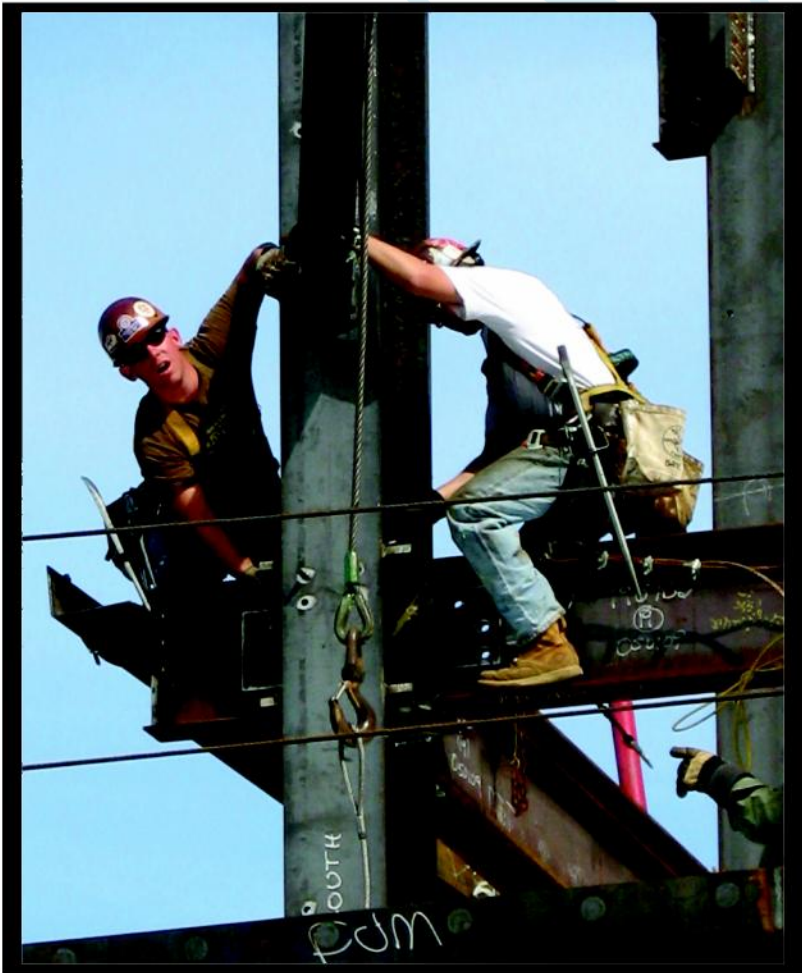


Quality Management Program Assessment



Nova Scotia
Construction Sector Council
Industrial-Commercial-Institutional



in partnership with



MARCH 2008

Table of Contents

1. EXECUTIVE SUMMARY	1
2. INTRODUCTION	3
3. BACKGROUND ON QUALITY MANAGEMENT PROGRAMS	4
3.1 WHAT IS A QMP?	4
3.2 WHAT DOES A QMP DO?	6
3.3 RELEVANCE TO THE CONSTRUCTION SECTOR	7
4. APPROACH AND METHODOLOGY	8
4.1 THE ICI CONSTRUCTION SECTOR.....	8
4.2 BACKGROUND RESEARCH.....	9
5. FINDINGS FROM INDUSTRY INTERVIEW	11
5.1 “QUALITY” AS DEFINED BY THE CONSTRUCTION INDUSTRY	11
5.2 THE IMPACT OF MARKET SEGMENTATION	12
5.2.1 <i>Construction Managers</i>	13
5.2.2 <i>General Contractors</i>	14
5.2.3 <i>Trades Contractors</i>	15
5.2.4 <i>Fabricators and Suppliers</i>	16
5.3 RESPONSIBILITY FOR AND INFLUENCE OVER QUALITY	17
5.3.1 <i>Owners</i>	17
5.3.2 <i>Design Professionals</i>	19
5.3.3 <i>General Contractors</i>	20
5.3.4 <i>Trades</i>	20
5.3.5 <i>Workers</i>	21
5.4 COSTS AND BENEFITS OF QUALITY SYSTEMS	22
6. CONCLUSIONS AND RECOMMENDATIONS	24
6.1 CONCLUSIONS	24
6.1.1 <i>Quality Driven Markets</i>	25
6.1.2 <i>Price Driven Markets</i>	25
6.1.3 <i>Reasons for adopting QMP’s</i>	26
6.2 OTHER OBSERVATIONS	27
6.3 RECOMMENDATIONS.....	28
6.3.1 <i>Suggested Approach</i>	28
6.3.2 <i>Developing a Basic QMP Framework</i>	28
6.3.3 <i>Basic System Benefits</i>	29
6.3.4 <i>Future Considerations</i>	30
APPENDICES.....	31
APPENDIX A INTERVIEW QUESTIONNAIRE	32
APPENDIX B FINDINGS FROM OTHER JURISDICTIONS.....	36
ACKNOWLEDGMENT	42

1. Executive Summary

Many industries have recognized the value of quality management systems in recent years, and their adoption has become widespread. The purpose of such systems is to introduce well defined and systematic approaches that guide and track all steps and activities performed by and within the organization in carrying out its business, whatever the nature of that business might be.

Several well recognized standards for quality management have emerged that apply well to many types of manufacturing, process and service industry. While there is no definitive quality management standard designed for the construction industry, many construction companies have successfully adapted specific certified quality management programs to meet their needs. Many other construction companies have implemented quality programs of their own, which, although not certified by any recognized standards awarding body, provide many or most of the benefits of such a standards-compliant system.

What a quality management system does for an organization is move the major steps, processes and activities away from dependency on the knowledge, and perhaps memory, of specific individuals, and introduces standardized, documented and repeatable steps and methods into the organization as a whole. The benefits to a growing company are immediately apparent: consistent and repeatable processes, better succession planning, simplified training of new employees, better records to use as a basis for producing estimates for future business, less defects due to errors in process, and better tracking for taking corrective action when needed. They allow for an improvement in scheduling, timekeeping and forecasting, and more accurate communications between prime contractors, subcontractors, owners and others.

Of course, along with these benefits there are costs; the cost to implement quality management systems in the first place, the cost of the additional administrative work that is imposed on most if not all employees. This study endeavoured to investigate quality management systems, where used and where not used in Nova Scotia's industrial-commercial-institutional construction sector. Our goal was to observe the results that can be attained from such systems as well as any barriers to their adoption, and to make recommendations to the Nova Scotia Construction Sector Council Industrial-Commercial-Institutional (NSCSC-ICI) for future action.

In this study we met with a number of firms in the construction industry both with and without quality management programs. An early finding was that we had to refine our analysis by trade segment: Construction Management, General Contractors, Trades Contractors, Fabricators and Suppliers. We had to make this distinction because of the very different significance of management methods in these different groupings.

We found that Construction Management firms have all developed quality management programs as a fundamental requirement for their operations. Managing quality is what they do for their clients, and without exception they have rigorous systems that enable them to do this. They have little need for recognized, certified standards, and in fact their own proprietary systems often predate those standards in time and exceed them in comprehensiveness.

The other construction segments all operate in price driven markets, and they have adopted or will adopt quality management systems if they can demonstrate business benefits, in terms of improving their ability to win bids, improve their ability to deliver, or their ability to sustain business operations. Since price is the dominant factor in their contract awards, there is little direct advantage to bidders in having quality management systems, although, as noted our report, in some sectors this factor is being taken into consideration. The prime benefits to such companies are in improved business management and operations, especially to those that are small or medium sized and growing, and are reaching or passing the point where they can rely solely on the capacity of a small group of individuals and informal control techniques.

We have recommended that the NSCSC-ICI should focus its attention on the needs of such companies, where the need and value of introducing quality management programs is greatest. There is value to some companies in becoming recognized under one of the certified quality management programs, and those that wish to follow this route should be encouraged to do so. However, for many small and growing trades and general contractors, there is significant and cost-effective benefit to be gained in implementing basic and straightforward controls and management practices. These can evolve into registered or certified systems should the company wish; regardless of this choice, they will help most firms grow and operate in a structured and more organized fashion.

In the final section of the report we have described such a basic quality management system, and an approach to delivery. We have also described some of the advantages of such systems, to give potential participants some reasons why such systems should be used, as well as how. It can be expected in the future that both the demand and standards for quality management will expand and develop; firms that recognize this now will be better positioned to align with a growing industry trend.

2. Introduction

This report is the outcome of a project initiated in early September 2007 by the Nova Scotia Construction Sector Council Industrial-Commercial-Institutional (NSCSC-ICI). Novus Consulting Group Ltd. was engaged, together with sub-contractors Costello-Fitt Ltd. and Field Experts Ltd., to identify and assess Quality Management Programs (QMP's) in Nova Scotia's Industrial-Commercial-Institutional construction industry.

In particular, the purpose was to:

- Identify best current practice and applicability of Quality Management Programs in the Industrial, Commercial and Institutional Construction (ICI) Sector
- Investigate a number of companies in this sector who currently do, and a number of companies who do not, deploy Quality Management Programs, about 5 in each category, with specific focus on their impact on work-related tasks and outcomes
- Assess cost, benefit, impact and hindrances of using Quality Management Programs vs. no formal use of such programs
- Identify other issues impacting the use/implementation of Quality Management Programs and analyze their validity and value
- Assess and analyze the validity and value of employing Quality Management Programs, including specific items for immediate deployment in this sector
- Produce a report of findings and recommendations

This report is the culmination of the project. In it we have outlined our approach and methodology, and summarized our findings from both background research and the interviews with representatives from the industry. We have presented a set of recommendations to NSCSC-ICI suggesting:

- How QMP's are being adopted and might better be adopted in certain industry segments
- Barriers to adoption of QMP's for small enterprises in the construction sector, and how they might be overcome with selective adaptation and adoption.

3. Background on Quality Management Programs

Within this section of the report we explore the meaning of Quality Management Programs (QMP's) and how they apply to the construction industry. We will look at the various types of QMP's and focus on those that would be applicable to this sector of companies.

We also investigate the intent and outcomes anticipated from establishing a QMP within a company and how it can impact both the customer and suppliers.

3.1 What is a QMP?

Quality Management Programs come in all shapes and sizes and in many cases are industry specific, but that has not always been the case. This broadening of QMP's to meet industry specific needs has only occurred in the past five years. Prior to this there were only a very few programs that were available to provide structure within industry. The most notable of these programs was ISO¹ 9000, which came into existence in 1987 and has been updated to its current version in 2000.

ISO 9000 is merely a guide for companies to establish process controls within their company. The first step in using this guide is to understand not only the functions that occur in each area of the company but also the inter-relationships between both internal customers and external customers. The early versions of ISO 9000 targeted not just manufacturing in general but specifically medium to large manufacturing companies. In the early years it was this group that championed the ISO 9000 revolution and in their wisdom encouraged the systems to filter down to their suppliers. This was marginally successful as the premise of implementing a QMP within a company was based on the need to keep a customer happy or the anticipated potential to expand into new markets. Many companies missed the key objective of a QMP, which was to control a process to ensure consistency of the finished product.

In 2000 the latest ISO 9000 standard was released to address companies in a service industry, which includes to many of the companies we met in the construction sector. This latest standard ISO 9001:2000 is the current version to be used as a guide in establishing a QMP within an organization.

A number of industry specific standards have also surfaced such as the CMMI² standard for guiding software development, ISO 13485 used to guide the

¹ International Organization for Standardization; see <http://www.iso.org/iso/home.htm>

² Capability Maturity Model[®] Integration (CMMI) is a process improvement approach developed originally by Carnegie Mellon University for information systems, now used in many industries.

development and manufacture of medical devices, ISO 16949 specific to the automotive industry, and ISO 14000 specific to meeting environmental requirements in production waste. These standards are similar to ISO 9001:2000 in that they all provide a guide to developing a QMP however they deal in terminology that is specific to companies within their defined sectors.

At this time there is no standard that is specific to the construction sector. The exception is a legislated requirement to control and document processes specific to Occupational, Health and Safety (OHS) to ensure the safety of workers both on the shop floor and on the job site. Consequently, there was consideration under ISO to develop an international standard that would guide the development of OHS practices, which would be very beneficial for the construction sector. We have extracted the following information to outline at what point in the process this standard has progressed.

“The Technical Management Board (TMB) of ISO recently sent a survey form to the ISO member bodies (the various national standard-setting organizations from each country) asking for direction on whether to proceed in developing an OHSMS (Occupational Health and Safety Management System) standard and, if so, what kind of standard.

Developing an ISO OHSMS standard has been an area of considerable controversy. Some labour and industry groups have been vehemently opposed to such an ISO standard. Other interested parties believe that, given the proliferation of different OHSMS standards and increased usage of OHSAS 18001, the time has come for the development of an international consensus standard that supports third-party accreditation of occupational health and safety management systems.”³

As can be seen, at this point in time the International Organization for Standardization (ISO) is only in discussions with ISO member bodies and there has not been any progress in developing a standard to meet this need.

However there is a guide for OHS, which could be used and applied by companies in any sector, specifically companies in the construction sector. This guide is the OHSAS-18001 standard for Occupational Health and Safety. Information on this standard including a copy of the standard can be found at the following web sites:

<http://www.ohsas-18001-occupational-health-and-safety.com>

<http://www.ohsas-18001-occupational-health-and-safety.com/procedure.htm>

³ Taken from the web site: <http://ohsas18001expert.com>.

The closest structured standard that expands beyond OHS and encompasses management's role in a QMP that could be used for companies in this sector would be ISO 9001:2000 which guides the user to setting up a QMP in all areas of the company.

3.2 What does a QMP do?

A QMP provides a guide to an organization in how to complete specific tasks. The focus of the system is to ensure that all requirements of the customer are understood and met. In the larger picture it is all about customer satisfaction and ultimately a "good" system is set up to ensure customer satisfaction. For many companies the difficulty in this concept is understanding who the customer is and what does it take to ensure they are satisfied. For many subcontractors, for example, differentiating between the general contractor as customer or the building owner as customer is not always a clear distinction and can put an emphasis on quality in the wrong place. Ideally knowing your customer and meeting your customer needs is the basic premise behind a QMP. The objective of the QMP is to define procedures and controls to ensure that when an action is completed it is done consistently and to meet the need of the customer.

Consider a number of examples. If a small company (company X) of say half a dozen employees is working as a sub-contractor on a construction job and the General Contractor (GC) has distributed a set of updated plans to the lead person in company X, then that individual would be responsible to get the plans to the appropriate employees to complete the work. In this situation the individual in company X with the plans has a responsibility to their internal customer, the employee, to ensure that they get the updated plans. The employee on the other hand has a responsibility to the GC to complete the work according to the updated plans. In this situation a QMP would be used to control the handling and distribution of the updated plans to ensure the ultimate customer, the GC, is satisfied.

The GC in this situation is responsible to the owner to ensure that the structure is built to the proper set of plans and consequently they would set up a QMP to ensure updated plans are distributed in a timely fashion to the sub-contractors.

Ultimately, the quality management program (QMP) is designed to control specific actions within the company to ensure the outcomes of the actions meet the needs of the customer. These programs are process based controls that suggest that if everything leading up to creating the end result is controlled and working properly then the end product should be a quality product.

3.3 Relevance to the Construction Sector

It seems evident that if the objective of any project or work being completed by contractors, sub-contractors, or specialist trades is to produce a quality product then it would be obvious that QMP's would be relevant to this sector. However that is not necessarily the case as was evident from our interviews.

The use and justification of a QMP within a company is dependent on a number of extraneous criteria. For example a sub-contractor with only a handful of employees may feel comfortable that they can manage and control the job well enough to ensure the end product meets the customer requirements without developing an independent system to guide the process. Likewise, a company of specialized trades may feel that the employees have undergone a strong regimen of training that ensures the quality of the end product will meet the requirements of the customer.

In both these situations the company would be hard pressed to justify an independent system or QMP when the processes are currently well under control.

So when does a formal QMP become relevant to this sector? Growth and the size of the company are key indicators as to when a quality management program may be of benefit to a company. As a company grows the ability to control all the functions and actions within the company becomes more and more difficult. Construction companies typically grow from the bottom up and are light at the top with respect to management employees. Consequently employees that are not well guided or are new and under trained can make mistakes that can cause a problem in terms of the quality of the end product and the consistency of the product is then jeopardized and the reputation of the company put under scrutiny.

It is at or before this point that the justification for a QMP can be made and the company should look at either a pre-established guide such as ISO 9001:2000 or build extended controls around the existing need for OHS and use a guide such as the OHSAS 18001 to create a QMP system of control. Alternatively companies can investigate implementation of their own basic quality measures and methods, and develop these further into standardized systems when and if dictated by growing business demands. We have outlined such an approach in the final section of this report.

4. Approach and Methodology

Our approach to this project focused on two key areas:

- Interviews with construction companies in the ICI sector with and without QMP programs in place
- Background research on industry practice and experience gained elsewhere

4.1 The ICI Construction Sector

Our initial meetings with the project Steering Committee focused on the development of a meaningful breakdown of a selected group of ICI construction sector companies into those that were most likely to have QMP's, and those that most probably did not. Early research indicated that this was most likely an oversimplification, and subsequent analysis as described in other sections of this report upheld this initial view. As a result, we restructured our investigation and developed the matrix of interviewees as shown below:

		QMP	No QMP
General Contractors	National ⁴	1	-
	Regional/local	2	2
Sub-trades	Building trades	4	2
Total		7	4

Civil engineering and excavation firms were deemed not relevant to this study and subsequently removed from consideration after early discussions.

The team worked closely with the Steering Committee to identify specific firms within the categories listed above. The consulting team developed a detailed questionnaire, a copy of which is attached as Appendix A to this report. Interviews with the selected companies took place in late 2007 and in some instances early 2008. It should be noted that in nearly all cases the interviews were well received by the target companies and there was a high degree of

⁴ In actuality two National firms, one a CM and one a GC, were interviewed

cooperation, suggesting significant interest in the study, the subject matter and potential outcomes. The sole exception to this was one company that was extremely busy at the time of interview request, and an alternate had to be found.

However, as will be shown in the findings section in this report, it became clear from the interviews that the lines between companies with and without QMP's are blurred, and that the distinction varies greatly by industry sector. This did not change the interview process or intent, but it did lead to some reclassification of findings.

4.2 Background Research

During our background research process, we contacted many organizations in other jurisdictions, to determine:

- Whether any similar analysis of quality programs had taken place and, if so, the outcomes
- Whether any other quality-related studies of the construction industry had taken place, and, again, their outcomes

A list of organizations contacted is attached to this report as Appendix B, together with a brief summary of activities reported.

In addition, we also conducted background research on:

- The current state and status of Quality Programs in industry
- Activities within the Workers' Compensation Board of Nova Scotia (WCB), and related Occupational Health and Safety (OH&S) programs

A description of the current state of Quality Programs as they apply to the Construction Industry is included in Section 2 to this report, above.

We were somewhat disappointed to find limited information of significant value through our background research. In general, we found that extensive work has been done in many jurisdictions and by many organizations in the area of OH&S. However, this is not the same as quality, and, as we both expected and found from our interviews, has little relevance to it. OH&S programs are highly prescriptive and in most cases rigorously enforced. There are some measures of effectiveness e.g. in terms of reduced rate and severity of injuries; this is mostly a recognition of industries' widespread conformance with mandatory requirements.

We were interested in the very recent (December 2007) evaluation by the WCB of the Certificate of Recognition (COR) safety program, which, although not mandatory⁵, is widely adopted within the Nova Scotia Construction Industry. The

⁵ However, the COR is required to bid on many Government issued contracts

findings from this study are of some interest as they have the potential to show measurably effectiveness, based on accident rates of a program with some (although as pointed out above, not many) similarities to those under investigation.

Unfortunately, the limited amounts of data available, and the limited comparisons available between firms with and without COR's, led us to no significant conclusions. The reports from this study should be available to the NSCSC-ICI. We suggest that the NSCSC-ICI should continue to monitor this program, and the consultants would like to thank the WCB representatives for sharing their findings.

5. Findings from Industry Interview

This section of the report is based on a survey of quality management practices that are currently being applied by construction firms in the ICI construction sector in Nova Scotia and their attitudes about the value of formal programs.

5.1 “Quality” as defined by the construction industry

One of the fundamental questions asked of the industry participants in this phase of the study attempted to clarify the meaning of “quality” within the construction industry. The question presented a simple dichotomy: do you think of quality mainly in terms of the final built product or in terms of the process that is used to achieve it?

The explanatory examples used to illustrate this question were, for instance, that a firm could have a tightly controlled, fully documented (hence high quality) process that produced an inadequate product, or on the other hand, a completely disorganized firm could conceivably produce a good quality product even though the process was chaotic, poorly documented, late and over budget. These are unlikely extremes but they served to illustrate the question.

Formal quality management programs like ISO 9000 speak entirely to process, documentation and consistency. Generally speaking, although not exclusively, the interviewees’ responses were in alignment with this approach.

One respondent stated that clients want projects that are finished on time, on budget and that offer value for money. This response, shared in general tone by most of the others, places the emphasis on process issues with particular emphasis on schedule and cost control.

Several interviewees commented that consistent approaches and procedures lead to results that consistently meet contractual requirements for quality in materials and workmanship. This response recognized that quality processes and quality buildings are linked, but the former is the prerequisite.

Another interviewee observed that a construction company’s view of quality changes as it matures and becomes bigger. A new, small company seeking to establish itself is likely to focus on quality in the context of results on the job site, perhaps at the expense of quality and consistency of the paperwork in the office. As a company grows, management is forced to focus more and more on the office processes until, at some stage, they get to the point where senior people cannot “keep it all in their heads” and written procedures manuals start to be created.

A couple of the interviewees felt that their companies were just at that cusp where, if further growth were to happen, significantly more complex systems would be needed, the beginnings of a formal, documented quality management program. Another having just passed that hurdle, had recently developed and implemented an ISO certified system, and was looking forward to seeing the benefits materialize although they had yet to do so.

Overall the burden of opinion among the interviewees was that quality in the construction industry refers to process, tempered by an assumption that consistent, well documented processes are more likely to meet the standards established by the owner through the design drawings and specifications.

A tangential issue raised by this question about the meaning of quality was the extent to which quality and occupational health and safety intersect with each other. In Nova Scotia, occupational health and safety is a highly regulated, mandatory process accompanied by a certification system and significant penalties for non-compliance. The consensus among interviewees was that, although quality management and safety management systems share many superficial similarities like rigid standards, extensive documentation, regular staff meetings and reports, formal certification, and in some cases the adoption of a new corporate and industry culture, the subject matters are quite different and have little in common.

5.2 The impact of market segmentation

The initial concept of this study was to select two groups of firms, one that has implemented formal quality management programs and another that has not, in order to conduct a “compare and contrast” type of analysis. However, it quickly became apparent that a more nuanced approach to the issue was required. The value of quality management programs to participants in ICI construction sector depends on the niche that a firm occupies within the industry. Each segment of the industry earns its profit by offering a slightly different suite of services to customers, some of which depend on formal programs and others that do not. The value and utility of a formal program depends on whether it provides an economic advantage in a firm’s particular segment of the market.

As a result of this determination during the investigative process, our findings have been summarized below by trade segment:

- Construction Managers (CM’s)
- General Contractors (GC’s)
- Trades Contractors
- Fabricators and Suppliers

5.2.1 Construction Managers

Not many years ago, most of the industry players would fall into one of three categories: general contractor, trades contractor, or supplier. In recent years, possibly in response to the frequency with which larger and more complex jobs have been coming to the market, some of the larger generals who formerly relied on lump sum bid projects have moved into the field of fee-based construction management work, a fourth category with significantly different competitive pressures than the other three.

At least two national firms with a substantial local presence have moved entirely out of lump sum general contracting work in this market and now focus exclusively on construction management. Several other medium sized firms are doing a mix of lump sum and construction management work. The change in focus has required a change in the way in which they promote themselves to potential clients, which in turn has an impact on the importance that they place on formal quality management programs.

Construction management is a service rather than a product. Firms are hired, in substantial measure, on their experience, the qualifications of their staff and the sophistication of their management systems. Most recent public sector construction management procurements demand very complex responses to requests for proposals. Evaluation criteria are typically weighted 75 to 80% on qualitative factors and only 20 to 25% on price.

In hiring a construction manager the client-owner is purchasing a project specific quality management program combined with construction logistics support. Firms with sophisticated, well documented procedures and quality management systems are more likely to win a job than those without, all else being equal, and so they have an economic incentive to adopt, maintain and advertise formal, comprehensive systems.

The large, national firms that we interviewed (and those with whom we have had other experience) all have quality management programs that have been developed in-house over a period of years. These systems include extensive on-line libraries of best practices, comprehensive standards and procedures for organizing, recording and reporting on every aspect of the firm's business and mandatory training requirements for employees. These large firms demonstrated no interest in formal certification like ISO because they do not perceive that it would bring any competitive advantage.

Regional firms that are competing in the construction management sector but, either in reality or perception, do not enjoy the same scale, resources, and market weight are moving toward external certification to add strength and credibility to their representations to potential clients. For instance at least one medium sized regional firm that is endeavouring to penetrate the construction

management market has pursued formal ISO certification so that they can compete more effectively against the national players in quality based selection processes.

5.2.2 General Contractors

In contrast to the quality based selection process that is usually employed for construction managers, the selection of lump sum general contractors is almost entirely driven by price. Quality and experience are not assessed during the bidding process. The culture of the industry has been shaped by an understanding that low price bidder always wins the job.

In a low bid environment, quality as manifested in the finished product is dictated by the plans and specifications prepared by the designers. The architects and engineers set out materials, methods, standards of workmanship, testing and inspection, commissioning procedures and warranties. The general contractor, by virtue of its contractual relationship with the owner, is liable for the quality of the finished result but only to the extent that the standards are clearly set out in the contract documents. Ambiguities in the specifications are almost always resolved in favour of the contractor and subjective measures of quality take a back seat if they are discussed at all. This results in an inherent conflict between the interests of the three main players, the owner, the architect and the contractor, frequently resulting in disputes.

General contractors create and implement formal quality management programs when and to the extent that it is in their long term economic interests to do so. Large general contractors with many projects underway at one time and offices spread across the region or sometimes across the country or the world have a variety of reasons for adopting relatively formal quality management systems including:

- the need to collect timely financial data from many locations in consistent, compatible forms
- the need to prepare internal reports based on aggregated data
- the desire to realize the benefits of diversity and scale by sharing of technical and process solutions across a large group of employees
- the desire to manage and control bidding and construction risks through the use of standardized processes
- the need to make the experience and knowledge of senior staff readily available to junior and middle management staff as they advance through the ranks of the firm.

The obvious omission from this list is the utility of quality management systems in marketing services to clients. This goes back to the fact that a low bid winner-

takes-all tender process leaves little or no room for consideration of quality management programs at the point of bid and award.

Smaller general contractors with only a few jobs underway at a time can maintain personal contacts between office and the field staff. These firms indicated that they do not need formal quality management programs to keep track of their business. In fact, some said that the nature of the construction business has not altered significantly for many years, exhibiting a conservative approach to change and an active resistance to the notion of voluntary adoption of formal procedures and certification.

Industry resistance to adoption of voluntary, formal procedures in the absence of a compelling reason was illustrated through a discussion of safety programs in several interviews. Most interviewees were quite frank in stating that the current strict safety regime depends entirely on government mandated practices backed up by significant liability penalties. They agreed that this is a good thing overall and that safety has now become an accepted part of the culture within the industry, but think it would not have come to pass if the requirement were voluntary instead of mandatory.

Similarly, in the area of formal quality management processes, most of the smaller general contractors said that they respond to mandatory requirements placed on them by the owner or the designer, but otherwise it's the economics of the business that govern. A couple of long established, successful firms had heard of ISO but appeared to be surprised that anyone would suggest that certification would be an asset to their business.

On a related topic, several larger firms that were interviewed stated that they would welcome and encourage wider use of quality based pre-qualification for general contractors. This would introduce quality into the process of successful tendering and possibly give an advantage to firms having a formal certification. However, this was not a universally held opinion, particularly among the smaller players, possibly because it would push them to spend money developing formal systems just to maintain their current position in the market. In any event there seems to be very little momentum toward wider use of quality based bidder pre-qualification in the industry.

5.2.3 Trades Contractors

The attitude of the trades contractors interviewed for this study generally mirrored those of the general contractors, mainly because they work in the same low-bid-wins business environment.

Large trades contractors with many projects underway at one time report that they tend to gravitate toward formal quality management programs for the same

reasons that larger general contractors do, as listed in the previous section. Smaller firms tend to rely on the traditional methods of memory, personal contact and tradition to track processes and outcomes.

However, there are some nuances that are particular to this market segment and this region that should be noted.

Trades contractors are generally hired by the general contractor, not by the owner directly. The generals are very interested in the bid price because if they do not “carry” the low trade bid, they in turn cannot bid low to the owner. Most of the general contractors interviewed said that they would take the low trades bid unless there was a compelling reason not to.

However, the process by which the trades bid to generals is not as transparent as when generals bid to owners (except when the Construction Association’s Bid Depository system is used) so there is greater room exercising discretion regarding which bid to accept. The generals are very well informed about which firms generally do a good job and are easy to work with, two of the hallmarks of quality. At least one indicated that he would carry the low price but might not accept the low bidder, and instead would use it as a negotiating position with the preferred trade. Another indicated that if the low bid was from a firm that was known to be difficult, he would probably accept it but add something to the overall margin on the bid.

In effect, the generals are recognizing the importance of quality within their sub-trades but this is only a secondary factor in their decision making process, well after price.

Subject to some important exceptions, the impetus toward adoption of formal quality management programs is weaker among the trades than among the general contractors simply because they are generally smaller, have less complicated and diverse business processes and risks, and are less able to absorb the cost in the absence of an immediate return on the investment.

The exceptions, where formal quality programs and certifications are important, are firms that are relatively large and whose business includes a significant fabrication component.

5.2.4 Fabricators and Suppliers

This study did not focus on fabricators and other suppliers to the construction industry, although a couple of firms that were interviewed have fabrication shops as a part of their business.

Formal quality management programs are very prevalent in manufacturing environments. There are a wide variety of formal accrediting systems and testing or performance standards for products that are built in controlled environments to close, consistently repeatable tolerances. Examples cited by interviewees include ISO, Canadian Standards Association (CSA), Canadian Institute of Steel Construction (CISC).

The requirement for formal quality certification in the fabrication and manufacturing industries is established by customers who will not, or are not permitted to, accept anything other than tested and certified products. However, the formal requirements are so deeply engrained in regulation and designers specifications that they are basic elements of the development process and marketing strategy.

Some firms have separate fabrication and construction divisions, in which case the fabrication division is formally certified under one or more accreditation regimes, but the construction division is not.

5.3 Responsibility For and Influence Over Quality

5.3.1 Owners

All of the interviewees said that, with a few exceptions, they have little contact with the owners and or ultimate users of the building and, from the perspective of the builders, owners have little knowledge of or interest in the matters that make the difference between high and low quality.

Looking a little further, this observation reflects the fact that owners are not usually experts in construction and therefore delegate their authority and responsibility to their design consultants and, to some extent, to the authorities having jurisdiction.

There are a few exceptions to this general disengagement by owners. Some public sector owners such the Department of National Defence and the provincial departments of Education, and Transportation and Infrastructure Renewal have extensive procedures manuals and standards that govern all aspects of the design and construction process. They conduct regular inspections with their own staff and take an active interest in all aspects of quality.

Firms that are regularly successful in tendering to these public sector owners are familiar with the quality management programs that are imposed by contract and, even though they may not have their own formal quality programs, do not appear to have any difficulty in meeting the owners' requirements.

There does not appear to be any trend among the public sector owners to establish a preference for firms with formal quality management programs or certifications as a part of the tendering process. They prefer to develop standards and inspection regimes that are particular to their requirements.

Another exception to the general disengagement of owners is in the heavy industrial environment. Construction firms that work in oil refineries, natural gas plants, nuclear plants, offshore installations and other similar facilities are subject to very stringent requirements, many of which focus on safety. This sort of work is not a large part of the business of the firms that were interviewed for this study, but at least one raised it.

The third exception to this general attitude is not strictly within the ICI construction sector but nonetheless is an important market segment for many of the same firms. One of the interviewees has built several large condominium projects and made a point of commenting on the challenges of meeting the quality expectations of new owners. Everything needs to be “perfect”. These owners are not “systematic” in establishing or articulating their quality standards; in fact it may be quite the contrary in many cases, so although formal quality management programs at the contractor level may mitigate the complaints they are not likely to be a panacea.

There is a final item that was raised in interviews that is pertinent to the role of owners in establishing and maintaining standards and procedures related to construction quality. Two large firms commented on the growing difficulty in “getting out of a job”. The time and effort needed to wrap up deficiencies and holdbacks, finish the commissioning process, deal with closing paperwork including as-builts and manuals, and administer warranty claims has increased dramatically in recent years. The commissioning process for a large new building is a complex undertaking that includes functional performance testing of individual pieces of equipment and building systems as a whole, air balancing, extensive air and water quality testing, user training and numerous other procedures. All of these processes demand management attention and extensive documentation, two of the essential elements of a quality management program even if not labeled as such. They are imposed on the contractors by the owners through the formal contract documents (even if some owners are only generally aware of the particulars).

Although it was only the subject of tangential discussion in a couple of the interviews for this study, all of construction firms are aware that design and construction to LEED (Leadership in Energy and Environmental Design) standards for sustainable buildings is being required for most new public buildings in Nova Scotia and to an increasing extent in the private sector. The LEED requirements comprise, in large measure, a focused quality management program that governs design issues (like use of environmentally benign

materials), construction methods and processes (such as handling and disposal of construction waste) and project documentation.

To an increasing degree LEED and similar building certification programs required by owners are forcing the more sophisticated contractors and trades to demonstrate that they can meet specific standards in terms of process and results. In order to be competitive in the bidding process, they need to be efficient in demonstrating and managing their compliance with the LEED process.

5.3.2 Design Professionals

The design professionals establish the standards that are applicable to the finished product and enforce them through inspections, but the builders control the process and methods by which they are to be achieved.

This division of responsibilities is widely accepted so with a few exceptions the attitude among the interviewees was, as one put it, “they design and we build”. In other words the architects and engineers are responsible for defining quality in terms of materials, methods, standards and workmanship, and the trades are responsible for building in accordance with their instructions.

As usual, this general statement is subject to some exceptions.

Within the construction management sector, one of the specific mandates of the CM is to collaborate with the design team and the owner and during both the construction and pre-construction stages on matters relating to design details, cost estimating, tendering procedures, job site management and so forth. Pre-tender engagement of construction expertise through a construction management process is cited as a way to add quality in to the process and the end result.

One of the general contractors complained that the design community is not very open to collaboration with builders during the design process, and if the contractor makes a suggestion after award the suspicion is too often that they are just looking for an extra.

On the other hand several of the trades contractors that were interviewed indicated that they are regularly consulted by the design community about detailing in specialized and sometimes troublesome fields before the tenders are issued and others indicated that there can be very constructive engagement during the shop drawing stage that adds significantly to the quality of the finished product.

5.3.3 General Contractors

General contractors are responsible for the overall quality of the finished project even though, in most cases they delegate the actual work to the subtrades and act primarily as organizers and coordinators of the construction process rather than doers. Among the firms interviewed for this study, the generals' employees other than the office staff usually only consist of project managers, site superintendents, carpenters, labourers, and in one case drywallers and painters.

In spite of the fact that the generals are at one remove from the actual execution of the work, all of those interviewed clearly stated that they are responsible for and take pride in the quality of the completed work.

There was near universal agreement among the firms interviewed for this study, whether general contractors, construction managers or trade contractors, and whether in terms of process or finished product, that a firm's commitment to quality emanates from the owners and senior management of the firm. It comes from the top down, not the bottom up.

However, one of the interviewees was a long established firm with a group of employees that had worked together for many years, decades in some cases. In that case, the quality management process appeared to be a collaborative effort based on long established common expectations that are not documented and probably never will be. Formal, documented procedures and third party quality certification were simply not on the horizon. This, perhaps, is an exception in modern terms but is also illustrative of how the construction industry is changing.

5.3.4 Trades

Trade contractors form the foundation of the complex pyramid of responsibility for construction quality. They execute the specific work and deliver on the warranties.

The building trades range from heavy steel fabrication shops to information technology intensive HVAC⁶ and controls firms to relatively traditional painting companies. The limited sample that was included in this study, supplemented by the experience of the consultant team in the industry, indicates that the approaches to quality management programs are as diverse as the firms and services they provide. Some, as noted above, simply deliver what the architects and engineers ask for with only as much fuss and paper as is absolutely necessary. Others actively pursue formal quality management programs and certifications.

⁶ Heating Ventilating and Air Conditioning

5.3.5 Workers

Several common observations emerged from the interview process with respect to the role of workers in the quality management equation.

First was that the as-built quality of a job relies heavily on the workmanship of individual workers, but it is impossible to monitor their every action. Ultimately, quality is dependant on the personal capability, integrity and professionalism of each worker. However, only one firm, primarily a fabricator, indicated that they have deliberately fostered a team approach that involves employees in both strategic planning and continuous quality improvement that they feel is central to their quality management program. All of the others felt that fostering quality is a top down process and several actively complained about perceived lack of commitment and workmanship among front line employees.

Second is that formal quality management programs involve meetings and paperwork that the average worker perceives to be an annoyance at best. Constant vigilance and pressure is needed to maintain the integrity of quality management systems.

Staff meetings (apart from the mandated safety meetings) receive very mixed reviews as effective quality management tools. Some firms, mainly the smaller ones, eschew them altogether stating that jobs are so diverse in their issues that general meetings are a waste of time. Another firm, recently ISO certified, has tried to maintain a schedule of weekly telephone conferences as per their new operations manual but is considering moving to a bi-weekly or monthly schedule. The same firm said in a candid moment that if ISO arrived for a review today they would probably not make the grade because the paper burden was proving to be too great.

One of the major firms commented specifically on the role of technology on the worksite, noting that projects in Nova Scotia tended to rely on paper based systems to a greater extent than other parts of the country resulting in a productivity disadvantage. There was some sentiment among other interviewees that the “paper burden” of jobsite and quality management systems will inevitably increase and they will be forced to explore a wider range of site based information technology applications.

The third issue that was raised by the interviews relates to training of employees. There is a clear difference between the requirements of the large national general contractors and the local or regional trade contractors. The national companies that were interviewed have specific annual targets for salaried employee training (i.e. project managers, coordinators, superintendents and office staff) in the range of 30 to 35 hours per year. Some of this is provided in

house and some such as LEED training is provided by third parties. Participation is nearly mandatory.

Even though the larger firms have ambitious training targets for their office and project management staff, they appear to rely on union sponsored training for their carpenters, labourers and other unionized employees just like all of the smaller contractors. Safety training is, of course, mandatory for all employees.

The Canadian Construction Association Gold Seal certification program is widely recognized and supported by most of the larger firms. It appears that a large proportion of project managers and estimators have obtained their Gold Seal or are working on it. However, the Better SuperVision program for superintendents is not well known, most interviewees only having a vague acquaintance with it.

Smaller firms, particularly the small trade contractors, do not have formal training requirements. They rely on the unions and manufacturers' representatives to provide advice and instruction about new methods and techniques in the industry. Some interviewees commented that there has been little change in the basic trades for many years. Training only becomes an issue when a design specifies a new system in which case they seek advice and instruction from the manufacturer.

5.4 Costs and Benefits of Quality Systems

One of the medium sized general contractors interviewed for this study had become ISO certified within in the past year. They reported that the initial cost was about \$15,000 and there is an unmeasured cost of ongoing administration. The other firms that have formal programs, certified or not, appear to have internalized the costs of developing and administering them to the point where it is possible that they cannot be meaningfully segregated.

The firms that have formal employee training objectives (an aspect of quality management) could readily measure the direct and indirect costs. One senior manager of a large firm advised that he had been directed by head office to increase his training budget this year, so it appears that those who have formal programs believe that it's in their financial interests to do so.

The putative benefits of formal quality management programs include reduced operating costs, decreased problems in meeting regulatory requirements, reduced deficiency lists, increased productivity and improved marketing capacity.

The interviews indicated that most of the firms that have formal quality programs believe that these benefits are and possible, but they cannot point to specific, measurable outcomes. The benefits are only apparent in very general terms.

The interviewees readily agreed with the common wisdom that it's less expensive to do work properly in the first instance than it is to go back and do it again. Reduction of costs incurred through deficiency correction and warranty work is a principal objective in introducing a quality management program and, thought by most to be an actual outcome even if direct measures are not available. Several interviewees noted it is hard to control what individual workers are doing on the job site with quality systems that are focused on paper procedures in head office. Inspection procedures are better at catching defects after they occur than preventing them in the first place.

There is also a general feeling that the planning and record keeping discipline required by a formal quality system makes it easier to track and verify the information needed to meet regulatory requirements. In some cases, particularly in fabrication shops, it's necessary. One interviewee specifically mentioned the record keeping demands of the LEED process which, as noted earlier, might be considered to be a quality management program applied to a specialized field.

It's not clear from the interviews whether quality management programs result in increased productivity. At one level, to the extent that a program reduces the incidence of deficiencies, it will improve productivity. However, several interviewees admitted that the paperwork associated with quality management programs is seen as a nuisance by the workers on the job site and, at least from their perspectives, a hindrance to productivity.

The contribution of formal quality management programs to marketing was discussed in Section 5.2 above. In summary, they are necessary to construction managers who compete for business in quality based selection processes but much less so for general contractors and trades who compete mainly on the basis of price.

6. Conclusions and Recommendations

6.1 Conclusions

Firms in the construction sector will consider adopting a quality management program (QMP) only if it can provide a competitive advantage in their market. This advantage can take the form of:

- enhanced credibility and client service capacity in quality driven markets (particularly fee for service construction management);
- lower operating costs that potentially lead to lower initial bids and/or lower project execution costs in price driven markets (lump sum bid construction); or
- compliance with regulatory standards in heavily regulated markets that require suppliers to have a certified QMP (e.g. nuclear, oil and gas, defence systems construction).

This study focused on firms that compete in light industrial, commercial and institutional (ICI) construction markets on the basis of quality or price. Another category, heavy civil engineering and earthmoving, was not a focus of this study.

The ICI construction sector is not well serviced by the existing certified QMP systems. Programs such as ISO 9000, Six Sigma⁷ and Capability Maturity Model Integration (CMMI) were developed for manufacturing, process and service industries where they apply well and are widely adopted, but they are not particularly well suited to the needs of construction firms.

There are three approaches to quality management in the construction sector:

1. Major firms have developed customized systems in-house to meet their specific requirements. These systems have credibility as a result of the size and strength of the firm but are not certified to any external standard.
2. ISO 9001:2000, the only possible choice among the formal certified systems, has been adapted to the needs of some medium sized and growing companies in the construction industry in spite of its limitations.
3. Small and medium firms, as they grow, are forced to develop their own management systems on an as-needed basis to facilitate employee retention, record keeping, risk management and succession planning. These systems may reflect many of the characteristics of a formal QMP even if they are not recognized as such.

⁷ "Six Sigma" refers to the ability to produce output within specification. A standard originally developed by Motorola, it is now widely used in production industries.

The approach to QMP development and implementation is a function of the sector of the industry within which the firm competes: quality driven or price driven.

6.1.1 Quality Driven Markets

Construction Management (CM) firms provide a professional service to their customers, the defining element of which is quality management. Large CM firms have proprietary systems that have been developed in-house over a period of many years. The foundation of these systems is service based project management techniques which are not well suited to structured QMP systems such as ISO 9000. They share common themes but are not certified to an external standard.

The major CM firms offer their services in a market where rigorous systems are essential. Adoption and use of effective control and communications systems is a mandatory requirement of procurements for their services and a major factor in bid evaluation, often more important than price.

Medium sized CM firms need to have a QMP system to compete with the major firms but they do not have the size and resources to start from first principles. As a result, they see value in the credibility conferred by “package” programs with external certification. In spite of the fact that it is not very well suited to the construction industry, these firms use the ISO standards as the best available alternative. It provides a starting point for developing a QMP and can help them to compete with the larger companies in quality based procurement processes.

Small firms usually do not compete in the CM field (although there are exceptions) and therefore do not need to consider either developing their own system or certifying a system to ISO.

6.1.2 Price Driven Markets

General Contracting (GC) work is virtually all price based and the existence/non-existence of a QMP system has little to do with the owner's decision to award. Bids in this sector are rarely evaluated on factors related to quality processes. The same can be said, with some reservations and exceptions (e.g. fabrication shops), for trade contractors that bid to GC's. We did, however detect within the GC group a general (but not universal) sentiment that greater use of pre-qualification of GC's and trades based on factors other than price alone would be a constructive development and an improvement in the bidding process.

In the absence of a change in the structure and economics of the industry, the benefits of a QMP need to be internal to the specific needs of the firm. That is,

they need to be advantageous in terms of price competitiveness, business sustainability, growth, employee retention or another material factor.

6.1.3 Reasons for adopting QMP's

For those firms that need to understand the internal benefits of adopting QMP's, especially those firms in price driven markets as described above, the reasons for introducing QMP's and their benefits fall into the following categories:

- *Record keeping:* As firms grow, complexity of management multiplies beyond the ability of one or two people to “keep it in their head”. Established processes and record keeping create routines that allow firms to grow without losing track of the essentials of cost and schedule control. There is a “tipping point” at which a firm is forced to start to develop established procedures if it is to grow. This point is not clearly defined and depends to a large extent on the attitude and management skills of the owners, but is probably in the range of 20 to 30 employees.
- *Consistent estimating and bidding processes:* Good record keeping (time and materials by type of task) and established field procedures lead to consistent pricing and predictable margins, both of which are important elements of financial risk management.
- *Management training and succession:* Written, consistent procedures created for both administrative and process based activities make it easier to either bring new people or move existing employees into management and administrative functions to allow a firm to grow. This infrastructure can also provide stability within the company.
- *Quality of completed work:* There is general agreement that documenting processes and results should reduce quality issues with completed work (deficiencies) and therefore reduce callbacks and costs. Currently this outcome appears to be more hoped-for than demonstrated in practice. However, it has been demonstrated that documenting job site based processes does facilitate the orientation of new employees and reduce the supervision required on the job site.
- *Direct reduction in operating costs through improvement in productivity:* There is no obvious or demonstrated reduction in operating cost or improvement in productivity that flows directly from adoption of a QMP, and in fact it may work the other way. The perception is that a QMP is overhead, not billable work completed. Paperwork associated with ISO is generally considered to be a burden, especially by field people. However there is little doubt that if a QMP achieved its objective of reducing re-work and deficiencies, it would also have a direct impact on productivity and the bottom line.

We suggest that that the above list of reasons and benefits can be used to assist in promoting the use of QMP's, should NSCSC-ICI adopt the recommendations

of section 6.3 below. They could provide useful background material in explaining to firms why they should introduce some form of quality management program, and the consequences of doing or not doing so.

6.2 Other Observations

Some other observations were made regarding adoption of QMP's:

- Attitude towards and concern for quality is driven by management from the top down.
- Most managers of medium sized construction firms readily admit that, at some point, their firms' administrative and quality management processes need to make a leap in degree of sophistication and effectiveness if they are to be able to grow and remain competitive.
- Change and innovation come slowly in the construction industry. Buildings are custom designed and built, one at a time, and many basic methods have not changed greatly for decades. Quality of the finished result (as opposed to the management process) is in the hands of the designers and the workmanship of the individual trades people employed on the job.
- All firms, even the largest, rely on the unions and manufacturers representatives for training in materials and methods and trades people do not receive much exposure to management issues or the benefits of a QMP. Management related training is usually restricted to management and administrative staff, project managers, and supervisors and is not typically offered to trades, even if directly employed. As a result, vertical mobility within the industry is not always very easy. A trades person can become a superintendent, but moving to project manager or above requires formal education and training that may not be readily available.
- There is very little crossover between quality and safety. Safety is treated as a free standing system mandated by legislation and regulation while quality-based systems are perceived as market-driven and optional. However, the basic principles underlying both systems are very similar and as construction management methods and techniques become more sophisticated and involve more complex processes, there is likely to be greater convergence between the methods that are used to manage OH&S and those used to manage quality.
- Some of the observations about formal, certified QMP systems are based on exposure to the ISO standards. They are not ideally suited to the construction industry and, as a result, may tend to colour the general attitude toward QMP's.

6.3 Recommendations

6.3.1 Suggested Approach

Based on the conclusions developed from the research, we recommend the following to NSCSC-ICI:

1. Work with firms, particularly those that are at or near the “tipping point”⁸ to help them recognize how future growth and succession depend on development of more formal systems.
2. Develop a basic QMP framework (see 6.3.2 below) to assist these companies and guide them in their development of a structured system.
3. Develop an instructional-based program in partnership with Nova Scotia Community College (NSCC) and other training providers to facilitate the implementation of a basic QMP framework.
4. Encourage firms (including the majors) to open the “management training” side of their QM programs to trades who may not typically be exposed to them. This will encourage vertical mobility within the industry.
5. Investigate the potential for cooperating with the unions and the NSCC to deliver more management training to trades people, to open doors for those who seek advancement within their existing firms or to branch out on their own.
6. Consider consultations with public sector owners and other construction associations, such as the Construction Association of Nova Scotia, around more extensive use of pre-qualifications systems and quality based bidding processes.

6.3.2 Developing a Basic QMP Framework

There are a number of key components that would form a part of our recommendation to develop a basic QMP framework. These component elements should be developed and implemented in tiers to accommodate companies at various levels of growth, size and complexity. We suggest three levels of implementation, at increasing levels of comprehensiveness.

First Level

The first level elements of a quality management system include:

- i) The required OH&S documentation required by the regulatory bodies;

⁸ The “tipping point” is typically companies with 20-30 employees and growing, see section 6.1.2

- ii) Process specific documentation that could be used to assist or facilitate processes on the job site;
- iii) Administrative information such as emergency phone numbers and contacts, time reporting information including time sheets, etc.;
- iv) A consistent process for reporting and seeking direction with respect to schedule, coordination, technical, materials management and deficiency issues.
- v) Clear documentation available to all employees at each work site.

Second Level

The second level of a system would develop and document standardized processes for routine construction tasks, perhaps supplemented with shop drawing examples where appropriate. Documents would be developed specifically for each company and would be only as complicated and detailed as deemed required based on factors such as the age and experience of the work force, value of the knowledge and the need to potentially grow the company.

Third Level

The third level of a system would deal with management and administrative procedures including project cost estimating, scheduling, recording and analyzing time and material costs for various tasks, procurement and purchasing, billing procedures, communications, formal meetings, reporting, and quality assurance.

6.3.3 Basic System Benefits

While it is important to recognize that this basic type of QMP model would not be “certifiable” in the manner of an ISO based program, it would be an immediately useful, manageable and affordable set of steps for firms that need to introduce more structure in order to gain management efficiencies and grow. It would assist efforts to become formally certified in the future if that should prove to be advantageous.

These benefits would be particularly significant for smaller trades and general contractors that wish to grow and but recognize the limitations of their current systems (or lack of them). Some larger organizations will continue to invest in and commit to fully certified QMP programs such as ISO 9001:2000 where they see advantages in an established and recognized system; they should be encouraged to do so.

6.3.4 Future Considerations

It was previously noted that currently established certified standards for quality management have only limited applicability to the construction sector. However standards developments continue to evolve; the general recognition of LEED⁹ certification, and Project Management¹⁰ standards, in their respective domains, are relatively recent examples of this. The demand for and recognition of improved quality standards continue to expand in numerous industries; construction is not likely to be an exception. As the NSCSC moves forward with these initiatives it is important to monitor organizations within the construction sector. Structured management standards, tailored for this industry, may begin to surface over the next five to ten years. These could eventually be able to augment or replace the basic framework outlined above.

⁹ The Leadership in Energy and Environmental Design Green Building Rating System, developed by the [U.S. Green Building Council](#)

¹⁰ The Project Management Institute PMP certification, for example

Appendices

Appendix A Interview Questionnaire

Appendix B Findings from Other Jurisdictions

Appendix A Interview Questionnaire

Nova Scotia Construction Sector Council

QMP Survey

Company Questionnaire

October 29, 2007

Questionnaire for QMP Survey

1. Do you have a system within your company that controls the products or services you provide?

2. Is it a formal system and has it be certified? If so to what standard?

3. Is it a system of control that is supported by documentation to indicate activities have been completed? Can you provide examples of this documentation?

4. Can we see examples of documentation such as contracts, meeting minutes, signed off documentation, etc.

5. Do you provide training to your workers that are either job specific such as product updates, work place safety, and etc. or general company information?
 - a. Do you keep records of the training your staff take?
 - b. When was the last product information training your staff had?
 - c. When was the last time you had a general company meeting to discuss job related topics?

6. How successful have you been at retaining employees?
 - a. What is the turnover rate in your company? industry?

- b. Do you think that a quality management program helps you and/or the industry to maintain a more stable employee base?

- 7. What do you think Quality Management Programs are, and how do you see them being used:
 - a. In your industry?
 - b. In your company?

- 8. When you think about quality, do you mainly think about:
 - a. Process?
 - b. Outcomes?

- 9. Where in the company (firm, organization) do you see the responsibilities and accountabilities for quality standards:
 - a. Primarily belonging (i.e. ownership)?
 - b. Belonging throughout the company (firm, organization)?

- 10. Within the industry as whole, where and how does the responsibility for quality lie:
 - a. General Contractors?
 - b. Sub Contractors?
 - c. Professionals (Architects, Engineers, Inspectors, etc.)?

11. What specifically are people doing beyond meeting standards, codes and OH & S requirements?

12. What do you aspire to achieve in quality and quality improvement?

13. What do your QMP programs actually do operationally in terms of measuring, recording, tracking, reporting, evaluation?

14. Do they have any measures of benefits from QMP programs such as:

- a. Reduced costs?
- b. Decreased hassle meeting regulatory requirements?
- c. Reduced deficiency lists?
- d. Tangible output improvements?
- e. Increased marketing capacity?

15. If there is a QMP, can they ascribe any value to what has been achieved as a result of implementing it?

16. Other comments and observations (particularly anything that would be of specific benefit to other organizations considering adopting QMP)

Appendix B Findings from Other Jurisdictions

Nova Scotia Sector Council QMP Project

Interviews with Associations, and Regulatory Bodies Summary Highlights and Observations

- 1 Doug McVittie, AGM of Const'n. Assoc. of Ont.** Ontario has no O H & S system standards, but lots of regulations from the Ministry and WSIB. The Association helps by providing guidelines to set up an OH&S program. Many other provinces do have standards, e.g. AB, BC, SK, MB. And NS requires a program to bid. There are national safety audit of policies, practices, inspections etcetera. There is a national safety audit program that measures if organisations have safety committees, policies, written practices and conduct inspections, which are validated through document reviews, and site visits and interviews. The larger firms, who use larger sub-contractors, have the best records and are more advanced. But, he does not know of any comprehensive QMP's. Individual firms have various types of programs. He has not seen any studies such as the NSCSC project. There is generally a lack of authoritative leadership in QMP area.
- 2 Pierre Boucher, Canadian Construction Association.** Does not know of any comprehensive QMP's. Their Gold Seal Program – national – is a voluntary certification process for managers, superintendents, project managers, etc. It ensures participants are keeping up to date on management process and construction techniques. They are looking at new ways to certify individuals. He feels the construction associations are the main influences. (Wants me to talk to Andrew Sheppard, Acting Director – back on Wednesday.)
- 3 Andrew Pilat: GM, Sarnia Construction Association.** Sarnia area is recognised as a leader in OH&S. The initiative is managed by a tripartite partnership of Building Trades, Contractors and Owners/clients, the latter driving safety programs and standards. Cooperation is high. The Industrial Education Cooperative manages training programs through which all companies must go. The area is unique in that it is 100% unionized. Does not know of any QMP, as described in our project, other than those in some individual firms, including quality, work process and management, and safety programs. But typically, these are not under one umbrella. Securing young people is difficult, even though the demand is high, since all firms are unionized and older workers take precedence. He feels some collective agreements can be impediments to adopting new, comprehensive programs such as QMP.

- 4 **Ken Gibson: Alberta Construction Association.** Mixed union and non-union members, and is really an association of associations. The association is not heavily involved in setting standards – all labour relations matters were spun off to union and non-union organisations. But it does promote and advocates legislated and industry standard practices. They are launching the promotion of skilled work forces, but this program is new and not yet in place. He recommended we talk to PCL, Webcor and Graham as Best Management Practices assessment targets. (PCL was mentioned in the “on the move” section in the Chronicle Herald regarding their Stadacona work.)
- 5 **Andrew Sheppard, Canadian Construction Association, Acting Director, Gold Seal Program.** Gold Seal is being promoted heavily and there has been a growing take up especially in Alberta and Ontario. This management training program aims to improve management skills and attracts mainly superintendent, project manager, estimator level staff. A safety component has been added and met with a strong positive response. He sees OH&S evolving into regulatory status and he believes Gold Seal and possibly quality and management programs will follow suit. Large Owner/clients are demanding better management and product Quality. Only a few of the larger companies seem to have QMP’s as described in the NSCSC project. In general, he sees QMP as being fragmented in the industry. No industry measures of effects of QMP on the work force are available.
- 6 **Clive Thurston, President, Stephen Bauld, Doug Chalmers, Ontario General Contractors Association.** (Met with this group in Halifax – their AGM was held here.) OGCA is taking initiatives in promoting Gold Seal, training at all levels, construction as a career, and introducing Gold Seal programs into high schools where credits can be earned in a 30-school pilot project. Clive said there is not a solid body of measurements to gauge the benefits of Gold Seal. OGCA are also working to attract people to the industry through publicity programs and working with government and academics. They noted apprentices are pushing for more management training. Key issues are the need to control sub-contractors to achieve compliance – in any program – and to break down provincial and regional work force mobility barriers. All agreed that a comprehensive QMP is ideal and some companies are working to that. But this requires significant cultural and behavioural adjustments. They also noted sharing best practices with firms outside the industry, such as Toyota and Boeing, have helped some companies immensely. Best QMP practices can evolve but will need a high level of cooperation among all industry players, with the help of authoritative leadership and standards.
- 7 **Neil Tidsbury, Alberta Construction Labour Relations.** The organisation represents construction firms and is similar to the Nova

Scotia Construction Relations Management. They are pushing the Field Level Risk Management tool, which is OH&S focussed. They are not directly involved with or pushing a comprehensive QMP with their members. He believes getting best practices information on QMP's from large firms could be difficult as they see them as a competitive advantage.

- 8 Eryl Roberts, Executive Secretary, Canadian Electrical Contractors Association.** The association designed and owns a voluntary OH&S program that is tailored to the nature and size of each company. It is based on TQM principles that require setting standards and conducting audits. 20% of the membership has completed the program, and Eryl feels saturation, for now, has almost been reached. CECA wants to make the program free of charge and if a company needs help, the consulting fees are paid. The members are taking a wait and see attitude on the Gold Seal Program. He also said associations have a silo approach to programs. For example, CECA 'Canadianized' a set of management programs from their U.S. Counterparts. In general, the CECA buys into the concept that safety, quality and good management must be linked. They are only starting to introduce quality at a basic level. They have established a minimum standard exam that addresses the code, OH&S, consumer protection, business and employment practices, and firms' liability, which represents a basic standard to be met. He feels the basis for future success in expanding the program includes lobbying and networking with appropriate ministries and achieving legislated requirements.
- 9 Art Riendeau, IT/Multimedia Manager, Alberta Construction Safety Association.** The ACSA is the safety voice for the industry. It sits in with the Construction Owners Association of Alberta, which is mainly comprised of wealthy firms in the industry. He sees some progress toward a more comprehensive QMP, but currently these reside only in some firms.
- 10 Paul Casey, Workplace Safety Insurance Board, (Ontario).** The WSIB is still primarily focussed on safety and has seen a 5% annual reduction in lost time injuries and deaths in the construction industry since 1997. It has introduced cash back incentives, as well as reduced premiums, to high performers, which has really caught construction firms' attention. They are in the process of introducing an accreditation process similar to ISO 18000. This will award and recognise high performers through an evaluation process. They support Safety Groups to share plans and practices, and include a process of mentoring by qualified firms to help others learn.
- 11 Richard Mei, Owner of Frampton Inc. (Ontario) and Associated with Quality Connections in U.S.** Mr Mei's firm is contracted by the Canadian

Electrical Construction Association to assist members of the IBEW firms implement their OH&S program. The program at this time does not go beyond safety in any substantive way. The Joint Electrical Promotion Program charges fees to individual trades worker members to fund the cost of this initiative. The OH&S program is based on the Ministry of Labour legislated requirements. Firms are audited in terms of accident rates and types, program materials and involvement of all workers, etc. They are awarded a bronze silver or gold medal. Other benefits include increased client base for participating companies, reduction in injuries, worker safety and awareness, and overall improvement throughout the firms. Other observations include increased demand by workers for more training in all aspects of their work.

12 Michael Chappell, Ontario Ministry of Labour. The Ministry is taking a team approach, for example, in creating a health and safety network of the provincial, public, firms' management, and trade groups representatives. While COCA represents safety, it is interested in moving beyond to include QMP practices. Mr. Chappell believes there is a groundswell regarding embracing general management, quality and safety program that would lead to accreditation processes. He also sees this trend as a means to drive "underground" firms out of the construction business. He suggested Dufferin Construction, AECON, and PCL as good best practices assessment candidates.

University of Wisconsin Study 2003: Concerned with the effects of injury rates on the construction work.

The study focused on:

- Identifying safety and quality programs in the industry.
- Quality Management was not a focus in the industry
- Contractors saw QM and Safety as separate entities.
- The study assessed if QM and OH&S can be integrated by using TQM type approaches. That is, setting standards, tolerances, and adopting continuous improvement practices. However, some major shifts in traditional attitudes would be needed.

Key Observations and Lessons Learned

Observations:

- Industry programs largely oriented to OH&S
- No consistent application of common standards across the industry and across Canada
- QMP and accreditation programs are fragmented in construction industry
- No common body of measurement of affects of existing programs on workers seem to exist
 - That is, HR concerns do not seem to be clearly factored into program measurement
- Some regulatory bodies moving toward QMP programs and eventual accreditation
- Pockets of movement toward QMP exist among some Associations in regions and provinces
 - e.g. Sarnia, Alberta, CECA, OGCA
 - Gold Seal Program (national), Construction Owners Assoc. Alberta
 - Introduction of Construction Industry credit programs into high schools

Lessons To Be Learned:

- Need strong leadership on the QMP front from regulatory bodies
- Need industry leadership
- Requires incentives to participants.
- Must demonstrate the ‘value added’ proposition to all participants from individual workers through to associations and client/owners.
- High level of cooperation is a prerequisite for developing and advancing QMP principals and practices.
 - Government, WCBs, trade groups, unions, industry associations, client/owners, and the school systems
- Raise awareness first, develop programs next

NS Construction Sector Council QMP Project

List of Trade Association and Regulatory Organization Representatives Contacted

Name	Organisation	Contact
Doug McVittie	Ass't.GM, Construction Safety Association. of Ontario	Direct: 416-679-4002
Pierre Boucher	COO, Canadian Construction Association.	613-236-9455, Ext. 430
Andrew Pilat	GM, Sarnia Construction Association	519-344-7441
John Barnsfield	GM, Industrial Education Cooperative, Sarnia (Note: Not contacted for interview)	519-337-8637
Ken Gibson	E.D., Alberta Construction Association	780-455-1122
Steven Kushner	Merit Contractors, Alberta: Non-union, (Refused interview)	780-455-5999
Neil Tidsbury	Construction Labour Relations, Alberta: bargains with trade groups	403-250-7390
Andrew Sheppard	Canadian Construction Association, Manager – Gold Seal Program	613-236-9455, Ext. 412
Clive Thurston	President, Ontario General Contractors Association	905-671-3969
Stephen Bauld	Vice President	“
Paul Casey	Workplace Safety Insurance Board: ON	1-800-387-5540
Eryl Roberts	Exec. Sec'y, Canadian Electrical Contractors Association	416-675-3226, Ext. 311
Rick Mei	Quality Connection – Occupational Health & Safety	705-524-0373
Art Riendeau	Alberta Construction Safety Association	780) 453-3311 Mobile: 780-994-4943
Michael Chappell	Ontario Ministry of Labour	416-326-9776

Acknowledgment

The consultants would like to acknowledge the assistance of:

- The Board and Staff of the Nova Scotia Construction Sector Council Industrial-Commercial-Institutional;
- The many companies and their representatives within the Nova Scotia Construction Industry who made themselves available for interview;
- Numerous statutory, trade, professional and advisory organizations to the Construction Industry across Canada;
- The Workers' Compensation Board of Nova Scotia;

Without their willing participation and support this assessment would not have been possible.

We would especially like to thank the project Steering Committee who helped throughout by providing guidance and direction, as well as giving much direct support to the consulting team. The Steering Committee members were:

- Alan Brown, Department of Labour and Workforce Development
- Roger Caissie, Industry Consultant
- David Carmichael, Atlantica Mechanical Contractors Inc.
- Tommy Harper, Workers' Compensation Board
- Roddie MacLennan, IA-BSOI Local 752
- Allan Stapleton, Construction Management Bureau
- Brian Tobin, IBEW Local 1852
- Nova Scotia Construction Sector Council – ICI Staff

This Project was funded in part by Service Canada. The opinions and interpretations in this publication are those of the authors and do not necessarily reflect those of the Government of Canada.



Nova Scotia
Construction Sector Council
Industrial-Commercial-Institutional

For more information or additional copies contact:

The Nova Scotia Construction Sector Council

Suite 205, 1600 Bedford Highway


Bedford, Nova Scotia, B4A 1E8

Phone: (902) 832-4761

Fax: (902) 832-4763

info@nscsc.ca

www.nscsc.ca

This project was funded in part by  Service
Canada