged that materials must be transformed into form. Definitions of value were limited in this foundational era and were constrained to perceptions of how ‘good’ (as in, how completely and accurately) a specific instance of an object type could be created in physical actuality. Rather than defining value, this understanding recognized failure to achieve

‘ultimate’ value (associated with the theoretically-possible realisation of the ideal form) as the inevitable shortfall between reality and ideal. Focus was entirely on the object and people were not recognised.

Consideration of value associated with the production of manufactured goods adopted process-dominant logics of analysis and production. This view operationalised the idea that an ideal product form should be the ‘ultimate’ goal of production; representing a perfect process if achieved. Value engineering considered its systematic Job Plan process deploying function analysis sufficient to define value in solely functional terms.

Minimising the value shortfall was the paradigm by which customer value was considered in the mass manufacturing era. This perception of value was entirely process-bound with no consideration of end users beyond the function analysis stage of the Job Plan. Manufacturer value resulted from design and production process optimisation, using the Job Plan to either increase functionality or reduce resources consumed in manufacture. With reference to the philosophical underpinnings of value, this era is typified by value engineering’s objective view of value and focus entirely on value-in-use. The assumption that value would result from systematic, process-led analysis of the problem space was also found in the process-dominant logics of the value methodology.

Faith in process-led definitions of value persisted into the era of value management. The Job Plan continued to be used, albeit with more focus on stakeholder engagement. Value management recognised the role of people - individually and collectively - in functional definition and judgement of value. Rather than eliciting functional definitions of value from individuals, value management deployed value engineering techniques and processed with facilitated workshops that provide a social forum within which group of people could build consensus on a mutual, satisficing definition. This is foregrounding of debate and discussion was a consequence of a person dominant logic. The logic was pluralistic in the era of value management, value as a service, and social value with the letter extending this pluralism to include entire communities beyond project team and project stakeholders. That logic remained in the digital era, however it was constrained to individuals but with the requirements of each individual uniquely satisfied advancing from value engineering design-to-market approach.

Across the eras of value delivery, we have seen progression from product-dominant logics to process-dominant logics to person-focused logics. This reflects an understanding of value that has shifted from an objective to a subjective perspective noting that functionality (representing the Austrian School’s value-in-use) has remained a useful surrogate for the expression of intangible and tacit values across all eras.

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