

**BERR**

Department for Business  
Enterprise & Regulatory Reform

**INNOVATION IN CONSTRUCTION  
SERVICES**

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# Innovation in Construction Services

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# Innovation in Construction Services

1. The work on innovation in construction services is set firmly in the context of the Rethinking Construction/Accelerating Change agenda. The main themes of that agenda – committed leadership; focus on the customer; integration; a quality-driven agenda; commitment to people – all relate to the working methods and processes of the industry, and the services it provides to clients.
2. This is the change agenda which the Strategic Forum for Construction and BERR (and formerly DTI) have been pursuing with some success over recent years. Much progress has been made and there is still much to do.
3. The work thus far (set out in the attached paper) confirms the importance of actions already in hand by industry and Government and identifies other areas for further work where there may be scope for pushing the boundaries.

## Recommendations

4. In June 2008 The Strategic Forum for Construction launched new targets to enable the industry to maintain the momentum towards making the whole of UK construction world-class (paragraph 8).
5. These targets include a new boost towards the use of integrated teams. The Strategic Forum for Construction has agreed a series of measures to give added impetus to this key area (paragraph 10).
6. As part of this effort, BERR should continue to work with key players across Government to showcase specific Demonstration Projects on how integration delivers better value for all parties (paragraph 11).
7. Project insurance may reinforce integration and reduce costs. The Strategic Forum is involved in a series of pilots. Decisions should be taken in the light of their results (paragraph 12).
8. One-third of construction output is procured by the public sector. The OGC White Paper “Transforming Government Procurement” is a key document. BERR should work with OGC to assist its implementation across Government (paragraph 14).

9. BERR and OGC should work together with other Government Departments to improve the performance of central Government on construction procurement (paragraph 17) and through the Local Government Task Force and the Local Government Association in respect of local authority construction procurement (paragraph 19).
10. BERR should continue to explore with the Department for Children, Schools, and Families whether the lessons of the LIFT Innovation Project may be applicable to construction procurement in education (paragraph 18).
11. The construction industry should continue to benefit from the reductions in time and cost of prequalification through Constructionline after the expiry of the current contract with BERR in the autumn of 2008 (paragraph 20).
12. Clients have a key role in construction innovation and need to take informed decisions as to the balance of risk and reward. More work is needed on how to ensure the client is well informed to make these judgements and the role of advisers (paragraph 22).
13. Awareness of the Technology Programme, of the Modern Built Environment Knowledge Transfer Network (and other KTNs) and of the industry-led National Platform for the Built Environment needs to be enhanced, and placed in the context of the wider Accelerating Change agenda (paragraphs 24 to 25).
14. Consistent with the report by the CEMEP (Commission on Environmental Markets and Economic Performance), regulation relating to construction should take account of what can be achieved through innovation so as to incentivise performance improvement and promote a more competitive construction industry (paragraph 27).
15. Standards set minimum requirements and can play a significant part in tackling performance (e.g. cowboy builders) and improving the image of an industry. BERR should continue to promote the benefits of Trustmark in driving up standards in this part of the industry (paragraph 28).
16. Codes and standards can enhance performance through embodying an aspirational element. Work is underway in BSI, and with Constructing Excellence, on how this can be achieved more generally in construction. Decisions should be taken in the light of that further work (paragraph 31).
17. More work is needed, not least with CLG, OGC, other Departments, the BSI Construction Standards Group on the opportunities and costs of greater use of digital design tools and of Interoperable Building Information Modelling (IBIM) (paragraph 32).
18. Work is needed, with CLG, on how new buildings operate in use, and on the benefits and costs of greater use of post construction evaluation techniques (paragraph 33).
19. Further work is needed on how to measure innovation in construction services. It is unlikely to be easy and could involve a lot of time and effort getting nowhere. The Community Innovation Survey (CIS) is the best guide now (paragraph 34).

20. BERR should continue working closely with the Sector Skills Councils and others especially the Construction Industry Council, to help take forward specific proposals in connection with developing a lifelong learning culture for managers and supervisors (paragraph 37).

# Innovation in Construction Services

## Definition of the sector/area

1. There are over 270,000 enterprises active in the construction industry, employing over 2 million people. Construction accounts for 8.7% of national gross value added and its economic importance is wider than that: well-managed and successfully delivered construction projects can improve the delivery of public services (such as health, education or transport), improve business productivity (more productive factories and offices) and improve standards of living and the natural environment.

## Market Structure

2. As Sir John Egan observed in "Rethinking Construction" (1998), at its best, the UK construction industry is world class. The industry is flexible, and its workforce willing and adaptable. Its ability to deliver the most demanding projects matches that of any other construction industry in the world. However, the "traditional" industry is often considered to be one with a low and unreliable rate of profitability, which invests little in R & D, in capital or in training, and which works indiscriminately on the basis of lowest price. The extensive use of sub-contracting has brought contractual relations to the fore and made it more difficult to develop the continuity of supply chains which can be so important for efficient working. This is reflected in the construction industry's representative bodies: an informal survey commissioned by Wates uncovered "a whole cottage industry – over 300 organisations."

## Drivers of Change

3. BERR's relationship with the construction industry is set firmly in the context of Sir John Egan's "Rethinking Construction" which set out an approach for substantial improvements in quality and efficiency. In 2002 the Strategic Forum's "Accelerating Change"<sup>1</sup> identified the 4 main areas of focus key to delivery of the Egan approach. These were:

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1 The Strategic Forum for Construction brings together the umbrella bodies of the industry to take forward the vision established by "Accelerating Change". This vision was "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." The Forum comprises the Construction Confederation; the Construction Industry Council; the Construction Products Association; the Construction Clients Group; the National Specialist Contractors/Specialist Engineering Contractors Group; and the Trades Union Congress.

- Client leadership: clients procuring projects in a way that allows all in the integrated team to maximise the added value their expertise can deliver;
- Integrated teams and supply side integration: created at the optimal time in the process to release fully the contribution each can make and share risk and reward in a non-adversarial way;
- Culture change in people issues : a positive image, an emphasis on education and training and behaviour based on mutual respect; and
- A focus on the end product.

## How UK firms are performing

4. There have been a number of productivity studies investigating the competitiveness of the UK construction sector in the past few years (two of which – UCL/Davis Langdon and Experian – were funded by DTI).

**Table 1: International Labour Productivity measures (indexed with UK as 100)**

	<b>University College London/Davis Langdon (2004)</b>	<b>Experian Business Strategies (2004)</b>	<b>NIESR (2007)</b>
<b>France</b>	137	108	95
<b>Germany</b>	121	109	93
<b>UK</b>	100	100	100
<b>USA</b>	139	132	131

This evidence suggests the US is performing better on labour productivity grounds than European counterparts, but the UK's relative position with regard to Germany and France is unclear<sup>2</sup>. Estimates of total factor productivity are more consistent, with the UK outperforming France and Germany but still lagging the US. The three studies in Table 2 show consistent ranking of UK, France, Germany and US.

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<sup>2</sup> International labour productivity comparisons need to be considered carefully. There are difficulties in measuring labour inputs in any country because of migration, the hidden economy and because the results are sensitive to exchange rates. Indeed cross-country comparisons of productivity levels across the whole construction industry are not comparing like with like, since the composition of construction output differs greatly from country to country.

Table 2: International Total Factor Productivity measures (indexed with UK as 100)

TFP Estimates	O'Mahoney and de Boer (2002)	Experian (2004)	NIESR (2007)
France	98	96	77
Germany	85	92	70
UK	100	100	100
USA	102	120	113

5. Since "Accelerating Change" in 2002, the Strategic Forum has been measuring the performance of the UK construction industry in 4 key areas:
- Client leadership
  - Procurement and Integration
  - Design Quality
  - Commitment to People.
6. Targets in all areas have been met save the target that, by the end of 2007, 50% of construction projects (by value) should be undertaken by integrated teams. In fact, by 2005 only 13% of projects (by value) were being undertaken by integrated teams. Work is currently under way to identify how much progress has been made since 2005 but it is clear that the 50% target has not been reached. A note on the improvement in industry performance in each area is at Annex A.
7. OGC have reported "a significant improving trend" in public sector construction projects in relation to benchmarks established in 1998 by Bath University, as follows:

Measurement Target	Bath University Study 1998	April 2003-March 2005	April – September 2006
On time	30%	65%	74%
Within Budget	27%	61%	70%
Exceeding customer & stakeholder expectations	–	70%	83%

## Scope for industry/Government action

### New targets launched by the Strategic Forum

8. In June 2008 *the Strategic Forum launched a range of new targets to enable the industry to maintain its momentum towards making the whole of UK construction world-class (Annex B)*. The targets intend to make the principles embraced in the 2012 Construction Commitments<sup>3</sup> the priority of all construction projects; and to reflect new targets being developed through the HSE (Health & Safety Executive), ConstructionSkills, and the Strategy for Sustainable Construction developed by industry and Government (BERR, CLG, DEFRA, OGC). The joint launch of the Forum's new targets and the industry/Government Strategy for Sustainable Construction sought to demonstrate that sustainability should not be a distinct category but intrinsic to the way industry and Government do business<sup>4</sup>.

### Continued emphasis on Integration<sup>5</sup> by the Strategic Forum and Government

9. Truly integrated teams should drive innovation in 6 key ways:
  - Early involvement of all key players in the project, enabling optimum solutions to be identified to specific issues. Second tier contractors are an important source of innovation and need to be fully integrated;
  - Enabling solutions to be selected on the basis of whole life value, and not on the lowest cost basis;
  - Use of common processes, e.g. common ICT, project wide information accessible through a portal which all players can access;
  - Performance measurement;

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3 The 2012 Construction Commitments set out six principles (Procurement and integration; client leadership; design quality; commitment to people; sustainability; and health and safety) to achieve a better construction industry and to exceed current best practice. The Commitments were developed with the 2012 Olympic and Paralympic Games in mind but they are of wider relevance to construction work generally. The Commitments were adopted by the Strategic Forum, by Margaret Hodge, Tessa Jowell, Ken Livingstone, David Higgins (Chief Executive, Olympic Delivery Authority) and Peter Rogers (Chairman 2012 Task Group).

4 see [www.berr.gov.uk/sectors/construction/sustainability/page13691.html](http://www.berr.gov.uk/sectors/construction/sustainability/page13691.html)

5 The Egan definitions of integration – endorsed again in November 2007 by the Strategic Forum – are as follows:

- An integrated team includes the client and those involved in the delivery process who are pivotal in providing solutions that will meet the clients' requirements. Thus those involved in asset development, designing, manufacturing, assembling and constructing, proving, operating and maintaining, will have the opportunity to add maximum value by being integrated around common objectives, processes, culture/values, and reward & risk. An integrated team requires team members to harness the potential of their integrated supply chains.
- An integrated supply chain is focused on the processes associated with the reduction of the total cost of the supply chain including, but not limited to, design, procurement, inventory management and product installation. A totally integrated supply-chain enables an end-user to more effectively and cost-efficiently manage manufacturing, inventory and transaction costs. In a true integrated supply relationship, the customer and the integrated supply partner analyse every aspect of the supply-chain process (acquisition, storage, logistics, installation, post-shipment support, information systems, etc) and then streamline each component, eliminating redundancy of effort and cost, and improving service levels.

- Fair commercial procedures based on trust, e.g. collaborative agreements, no unfair contracts, use of project insurance; and
  - Establishment of long-term relationships, enabling knowledge transfer from one project to another.
10. In November 2007 the Strategic Forum considered a report by its Integration Task Group on what further action should be taken to boost the use of integrated teams. The Task Group found substantive evidence that working across the industry in an integrated fashion delivered discernible and material benefits to each contributing party. *The Forum recommended greater use of case studies demonstrating the business case for integration, establishing 10 Integration Champions to promote the case, and simplification and promotion of the Strategic Forum's Integration Toolkit.*
11. *BERR is working with the Olympic Delivery Authority (ODA), the Department for Children, Schools and the Family (DCSF), the Ministry of Defence and the Department of Health to showcase specific projects demonstrating how integration delivers better value for all parties.* This project is being managed by Constructing Excellence. This activity will make available material from past projects as well as new material from projects currently in hand or in prospect as the projects develop.
12. The National Audit Office has recommended that Departments should seek opportunities for project insurance. *The Strategic Forum's Integration Task Group is currently involved in a series of pilots on whether the concept works in practice; we need to await the results of these before taking decisions.* At the anecdotal level, international experience is mixed: the evidence from Belgium is encouraging, that from the USA disheartening.

## Public sector construction procurement

13. About one-third of construction output is procured by the public sector. The White Paper "Transforming Government Procurement" was published by the Treasury in January 2007. Its aim was to use public procurement to drive improvements in public services and value for money and to set out the new role of the OGC (Office of Government Commerce).
14. "Transforming Government Procurement" said the OGC Chief Executive would head a reinvigorated service across Government, with Departments required to give a clear direction from the top about the central importance of procurement. In particular:
- Procurement capability reviews of Departments would be piloted with a view to their being rolled out across central Government;
  - A Major Projects Review Group would be established, composed of commercial experts from within Government, to examine projects at the early stage of development and review projects before tender, to ensure all procurement options have been explored;
  - OGC would have stronger powers to:

- set out the procurement standards Departments should meet;
- monitor Departmental performance through procurement capability reviews, and ensure remedial action is taken where required; and
- demand Departmental collaboration when buying common goods and services.

*“Transforming Government Procurement” is a key document. BERR should work with OGC to assist its implementation across Government.*

15. The National Audit Office (NAO) report “Improving Public Services through better construction” (March 2005) recommended the OGC should lead in establishing and supporting a single Departmental forum at senior management level to strengthen the leadership and coordination of public sector construction activity. The Public Sector Construction Clients’ Forum (PSCCF) was established in December 2005 chaired by Sir Christopher Kelly<sup>6</sup>. It aims to improve public sector construction procurement.

Through:

- Standard-setting, whole life performance monitoring, and benchmarking. OGC will refresh the mandatory Common Minimum Standards for the procurement of built environments in the public sector (CMS)<sup>7</sup>. PSCCF will use the CMS as the vehicle to take forward:
  - whole life value procurement, where a PSCCF working group has developed guidance for the Treasury Green Book, now ready for promulgation; and
  - The Fair Payment Charter, developed by a PSCCF working group, signed off by the industry and Government Departments, and launched in the autumn of 2007. By establishing agreed payment methods and procedures throughout the supply chain, the Charter should facilitate collaborative working on construction projects.
- Giving Government Departments and the industry a clearer picture of construction demand/capacity now and for the foreseeable future to help the industry plan against Government procurement intentions and Government to take account of industry capacity in construction procurement.

16. Whole life value is important because the capital costs of a building are a fraction of its costs when in use, and of the value of activity which it supports. A paper<sup>8</sup> given at the Royal Academy of Engineering in 1998 estimated the typical ratio between the initial capital cost of an office building, its cost in use over 20 years

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6 The work of the PSCCF is supported by a series of limited-life working groups on particular themes, The latest Working Group is tasked with considering how the Transforming Government Procurement White Paper translates to construction.

7 The Common Minimum Standards published by OGC in September 2005 required all public sector construction projects to be carried out in accordance with OGC’s Achieving Excellence Initiative.

8 R Evans et al, *The long-term costs of owning and using buildings*, Royal Academy of Engineering, London 1998.

and the cost of operating the business over 20 years (largely staffing costs). This ratio is described as the 1:5:200 rule. There has been debate since 1998<sup>9</sup> about the precise figures but the basic relationships hold good.

17. The performance of central Government on construction procurement is seen by the industry as indifferent. Defence Estates and the Highways Agency are generally singled out for praise. The industry seems more critical of other programmes, such as health and education, on the grounds that contracts in these areas are not determined on the basis of whole life value nor, for instance, do they take account of the potential benefits (e.g. improved quality control, reduced waste, better health and safety performance, enhanced standardisation) of offsite fabrication. It may be that in these areas, construction orders are being placed by one-off rather than repeat clients. *In such cases, OGC and BERR should work with the Departments concerned to improve performance.*
18. BERR is collaborating with the Department of Health to establish a managed innovation and knowledge transfer programme for the Local Improvement Finance Trust Companies (LIFTcos) to deliver improved primary health care facilities. The results of the pilot are encouraging. *BERR should continue to explore with the Department for Children, Schools, and Families whether the lessons of the LIFT Innovation Project may be applicable to education.* (On Knowledge Transfer generally, and specifically in relation to technology, see paragraphs 23 to 25 below).
19. OGC's focus is on central Government and not on local authorities. *OGC and BERR will need to work through the Local Government Task Force and the Local Government Association to ensure that construction procurement by local authorities is based on best practice procurement.*
20. Several years ago DTI introduced Constructionline – a prequalification scheme designed to reduce significantly the time and cost for construction firms in tendering for contracts to prequalify once using the scheme and then to provide registration details to procuring organisations as proof they were genuine. A number of (mostly less rigorous) private sector schemes have followed where DTI led. *Following the retendering and award of the Constructionline contract in July 2008 the service will see further enhancements and increased membership over the next 4 years.*

## The Client Adviser Role

21. Academic research and common sense suggests that the more knowledgeable the client, the more likely is the relationship with construction professionals to be collaborative. A repeat client is likely to be more knowledgeable than a one-off client. "Differences in types and levels of knowledge held by clients and construction professionals have been identified as a considerable barrier for

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9 G I've proposed a more thoroughly derive ratio for offices of 1:3:30. See: G I've, *Re-examining the costs and value ratios of owning and occupying buildings*, Building Research and Information 34(3), May-June 2006, pp 230-245.

effective client collaboration in construction projects.” (Ivory, 2004<sup>10</sup>). Nam and Tatum<sup>11</sup> claim that construction clients must have good technical knowledge for them to have the confidence to commit to innovation. Lack of knowledge makes the one-off client less challenging to construction professionals.<sup>12</sup>

22. Innovation is not without risk and improvements in the advice provided to the client may help the client make the best judgement of the balance of risk and reward. *More work is needed on whether the best way to achieve this is through establishing a formal client adviser role or whether the advice already available (e.g. from the OGC in the first instance for the public sector), from the myriad of professional advisers already working in the field, or from another body (e.g. Constructing Excellence). In respect of offsite products, the primary source of advice to the client may well come from the product or system supplier*<sup>13</sup>.

## Knowledge Transfer

23. One theme which emerged from the scoping study carried out by Richard Saxon at the start of this project was that innovation came largely from a self-selected “pioneer” group of clients, consultants and suppliers who sought each other out. The rest of the market might follow in their footsteps and adopt innovations once they were deemed proven.
24. Government is seeking to encourage knowledge transfer in several ways, e.g:
  - a) Through *the Technology Programme*. The Technology Strategy Board has approved an Innovation Platform on Low Impact Buildings, supported by BERR, CLG and DEFRA with an initial budget of £30m over its first three years of operation. Government procurement is central to the thinking behind Innovation Platforms, since this can create or shape the market and provide a platform to demonstrate innovation. The platform aims to develop technologies for new buildings to enable them to meet the energy, material and water efficiency targets set out in the Code for Sustainable

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10 Ivory, C, *Client, User and Architect Interactions in construction: implications for analysing innovative outcomes from user-producer interactions in projects*, Technology Analysis & Strategic Management, 16(4), 2004, pp 495-508.

11 Nam, C.H. and Tatum, C.B., *Leaders and champions for construction innovation*, Construction Management and Economics, 15, 1997, p 259.

12 Richard Saxon’s scoping study looked at client behaviour in the sectors of high density housing, schools, office buildings and retail development. In high density housing, private developers tend to be conservative because everything will sell. For affordable homes, the advisers to a Registered Social Landlord will influence what is built. The schools programme may be exposing inexperienced client groups to great pressure, the reliance on CABE (Commission for Architecture in the Built Environment) Enablers notwithstanding. The office buildings market is very competitive, with developments planned before end users are identified, and innovative design pushing design and construction technology. Retail development is now largely confined to town centres with mixed use (eg leisure, residential as well as retail) typical, and much innovation project-specific.

13 A detailed examination was carried out of the Constructing Excellence Demonstration Projects to assess whether any case studies showed evidence of innovation arising out of the relationship between the client and the adviser. There was, in fact, little specific information about any innovation that took place as a direct result of this relationship. This does not mean that such relationships did not inspire innovation – merely that the focus of the recorded project information was focused on other improvements or innovations.

Homes (and developing Code for Sustainable Buildings) and the prospective future Building Regulations aiming to achieve zero carbon new homes by 2016.

Initial themes of the Platform will be:

- Design for Climate Change
- Design and Decision Tools
- Management and Operation of Buildings
- Better Materials and Components
- Low carbon energy sources.

The first major research call for the platform, to develop Components and Materials for Low Impact Buildings was announced in June 2008.

- b) Through *the Modern Built Environment Knowledge Transfer Network*. This is a Technology Strategy Board initiative primarily aimed at accelerating the take-up of new technology emerging from the knowledge base, with academia being central to this. The network is operated by BRE (Building Research Establishment), CIRIA (the Construction Industry Research and Information Association), BSRIA (the Building Services Research and Information Association), and Arup. The focus of the KTN is on health, office and infrastructure-related construction with cross-cutting technologies and markets such as Housing.

These are important initiatives. *More needs to be done both to enhance awareness of these activities and to place them in the context of the wider industry improvement agenda and not something distinct.*

25. Looking to technologies with potential application some five to ten years, the Government supports the industry-led *National Platform for the Built Environment*. Three studies are currently in hand:

- a) ICT (Information Communications Technology) and Automation (scoping study complete);
- b) Building a Client-Orientated Knowledge-Based Industry (scoping study complete); and
- c) Reduced resource consumption (scoping study likely to be completed in Autumn 2008).

This work is unlikely to be of application in the short term, but *it provides a direction of travel for the industry and awareness of the work of the National Platform needs to be greater.*

## Regulation

26. Regulation can be a key driver of innovation in construction. Good regulation specifies the outcome to be achieved and provides industry with sufficient lead-time to apply initiative and innovation to meet that goal in the most cost-effective manner. An example is the Government requirement for all new homes to be zero carbon by 2016, with a commitment to increase the energy performance standards for new homes through the building regulations by 5% in 2010, by 44% in 2013 and to zero carbon in 2016. Good regulation must also be enforced to ensure the specific outcome is achieved and that all suppliers compete on the basis of a level playing field. Failure to enforce regulation rightly attracts criticism from those who comply and helps cowboy builders.
27. Regulation should be dynamic and not lock in existing technology. Instead, in setting its targets, *it should do so taking account of what can be achieved through innovation so as to incentivise performance improvement and promote a more competitive construction industry.* This is in line with the CEMEP (Commission on Environmental Markets and Economic Performance, chaired by David Miliband and Alastair Darling) report published on 19 November 2007.

## Standards

28. Botched home improvement work wastes around £1.5 billion annually. Trading Standards Officers get more complaints about construction work than any other issue – in 2004 there were 111,000 complaints about cowboy builders. The DTI therefore developed the TrustMark initiative in partnership with the industry and consumer protection organisations to set acceptable standards of competency and customer care under a single recognisable badge. DTI core-funding of TrustMark ceased in March 2007 and TrustMark, funded by contributions from Trade Associations, is now financially self-standing. *BERR should continue to promote the benefits of TrustMark membership to drive up standards in the industry.*
29. The EU Construction Products Directive was introduced in 1988 to cover materials used in construction, with the aim that common European standards would assist the free movement of goods within Europe. The European Commission is currently proposing to replace the directive with an EU Construction Products Regulation. This is to address perceived shortcomings in application of the Directive addressing remaining barriers to free trade and strengthening their implementation. If adopted this would make their use mandatory in the UK. Currently UK Building Regulations only require that materials are suitable for their intended purpose.
30. In the 1970s the EU Commission launched an initiative to establish a set of harmonised technical rules (*Eurocodes*) for the structural design of construction works which, in the first stage, would serve as an alternative to the national rules in force in Member States and which would ultimately replace them. The Eurocodes are currently in their transitional phase and are replacing UK Codes and standards. They maintain the same standing as British Standards and Codes of Practice.

31. TrustMark is a good example of how standards set a minimum requirement for all providers to meet (though some providers will want to provide an enhanced service). BSI (British Standards Institute) standards such as the Guide to project management in the construction industry could also be used to enhance performance by embodying an aspirational element. *Constructing Excellence is working with the BSI to assess whether construction standards can be used in this way to improve the industry's performance. Nick Terry of BDP chairs the reformed BSI Construction Panel (now known as the Buildings and Civil Engineering Committee) working on how standards can benefit the construction industry. We will need to review recommendations on codes and standards in this area in the light of that work.*

## Interoperable Building Information Modelling (IBIM)

32. The scoping study to this project favoured greater use of digital designs tools, particularly in relation to IBIM. BIM at the design stage is now a mandated requirement for Public Office Buildings procured and maintained by the US General Services Administration for 100 Federal Agencies across the USA and has been used for some time for design and product assurance in the shipbuilding and aerospace sectors. IBIM relies on clear and accepted standards for the creation and exchange of information to facilitate interoperability between, for instance, design and facilities management tools. Full implementation involves establishing a Building Log Book, a database comprising all information about the building to which clients and the supply chain would have access and which would be maintained throughout the building's life. *IBIM offers the prospect of significant benefits (e.g. in design, in integrated project working from a common data model (using protocols such as Avanti and Asite), in building operation, adaptation and demolition) but could add to upfront building costs. The standards for data creation will be key. More work is needed on this proposal, not least with CLG, OGC and other Departments, and the BSI Construction Design Standards Group.*

## Performance of Buildings in Use

33. It is rare for the performance of a building in use to be compared with the promise of its original specification. Two tools are relevant: Post Construction Evaluation (PCE) which compares performance against original specification; and Post Occupancy Evaluation (POE) which evaluates the performance of a building in use from the perspective of those using the building. There are, however, a number of reasons why the project team and the client will not voluntarily engage in post project evaluation, e.g. fear of identifying problems and defects which may lead to claims and litigation, and reputation damage. Both tools could yield interesting findings – it is rare, for instance, for a building to perform up to its specifications – and, in the case of repeat buildings, the results could be directly useful for subsequent construction. For one-off buildings the lessons would be more general, which is why use of these tools is rare (i.e. generally no party has a financial incentive to carry them out) though still of potential significance. *We should explore with CLG how they intend to*

*ensure that new buildings deliver the projected environmental benefits; and whether, more generally, there is scope for making better use of these tools (or of equivalents).*

## Measurement

34. *Further thought needs to be given to how best to measure innovation in construction services. This will not, however, be easy. Innovation in ways of working and processes is how people in the sector do their jobs and is not a separate activity. The best guide we have at the moment is the Community Innovation Survey (CIS), the results of which<sup>14</sup> suggest that, low levels of relative R & D spend notwithstanding, broad construction (contracting, products and services) is about as innovative as other industries and, indeed, more innovative as far as construction services are concerned.*

	All enterprises	Broad construction industry	Construction services
<b>Innovation active</b>	57%	54%	69%
<b>Wider innovator</b>	33%	54%	36%
<b>Broader innovator</b>	61%	59%	72%

## Skills and development

35. Strategies and programmes to ensure that the training needs of people involved in the construction trade occupations are generally well established. But as highlighted by ConstructionSkills in its forward Business Plan (2008-2012), the development of those working in management and supervisory roles is equally important. The contribution of those in positions of team leadership, such as Project or Site Managers, has a major bearing on the successful delivery of projects. A successful outcome of the industry's continuing improvement programme will in part depend on increasing the awareness of supervisors and managers at all levels of new working methods, processes and materials. They also need the opportunity to develop and apply new technical, professional and team leadership skills in their project work.
36. Many companies have development programmes in place for their managers and others in key positions. The sustainable construction, and the innovative methods of construction agendas, have prompted the Sectors Skills Councils,

14 This CIS covers innovation data for the three year period 2002 to 2004. The survey was sent to firms with 10 or more employees. More than 16,000 responses were received. Returns are voluntary, ie the sample is self-selecting. The CIS defines a business as innovation active if it is involved in introducing a new or significantly improved product (good or service) or process, or has incurred expenditure in internal R & D, training, acquisition of external knowledge or machinery and equipment linked to innovation. It defines wider innovation as major changes in management practices, business structure and organisation; and broader innovation as enterprises that are either innovation active and/or wider innovators.

and their industry partners, to look specifically at the impact of associated skills and development issues.

37. In its Business Plan, ConstructionSkills has pointed to the need to develop the culture of lifelong learning in the industry. In support of this objective it has proposed a budget of £2.1 million annually to support supervisory and management skills projects. This dimension of their skills strategy will become increasingly important if the industry is to maintain momentum on industry improvement. BERR should to continue working closely with the Sector Skills Councils in these areas to help take forward the specific ideas that have been proposed, and others – e.g. a Lifelong Learning Network; a Skills for Life strategy. As the umbrella body for construction professionals, the Construction Industry Council would have a particularly crucial role in helping to scope, and drive, particular proposals that would impact on continuous professional development.

# Annex A

## 1. Client Leadership

*20% of construction projects (by value) should be procured by clients that embrace the principles of the Client's Charter by the end of 2004, rising to 50% by the end of 2007.*

A survey at the end of 2004 suggested some 60% of major and repeat clients embraced the principles of the Client's Charter and suggested that over 80% of clients that had used the Charter would do so again. A Starter has subsequently been launched by the Construction Clients Group to encourage a wider range of clients to engage with this agenda and a major review of the Client's Charter is being undertaken to see how the aspirations in the 2012 Construction Commitments and the Charter can be aligned.

## 2. Procurement and Integration

*20% of construction projects (by value) should be undertaken by integrated teams and supply chains by the end of 2004, rising to 50% by the end of 2007.*

Surveys undertaken at the end of 2004 suggest that at least 13% of projects were being undertaken in an integrated way and, out of all clients undertaking projects in an integrated way, over 75% said it had led to time and cost savings.

An Industry Workshop in May 2006 confirmed that the 2007 target was unlikely to be met.

## 3. Design Quality

*By end of 2004, 500 projects to have used the Design Quality Indicators (DQIs). By the end of 2007, 60% of all publicly-funded/PFI projects (having a value in excess of £1m) to use DQIs.*

The 2004 target was exceeded with over 600 projects using DQIs or one of its variants at that time. As of September 2007, over 850 projects have been registered online of which 604 are DQI and 255 DQI for schools.

## 4. Commitment to People

*By 2006, 300,000 qualified people to be recruited and trained in the industry.*

Labour Force Survey shows a net increase of 177,200 people recruited into the industry between spring 2002 and spring 2006. On this basis, the gross increase is likely to be at least double, and so the target has been met.

*By 2007 a 50% increase in applications to built environment higher and further education courses.*

UKAS (UK Accreditation Service) show that applicants to built environment higher education courses increased from 6,341 in 2002 to 9,461 in 2006 for those domiciled in the UK, a 52% increase.

*By 2010 an increase in the annual rate of apprentice completions to 13,500.*

Latest figures show completion rates in ConstructionSkills Managing Agency have risen from 33% in 2004 to 65% in 2006. Difficult to establish an absolute figure in accordance with the target because similar information is not available for LSC (Learning & Skills Council) apprentice completions relevant to the construction sector.

*By 2010 a fully trained, qualified and competent workforce on all projects.*

In 2006, the Major Contractors Group (MCG) agreed that with effect from 1 January 2007, everyone working on their sites had to have an appropriate skills card – i.e. an CSCS card (or equivalent). Latest information from various surveys shows take-up of cards amongst MCG members to be around 90% and CECA (Civil Engineering Contractors' Association) members 80%.

# Annex B

## 1. Procurement and Integration

### 2010 Target

*No specific interim target, but progress to 2012 target will be monitored on an annual basis.*

### 2012 Target

*Different parts of the industry – clients, consultants, main contractors, specialist contractors\*, and product manufacturers and suppliers – to be engaged in supply chains on 30% of construction projects and for 40% of their work to be conducted through integrated project teams.*

*\* These targets do not apply to those specialist contractors not involved in M&E work. For them the target is to establish by 2012 a mechanism for measuring integration in their sector.*

## 2. Commitment to People

### 2010 Target

*Net increase of 230,000 qualified people recruited and trained in the industry compared with 2006. Apprenticeship completions of 13,500 in England, Wales and Scotland. Fully trained, qualified and competent workforce on all projects. Net increase of 260,000 qualified people recruited and trained in the industry compared with 2006. Apprenticeship completions of 18,700 in England, Wales and Scotland.*

### 2012 Target

*Further target for fully trained and competent workforce to be developed in the light of progress to 2010 target. This is likely to place greater focus on smaller contractors.*

### 3. Client Leadership

#### 2010 Target

*35% of client activity, by value, embraces the principles of the Clients' Commitments.*

#### 2012 Target

*60% of client activity, by value, embraces the principles of the Clients' Commitments.*

### 4. Sustainability

#### 2010 Target

*No interim target.*

#### 2012 Target

*By 2012, a 50% reduction of construction, demolition and excavation waste to landfill compared to 2008. By 2012, a 15% reduction in carbon emissions from construction processes and associated transport compared to 2008 levels. 25% of products used in construction projects to be from schemes recognised for responsible sourcing. Water usage in the manufacturing and construction phase reduced by 20% compared to 2008 usage. All construction projects over £1m to have biodiversity surveys carried out and necessary actions instigated.*

### 5. Design Quality

#### 2010 Target

*10% increase year on year from 2007 levels in proportion of projects using DQI in public buildings (custodial, police, fire, courts and other public projects), housing, and education projects. 10% increase year on year in the number of times the projects above use DQI. 80% of projects to achieve at least 50% demand side representation at all workshops.*

#### 2012 Target

*Continued 10% per annum growth from 2010 levels in both of the first two 2010 targets.*

### 6. Health and Safety

#### 2010 Target

*Reduce the incidence rate of fatal and major injury accidents by 10% from 2000 levels. Reduce the incidence rate of cases of work-related ill health by 20% from 2000 levels.*

## 2012 Target

*10% reduction in the incidence rate of fatal and major injuries from 2010 levels.  
50% increase in projects offering a route to Occupational Health support from 2008 level.*

*30% increase from 2007 level of micro-SME's and SME's taking up H&S training and education at an organisational level.*

