nCRISP Commission 04/13
Value Task Group

Report of the Be/nCRISP Value Task Group

Final report
31 March 2005

Mission statement and objectives for the Be/nCRISP Value Task Group

The brief from nCRISP for this Task Group was:

> To provide a framework for understanding Value and Commercial Drivers.

Subsequently, the Group devised the following mission statement:

> To communicate a strategy by which the built environment industry can add value to customers and society by shaping and delivering a sustainable environment and high quality of life.

During the period while it is operating simultaneously as the nCRISP Task Group on Value, the group aims to identify value drivers for construction outputs to help achieve both commercial and community value. This report to nCRISP sets out a programme of short and medium term research needs that will deepen understanding and support further development of these drivers. More generally, the paper seeks to identify a research agenda and to contribute to the building and maintaining of a community of inquiry and innovation in practice – ranging across practitioners, policy makers and academics – to broaden conceptions of value in decision making about the built environment.

In the medium term, the Be Value Task Group has as one of its goals the production of *Be Valuable,* an authoritative Be guide to value in the built environment. This will form part of Be's *Designing the Future* project which is based on describing a future industry which delivers far better value to clients and society through perceiving and providing fully integrated building solutions.

Task Group membership

The membership of the Task Group is:

Richard Saxon	– Building Design Partnership (chair)
Malcolm Dodds	– Be Research Director
Alan Arthur	– Lloyds TSB Bank
Simon Austin	– Loughborough University
Martin Barnes	– Major Projects Association, Templeton College
Vince Clancy	– Turner and Townsend
David Gann	– Imperial College
Graham Ive	– The Bartlett, University College London
Bryan Lawson	– Sheffield University
Sandy Mackay	– Building Performance Group
Sebastian Macmillan	– Eclipse Research Consultants (report author)
Hugh Rogers	– Slough Estates
John Worthington	– DEGW

The Group has also benefited from meetings with Richard Haryott and Simon White (Arup), Will Hughes and Debbie Ancell (Reading University), Roger Zogolovitch (Solid Space), Richard Kirkham and Halim Boussabaine (Liverpool John Moores), Peter Morris (UCL), Stan Maiden (BAA) and Andrew Harrison (DEGW); and it has communicated with Paul Bartlett (Office Productivity Network), Richard Holti (Open University Business School), Kate Trant (CABE) and others.

The Group's first meeting was held on 14 May 2004 at the offices of BDP. A series of sub-group meetings took place between then and March 2005, including larger meetings at Davis Langdon Management Consultancy (DLMC) on 4 October 2004 and at BDP on 22 February 2005.

Background

> We shape our buildings; thereafter they shape us.[1]

Awareness of, and a belief in, the effect that the built environment has on people is a longstanding one. The great cathedrals, for example, illustrate that our forefathers believed that the splendour of the building enhanced religious experience. Similar beliefs about church architecture were expressed in the nineteenth century, and were extended to other building types. In healthcare, Florence Nightingale writing in 1860, was convinced of the recuperative benefits of sunlight and views from windows:

> Second only to fresh air … I should be inclined to rank light in importance for the sick. Direct sunlight, not only daylight, is necessary for speedy recovery … I mention from experience, as quite perceptible in promoting recovery, the being able to see out of a window, instead of looking against a dead wall; the bright colours of flowers; the being able to read in bed by the light of the window close to the bed-head. It is generally said the effect is upon the mind. Perhaps so, but it is not less so upon the body on that account .... [2]

Similar sentiments were also expressed for educational buildings. E. R. Robson, architect to the London School Board, stressed the therapeutic value of sunlight when he wrote:

> It is well known that the rays of the sun have a beneficial influence on the air of a room, tending to promote ventilation, and that they are to a young child very much what they are to a flower.[3]

Accordingly, schools of the period used tall windows to admit light, and high- and low-level opening lights for controlling ventilation. Between the first and second world wars, there was a revival of these concerns and a renewed interest in the physiological benefits of sunlight which influenced the design of schools and sanatoria.

In the second half of the twentieth century a more 'scientific' approach began to be taken towards the study of buildings and their impact on people, corresponding with the expansion of the universities and architecture itself becoming a university discipline. Numerous studies were carried out in the 1960s and 1970s, when 'architectural psychology' emerged as a sub-discipline with schools of architecture and elsewhere. Largely using methods devised in psychology (such as personal construct theory) researchers examined people's behaviour and their responses to different designs. Comfort theory also emerged as a topic for investigation by building science. Much of the work was laboratory-based and remained academic in nature so, although published, it had little impact on design practice. A subsequent reaction against the notion of 'architectural determinism' – the proposition that there is a direct causal and mechanistic link between the built environment and behaviour – led to the demise of 'architectural psychology' with most of the lines of enquiry effectively ceasing. Two significant groups did, however, continue into the 1980s and beyond. At King's College London Alice Coleman's group, founded in 1979, focused on identifying correlations between crime/social malaise and particular features of public housing connected with anonymity, surveillance and alternative escape routes[4]. Coleman's hope was to be able to design out crime, or at least reduce it. The 'space syntax' group at UCL focused on topological mapping of buildings and cities as a means of modelling pedestrian behaviour, research which continues to this day and which has been widely taken up in practice.

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[1] Winston Churchill, 28 October 1943, to the House of Commons at a meeting in the House of Lords on the re-building of the House of Commons

[2] Florence Nightingale (1860) *Notes on Nursing*, London: Harrison.

[3] E R Robson (1874) *School Architecture*, London: John Murray.

[4] Alice Coleman (1985) *Utopia on trial: Vision and reality in planned housing*, London: Hilary Shipman.

In the 1990s built environment research was dominated, to some extent, by construction-related issues and a focus on the construction process rather than its products. In parallel with the Latham[5] and Egan[6] Reports on inefficiencies in construction, construction research programmes included DoE's Partners in Technology (later DTI's Partners in Innovation), Construction as a Manufacturing Process (EPSRC), Integration in Design and Construction (DoE/EPSRC) and Meeting Clients' Needs through Standardisation (DoE/EPSRC). The Movement for Innovation and Construction Best Practice programme were both started in 1997 and were later consolidated as Constructing Excellence. The Housing Forum was inaugurated to carry forward new ideas into the housing sector. These programmes all shared a broad agenda focused on business process improvement, such as greater efficiency, elimination of waste, reduced cost, on-time delivery, improved health and safety, and improved collaborative working arrangements. Debate about the attributes of the product was conspicuously absent.

The Design & Build Foundation, Reading Construction Forum, Building Down Barriers and Collaboration for the Built Environment

In his JCT Povey Lecture[7], Richard Saxon noted that the Latham, Egan and Fairclough reviews caused a great deal of change in customer and supply side behaviour, and he went on to describe how two private sector initiatives sprang from the Latham report: the Reading Construction Forum in 1995 and the Design Build Foundation in 1996. Each represented groups from across the supply chain: clients, consultants, contractors, specialists and academics. The RCF concentrated on researching new thinking and helped to inform the Egan report and to form M4I. The DBF concentrated on rethinking the integrated team and how it should work. *Building Down Barriers*, a pioneering action research project with the research component led by the Tavistock Institute, aimed to create a learning mechanism for establishing the working principles of supply chain integration in construction. The project was led by Defence Estates with support from DETR, Amec and Laing, and resulted in the development of a toolkit and a handbook[8].

The process developed on the two action research projects for the Army was favourably reviewed by the National Audit Office[9] and promoted by the Office of Government Commerce (OGC) as the preferred construction procurement route for central government departments[10]. The DBF took on the challenge of developing and facilitating the rolling out of Prime Contracting in 2001 .The Building Down Barriers research team, in collaboration with the RCF, continued the work on a three year research project funded by DTI and EPSRC, to develop commercial arrangements which actively support collaborative working. A contract document supporting collaborative working practices is one of the anticipated outcomes.

In 2002, the RCF and DBF merged to form *Be*, Collaborating for the Built Environment, following the 2002 *Designing the Future* conference held in Rugby which looked at scenarios for the next 5-10 years.

Saxon's lecture also noted that Sir John Fairclough's review of the industry's approach to research and innovation expressed surprise at the lack of vision and values, and therefore of rationale for research. Fairclough's report[11] states:

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5 Sir Michael Latham (1994) *Constructing the Team: The Final Report of the Government/Industry Review of Procurement and Contractual Arrangements in the UK Construction Industry*, London: HMSO

6 Construction Task Force (1998) *Rethinking Construction: The Report of the Construction Taskforce*, London: DETR

7 Richard Saxon (2003) JCT Povey Lecture, RIBA, 29 October 2003

8 Richard Holti, Davide Nicolini and Mark Smalley (2000) *The handbook of supply chain management*, London: CIRIA and the Tavistock Institute

9 NAO, *Modernising Procurement*, ISBN 0-10-282099-6

10 OGC, *Prime Contracting, Procurement Guidance document no.5*, OGC. This recommended the use of Prime Contracting and Framework Agreements.

11 Sir John Fairclough (2001) *Rethinking Construction Innovation and Research*, London: DTI/DTLR

> Construction should be seen as central to a better quality of life for everyone, and concerned with a sustainable future. It needs to develop its vision, get widespread buy-in and communicate it to all stakeholders.

In response, Saxon proposed the following mission statement for the industry:

> To add value for customers and society by shaping and delivering the built environment to meet their needs.

Saxon went on to suggest:

> …the key enabler to unlock greater profitability and thus investment is a strategy to deliver more value to customers and society. …understanding value means understanding the benefits required or offered as well as the costs involved. For buildings benefits can be defined in how the building will service its function, how it will perform technically and how it will positively impact on users, the public and the environment. It will also perform as a financial asset. Costs should not be seen solely as capital ones. Whole life costs, plus the negative impact on the environment, society, the risk of failure and the opportunity costs of alternatives foregone must also figure.

And he concluded:

> *Be* is certain that the future of the industry formerly known as construction lies in Built Environment Solution Provision, by alliances of firms or by vertical integration.

Built Environment Solution Provision is intended to bring together and integrate the separate areas of property, design, construction, and facilities management. Be will offer training and tools to support this new landscape and will contribute to education and CPD courses in support of these new operating principles.

Be have been working with a team from Imperial College London, the Centre for Research in Innovation Management (CENTRIM) at the University of Brighton, and SPRU at Sussex University. Recent research by team members on Integrated Solutions in capital goods sectors have led to two relevant reports – *Integrated Solutions, the new economy between manufacturing and services*[12], and *Delivering Integrated Solutions*[13].

Integrated solutions (IS) are combinations of products and services that address a customer's unique requirements throughout the life cycle, from development and design to systems integration, operations and decommissioning. To become integrated solutions providers in capital goods, suppliers have had to create new business models, undergo major changes in organisation, and develop new capabilities and new approaches to customer relationships. Becoming solutions-focused has involved providers in having to understand how value is created through the eyes of the customer. Value is a central concept in the IS business model – value adding, value-creating, value-sharing, and value-delivering.

The place of design

Towards the end of the 1990s the design community too responded to the Latham and Egan agendas with several initiatives. The RIBA Practice Committee formed the Constructive Change group and organised a conference in 2000 called *Design Quality – the evidence*. Meanwhile the RIBA Futures

[12] Andrew Davies (2001) *Integrated Solutions, the new economy between manufacturing and services*, December 2001, ISBN 0-903622-96-3

[13] Andrew Davies, Tim Brady and Puay Tang, with Mike Hobday, Howard Rush and David Gann (2003) *Delivering Integrated Solutions*, , November 2003, ISBN 0 903622 98 X

Group commissioned two essays on *the value of architecture*[14]. CRISP convened a Design Task Group. The CIC commissioned the Science Policy Research Unit at Sussex University to develop Design Quality Indicators as a means to assess the product – in response to the Movement for Industry's Key Performance Indicators with their emphasis on benchmarking process. Housing Quality Indicators were devised. The Royal Academy of Engineering published a paper on *The long term costs of owning and using buildings* which promoted whole life costing and introduced the *1:5:200* ratio as a reminder to clients that it was important to look at the possible improvements to productivity of a well-designed building rather than just the initial capital cost. Jon Rouse, secretary to the Urban Task Force, studied for an MBA at Nottingham University where he interviewed the clients of ten bespoke buildings about their corporate investment in architectural design – and went on to head the newly established Commission for Architecture and the Built Environment. Funded by the DCMS and ODPM, CABE champions good design in the built environment. One of its first actions was to begin collecting and collating evidence about the benefits of good design; it also influenced government to launch the *Better Public Buildings* campaign which is intended to bring about a step change in the quality of our public buildings[15]. Design quality has become increasingly recognised as important in value for money assessment criteria for public building proposals[16,17].

These initiatives reawakened interest in the impact of design on outcomes. For example, when the Egan Report was updated and re-published as *Accelerating Change*[18], the earlier omission of any reference to the design of the finished product was corrected. The report now said:

> Our vision is for the UK construction industry to realise maximum value for all clients, end users and stakeholders and exceed their expectations through the consistent delivery of world class products and services. In order to achieve this the UK construction industry must:
> - add value for its customers, whether occasional or experienced, large or small;
> - exploit the economic and social value of good design to improve both the functionality and enjoyment for its end users of the environments it creates (for example, hospitals where patients recover more quickly, schools and work places which are more productive and more enjoyable to work in, and housing which raises the spirits and enhances the sense of self worth).[19]

Increasingly then there has been a widespread recognition both that everyone benefits from the buildings and facilities where we live and work providing environments that promote health, productivity, neighbourliness and civic pride, but also that the construction of new buildings, the refurbishment and maintenance of existing ones, and the management of facilities and property are a vital part of the economy and need to be operating successfully and efficiently for the well-being of society.

Publications written to deliver this message to clients include *Buildings that work for your business*[20] and *How buildings add value for clients*[21], and *Selecting Contractors by Value*[22].

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[14] Worpole, K. (1999) *The Value of Architecture – design economy and the architectural imagination*, London: RIBA Future Studies; and Loe, E (2000) *The value of architecture – context and current thinking*, London: RIBA Future Studies

[15] Department of Culture, Media and Sport (2000) *Better Public Buildings: a proud legacy for the future*, DCMS, October 2000

[16] Treasury Task Force (2000) *How to achieve design quality in PFI projects*, Technical Note 7, London: HM Treasury

[17] HM Treasury (2003) *Green Book, Appraisal and Evaluation in Central Government*, London: HM Treasury

[18] Strategic Forum for Construction (2002) *Accelerating change*, London: Strategic Forum

[19] This terminology came from the RCF's *Industry Network for Construction Research* group's vision statement

[20] Davis Langdon & Everest (2001) *Buildings that work for your business: building premises to enhance performance*, Institute of Directors/Director Publications Ltd

[21] Spencer, N. and Winch, G. (2002) *How buildings add value for clients*, London: Construction Industry Council

[22] Adrian Jackson-Robbins (1998) *Selecting Contractors by Value*, London: CIRIA

Revaluing construction

In February 2003 a conference was held in Manchester organised by the Conseil International du Batîment (CIB) under the title *Revaluing Construction – the International Agenda*[23]. The conference identified that new financing and contractual structures were being adopted by governments which determined new market relationships and created new business opportunities, and it noted that they brought with them new issues – of creating new forms of project team, of defining and measuring value and of managing life-cycle risk.

Subsequently on 5 September 2003, a seminar was held at Davis Langdon to consider *Value in Construction*. It was attended by representatives of academia and industry and considered the ways in which different concepts of 'value' relating to the creation, operation and use of the built environment, might be explored. The discussion considered value to the client (who may also be the user), value to the supply chain, and value to society, and reviewed various initiatives that were exploring these three value streams. The seminar identified a number of areas requiring research to improve fundamental understanding and create operational tools, including:

- developing improved understanding of the ways in which buildings and facilities add value to their owners'/users' operations. This will include studies and modelling of:
    - the influence of physical lay-out and environmental conditions on operational effectiveness
    - the influence of buildings on external perceptions of an organisation
    - the second-order business benefits (attractiveness to potential recruits, retention of staff, etc) obtained from an effective built environment
    - the technical factors that influence costs and effectiveness, incorporated in 'whole life' models
- reflecting the outputs in performance models and using these to underpin specifications and statutory performance requirements
- mapping the creation of value through construction processes and identifying the ways in which value is reduced
- characterising and modelling the value systems implicit in actors within the supply chain (including clients)
    - relating financial to non-financial reward factors
    - assessing the role of risk in influencing perceived values
    - identifying where communications fail because of inconsistent value systems
- developing contractual and procurement systems that reflect understanding of value creation
- examining the interaction between construction and societal representatives from a values perspective, identifying conflicts and developing tools for resolving these
    - linking this to the developing sustainability agenda
    - providing evidence-based assessment of the benefits from investment in the built environment in

One of the outcomes from the seminar was a proposal (unfortunately not funded) for a 'cluster' submitted to the joint AHRB/EPSRC *Designing for the 21st Century* Initiative under the title 'Designing for value and service delivery – expanding the design perspective in the built environment'. The principal strands to be explored by the cluster were:

[23] www.revaluingconstruction.com

- The concept of 'services' in this context – in what ways does the built environment provide services for its users?
- The measurement of impacts and performance – how can interactions be monitored and different levels of performance distinguished?
- The translation into value – what are the dimensions of 'value' in this context, including non-monetary aspects, and how might these be brought to a common metric?
- The different perspectives of stakeholders – clients, occupants, the community – how can their value systems can be taken into account in the design process?
- The implications for the design process of taking this perspective – how do responsibilities change and what new skills are required?

Several members of the Be/nCRISP Task Group had agreed to participate in the planned cluster, and the cluster's principal strands have been captured within this report.

Putting a value on intangible benefits

Within the last three or four years, it has become a commonplace to speak of the social and economic benefits[24] that accrue from good design. The introduction to the *Better Public Buildings* campaign, for example, said:

> …we know that good design provides a host of benefits. The best designed schools encourage children to learn. The best designed hospitals help patients to recover their spirits and their health. Well-designed parks and town centres help to bring communities together.

While the costs of construction are comparatively easy to assess, these kinds of benefits are far more difficult to measure – they are intangible – making it difficult for the industry to know the value of its own products. There is a parallel in business where accountants are increasingly faced with companies whose market value far exceeds the book value. Lev reports that between 1980 and 2001 the mean market-to-book ratio of the Standard & Poor 500 companies rose from about 1.1 to about 6 or 7 in March 2001: for every six dollars of market value, only one appears on the balance sheet, with the remaining five dollars representing intangible assets[25]. According to Lev, International Accounting Standard 38 (IAS 38) gives the following definition:

> Intangible assets are defined as non-monetary assets without physical substance held for use in production of supply of goods or services, for rental to others, or for administrative purposes and that are identifiable, that are controlled by an enterprise as a result of past events, and from which future economic benefits are expected to flow to the enterprise.

The future economic benefits may include:

> … revenue from sale of products or services, cost savings, or other benefits from use of the asset by the enterprise itself.

Rouse[26] describes how a number of corporate clients, whose expenditure on their new buildings exceeded the market value, tried to measure architectural value in order to justify the extra over expenditure. All the organisations recognised the corporate benefits from architectural investment, representing both tangible benefits of the sort that can be counted by traditional cost/benefit but also

[24] Environmental benefits have also been emphasised under the energy and sustainability agendas.

[25] Baruch Lev (2001) *Intangibles: management, measurement and reporting,* New York: Brookings Institute. In a footnote, Lev explains the 5:1 ratio is an oversimplification about the value of intangibles, but nevertheless 'the value of intangible assets is approximately three times larger, on average, than the current value of physical assets.'

[26] Jon Rouse (2004) 'Measuring value or only cost: the need for new valuation methods', in *Designing Better Buildings* edited by S. Macmillan, London: Spon Press

intangible benefits that are more difficult to measure. Employee satisfaction was the most highly rated motivation; human capital is the major resource of the organisations and they seek to enhance the ability of their employees to contribute to turnover and profitability. Corporate policy in architectural investment was also very important; design champions at senior levels within the organisation and corporate precedents for high quality architecture were both found to be important. For seven of the ten organisations, procuring a building was part of a much wider corporate development process – with the goals typically of transforming how the company does business; encouraging creativity, enhancing communication, promoting team work, operating less formally, encouraging flexible working and reducing hierarchy. Rouse argues that if the benefits of architectural quality and value can be demonstrated then additional investment into the built environment can be released.

In a direct follow on from Rouse's work, Eclipse Research Consultants undertook a project called *Better Designed Buildings – improving the valuation of intangibles* with funding from DTI's Partners in Innovation programme. The views and expertise of facilities managers, designers and surveyors and valuers were elicited through a series of workshops. The study identified six bundles of valued outcomes, shown in the following table:

Type of value created	**Bundle of valued outcomes**	**Examples of indicators or metrics**
Exchange value	Building as a commodity to be traded, whose commercial value is measured by the price that the market is willing to pay. For the owner this is the book value, for the developer the return on capital and profitability. Also covers issues such as ease of letting and disposability.	Book value Return on capital Rental Yield
Use value	Contribution of the building to organisational outcomes: productivity, profitability, competitiveness and repeat business, arising from a working environment that is safe in use, that promotes staff health, well-being and job satisfaction, that encourages flexible working, teamwork and communication, and enhances recruitment and retention while reducing absenteeism. Metrics will vary sector by sector but might include recovery rates, footfall, examination results, and occupant satisfaction.	Measures associated with occupancy: such as satisfaction, motivation; teamwork. Measures of productivity and profitability.
Image value	Contribution of the building to corporate identity, prestige, vision and reputation, demonstrating commitment to design excellence or to innovation, to openness, or as part of a brand image.	Public relations opportunities Brand awareness and prestige
Social value	Buildings that make connections between people, creating or enhancing opportunities for positive social interaction, reinforcing social identity and civic pride, encouraging social inclusion and contributing towards to improved social health, prosperity, morale, goodwill, neighbourly behaviour, safety and security, while reducing vandalism and crime.	Community pride Neighbourly behaviour Reduced crime and vandalism
Environmental value	The added value arising from a concern for intergenerational equity, the protection of biodiversity and the precautionary principle in relation to consumption of finite resources. The principles include adaptability and/or flexibility, robustness and low maintenance, and the application of a whole life cost approach, and the immediate benefits are to local health and pollution.	Environmental impact Whole life value
Cultural value	Culture makes us what we are. This is a measure of a building's contribution to the rich tapestry of a town or city, how it relates to its location and context, and also to broader patterns of historical development. Cultural value may include consideration of highly intangible issues like symbolism, inspiration and aesthetics. Indicators of cultural value may include critical press opinion and, perhaps, the 'wow' factor.	Press coverage Critical reviews

Box 1

A key suggestion from the study was the need to move away from a single point value towards a probability curve for quantifying value – future valuation methods may offer us ranges of values or a profile, rather a single number. Other recommendations were that:

- Occupying organisations need to understand much more about the contribution of their building to business outcomes, and to share the information across the whole sector
- The evidence base about the impact of buildings on outcomes needs to be developed and broadened and designers need to be more engaged with the delivery of successful outcomes
- The professional institutions and government need to assist in the development and promotion of new approaches to valuation that will capture the intangible benefits that accrue from higher design quality in the built environment.

The vocabulary of value and a dictionary of tangible and intangible benefits

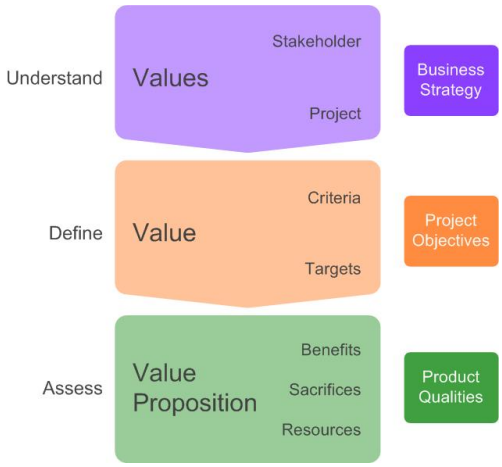
A current research project – *Value in Design* – at Loughborough University has worked alongside the Task Group. *Value in Design* has begun to establish terminology and a framework for understanding value. It is developing a common language for values and value, and devising methods to capture and communicate project values, to relate design tasks to project values and to monitor the delivery of value through the design process[27,28]. For example, the project has proposed that the stages of a building project can be expressed in terms of: first the *envisioning* of project values during briefing including target-setting and the initial 'value proposition'; then their *delivery* through design during which stakeholders judge the extent to which the projects reflects their values; the *realisation* of value though construction; and finally the *experience* of value by users and the public when the project is completed. The Loughborough team has proposed a specific definition of value and developed a framework which contains other key elements of a language of value (see box below).

We see value as a trade-off between what each stakeholders gets and what they have to give up, and believe that value should be seen from each stakeholders' own perspective.

$$\text{Value} = \frac{\text{What you get}}{\text{What you give}} \text{ for}$$

We believe that the framework provides a logical structure to help project teams understand all the issues that must be discussed among project stakeholders if value, and the drivers for its delivery, are to be fully understood. The framework has three elements which guide stakeholders through the discussion of their values to assessing project performance in delivering value.

27 Thomson D S, Austin S A, Devine-Wright H and Mills G R, (2003) 'Managing value and quality in design', *Building Research and Information*, Vol 31, No 5, 2003, pp 334-345.
28 www.valueindesign.com



Understanding values

Values describe stakeholders' beliefs, attitudes, and the principles that drive their actions. VALiD includes a method to help stakeholders understand, express and share their values. To establish common purpose and intent, a project team can also develop a shared set of **project values** formed from the values of each stakeholder and influenced by the project's nature and objectives. Each stakeholder's **business strategy** should be informed by their organisational values

Defining value

A representative of each stakeholder group expresses a set of *value criteria* and targets in a dashboard. They are responsible for what their group gets (beneficial and sacrificed outcomes) and the resources they give up. These targets, together with traditional *project objectives*, inform the team's development of the concept design solution that defines the value proposition. VALiD helps stakeholders express the "get" and the "give" of their 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.

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

This quite detailed definition has been developed through extensive review of the value literature. It embodies key sentiments expressed by influential reports on the construction sector, that have been identified in this report, namely a focus on outcomes (what you get) that are often termed benefits, in addition to a broader view of inputs (what you give) than costs.

Assessing the value proposition

Stakeholders undertake judgements of the value proposition offered by the emerging solution at key points in the process. They assess their own benefit, sacrifice and resource criteria and the results are summarised in their dashboards. These enable an informed discussion of performance so that the providers can take appropriate actions. These judgements are based upon product qualities – the physical and functional characteristics of the built product and the business it facilitates. Value delivery is focused on the knock-on effects of decisions on long term operating costs and business performance.

There are a number of tools to help implement the VALiD approach and Framework. These include a way to reveal values of individuals and groups as well as *dashboards* to capture stakeholder value criteria, targets and judgements.

The VALiD framework and instruments are now ready for evaluation and application through a programme of action research, and negotiations are under way for this to take place in association with Manchester City Council's capital and asset management programmes. Other test sites are also needed. Negotiations have also taken place to further the work on value drivers through action research with the London Development Agency. Both organisations are keen to participate.

To complement the VALiD framework, the Group believes that more needs to be known about the full spectrum of tangible and intangible benefits that buildings deliver for various stakeholders, across sectors, together with the means of measuring them and the factors that contribute to their successful achievement. The Be Valuable document will include a diagram of the value exchanges that occur in the built environment, developed by Richard Saxon.

Recommendations about the vocabulary of value and a dictionary of tangible and intangible benefits

Project description	**Funding body**	**Short or medium term**
The Group endorses the development of a consistent terminology for discussing value throughout a construction project and recommends that the framework is further tested and developed in action research projects.		
Two possible opportunities have already been identified: 1) that Loughborough collaborate with Salford University to work with Manchester City Council on their Schools Framework, their Housing Framework, their Asset Management Plan Programme and potentially their Disability Programme 2) that Be collaborate with the London Development Agency in their Regeneration & Development Division to explore issues about value and its delivery through regeneration..	EPSRC DTI Manchester City Council LDA	Medium term
More needs to be known about the full spectrum of tangible and intangible benefits that buildings deliver for various stakeholders, across all sectors, together with the means to measure them.	CABE DTI	Short
The framework of value exchanges between stakeholders that has been pioneered by Be should be developed into a comprehensive picture, both generically and within sectors.	Be	Short

Tools for making the business case, including value management

The *VALiD (Value in Design)* approach is developing as a means to capture and communicate stakeholder values. More generally, the approach of value management is widely written about and practised as a technique. BRE has published widely including a 38-page comprehensive bibliography of the value management literature by Hayles, Bowles and Gronqvist[29] who describe value management as:

> '…a strategic approach to achieving maximum value in a project consistent with the organisation's broad business goals. It is a structured team approach to problem solving that can be applied to the objective setting, concept, design and construction stages and the on-

[29] Hayles, C, Bowles, G and Gronqvist, M, (1997) Value from construction: a comprehensive bibliography, BRE Report BR 333

going management of buildings. A value management exercise aims to attain optimum value by providing the necessary functions at the least cost without prejudice to specified quality and performance.'

Connaughton and Green[30] published a guide for clients, while Male and Kelly[31] produced a good practice framework on value management for clients and practitioners. The Institute of Value Management (www.ivm.org.uk) has an extensive website in which construction is one of the sectors featured. Typically value management is conducted through a planned series of externally facilitated multi-disciplinary workshops that run from the strategic briefing stages through to technical implementation. The IVM admits that for many years value analysis and value engineering were associated with cost cutting and the elimination of waste, but claim that the application of value methods today is equally concerned with understanding client requirements and business needs – and has led to substantial improvements for many organisations in returns on investment and improvements in capital productivity.

Green went on to pioneer a 'soft VM' approach, and more recently has worked with members of Be and other organisations to bring together risk management and value management in a common approach. Through facilitated workshops, project teams negotiate and work towards alignment[32].

Tools are beginning to emerge, from VALiD and through value and risk management methods, for making the business case. Nevertheless, the Task Group believes there is an on-going need to devise tools that will enable property professionals to value key intangibles (perhaps using methods drawn from brand valuation) addressing the ways in which investment in facilities can add tangible and intangible benefits as perceived by various project stakeholders. The resulting understanding could then inform strategic briefing to ensure these benefits were delivered through the design of the project. These tools for making a business case should be consistent with terminology emerging from the Loughborough research and with the ideas embodied in the 1:5:200 ratio, though with the proviso that not all benefits can be counted in purely monetary terms and it would be a mistake to seek to represent them in this way. Quantitative and qualitative data about benefits and outcomes will need to be collated as part of this tool development.

While cost in use studies provide valuable information for decision making, in many fast moving sectors it is crucial for the project team to align a project or programme of works to their customer's business plans in terms of occupancy life. Project teams often make value decisions based on their knowledge of the expected life of systems and components, typically for a customer who has not been forced to consider the issue. Yet in periods when change is rapid, and there are pressures on PLCs to take short term views, it is vital that the issue of occupancy life be debated from the outset. The significance of the debate is particularly pertinent when linked to capital depreciation. Various companies will have different policies in place, but these will always need to be aligned to the operating life of the elements considered. The term can be defined by natural elemental redundancy, excessive use, or term of occupancy lease, whichever is the shorter. When assessing the NPV for the business case, the depreciation period can make payback on short lease expiry periods particularly onerous. If the property team assume long term design and delivery decisions for a short depreciation term it is unlikely that the project will proceed, and it is questionable whether they have served their customers well in understanding what value means to that customer.

[30] Connaughton, J and Green, S, (1996) *Value management in construction: a client's guide*, London: CIRIA
[31] Male, S. Kelly, J. et al, (1998) *The Value Management Benchmark: a good practice framework for clients and practitioners*, London: Thomas Telford
[32] Green, S. D. (2001) ,Towards an integrated script for risk and value management,, *International Project Management Journal*, **7**(1), pp 52-58

Recommendations about tools for making the business case		
Project description	**Funding body**	**Short or medium term**
Tools are needed to enable property professionals to value key intangibles, with the resulting understanding informing strategic briefing. These tools for making a business case should be consistent with terminology emerging from the Loughborough research and with the ideas embodied in the 1:5:200 ratio. Value and cost should be clearly differentiated.	RICS	Short
More needs to be known about the cost of ownership of buildings to organisations, and there is a need for data collection and sharing about running costs of buildings, as well as whole life costs. This is one of several areas where academic and industrial collaboration is needed to add to our knowledge.	RICS	Medium

Bottom up sectoral studies of the impact of buildings on delivery of value

There is a growing body of knowledge in various sectors about the impact of building design features on stakeholder outcomes. CABE commissioned a review of these in 2001 under the heading *The value of good design*[33] and – in some sectors – went on to turn the understanding into design guidance[34]. In this report, we focus on just three sectors although the principles we propose are equally applicable to other sectors.

Offices sector

Productivity in offices is a well-established research topic, and in 2004 CABE commissioned a major review of the global literature on productivity which has yet to be officially published. Past reviews include those by Oseland[35]; Heerwagen[36] and Haynes, Matzdorf, Nunnington, Ogunmakin, Pinder and Price[37]. It is widely accepted that productivity is affected negatively by poor indoor air quality and poor levels of thermal comfort[38]. However, as Hertzberg[39] has identified, the converse does not necessarily hold – improving comfort does not raise productivity. Leaman and Bordass[40] report that the killer variables among those which are under the control of building designers and facilities managers are:

- Personal control (also referred to as adaptive opportunities by others) - the ability to raise or lower blinds, open and close windows and use switches to control services
- Responsiveness – that is the speed of reaction to staff discomfort by facilities managers
- Building depth – deeper buildings tend to reduce satisfaction and productivity, while a depth of around 12m across the building seems about optimal
- Workgroups – perceptions of productivity are higher in smaller and more integrated workgroups.

[33] CABE (2001) The value of good design: how buildings and spaces create economic and social value, London: CABE
[34] CABE (no date) *Client Guide: achieving well designed schools through PFI*,London: CABE
[35] Oseland, N (1996) 'Productivity and the indoor environment', paper to fourth Indoor Air Quality Conference, held at Mid Career College
[36] Heerwagen, J (1998) 'Design, Productivity and Well-being: what are the links?' Paper presented at the American Institute of Architects Conference on Highly Effective Facilities, Cincinnati, Ohio
[37] Haynes, B, Matxdorf, F, Nunnington, N. Ogunmakin, C, Pinder, J and Price, I. (2000) *Does property benefit occupiers? An evaluation of the literature*, Occupier.org report number 1, Facilities Management Graduate Centre, Sheffield Hallam University.
[38] Wyon, D. no date, 'Enhancing Productivity While Reducing Energy Use in Buildings'
[39] Herzberg, F, (1993) *Motivation to Work*, Transaction Publishers.
[40] Leaman A and Bordass, B. 2000 'Productivity in buildings: the 'killer' variables, in Clements-Croome, D. (editor) 2000, *Creating the Productive Workplace*, London: E & FN Spon

The Task Group believes that post occupancy evaluation needs to become routine both for the purposes of organisations reviewing what is working and what is not working in their facilities, and also to generate evidence and knowledge for design teams. The Probe studies have given post occupancy studies a renewed impetus and the Usable Buildings Trust[41] has compiled a portfolio of feedback techniques for use at various stages in the project lifecycle.

The Office Productivity Network is engaged in developing a benchmarking tool for productivity in offices. Based on the balanced scorecard tool, there are 100 questions with 4 way scored answers divided into five categories: *Infrastructure and support; Environmental Conditions; Facilities and Amenities; Design and Layout; Location and Access*. It is completed through interview with the Facilities Manager and, ideally, with property colleagues. Its aim is to help distinguish 'good' from 'bad' offices in terms of their impact on the operations of the occupants and provide an objective and analytical mechanism for identifying those buildings in a portfolio which enhance occupying teams' performance from those sites which present barriers to performance.

While the OPN Index is a valuable qualitative approach, few companies have comprehensive data about their FM costs and the relationship between these and costs and productivity. Often buildings remain below the business radar. The Task Group believes that a change in perception is needed among occupying organisations. Facilities are, after all, fundamental to business performance, and FM spending needs to be seen as providing added value rather than begrudged as an overhead. Relatedly, there is a need for a quantitative benchmarking tool to enable Facilities Managers, consultants, and companies to understand better the relationship between occupation costs of their premises and their business performance, and what it is worth spending to achieve improved results. In the first instance, Be is forming a benchmarking club for its members to address this issue and has an FM group.

Education buildings

Schools figure prominently as a sector where there is interest in good design. Feilden reported:

> Gradually, research studies are being undertaken, mostly in the USA, but increasingly in Britain, with their findings being collated by the Commission for Architecture and the Built Environment. Positive correlations are claimed between the attributes of the building and pupils' examination results, and between quality of daylighting and progress in reading and maths; improvements of between 20 and 26% going from the worst daylit school to the best are reported (Heschong Mahone Group, 1999). In Britain a team lead by Professor Brian Edwards is investigating the performance of 'green' schools compared with similar schools that do not have these features. Early results imply positive correlation between green features and pupil performance, particularly at the primary level, although caution is essential in interpreting the data since it is difficult to ensure comparability among the schools being investigated for factors such as pupil intake and staff capability. Both this research and that undertaken by Price Waterhouse Coopers (2001) on behalf of the DfES show improved staff morale and retention in better facilities.[42]

Building Schools for the Future is an ambitious government programme to renew or rebuild all the nation's secondary schools in the next 10-15 years[43]. Exemplary designs for both primary and secondary schools have been commissioned to help:

> … develop a shared vision of what are 'Schools for the Future'; create benchmarks for well designed schools; push forward the boundaries of innovation and inspiration; support the delivery of Building Schools for the Future; and encourage industry to develop new ways of delivering school buildings.[44]

[41] www.usablebuildings.co.uk
[42] Richard Feilden (2004) 'Design Quality in New Schools', in *Designing Better Buildings*, edited S. Macmillan, London: Spon Press
[43] www.bsf.gov.uk
[44] DfES (2004) *Schools for the Future: exemplar designs, concepts and ideas*, London: DfES

Though the publication provides information on floor areas and costings, it makes no reference to learning outcomes and refers only fleetingly to the delivery of value to stakeholders. *Building Bulletin 95*[45] gives advice on a wide variety of design issues for schools for the future, although it too contains no reference to the impact of design on learning outcomes, staff recruitment or value to other stakeholders.

At every level of education (primary, secondary, tertiary) substantial changes are taking place in how education is delivered and in the ways in which young people are being taught, as well as the more widespread use of educational buildings by local communities. IT is becoming widely exploited in the delivery of education, but the new patterns of learning also demand new learning environments. The Task Group believes there are clear opportunities in the educational sector to introduce the vocabulary of value into current thinking about new learning environments. There is a need to gather feedback about the educational value of conventional building forms, and how robust these will be in the light of current and proposed changes in the pattern of teaching and education. There is also a need for feedback about the educational value of experimental designs. There is a need for more speculative research into the sorts of learning environments that will best support new styles of learning, for example, environments that promote the ability of people to work in groups and to learn from one another; that enable easy supervision and reduce opportunities for anti-social behaviour; and that provide calm spaces for attentive pupils to learn and study individually.

In tertiary education rising student numbers, lower staff-student ratios, group working, life-long learning and e-learning have prompted several universities to construct learning resource centres. There are few precedents available, and feedback about the effectiveness of these new facilities on learning is urgently needed. Two academic groups have commenced work of this kind. The University of the West of England has undertaken research into the impact of well-designed buildings on the performance of HEIs[46]. Meanwhile Loughborough University is studying *Research Environments for the Knowledge Economy* which is investigating how, and to what extent, better designed research environments can promote knowledge growth and innovation in non-laboratory research facilities[47]. Government expects HEI's to deliver better value, creating a need for productive work environments for research activity, but design guidance is scarce. The project takes a multi-disciplinary approach, using expertise from both academia and industry within fields such as the human sciences, social sciences, built environment and workplace design.

Healthcare buildings

The concept of designing therapeutic environments has a long history and this is one of the sectors which is relatively well-served by investigations into the impact of built facilities on healthcare outcomes. In 2001 NHS Estates formed their Centre for Healthcare Architecture and Design, and the Better Health Buildings initiative was launched in 2002 as the Department of Health's response to Better Public Buildings. The *Achieving Excellence Design Evaluation Toolkit* (AEDET) was developed, based on the DQI tool. *OnDesign*, the NHS heathcare design portal, includes a knowledge base about facilities and their impact. CABE formed a *Healthy Hospitals* programme and supported a study of *The role of hospital design in the recruitment, retention and performance of NHS nurses in England*[48]. The appendices of the report contain a detailed literature survey of the impact of healthcare buildings on their users; with more details available via the knowledge portal. Bryan Lawson has played a leading role in compiling and collating much of the evidence base.

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[45] DfES (2002) *Schools for the Future: designs for learning communities*, Building Bulletin 95, London: HMSO

[46] Grimshaw, R., Peglow, C., Puybaraud, M. and Symes, M. (2004) Design quality and institutional performance: the impact of well-designed buildings on the performance of HEIs in England. Evaluation in Progress: Strategies for Environmental Research and Implementation, presented at the 18th Conference of the International Asociation for People, Environment Studies, Vienna, 7-10 July 2004

[47] see www.theresearchenvironment.com

[48] PricewaterhouseCoopers (2004) *The role of hospital design in the recruitment, retention and performance of NHS nurses in England*, London: CABE.

NHS Estates held a conference in March 2005 on *Transforming the Environment – practical lessons in creating the environment for care.* Three themes were particularly in evidence:

- post occupancy evaluation (in which lessons learned are shared in a blame-free environment)
- the importance of briefing
- the potential of evidence based design to ensure the lessons from the past feed forward to new schemes.

In the US, a major literature review[49] was published in September 2004 by a team drawn from the Center for Health Systems and Design at Texas A&M University and the College of Architecture at Georgia Tech, led by Roger Ulrich, Director of the Center and well-known authority in the field. The authors report that they combed through scores of databases and several thousand scientific articles in order to identify 600-plus studies of how hospital design can impact on clinical outcomes. They acknowledge that hospitals are complex systems where it is difficult to isolate the impact of single factors. They go on to review studies of how the physical environment impacts on staff stress, fatigue and effectiveness in delivering care, and on patient safety and healthcare outcomes. The review covers design issues such as single-rooms versus multi-bed rooms, way-finding, noise and its effect, sunlight, exterior views, mechanical ventilation systems, and ergonomics. In their conclusions, they call for the adoption of evidence-based design as a means for creating health care buildings that are informed by the best available evidence about how the physical environment can interfere with or support activities by patients, families, and staff, and how the setting should be designed to provide a caring, effective, safe, patient-centred environment. Roger Ulrich is himself currently working in the UK looking at the drivers of hospital performance and the Task Group supports his secondment to the NHS.

An earlier and extremely detailed review in the healthcare sector by Rubin, Owens & Golden[50] combed the medical literature for research papers on the effect of the physical environment on patient outcomes. The authors applied the demanding standards of proof used in medical research and concluded that almost all the studies were methodologically flawed or limited. They had found 87 relevant studies to review in detail, whereas the 2004 paper found over 600, suggesting that the evidence base has grown substantially in the intervening years.

Healthcare infrastructure research is currently the subject of a major proposal to EPSRC being led by Imperial College, with team members from the universities of Salford, Loughborough and Reading, to establish a Health and Care Infrastructure Research and Innovation Centre (HaCIRIC) with seven themes: managing innovation in a context of technological change; delivering increased performance of health and care infrastructures through operations management; procurement for innovation; innovation in facility design and construction processes; knowledge management in complex systems; design and evaluation of integrated systems; and care delivery practices. HaCIRIC already demonstrates an awareness of the potential of therapeutic environments and the issue of value delivery. The Task Group supports the HaCIRIC initiative and believes that it will be important for the emerging new knowledge from the Centre about the issue of value capture and delivery to feed into mainstream practice.

Above all, the Task Group believes that hospital design is constrained by the past, as summed up by the saying: ‘if you do what you always did, you get what you always got.’ Briefs for new hospitals are based on Hospital Briefing Notes and there are rarely opportunities for radical innovation. The Group believes that there is a need for a fundamental review of the purpose of hospitals in terms of patient outcomes, and for a consideration of radical opportunities for the delivery of these outcomes. An example is the British preference for open wards versus single rooms, even though the risk of cross-

[49] Roger Ulrich*, Xiaobo Quan, Craig Zimring*, Anjali Joseph, Ruchi Choudhary, (2004) *The Role of the Physical Environment in the Hospital of the 21st Century: A Once-in-a-Lifetime Opportunity*. report, Center for Health Systems and Design, College of Architecture, Texas A&M University

[50] Rubin, H., Owens, A. J., & Golden, G. (1998*). Status report (1998): An investigation to determine whether the built environment affects patients' medical outcomes.* Martinez, CA: Center for Health Design

infection is considered to be higher in open wards, potentially resulting in slower speed of recovery and longer stays. It may be, for example, that 400 single rooms could achieve an equivalent throughput to 500 bed spaces in open wards. The Group believes that there is a need for evidence of this kind to be collected about outcomes, which could then be used to inform the strategic briefing process. This would enable design teams to have a creative dialogue with project stakeholders about performance drivers, valued outcomes, alternative options and opportunities for radical innovation.

Short and long term value: flexibility and adaptability

The recommendation that buildings are designed to be 'long life, loose fit, low energy' was extolled more than thirty years ago, and it has reappeared periodically since then, most recently within the sustainability agenda. As David Fisk has argued:

> ..it hardly then means much to say "form follows function" when "function" may vary so widely during a building's life. The function one seeks is then simply flexibility within the building shell. The idea of a design tightly optimised to first use looks inconsistent with sustainable development in a rapidly changing world. If these speculations are correct, it does not mean the end of building design appraisal, possibly the reverse. Rather than an automaton optimisation to a client brief, design becomes an assessment of the options to be left open, not the options to close.[51]

Clearly value in both the short term and long term needs to be recognised and taken into account.

Cross-sector consistency

The Task Group recognises that there are substantial differences in the stakeholders, the drivers and the outcomes in various sectors, and believes that an initial task is to explore whether there are common principles and generic processes that all sectors share. To the extent that there are, the Group recommends that sector-based studies should be prepared according to a mutually consistent framework and vocabulary so as to facilitate cross-sector comparisons and make it possible to identify similarities and differences. However, the attempt to work within a consistent framework should not be at the expense of understanding diversity among sectors.

Recommendations about bottom up studies[52]

Project description	Funding body	Short or medium term
The professional institutions need to support changes in perceptions among occupying organisations about their facilities and the contribution they make to business performance. Examples would be healthcare facilities that are themselves perceived not just as a container of activities but as part of the cure, or schools that are of themselves teaching tools.	BIFM RICS Be Centre for Facilities Management (CFM) at Salford University	Short
Grounded studies and quantitative benchmarking are needed to enable Facilities Managers, consultants, and companies to understand better the relationship between occupation costs of their premises and their business performance, what it is worth spending to achieve improved results, and how whole life value decisions are best incorporated into capital spending practices.	Be CFM at Salford UCL and Royal Bank of Scotland	Short

[51] David Fisk (1996) 'Sustainable development and Building Design' in *Buildings in the Age of Paradox* Edited by Adrian Leaman, Institute of Advanced Architectural Studies, The University of York, February 1996 page 19

[52] This paper is not sufficiently in-depth to recommend research needs sector by sector – by and large these are indicative recommendations about particular sectors to illustrate the type of research projects needed.

Bottom up studies in various sectors are needed to gather evidence about the value of existing forms of building and how robust these are against changes in styles of occupancy (e.g. how robust schools are given current changes in the pattern of education).	DTI Central and Local Government as clients and regulators	Medium-long
Speculative research (in various sectors) is needed into innovative and experimental designs that support new styles of occupancy where there are few precedents and rapid feedback is needed.	HEFCE NHS and OGD's CABE, Local Government, CBI and IoD	Medium-long
Because of the size and duration of government spending, and because some work has already been done by CABE, DfES and the Audit Commission, the schools sector would be a good initial focus and demonstrate what is possible in other sectors. Collaborative action-research teams are needed comprising education clients and users, bodies such as CABE and the Audit Commission, leading school design professionals (such as those involved in Building Schools for the Future), education researchers and built environment value-in-use researchers. Potential projects would include follow-up studies on first generation Building Schools for the Future projects, together with feedback from users who have contributed desired output specifications to PFI school projects, and designers who have responded to these. Wider studies of users (head teachers and similar) would examine their perceptions of how school buildings can add educational value.	Audit Commission CABE DfES	Medium
In the healthcare sector, the Task Group supports the HaCIRIC initiative and believes that it will be important for the emerging new knowledge from the Centre about the issue of value capture and delivery to feed into mainstream practice.	EPSRC	Short
In the healthcare sector specifically, there is a need for radical examination of the purpose of hospitals and fundamental review of how best to achieve the purpose, unconstrained by current practice.	NHS	Medium
The Task Group recognises that there are substantial differences in the stakeholders, the drivers and the outcomes in various sectors. An initial task is to examine whether it is feasible for sector-based studies to be prepared according to a common vocabulary and approach. If a common framework is feasible, this will facilitate the next stage – cross-sector comparisons and the identification of similarities and differences. However, it is important begin by collecting evidence of diversity and to use it to test for commonality rather than to assume commonality from the start, since a misplaced attempt to standardise may disguise important differences rather than illuminate them, and reduce understanding rather than enhance it.	EPSRC CABE	Medium

Public and private value in the urban context

The 'Guggenheim effect' in Bilbao has been widely reported, as has the impact of Brindley Place in Birmingham. Both flagship projects have helped to generate inward investment, leading to urban regeneration[53]. In his presentation at an Edge Debate, Geoff Mulgan referred to the same phenomenon. First he made the point that value is socially created – if people cease to buy mock-tudor style houses, their value will fall. He went on to point out the added complexity in the urban context in relation to private and public value:

> A new railway will raise property prices near stations; likewise a newly improved town centre or park. One measure of the success of regeneration projects is their impact on house prices (though this may of course displace the people who were originally intended to benefit from the regeneration). Conversely a private development may increase the attractiveness of a town square or a railway station.[54]

The Task Group believes research is needed into urban value systems, identifying the synergies between public and private value-seeking. This might study whether demand for healthcare and justice system services vary according to urban quality and sustainability factors ('where housing is poor or there are high levels of urban pollution, is there an increased demand for healthcare?'); how public investment in infrastructure and amenities creates private value gains; and how regulation could optimise the need for development and movement, with their energy and materials use implications.

Recommendations about public and private value in the urban context

Project description	Funding body	Short or medium term
The Bilbao effect of a flagship project driving inward investment has been widely reported, but few studies examine in detail the impact of urban regeneration on development activity. Such an examination would increase understanding of the impact of particular styles of regeneration, and would help to ensure investment in regeneration is used to greatest effect.	ODPM	Medium
Research is needed into urban value systems, identifying the synergies between public and private value-seeking, for example, whether demand for healthcare and justice system services vary according to urban quality and sustainability; how public investment in infrastructure and amenities creates private value gains; and how regulation could optimise the need for development and movement, with their energy and materials use implications.	ODPM Cabinet Office	Medium
Studies are needed into the creation of value in the public sector where there is no market	ODPM Cabinet office	Medium
There is a need to encourage innovative debate and learning about different aspects of value of the built environment within forums concerned with urban and regional development and regeneration, bringing together policymakers and academics from different disciplines. Institutions that have good contacts within this field of "social enterprise" (such as the Open University Business School) could play a facilitating role in bringing the value of the built environment into clearer focus within existing forums, as well as helping establish new forums.	ODPM, DTI	Medium

[53] Worpole, K. (1999) *The Value of Architecture – design economy and the architectural imagination*, London: RIBA Future Studies

[54] Geoff Mulgan (2005) *Public value, physical capital and the potential of value maps*, paper for CABE presented at the Edge Debate, RIBA, 29 January 2005.

Relating costs of finance, design, construction, facilities management and business operation

The ratio between finance, capital cost, facilities management costs and business operating costs was first coined in a paper published in 1998 by the Royal Academy of Engineering[55] and the ratio given in the paper of 1:5:200, has since been widely quoted.

When the ratio was originally introduced it was as an aside in a paper about the long term costs of owning a building, whose goal was to promote whole life costing methods over the traditional short-term focus on initial capital costs. No supporting data was provided in the paper to underpin the ratio and, though influential, in fact it was widely misunderstood:

> The paper had a galvanic effect, especially on public sector thinking about Best Value. The immediate and incorrect assumption was made that the '5' represented operating costs alone. … In fact the '5' consists principally of rent, the amalgam of construction and land costs, finance to pay for them, development costs and profits. Only a rump, typically a quarter, to a third, is actual operating cost. All occupiers pay rent or its equivalent: opportunity cost on their own capital; use charges from the public sector; a PFI unitary payment. A typical uninflated 25 year PFI payment is often five times the capital construction cost, but with only a quarter of it providing FM services (ref). It is possible to make a case for better construction standards to reduce whole life costs, but the use of borrowed money for additional capital makes payback calculations more taxing.
>
> What was really interesting in '1:5:200' was the relationship between lifetime building costs and employee costs. Whilst the ratio differs between building types it is always true that staff costs will be an order of magnitude greater than facilities ownership and operating costs. The basic message is that facilities should support occupier performance and that minimum cost facilities may not do that.[56]

In 2004 Hughes and his colleagues located and analysed data from three UK offices which, based on different assumptions about each of the three terms, revealed a ratio of 1:0.4:12[57]. In another examination from a top-down macro-economic perspective, Ive[58] started with the amounts spent nationally on housing and construction, the national costs of facilities management, and total GDP, and demonstrated that the national economy was insufficiently large to support such a ratio in every sector.

The 1:5:200 ratio clearly caught the imagination of many players and has been widely cited since it was first published. Perhaps it has a simplicity that makes it easy to assimilate. Since its publication, the assumptions on which the original ratio were based have been clarified, and other data on capital and operating costs has been obtained from various sources to enable the ratio to be re-examined under different assumptions.

The Task Group believes that there is now a need to obtain widespread agreement across the industry about appropriate categories for each of the three terms so that future comparisons are made on a common basis. The Group recommends that the third term needs to capture the 'value added' by the business operations in the facility in some way that expresses the facility's effectiveness. While the

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[55] Raymond Evans, Richard Haryott, Norman Haste and Alan Jones, (1998) *The long term costs of owning and using buildings*. London: Royal Academy of Engineering.

[56] Richard Saxon (forthcoming) in *Be Valuable – the Be guide to value*, to be published by Be.

[57] Hughes, W., Ancell, D., Gruneberg, S. & Hirst, L. (2004) 'Exposing the myth of the 1:5:200 ratio relating initial cost, maintenance and staffing costs of office buildings', in Khosrowshahi, F. (ed.) *Proceedings ARCOM 20th Annual Conference*, held at Heriot-Watt University, September 2004. Reading: ARCOM.

[58] Graham Ive (2005) '1:5:200 in the long term costs of ownership and occupancy of offices – a comparison of a project-discounting and a portfolio or stock account perspective', unpublished paper first introduced at a meeting, DLMC, 4 October 2004, and refined for a second meeting at BDP, 22 February 2005.

present 1:5:200 ratio has emerged from the offices sector, the Group believes an equivalent measure could be useful in other sectors – where again, there needs to be agreement about what each of the terms should include and exclude. Potentially, it could be part of the benchmarking tool cited above for comparing costs of occupancy and business outputs. The overarching aim of this work will be to reveal whole-life benefits, sacrifices and resources and encourage investment in a robust and well-designed building stock that reduces maintenance and utility costs and increases business/occupier effectiveness.

Recommendations from the Task Group about costs and impacts of design

Project description	**Funding body**	**Short or medium term**
The comparison of *capital costs*, *lifetime facilities costs* and the *effectiveness of a facility in adding value to business operations* is widely recognised as useful[59] The Task Group envisages that what is needed are separate, but mutually consistent frameworks and methods of measurement for owner-occupiers and for tenants / property investors. A group should be formed to develop, test and refine approaches (e.g. economic and accounting; rent-as-annualised-construction cost and discounted resource cost) for single office buildings with a view to testing the market for a standard method of measurement. A possible research team would comprise Bartlett UCL, City Business School, Reading, RICS (and its subsidiaries, BCIS and BMIS) and occupiers, owners and surveyors. If successful, an industry club might be formed to take this work forward.	EPSRC ESRC RICS	Short - medium
Once a set of principles have been agreed about how to treat *capital costs*, *lifetime facilities costs* and some measure of '*added value'*, data should be collected across various sectors. An evidence base of this kind would enable cross-sectoral comparisons and provide the basis of a benchmarking system within sectors. Building age may be an important factor on FM costs and should be included within the assessment. Reviews should be conducted of the business cases for recent public sector building projects to assess what evidence and what methods have been used to estimate costs and benefits, and what has been the balance between *added value*, *initial capital cost* and *on-going costs* – and whether the projected costs and benefits have been borne out in practice.	EPSRC, ESRC	Short
While there are many studies on the impact of the physical environment on social and economic outcomes in offices and hospitals, there are far fewer in other sectors. Such studies should be encouraged in order to develop a well-founded evidence base about the impact of the built environment on social and economic outcomes.	National Audit Office Audit Commission	Medium
The formation of a benchmarking club for customers, FMs and consultants on occupation costs and business performance factors should be supported within the industry.	Be	Medium

[59] Ive identifies four components to the value / cost relationship:

- value-in-use of final outputs (V);
- cost over project life of operating within the project assets to deliver those final outputs or services (S);
- cost over project life of maintaining, partially replacing and managing the project assets (F); and
- cost over project life of initial construction of the project assets (C).

Modelling Value in the Built Environment – a top down view

The report for nCRISP from David Pearce[60] provides a high level top-down view of the contribution of both the construction industry and of the built environment to the whole economy. Pearce's report deals, *perhaps for the first time in a single volume*, with four related issues: the flows and transactions of the industry (construction activity), the building stock (the assets that comprise constructed wealth), unmarketed benefits (the well-being produced by the built environment) and unmarketed costs (such as pollution or loss of aesthetic quality). Among its nine recommendations for a research agenda (pp59-60), it identifies the need for widening and deepening understanding of the socio-economic value of construction, and improving understanding of the impact of good design on the built environment (in recognition that good design can produce significant benefits and the opposite is also the case).

VTT in Finland have prepared a study of *Well-being through construction in Finland*[61]. The Group believes this is an exemplary output that convincingly demonstrates the huge importance of the construction industry and the built environment to the national economy. The Pearce report contains some of the equivalent data for the UK but is written from a more academic standpoint. The Group would like to see an attractive and accessible publication about the industry comparable to the Finnish example prepared for the UK. It should include statistics not only about the design costs and trade spend of the construction industry (in new build and refurbishment, maintenance and improvement) but also about facilities management and utility flows. The Task Group believes there is an argument that some RMI costs should more logically be classified as FM rather than construction for future analyses, on the grounds that different decision makers are responsible for change & churn and minor works compared with those responsible for new build.

Recommendations about top-down modelling of value

Project description	**Funding body**	**Short or medium term**
There is a need: • to build a top-down economic model integrating property, design, construction, and FM • to ensure this model is consistent with bottom up studies of building value • to reconcile the terminology used in the built environment to ensure consistent treatment of costs and benefits as perceived by economists, accountants and valuers.	ESRC EPSRC DTI CABE	Medium
The Task Group would like to see the production of an attractively produced and accessible publication setting out the huge contribution of the construction industry and the built environment to the UK economy.	Be in collaboration with DTI, nCRISP, or CABE	Short
In terms of added value, there is a need for research into: • how business is transacted in the construction sector • the influence of the institutions on relationships between suppliers and designers • the impact of legislation and the impact of these on the delivery of value to stakeholders.	DTI	Medium

[60] David Pearce (2003) *The social and economic value of the built environment*, report to nCRISP, London: CRISP.
[61] VTT (2003) *Well-being through construction in Finland*, Helsinki: VTT. http://www.vtt.fi/rte/dms/tuotteet/wellbeing2003.pdf

A programme of research is needed to improve the measurement of flows of output and expenditure under the constituent categories of Facilities Management. This should include checking how representative and reliable the data is by combining top-down and bottom-up assessments. The outcomes of this include better macro figures for FM, means and spreads for FM costs by building type, as well as potential case studies and building-level data. The categorisation of refurbishment, maintenance and improvements costs needs to be reviewed, since some of these costs – for example, where they relate to change and churn and minor works – might more appropriately be classified as FM. These projects will require a research team combining knowledge of FM practice and of national income accounting.	Be, DTI, UCL	Medium

Value based reward systems

Traditionally reward for architectural and engineering design services was based on a percentage of the capital cost of the building. During the 1980s fees were subject to compulsory competitive fee tendering promoted as part of the Citizen's Charter. In an impassioned article in the Independent, Richard MacCormac pointed out:

> Consumers know they get the quality they pay for …The critical resource of architects … is time and traditional fee arrangements offered sufficient time to give maximum creativity, attention and energy to the task. Price competition inverts this principle, inviting the minimum application of time and energy to minimise price.[62]

Among the changes in fee structures since then has been for the design of building services. Where previously fees for mechanical and electrical engineering services were based on a percentage of the capital cost of the mechanical and electrical plant, today they are more often based on the total capital cost of the building. As a result building services engineers are more willing to consider total energy performance of a building and give advice on issues such as thermal mass and window design even where this advice reduces the need for mechanical plant. Generally speaking however, design fees remain linked to capital cost. This tends to work against the exploration of options in the search for the most effective solution and the highest added value, as well as against the use of sophisticated building simulation tools for exploring performance. Nor, if the design team identifies during the design process a better way to do something, is there an incentive to propose it – since the designer may have to spend more time to develop the idea but receive no additional reward. By contrast the Building Down Barriers project pioneered an approach where anyone in the supply chain could suggest improvements that would benefit the project without risking their own profit.

Value-based reward is an alternative approach to reward. It recognises that the early design phase is a period when the greatest opportunities occur to add value. But those who are experimenting with it are also encouraging the design team to be fully integrated into the supply team and contribute to the design of component and system interfaces. Roger Zogolovitch, who introduced the notion of value based reward and proposed a value framework at the 2002 RIBA Conference, believes the industry has become obsessed with cost control at the expense of supply chain motivation. As an architect turned developer he is exploring two approaches to value: sharing the margin with the professional team, and extending professional services to ensure they cover the complex relationship between structure, fabric and services.

[62] Richard MacCormac (1992) 'Look at our monuments and weep', *The Independent*, 9 December 1992, page 21

To share the rewards with the professional team, Zogolovitch's approach is to identify the margin between cost and value and then to convert the percentage of the capital cost into a percentage of the margin. For example, instead of receiving 5% of the capital cost, the team might receive 30% of the margin. All members of the professional team are engaged on the same basis. In consequence, if this margin is increased (either by reducing the capital cost or by increasing the value) then the fee is also increased – providing an incentive to the whole professional team both *to add value* and *to control costs* and without risking their own reward, indeed potentially enhancing it. Extending the professional team through the later stages (even with a Design & Build contract) is also linked to this – designers have the skills to design interfaces between structure, fabric and services and he ensures the team continues to exercise their skills through to the later stages.

Zogolovitch also argues that, with building services now representing 35-40% of total capital costs, and also being the cause of 55-60% of maintenance costs, attention needs to move towards making them more efficient. Currently buildings comprise two different approaches – with the fabric designed as a static system and the services updated and changed around it. Zogolovitch believes there may be alternative ways for the two systems to be better linked; raised floors are an example of linkage, but they are relatively unresolved and primitive.

BDP has worked in a similar way with Roche, where fees were time-based rather than linked to the cost of construction. The project was brought in two months early and below budget (ref article in Building, Feb 2005)

The Task Group recognises that the delivery of value is not in the gift of any one profession or community. Value is cross-disciplinary and unbounded. The range of interventions needed, for example, to deliver improved patient or educational outcomes require effective collaboration by all the key stakeholders. Potentially the replacement of adversarial relationships and defending territory by greater openness, collaboration and negotiation, when combined with greater rewards for adding value, could help to improve the attractiveness of the industry to talented young people. Be is talking to Richard Holti and his colleagues at the Open University Business School about this area.

The Task Group believes there is a need for case study material to document how value based reward operates and to provide precedents and examples. Value-linked payments might include equity shares, sale or letting price bonuses, bonuses for exceeding target net-to-gross and gain shares for improving on timescale and budget. All these means help to move risk from the client team to the professional team. As well as positive incentives, there may be negative ones, such as the withholding of rewards when targets are not reached. A programme of action research – with researchers working alongside organisations who are exploring value based reward – is needed. Such research would allow the processes to be facilitated, documented and recorded, and the benefits and risks associated with the various alternative approaches to be catalogued and assessed, including how margins are assessed, how risks are managed, and how trust is developed. Comparisons with conventional practice are needed.

Recommendations about value based reward systems

Project description	**Funding body**	**Short or medium term**
Research is needed into the possibilities of, and implications for, value based reward for construction projects. A programme of action research is needed where researchers work alongside organisations who are exploring value based reward with the aim of studying the contributions that various parties within the supply side have the potential to make and the inter-disciplinary collaboration that is needed to support these contributions. Case studies are required.	ESRC EPSRC DTI	Medium

To complement this, theoretical research is required applying the theory of incentives in this area, examining design contracts and practices and grounded in the construction sector. Possible participants could include Centre for Market and Public Organisation at the University of Bristol, and the Bartlett and Department of Economics at UCL. Such research would facilitate, document and record the process, and evaluate the benefits and risks associated with the various alternative approaches, including how margins are assessed, how risks are managed, and how trust is developed. Comparisons should be made with conventional practice.		

Learning and skills agenda: knowledge capture, briefing and collaboration

There are a number of initiatives currently under way in connection with the learning and skills agenda. Davis Langdon Consultancy and Experian Business Strategies undertook a survey of Built Environment Professional Services Skills Survey for 2003/2004, which included reviewing design skill needs[63]. nCRISP has an Education and Skills Task Group whose aim is to identify what research is needed to support the needs for change with respect to the "ConstructionSkills" agenda.

The Sustainable Communities Plan, launched by the Deputy Prime Minister in February 2003 was accompanied by the commissioning of Sir John Egan to consider the skills needed to help deliver the vision and aims of the Sustainable Communities Plan. Subsequently, Ernst & Young prepared their *Evidence base review of skills for sustainable communities*[64]. This reported on the availability of appropriate skills and whether the number of people in the identified 'core' professions would be sufficient to meet the demands for skills created by the Sustainable Communities Plan. A national centre for developing skills was proposed, and became operational in 2005 as the Leeds-based Academy for Sustainable Communities[65].

ASC intends to work with other bodies and to develop a widely-accessible research base on sustainable community skills which will be used to establish baselines on supply and demand; to identify gaps in provision and people shortages; and inform action plans and programmes. An earlier initiative in support of the built environment is CEBE, the Centre for Education in the Built Environment. The Centre provides discipline based support to enhance the quality of learning and teaching in the UK Higher Education Built Environment community. *Interdisciplinary Design in the Built Environment* is a part-time Masters course at Cambridge that promotes design as an activity that adds value, while the Bartlett at University College London has recently launched an MSc in *Interdisciplinary Management of Projects*. Training is being offered by Be's Collaborative Working Centre (CWC) for the ProCure 21 Design Champions Group to promote an understanding of the nature of design and how it can add value in healthcare.

The Task Group believes that changes to current practice implied by a focus on outcomes rather than outputs and on buildings perceived as assets rather than artefacts, together with the emphasis on the delivery of value to stakeholders, have implications for both learning and skills. Neither CEBE nor ASC (though it is early days to judge the latter) appears, so far as can be determined by their web-sites, to be addressing the issue of delivery of value to stakeholders. Yet we believe that the issue of value represents an advance in thinking for construction and that there is a need to study the cultural change issues and how they can be managed and introduced into construction education both at the early stages and later as part of CPD.

[63] Davis Langdon Consultancy and Experian Business Strategies (2004) *Built Environment Professional Services Skills Survey 2003/2004*, Construction Industry Council
[64] Ernst & Young (2004) *Evidence base review of skills for sustainable communities*, London: HMSO
[65] www.ascskills.org.uk

One of the key areas where change is required is in the briefing process. *Accelerating Change*[66] recommended that it is the task of designers to assist their clients to enter the construction process with a clear understanding of their business needs and the functionality they require from the finished product. Designers should to help clients understand what value means for them. New knowledge based on feedback from the operation of buildings in use is needed for this process to occur. But there is also a need for building designers themselves to develop a better understanding of their clients' business processes, business needs and performance drivers. This will demand a change in mind set towards greater customer focus, and improved consultancy skills in briefing-making. These skills may include the capability to elicit knowledge, determine goals and capture values from diverse stakeholders, not only within business organisations but also neighbouring residents, local authorities, building visitors, and so on. The means to do so are likely to include observation, surveys, focus groups, meetings and other forms of consultation and negotiation. There is also a need for case studies that show how these skills can be developed and exercised in various sectors, and how the enhanced understanding that results can lead to buildings that better meet the needs their stakeholders.

Effective teamwork and collaborative working – in so-called integrated teams – was an issue stressed in the original Egan report and emphasised again in Accelerating Change. Be is producing a guide to effective collaboration and the Task Group believes that collaboration too needs to be part of the learning and skills agenda. The Be Education Working Group has been working with CITB ConstructionSkills, their consultants, and CWC, on the development of an extensive, multi disciplinary training database with a particular focus on collaborative working, management and leadership in the built environment.

A wide range of new knowledge and principles will emerge from the value agenda, and these need to be effectively captured and conveyed through undergraduate and post-graduate education, through CPD and through organisations like ASC and CEBE.

Recommendations about the learning and skills agenda

Project description	**Funding body**	**Short or medium term**
The potential of good design to add social, economic and environmental value should be introduced into the learning and skill agendas of CEBE and the Academy of Sustainable Communities.	CEBE ASC	Short
New knowledge based on feedback from the operation of buildings is needed to enable designers help clients to understand what value means for them.	ESRC EPSRC	Medium
Building designers need better understanding of business processes, business needs and performance drivers. There is also a need for a change in mind-set towards greater customer focus. New skills are required - in eliciting knowledge, determining goals and capturing values from a wide range of stakeholders – which may need observational and survey skills, and skills in facilitation, negotiation, and collaboration.	CEBE ASC	Short
A better understanding is needed, through grounded research, of the processes and practices by which project managers incorporate and optimise O&M decisions into capital expenditure decision making, and how these practices can be embedded in capital management organisations, such as clients, owners, project managers, contractors, suppliers, and others.	UCL and Royal Bank of Scotland	Short

[66] Strategic Forum (2002) *Accelerating Change*, London: Strategic Forum.