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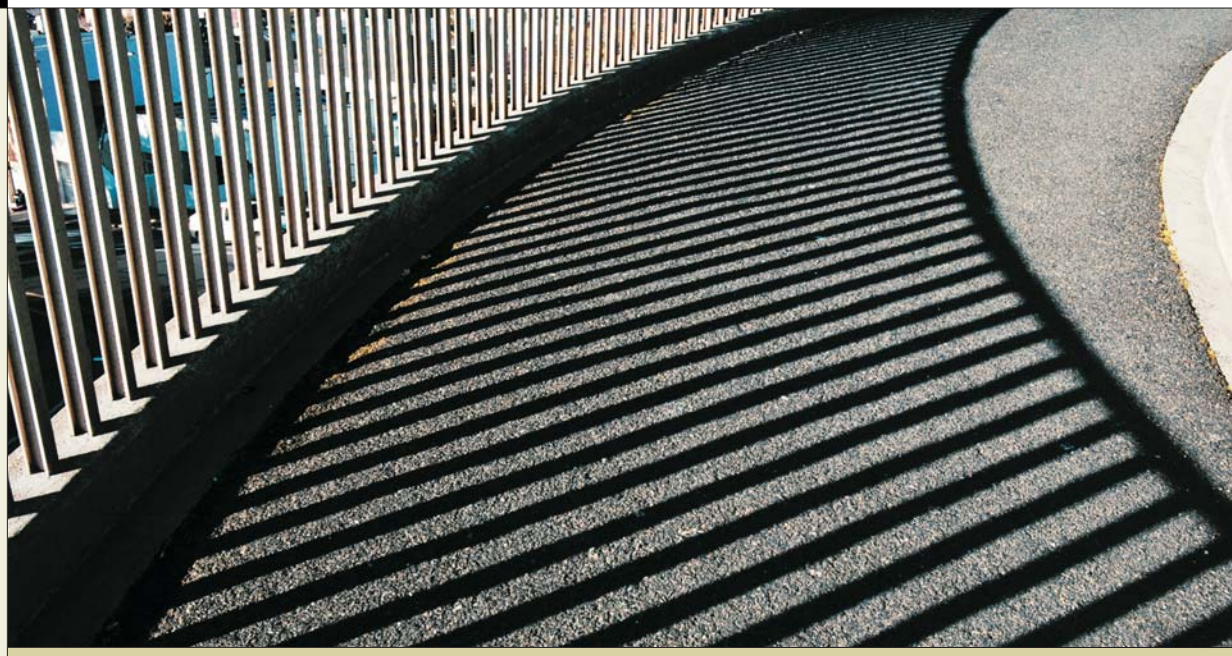

Of Baskets and Eggs…

The horrendous photos of the collapsed bridge over the Mississippi River in Minneapolis are a graphic call to attention: maintenance, maintenance, maintenance! A huge steel bridge lies in the bottom of the river, broken like a mere house of cards: trucks, buses and cars perilously perched on crazily twisted surfaces, several of its occupants dead.

The May 28, 2007 issue of *Time* Magazine 'Briefing' section, pages 8 and 9, gave sobering examples illustrating the consequences of not attending to infrastructure maintenance and upgrade. 97% of the roads in the USA are said to need improvement; airports are crowded and inefficient, needing US$14 billion annually "to keep pace with basic needs". Their railways have fallen behind in standards: to improve them (but not quite to 'bullet train' speed!) they will require an investment of US$250 billion over 20 years. 3,500 dams in the US are unsafe, requiring attention to bring them into compliance with safety standards – and the Environmental Protection Agency estimates that "up to US$500 billion will be needed to repair and upgrade wastewater systems".

It is true, the USA have vast infrastructure systems and their financial numbers are equally "humongous". Some of their environmental challenges are particularly severe: weather conditions, especially in the northern states, require the regular application of grit and salt to roads and bridges through the very cold winters. The salt has been corroding steel structures for decades, and many bridges are in need of replacement. It is a well-known problem, part of the huge backlog of periodic maintenance suggested by the above figures. At the time of writing the official views on the causes of the Minneapolis collapse are not known, but… was it an accident waiting to happen?

Meantime in dear old New Zealand…

Recently published figures show that 48% of investment in state highways is concentrated around Auckland. In other sectors, growing demand in Auckland requires new overhead electricity transmission lines over farmland and close to smaller settlements; and water is also "imported" from south of the Bombay Hills… all subsidized by the rest of the nation, either in cash – or in kind: electricity, water.

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Ernesto Henriod, Editor

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I cannot but think that we are placing most of our eggs in the one basket, a basket which is full of holes. Figuratively speaking, of course: I refer to the very difficult geography of Auckland which, while providing both resident and visitor with wonderful vistas and magnificent opportunities for swimming, yachting and relaxation, create communications problems which are very expensive to overcome. The problems include remote supplies and transmission losses from the heartland; inlets and bays to bridge or tunnel under, hills to flatten or craters to circumvent; inorganic urban growth which has created street mazes and bottlenecks or forces highways under or above ground.

And then we have the alphabet soup of laws and regulations, and the boroughs and regional, ethnic and national authorities, learned and special interest societies, school boards, parishes… all pulling their own weight, adding to the geographical challenges and creating more expense. Sometimes it is a problem of NIMBY, others it is the preservation of a building of doubtful value, or avoiding the crater of a long extinct volcano. Buildings must be moved, new premises built for schools and places of worship, special measures taken to reduce noise levels… it is a long list, providing challenges around every corner.

Modern cities the world over create their own centripetal forces, attracting people from the country and abroad: conurbations spring everywhere, from London to Mumbai, Sao Paulo to Tokyo. It is a phenomenon of human migration towards sources of work, towards real or perceived opportunities. The attraction of Auckland is partly due to its own population mass and the enhanced public amenities it may provide; its northern location and warmer clime; and its being the port of entry, the landing pad for immigrants. It provides work opportunities for migrants, but – is it the most efficient place for industry to grow? Can Auckland industry surmount the inefficiencies of space (cost, topography, accessibility) in a global economy? Is further industrial expansion warranted in the Auckland region, or are we still in time to stimulate future industrial growth in areas with plentiful flat land, ample resources, and easier access to local markets? Hamilton, Tauranga and Napier come to mind in the North Island; Christchurch, Ashburton and Dunedin in the South.

Let's not forget that, by placing so much emphasis on the problems of Auckland, we may be reducing the funding available to maintain, update or upgrade vital infrastructure in the rest of the country. We may be going the way of the United States. What are the equivalent figures for New Zealand? Are we placing our country in a downward spiral of neglect? Do we hear a rising chorus of concern?

Ernesto Henriod

Several articles in this issue bring our focus into the supply-chain management and relationships that are emerging as key to greater efficiency in industry –drawing, in one instance, from remarkable similarities among industries as different as construction and car manufacture. One article presents a provocative challenge to traditional concepts of management and presents a well-tried approach using realistic concepts that minimize waste and over-reporting and concentrate on monitoring project performance. We also include a brief note with highlights of the Conference on Procurement in a Hot Market, and a note on the work being done on Improving Construction sector performance. A few abstracts also suggest further reading on the work being done by others on associated subjects. In sum, increasing complexity of the business environment and scarcity of resources are leading us into new approaches…read on!

Forthcoming Event

The SB07 NZ Sustainable Building Conference will bring together a wide range of industry stake holders to focus on the issue of sustainable building in the New Zealand environment.

Taking a 'cradle to grave' approach, SB07 NZ aims to separate the different stages of a buildings' life to highlight and give focus to the key issues of each stage. Starting from the policy, planning and design through to construction then maintenance and the re-use, refurbishment or de-construction. The main goal for SB07 NZ is to provide a focus for sustainable building in New Zealand moving forward.

Date: 14-16 November, 2007, in Auckland, New Zealand.

For more information visit: www.sb07.org.nz

Your comments or papers proposed for publication will be most welcome. The deadline for new material for the Sixth edition is **31 October 2007**.

Disclaimer

While every care is taken to present articles discussing current trends and techniques in contracting and construction, CAENZ emphasises that the information contained in this Newsletter is not a substitute for experience and expertise, which must be sought by the readers where deemed necessary.

Note also that some articles may propose matters for discussion based on the authors' opinions, drawing on their own experience or theories and, as such, may be subject to further testing, and should therefore not be taken as proven or approved practice.

The Construction Sector in a Hot Market

by Dr George Hooper

The New Zealand construction industry is experiencing an unprecedented level of activity and forecasts are for this to continue, at least for the infrastructure sector, for several years. This surge in construction investment is being driven by the need at national level to play "Catch-up" in renewal of our critical infrastructure plus available private capital looking for secure investment portfolios.

In the traditional construction market era, investment was dependent on government sentiment; capital could be turned off very quickly or turned back on at will. This lead to the inevitable boon/bust cycle and industry oscillations. However, nowadays globalisation is driving reform of the sector with the emergence of the Private Finance Initiatives (PFI's) seeking optimal investment outcomes and more reliable commercial performance.

In response we are seeing different business models, more complex supply chains and a construction market that is progressively becoming supplier-led. We are also seeing the emergence of different industry structure that is moving from a strictly construction focus through to the emergence of new entities with a business focus directed towards facilities provision and asset management service. Internationally, public sector projects are more and more being paid for by private owners.

This process of transformation will be a long-term trend, but a recent industry summit has revealed that significant change is already under way. Construction industry players are recognising a need for greater collaboration and new methods for sharing risks and returns. The industry is acutely aware that the current competition for resources, and other constraints, are holding the industry back and denying all of the players an optimal outcome – and the mood is for change.

But visionary leadership is needed if the industry is to respond to the challenges and deliver on beneficial change.

Transformational change of the type currently being experienced is characterised by:

- Increased input costs.
- Skills/experience shortfalls.
- Mobility of resources.
- Blurred boundaries and accountabilities.
- Supply chain reliability.
- Collaborative working arrangements.

In this respect, the major issue confronting the construction sector today is management of the various risk elements inherent in the above environment. New relationships are called for that can find values from within the supply chain. Ultimately owners need to be attractive to the supply industry and, in turn, suppliers need to demonstrate game-breaking performance.

Significantly, other fundamental shifts are occurring. From the client perspective there is a growing interest in new ownership models, and both the client and the provider now share a greater interest in best value and life cycle costs. There are examples in New Zealand where these new arrangements are also impacting on procurement methods. In these cases, construction risks are dealt with within the project framework rather than through the balance sheet. These lead to new forms of working together towards better risk outcomes.

It is certainly an exciting time for the construction sector and there are clearly some very good incentives to drive these changes: There is currently $3.5 billion of Australian super funds looking for assets, and if New Zealand doesn't address these issues fully the money will go elsewhere. Our construction sector cannot afford higher risks, because today's risks become tomorrow's downturn.

The recent industry summit has shown that despite some good examples of innovation, New Zealand needs to do more to compete with others for international investment in a global industry. The response was a call for action to improve the way New Zealand's build programme is delivered over the next decade and beyond.

This will see a process of transformational change looking more broadly at procurement and audit trails to deliver best value, and recognising the emergence of strategic asset management as a special role. The potential benefits of this are large. The construction industry employs roughly 135,000 people directly, or about 7 per cent of the workforce. A BERL report suggests that a 10 per cent improvement in construction efficiency would achieve a 1 per cent increase in GDP (approximately $15 billion), including savings of $350 million in government procurement costs.

The key to achieving these gains is ensuring that the collaboration within the sector is allowed to continue. Major changes can only occur in a hot market. A reassessment of risk and procurement methods will make a significant contribution to overall economic performance.

Dr George Hooper is Executive Director of the New Zealand Centre for Advanced Engineering, an independent think-tank and research facilitator based in Christchurch. This article is based on a CAENZ/New Zealand Property Council summit to examine construction industry performance in a hot market.

Never Mind the Contract, Feel the Behaviour

by Dave Nellist, GHD Ltd

After many years in the Procurement business, I have come to realise the extent to which success depends on simple principles, such as upholding and fostering integrity in relationships, and from a clear, consistent, common sense approach. This is the case irrespective of the industry - contracting in the construction and engineering sector is no exception. It is important to focus less on the form of contract and more on developing a mutual understanding of what the contract will deliver for both parties.

I have been a procurement practitioner for over 20 years – most spent in the private sector outside New Zealand - and would like to comment on how my experience has relevance for current procurement factors in the context of the New Zealand construction and engineering industry.

Parallels: NEC and Toyota

Toyota is a hugely successful global enterprise, with a net income of close to NZ$18 billion on revenues of over NZ$260 billion and in April this year reportedly overtook GM as the number 1 carmaker in the world by volume. Why do I mention this? Having spent 12 years working for Toyota's European manufacturing operation, I can appreciate that this level of success is achieved primarily from the deployment of simple, common sense tools, in a consistent way. It is about recognising the mutual dependency of client and contractor, employing a pragmatic approach to resolving issues, and placing value on the investment that each party makes in the relationship in the long-term. Procurement is a strategic function within Toyota.

I was struck during a recent NEC3 ECC (Engineering and Construction Contract) workshop by the parallels between the NEC and Toyota procurement – not just philosophically but in the practical hands-on tools employed to achieve an outcome acceptable to all parties. I list some examples in the table below.

Concept	Category	Toyota Examples	NEC Examples
Contract Meaning	Philosophy	Primary intent is to support a practical working relationship	As Toyota. NEC contracts are live tools. Contract is subordinate to outcome.
Earning Repeat / Follow-on Business		Repeat business not guaranteed but good performance is respected	Concept supports long-term mutual understanding, not short-term 'chop & change'
Mutual Trust and Cooperation		Supplier relationship principle of promoting mutual trust and prosperity	Article 10.1: "...spirit of mutual trust and cooperation."
Openbook Costing	Philosophy & Process	Openbook is a fundamental tool for co-operative cost reduction whilst protecting supplier margins	Refer ECC main option clauses C to F – striving for openbook transparency
Problem Avoidance	Process	Process geared to early and open identification of problems	Early warning (eg 'risk reduction meeting') is preferable to compensation events
Continuous Improvement		'Kaizen' concept. Toyota and supplier each promote continuous quality improvements.	Similar to Toyota
Status Monitoring		Emphasis on reporting methods to clearly show status or condition & enable appropriate follow-up action	Use of risk and compensation event registers. Requirement for a clear programme.
Specifying	Responsibility	Default liability for any cost or negative impact falls on the requestor	Responsibility sits with any party specifying a particular subcontractor or piece of equipment, for example
'Eyes Open' Approach		Keep other party informed so that they are able to make decisions which best fit their own unique situation	Places strong emphasis on communication

Table 1: Observed Parallels between Toyota and NEC ECC Procurement Concepts

These concepts can work to dramatic effect when all parties adopt an attitude and culture intent on accentuating the areas where business interests converge and apply this consistently throughout their organisations. Whilst it was possible at Toyota to categorise certain contract terms as underpinning key company principles (a normal facet of any proposed supply agreement) I gained the strong impression that the working relationship and acceptance of responsibility were themselves far more important than the contract per se.

An essential point being made is that the concepts in the table above are recognisably characteristics of Toyota's business culture (well-documented, commented on and copied in global manufacturing) and that it is this culture that drives the approach to supply market management. In other words the procurement behaviours remain consistent with and stem from Toyota's successful wider business principles.

Infrastructure Procurement Boundaries

Procurement practitioners need to be active in managing and influencing capability and capacity in the supply markets that are important to them. Some contractors and sub-contractors have direct interfaces with the client's customers (e.g. road users) and this aspect must also be managed. The customer will not see the distinction between the organisation and its supplier tiers – they will see only the principal and will judge what they see in this context.

In effect the organisation's boundaries extend back into the supply base and the holistic management of this is the responsibility of procurement. It is a strategic function.

Establishing the core purpose of an organisation leads to defining the outsourced goods and services. This in turn enables the profile and structure of the optimum supply base for the organisation to be well understood. Procurement needs to map the capability, performance and interdependencies of current and potential suppliers in key supply commodity areas in order to identify, and so manage, risk and opportunity.

This supports the identification of the appropriate supplier relationship model, taking into account risk, impact, and options available in a given supply situation.

The establishment of specific supplier relationships is subordinate to acquiring the goods and services

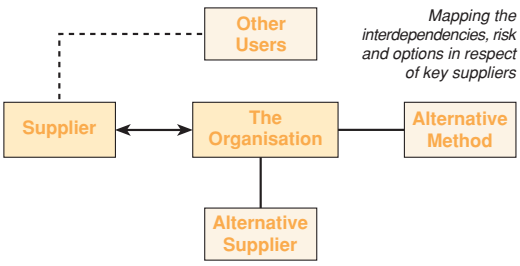

Figure 1: Supply Base 'Mapping'

themselves. By adopting this approach it is possible to fully examine opportunities to aggregate requirements for common or similar goods & services and thereby unlock cost and performance benefit. It is about managing commodity supply strategies first and supplier relationship strategies second, not in terms of importance, but in terms of sequence. This is equally relevant in construction and engineering.

Cost in Construction Supply Chains

'Supply Chain Management' is the concept of looking beyond an individual customer: supplier relationship and instead looking more holistically at the wider supply chain from raw material (or service inception) through to delivery to end-customer. The intention is to consider how efficient the whole supply chain is by examining where value is being created bearing in mind that cost is added continually whereas true value is added only intermittently.

Along the total supply chain some cost can be defined as wasted (e.g. defective materials, excess stock, or poor workmanship), some is redundant or unproductive (e.g. cost of storing materials), and some is necessary but undesirable (e.g. transportation, or the cost of an unsuccessful tender). However, all of these undesirable costs, as well as the reasonable profit margin of all contractors in the chain, must be recovered somehow if individual organisations in the supply market are to remain viable[1]. No customer wishes to pay for unnecessary cost – and the larger customers will have the ability to influence the market so that smaller users pay for more than their share. However, the notion that contractors and sub-contractors can indefinitely 'absorb' these costs is nonsensical – the economics simply don't work.

Through collaborative work, gaining a true appreciation of each other's position clients and supply markets, in tandem, can follow the preferred route of driving costs out of the supply chain. It is in the long-term interests of all parties to do this – viable and cost-efficient contractors make for viable and performing supply chains.

Infrastructure procurement is no different to other procurement, private or public sector, when it comes to this concept of value management. It is characterised by:

- Equitable risk sharing.
- Consistent approach across the supply chain.
- Pain : Gain share to drive out cost inefficiencies.
- Openbook costing and mutual cooperation to reduce cost and risk.

[1] I assume here for the sake of debate that contractors and subcontractors are not making unreasonable or excessive profit as of course this would enable them individually to pass on these cost inefficiencies through the excessive margin. If there is either insufficient competitive tension or cooperative intent within the supply market then it will not be possible to have full confidence that supply chain value has been optimised.

- Setting and protecting fair margins throughout the chain.
- Each party accepting responsibility for its actions.

The characteristics exhibited by a 'best practice' supply chain relationship management approach promote integrity, cooperation and responsibility. These collaborative characteristics, rather than being weaknesses, are the strengths that underpin the development of stronger, leaner, supply chains.

Summary

Procurement is a fundamentally important function for organisations to manage well.

Some of the procurement and supply chain concepts employed successfully in the private sector for many years have relevance in public sector engineering and construction and vice versa. Indeed, NEC3 suggests there is already a significant overlap in thinking and implementation.

The central purpose of procurement is not to negotiate and manage contracts (in the same way that, say, construction contractors don't exist to run IT systems, or clients to create CAPEX budgets). The focus should be on delivering core purpose outcomes and that has always been best served through the consistent management of contractor relationships, informed by a sound understanding of an organisation's strategic supply market context. Relationship form matters above contract form.

By seeking merely to deflect or pass on supply chain cost, instead of managing processes to remove it, customer organisations run the risk of promoting supply market inefficiency and of achieving sub-optimal levels of value performance. In adopting a more rigorous, collaborative, approach all parties in the supply chain can become leaner and more effective organisations.

David Nellist has worked in Procurement in the international market for twenty years, and is a strong believer in the value of effective supplier-customer relationships, and how they can deliver sustainable benefits for both parties. Dave worked for 12 years in the Toyota European manufacturing operations, where he was a purchasing manager, and later with Barloworld Scientific in the UK – entrusted with redefining their procurement systems to meet new challenges faced by the business. He joined GHD Limited in January 2007, as a Senior Procurement Consultant. Dave is a member of the Chartered Institute of Purchasing and Supply (MCIPS).

Recent Papers

Partnering practice and the delivery of construction projects for Housing Associations in the UK [Chris Fortune, Shinta Setiawan (2005). Journal: *Engineering, Construction and Architectural Management*, Vol. 12 Issue: 2, p181-193]

Abstract

Purpose: Housing Associations in the UK are being encouraged to change the way in which they procure their building projects. This work aims to provide a snapshot of current practice in relation to the use of partnering as a procurement approach.

Design/methodology/approach: Accordingly, a quantitative research design was used to capture data from a sample of 100 of the largest Housing Associations involved in the commissioning of new house building projects in 2003. Two administrations of the survey generated a 43 per cent response rate.

Findings: The findings of the study revealed that two differing types of partnering alliance could be identified. The types of partnering alliance identified were considered to have either a "supply side" or "demand side" focus. The results show that partnering practice, open-book cost management, risk analysis and the use of standardised and pre-fabricated components are now widespread and believed to deliver benefits in project costs, delivery times and quality levels.

Research limitations/implications: The work is limited due to the size of the sample frame and the measuring instrument used, which could not uncover reasons for the current practices that were revealed.

Practical implications: The outcomes of the work provide practice with benchmarks that can be used to evaluate organisational approach and if necessary develop alternative approaches to the delivery of partnered projects.

Originality/value: The paper contributes to the body of knowledge available on partnering practice in a client group that has been identified as being key in driving forward the post-Egan agenda in the construction industry.

Keywords: Construction industry, Housing, Partnership, Strategic alliance, United Kingdom

Procurement effects on trust and control in client-contractor relationships [Per Erik Eriksson, Albertus Laan (2007). Journal: *Engineering, Construction and Architectural Management*, Vol.14 Issue: 4 p387-399]

Abstract

Purpose – This paper aims to investigate how construction clients currently deal with procurement and to analyse how the choices made during the buying process stages affect the

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Minimising Risk in the Futuristic Environment

by Kenneth Sullivan, Marie Sullivan, Jacob Kashiwagi & Dean Kashiwagi

Research Team from Arizona State University led by Dean Kashiwagi

Future construction risk will be minimized by construction professionals (engineers, architects, project managers, et al) who use a supply chain strategy that minimizes transaction costs and risk, best value selection, transferring risk to contractors who can minimize risk, having the contractors practice quality control to minimize both the risk that they control and do not control, and putting a system of measurement of performance for all participants in the delivery chain that makes all participants accountable.

This is an information environment that minimizes the flow of information, motivates the minimization of management, control, and direction, and minimizes decision making by those who are not accountable to minimize risk. This "futuristic" environment is foreign to construction professionals who increase the flow of information, maximize decision making, and practice a high degree of direction and control. This provocative paper by a talented group of researchers from the USA presents a sustainable best value and leadership based approach that shows how the future of construction will need to be if efficiency, performance, and value are to significantly increase.

Introduction

Construction projects have reported a high degree of risk (not being on time, not being within budget, and not meeting the expectations of the client) (Post, 1998; CMAA, 2004). The construction industry's solution has been to implement more management, direction, and control (Hwang and Liang, 2005; Cottrell, 2006; Gordon and Akinci, 2007). The authors propose that this solution is not theoretically defendable, and has not produced evidence that it is able to minimize construction risk. Management, by definition, increases a process's inefficiency, drives transaction costs higher, and relegates accountability. The authors make the following deductive observations about management, control, and direction:

1. Management is a manifestation of system and process inefficiency.
2. If the working participants are highly skilled, experienced, and perform, there is minimal need for management.
3. The more value management brings in direction/control, the lower value the contractor/workers brings.
4. It is difficult to control human participants or change behavior in a process/system.
5. A structure and process with a high degree of client management and control, requires a high level of information flow, decision making, and risk.
6. An optimal structure/process minimizes management.

The practices of leadership, quality control/quality assurance, outsourcing, lean and supply chain management all support the minimization of management, decision making, control and direction (Deming, 1986; Shook, 1988; Seppala, 2003; Price and Dainty, 2004; Chen and Kirkman, 2007). The authors propose that by applying these principles the management system of the client's professional representatives can optimally minimize construction risk. The principles can be exercised through the following tools found imbedded in the Best Value System:

1. Best Value Selection: selecting contractors and their key personnel who have the capability to perform.
2. Self regulation: requiring contractors to practice quality control/quality assurance to minimize risk that they do not control.
3. Information Environment: using simplistic information to track, prioritize, and mitigate project risk.
4. Supply Chain focus: practice principles that reduce the system's transaction costs by minimizing duplication and additional work.

Best Value System

Best value delivery has been developed and tested for the past 13 years at the Performance Based Studies Research Group (PBSRG). The Best Value/Performance Information Procurement System (PIPS) focuses on three main phases: 1) Selection, 2) Preplanning/Quality Control, and 3) Management through Risk Minimization. The purpose of the system is to utilize performance information in order to identify the best value contractor. The best value contractor is then transferred accountability and control, being considered the technical entity most capable of minimizing project risk. Best value practices have resulted in reducing up to 90% of the client's construction management, while increasing construction performance to 98% (on time, on budget, and customer satisfaction).

The Best Value/PIPS selection has the following steps (See Figure 1):

1. Selection (Identifies the "best value" contractor)
   a. Past performance of all key/critical project

components are measured.

b. Contractors demonstrate preplanning abilities by creating a document identifying and minimizing project risks dependent on variables out of the contractor's control.

c. Contractors identify how they add value through differentiation.

d. Key personnel are interviewed to identify if they have the capability to minimize risk instead of passing the risk to others.

e. The best value contractor is selected, based on performance information and price.

2. Preplanning/Quality Control (QC) (Transfers project risk, accountability, and control to the "best value" contractor)

   a. The "best value" contractor begins preplanning the project, creating a QC plan and schedule.

   b. The "best value" contractor's QC plan and schedule are incorporated into the contract, and the contractor is awarded the project.

3. Management by Risk Minimization (Information Environment).

   a. Throughout the execution of the project, the contractor provides critical project information through the reporting and documentation of risks via their weekly report.

4. When the project is completed, all critical elements (contractors and their personnel) of the project are measured. The measurement becomes 50% of their past performance rating used to compete for future projects. This allows the best value system to regulate itself, as performance becomes requisite to future competition.

Selecting Best Value

In Best Value procurement, performance information allows the owner to measure each contractor in the selection phase. After the contractors have been prioritized, the "best value" contractor is cost controlled. If the "best value" contractor has the lowest cost, there is no conflict in the award. However, when the "best value" contractor is either not the lowest cost or above budget, a subjective decision making process is followed in order to minimize the owner's financial and political risk. Because the client professional's cost estimate rarely considers the level of risk and the uniqueness of a project's constraints, the following factors are considered:

1. Competition of the best values.
2. Contractors' justification and validation of prices higher than the benchmarked prices.
3. Owner's scope and budget.

If the "best value" contractor is not the lowest cost, considerable care must be taken to determine whether awarding to the contractor is justifiable (See Figure 2). If all contractors have submitted prices over the budgeted amount, the award will go to the lowest priced contractor who can prove with dominant information that they can minimize the risk of nonperformance (See Figure 3). In both cases, the owner always has the option to rerun the process. The difference when prices are over budget versus within budget is that when the best value is over budget, the performance information is used to try to prove that the lowest priced option cannot do the project. If it is within budget, the performance information is used to prove that the best value should justifiably be paid more. This minimizes the owner's risk in defending their "best value" selection. The contractor who is selected for the project becomes the "best value" in consideration of the owner's budget.

Self Regulating Quality Control

After the "best value" is selected, that contractor moves on to the preplanning/quality control phase. Quality control is a dynamic process that considers both the controlled variables within a system as well as uncontrolled variables in risk minimization, and compensates or adjusts plans according to the changes found in the uncontrolled

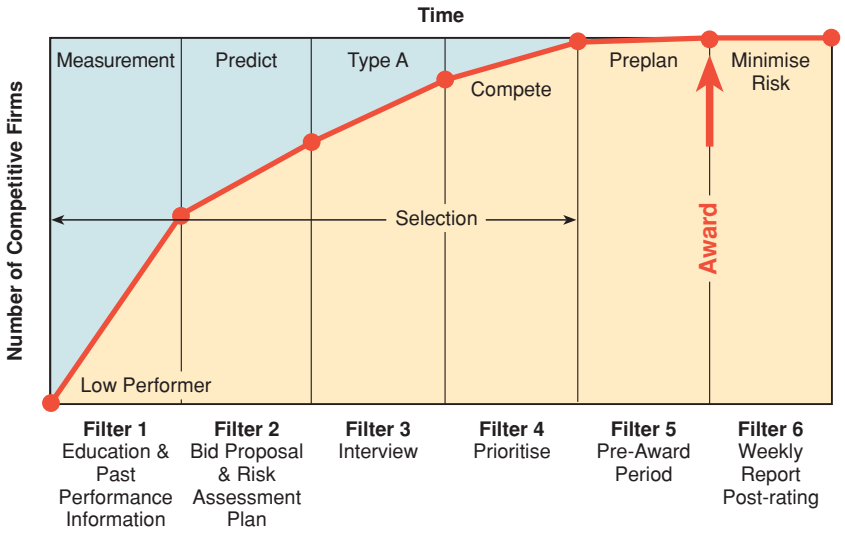

Figure 1: Best Value/PIPS Steps

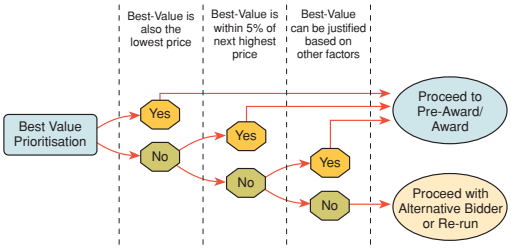

Figure 2: Subjective Cost Control of Best Value Alternative

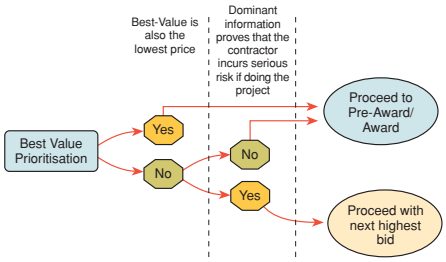

Figure 3: Best Value When the Prices Are Over Budget

or variable factors.

Quality control was initially applied during the Industrial Revolution when quality became a factor of group production rather than the responsibility of one individual (American Society of Quality, 2007). It was further developed by providers to eliminate the manufacturing production expenses due to costly rework and defects (risk in terms of cost and time.) Modern day quality concepts develop by Edward Deming and Joseph Juran focused on ensuring a product's ability to meet or exceed customer requirements (Deming, 1982). Quality control empowered the vendor with the knowledge that the quality of the service or product, as well as the profits, could be controlled through self-regulation. However, QC has not worked as well in the construction industry. In the last ten years, the construction industry has attempted to use technology transfer from other industries to improve the performance of construction, or minimize the risk of nonperformance. The industry has implemented a version of QC executed by the owner representative in attempts to minimize the owner's risk of not receiving the technical results procured in a price based environment. It was not understood that QC is not a tool to manage or enforce behavior, but a tool to assist in the actual minimization of risk. It is best applied in an environment where the entity performing the QC is the entity minimizing the project risk.

QC/QA2 Differential In the Best Value Environment

Figure 4 shows the difference between the low bid and best value environments. In the price based environment, the client's representative is the manager, decision maker, and inspector. The low price, minimum requirements of the price based environment creates this management structure. The risk to the client is that the contractor's personnel are not technically qualified and unable to meet the technical specifications. The contractor is therefore closely inspected and managed by the owner's QC/QA process.

In the best value environment (Figure 4), the risk is not the technical requirement described in the specification, because a best value knows how to do their job, and is planning on exceeding the minimum requirement. In the best value environment, the risk is what the best value contractor cannot control. It is the risk in the interfaces between the parties, the gray areas dependent on outside variables that are usually ignored. It includes factors that the contractor does not control, such as:

1. Coordination between parties.
2. Inaccurate or incomplete design.
3. Conditions that are not addressed in the specifications.
4. Environmental conditions (i.e. weather).
5. Special owner requirements or facility constraints.
6. Concerns/risks identified by the client.

The QC/QA program in the best value environment should contain plans to minimize the risk that the contractor does not control. However, if the contractor attempts to minimize the risk that they do not control, and the risk still occurs after doing everything they can possibly do, the client and not the contractor should be responsible for the effects of the risk. If the contractor is a performing contractor who is thinking in the best interest of the client, they will continue to attempt to minimize the risk; however the client should compensate the contractor for

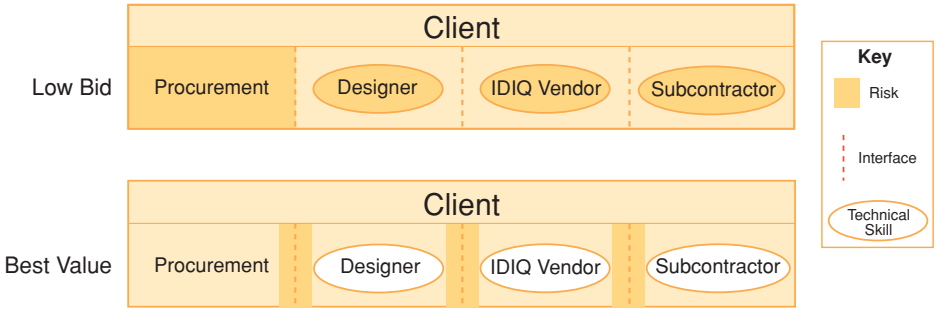

Figure 4: QC/QA Differential

additional expenses. After the risk minimization efforts of the contractor, the risks should be treated as unforeseen risks.

Best Value QC/QA

The best value QC/QA process needs to meet the following requirements:

1. Force the contractor to preplan and identify risks to the project that they do not control, and identify how they will minimize the risks. This includes risks identified by the client and other contractors during the selection phase.
2. Risks need to include client concerns, unforeseen risks, and risks that are caused in part by the other participants in the construction delivery.
3. QC/QA process should be coupled with a report that identifies which risks are not minimized, and contractor identified action on what will best minimize the risk.

By forcing the contractor to identify the risks that they do not control, by default, the contractors identify what they do control. Instead of tasking the client's professional representatives to completely identify and clarify what a contractor is responsible for, the client now transfers the risk of construction risk to the expert, requesting them to identify what they don't control, and how they will attempt to minimize the uncontrolled risk. The contractor is the best suited for identifying risk, as they are the construction expert. It also assists the contractor in taking control. As risk and accountability are transferred to the contractor, they are now responsible to integrate all participants into the construction plan.

The QA program is an extension of the QC document. It contains a list of the QC risks, and is being reviewed weekly by the contractor to verify that the QC plan is being used to minimize all uncontrolled risks. The QA checklist is signed and dated at the end of each week. This is the totality of the QA program. The QC/QA program is used by the contractor to minimize risk. It does not invalidate the requirement to minimize the technical risk. The minimization of technical risk should be in the specification and is a technical requirement. If the contractor does not meet the technical requirements, they are not meeting the specification.

Risk Management through an Information Environment

In order to take full advantage of the best value QC/QA, the program must be coupled with an information environment. The information system should distribute the correct information to the entities involved that encourages action that increases performance. Earlier in this paper, the authors proposed that no organization or entity could successfully, over time, effectively control another organization or individual. If this is true, as history has shown, then the organization or individual controls their own destiny, direction, efficiency (profit margin) and performance. Contractors can truly be effective only when doing the following:

1. Controlling their own project.
2. Preplanning.
3. Preset plans to minimize risk that they don't control.
4. Increase the contractor's knowledge of the project, preplanning, and pride in their construction skill.
5. Get all the help they can get from the client's personnel and other participants in the delivery process/structure.

The method to make everyone accountable is to set up an information system that:

1. Is simplistic and minimizes the amount of information.
2. Avoids the filtering of information by participants who have an agenda.
3. Documents any directives or decisions by any of the participants.
4. Identifies when any participant has not completed a task which brings risk.
5. Make the contractor who is at risk, document the information.

In the best value system, a "weekly report" is organized in such a way, that by receiving the risk information on a project, it results in measuring all participants (including client's project managers, inspectors, designers, and contractors) in the delivery process based on the risk information. The minimal information is moved to the right spot and at the right time, disabling the normal bureaucracy (Figure 5). By having the contractor protect themselves through minimizing risk they do not control, and through capturing the risk information which the contractor cannot control even though they have attempted to minimize the risk, all participants in the process are measured through the captured the risk information.

The established information environment now passes simplified project information to the appropriate entities in a manner that accurately reflects the status of the project and encourages swift resolution and minimization of risk. This too is facilitated through aforementioned weekly report (See Figure 6). The weekly risk management report records risks from the QC document, that have actualized despite contractor risk minimization efforts, thus impacting the project's schedule, budget, or quality. It also records unforeseen risks that could not have been predicted, that have negatively impacted the project. The weekly report is updated and distributed weekly, and contains the following information:

1. Identifies any unforeseen risks or risks that cannot be minimized.
2. Identifies the date of the risk, why the risk

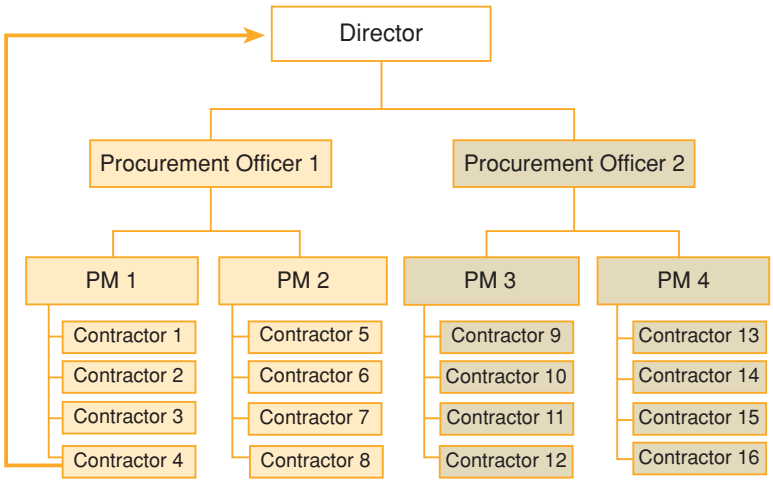

Figure 5: Right Information to Right Place Minimizes Bureaucracy

happened, who can most easily minimize the risk, an anticipated resolution date, and any time or cost associated with resolving the risk.

3. Lists any contractual change orders that result from the unforeseen risks.

By having the contractor report and minimize risks occurring that the contractor does not control, risks that were previously prolonged due to inactivity or finger pointing are being addressed. When the contractor reports a risk on the weekly report, they also identify the entity controlling or causing the risk to the project. As a result, the risk is minimized as soon as possible, as the responsible party is identified through the weekly distribution of the report, as agreed to prior to the award of the contract. This concept has been tested in recent tests at a Florida hospital site, and quickly dispels confusion of who is responsible for contractor uncontrolled risk. Instead of a client's representative attempting to minimize unresolved risk, the contractor identifies the risk, how to minimize the risk, and who may be involved in creating or increasing the risk.

Change Caused by an Information Environment

The authors developed a process for organizations involving multiple projects to compile the weekly reporting information in order to quickly provide the Client with the ability to identify and prioritize risk. The report contains the following information (Figure 7):

1. Which projects are the riskiest…
2. Who is the project manager responsible for the project…
3. Who is responsible for causing the risk...
4. Every participant's performance information in relation to everyone else in the same job description.

Supply Chain Thinking

Client's professionals must use best value to identify the most experienced, perceptive, performing and accountable contractors and their personnel. Professionals must then set up a structure that the high performing best value contractors minimize the risk that no one previously addressed or controlled. To transfer the risk and accountability to the contractors, the professionals must give them a documentation process that is simple, easily understood, and that makes everyone who interfaces with the contractor accountable. The QC/QA program, the weekly

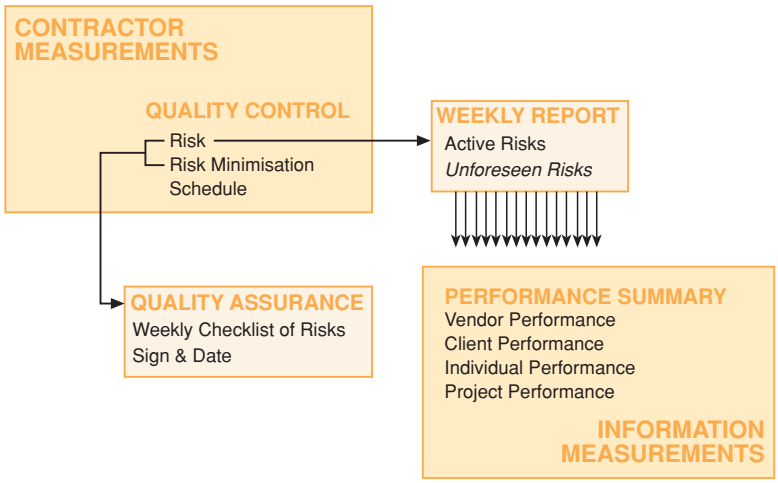

Figure 6: QC/QA/Risk Minimization Structure

report, and the information environment protects the high performance contractor. As the professional has now formed the best value environment which is the most efficient, and where the contractors minimize the risk of the client, the client's professional must now stop all practices which are adversarial, cause duplication, increase transaction costs, and create a win-lose relationship. Some of these practices include:

1. Analyzing a best value contractor's price in detail after they have gone through competitive bidding and have selected best value subcontractors.
2. Negotiating the contractor's price downward.
3. Not allowing the contractor to take responsibility for their work.
4. Forcing the contractor to get their approval for no cost changes and schedule changes.
5. Reviewing material submittals.

The professional must think in terms of supply chain instead of themselves. They must service not only the client, but all the other participants in the delivery chain.

Conclusion and Recommendations

To minimize construction risk in the future, construction professionals representing the client must move the delivery environment from a management-based, price-based environment to a leadership-based best value environment. To make this movement, the professionals must use best value procurement, use a structure that requires best value contractors to preplan and use QC/QA. The professionals must also learn how to use the performance/risk information to setup an information environment that will motivate everyone to be accountable. And lastly, unlike in the price based environment, the client's professionals must think in terms of supply chain, instead of a construction professional who manages and controls in an adversarial environment, which is slowly disappearing.

The list of References can be obtained by emailing the Editor at constructingnz@caenz.com

Dean Kashiwagi is a professor at Arizona State University's Del E Webb School of Construction and also the Director of the Performance Based Studies Research Group (PBSRG), the worldwide leader in improving construction management performance and efficiency. Dean has developed a 'hands off' approach to managing vendors or contractors in the construction industry or any industry. His technology has been tested in over 500 construction and non-construction projects with a 98% success rate since 1994. He is a professional engineer and an accomplished author in best value procurement.

DIVISION OVERVIEW	11/03/06
Total Awarded Budget	$172,751,944.23
Current Cost	$174,484,794.47
Over Budget	$1,732,850.24
PROJECT OVERVIEW	
Total Number of Projects	116
% Projects on Time	85%
# of Jobs Delayed	17
% Projects on Budget	86%
# of Jobs over Awarded Budget	16
# of Projects Missing Owner Ratings	0
AVERAGE PROJECT	
Project Budget	$1,489,240.90
# of Risks per Job	3.14
Owner Generated Risks	1.66
Number of Overdue Risks	0.25
% Over Awarded Budget	3.39%
% over Budget due to Owner	3.23%
# of Days Delayed	8.76
# of Days Delayed due to Owner	7.62
Owner Rating	9.17
Risk Number	2.42

(a) Overall organization performance

UNFORESEEN (UF) & OWNER (O) RISK	
# UF Risks affecting Budget/Schedule	0
Days Delayed (Calendar)	0
Additional Cost	$–
# O Risks affecting Budget/Schedule	1
Days Delayed (Calendar)	0
Additional Cost	$2,000.00
Above risks include both potential and resolved	
CONTRACTOR RISK	
# of Unaddressed/Overdue Risks	1
# Unrated Risks	0
# Risks affecting Budget/Schedule	2
Risk to Schedule (Calendar days)	15
Risk to Cost	$1,000.00
Contractor Satisfaction Rating	10.0
Above risks include both potential and resolved	
OVERALL CURRENT STATUS	
Days Delayed (Calendar days)	5
% Delayed	0.8%
Contractor % Delayed	0.8%
Additional Cost	$2,000.00
% over Award	9.2%
Contractor % over Award	0.0%
Project Satisfaction Rating	10.0
Risk Number	1.16
Above Schedule & Budget additions include only resolved risks	

(b) Individual project performance

TOP 10 RISK RANKING PROJECTS		
No.	Project	Risk #
1	Design for two HVAC(s) & Windows	52.94
2	Tpe III WP	17.71
3	WP Replace C Tower HVAC Sys	13.61
4	Rpr/Rpl Elec Distr Sys	11.91
5	Renew Troop Medical Clinic	11.07
6	Fire Damage Repair	10.51
7	Construct Hyperbaric Chamber	10.50
8	Fault Current & Over Dev CS	10.35
9	Convert Warehouse to Admin. Area	10.10
10	WP Fire Protection Upgrade	10.07

(c) Risk ranking of projects

CONTRACTOR OVERVIEW	Contractor A	Contractor B	Contractor C
Total Awarded Budget	$15,725,858	$52,274,179	$2,885,433
Current Cost	$16,480,244	$52,274,179	$2,885,433
OVERVIEW OF PROJECTS			
Total Number of Projects	25	18	6
# of Jobs Delayed	4	2	4
# of Jobs Over Awarded Budget	9	0	0
AVERAGE PROJECT			
% Over Awarded Budget	13.93%	0.00%	0.00%
# of Days Delayed	6.84	2.33	9.50
Owner Rating	8.03	8.89	10.00
Risk Number	4.15	2.94	2.41

(d) Comparing vendor performance

Figure 7: Performance Information on Different Client's Project Managers

Highlights of the Conference on Hot Market Procurement

(Auckland, 30 May 2007)

The Conference took place in Auckland, on May 30 2007. Sixteen speakers addressed over 100 participants from the construction industry and its clients in a marathon session. The subjects ranged from traditional procurement issues to alliances and other 'state of the art' procurement approaches. A few of the key points recorded follow – however, this brief account does not cover all presentations and we apologise to the speakers whose equally important presentations have been omitted.

Dr Martin Barnes

President, Association for Project Manager, UK and principal author of the New Engineering Contract forms.

The traditional five-year 'boom and bust' cycle of the construction industry in the UK is not operating: the last 10 years have marked a continuing growth of demand, exceeding the capacity of the industry. There is a new phenomenon, that of the 'globalisation' of the market for labour and materials, largely generated by China's demand. He forecast continuing steady demand growth.

In the UK the continued growth is largely being fueled by PPP or PFI – which are now well established means for developing Infrastructure.

Contracts are no longer being let primarily to the lowest tender: public procurement is now stressing 'perceived best value' and taking into account factors such as track record, construction methods proposed, constructability, time for construction, and life-cycle costs.

'Adversarial' contracting practices have been largely abandoned, in favour of contracts which share risk more equitably, and encourage the parties to collaborate. The New Engineering Contract, which is based on this principle and uses simple language, is now in general use in the UK. A culture shift towards collaborative contracting, is taking hold.

Warren Warfield

Managing Director of RCP

He forecast that the heated construction market will get worse. The current turnover is of about $3 billion per quarter – population growth alone raises a demand for 2,500 new houses per month. In spite of the over-valued NZ dollar, cost escalation averages between 4 and 6% p.a., with some key components reaching 10% p.a.

The issues faced by the Government include political pressures and the lack of skills in Procurement. The Government is now reviewing its procurement approaches, checking, streamlining and revising contract documents; minimising tendering costs, looking for value, not initial cost.

Clive Tilby

Independent Industry Consultant – Participated in the MAG re roading costs

The construction industry is undergoing a transformation, in a supplier-led market, with higher input costs and resources going to the highest bidder. The MAG study of roading costs for 2000/05 found a weighted average increased cost of inputs of about 30%, with increased scope of construction running in parallel. Nevertheless, he felt competition was adequate, if not 'ideal'.

Scope uncertainties include shifting requirements; legislation; toughening standards; geotechnical uncertainties; design challenges; and community desire for (ready) benefits.

The construction industry needs leadership and collaboration; strategic decision making; industry-wide performance measures (e.g. KPIs). Political leadership is needed, including cross-sector collaboration for public and private investment, on a strategic framework for decision-making.

Richard Anderson Director of Rider Hunt: After describing traditional and later developments in procurement – including ECI, early contractor involvement, he suggested that in a heated market, construction industry and its clients should aim to:

- Secure resources early;
- Manage properly the critical supply chain relationships;
- Use flexible procurement models;
- Use realistic conditions of contract; and
- Emphasise good quality and complete contract documentation.

Kevin Doherty & Robert Jones

National Procurement Manager, Transit NZ; NZ Operations Manager, Leighton Contractors, and Project Director, Northern Gateway Alliance, respectively

Kevin and Robert spoke about the Northern Gateway Alliance, established for the construction of the ALPURT B2 motorway section, leading north of Auckland. This project faced a considerable number of challenges, and the Alliance approach was key to their resolution, with the least disruption to an orderly construction process, achieving value for money. The "virtual enterprise" created with the participation of top

personnel from Transit NZ, the contractors and consultants, was able to resolve all design and construction problems expeditiously, through fair risk-sharing and collegiate participation in decision-making, keeping the principal joint objective in mind and operating in an environment of total collaboration with 'open books'.

Lindsay Crossen

CEO, NZ Contracting, Fulton Hogan

started by asking whether this was a hot market or a new plateau of the NZ economy? He keeps a very positive outlook, particularly regarding the new approaches: he has witnessed success with the Northern Gateway Alliance, of which he is the Chairman. Best value is being achieved – which he described as the 'optimum affordable solution'. However, he pointed out a few risk areas of operating in a true alliance:

- 'open books' can be risky for commercial companies, in that confidential trade information may reach their competitors. This may inhibit some firms from taking part.
- While contributing to the joint design effort, there may be a risk of losing control of the firm's intellectual property; and
- An alliance can tie the best people of a firm to the 'virtual company' which is formed as the Alliance. Can this be tolerated in a business environment short of qualified staff?

This last point will affect al participating entities in an Alliance – but most particularly, the Clients, who may have few people with the skills necessary to match those of the personnel seconded by consultants and contractors and participate with authority in decision-making. Editor's note.

Martin Fahey & Robert Stevens

Auckland Area Manager, Mainzeal; Manager, Construction Management, Department of Corrections respectively

Martin and Robert described various aspects of the construction of prisons using a Collaborative Working Agreement (CWA) procurement model.

CWA works like an alliance: it is a single team, formed by individuals seconded by the parties. There is no corporate identity; the team accepts responsibility under their allegiance to the virtual organization. Decisions are reached unanimously and only when difficult issues are encountered, they are referred to a senior board, made up of the senior managers of the client, consultant and main contractor.

It is essential to have a well-defined design brief, aiming to use the design ability of the supply chain as well as its buying power (e.g., special deals available to subcontractors and suppliers). Early establishment of the Target Outcome Cost (TOC) is key; the commitment to construction should not be made until the TOC is known.

CWA has led to a 'no claims' culture and efficiency gains in an environment of full transparency.

Mark Kunath

GM, Engineering Services, Queenstown Lakes District Council

Mark runs a local government operation with a turnover of $20 to 25 million p.a., which includes over-year projects of up to $50 million, in an area of restricted supplies, short of resources. He opted to work out a three-year works programme, and to share it with the supply chain to ensure continuity of execution.

He started by preparing a short list of qualified consultants, approved by LTNZ and a contractor panel, including Fulton Hogan, Works Infrastructure and local construction firms, as well as local suppliers. He also built up a reservoir of projects, totaling up to $70 million, to create continuity of work opportunities for the industry and retain the local capacity.

Whilst procurement is competitive, good performance is rewarded when making contract awards. Mark still has to face the problem of how to apportion work among three consultants which have similar high qualifications.

Joe Hollander

Chairman of the Construction Clients Group and Director of Strategic Facilities Management, Massey University

Traditional procurement wastes time – he advocated for the formation of integrated teams of the best people available, striving for top quality results, best value and a safe environment.

The Construction Clients Group is working to establish a 'Clients' Charter, a 'benchmarking club' (sharing KPIs among the participants), disseminating construction best practice and an Academy of Construction Excellence – leading to diploma courses.

Paul Barker

Manager, Labour Market Dynamics, Department of Labour

Paul described the issues and strategies in a market affected by labour shortages. In 2001 the construction industry employed 120,000 people; this number has grown to 180,000 in 2006, i.e., 10% of the NZ workforce. And the industry faces acute personnel shortages: there is a chronically low fill rate, which is likely to continue.

Improving the stock of workers,

- "MAKE": there is a limited supply of people willing to be trained;
- "BUY": through immigration, but integration is problematic; and
- "FIX": by improving skills – not in the workforce at large, but in the work places.

Phil Heenan

Construction Policy Manager – Office of Government Commerce (UK)

Phil spoke about the UK Government approach to the procurement and contracting of infrastructure construction. Government procurement is being transformed in the UK, towards better delivery of quality finished products through raised skills. To this end, the procurement capability of the Government is being strengthened, as it operates increasingly in a collaborative environment.

In the UK, the Construction Industry contributes about 8% of GDP; the public sector purchases 40% of the industry's output. There are 250,000 firms, employing 2.1 million people: not many large companies. Construction is subject to European Union rules, and is supervised by no less than 6 different government departments: this creates many opportunities for interference.

In 2005 they convened a public sector construction clients' forum, representing 80% of the public sector construction 'spend'. They now have 7 working groups, meeting 4 times each year. Inter alia, they are developing a Public Sector Construction Demand Data Base (search PSCDB for website reports); they have developed an econometric model for supply and demand -- which has already identified key deficiencies, for example, shortages of certain skills.

At the end of the day, Martin Barnes reviewed the proceedings – and noted, in his inimitable dry humour, that we had broken the Guinness record for the number of speakers in one day – previously held by a Conference of the Association of Dyslexic Speakers in Honolulu. It was, indeed, a marathon – but a most useful one!

Annual Survey

Construction Sector Performance Slips Under Pressure

An annual survey of construction industry performance in New Zealand has revealed a general decline in the past year against key measures, including on-time completion, budget predictions and profitability. The Centre for Advanced Engineering (CAENZ), which administers the survey of key performance indicators (KPIs), says the figures suggest construction industry providers and their clients are struggling to cope with the pressures associated with a "hot market" and a shortfall of skills and resources.

Now in its third year, the KPI survey includes data from around $400 million of construction industry projects in the public and private sectors (excluding residential housing). The project is funded by the industry's research and information agency, Building Research.

While the data set is too small to identify definite trends, the latest survey highlights some significant differences in performance:

- The number of projects completing the design phase on time has decreased from 52% to 22%.
- The number of projects achieving construction targets on time has decreased from 53% to 23%.
- Median profitability decreased from 10% in 2004 to 7% in 2006.
- The number of projects accurately predicting total costs is 40%, a slight decrease, but with a pronounced decrease in predictability of costs in the construction phase - down from 54% to 39%.
- Client concerns about defects have increased significantly with only 31% of projects rating as acceptable, compared with 78% in 2005.
- Overall satisfaction with the finished project has increased, with 88% of projects reaching the a benchmark score of 8/10 – up from 73% in 2004 and 82% in 2006.
- Overall perceptions of the standard of construction services has also declined, from 79% meeting the benchmark score in 2005 to only 39% in 2006.

CAENZ project co-ordinator Scott Caldwell says the variations are likely to reflect the pressures associated with a market that has run hot for longer than anyone expected.

"Historically the industry has faced a boom-bust cycle of approximately five years, but this is no longer the case. The emergence of private equity funders and the need to renew key infrastructure has seen demand for construction industry services remain extremely strong. The industry's latest performance figures would appear to reflect the sustained pressure on people and resources, leading to delays and cost escalations in the design and construction phases."

The survey highlighted the continuing variation in profitability between smaller operators and the industry's largest firms.

"The median profitability for firms with one FTE is 35% compared with 6% for firms with 100 FTEs or more. In the first year of our survey these figures were 39.6% and 3% respectively. While there is no major change, the increase in profitability of the large contractors may represent

the move towards more integration of the supply chain for construction projects and the efficiencies gained."

The performance measures for 2006 also show:

- The industry scores 8.0 out of 10 on average for client satisfaction with the finished product, and 7.7 out of 10 for the level of service.
- For defects, the industry scores 7.6 out of 10.
- Finished costs were on average 2.8% over forecast, with most of the budget variance occurring after the design phase.
- Design services were delivered on average 12% later than forecast but with construction on average completed on time.
- The median number of Lost Time Incidents for all construction firms was 13 per 200,000 hours worked (adjusted for under-reporting), confirming a pattern of improvement over three years.

Data was gathered from a range of sources including a survey of the industry, the Department of Statistics' annual enterprise survey and a survey of the industry's customers by CAENZ.

Scott Caldwell says there has been strong support for the project from survey participants, but more companies and organizations are encouraged to take part. "When they are used as a part of an improvement programme, KPIs can enable firms to set realistic targets and focus their efforts where they're needed most. It also allows organizations to see how they are performing compared with best practice, and to differentiate themselves on factors other than price. In addition, it eliminates the temptation to say 'it can't be done' when considering performance improvements.

About the KPI Project

The National Key Performance Indicator (KPI) project is based on the premise that purchasers of construction services want them delivered on time, safely and free of defects, by efficient company's operating profitably. Continuous improvement requires a national set of performance measures, against which the industry players can measure their current performance and set priorities for improvement.

About CAENZ

CAENZ is an independent think-tank and research facilitator associated with the University of Canterbury and Auckland University and funded by grants and sponsorships. CAENZ's mission is to advance New Zealand's development and well-being through the promotion and use of world-leading practices in engineering and related technologies. www.caenz.com

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continued from page 6

combination of governance mechanisms and control types in client-contractor relationships. Design/methodology/approach – Empirical data were collected through a survey of 87 Swedish construction clients.

Findings: Current procurement procedures establish governance forms facilitating a focus on price, through output control; and authority, through process control. Since construction transactions are mostly characterized by high complexity, customisation and long duration, the theoretical framework prescribes a focus on trust and a somewhat lower focus on price and authority. Hence, from a transaction cost perspective, construction clients focus too much on price and authority and too little on trust. Since current procedures may cause problems in all stages of the buying process, the result suggests that partnering arrangements, entailing completely different choices during the buying process, may be a suitable way to facilitate trust and cooperation through informal social control.

Research limitations/implications: Since the empirical results are based on data collected only from Swedish clients, international generalizations should be made cautiously.

Practical implications: Clients wishing to implement trust-based collaborative relationships need to reconsider their procurement procedures entirely; joint objectives, team building and other "fuzzy" techniques are not enough to transform adversarial relationships into cooperative ones.

Originality/value: Earlier research has focused on one or a few aspects of procurement and governance, while this paper adopts an overall process perspective, taking into account clients' procurement procedures in their entirety.

Keywords: Construction industry, Partnership, Procurement, Sweden, Trust.

Contact Information

Comments and questions are welcomed! *ConstructingNZ* is published by the New Zealand Centre for Advanced Engineering.

Mail: CAENZ, University of Canterbury Campus, Private Bag 4800, Christchurch 8140

Phone: (03) 364 2478

Fax: (03) 364 2069

e-mail: constructingnz@caenz.com

web: www.caenz.com

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