MAINTENANCE COST ESTIMATING

MAINTENANCE COST PLANNING

BCIS STANDARD FORM OF COST ANALYSIS

CONSTRUCTION COST ESTIMATING

CONSTRUCTION COST PLANNING

MAINTENANCE COST PLANNING

WORKS PROCUREMENT

WORKS PROCUREMENT

CAPITAL COSTS
- Capital works
- Refurbishment works costs

EXCLUSIONS
- Operation Costs
- Occupancy Costs
- End of Life Costs
- Income
- Externalities
- Non Construction Costs

MAINTENANCE COSTS
- Maintain costs
- Renewals costs

Construction costs
- Capital replacement costs

NRM3
Managing the costs of buildings maintenance

A puppy is not just for Christmas...
Life cycle cost planning

The digital journey to faster delivery
New age for project data

NEW THIS ISSUE
Learning curve
Industry education and training

September/October 2013
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CHAIRMAN’S COLUMN

Chartered quantity surveyors must seek to prevent the ‘race to the bottom’ of fee levels at all costs, and the QS and Construction PG Board will play its part in combating this dangerous trend, claims David Bucknall.

Value for money

This edition of the Construction Journal provides some answers to the difficult fee situation that affects quantity surveyors (QSs) and most other construction consultants, with a focus on NRM3 among many other issues.

NRM1, 2 and 3 are good examples of QS-initiated developments that lead to an integrated, seamless method for managing and controlling the key stages of all projects, from inception (cost planning NRM1) through construction (documentation NRM2) to operation (NRM3). Each links seamlessly into building information modelling-led integrated project delivery.

As the journal explains, the launch of NRM3 linked to NRM1 and 2 allows chartered quantity surveyors to deliver better whole-life value for money to our clients. It also gives us a unique selling point in demonstrating real benefits to our clients by becoming key players in delivering the high profile, ‘more for less’ agenda to all public and private clients.

This issue also deals with a wide range of other questions that, if adapted and applied correctly, will deliver significant benefits to the market. There is no ‘big bang’ answer to arresting the ‘race to the bottom’, but I am aware of the growing attitude of many QSs who argue that “it is just the recession and it is inevitable”. In the real world of an extended downturn this is understandable.

However, I believe that chartered QSs have the opportunity to change perceptions and climb back up the ‘value chain’, although this will require bravery and determination from leading players in our profession.

The UK government’s current drive for a 15%-20% reduction in the whole life cost of built assets is a quantity surveying charter. After all, we are the best-qualified profession to take a lead and identify the key cost components where efficiency improvement can deliver outturn cost reduction, without damaging sustainable supply chain margins.

In the autumn, the RICS Director of the Built Environment, Alan Muse and Associate Director Matthew Saunders will lead in the production of a paper that will detail ways in which RICS QSs can deliver the cost improvements sought with better functionality and quality. By linking this to the positive application of NRM1, 2 and 3 – the recent Black Book publications – and the information delivered by BCIS, I can see many great opportunities for QS services to evolve from the current low price commodity, into real added value that will command enhanced fees.

Using a bolder approach that integrates these wider service offerings, the QS can sit alongside the client and offer both cost and value advice to better inform clients’ key project decisions. It is a long journey, but it has to start with a short step.

David Bucknall is Chairman of the Quantity Surveying and Construction Professional Group Board.

qsandc.professionalgroup@rics.org
**Managing communications**

The RICS *Managing communications* information paper has been published. Produced by Tim Fry in consultation with the Project Management Board, the paper identifies the ‘hard’ and ‘soft’ skills of communication, and provides practical advice on applying these skills to improve communication.


**Infrastructure pathway**

RICS is piloting an Infrastructure Pathway to membership. This is an important new route for surveyors who want to, or already operate within, the infrastructure sector. The pathway offers a blend of quantity surveying and project management, with some new infrastructure-specific competencies. It presents opportunities for surveyors in infrastructure, both domestically and internationally.


**Information service**

The UK government has focused on construction in infrastructure as one of its levers for growth.

Understanding the cost and price implications of changing demand patterns will be a key factor in meeting infrastructure objectives, while greater transparency of costs will be essential in making business cases and benchmarking costs.

To help members in this sector, BCIS is developing an Infrastructure Information Service that will deliver this type of information. The service will include:

- price and cost index series for the infrastructure sector and sub-sectors
- forecasts of demand
- prices and cost trends
- civil engineering estimating database; analysis of benchmarking studies.

Contact Joe Martin, jmartin@bcis.co.uk or Robert Dent, rdent@bcis.co.uk

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**Vocational skill focus for new Midlands college**

Set to open in September 2014, the West Midlands Construction Technical College will provide 600 students aged from 14 to 19 with a gold standard of training. Specialising in full-time vocational and academic education, the curriculum focus is on construction, key GCSEs and business, entrepreneurial and employability skills.

Vocational grounding is important in an industry such as construction, which depends on a workforce with a mix of practical skills and theoretical knowledge. Run by CITB, the Industry Training Board and Sector Skills Council for the construction industry, with partners Wolverhampton University, Walsall College and strong engagement from employers Lovell Partnerships, Willmott Dixon, Barhale, Balfour Beatty, Hewden and Carillion, the new college aims to deliver qualifications to meet the current and emerging needs of industry.

Contact amanda.sergeant@citb.co.uk

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**RICS publications**

RICS has added the following titles to its Black Book guidance notes series: *Developing a construction procurement strategy and selecting an appropriate route* – published June 2013 (ISBN 9781783210213), price £30.


For more details, visit [www.rics.org/shop](http://www.rics.org/shop)

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**RICS events**

**RICS Merseyside and Cheshire Annual Construction and Property Dinner 2013**

4 October

Hilton Liverpool Hotel, Liverpool

**RICS Yorkshire and Humber and South-East CPD days**

17 October

Leeds and Winchester

**RICS Wales Infrastructure Conference**

24 October

Cardiff

**RICS Legal Issues in Construction Annual Conference**

November

London

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**RICS Q5 and Construction Dinner**

12 September

Cumberland Hotel, London

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**RICS training**

The following live web classes are available this autumn:

- **Measuring embodied carbon for infrastructure**
  3 September, 9.00 – 10.30
  - Working with NEC contracts
  13 November, 9.00 – 10.30
  - [http://www.rics.org/webclass](http://www.rics.org/webclass)
  - Improving infrastructure delivery with building information modelling
  19 November 09.00 – 10.30
A puppy is not just for Christmas...

Most investments bring with them long-term financial and resource commitments. Just as some dogs require more food and more exercise to keep them healthy, so some building solutions require more maintenance, energy, etc to keep them functioning to the required level of performance. Taking account of these future costs at the time of the initial investment decision, or reviewing them to optimise future expenditure, is the basis of life cycle cost planning.

Peter Stone, who wrote some of the seminal books on building economics in the UK, argues that life cycle costing (LCC) had its own distinctive cycle. In short, he claimed, every 13 years LCC became the next big thing. He was correct in that the obvious advantages of making decisions on this basis have had many advocates, all of whom have in the past struggled to overcome the construction industry’s obsession with initial cost. This time round, however, LCC is here to stay.

So why now? Over recent years the construction industry has been compelled to make the grudging acknowledgement that it cannot continue to commit to excessively high levels of future expenditure, and that if we are to control future spending we need to take cost into account in the buildings we are constructing today. The search for best value, the savings required in the UK government’s Construction Strategy and its commitment to building information modelling (BIM), are in large part based on the reductions in operating costs that can be achieved by life cycle cost planning.

Plainly, we have learned from the lessons of the 1960s and 1970s, when public buildings were put up with little thought about how their future maintenance was to be funded. As a consequence of this the application of LCC will, therefore, be mandated on all public sector building investments. The Treasury’s The Green Book: Appraisal and evaluation in central government stipulates that: “The costs and benefits considered should normally be extended to cover the period of the useful lifetime of the assets”, and details how LCC should be applied in the public sector. In the private sector, where construction projects are subject to the same decision making processes as other investments, consideration of future running costs will form part of that decision.

The sustainability agenda also requires that construction decisions be made in the light of future carbon equivalent outputs from building projects. This will be done in a similar way to the life cycle cost plan, and will also be based on the consideration that current, future cost and carbon are part of delivering value for money from any investment.

Guidance and standards
RICS has long been a proponent of LCC. In the 1980s one of its ‘next big thing’ cycles was sparked by the work of Roger Flanagan and George Norman. In response, RICS produced a guidance note, which was subsequently expanded and included in the Surveyors’ construction handbook in the 1990s.

It is interesting to note that these were published exactly 13 years apart. A mere nine years later BCIS and the British Standards Institution (BSI) produced a supplement to ISO 15686-56, The standardised method of life cycle costing (SMLCC) for construction procurement. This sets out the components as follows:

- initial costs – design and construction
- cost in use – maintenance, operation and occupancy
- end of life.

Maintenance costs include:
- Renewal – major replacement, subsequent refurbishment and adaptation and redecorations
- Maintain – minor replacement, repairs and maintenance (planned), unscheduled replacement, repairs and maintenance (reactive) and inspection and monitoring (proactive).

Operation costs are the other costs that relate to the building and include:
- cleaning
- utilities – fuel, water and drainage
- administration costs – property management, waste management and disposal
- overheads – property insurance
- taxes – rates and other taxes payable in connection with owning the building.

Occupancy costs are those costs that relate to the use of the building, and will be client and project specific but may include, for example:
- reception
- occupants’ security
- telephones
- post room
- ICT and IT services
- catering and hospitality.

The SMLCC and its predecessor guides have generally concentrated on the application of LCC to cost planning for investments in new construction projects. However, the techniques and principles can equally be applied to improving the management of existing buildings. For
organisations with large property portfolios that are trying to control their future expenditure, the introduction of a life cycle cost plan is a key to understanding and managing their maintenance and operating costs.

The BSI committee responsible for service life planning is currently producing a guide to LCC for buildings currently in use. The RICS representation on this committee is coordinating this standard with the development of NRM3 – the new rules of measurement for maintaining and renewing constructed assets.

The development of the new rules of measurement provides a consistent elemental data structure across the *Standard form of cost analysis*, namely NRM1 and NRM3. This allows for the development of a capital and maintenance order of cost estimates, cost plans and maintenance delivery plans. Furthermore, NRM3 provides a consistent data structure for the information needed to carry out these tasks.

**Doing the calculations**

Basically, LCC is systematically thinking about the future ramifications of current decisions. For any given building it simply requires the documentation of all construction costs, both now and in the future. While each calculation is simple, it may need to be carried out for thousands of individual components on a building, making it rather more complex.

Because the costs occur in different time periods they need to be adjusted for inflation and the changing time value of money. This is normally done by discounting future costs to express them at net present value. The time value of money reflects the principle that, generally, people prefer to receive goods and services sooner rather than later, and it can be measured by the real interest rate on money lent or borrowed. The discount rate is based on an estimate of interest rates adjusted for inflation.

The key information required for an LCC calculation is therefore:

- the discount rate
- the life of the investment – the study period
- the cost and frequency of future payments (at the component, elemental or total building level as appropriate).

This will include the life of the element or component, and the maintenance requirement of the element or component

- end of life costs.

The most influential decision on the outcome is probably the choice of discount rate. In the public sector the Treasury publishes discount rates to be used in its *Green Book*, currently 3.5% for periods up to 30 years, declining thereafter. In the private sector it will need to be agreed with the client.

The period over which the calculation is to be carried out – the study period – is normally the life of the investment, but it may be the life of the building. For some private sector clients, particularly in retail, the investment period may be less than 10 years. For economic appraisals, that form part of a wider environmental or sustainability assessment, it might be over 100 years.

The life of each element or component needs to be estimated in order to account for replacements during the study period. This may be the physical life, but other causes of obsolescence need to be considered, such as economic, functional, technological, social and legal. The maintenance requirements for each element or component also need to be estimated.

The cost of replacements, maintenance and any costs or values that arise at the end of the study period will also need to be estimated. These streams of cost must subsequently be discounted to arrive at the net present value.

It should be borne in mind that all life cycle cost plans are predictions and that the input data therefore constitute estimates, so the plans should be subject to such techniques as sensitivity analysis, risk analysis, factoring and smoothing for reporting.

**Sources of data**

The choice of the cost data required should be straightforward for quantity surveyors. Life cycle data and maintenance requirements are available from a variety of sources including:

- BCIS Building Running Costs Online – component life data
- BCIS Occupancy Cost Plans containing maintenance and cleaning requirements for elements and components
- Building and Engineering Services Association *Standard maintenance specifications for building services* (SFG20).
- Chartered Institution of Building Services Engineers Guide M contains a table of plant life expectancies.

All of the above sources have been, or are being, restructured in accordance with the NRM3 data structure.

**Conclusion**

Life cycle costing, both as an initial appraisal technique and as a management tool for buildings in use, is a key process in ensuring that clients get value for money from their buildings.

I am certain that we have broken the 13-year cycle, that LCC is now an integral part of project evaluation and that delivery and a detailed maintenance and operation plan will be one of the most important outcomes of the introduction of building information modelling. In this context, the importance of NRM3 cannot be overstated because, for the first time, it provides an explicit link between capital cost planning and maintenance cost planning and the sources of information.

Joe Martin is Executive Director BCIS jmartin@bcis.co.uk
Matthew Saunders looks at the central role of the quantity surveyor in delivering the objectives of the UK’s Government Construction Strategy and evaluates the future of the profession.

Delivering the message

Currently the government’s Construction Strategy (launched in 2011) and its key themes of cost benchmarking, procurement, BIM and facilities management (FM) all offer real potential for the quantity surveying profession. While benchmarking and procurement need no introduction to any practising QS, BIM and FM are relatively uncharted territory. Despite this, each of these has one simple underpinning theme, namely to reduce costs. Clearly, cost reduction is currently very high on the government agenda, and it is likely to remain so regardless of what happens after the 2015 election.

RICS recently hosted a meeting with a number of senior industry figures (all surveyors), with the aim of delivering an RICS policy on how best to achieve sustained cost savings on publicly procured projects. The discussion covered much ground, and will eventually result in a paper to government provisionally entitled How to achieve 15%-20% cost savings while delivering outcomes and benefits.

When considering the government’s Construction Strategy and the ‘savings paper’ debate, three things stand out. First, the QS will remain central to delivering the strategy, even if, regrettably, the profession is not explicitly named as part of the solution. Second, the debate proposes that the language used in the paper should be more relevant to non construction professionals, in other words to the public and the wider business community. Third, the debate gives rise to an overwhelming and perceived need for the RICS’ savings paper to have a clear and simple message that could be more easily understood by the public. In short, this suggests that the QS profession is misunderstood, or at least is not currently providing a clear enough message of what it can offer.

In a recent report on the delivery of major infrastructure projects Lord Browne, the government’s Lead Business Adviser to the civil service, called for “an enhanced central cadre of commercial specialists in Infrastructure UK that will be deployed into infrastructure projects across government”. Essentially, he was suggesting ways to improve the delivery of infrastructure projects and offer greater assurance to investors.

This is surely a challenge to the QS profession, although again, the QS is not named explicitly. Alternatively, it could be that the QS is not even taken into consideration when the government thinks about improving the commercial aspects of infrastructure delivery. This poses a dilemma to the profession. Either there is a clear opportunity to become a part of the ‘enhanced central cadre’, or, as a profession, we are not perceived of by our political and business leaders as capable of improving the delivery of major infrastructure projects. If the latter is true, then there exists a challenge to alter that perception.

McKinsey suggests that at a global level, $1 trillion could be saved every year for the next 18 years during the delivery of infrastructure projects.
A recent report by management consultant McKinsey\(^2\) suggests that at a global level, $1 trillion could be saved every year for the next 18 years during the delivery of infrastructure projects. These savings can be achieved by doing three things: by improving project selection, by streamlining delivery and making the most of existing assets. This suggests that the QS profession can make a positive difference through the adoption and application of best practice, which may be easy to say but rather more challenging to do. More importantly, the core message of the McKinsey report is very much aligned with what RICS is actually doing through its introduction of the New Rules of Measurement 3 (NRM3). For the first time, the QS now has a suite of guidance documents that spans the entire life of a built asset, and includes pre-construction (NRM1 cost planning), construction (NRM2 measurement of the design for implementation) and the existing asset (NRM3 facilities management). The three stages are matched with the three recommendations of the McKinsey report around project selection (aligned with the early cost planning stage of NRM1), streamlined delivery (supported by the more detailed planning stages of NRM1 and the measurement rules of NRM2) and finally in maximising the use of existing assets (supported by NRM3 facilities management and its interface with BIM). NRM3 completes the circle of the asset life cycle, and places the QS at the very heart of the process.

Looking ahead, the great number of current global infrastructure projects now underway or in the pipeline offer the opportunity unrivalled opportunities. To benefit from these opportunities, practitioners should aim to target governments and private infrastructure investors, and they could also benefit by getting closer to the civil engineering professionals who are clearly more established in infrastructure than QSs. It is important to develop an understanding of the nature of the infrastructure project environment, which is not the same as the building project environment. Almost certainly, the new RICS Infrastructure Pathway can help with this.

Beyond infrastructure, there are global opportunities for chartered surveyors in providing strategic advice, construction and now, thanks to NRM3, there is also a place for quantity surveyors in facilities management and real estate consultancy. These global opportunities exist because the RICS brand enjoys considerable credibility. Furthermore, as our international membership continues to grow, so too will our brand and with it the number of opportunities.

Of course, technology cannot be underestimated in terms of shaping the future of professionalism. BIM has arrived and those that fail to become BIM enabled are likely to get left behind. But there is far more to technology than BIM. HR Magazine predicts that by 2015 37% of the global workforce will work remotely\(^3\). Technology will continue to offer improved efficiency, reduced waste and costs while helping to facilitate more creativity, which is exactly what is needed for the future of any profession if it wishes to thrive.

If the QS is misunderstood then it may be that the profession itself needs rebranding, and even renaming. For instance in much of Europe the commonly used title of ‘construction economist’ rather than quantity surveyor, cost manager or cost consultant indicates a range of professional activity beyond mere numbers, yet it still has measurement at its core. Ultimately economics is the ‘science of choice’\(^4\) and is influenced by measuring and interpreting a vast number of factors. Similarly, QS services are about helping clients make the right choices, and after measuring and analysing a broad range of factors. But whatever your preferred choice of title may be, perhaps the most important aspect for our future rests with the perception of our profession. Because, after all, perception is everything.

Matthew Saunders is RICS Associate Director for Built Environment msaunders@rics.org

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1 Browne report http://bit.ly/18mXIVt
3 HR Magazine http://bit.ly/152g2dw
4 “Economics is the science of choice”: Construction economics, a new approach. Myers, D. [2006]
Later this year the construction industry is set to celebrate the launch of the New Rules of Measurement (NRM3), the new RICS system of measurement for constructed assets. The guidelines are expected to encourage a more comprehensive use of life cycle costing (LCC) techniques for property development and facilities management. NRM3, which establishes the rules of measurement, structure and methodology to be used in estimating the costs of built asset renewal and maintenance, offers a sound common base for quantity surveyor practitioners to work to. More importantly, it helps in the establishment of a more comparable and reliable building maintenance cost data bank.

By taking into account both cost-in-use and initial capital cost, LCC analysis can help to identify design solutions that offer better performance and higher efficiency from the whole life cycle perspective, which in turn benefits the clients, the end-users and indeed society as a whole. But although LCC has long been recognised as a useful tool in the delivery of design solutions, its use is still not as widespread as it should be in countries such as Hong Kong and China.

Kenneth Kwan and Danny Chow examine the implications of NRM3 for the Chinese and Hong Kong construction industries.

The major barriers to its take up in this region stem largely from the various challenges posed by the use of NRM3. While the initial capital cost of a building can be determined readily and reliably by way of an abundance of historical cost data, estimating the cost-in-use is far less predictable. It takes considerable time and effort to collect data for LCC analysis. The efficient nature and reliability of LCC can be appreciated only if the lifetime maintenance, renewal and operating requirements of a given building are fully understood, and calculated accurately at the early design stage.

Arriving at a reasonably accurate prediction of these requirements is a frequently daunting task, and the lack of any clear existing methodology for assessing such requirements aggravates the situation considerably. As a result, both Chinese and Hong Kong property developers and practitioners are not overly enthusiastic about LCC, but instead make decisions based on initial capital cost, or at best give consideration to energy-efficient measures, based on a subjective and wholly arbitrary approach.

In Hong Kong, the structure of the Schedule of rates for term contracts for building works published by the Architectural Services Department, is basically comprised of the ‘methods of measurement’, the ‘rates to include’ and the charges levied by the various contractors involved with carrying out building renewal and maintenance work. Tenderers generally quote their adjustments according to the unit rates set out in the original tender, and this will
By taking into account both cost-in-use and initial capital cost, LCC analysis can help to identify design solutions that offer better performance and higher efficiency from the whole life cycle perspective.
Andrew Green outlines NRM3 – the new rules of measurement for maintaining and renewing constructed assets that will allow robust life cycle cost management and the comparison of costs on a like-for-like basis.

Measuring up to maintenance

Since 1922, the UK construction industry has used the RICS Standard Method of Measurement for the cost management of capital building works. However, until now the maintenance industry has never had any accepted standard methodology for quantifying and managing the life cycle costs of maintaining, and renewing, constructed assets.

This is now set to change with the imminent launch of the NRM3: order of cost estimating and cost planning for building maintenance works. The third in the series of RICS NRM documents, it follows on from the publication last year of:

- NRM1: Order of cost estimating and cost planning for capital building works
- NRM2: Detailed measurement for building works.

The prime function of the NRM suite is to provide consistent rules and guidelines for the quantification and measurement of capital, maintenance and renewal works. The documents are based on a structured and integrated methodology for producing an order of estimates, cost plans, bills of quantities and reports, throughout a building’s life cycle.

NRM3 has been drafted in the same style and format as NRM1, with the emphasis being on creating an alignment between the documents. After significant work, a standardised cost data structure has been established linking construction elements to the relevant maintenance and renewal elements (see Figure 1). This will have a massive impact in that it allows users to overcome the construction/revenue divide, and to get into the detail of life cycle costs in order properly to analyse and understand where money is being spent.

To enable this, revisions have been made to the elemental cost breakdown structures and coding in NRM1 (2nd edition), and the BCIS Standard Form of Cost Analysis (NRM edition) in order to totally align with NRM3. NRM3 has used the element data structure of NRM1 levels 1 to 3, and expanded on this to identify all

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**Figure 1**

New measurement rules integrating construction (NRM1) with maintenance (NRM3)

<table>
<thead>
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<th>NRM3</th>
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<td>- development/project costs</td>
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<tr>
<td><strong>BASE COST ESTIMATE</strong></td>
<td>(excluding risks/inflation/VAT)</td>
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<td>Risk allowance estimate</td>
<td><strong>Renewal</strong></td>
</tr>
<tr>
<td>Inflation estimate [construct]</td>
<td><strong>Forward maintenance</strong></td>
</tr>
<tr>
<td>VAT assessment (if included)</td>
<td>Major repairs/replacements;</td>
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<tr>
<td>Other considerations</td>
<td>predicted scheduled actions</td>
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<tr>
<td>TOTAL COST LIMIT at agreed base</td>
<td>Refurbish and upgrade works</td>
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<td>date costs</td>
<td>Redecorations – (if separated)</td>
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<td></td>
<td>Maintenance contractors:</td>
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<td>- management and administration</td>
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<td>costs - overheads and profit</td>
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<td>Other specific costs:</td>
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<td>- consultant/specialist fees</td>
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<td>- employer definable works</td>
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<td><strong>BASE COST ESTIMATE</strong></td>
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<td>(excluding risks/inflation/VAT)</td>
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<tr>
<td><strong>Risk allowance estimate</strong></td>
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<td><strong>Discounting [maintain]</strong></td>
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<td><strong>VAT assessment (if included)</strong></td>
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<td><strong>Other considerations</strong></td>
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<td>TOTAL COST LIMIT at base date</td>
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<td>or discounting</td>
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of the ‘maintain’ and ‘renewal’ elements, sub-elements and components as shown in figure 2.

Following extensive collaboration, the BCIS, the Chartered Institution of Building Services Engineers (CIBSE) and the Building & Engineering Services Association (B&ES) have agreed to adopt the NRM3 expanded cost structure. This means that the NRM3 elemental cost structure is now fully aligned with industry standard planned preventative maintenance task schedules (the B&ES SFG20 maintenance task specifications), and the economic reference life expectancy data published by BCIS and CIBSE Guide M – 2013 October revision.

This alignment will allow the cost estimating, cost planning, cost reporting and benchmarking of the total cost of capital building and maintenance works. It makes use of a common format aligned with capital building costs – which is a significant development in itself – and one reason why NRM3 will be truly groundbreaking.

For these reasons NRM3 should have huge benefits for the UK construction and maintenance industry, because it will enable key stakeholders to compare costs on a like-for-like basis. Together with NRM1 and 2, NRM3 will provide a basis for financial life cycle cost management. It will enable more effective and accurate cost advice to be given to clients and other project team members (during construction procurement), and facilitate better control of combined construction, maintenance and renewal costs. For example, the combined NRM suite will provide information for:

- input into life cycle cost plans (LCCP) in a structured way so the same approach is adopted for all LCCP cash flows and option appraisals, which will in turn facilitate meaningful comparison and more robust cost analysis
- advising clients on the appropriate cash flow requirements for annual budgeting, and informing the forecasting of the forward maintenance and renewal programmes of works
- informing the implementation of maintenance strategy and procurement
- provide object cost data for building information modelling (BIM) and option value engineering.

Given that the NRM3 rules follow the same format as NRM1, they provide direction on how to quantify and measure other items associated with building maintenance works, which are not reflected in the measurable work items. These include maintenance contractors’ management and administration costs, consultant fees and the risks connected with maintenance and renewal costs, as well as VAT, taxation and other incentives.

Unlike capital building works, maintenance works are required from the day a building or asset is put into use until the end of its lifespan (or period of study). The costs of capital building projects are usually incurred by the owner or developer over a relatively short term, while the costs connected with maintenance works are incurred throughout the life of the building, in other words over the short, medium and long term. Therefore, in addition to providing guidance on the measurement of inflation, the rules will help with the calculation of the annual costs of maintenance and renewal programmes, and the use of economic methods.
expressed in the time value of money – e.g. net present value; payback periods.

Efficiency and BIM agenda

The Government construction strategy focuses on procurement based on greater cost certainty and on minimising life cycle costs. Its BIM strategy calls for whole life cost information to be supplied from the BIM model at various stages during the project. Clear new rules of measurement for capital building and maintenance works will prove pivotal in enabling this to happen in both public and private sector construction procurement. Meanwhile, comparative cost analysis and benchmarking are also key pillars of the Cabinet Efficiency and Reform Group agenda. Cross-industry acceptance of a common data structure and new rules of measurement will therefore be very important.

The NRM cost data structure and classification coding will also provide the means for standardising asset registers and condition surveys, as well as providing a robust basis for BIM and databases. This will be pivotal to the BIM agenda and the interoperability of life cycle cost data and meaningful benchmarking.

In the words of Lord Kelvin: “What can be measured can be evaluated, improved, directed – in short managed.” In these austere times, everyone in the construction and building maintenance industries is seeking ways to reduce their total cost of operating, as well as their capital building and asset investment costs. NRM3 will provide accepted cost management methodology for overcoming the capital and revenue divide, along with having a big impact on how buildings can be handed over to be operated and maintained.

Ninety years on from the first standard method of measurement, the construction and maintenance industry now have rules in place for effective capital building works in the form of NRM1 and NRM2. NRM3 will provide them for maintenance and renewal works. The new building maintenance rules will transform the UK construction and maintenance industry and prove fundamental to ensuring that more effective and robust life cycle cost management becomes the industry norm.

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“NRM3 will provide accepted cost management methodology for overcoming the capital and revenue divide, along with having a big impact on how buildings can be handed over to be operated and maintained.”

Further +info

Related competencies include T010
Mark Bew explains how the availability of digital data will speed project delivery and cut costs

The digital journey

The need for common measurement approaches is well understood, and has challenged the construction industry for many years. The work to standardise measurement through the New Rules of Measurement (NRM) project is the culmination of many years’ work and experience, and marks the current state of the art with traditional methods.

But we are entering a new age, and the UK government has, as part of its 2011 Construction Strategy, set out on the digital journey. The government’s adoption of building information modelling (BIM) Level 2 for all public procurement from 2016 onwards, and the comprehensive programme of delivery contained in the National Infrastructure Plan (2010) signals a new commitment from the public sector. This now ensures that it both supports and secures the best possible performance from one of the largest sectors in the UK economy.

An essential by-product of the BIM programme is the procurement and delivery of clean, verified data that can be put to a multitude of uses. These include regulation checking, procurement, planning, take off, room data sheets, answering key client questions and, of course, cost management.

The UK BIM Task Group website hosts a ‘labs’ area that has published the first system to help bridge the gap between the old ‘plans of work’ – which defined levels of geometric detail and a list of key documented deliverables – with the new ‘digital plan of work’. Together with the geometric details, the digital plan also displays the required ‘attached’ data for each element in the design. This clear definition of need is then used to verify that the required data is delivered at the appropriate time. Obviously this will not guarantee a good design, but it will at least ensure that clients and other suppliers are provided with all the required information. In turn, this will then allow users more time to ‘design’ productively rather than sort through large numbers of drawings and schedules, only to find a week later that the information required is missing key elements.

The dataset the government has identified at Level 2 is known as Construction, Operations, Buildings Information Exchange (COBie). The purpose of COBie is to provide a common data format designed to exchange information between organisations, typically, in the case of government strategy, between the client and the supply chain. This common approach is designed to present a consistent demand on the supply chain, so that users can optimise their systems and approaches across their organisations. The intention, of course, is to reduce costs so that the client is in a position to verify data deliveries quickly, and reformat this into information useful to their businesses operations.

Clearly, the amount of data and geometry delivered on a project increases as it progresses. Currently, the level of detail delivered is a function of the various plans of work, and duties documents provided by the client that make up the contract. These documents are the result of many years’ experience and practice, but new methods of procurement have challenged the approach and we have all seen the rise of language such as ‘C+ or D-’ which articulates an unmeasurable delivery to suit specific needs. This ‘analogue’

Bridging the gap

The DPoW is the next incarnation of the plan of works and manages the process of procuring design and data delivery services. It sets out to bridge the gap between the client and statutory needs. If information is provided too early it may be abortive or wasted. If it is provided too late, key questions cannot be answered and waste is introduced, which will invariably result in poor decisions that may introduce delays due to retrofit key information.

It therefore follows that a reasonable place to start would be with the key client questions, or ‘plain language questions’ (PLQs) that every client needs to address. In the DPoW it is these PLQs that drive the level of geometry and data required at each key stage.
Figure 1 demonstrates this point. The red diamonds represent the client decision, the green spheres the data transaction and the red line the progressive growth in geometry and data. Once these data points are defined, a matrix of attributes to be delivered at each stage can be produced. The key questions at this stage are how many elements should I check, and at what level should I be checking my data? These are difficult questions but the current view is that asset elements, defined by table G and L in the Unified Classification for the Construction Industry (Uniclass) or table EE in Uniclass 2, means by current definition around 2,500 individual elements.

With this approach it is now possible to procure specific data requirements, test delivered data and move from a position of extremely variable data quality to one of quality certainty. This leaves the client or data recipient in a position of being able to focus on adding value to the design from the moment of verification, and with a much enhanced level of confidence. This benefits the client in operating their business, as well as onward suppliers and designers who are subsequently able to focus on delivering design rather than administration.

COBie as a data format is only a common method of transporting data from one organisation to another, a type of ‘common briefcase’. This enables software vendors to develop and deploy common verification and interfaces. However, to make use of the data we have to reorder it and pass it on to other systems. These may be very simple, such as report writers or spreadsheet applications, or highly complex enterprise resource planning or computer aided facilities management systems as shown in Figure 2. To reorder the data to apply to these new requirements, classification systems such as Uniclass are employed, analogous to the index numbers on library books (except that the index code is buried in the COBie data). The subject of interest is looked up in the index, and the number leads the reader directly to the correct shelf and book.

NRM3 is focused on the estimating and cost management of building maintenance works. Clearly, this dataset is a subset of the entire COBie set, and Uniclass is used to identify the data needed to undertake these operational activities. The BIM Task Group is engaged in delivering further data, and process guidance in this area is due for release toward the end of 2013 in the form of PAS1192:3:2013.

More information

- **BIM Task Group**
  - [www.bimtaskgroup.org](http://www.bimtaskgroup.org)

The Digital Plan of Works (DPoW) can be found in the ‘Labs’ area. The Construction Industry Council is coordinating the public consultation process. Documentation for the DPoW and demonstration class room models can be downloaded and used to validate individual models


- **Uniclass**
  - [www.bimtaskgroup.org/uniclass-2](http://www.bimtaskgroup.org/uniclass-2)
  - [www.bimgateway.co.uk](http://www.bimgateway.co.uk)

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  - mark.bew@ecstrategies.co.uk

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**Figure 2**

Data Validation & Usage Process

- **Supply Chain**
  - **Client/Employer**

- **Uniclass2**
  - Validate
  - Use Data
  - Report
  - Cost Mgt
  - Reg Check
  - NRM1
  - NRM2
  - NRM3

- **Uniclass2**
  - Use Data

- **CAFM**
  - Sustainability
  - Answer ‘Plain Language Questions’

- **Other System**
  - NRM
  - Reg Check
  - Cost Mgt
  - Use Data

- **Place in Data Repository**
  - COBie
  - 2D PDF

- **A Co**
  - Store in Collaboration System or EDMS

- **Client**
  - X

---

**Figure 1**

**Progressive data delivery**

- **Operational decisions**
  - 1. Capital delivery phase
  - 2. Operations and maintenance delivery phase

- **Information exchanges**
  - 0% data and geometry maturity

- **Figure 2**

**Data Validation & Usage Process**

- **Supply Chain**
  - **Client/Employer**

- **Uniclass2**
  - Validate
  - Use Data
  - Report
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  - X
RICS has a vital role in driving forward the infrastructure projects that UK government believes will support economic growth, says Tim Wainwright

The road to recovery

Following the Comprehensive Spending Review and the proposals set out by the Treasury, it is now clear that the UK government recognises spending on infrastructure as vital to the country’s recovery.

From George Osborne and Danny Alexander’s strategic, long-term vision in the Investing in Britain’s future document, it is evident that considerable thought and consultation has gone into the government’s approach to infrastructure delivery. In particular, the Prime Minister’s appointment of former London 2012 Chief Executive Lord Deighton was made precisely to ‘overhaul the delivery of public-sector infrastructure projects and programmes’. Private sector best practice, supported by efficient and ‘commercially-aware’ government departments, it is expected, will help in the successful overseeing of major projects.

Given that a pipeline of £100bn of public money has been set aside to finance projects such as the HS2 rail link and a number of road improvements, the government’s initiatives, encouraged by the National Audit Office, the Public Accounts Committee and the Lord Browne review, to develop civil service commercial skills will contribute toward lowering infrastructure costs.

RICS, with its internationally recognised reputation for excellence in training and providing effective guidance for such major infrastructure projects, will undoubtedly prove pivotal in moving government policy forward in the years ahead.

Beyond being a driver of growth, infrastructure is the fabric of our everyday lives that must remain efficient and well maintained. It is, therefore, heartening to see the additional investments, but we must ensure that this funding goes quickly to where it is so desperately needed: into the repair and maintenance of our transport and energy network.

Recovery is still fragile. Well-planned infrastructure projects commissioned in the right places and at the right time will provide immediate economic returns, and much-needed work for the construction sector.

To achieve this vision for the UK at a time when the government’s pockets are squeezed, the effective project management capability and the drive to achieve cost efficiencies that we saw during the London 2012 Olympics project need to be replicated. Central to this ambitious programme will be chartered surveyors, who remain integral to delivering savings throughout the life cycle of infrastructure projects. Using industry-agreed and government-endorsed professional standards, guidance, qualifications and training mean the UK private sector can deliver projects on time and in budget, all of which will contribute to boosting investor confidence.

Working closely together, industry, policy-makers and professional bodies can achieve the infrastructure challenges of the future, and ensure that the UK remains globally competitive.

£100m of public money has been set aside to finance projects such as HS2
The infrastructure conundrum

The British economy, like many of its international counterparts, has continued to perform sluggishly since 2008’s financial crisis. Key think tanks, such as the Organisation for Economic Co-operation and Development, have recently revised their figures for British economic growth for 2014 down from 2.6% to 2.5%, and in doing so have advised Chancellor George Osborne to increase investment so as to create jobs and stimulate a more sustained national recovery (www.guardian.co.uk/business/2013/may/29/oecd-uk-economic-growth-forecasts). With both the UK Treasury and the International Monetary Fund also revising their British growth forecasts downwards in their latest predictions for 2014, it is clear that the future remains mired in uncertainty (www.gov.uk/government/organisations/hm-treasury/series/data-forecasts).

No-one in the UK construction sector will have remained immune from these bleak economic statistics, and the continued fallout from the credit crunch. As a recent article in Construction Journal stressed, the UK construction sector is currently stalled, lacking in any real sense of confidence and in need of a major boost (see Restoring confidence, June-July, p6). Many in the industry, and a great deal of opinion beyond it, now believe that a sustained programme of much-needed infrastructure improvement holds the key to driving ahead the UK’s economic recovery. But after three years of punishing ‘austerity’ measures, how will the Treasury finance such a programme, and is the coalition government in a position to deliver any major overhaul of the national infrastructure through ambitious projects such as HS2?

The debate
At the RICS-hosted infrastructure roundtable How can infrastructure help the UK economy? held in London on 22 May and attended by several senior figures from the construction industry, Commercial Secretary to the Treasury Lord Deighton placed great emphasis on the government’s determination to prioritise major infrastructure projects. Building the ‘right infrastructure’, Lord Deighton argued, was of crucial importance to the UK economy in its battle to compete globally, and only the ‘jobs and growth’ generated by such a programme could finally put Britain on a path of sustained growth. But in his role as ‘infrastructure minister’ he also stressed that before such an ambitious modernisation programme could even get off the ground, there would need to be significant improvements in the UK planning and delivery processes for such large-scale projects.

Setting out the main objectives of the coalition’s National Infrastructure Policy (NIP), Lord Deighton identified the key areas in which such improvements were vital:

- Planning: must be undertaken with greater strategic vision to assess when supply chains are strong or weak
- Delivery: there is a perceived need to ‘rebalance’ capacity to move away from a policy focus toward a stronger delivery capability, and to improve Whitehall’s approach to processing such major projects
- Policy: should be directed increasingly at securing greater private-sector investment, and in particular the ‘right sort of investment’.

The levels of private capital required to invigorate the British infrastructure drive are truly mind boggling. The coalition has so far singled out a pipeline of 550 projects worth £330bn and, as Lord Deighton emphasised, airport and road improvements and the Crossrail development are already delivering a significant upgrade to the country’s creaking infrastructure.

But as he and many of the industry figures participating in the roundtable warned, infrastructure spending is not a straightforward matter. For one thing, convincing private enterprise to invest in the government’s construction programme has so far proven difficult. Announcing the launch of the NIP some 18 months ago, Osborne pledged £40bn of taxpayers’ guarantees as an inducement to pension fund investment in the programme. To date, only two of the 550 projects have secured financial backing.

Many of the delegates agreed that the principal reason for the hitherto slow progress in implementing the NIP was not so much raising the necessary capital as making the projects themselves financeable. Kate Hall of Arup and John Hicks of Davis Langdon both voiced the view that the ‘legislative process’ retarded progress, and ideally infrastructure projects of this scale should be removed from the process of government altogether. Lord Deighton agreed that the government’s emphasis on ‘scrutiny’ acted as a drag effect on progress, adding that there was a need for “good scrutiny, just once.”

The need for progress
Plainly, the task facing Lord Deighton is a gargantuan one that will require all of the resourcefulness and skill that allowed him to make such a resounding success of London 2012. The problems confronting him and the coalition are indeed serious. As Neil Broadbent of PricewaterhouseCoopers pointed out, British infrastructure ranks 24th in the top 30 industrialised nations, and in its current condition is having a negative impact on British competitiveness. Lord Deighton’s remit is to begin the admittedly lengthy process of modernising the UK’s ageing infrastructural framework, overcoming the at times cumbersome nature of governmental processes and allowing private capital to flow into the designated project areas quickly. The UK construction industry will be hoping that the 550 projects outlined as part of the NIP will become a reality very soon, and beyond the next general election in 2015.

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Can infrastructure minister and chief architect of the London 2012 Olympics Lord Deighton deliver growth for the UK construction sector up to the next general election and beyond? Robert Mallett analyses the industry view
Jeremy Blackburn assesses the potential political impact of the imminent RICS NRM3 system of built asset cost maintenance

The publication of NRM3 later this year comes at a very interesting moment for the quantity surveying and project management professions, the government and in many ways the country. Although perhaps not uppermost in the minds of the average person in the UK, many will be fully aware of how schools and hospitals need maintenance, or that their local rail and road network urgently need repair.

While the coalition government has reduced its spend on public construction as part of its overall programme of austerity measures, it is still looking at how much it can get out of that expenditure. The same is very much true of the government’s repair and maintenance budget and how that is spent, involving not only the Treasury, but also the Department of Transport and its executive agencies (such as Network Rail), the Department for Communities and Local Government and all local authorities.

So repair, maintenance and improvement have moved centre stage, sitting alongside the value for money agenda and the need to stimulate real growth across the regions. All three were plainly in evidence in the Comprehensive Spending Review (CSR), and in fact the allocation of more money for repair and maintenance was one of the big ticket announcements.

NRM3, therefore, arrives perfectly scheduled to help those who will pick up these contracts. This does not simply apply to the efficient delivery of the project, but to the much longer term whole life cost, given that austerity and restrained public spending will stretch until at least 2017-18. RICS has been highlighting the importance of this money to local economies and the construction sector for some time, and of course it will continue to do so.

HM Treasury is still (officially) anticipating the economy to expand by a mere 0.6% this year, rising to only a marginal improvement of 1.8% in 2014. Recent media speculation suggests that the forecast for this year may be a touch on the low side. But notwithstanding this probability, there may still be a case for the government to bring forward some of the projects detailed in its Investing in Britain’s future policy document to give the economy a more immediate boost.

The principal reason for this sluggish economic performance is that delivering actual growth and jobs outside London and the South East remains a serious problem. Ministers believed that the streamlining of planning and reducing red tape would unleash development, but that has not really happened. Then came, successively, the Getting Britain Building policy, the National Infrastructure Plan, quantitative easing and a raft of house building mechanisms. All good stuff naturally, but not quite enough when we are de facto facing the final 16 months of this government.

In the CSR and Investing in Britain’s future, the coalition had to outline the hard policy decisions it had been forced to take to kick start growth before the end of this Parliament. There was a strong element of road and rail repair, maintenance of the health and education estate, repairing flood defences, a release of surplus public land, energy subsidies, getting broadband rolled out to rural areas, all complemented by further investment in housing development for affordable and rented homes.

Politicians will naturally be attracted to grand projects – such as the necessary but very long term HS2 – in contrast to the less glamorous filling of potholes on motorways, or repairing local schools but these will be far more effective in creating the construction jobs that ministers need to deliver by 2014. It probably means that people will still complain about acres of cones on our motorways, but then it would not be Britain otherwise, let alone entertaining content for the average episode of Top Gear.

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Controlling project costs is not necessarily about fancy software and multi-level coding, but about ensuring that certain fundamental principles and some basic rules are followed. **Thurstan Ollerearnshaw** offers a project manager’s perspective on cost management

**Working by the rules**

Historically, there have been regular reports of cost overruns on construction projects, and particularly in the public sector. Therefore it is important to make sure that the right professional discipline is employed to manage the costs of any construction project. Chartered quantity surveyors (QSs), with the appropriate skills and experience relevant to a project, are obviously essential to successful cost management.

Controlling the final outturn cost of a construction project begins with establishing a cost limit or budget. This acts as the benchmark or baseline against which cost performance will be measured, so getting it right is important. The project manager must guard against both over optimistic and overly pessimistic calculations. In the early stages of a project it is easy for the project team to become swept up by collective enthusiasm, and succumb to the temptation to ‘make the numbers fit’. The danger here is that the budget is effectively unachievable from the start, and that the project ends up being considered a failure when costs inevitably exceed the budget. On the other hand, an overly pessimistic budget, that is loaded with allowances catering for every eventuality may condemn the project as being economically non-viable. The project manager should be able to benchmark the budget, either as a whole or in parts.

The RICS New Rules of Measurement (NRM) suite is an invaluable tool in allowing comparisons to be made on a common basis. The relationship between the constituent parts of the NRM suite is set out in Figure 1.

The earlier the budget is set, the more use it will be in controlling costs since traditionally 80% of a construction project’s costs are fixed during the first 20% of its lifespan. Detailed information is unlikely to be available during the early stages of design, and this is where the skills of the chartered quantity surveyor and their ability to develop an accurate and usable cost plan come into play. The RICS NRM documents provide a standard set of rules for cost estimating and cost planning that aid communication between the members of a project team. They also help the QS to provide accurate and effective cost advice early enough in the project cycle to allow informed decisions. Organisations have different approaches to budgeting for construction projects, and may require a different presentation of the breakdown of the budget to that described in NRM1. However, it is crucially important to establish the cost limit or budget early on, and to include allowances for risk and contingency within it. The risk allowance can include separate allowances for design development, construction, employer change and employer other risks as recommended in NRM1, or a quantified assessment of the cost and probabilities of the identified risks as recommended in BS8534. In addition to the risk allowance, it is recommended that a separate contingency is added to cover unexpected and unidentified occurrences that might befall a project. This provides the first rule in cost

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**Figure 1**

Cost data flow

Cost Analysis of Completed projects

Cost data

Cost Estimate Cost Plan

NRM1

Budget

Priced tender

BQs

NRM2

Priced variations

NRM-3

Fees & Other costs
management: Rule 1: Establish a budget and include appropriate allowances for risk and contingency. Once a budget is established, the next task is to ensure that the design team designs to cost.

The next stage in the cost management process is to check all costs and commitments against the budget. By applying basic principles and adopting simple rules, problems can be avoided. Commitments (either contracts awarded or purchase orders issued) can only be authorised if there is sufficient budget to cover them. Where an insufficient budget exists, or where there is no budget at all, then it must be created by appropriate authorised transfer from the risk and contingency allowances. So the second rule is: Rule 2: Commitments can only be entered into when there is a budget for them.

In the same way, all payments made must be tracked against authorised commitments (i.e. a contract must be awarded or a purchase order issued), and only up to the amount of the commitment, never beyond it. Most companies have systems in place to receive, track and authorise payments. The QS must establish a similar method to track payments, and allocate them against the appropriate sections of the budget to ensure that payments do not exceed the value of the commitment. Hence the third rule: Rule 3: Payments can only be made against approved commitments.

Costs are managed and controlled by predictive forecasting that allows decisions to be made before commitments are entered into. Identifying variances as they occur only allows costs to be monitored. For the project manager it is more important to know in advance that a cost overrun might occur, than to know by how much costs have actually overrun.

When dealing with fixed price work packages or cost accounts spending more than the authorised commitment is difficult, especially if Rule 3 is applied. However, when it comes to reimbursable work packages it can be a different matter. In addition to tracking and recording actual costs as they are incurred, the project manager needs a forecast of costs to complete. Simply taking the amount remaining between the original commitment and the cost to date may often not provide the correct forecast. It is better practice to properly assess the cost to complete – often from first principles – and add that to the cost to date to provide an accurate forecast final cost. Systems such as earned value analysis (EVA) provide an understanding of the performance or efficiency to date, and make use of that to predict future performance.

Control can only be effective if it is applied early enough, since only the costs that remain to be committed or spent can be changed. The maxim of simple controls applied early in preference to complex control mechanisms applied too late, should be adopted wherever possible. This gives us rule 4: Rule 4: Be predictive (look forward).

By transferring risk and contingency amounts as approved changes to create current control budgets, the project manager will be aware of how those allowances are diminishing over time. At the same time, forecast overruns should be balanced by a corresponding under-run in contingency, so as to allow the project manager to determine how much is potentially going to be consumed. This allows them to take decisions to approve additional costs, or to seek alternative solutions.

Plotting the actual risk and contingency remaining against a planned drawdown allows the trend to be examined. The application of professional judgment as to the sufficiency of the remaining allowances by both the project manager and the QS, is another essential in the management of cost. The project manager and QS need to assess, based on the current status of the project, whether the amounts are sufficient, which gives rise to the fifth rule: Rule 5: Monitor risk and contingency.

The third stage in the process of cost management is reporting. Cost reports generally comprise four classes of data, which are generally presented hierarchically with increasing detail at the lower levels. At the highest level an executive summary showing current control budget (CCB), forecast final cost (FFC), variance and spent to date may be all that is required (see Table 1).

While more complexity may be added, the data in the table should provide the basis for a simple cost control system. Additional data may include change in CCB or FFC in the period, percentage of FFC or any other metric that the project team consider important to track.

To assist in the understanding of the report it is useful to summarise a number of key metrics such as:

- CCB and FFC
- variance (between FFC and CCB)
- amount and % spent
- number and value of changes approved
- number and value of pending changes
- amount of risk and contingency remaining
- value of the priced risk register
- potential cost items not included in the report such as EOT claims.

An understanding of not only the current position, but also how it is changing allows the project manager to gauge how ‘healthy’ their cost position is. The skills of the QS in analysing, presenting and interpreting the data are invaluable in assisting the project manager’s understanding. This gives us the sixth rule: Rule 6: Understand the cost report.

In summary, the main flaws traditionally encountered in cost management processes and systems stem from inaccurate estimates, late information and insufficient detail. Adopting NRM should help chartered quantity surveyors improve the accuracy of cost plans and estimates, by allowing them to benchmark them more easily against previously achieved costs. This should translate into realistic and achievable budgets being set for projects.

Timely presentation of information is obviously important, as is sufficient detail to allow a better understanding of the effects of design decisions or proposed changes. Coupled with a continuous forward look and the inclusion of the techniques of EVA, costs on the project should be successfully managed.

Table 1: The four data classes of cost reporting

<table>
<thead>
<tr>
<th>Control</th>
<th>Forecast</th>
<th>Variance</th>
<th>Spent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Original approved budget</td>
<td>Committed costs [contracts awarded]</td>
<td>FFC - CCB [under]/overrun</td>
<td>£</td>
</tr>
<tr>
<td>Approved changes</td>
<td>Uncommitted costs</td>
<td>% of committed</td>
<td></td>
</tr>
<tr>
<td>Current control budget</td>
<td>Forecast changes</td>
<td></td>
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</tbody>
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| Forecast final cost | |

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RICS is using building information modelling (BIM) on its London head office and plans to share its experiences with members and industry. In the first of a series of articles following the project over the next year, Les Pickford talks to the main players involved and asks about the benefits and challenges

BIM at work

The UK’s Government Construction Strategy requires “collaborative 3D BIM (with all project and asset information, documentation and data being electronic) on its projects by 2016” and is part of UK’s government’s aim to reduce its construction costs by 20%. There is also increasing BIM activity in the private sector, propelled by an industry still trying to understand its impact on smaller projects, the supply chain and the wider property and construction world.

Given these drivers, RICS established an internal BIM group to improve its communications with its members and industry. At the same time, Severn Partnership offered to create a BIM model for the RICS head office at Parliament Square (PSQ).

“We wanted to use the PSQ BIM project to enhance our facilities management operation,” says Matt McDermott, RICS Sales and Marketing Director and catalyst for the BIM communications programme, “But we also wanted to help industry understand the challenges and benefits of a project, especially so that other occupiers of existing buildings can learn from our journey. If a client is undertaking refurbishments, I’d like surveyors to be able to discuss the benefits of BIM and have a compelling business case to add fee value. Severn volunteered to create a BIM model of PSQ because it is passionate about being RICS surveyors, this building and the BIM process. It was a great opportunity for everyone.”

What’s the plan?
Severn has laser-scanned PSQ and is in the process of delivering a 3D BIM model to RICS, which will help the organisation understand how to use. “But it’s not just about the 3D model, it’s about the information behind it and how everyone can share it and collaborate,” says Mark King, 3D Modelling Project Manager at Severn Partnership.

Future steps in the project include:● helping RICS to choose appropriate software and hardware and to plan how the model will be populated, e.g. data from ongoing building maintenance● training RICS Facilities staff, and its refurbishment consultants and contractors, to use the model● working with BCIS to include costs elements into the model. “We are lucky to have cost benchmarking experts working for us,” says McDermott, “because not everyone has this resource.”

It is clear that the RICS Facilities team will have to change the way it operates. “It is learning as it’s going along; it’s not just about purchasing a 3D model and putting it into a facilities management system,” King suggests. “Real success for RICS will be in its ability to communicate the pros, cons, pitfalls, benefits, etc with others through conferences, training courses, white papers etc.”

What are the benefits?
Paul Chidgey, RICS Head of Facilities, has some initial thoughts on benefits, but admits that it is still early days. “I’m still not fully aware of everything that we’ll get out of it, but we are learning. I’m sure other benefits will become clearer.”
For him the immediate ones include:● using a 3D image to enable decision makers to understand how any major refurbishment will look● potentially linking it with the RICS Venues operation so people hiring a room can see 3D images of how it could look● condensing information into one place. There are cupboards full of operation and maintenance manuals from the previous major refurbishment of PSQ, so information can be found if needed but BIM means that it is all in one place.

King echoes this last point and says a big benefit to RICS is access to facilities management information. “We’ve probably all heard stories of a building being delivered to a client, which is then given a vanful of paper drawings and DVDs containing information that it doesn’t know what to do with. Ultimately, most of it just gets left in its box and is never seen again.”

BIM gives you information almost at your fingertips, explains King, and software is being developed that make these models very interactive and usable, “If RICS can get that information working for them they will have something they’ve never had before in facilities management.”

Existing buildings
But while BIM on newbuild projects gets a lot of attention, it should not be forgotten that existing buildings could also benefit.

“The advantage for the lay person is that they can see how changes to an existing building will impact their environment,” says McDermott. “This can mean improved staff engagement and happier clients. A model can provide a centrepiece for better communications.” This focus on newbuild is probably because the tools have been developed with this in mind, says King. “They don’t
We wanted to help industry understand the challenges and benefits of a project, so other occupiers of existing buildings can learn from our journey.

hundreds of years old or of unknown origin, so model details have to be populated from scratch. “For example, when doing M&E modelling we can scan a pipe but we don’t know what it’s made from, what flows through it, where it comes from or where it goes to,” warns King. “So we will add parameters to drop-down menus so an engineer can click on the pipe and complete the details of its use (e.g. gas, water or electrics), and what it is made from (e.g. steel, iron or plastic).

“Not many organisations can afford to immediately populate a new model for an existing building,” King adds. “But through ongoing building maintenance, this can be done room by room, window by window, door by door. Soon, RICS could have a very information-rich model.”

The challenges ahead
As you might expect, being at the start of this ‘learning journey’ means there are quite a few challenges in the months and years ahead. But what are the key ones?

Skills
“We don’t currently have the skills to truly realise the benefits of BIM,” McDermott emphasises. “Using a BIM model and squeezing value from it is something we haven’t done before. So it’s a massive step and we’ll need training.”

King agrees that there will be a learning curve and says: “Some people may not have worked in a 3D environment before, and using vast amounts of information could be quite overwhelming.”

However, the issue for Chidgey is that BIM skills are not inherent in his team’s current working environment. “But I don’t see it as solely a responsibility within Facilities. I also see possible partnerships with contractors and consultants and to build this into our cost.

take into account Victorian or Georgian architecture, and things being curved or ornate. So it makes it a little more difficult to model an existing building.” But because it is predicted that 60% of buildings today will still exist in 2050, more will be refitted and refurbished rather than being newbuild. So BIM will increasingly be part of the process, he argues.

One of the main advantages for newbuild also applies to existing buildings – collaboration. “A 3D model allows you to collaborate with structural and mechanical and electrical (M&E) engineers, etc,” King claims. “If you wanted to change all of the windows, for example, the model allows you to quickly create a windows schedule that can be used immediately by all parties.” He adds that without the collaborative element of BIM, this process would probably mean architects and engineers annotating and emailing documents back and forth until a new specification is agreed, which could take weeks.

The PSQ survey
King says the process for surveying PSQ followed a standard route – with a measured building survey, a topographical survey, elevations, sections, etc – but also created a 3D model with the ability to assign information to building elements. “Previously, we may have done a building survey, and took the elevations from a laser scan, but delivered only 5% of the information we captured. With BIM we’re giving much more information to the client.”

King advises that conducting a laser scan of an existing building presents specific challenges, including:
- a lot of information is not accessible, e.g. because services such as plumbing are behind walls
- the building is occupied and so it is often difficult to access certain areas, e.g. server rooms due to confidentiality policies. It helped that RICS had CAD drawings to fill any gaps and Facilities staff available to help with access and scheduling of room surveys to work around conferences
- windows that do not open can prevent the laser scanning team from clearly seeing external control points used to ensure the accuracy of scans
- historic buildings tend to have smaller rooms with more corridors and doors to staircases. This makes the scanning process slightly more complex and time consuming, compared to modern buildings with more open floors, fewer walls and more columns
- clients often do not like any marks left in the occupied building. “If we return to a room, we’d like to use the same control points but we can’t really mark the floor or walls as we can with industrial buildings,” argues King. “This is why we try to start and finish on known fixed coordinates and complete a room in a day.”

However, while newbuilds allow models to be populated with manufacturer’s product details, existing buildings (especially historic ones) could have elements that are
model. I need to ask whether we need these skills internally, with the required resource levels, or bring them in as needed.”

**Model use**
McDermott suggests there will also be a challenge because, generally, using the model will not be a daily process.
“Populating the data won’t happen until work is performed. As we are not completing the model during a big project we may not get the enthusiasm and buy-in you would expect. But over the next few years there will be many smaller PSQ projects and this will improve as the model beds in.”

**Information technology**
“New hardware and software will probably be required, with all of the related training,” says King. “Also, decisions will be needed about the IT environment around the model, for example will the data be held internally or in the ‘cloud’ and what are the security requirements?”

**Working practices**
Moving from a predominantly paper-based environment to an electronic one is likely to present the biggest challenge, King notes. “All organisations have people who will be adverse to change. So it’s about managing them and getting their buy-in to this new way of working. You might have the budget to buy PCs and software, but it’s the people who will ultimately make the project a success.”

Chidgey says he also needs to find a balance between running the model and delivering a working building. “I probably won’t get any thanks if I’m busily entering data to the system, and we’re not getting carpets cleaned or walls painted. It’s hugely exciting and it’s going to have some clear advantages, but we need to ensure there is a clear cost benefit.”

**What’s in it for you?**
“BIM is here to stay and will affect many surveyors, especially quantity surveyors (QSs),” says McDermott. “Their core skillsets can transfer into BIM management activity, and they can take advantage of the benefits that BIM offers. There is a massive challenge – the theory sounds great but the reality is hard, so QSs can help to make models and processes work well. Also, industry says King. “Also, decisions will be needed about the IT environment around the model during a big project, for example will the data be held internally or in the ‘cloud’ and what are the security requirements?”

**Implementing BIM on PSQ is a huge task for RICS and will need decisions on everything from IT requirements and skills, to working practices and data collection. “I hope that by sharing the lessons, our members will understand the challenges of developing a BIM model on an existing building,” says McDermott “and how to create the right working environment for its successful use.”

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**RICS view point**

The UK’s largest client in the built environment is the government; it accounts for 40% of construction expenditure across a diverse range of sectors that are relevant to nearly, if not all RICS members. With the government’s mandate requiring all its projects to adopt collaborative BIM by 2016, surveyors across all disciplines cannot afford to overlook its importance. Add to this the increasing BIM uptake in the private sector and you have a compelling case. Early adopters are likely to thrive, while those who do not will miss out on new found efficiencies and opportunities for growth that can directly impact the bottom line.

For quantity surveyors and project managers, opportunities include increased efficiency, demand for new roles such as the BIM/Information Manager and, with the arrival of NRM3, they have the tools to operate during the life cycle of built assets.

The RICS PSQ project and the work with government, industry and other institutions is paving the way for members to embrace this unique opportunity.

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**More information**
- **Government construction strategy**
  bit.ly/12ueWFu
- Sir Michael Latham’s 1994 report Constructing the team bit.ly/mjcgxv

**Visualisation of RICS library from building information model**
The continued learning experience offers construction industry professionals many competitive advantages

Given the current economic climate and a constantly changing global business environment, it is now more important than ever that industry employees remain highly trained and on the cutting edge of technical innovation.

Companies that invest in staff training with well-developed and highly organised development programmes are frequently the ones who successfully improve their productivity, as well as their levels of customer satisfaction.

Clearly, companies are under pressure, and a great many businesses are looking closely at ways of reducing expenditure as revenues contract. Under these circumstances many organisations face a difficult dilemma: either they face having to cut their training budgets to lower costs, or invest in new programmes to gain future competitive advantages.

However, many in our industry will be fully aware that it is precisely during challenging economic times such as these that it is crucially important to make vital investments in staff training. RICS has developed the Online Academy to support members and all professionals working in the built environment industries, as a means of safeguarding the future of the core professional competencies. Beyond this crucial task the academy has the objective of constructing intellectual capital and, therefore, of providing industry professionals with sustainable competitive advantages.

The Online Academy has been offering e-learning solutions since August 2010, and has subsequently been widely applauded for its proven ability to provide top quality, agile and affordable solutions to practitioners and companies alike. Making use of this important online resource can help industry professionals get the training that best suit their needs.

RICS believes in the advantages of making extensive use of e-learning. If done right, it can produce great results by decreasing costs and improving performance. The Online Academy looks at e-learning with a holistic, organic approach. Starting from a theoretical position we take into account all the variables that might influence the efficiency of the courses.

We have created an engaging e-learning experience through which participants can engage with animations, graphics, audio-video and synchronous and asynchronous events. We sustain the experience by varying the learning environment, and we use case study analysis to arouse the curiosity of learners.

We continually update our content and modes of delivery to provide our clients with the best possible learning experience. We also offer many different forms of assessment to ensure that the learning outcomes of our courses are reached.

The RICS Online Academy has developed a broad portfolio of courses, ranging from one hour, self study e-learning interactive courses, to live online web classes, six-month distance learning and bespoke programmes. More than 20,000 registered users from 90 different countries have participated in the Online Academy’s programmes, and we have delivered over 92,000 man hours of learning. For the team, this has proved to be a resounding success.

More information
> pfranco@rics.org
www.rics.org/onlineacademy
www.rics.org/training
training@rics.org

“More than 20,000 registered users from over 90 different countries have participated in the Online Academy’s learning programmes”
COURSES & TRAINING

Advanced course in quantity surveying
Six-month distance learning

The course has been designed to provide advanced knowledge and understanding of quantity surveying techniques and practice including dispute resolution, project management and value and risk management.

This course explains the fundamental activities that comprise quantity surveying, and will also progress through a logical sequence of thinking about quantity surveying.

The learning activities draw on both the hypothetical situations commonly found in quantity surveying and from practitioners' personal experience in the workplace.

www.rics.org/uk/training

Measuring embodied carbon – infrastructure
13-hour web class

UK government targets state that all domestic buildings should be zero carbon by 2030 and all non-domestic buildings by 2019. What does it mean for construction professional?

This course will look at what embodied carbon is and what are the drivers for change. It will then cover techniques and measurement methods.

Based on case studies and real examples, this session will give the basics to calculate accurately carbon emission in construction projects.

www.rics.org/uk/training

Maintaining client relationships
3 hours e-learning

The module is designed to improve the skills of those in direct contact with customers with a focus on developing and improving customer loyalty.

Consisting of five e-learning courses, this module focuses on how to maintain long term client relationships.

www.rics.org/uk/training

Achieving more from less

During an economic downturn, when the sales performance of many companies is weak, it is not easy to justify training expenditure, and the emphasis is frequently on budgetary cuts in order to maintain efficiency.

However, the key issue should be how to increase profits through a more productive and efficient workforce, and how to think more creatively and to achieve more with less.

At times of financial uncertainty training and education are very often the first to face the axe. But while cutting the training budget may represent immediate savings, there is considerable evidence to show that it can be a serious mistake in the long term.

In fact, a number of studies indicate that organisations that keep in place education and training programmes are in a stronger position to take advantage of improving sales environments once economic conditions improve. Educated workers have much higher levels of morale, greater productivity and feel supported by the company as a result of professionally organised training programmes.

The chief problem is that many organisations cannot afford training programmes under current market conditions. It is here that e-learning should be considered as an effective option that offers positive and quantifiable results.

Online learning can help in many ways. E-learning programmes can significantly reduce the cost of training per person, especially when compared with instructor-led courses. Major factors such as travel costs and travelling time, are taken out of the equation. Online also offers ongoing access to learning and the possibility to be trained anywhere and from anywhere, providing participating organisations with truly global, cross-time-zone communication and learning.

Moreover, the learning management system provides easy management and tracking of learning, and automated course evaluation to maximise the return on employer investment.

Adopting e-learning means enhancing the models of learning, and achieving better outcomes through the assistance of technology. Overall outcomes can be better assessed, and employers can enjoy the benefits of a more cost effective learning environment for their staff.

The key to the success of e-learning is its holistic approach, given that the most suitable delivery method, the quality of the programme and the relevance of the course content are matched to the needs of the business.

Studies report that online continuing education provides equal or higher quality of learning than many other approaches, and saves between 40%-60% of staff time.

Online continuing education provides equal or higher quality of learning than many other approaches, and saves between 40%-60% of staff time.

www.rics.org/uk/training
Kevin Joyce looks at the concept of ‘acceleration’

What is ‘acceleration’ and is it recognised under English law?

Acceleration relates to a situation where a contractor aims to achieve an earlier completion date. It intensifies the level of work being undertaken, and should not be confused with mitigation, which is the reallocation of resources to minimise cost and delay.

If the contractor has accelerated they aim to recover costs incurred by measures such as increased working hours, or using extra equipment or resources.

Express instruction

Under circumstances where employers have instructed a contractor to accelerate, and where the acceleration does not arise from the contractor’s delay, the recovery of the costs of acceleration is often straightforward.

If the contract does not, however, provide for instructed acceleration, the employer must reach agreement with the contractor on how the work is to proceed.

The contract terms

Contractual authority to instruct acceleration forms no part of the JCT11 standard form. Therefore, the project manager’s power to request a quotation from the contractor revising the programme to achieve earlier completion under NEC3 is limited.

Where a contract grants no such power, but the employer instructs the contractor to accelerate anyway, the contractor can recover their acceleration costs on the basis of an implied promise to pay.

Constructive acceleration

The more difficult and common situations are those where there are no clear instructions to accelerate. This arises where a contractor believes that they have a valid claim for an extension of time, but the employer refuses to certify an extension and the contractor, rather than risk having to pay liquidated damages, accelerates to make up the delay. This is known as ‘constructive acceleration’.

The UK courts do not accept the principle of constructive acceleration. Convention dictates that the parties have included contractual provisions for time extensions, and if the employer fails to certify an appropriate extension the dispute resolution procedures are used to correct failures.

In reality there will be significant commercial pressure on contractors who continue at a normal rate of progress. By doing so, they become liable for liquidated damages while the employer decides on the contractor’s entitlements, and/or the parties follow the dispute resolution procedures in the contract. In Ascon Contracting Ltd v Alfred McAlpine Construction Isle of Man Ltd [1999] and Motherwell Bridge v Micafl Vacuum Technik [2002] the courts suggested that there may be limited circumstances whereby a contractor could recover acceleration costs, even where there has been no express instruction. However, the position remains unclear.

Best practice – the contractor’s perspective

The best advice for the contractor is to resolve extension of time claims promptly, and/or obtain a written instruction to accelerate before undertaking such works.

Where that is not possible, but in instances where the contractor decides to take accelerative measures, the contractor must set out the basis of the steps they intend to take in advance. They must also explain why the conduct of the employer leads them to believe that they are being instructed to accelerate.

If it is established that the causes of delay are the responsibility of the employer, then there is every likelihood that the contractor may be able to recover costs – either as loss and expense – damages for breach, or on grounds of unjust enrichment.

Once the principle of recovery of acceleration costs is established, the contractor needs to be able to prove what these costs are. The contractor can only recover only the additional costs they have incurred in taking the accelerative measures. As a result, the contractor must accordingly be able to produce evidence that the costs are additional to those which would have occurred in any event.

Best practice – the employer’s perspective

From the employer’s point of view the contractor’s entitlements to a time extension should be addressed promptly, and agreement sought in relation to the value of acceleration.

If the employer does not intend to instruct acceleration care needs to be taken with written and oral communication, because an inadvertent reference to ‘acceleration’ could result in arguments from the contractor that they have been so instructed. Once again, the employer must ensure that good records are maintained.

Kevin Joyce is a Partner with law firm Pinsent Masons and runs a free Legal Helpline Service for RICS members kevin.joyce@pinsentmasons.com

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