Architectural Programming

Architectural programming began when architecture began. Structures have always been based on programs: decisions were made; something was designed, built and occupied. In a way, archaeologists excavate buildings to try to determine their programs.

Today, we define architectural programming as the research and decision-making process that identifies the scope of work to be designed. Synonyms include "facility programming," "functional and operational requirements," and "scoping." In the early 1960s, William Peña, John Focke, and Bill Caudill of Caudill, Rowlett, and Scott (CRS) developed a process for organizing programming efforts. Their work was documented in Problem Seeking, the text that guided many architects and clients who sought to identify the scope of a design problem prior to beginning the design, which is intended to solve the problem. Architectural programming is a team effort that requires close cooperation between architects and their clients. Problem Seeking, put forth a five-step procedure that teams can follow when programming any building or series of buildings, from a small house to a hospital complex. This simple yet comprehensive process encompasses the entire range of factors that influence the design of buildings.

The "whole building" design approach is intended "to create a successful high-performance building." To achieve that goal, we must apply the integrated design approach to the project during the planning and programming phases. People involved in the building design should interact closely throughout the design process. The owner, building occupants, and operation and maintenance personnel should be involved to contribute their understanding of how the building and its systems will work for them once they occupy it. The fundamental challenge of "whole building" design is to understand that all building systems are interdependent.

A Six-Step Process

Many different programming formats incorporate the same essential elements. In all cases, the design programming fits within a larger context of planning efforts which can also be programmed. For design programming for a building, we propose a six-step process as follows:

1. Research the project type
2. Establish goals and objectives
3. Gather relevant information
4. Identify strategies
5. Determine quantitative requirements
6. Summarize the program

1. Research the Project Type

This step is necessary if the programmer is working on a project type for the first time. The programmer should become familiar with some of the following relevant information:

The types of spaces frequently included in the building type,
The space criteria (number of square feet per person or unit) for those spaces,
Typical relationships of spaces for these functions,
Typical ratios of net assignable square footage (NASF—areas that are assigned to a function) to gross square footage (GSF—total area to the outside walls) for this building type,
Typical costs per square foot for this building type,
Typical site requirements for the project type,
Regional issues that might alter the accuracy of the data above in the case of this project, and

Technical, mechanical, electrical, security or other issues unique to the project type.
This information can be obtained from literature on the building type, analysis of plans of existing projects, expert consultants familiar with the building type, and/or cost estimating services.

2. Establish Goals and Objectives
Working with the committee, the programmer solicits and suggests broad goal statements that will guide the remainder of the programming process. Each of the following categories of goals should be addressed:

Organizational Goals: What are the goals of the owners? Where do they see their organization headed? How does this architectural project fit into this broad picture?

Form and Image Goals: What should be the aesthetic and psychological impact of the design? How should it relate to the surroundings? Should its image be similar to or distinct from its neighbors? From other buildings belonging to the owner that are located elsewhere? Are there historic, cultural, and/or context implications?

Function Goals: What major functions will take place in the building? How many people are to be accommodated? How might the building design enhance or impact occupant interactions?

Economic Goals: What is the total project budget? What is the attitude toward initial costs versus long-range operating and maintenance costs? What level of quality is desired (often stated in relation to other existing projects)? What is the attitude toward conservation of resources and sustainability (energy, water, etc.)?

Time Goals: When is the project to be occupied? What types of changes are expected over the next 5, 10, 15, and 20 years?

Management Goals: These goals are not so much an issue of the nature of the project as they are the circumstances of the owner, clients, programmer, or architect. For example, perhaps the schematic design must be completed in time for a legislative request application deadline.

3. Gather Relevant Information
Based upon the goals, the categories of relevant information can be determined and researched. Typical categories include:

Facility users, activities, and schedules: Who is doing what, how many people are doing each activity, and when are they doing it?

What equipment is necessary for activities to function properly? What is the size of the equipment?

What aspects of the project need to be projected into the future? What is the history of growth of each aspect that requires projection?

What are the space criteria (square feet per person or unit) for the functions to take place?

What other design criteria may affect architectural programming: access to daylight, acoustics, accessibility, campus/area design guidelines, historic preservation, etc.?

Are there licensing or policy standards for minimum area for various functions? What are these standards?

What are the energy usage and requirements?

What code information may affect programming decisions?

Site analysis: the site is always a major aspect of the design problem and therefore should be included in the program. Site analysis components that often affect design include:

Legal description
Zoning, design guidelines, and deed restrictions and requirements
Traffic (bus, automobile, and pedestrian) considerations
Utility availability (a potentially high cost item)
Topography
Views
Built features
Climate (if not familiar to the designer)
Vegetation and wildlife

Client's existing facility as a resource

If the client is already participating in the activities to be housed in the new facility, it may be possible to make use of information at hand. Determine if the existing facility is satisfactory or obsolete as a resource.
If a floor plan exists, do a square foot take-off of the areas for various functions. Determine the building efficiency (the ratio of existing net-to-gross area). This ratio is useful in establishing the building efficiency target for the new facility.

If the client is a repeat builder (school districts, public library, public office building, etc.), obtain plans and do area take-offs; determine typical building efficiencies.

Use the existing square footages for comparison when you propose future amounts of space. People can relate to what they already have. (See illustration above in Step 5, Determine quantitative requirements.)

4. Identify Strategies
Programmatic strategies suggest a way to accomplish the goals given what one now knows about the opportunities and constraints. A familiar example of a programmatic strategy is the relationship or "bubble" diagram. These diagrams indicate what functions should be near each other in order for the project to function smoothly. Relationship diagrams can also indicate the desired circulation connections between spaces, what spaces require security or audio privacy, or other aspects of special relationships.

Other types of strategies recur in programs for many different types of projects. Some examples of common categories of programmatic strategies include:

Centralization and decentralization: What function components are grouped together and which are segregated? For example, in some offices the copying function is centralized, while in others there are copiers for each department

Flexibility: What types of changes are expected for various functions? Do facilities need to change over a period of a few hours? A few days? A summer recess? Or is an addition what is really needed?

Flow: What goods, services, and people move through the project? What is needed at each step of the way to accommodate that flow?

Priorities and phasing: What are the most important functions of the project? What could be added later? Are there ongoing existing operations that must be maintained?

Levels of access: Who is allowed where? What security levels are there?

Ideally, each of the goals and objectives identified in Step 2 will have some sort of strategy for addressing that goal. Otherwise, either the goal is not very important, or more discussion is required to address how to achieve that goal or objective.

5. Determine Quantitative Requirements

Cost, schedule, and affordable area are interdependent. Costs are affected by inflation through time. Affordable area is determined by available budgets.

In this step, one must reconcile the available budget with the amount of improvements desired within the project time frame. First, a list of spaces is developed to accommodate all of the activities desired. The space criteria researched in Step 3 are the basis of this list of space requirements. The space requirements are listed as net assignable square feet (NASF), referring to the space assigned to an activity, not including circulation to that space.

A percentage for "tare" space is added to the total NASF. Tare space is the area needed for circulation, walls, mechanical, electrical and telephone equipment, wall thickness, and public toilets. Building efficiency is the ratio of NASF to gross square feet (GSF), the total area including the NASF and tare areas. Building efficiency equals NASF/GSF. The building efficiency for a building type was researched in Step 1 and possibly Step 3.

The building efficiency of an existing space used by a client can inform the selection of the net-to-gross ratio. The example below of an office suite within an office building illustrates the areas of net assignable square feet and tare area. Notice that some space within an office is considered circulation, even though it is not delineated with walls. We call this circulation, "phantom corridor."

In the case of a tenant improvement within a larger building, one establishes the "internal gross" of the leased space. Additional support space or tare area such as mechanical rooms and public toilets would not be included in the calculation for this project type.

The desired GSF is then tested against the available budget (see Exhibit B). In drafting the total project cost, the programmer uses the cost per square foot amount researched in Step 1. Factors for inflation should be included, based upon the project schedule. Costs should be projected to the date of the mid-point of construction because bidders calculate estimates on the assumption that costs could change from the time of the bid date.

The total project cost includes the construction cost (for building and site work), plus amounts for architect's fees, furniture and equipment, communications, contingency, printing for bid sets, contingency, soils tests, topological surveys, and any other costs that must come from the owner's budget. The intention is to help the owner prepare for all the project costs, not just those costs assigned to construction.

If the bottom line for the project costs is more than the budget, three things can happen: 1) space can be trimmed back or delegated to a later phase (a reduction in quantity); 2) the cost per square foot can be reduced (a reduction in quality); or 3) both. This reconciliation of the desired space and the available budget is critical to defining a realistic scope of work.

6. Summarize the Program

Finally, once all of the preceding steps are executed, summary statements can be written defining "in a nut shell" the results of the programming effort. All of the pertinent information included above can be documented for the owner, committee members, and the design team as well. The decision-makers should sign-off on the scope of work as described in the program.

Once a program is completed and approved by the client, the information must be integrated into the design process. Some clients want the programmer to stay involved after the programming phase to insure that the requirements defined in the program are realized in the design work.

Commercial Programming Questionnaire

- Describe the project type.

- What will be the primary use of the building(s) and site?

- If any, what is the secondary use of the building(s) and site?

- What are the square footage requirements?

- What percent of site coverage do you expect?

- Is the building(s) one-story or multi-story?

- Are there any existing structures on site? If yes, are the existing structures to be remodeled or demolished?

- Will the building(s) be a shell or finished out for the occupant?

- What is your desired building schedule?

- Do you anticipate future construction or building phases on this site?

- Does the site have any special features or views that need to be taken into consideration?

- Are there any specific site restrictions?

- How do you want the site to be accessed?

- How should the site be viewed from the street?

- Are there any specific parking requirements other than what is required by code?

- Are there any environmental considerations?

- Circle any outdoor spaces you would like on site and describe any specific location or requests:
  Portals

  Patios/Courtyards

  Outdoor Dining Areas

  Other

- Are there any specific landscaping requirements or desires?

- What is the goal of the proposed space? What are the most important functions of the project?

- What type of aesthetic and psychological goals or impact should the design have?

- Does the inside of the space need to relate to the outside?
- Should the image of the building be similar or different from its neighbors?
- Are there historic, cultural, and/or context implications that should be addressed?

- What major functions will take place in the building?

- How many people are to be accommodated?
- How might the building design enhance or impact occupant interactions?

- What level of quality is desired (often stated in relation to other existing projects)?

- What is the attitude toward conservation of resources and sustainability (energy, water, etc.)?

- What is the attitude toward initial costs versus long-range operating and maintenance costs?

- What is the total project budget?

- When is the project to be occupied?

- What types of changes are expected over the next 5, 10, 15, and 20 years?

- What function components are grouped together and which are segregated? For example, in some offices the copying function is centralized, while in others there are copiers for each department

- What types of changes are expected for various functions? Do facilities need to change over a period of a few hours? A few days? Over the course of seasons?

- Level of access: Who is allowed where? What security levels are there?

- *Other Notes:*