

Commissioning on Purpose

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Synopsis

This article, written by two commissioning professionals with a combined experience of 30 plus years in the commissioning field, will reflect on the nature of the commissioning industry today and will present a concept of what commissioning could be in the future. This paper will explain why commissioning professionals, working with building owners, designers, constructors, operators, and industry organizations need to lead an evolution in the way we design, construct, operate and maintain buildings to center the entire process around the purpose of the building.

The authors believe the Commissioning Authority could and should be the entity that represents and communicates the building purpose from the initial concept phase throughout the lifetime of the building. This paper will discuss some of the current obstacles to achieving this evolutionary concept and will suggest ways of thinking about buildings that could lead to large order-of-magnitude improvements in the long-term performance of buildings. At the same time, we will discuss achieving substantial savings in life-cycle costs and significant improvements in reducing the environmental impact of a building.

About the Authors

Jim Coleman is a Principal with Engineering Economics, Inc. He has been involved in the HVAC industry for 35 years with experience in the design, installation, testing and balancing and commissioning of HVAC systems. Jim is a Certified Energy Manager, Certified Building Commissioning Professional and is a NEBB qualified supervisor in Air & Hydronic Testing and Balancing, Sound & Vibration Testing and Building Systems Commissioning. He is also an instructor for courses in HVAC Systems, TAB and Building Systems Commissioning.

Gretchen Coleman, P.E., Operations Manager for Engineering Economics, Inc.'s Roanoke, Virginia branch office, is a leader in the building commissioning industry. As one of the early pioneers in the field, Gretchen has progressed through the ranks of the industry. Gretchen has extensive hands-on experience commissioning HVAC equipment and the DDC systems that control them. She has been instrumental in standardizing written functional performance test procedures and other reporting documentation. As a commissioning agent, she has managed air/water Test and Balance (TAB) services as part of the commissioning process. She holds a BS in Architectural Engineering and has taught basic test and balance theory and instrument application classes for the Washington State Energy Office. Gretchen has spoken on the subject of commissioning at various venues, including the National Conference on Building Commissioning. She is a past Board Member of the Building Commissioning Association (BCA) and is currently on the BCA's Project Monitoring Committee for the Certification Committee. In addition, Gretchen was a beta tester for the certification program being launched this year. Gretchen is a NEBB qualified Systems Commissioning Administrator.

Commissioning Industry Overview

Until the early 1990's, commissioning was not a common term in the traditional construction industry. Some Design-Build Mechanical Contractors had separate installation and start-up personnel and used the term "commissioning" to refer to the start-up process. This process frequently included equipment start-up and checkout; testing, adjusting and balancing (TAB); and the turnover process to the owner. The intent of these groups was to improve the quality of system performance within the scope and budget of the project. These early attempts at commissioning helped improve the quality of the project and are still used by most successful design-build mechanical contractors today.

While this approach to commissioning has many merits, it also has shortcomings for many owners:

- The commissioning process usually did not start until the installation was nearly completed. Problems with the design and installation were not included in the commissioning process. Therefore, problems with the system were likely not found until the systems were started and balanced.
- The commissioning process was performed by the same contractor that designed and installed the systems. While design-build contractors had motivation to provide functional services to enhance their quality reputation, they were still limited by the project budget. The contractor's motivation to maintain a profit on the project often limited the extent that system problems were resolved. The owner rarely had the expertise or time available for in-house staff to check and monitor the contractor's work.
- Many owners were limited by purchasing regulations to use the design-build process.

By 1990, some owners of multiple buildings embraced the idea of formalizing the commissioning process. Several industry organizations recognized commissioning as a method to improve the construction process and provide owners with a better end product. At that time, there were two different approaches taken.

The first approach was to have the Mechanical Contractor perform the commissioning as an enhancement to the TAB process. The Sheet Metal and Air Conditioning Contractors Association (SMACNA) introduced a manual of HVAC Systems Commissioning directed at contractor based commissioning processes. At the time, the National Environmental Balancing Bureau (NEBB) was a contractor based organization, closely affiliated with SMACNA and the Mechanical Contractors Association of America (MCAA). MCAA was principally involved in the standards, training and certification of member firms in TAB for air and hydronic systems and sound and vibration testing. In response to owner demand for better quality systems, the National Environmental Balancing Bureau (NEBB) developed a Building Systems Commissioning certification program for firms already certified in air and hydronic TAB.

The other approach was to promote commissioning as an independent process. In 1989, ASHRAE introduced Guideline 1 *The HVAC Commissioning Process* which presented guidelines for a commissioning process that began in the pre-design phase and continued through

the warranty phase of a project. During the same time period, commissioning was beginning to catch on in the Northwest. Portland Energy Conservation, Inc. (PECI) was promoting commissioning as a method for improved building performance. In 1992 PEGI sponsored the 1st National Conference on Building Commissioning. Over the first few years of the conference a consensus definition of commissioning was developed. “Commissioning is a systematic process - beginning in the design phase, lasting at least one year after project close-out, and including the training of operating staff - of ensuring, through documented verification, that all building systems perform interactively according to documented design intent and the owner’s operational needs.”(1)

Today, building commissioning is “business as usual” in a number of building sectors and the demand for commissioning services is dramatically increasing every year.

Commissioning Impact on the Construction Industry

The growth of commissioning has begun to make changes in the construction industry. As owners have discovered the benefits, the construction industry has come to accept a new player in the traditional building process. As the owner representatives, Commissioning Authorities are becoming involved into the construction process from design through the warranty phase. Architects, Engineers, Construction teams and owner O&M staff have all been affected by the commissioning process. Despite predictions to the contrary, many owners have been very willing to invest in the cost of commissioning.

Recognition of the benefits that can be derived from commissioning in areas such as energy costs, indoor air quality and comfort has resulted in some states requiring commissioning on public projects. The prerequisite of commissioning in the LEED[®] rating system has resulted in commissioning being required on many Federal, State, Municipal as well as private projects seeking LEED certification. There can be little argument that commissioning has caused substantial changes in the construction industry in a relatively short period of time.

Current Trends in Commissioning

As the commissioning industry has grown, there have been numerous “lessons learned” that have resulted in the current trends in the industry:

- Commissioning services are being bought directly by the owner rather than being a part of the construction contract.
- Owners are seeking Commissioning Authorities who are independent or otherwise have little or no conflict of interest in the project.
- Experience has demonstrated that the earlier a Commissioning Authority becomes involved in the project, the more benefits can be derived from the process.
- Building on the benefits of commissioning HVAC and control systems, the trend is toward Total Building Commissioning.

- Many owners have recognized the benefits of commissioning processes to existing buildings as well as new buildings.
- The increased demand for commissioning has led to more organizations developing commissioning standards, training courses and certification programs.

The National Institute of Building Sciences, in conjunction with ASHRAE and other construction industry organizations, is developing a Total Building Commissioning Standard. ASHRAE was chosen to write Guideline 0, which will serve as a guide to the basic commissioning process, as well as technical standard on commissioning HVAC systems while other organizations are writing the technical standards for commissioning their specialty area. One of the directions of Guideline 0 is to emphasize the importance of documenting the Owner's Project Requirements (OPR). The authors believe this is a very important step toward the evolution of the commissioning industry.

Commissioning on Purpose

Both of the authors have spent many years in the commissioning industry and in the HVAC industry as well. What we see as the next evolutionary step of the commissioning industry is what we call Commissioning on Purpose. This is not to suggest that anyone today does Commissioning by Accident, but we believe that the commissioning process, and the entire building industry for that matter, would benefit from centering the entire building process on the *purpose* of the building. As simple and logical as that may seem, we do not believe that is where the building industry is centered today.

As previously stated, ASHRAE Guideline 0 takes an important step in documenting the Owner's Project Requirements (OPR). To be able to do this means the Commissioning Authority (CA) must be involved during the pre-design phase. One suggested method of arriving at the OPR is by conducting a workshop including owner, Architect and Engineer representatives. Owner representatives might include members of the facility staff, occupant representatives and operating and maintenance staff representatives. While this is a very worthwhile and recommended process, the first thing that needs to be defined is the purpose of the building.

The dictionary presents the following definitions for *purpose*:

1. Reason for existence: the reason for which something exists or for which it has been done or made.
2. Desired effect: the goal or expected outcome of something.
3. Determination: the desire or the resolve necessary to accomplish a goal.

For many of us, one of our greatest desires is to find our purpose in life. This can be seen by the extraordinary sales of the recent book *The Purpose Driven Life* by Rick Warren (over 10,000,000 copies sold to date). People who understand their purpose in life and live their life *centered on their purpose* are likely to have a happier, more meaningful and successful existence. Just as we believe that every person has a purpose, so should every building. The more centered that a building is on supporting its purpose throughout its life span, the more benefit that building will

provide. In other words, every building should have a reason for existence and all decisions regarding the planning, design, construction and operations of that building should be centered on that purpose. Furthermore, the purpose of the Commissioning Authority should be to help the owner clearly define and document the building purpose and carry the banner of that purpose with determination to assure the final building has the desired effect of being centered on its purpose.

If we aren't centering our building process on purpose today, then where are we centering the processes? How would the construction of a purpose centered building be different from what is being built today? What type of effects would this have on the ways owners fund buildings, how Architects and Engineers design buildings, how construction teams build buildings and how the buildings are operated and maintained? In our opinion, construction projects that are centered on purpose will require a new way of thinking and decision making regarding the project.

Where We Are Currently Centered?

The Building Commissioning Association (BCA) is an organization that began as an association in the Northwest section of the country to serve the needs of both Commissioning Providers and Commissioning Users. The organization was in large part formed in response to numerous requests at NCBC meetings for a professional organization that focused on the needs of the commissioning industry. A group from the northwest began the organization and received funding by the Northwest Energy Efficiency Alliance. Their definition of commissioning is: "The basic purpose of building commissioning is to provide documented confirmation that building systems function in compliance with criteria set forth in the Project Documents to satisfy the owner's operational needs." (2) In this definition, commissioning is centered on compliance with criteria set forth in the Project Documents to satisfy the owner's operational needs. In most cases, the only Project Documents are the plans and specifications. Occasionally you may get a Design Intent (the Owner's Project Requirements) and a Basis of Design. The Basis of Design document is the design team's response to the Owner's Project Requirements with calculations and information that describe the following:

- System approaches considered for the project;
- A written description of the assumptions used by the design team;
- The Codes used in the building design;
- Backup information such as heating and cooling loads; and
- A written description of how the systems were intended to be operated.

ASHRAE's proposed Guideline 0 describes the Commissioning Process as "a quality-focused process for enhancing the delivery of a project. The process focuses on verifying and documenting that the facility and all of its systems and assemblies are planned, designed, installed, tested, operated, and maintained to meet the Owner's Project Requirements". It then defines the Owner's Project Requirements as "a written document that details the functional requirements of a project and the expectations of how it will be used and operated. This includes project and design goals, measurable performance criteria, budgets, schedules, success criteria, and supporting information."

The proposed ASHRAE document appears to make an evolutionary step in forwarding the importance of the Owner's Project Requirements. The document suggests that the Owner's Project Requirements should be prepared with the following hierarchy:

- a. Objectives and functional requirements of the facility
- b. System and assembly requirements.

The guideline goes on to suggest considerations that should be included in the objectives and functional requirements of the project. The ASHRAE Guideline is certainly a step in the right direction. While all the information suggested in this guideline should be included in an OPR document, the lacking element is a clear definition of the building's purpose which should come first.

Even if you assume that some entity has developed an OPR document and that the building is designed within those parameters, the proposed suggests that the Owners Project Requirements be referenced in the bidding documents as "information available to bidders". It goes on to state "Do not identify the Owner's Project Requirements as 'Contract Requirements' to avoid the possibility of conflicting contract requirements." Therefore, at best case a bidder may decide to look at the Owner's Project Requirements but is only contractually obligated to comply with the Plans and Specifications. If this is a competitive bidding situation, the contractors focus must be on only including the minimum costs required to meet what he believes will be the enforced minimum contractual project requirements. Also, the CA is then limited in scope by the contractual limits of the contractor. In effect, the construction contract becomes the thing on which the project is centered. Contractors have little or no motivation under current contracts to discuss the Owner's Project Requirements with the owner, design team, O&M staff and Commissioning Authority, much less suggest ways to complement the project by contributing ideas that would help the project become more centered on the Owner's Project Requirements.

There is no doubt that if ASHRAE Guideline 0 and the NIBS Total Building Commissioning Guidelines are accepted by owners, a major change will be required in how owners begin the process to erect or modify buildings. It would mean that CAs would become involved in projects much earlier, perhaps even before the design team, and the CA would have a more active role in the entire building process. This would also increase the likelihood that more information would be available to the future operating and maintenance staff, and that the OPR and BOD documents are included in both the Systems Manual as well as the O&M training. Additionally, the standards for quality control and inspection during the construction phase should be raised to a higher level. However, beyond that, there is little that would probably change in the construction process centering on a contract based upon the Plans and Specifications. In the end, it all revolves around the issue of money – what is the owner willing to pay and what is the contractor willing to provide in exchange for that money?

In a paper entitled "Contracts Verses Covenants in Integrated Project Delivery Systems", the authors suggest that it is time we begin looking at Collaborative Covenants where all parties share the same project goals and are equal participants to assure that project goals are met. As

equal partners, the covenants would equitably distribute all risks and rewards on the project. The more closely all parties collaborate, the higher the chance of ending up with a building that can serve the building's purpose and provide fair and equitable profits for all parties in the covenant. (3)

What's the Difference Between an Owner's Project Requirements and Purpose?

The Lawrence Berkley Labs, in collaboration with Karl Stum, P.E., have published an extensive Design Intent Tool (4). In the User's Guide for this tool the Design Intent (or OPR) is described as "a framework in which design solutions can be described in terms of Objectives (overall goals), with subordinate Strategies (specific means of achieving the goals), and Metrics (measurable performance targets)." (5). In an article that further defines Design Intent (OPR) and other components of the Design Record, Mr. Stum states "Owner's project requirements consist of the owner's requirements or objectives in specific or general terms and include quantitative metrics or criteria for each objective." (6) Mr. Stum goes on to state "In summary, OPR statements consist of the needs, goals and special directives of the owner." The following is a list that captures the types of content that make up the qualitative OPR statements.

- Functional requirements, needs and goals for building use, operation, maintenance renovation and expansion, including user requirements
- Occupancy schedules and space plan requirements
- Sustainability, reliability, durability and aesthetic goals
- Quality of materials and construction
- Warranty, project documentation and training requirements
- Goals relative to the process and outcome of the design and construction (budgets, schedules, change orders, safety, aesthetics, impacts to adjacent or integral occupied spaces and tenants)
- General commissioning scope and objectives
- General statements about codes and standards to be followed
- Limitations likely to impact design decisions
- Specific features, systems, assemblies or brands the owner requires (these will be repeated in the design narrative)
- Instructions to the designers and commissioning team on types of design tools, aides and analytical and verification tools and methods expected to be used."

The authors agree with Mr. Stum's assessment of the need for this document and what should be included in the OPR document. We also agree that this document should be developed in a collaborative workshop comprised of the owner's representatives, users/occupants of the proposed facility, designers, O&M staff, the Commissioning Authority and construction specialists. The OPR development can provide clear goals, objectives, strategies and performance metrics that can be used by both the design team and the O&M staff for guidance. If a contractor is involved with the project in a collaborative nature, this can also be a valuable document to the construction process.

So how does a well developed OPR differ from purpose? We can summarize the OPR as a roadmap to help you get to where you want to go. Purpose defines the destination for the trip. It is the *raison d'être* of the facility. Purpose should describe *why* the building is being built.

When we build a facility we are using precious resources to build it and to operate and maintain it. In order to take responsibility for the resources that go into the construction and operation of the facility we should first be sure there is a well defined purpose that will justify project resource expenditures. We should also make every attempt to minimize the effect on the environment and be good stewards of the world's resources. If a proposed facility has a well defined purpose one can then come up with core principals that should be used to evaluate every decision from the development of the OPR, to the design, construction, and operation and maintenance.

As an example, if a University decided they needed a new Vivarium to support their research programs into Chemical, Biological and Radiological (CBR) defenses and antidotes, they should first define what purpose(s) the facility needs to serve. The purpose statement might be as simple as "The facility should be designed to provide a safe and controlled environment for laboratory research animals that will be used in research programs to protect people all over the world from terrorist attacks using CBR weapons of mass destruction. The facility should support the needs of the research programs by assuring that animal containment spaces eliminate environmental conditions as a bias to the research as well as prevent the cross contamination of disease from other animals and from human contact. The facility should use systems that provide a high degree of reliability and minimize operating and maintenance costs." This is an over simplification, but is at least a good starting point.

From this purpose statement, the University could proceed with developing the technical aspects and budgetary limitations of the project through the OPR workshop process. The workshop would answer questions such as: How much space will be required? What are the temperature and humidity limitations? What are the pressurization requirements? What are the allowable tolerances of the environmental control systems? All of the parameters required to fulfill the purpose statement should be asked and answered in the OPR and the Basis of Design. This should include specific objectives, strategies and performance metrics. However, it is important that all the questions and answers center on the stated purpose of the facility and all decisions regarding facility design, construction and operation and maintenance should support the stated purpose. When you consider that the cost of just one transgenic mouse may be \$10,000, it makes sense that you need to have a specific purpose and well defined building parameters. At the core of the purpose, it's all about the mouse – or more specifically, the contribution the mouse (and other research animals) plays in the successful outcome of the CBR research.

There is incredible power in purpose. If we look back through history, it is individuals and small groups of people who are centered on the purpose of bettering the world in some field that have resulted in significant change. Consider the changes to our world from people like Jesus of Nazareth, Gandhi, Madame Currie, Jonas Salk, the signers of the Declaration of Independence, Thomas Edison and Dr. Martin Luther King. All of these people, and many more, centered on a purpose and the work of their lives has changed history. All true evolution of humanity has

come from people who were willing to center on a purpose and dedicate their lives to achieving that purpose. We are not suggesting that any Commissioning Provider needs to sacrifice their life in the achievement of the necessary evolution that needs to take place in the buildings industry, but we do believe that the determined effort of our industry to become the agents of change have the power to bring about change.

Purpose should be developed and documented before the OPR process. All building systems and components should be judged in light of their ability to support and serve the building's purpose. The design should question the applicability and worth of every design feature based upon how it centers on purpose.

To summarize the difference between the OPR and the facility's purpose is that the purpose should describe *why* the facility is being built and the OPR should provide the critical information regarding how the facility is to be designed, built and maintained. The important thing to remember is that the purpose should always be the starting point and the guiding principles for the project should develop from the purpose.

Begin with the End in Mind

If a major change in the way we think about and construct buildings is to occur, it has to begin at the beginning with the owner. The owner wants to erect a facility to serve a definable purpose and will be supplying the funds for the entire process from pre-design through building operations, with the exception of buildings that are not owner-occupied. The owner is the one with the most influence to drive change in the industry and if a change is to be made, it will require a proactive approach from owners.

Stephen Covey summed up this concept of "begin with the end in mind" in his best seller book *Seven Habits of Highly Effective People*. (7) It is such a simple concept yet one which we lose sight of all too often. Before any facility is ever built, the owner needs to have a clear understanding of the purpose the facility serves and what requirements will support that purpose, both in the short-term completion of construction and the long-term operations and maintenance of that facility.

Once the purpose is clearly defined, documented and understood, all decisions regarding the construction of that facility should be centered to support the purpose of the building. That means that every dollar spent on that facility should be weighed against the value it brings to the stated purpose. Unfortunately, too many monetary decisions today are based more upon aesthetics or making an architectural statement rather than functionality. Some buildings seem to be centered on the purpose of being a monument to those who built the facility more than the operational functionality that supports the planned activities within the facility.

This does not mean that buildings should be constructed without creativity or in a strictly utilitarian fashion. For instance, if we say the principle purpose of a hospital is to heal patients in a safe, comfortable and secure environment where no further harm will be done to the patient, then assuring that the HVAC systems provide conditions to keep the patients and staff

comfortable while controlling the cross-contamination of infectious diseases and infections, would become a primary focus. Instead of just complying with minimum code required systems, a hospital centered on purpose would be more concerned about what extra equipment and operating protocols could be used to improve patient care than about expensive architectural features. However, making provisions for areas for visiting family and friends also supports the purpose since the presence of visitors can be an important contributing factor in a patient's recovery process.

First Cost vs. Life Cycle Cost

A good purpose statement should include goals for the successful long-term operation and maintenance of the facility. If the facility design and commissioning programs are just centered on the goal of delivering a better building to the owner and only includes tasks such as more O&M staff training as a secondary goal, then the owner will likely receive a better building, but may or may not end up with a program that provides continuing benefits throughout the life of the building. On the other hand, if your primary goal for the design and commissioning is to ensure the long-term success of the facility, the persistent benefits of commissioning could be greatly increased.

Studies conducted by the Building Owner's Management Association (BOMA), suggest that the first cost of a building only represents about 20% of the life cycle cost of that building. The other 80% consists of the cost to operate and maintain the building and does not include the cost of the people and activities in the building. When the overall costs are considered, the first cost of a building is only a minor component of the true life cycle costs. This means that the cost to operate and maintain the facility, and the costs represented by people and activities in the building, far outweighs the investment in first cost. Therefore, any program that concentrates on controlling the long-term operational costs will have a dramatic affect on the building owner and occupants while improving the economic return on investment for the commissioning program.

While the benefits in commissioning for long-term operational needs may seem intuitively obvious, most commissioning programs today still focus more on the shorter term goal of delivering a better building rather than the longer term goals of operation and maintenance of the building. Unfortunately, this is consistent with one of the core problems that make commissioning a good idea in the first place – the fact that building owners are more concerned with the first cost of construction than the life cycle costs of the facility and therefore base the project on lowest initial cost. Designing and building a facility based solely on low cost typically results in a building that is besieged with problems unless an independent quality process, such as commissioning, is integrated into the process. While it is true that a commissioning program that focuses on the long-term operations of the facility may require more of an initial investment on the owner's part, this investment is small compared to the potential benefits of the program.

Another problem is that owners who want to invest in commissioning for long-term operations and maintenance may have funding and/or organizational problems that makes it difficult for them to commit to the initial investment. For many organizations the funding for capital

investments and for operations and maintenance comes from different funding sources. Internal organization and accounting may prove to be a major obstacle in securing additional funds for commissioning that increase the capital investment when the major benefactor of the investment will be operations and maintenance. While this is a real problem in some organizations, we must learn to overcome these issues in order to achieve more successful buildings that are centered on purpose.

Commissioning Providers as Change Agents

The addition of commissioning processes into the design and construction of buildings has resulted in changes regarding the design, installation and operations and maintenance of buildings. The authors believe that our industry is in the best position to lead the evolution in the construction industry to focus on the purpose of a building. We are the entity that is most involved in a building from pre-design through post occupancy. The concept of commissioning providers leading discussions to define the Owner's Project Requirements is a good step toward improving the building process. However, if we can work with owners and precede the Owner's Project Requirements by helping them define and document the purpose of the building and then carry the banner of purpose throughout the entire construction process and into the operation and maintenance of the building, we can make a significant affect on the way the building serves its purpose.

Let's Be Nice to Mother Nature

As we consider the purpose of a building, it is increasingly important as a society to include the preservation of natural resources. A building that can operate more efficiently and for a longer period of time helps conserve not only precious natural resources but capital expenditures as well. The trend for building codes is to require more efficient buildings and consideration of all the resources it takes to construct and maintain these facilities. Today the US Green Building Council LEED standard is voluntary. In the not too distant future it is likely that voluntary guidelines for "greener" buildings will become mandated by building codes. By becoming responsible stewards of all our resources today, we are creating a better environment for generations to come.

Threats to the Future of Commissioning

Commissioning on Purpose is not only about defining the purpose of a building, but also includes being purposeful as an industry and as individual providers. To be purposeful as an industry, we have to recognize threats to our industry and be proactive in diffusing those threats before they have a negative affect. While the future of building commissioning appears to be very bright, there are still many obstacles we must overcome and pitfalls experienced by other growth industries that need to be avoided. This industry talks a lot about "lessons learned," and we need to be sure that we learn the lessons that other industries have paid a heavy price for in the past.

Success Can Breed Failure

During the early years of the commissioning industry, there were only a few firms that offered commissioning as an independent service. Most of these firms employed individuals with many years of experience in the HVAC industry that had both the training and the understanding of systems required to provide successful commissioning services. Many of these firms were instrumental in laying the foundation for the development of the commissioning industry. Today, there is reason to be concerned about the future of the industry. The industry's own successes in developing the demand for these services could endanger the future of our industry.

The problem we are facing is not uncommon to other segments of the building services industry. The problem is that the demand for commissioning services is exceeding the supply of competent people and firms to provide quality commissioning services. The commissioning requirements for LEED Certification and State and Federal mandates for commissioning of facilities are both a blessing and a curse. The commissioning industry has not kept pace with programs to train enough competent people to work in the industry, and there is simply no substitute for field experience required for a good commissioning specialist.

Like the TAB and Energy Management industries that preceded formal commissioning services, our industry could be facing a devaluation of the perception of commissioning benefits by owners. The combination of increased demand and the recent economic down-turn has created an increased interest in providing commissioning services. Commissioning is in danger of becoming a commodity that is awarded to the lowest price supplier.

The authors believe it is important for our industry to raise the bar of performance by providing in-depth training and apprenticeship programs as well as Certification programs that will instill confidence in owners who are looking for commissioning firms and individuals that are capable of adding true and lasting value to any building program. Certification programs need to expand to include not only knowledge gained through taking a course on the subject matter but require demonstration of the ability to successfully apply that knowledge.

Summary

In its relatively short history, commissioning has gone from being a little known service that was ill defined and limited in scope to a well defined process that has expanded in scope to include pre-design and post occupancy services. Commissioning is well on its way to becoming "business as usual". The trend in the industry is toward incorporating commissioning earlier in the building program and working with owners and design professionals to define and document the owner's project requirements as well as the basis of design.

The authors believe the next evolutionary step for the entire building process is centering on the purpose of the building. The purpose needs to be well defined and documented as the first step in a building program. This purpose should take into consideration the long-term operation and maintenance of the facility as well as mandate the systems selected. All decisions and every

dollar spent on the project should support the purpose of the building. This approach will require a new way of thinking about how we design, build, operate and maintain buildings, but the benefits derived from this approach could be dramatic. Commissioning providers could and should be the agents of change for this evolution. We don't have the answers to all of the questions regarding ways the industry can be changed. However, it is a subject that industry leaders should discuss. The authors invite comments and discussion from owners, commissioning providers and other leaders in the building industry.

References

1. Proceedings of the 5th National Conference on Building Commissioning, Portland Energy Conservation, Inc.; www.peci.org
2. Building Commissioning Association web-site; www.bcx.org
3. Contract Verses Covenants in Integrated Project Delivery Systems, David W. Martin and Anthony D. Songer
4. Design Intent Tool, Lawrence Berkeley Labs, <http://ateam.lbl.gov/DesignIntent/>
5. Design Intent Users Guide, Lawrence Berkley Labs
<http://ateam.lbl.gov/DesignIntent/UGhtm/WebHomePage.htm>
6. Design Intent and Basis of Design Clarification of Terms, Structure and Use, Karl Stum, P.E., *ASHRAE Transactions* 2002, V. 108, Pt. 2
7. *The 7 Habits of Highly Effective People: Powerful Lessons in Personal Change*, Stephen R. Covey