

# **2<sup>nd</sup> International Conference on “Quality Chain Management” Stockholm, 30<sup>th</sup> – 31<sup>st</sup> May 2007**

## **Conference Report**

### ***Introduction***

The Second International Conference on ‘Quality Chain Management’, organised by the Swedish Council for Constructing Excellence (BQR<sup>1</sup>) in co-operation with the Swedish Construction Clients Forum<sup>2</sup> and the PSIBouw<sup>3</sup> programme of the Netherlands, was held at the conference centre of the Ingenjörshuset, Stockholm, on 30th and 31st May 2007. It was attended by more than 80 participants, from 10 countries.

The event built on the exchanges at the first international conference on Quality Chain Management, held in The Hague in October 2006, which had revealed many common concerns in Sweden and the Netherlands over the quality and efficiency of the construction sector, these concerns being also shared by participants from other countries.

Following the opening welcome addresses, the Second International Conference was structured in four sessions, each focussing on a theme which addressed a key concern. Each session was opened by a keynote speaker, and included several supporting presentations. A panel discussion concluded each session, with some panel members taking this opportunity to introduce further thoughts through short presentations. A final summary presentation concluded the proceedings. The conference programme is at Annex A.

### ***Welcome presentations***

Opening the conference, **Sven Gunnar Dahlqvist**, Chair of BQR, emphasised that the activities of BQR were based on a shared vision of the entire construction process from the initial conception of a project to the long-term use and management of the final output, with a strong focus on the needs of the end-user. This was the ‘Quality Chain’. The first international conference had shown that strong client leadership and co-operation amongst all parties to the construction process were key factors in project success, and he looked forward to this conference providing participants with information and ideas on how to put these principles into practice.

**Christer Wannhedren**, Chair of the Swedish Construction Clients Forum, emphasised the importance of the client role in interpreting the needs of users and ensuring that these were fulfilled. The Forum had established a national R & D programme and an educational programme to support the development of professionalism amongst clients. However, at present clients had to spend too much time on inspection and similar processes in order to assure quality. He looked to be able to reduce this, through the ideas at the conference.

**George Ang**, giving a welcome on behalf of Henk van der Horst, CEO of PSIBouw who was prevented by personal reasons from attending the conference, drew attention to the need for construction to become more attractive to young people as a career choice. It would do this if it was seen as a high quality industry. The sector played a key role in addressing key social and

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<sup>1</sup> Rådet för Byggekvalitet

<sup>2</sup> Byggherreforum. [www.byggherreforum.se](http://www.byggherreforum.se)

<sup>3</sup> Process and System Innovation in Building and Construction. [www.psibouw.nl](http://www.psibouw.nl)

environmental challenges and needed to operate through collaboration amongst all players, with clients taking a professional lead.

***Theme 1: Driving Forces and Management Tools***

In the first keynote address, **Barbro Engman**, Chair of the Swedish Union of Tenants, stressed the importance the end-user when undertaking a construction project. Many reports had drawn attention to the lack of customer focus in construction and its inefficient structures. BQR had undertaken a study of the way that society regarded the sector and the factors that needed to be improved in order for construction to be more highly regarded. There was in particular a lack of trust within the sector and between it and its clients. With a housing shortage needing to be addressed, it was vital that consumers' requirements and preferences were taken into account, especially since housing was not just a matter of the physical construction; it created communities and so there were many social aspects to housing development. Users were the central thread in the Quality Chain, which began with client needs and finished with client satisfaction.

**Peter Cunningham**, a Director of Constructing Excellence in the UK, reviewed the history of construction improvement initiatives in the UK since publication of the 'Latham' report in 1994, with particular emphasis on the development and use of Key Performance Indicators (KPIs). These were as a means of monitoring trends in industry performance and provided benchmarks which enabled firms to see where their performance stood in relation to the industry as a whole. They were also valuable in promoting new ways of working, by showing the superior performance achieved in demonstration projects where new approaches had been employed. Client satisfaction had, for example, steadily improved since the first set of KPIs in 1999. Until now, KPIs had been published as wall-charts but a new Web-based system would be launched in June 2007. This would enable firms to construct sets of KPIs tailored to their own requirements, drawing on industry-wide data. Another development was that firms that used the KPIs for performance improvement would be able to demonstrate this through a logo; this was an example of the way that the KPIs were now influencing procurement.

**Ib Steen Olsen** of the National Agency for Enterprise and Construction, Denmark, reviewed the experience of KPIs in public sector projects in Denmark. Following critical reports on the industry, an independent Construction Benchmarking Centre had been established in 2002. The Centre had established a set of KPIs and from January 2004 all publicly funded non-housing construction projects above a threshold size had to contribute data to the Centre, and contractors had to include their KPI data in tenders. This requirement had been extended to publicly-funded housing projects in 2007. Outputs were in the form of 'Grade Books' for contractors and clients respectively, which for contractors presented data on four KPIs (time, quality, safety and client satisfaction) with clients receiving additional data on efficiency, costs and the degree of collaboration (ie the use of partnering). Comparable outputs were being developed for the design phase of the project. The system had broad acceptance based on strong central support and visible use of the KPIs in tendering. Making the provision of data mandatory had been valuable in enabling the rapid collection of a 'critical mass' of data.

**Per-Erik Josephson** of Chalmers University presented a Best Practice tool developed at the university, with industry support, for setting and monitoring goals in the course of a project. This had followed an analysis of the approaches of existing tools. The client was responsible for introducing and using the tool in a project. It used three sets of indicators: leading (leadership, motivation, organisation); process (goal, time, cost); and lagging (customer satisfaction). These were applied at each stage of the project, with relevant data being collected and then discussed at the end of the phase to inform future performance. Use of the tool had been found to increase collaboration and to lead to fulfilment of project goals because it led to real actions being taken to improve performance.

Subsequent discussion, through questions to the speakers and in the panel session (Panel members are listed in Annex A) touched on the following points:

- Having effective communications with stakeholders, and particularly clients and users, was essential. Uncertainty over the real client, and their expectations, led to confusion in objectives. Alignment of requirements was required. It was noted that the UK KPIs for housing developments took into account the views of occupiers, and that guidance on the requirements of different types of client was in preparation.
- 'Performance' as monitored through KPIs needed to relate to users; for example, it was not clear how the KPIs reflected the needs of users who were in any way disabled. More generally, issues of comfort, serviceability and image were important to users and should be incorporated in project processes, although sometimes we lacked the means of communicating these concepts between users and professionals. Post-occupancy surveys, conducted perhaps five years after a building or facility came into use, could illuminate a more comprehensive view of performance from a user perspective.
- KPIs had to be trustworthy to be useful. That was why Denmark had chosen to establish an independent body to produce them. But data for the KPIs could be produced by bodies other than the Construction Benchmarking Centre provided they were independent. There had been some discussion in the UK over the quality of data supplied by firms particularly if it were to be used in procurement actions, but there were means of checking and in practice it had not been an issue.
- Many decisions were driven by financial factors. If 'quality', however defined, could be reflected in financial measures, this would drive up levels of performance. A new approach to valuing buildings and facilities might be required, which took more account of quality factors.
- Greater alignment of KPIs with harmonised European standards would be desirable and was under discussion; this would help the translation of clients' subjective needs into objective measures that could be used in design processes. Such a move would also help to retain competition in the European market for construction services, which could otherwise be reduced by the development of national KPIs.

### ***Theme 2: Procurement strategies for co-operation in partnering and alliancing***

**Keith Hampson**, CEO of the Co-operative Research Centre for Construction Innovation in Brisbane, Australia, presented a keynote address which drew on the Centre's research into Australian experience of partnering and alliancing. He stated that client leadership, expressed through the procurement framework, was the key to changing the culture of construction projects and the move from traditional adversarial relationships. Early Contractor involvement (ECI) was an approach which had brought good results for been major public clients such as Queensland's Department of Main Roads. This employed a two-stage process, with the contractor and designer engaged early through a time-related contract to develop the design to the stage where a price could be agreed. At that point, the contractor was appointed to complete the design and construct the work. This approach reflected the general principle that early decisions, which could be made using little resource, had most effect on the final outcome and cost. In the expanding Australian construction market, this approach was much more attractive to designers and contractors than traditional competitive bidding and therefore it provided clients with greater chance of securing suitable firms for their projects.

Alliances had also been used successfully. They offered greater scope for cost and risk management and for the development of innovative solutions. All parties, including the client, shared risks and rewards and worked under a 'no blame, best for project' framework. But setting

a realistic Target Cost Estimate was essential, so that subsequent variations were clear and understood by all parties. Clarity of decision and goals had been shown by research to be the most important factor in achieving successful projects. Overall, collaborative approaches had produced excellent results, but required a real commitment from the project team, made demands upon the client's staff resources, and could not work without a culture of openness and a willingness from all parties to learn as the project proceeded.

**Knud Erik Busk** of the Foundation for Affordable Housing, Denmark reviewed the Danish experience of partnering. This approach to procurement had been recommended for publicly funded projects since 1999 and had been required (unless a study showed it inappropriate) since 2003. Studies had shown that the overall experience had been positive, with partnering providing benefits such as more openness, more innovation and better risk management. At the same time, there had been problems such as misuse of information provided through open relationships and there was still more scope for cost savings. A leading project which had been constructed through partnering was the Byen 'media house' of Danish Broadcasting (DR). The client had appointed contractors on the basis of early designs and as part of the tendering process had invited alternative proposals. Weighted criteria relating not only to price but also to competence in partnering, the experience and competence of staff and to health and safety were used in the appointment process. There were financial incentives for savings, early completion and good safety performance and an arbitrator had been appointed to resolve conflicts. Overall, the experience on the project had been positive but the approach required a higher level of input from the client and their consultants. And despite the partnering approach the project had exceeded its budget.

**Marleen Hermans** and **Diederick van der Staay** of the Government Buildings Agency (RGD) in the Netherlands presented the Agency's approach to value-based procurement. RGD was responsible for a wide range of buildings and aimed to maximise the value obtained from its expenditures. This meant focussing on the requirements of users, and purchasing services that met these rather than purchasing the buildings themselves. Payments were then linked to the delivery of these services. The trend was toward more integrated forms of procurement, such as DBFMO<sup>4</sup>; thus life-cycle costs became part of the evaluation process. However, the Agency used a range of contractual forms and had developed a decision tool for assisting the choice amongst the different options based on factors such as the project characteristics, the level of influence required and the competences and capacity available for input to the project. RGD's initiative was part of a more general reform of procurement practices in the Netherlands.

**Peter Tolf**, CEO of the Swedish contractor Arcona, outlined the company's business philosophy. Arcona had been founded in 1985 with the express aim of working collaboratively with its clients and strategic partners, who covered architecture, structural design, steelwork and other key inputs. Its processes were open, with a clear project structure. It developed teamwork through 'training camps' and individual coaching and focussed on continuous development in its services. The advantages for clients included lower costs, faster delivery and better project outcomes.

**Peter Cunningham** summarised the UK experience with collaborative forms of project organisation in 'Top ten tips for achieving more with less'. The KPIs had shown that these approaches delivered superior project performance. The tips included early involvement of contractors, selection by value not price, having common processes and tools and forming long-term relationships.

In the subsequent panel discussion, the points raised included:

- Changing to a co-operative project culture required a mind-shift in the individuals concerned, not only in the client and principal suppliers, but also in secondary suppliers, workers etc. Finding the means of causing this shift was a major challenge.

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<sup>4</sup> Design- Build-Finance-Maintain-Operate

- In addition, many partnering arrangements were confined to the principal actors. They needed to be extended down the supply chain in order to produce the most effective teamwork. Clients should have direct contact with these lower-tier suppliers.
- With the growth of private finance in public projects, many project structures now included financial interests. The reasons for this were not clear – finance was available from conventional public sources. In response, it was asserted that the introduction of commercial disciplines into a project could improve its performance and value, and that paying for services rather than ‘bricks’ reduced the risk to the public client.

### ***Theme 3: New roles and competences among players***

In his keynote address, **Professor Hennes de Ridder** of Delft University of Technology in the Netherlands contrasted the approach of consumer-orientated industries towards the products that they offered with that of the construction sector. Consumer industries recognised that needs changed, and adapted their product accordingly using marketing, research and product development to create new offerings. Construction, on the other hand, created very long-life products which allowed little scope for change and because these involved large investments and corresponding large risks, did not embrace innovation. Hence the approach of construction might be summed up as providing buildings and facilities with *yesterday's* technology and *today's* ideas for *tomorrow's* people.

Such an approach would not serve future needs. A dynamic control ‘approach to building operation was required, with collaboration between users and operators that maximised the benefit to both. Specifications needed to be less deterministic, with minimum requirements then being complemented by negotiations on desirable additions which could be regularly revisited as changes were needed. The built environment would become more like a living organism, responding to stimuli, with different components changing as a result of the evaluation of alternatives over the relevant product life-time. This would generate a market for new products and push down costs, with consequent benefits to users and society.

**Kay Hedvall** of Senate Properties, the buildings agency of the Finnish government, outlined the agency's approach to relationships with its suppliers. It had utilised several forms of partnering, in particular framework contracts, and had developed a way of analysing the relationships that it required in terms of their strategic significance and difficulty of replacement. Genuinely strategic partners were few and were confined to knowledge-intensive business services such as space management; more common were partners with whom Senate Properties had a ‘Velcro’ relationship. This term originated from Michigan Business School and related to the ability of networks to evolve through creating new linkages. Different projects required different combinations of expertise. Their experience was that partnering with groups of firms was difficult – commercial interests intervened. But partnering with a single firm was more feasible. In the selection of ‘corporate’ partners, quality considerations were dominant but at the project level, when a choice from amongst the group of corporate partners was required, price became more significant. Financial incentives were used to stimulate and reward good performance.

**Peder Hagen** of Statstbygg, the Norwegian government's building agency, introduced the ‘Samspill’ initiative of the agency. This focussed on creating teamwork and had involved selecting consortia (designer, contractor, etc) rather than individual firms in a pre-qualification exercise. The selection criteria included the experience that the members had of working collaboratively. The pre-qualified consortia then competed for projects, with price accounting for 30% of the final evaluation. The successful consortium developed the design on a time-related contract until a target cost could be agreed and then was appointed on an incentive contract with full transparency on costs etc. So far, four projects had been completed and the outcomes were encouraging, with reliable cost estimates being produced early in the project and the

development of trust among the parties. The effort required for reporting was, however, greater than in conventional projects because incentives were based on cost estimates and these needed to be accurate. The approach had shown particular benefits where there were uncertainties in the project (eg in refurbishment) or where the contractor's experience was an important contributor to the eventual solution.

**Miguel Guirao** of Swepro Project Management stressed the importance of clarity in project objectives combined with professional project management in the achievement of successful projects. Each stage of the project required the integrated management of key factors such as cost, time, communications and risk. Typically, a sequence of steps: 'initiate; plan; execute; close' was repeated at different levels, as each phase of the project proceeded. This structured approach promoted the achievement of the desired outcomes.

In the panel discussion, various aspects of project organisation and the roles played by different parties were explored:

- Partnering was often focussed on the client and contractor. However, it should also embrace the design aspects of the project. Architects interacted with clients to interpret their vision of the project in tangible terms while handling the 'soft' issues that were significant for clients. The resources allocated for these early processes were not always sufficient but good planning was the key to sustainable development. It was also the case that some clients did not wish to be concerned with the detail of projects, and relied on architects to handle these for them.
- Public clients in particular had multiple objectives in relation to public policy as well as ensuring that the building was suitable for its users. Achieving sustainability, for example, posed large challenges. These potential conflicts had to be reconciled through design.
- Sub-contractors should also be an integral part of the project team. This provided them with the opportunity to add value to their services. Otherwise, they might have to fall back on cost (and quality) reduction in order to compete in a price-dominated market
- While projects were often thought of in linear terms, it could be more helpful to have a cycle in mind, since this emphasised the need for feed-back and evaluation at each stage and at the completion of the project.
- Clients needed greater levels of expertise. This could be provided through education, as now initiated through the Swedish Construction Clients Forum. This would encourage new behaviours.
- Legislation and administrative rules could inhibit the development of good project practices, but in time these constraints could be changed.

#### ***Theme 4: Supporting tools and information technologies***

Introducing this session, **Lone Møller Sørensen**, CEO of the Danish Building Research Institute, focussed in her keynote address on the way in which new ICT-based tools could improve communications and mutual understanding among the many stakeholders in construction projects. Such tools provided stakeholders with the means of accessing the same design data and drawings and therefore reduced the risk of misunderstandings and errors. But take-up was slow and in Denmark a 'Digital Building' initiative had been established in order to promote their use. This covered tendering, 3D models, project Websites and digital submissions. It was being supported by a government requirement for use of digital models in public sector projects. 3D models and project Websites facilitated dialogue with users and improved decision processes. The programme was a platform for learning but firms had to be prepared to change their

processes in order to take full advantage of ICT technologies. In addition, surveys had shown that clients did not consider that ICT tools were suited to their needs and further development of standards for communication and representation was required. Finally, an open source philosophy needed to mature in the software supply industry.

**Christer Wannheden** reviewed the standard forms of contract that were used in Sweden, noting that the warranty period had recently been increased in a number of forms of contract. This increase, normally to 5 years, had caused more attention to be paid to quality issues, particularly when workmanship was involved. BQR had conducted a study of the implications of a further increase, to 10 years, to determine whether this was feasible and desirable, and had published guidelines to achieve this. Their conclusion was that longer periods of warranty would stimulate collaborative behaviours. However, the study had led to suggestions from supply interests that clients would need to take more responsibility within projects, even though logically it was the supply side that would need to take responsibility to deliver the required performance over the longer period.

**Väino Tarandi**, Nordic co-ordinator for the International Alliance for Interoperability, reviewed the development and application of Industry Foundation Classes (IFC) and their use in Building Information Models, now given the generic title of BuildingSMART. This concept provided a means of creating internationally recognised digital models of buildings and processes. With the aid of tools such as the Information Foundation Dictionary (IIFD) and Information Delivery Manual (IDM), this systematic approach to digital modelling was now starting to be introduced. Some major clients such as the General Services Administration and Senate Properties were defining their first modelling standards and moving towards requiring models meeting the IFC standard. This compulsory element was essential in achieving the widespread use of digital modelling – otherwise firms would not make the necessary investments and change their processes. The outcome would be more efficient processes and fewer errors in design and construction.

**Gerrie Muhren** of the Dutch reform programme PSIBouw presented the way that building modelling was being promoted in the Netherlands. The Council on Building Information, created by PSIBouw, had mapped out a programme for achieving a comprehensive range of digital products by 2012 and this was now being taken forward. This initiative involved a full range of stakeholders, including the software suppliers. They aimed to facilitate more integrated project processes with greater potential for concurrent working and a life-cycle approach to performance. But new roles would need to be defined and managements would have to drive the changes.

In discussion, issues raised over the implementation of ICT in construction included:

- Clients were able to require the use of digital models. But many found the subject too complex. In addition, the present tools were not suited to the SMEs who constituted the majority of construction firms. There was a need to adapt tools to them.
- There was dangers in reliance on ICT models, for example those that calculated energy use. There needed to be independent verification of their outputs.
- By facilitating the exploration of alternative designs at an early stage, ICT could produce cost savings; the large public buildings agencies would not be moving into digital modelling if they were not convinced that it would produce these savings. There was evidence from different countries of the benefits – for example a project in Sweden had saved ten times the investment in the modelling system.
- Some people had claimed that because the models could provide data for operation and maintenance, the resulting buildings would be more economical to run and would command a higher price. In practice, though, this effect was insignificant in the present market; developers had no interest in that aspect of modelling.

In discussion of warranty periods, it was noted that the range of such periods across Europe could constitute a barrier to firms conducting business in different countries, while studies had shown that some technical standards could be deficient when applied to tall buildings. Thus the introduction of longer warranty periods should be approached with caution.

### ***Summing up and pointers to future issues***

In a final presentation, **Roger Courtney**, consultant in construction innovation, summed up the main themes emerging from the conference. Noting that the conference had been founded on the concept of the quality chain, he commented that a novel interpretation of the chain had been offered in one of the welcoming presentations, in that quality was seen as a factor in the attractiveness of the industry to young people, and if recruits with a high level of ability could be attracted to the industry, that would itself promote higher quality standards. However, while there had been many references to quality in the conference, it remained a concept that needed further definition. The difficulty that one panel member had had in relating the KPIs to the needs of disabled users illustrated that each of the stakeholders in construction would have a different perception of what constituted quality. This might be explored in a future conference.

Reviewing the themes of the conference, he noted that it had essentially dealt with:

- 1) The importance of customer and user needs in defining what a project should deliver, and how these might be translated into measurable project objectives
- 2) The need to align project goals across all participants, which could be addressed through organisational measures, financial incentives and through the overall project environment (eg the way in which an extended warranty period focussed attention on aspects of quality)
- 3) Having the capabilities to deliver quality in a changing environment, through appropriate project structures and professional management
- 4) Tools to aid the achievement of quality, both these based on ICT and process monitoring tools

The conference had illustrated that there were developments across the world from which practitioners could learn. And it had also underlined that there were issues common to many countries which needed further exploration. Amongst these were:

- The characterisation of 'performance' and 'quality' from different perspectives
- Tools for refining and translating user needs
- The role of the client in projects of different types
- How 'hard' sciences (engineering and mathematics) and 'soft' sciences (psychology and sociology) may be combined to improve construction performance
- Stimulating and motivating change, including means of showing the benefits from new approaches and justifying investment in ICT support systems

There was also a need to understanding how different construction cultures produced quality outputs – it was notable that the issues discussed at the conference did not seem to be as significant in countries not represented at the conference (eg France) where construction operated through different structures.

The Seventh Framework Programme of the European Union offered a means of addressing these issues in an international context. While previous Frameworks had been orientated towards technological research, there were opportunities in the Seventh Framework for studies of client-orientated and construction process issues. And further learning opportunities would occur in



## **2nd International Conference on Quality Chain Management**

October 2007, when the Revaluing Construction 2007 conference would be held and the International Construction Clients Forum would meet.

Closing the conference, **Gun-Britt Solberg**, CEO of BQR, thanked all speakers and participants for their contributions and said that the success of the event meant that the organisers would arrange a third conference. This may take place in 2008 in Denmark or the Netherlands.

R G Courtney  
7th June 2007