

The Owner's Project Requirements and where it Fits In the Design Process

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Synopsis

The Owner's Project Requirements (OPR) provides the foundation for successful delivery of a project. It is defined by the owner and users who deliver their mission through the completed project. As defined in ASHRAE/NIBS Guideline 0 – 2005 *The Commissioning Process*, "The Owner's Project Requirements (OPR) form the basis for evaluating all activities and products during pre-design, design, construction, acceptance, and operational decisions are made." This paper focuses on:

- The differences between an architectural program and OPR
- Why an architectural program typically does not meet the requirements for the commissioning process
- The interaction between the OPR and architectural programming
- The timing for developing the OPR

About the Author

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Architectural Program vs. Owner's Project Requirements

“Architectural programming began when architecture began. Structures have always been based on programs: decisions were made; something was designed, built, and occupied” wrote Edith Cherry, FAIA, ASLA and John Petronis, AIA, AICP. Many architects believe that the architectural program is the Owner's Project Requirements which is why there is confusion in the building industry. Careful examination of the key elements of how to develop an architectural program defined in the book “*Problem Seeking*”, An Architectural Programming Primer by W.M. Peña. New York, NY: John Wiley & Sons, Inc., 2001 helps with identifying the differences between what is provided through architectural programming and the Owner's Project Requirements as defined in Guideline 0-2005.

Problem Seeking breaks architectural programming down into five steps:

1. Establish goals (search for pertinent information) – What does the client want to achieve and why?
2. Collect and analyze facts (search for pertinent information) – What do we know? What is given?
3. Uncover and test concepts (search for pertinent information) – How does the client want to achieve their goals?
4. Determine needs (feasibility test)-How much money and space? What level of quality?
5. State the problem (distilling what has been found) –What are significant conditions affecting the design of the building? What are general directions the design should take?

Conducting architectural programming is very important to developing a project as is documenting the owner's project requirements. In comparing Table 1, which lists the elements that should be included in the architectural program, and Table 2 which lists the elements that should be included in the OPR, as defined by Guideline 0 - 2005, notice the similarity in the five steps of programming and the elements of the OPR. Both the five steps of architectural programming and the elements of the OPR use the term “Establish Goals” with different connotations, which leads to part of the confusion about the role of each document. However, the OPR establishes high level goals, versus determining the details on achieving these goals, which is the role of the programming document, design reports (including the basis of design (BoD)), and construction documents.

The similarity of words used in both architectural programming and the OPR result in significant industry confusion and difficulty for design professionals to understand. In reality, when the OPR and CxP plan are effectively and timely developed, the work of those developing the programming documents and construction documents are substantially improved. It should always be noted that the CxP is strictly formulizing what has been noted in prior projects as best practice to achieve the owner's requirements. It does not imply it is the only means, but a proven means towards delivering successful buildings and facilities. This continues to mean that we need a quality and accurate architectural programming document to guide the design team in achieving the goals of the commissioning process and the desired OPR.

To illustrate both the reasons for this confusion and the differences between the architectural program and the Owner's Project Requirements examine the underlined words/phrases contained in both Table 1 and Table 2. Table 1 list in the Function row and Facts column "Physically challenged" which in Table 2 could match with "Accessibility requirements." Both terms physically challenged and accessibility requirements could mean the same. To provide more clarity as to the main differences compare the following:

In Table 1 "Physically challenged" is in this author's opinion referring to visitors and occupants who are disabled and as required by the Americans with Disability Act (ADA), are to have specific features and amenities that allow physically challenged individuals' access without assistance.

In Table 2 "Accessibility requirements" has added emphasis in the OPR which goes beyond physically challenged individuals to include access by able body individuals who install and remove office furniture and equipment, service and conduct repairs of building systems and assemblies, etc. Both the ADA and maintainability/serviceability requirements could be contained in the OPR. The OPR characteristically focuses on identifying the operational and functional objectives and criteria that can have a significant impact on how the project is designed and operated, and is typically not part of the architectural program.

A second example from Table 1 is "prime activities", under Function/Goals, which could be construed as a way to define "User requirements." Prime activities in the architectural programming document would typically define the task, i.e. laboratory testing, but not generally the specific requirements associated with the task such as DNA testing. The typical architectural program document would include the space for associated laboratory equipment and personnel but not the allowable variation in room temperature during the test/analysis period. The mechanical engineer will usually determined the heating and cooling load and write a general sequence of operation about how the HVAC system will control room temperature without knowing the one of the most important requirement of having a valid DNA test the limit of temperature change in the test area.

Other distinct differences between architectural programming and the commissioning OPR is the process of how specific project elements blend into a project. Table 1 lists sustainability under economic goals. While sustainability has economic benefits delivering a sustainable project requires direct correlation between occupant activities in delivering their mission, and form and function of a project. The interaction among sustainable project goals affects every aspect of a project. Failure to fully understand how the facility will operate and the specific activities therein can send a design team in the wrong direction; a common error made by many project teams seeking a third party certification of sustainable development. It seems clear that one of these documents, OPR and architectural program (AP) should be developed first. The logical option is the OPR. This prevents AP developments that cannot easily be changed or modified if the OPR is developed after the AP.

A well prepared OPR should give the details necessary to evaluate the impact of sustainable development principles upon user's and the missions they perform in the completed project. Many of the projects which fail to meet third party certification for sustainability are the result of not including the owner's end goal of sustainable, often referred to as green, requirements into

the architectural definition of the design problem the design solution is to address. For example, development of a military headquarters and using native and adaptive vegetation typically do not go together because military facilities do not allow vegetation which could obstruct line of sight or hide terrorist activity. Envisioning, designing, constructing, and operating projects especially sustainable, healthy, high performance buildings requires design solutions which fully encompass both the requirements of not just the architectural program but also the commissioning process OPR needed to fully define the problem to be solved by the designers.

In W.M. Peña's book he describes architectural programming as a heuristic process and not an algorithm. Wikipedia defines "Heuristic (/hjuˈrɪs.tɪk/) is an adjective for methods that help in problem solving, in turn leading to learning and discovery. These methods in most cases employ experimentation and trial-and-error techniques. A heuristic method is particularly used to rapidly come to a solution that is reasonably close to the best possible answer, or "optimal solution." Heuristics are "rules of thumb," educated guesses, intuitive judgments or simply common sense. In more precise terms, heuristics stand for strategies using readily accessible, though loosely applicable, information to control problem solving in human beings and machines.

Table 1 – Architectural Program Elements

	Goals	Facts	Concepts	Needs	Problem
Function	Mission Maximum number Individual identity Interaction/privacy Hierarchy of values <u>Prime activities</u> Security Progression Segregation Encounters Transportation/parking Efficiency Priority of relationships	Statistical data Area parameters Personal forecast User characteristics Community Characteristics Organizational structure Value of potential loss Time-motion study Traffic analysis Behavioral patterns Space adequacy Type/intensity <u>Physically challenged guidelines</u>	Service grouping People grouping Activity grouping Priority Hierarchy Security controls Sequential flow Separated flow Mixed flow Functional relationships Communications	Area requirements By organization By space type By time By time Parking requirements outdoor space requirements Functional alternatives	Unique and important Performance requirements that will shape building design
Form	Bias of site elements Environmental response Efficient land use Community relations Community involvement Physical comfort Life Safety Social/psychological environment Individuality Wayfinding Projected image Client expectations	Site analysis Soil analysis FAR and GAC Climate analysis Code survey Surroundings Psychological implications Point of reference/entry Cost/sf Building or layout efficiency Equipment costs Area per unit	Enhancements Special foundations Density Environmental controls Safety Neighbors Home base/officering concepts On-premise: fixed, free, group address. Off-premise: satellite, telecommuting, virtual office Orientation Accessibility Character Quality control	Site development Environmental influences on cost Building cost/sf Building overall efficiency factor	Major form considerations that will affect building design
Economy	Extent of funds Cost effectiveness Maximum return Return on investment Minimizing of operating costs Maintenance and operating costs Reduction of life cycle costs <u>Sustainability</u>	Cost parameters Maximum budget Time-use factors Market Analysis Energy source costs Activities and climate factors Economic data LEED rating system	Cost control Efficient allocations Multifunction/versatility Merchandising Energy conservation Cost reduction Recycling	Budget estimate analysis Balance budget Cash flow analysis Energy budget Operating costs Green building rating Life cycle costs	Attitude toward the initial budget and its influence on the fabric and geometry of the building
Time	Historic preservation Static/dynamic activities Change Growth Occupant date Availability of funds	Significance Space parameters Activities Projections Durations Escalation factors	Adaptability Tolerance Convertibility Linear/concurrent scheduling Phasing	Escalation Time schedule Time/cost schedule	Implications of change and growth on long-range performance

Table 2 Owner's Project Requirements

	Goals/Focus	Facts/Information	Concepts	Needs
Function	<p>Owner directives</p> <p><u>User requirements</u></p> <p>Energy efficiency</p> <p>Security requirements</p> <p>Health, hygiene, and indoor environment requirements</p> <p>Acoustical</p> <p>Vibration requirements</p> <p>Aesthetics requirements</p> <p>Sustainability</p> <p>Maintainability</p> <p>Functional and operable for the life of the building</p> <p>Flexibility to future use changes</p> <p>Constructability, testability or confirmation</p>	<p><u>Accessibility requirements</u> Occupancy requirements and schedules</p> <p>Restrictions and limitations</p> <p>Communication requirements</p> <p>Life cycle cost criteria</p>	<p>Developing criteria and high level owner and users requirements to evaluate the:</p> <ol style="list-style-type: none"> 1. each architectural programming submittal 2. each design submittal 3. various construction activities <p>achieving requirements during occupancy</p>	<p>Systems integration requirements, especially across disciplines</p> <p>Benchmarking requirements</p>
Form	<p>Owner directives</p> <p>Community requirements</p> <p>Environmental</p> <p>Security</p> <p>Energy Efficiency</p> <p>Health</p> <p>Vibration requirements</p> <p>Seismic requirements</p> <p>Aesthetics requirements Sustainability</p>	<p>A list of high level needs of the owner, users, and occupants of the facility</p> <p>A general narrative of the OPR and it's relationship to the commissioning process</p> <p>Restrictions and limitations</p> <p>Applicable codes and standards (when they apply to the specific success of a specific OPR)</p>	<p>Achieving a facility that will service the operations and occupancy needs at the lowest life cost and highest "productivity"</p> <p>Economical adaptability for future facility changes and expansion</p> <p>Use of commissioning process tools to reduce the cost of programming, design, construction and operations</p>	
Economy	<p>Owner directives</p> <p>Project budget</p> <p>Risk reduction</p> <p>Sustainability</p> <p>Operational efficiency</p> <p>Constructability requirements</p> <p>Quality requirements for materials and construction</p> <p>Operation and maintenance criteria for the facility that reflect the Owner's expectations and capabilities and the realities of the facility type</p> <p>Project documentation requirements, including format for submittals, training materials, reports, and the Systems Manual. Consideration should be given to use of electronic format documents and records where appropriate</p>	<p>Commissioning budget</p> <p>Restrictions and limitations</p> <p>Equipment and system maintainability expectations, including limitations of operating and maintenance personnel</p> <p>Training requirements for Owner's personnel</p>	<p>Commissioning scope</p> <p>Allowable tolerance in facility system operations</p>	<p>Life cycle costs Benchmarking requirements</p> <p>Warranty requirements.</p> <p>Final Report that reflects the actual OPR as constructed</p>
Time	Owner directives		CxP Plan	

The Heuristic Model (or commonly referred to as the gut-level approach) is a simplified method of decision making that put emphasis on internal personality attributes of the decision maker. Mr. Pena further states, “As such, even good programming cannot guarantee finding the right problem, but it can reduce the amount of guesswork.” This highlights perhaps the greatest difference between the OPR and an architectural program: who makes the decisions that guide the design and construction! For many it is the designer who makes the decisions using the heuristic process instead of involving the owner and users through the OPR in the commissioning process.

Table 2 Owner’s Project Requirements show this author’s interpretation of how the information required for development of the OPR would fit into the structure outlined in “*Problem Seeking*.” Please note many of the topics (Owner’s directives, sustainability, energy efficiency, etc.) in each of the tables rows topics are listed more than once. The reason for this duplication is to illustrate the great extent that these topics blend what information the designer must consider when defining the problem for which the projects design must provide a solution. Providing the in-depth criteria and objectives which the design, construction, operation of the project should meet in order to facilitate achieving the owner’s and the project occupants needs and the mission that will be delivered, brings the project’s owner and users back into the decision process; a key element of the commissioning process.

Collection and Analysis of Facts

Examination of topics listed in Table 1 under column “Facts” illustrates the information the architectural program should collect. Note the information needed by the architectural program listed in the “Facts” column of Table 1 are primarily related to defining project sq. ft. needs, adjacencies, circulation, cost, and structural pre-design test results. The difference between architectural program and OPR is further clarified by examining the different information in Table 2 – information required by ASHRAE Guideline 0. Note in the “Facts” column of Table 2 the OPR process focus is functional requirements, equipment maintenance, operator skill level, training requirements, restrictions and limitations. The typical architectural programming does not address how the building will be operated, specific operational limits or requirements of the occupant processes used in delivery of their mission, etc.

In addition to the type of information collected for an OPR there are also significant differences of how information is collected. Information collected for an OPR is typically obtained through the use of the nominal group technique process which encourages and facilitates full participation by administrators, users, operational personnel, designers, etc. This allows project stakeholders a quick way to provide input, an opportunity to discuss their perspective, and impact on prioritization of what they think is important. When the results of tabulated common themes, needs, objective, and criteria are identified and prioritized which results in clearly identifying what the stakeholders expect the design team to provide in order to meet their defined criteria.

Most programming efforts limit who can participate, often excluding the actual users of the facility. While the reasons users are typically excluded vary a common theme for this exclusion is concern that allowing the users to participate will drive project cost up. Many owners’ fear that users will demand more square footage resulting in politically charged negotiations between users. Developing an OPR using the nominal group technique almost completely erases the political dilemmas associated with defining square footage requirements. With the OPR focus of what types of spaces are needed as functional requirements the OPR provides valuable information to the architectural programmers and designers.

The OPR does not replace the need for Architectural Programming; it does identify the owner's perspective on what is required including areas/space types, durability, energy efficiency, maintainability, and other goals including sustainability, general aesthetic, etc., which are required. The OPR does not address the basic sq. ft. requirements, groupings of people relative to their interaction, the hierarchy of office selection and sizing, etc. The most successful OPRs gather information from the occupants, operations and maintenance, service vendors, management, and designers allowing everyone input and discussion that promotes understanding. Each participant has a vote in defining the priorities and the overall consensus of the group establishes the hierarchy of the project goals.

Interaction between Owner's Project Requirements and Architectural Program

The Owner's project requirements (OPR) detail the high level functional requirements of a project and the expectations of how it will be used, achieve user needs, and operated for the life of the building. Some OPR may have little or no relationship to the AP or design. For example if the following is an OPR, "desire re-training during after 5-months of occupancy on the Jit-Jit conveyor systems," this may not be specifically noted as a programming requirement for the design team, and it may not be included in the construction documents. The Commissioning Team uses the OPR to verify that the project is achieving these defined objectives and criteria throughout the delivery of the project and in post occupancy to assess if the team is meeting the owner's requirements. This includes the designers, contractors, and operators of the building or facility.

As circumstances change, the OPR will change throughout the life of the building. This is another criterion that is not typically included in the programming documents. The AP documents usually have a life that ends when the development of construction documents begins. Whereas, the OPR and CxP Plan will continue to evolve and change during the life of the building, including development of construction documents, construction, and occupancy.

To be of the greatest benefit and value to the Owner and their team the OPR must be developed before the design team begins pre-design activities such as Architectural Programming. The value of developing the OPR first is that the end goals are defined at the beginning of the project placing the owner and team on a strong foundation for success. Knowing what the occupants need to successfully deliver their mission before programming saves time, effort, and reduces cost. This is especially true when designing a high performance project utilizing sustainable development principles captured in many of the green building rating systems.

The OPR for such high performance projects change the typical chasing of points/credits and lays out a sound approach that blends operational and user needs with applicable sustainable development principles for optimal results in performance and user satisfaction – the real test of sustainability. The ability to continuously evaluate how to optimize the high performance building throughout all phases of the project delivery with the CxP Team, while developing enhanced OPR is a much smoother process that recalling the AP team during design, construction, and occupancy, assuming they were a different team members than the design team.

Timing for developing OPR

The initial OPR should be developed at project inception and prior to beginning the architectural program. In reality, these frequently are developed at the same time. However, the OPR development is a much shorter process and can be used as though it was developed prior to the development of the AP. The OPR will provide

the first level of information on the project goals for developing the architectural program. It further provides a means for the owner and the commissioning team to evaluate the various reviews of the architectural program by the owner, CxP Team leaders, and users of the facility, including the engineering, operations, and maintenance staff or service contractors.

As the architectural program evolves there will be updates of the OPR to match the enhanced information developed by those developing the architectural program. The commissioning team is usually especially interested in the details in the programming document that will direct and guide the design team in developing construction documents that will allow the OPR and the commissioning team activities to be economically and successfully achieved during both construction and for the life of the building. The maximum benefits are achieved from the CxP when the initial OPR and CxP Plan are developed prior to beginning architectural programming. This allows the maximum input at the lowest cost and prevents redoing drafts of the programming documentation.

For owner's that are continuously using the CxP for delivery of new and existing facilities, this timing is easy to achieve. It should further be noted that frequently the owner will have selected the teams, firms, or organizations that will do the AP and the design, and sometimes selected contractors or specialist (controls, acoustic, sustainability, TAB, etc.). When these are known, they are always part of the CxP Team and will be involved with developing the OPR and CxP Plan. This even enhances the project benefits through "best possible initial OPR."

Summary

Many architects feel threatened that commissioning authorities are developing "Owners Project Requirements" (OPR) and believe that the "Architectural Program" is the OPR. Architectural Programming relies on the gut feeling/expertise of the designer to define the problem the design is to solve typically eliminating the owner and users in the design decision process specifically in the topic areas of detailed functions the occupants need to successfully fulfill their mission.

Understanding the purpose of the OPR, the distinct differences between the commissioning process OPR and the Architectural Program, and the sequence the OPR belongs in the project delivery process can provide significant value to the owner, project team, operators, and occupants in addition to society and the environment. The OPR can lower project soft costs by providing architectural programmers and designers with the owner's high level end goals before start of developing the program or design, providing information typically not collected during the programming and design processes that is essential to delivering a project that meets the functional requirements of the occupants and return on investment of the owner. The primary function of the OPR is the establishment of the end goals that the project design, construction, and operation will be compared to in assessment of project success a function not part of an architectural program. The OPR focuses on the life of the building versus what is required to deliver the functional building on day one.

Developing an OPR generally takes skilled commissioning providers who are:

- Knowledgeable in conducting OPR workshops
- Experienced in design, construction, and operations of facilities
- Excellent communicators, articulate writers that can define goals in concise, salient, easy to read document
- Team advocates and players

Whenever the OPR is developed early and is a living document, it brings benefits to all stakeholders and provides a document for the life of the building, which has been difficult to capture the key elements of the AP document and hold them modification for the life of the building.