

# Programming

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*Architectural programming is the thorough and systematic evaluation of the interrelated values, goals, facts, and needs of a client's organization, facility users, and the surrounding community. A well-conceived program leads to high-quality design.*

Architectural programming has developed as an activity related to, but distinct from, architectural design. It is considered an optional pre-design service under AIA Document B141, Standard Form of Agreement Between Owner and Architect. Document B141 states that under "basic services," the architect is required only "to provide a preliminary evaluation of the Owner's program." Presumably after this preliminary evaluation the architect is expected to proceed with normal design services.

An increasing number of architects have found the above approach unsatisfactory and have elected to offer architectural programming as an integral part of their services. In this context, programming has evolved into a far more thorough and systematic endeavor than when it was offered as an incidental part of the architectural design process or when it was conducted by the owner.

The need for programming services is likely to expand owing to the increasing complexity of buildings and building systems. As well, many clients are becoming much more sophisticated and thus more interested in understanding and managing their physical resources.

Programming led by architects can provide clients with a systematic process for decision making about organizational and project values, goals, and requirements. Many clients have a limited view of the range of physical possibilities for accommodating their operations; architects have the ideal professional background to help them visualize options during programming. The programming process as led by architecture firms can expose clients to a wide range of alternative approaches and help them choose appropriate directions.

## CLIENT NEEDS

All types of clients need programming services. Institutional, government, and corporate clients are most likely to recognize this need and be willing to pay for programming

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## Summary

### PROGRAMMING SERVICES

#### **Why a Client May Need These Services**

- ▶ To clarify project goals and design issues
- ▶ To provide a rational basis for design decision making
- ▶ To ensure that the project reflects the client's values

#### **Knowledge and Skills Required**

- ▶ Knowledge of architectural design
- ▶ Knowledge of construction methods and timelines
- ▶ Investigative and information-gathering skills
- ▶ Familiarity with construction costs
- ▶ Knowledge of space standards
- ▶ Analytical skills
- ▶ Strong verbal, writing, and management skills

#### **Representative Process Tasks**

- ▶ Assemble programming team
- ▶ Identify and prioritize client and user values
- ▶ Determine project goals
- ▶ Identify project constraints and opportunities
- ▶ Gather and analyze data
- ▶ Document project requirements

services, although in some cases these clients may produce programs in-house or by using other programming consultants before engaging the services of an architect.

Government agencies use programming services extensively because they often base procurement of design services on fully developed programs. Owners of complex institutional facilities such as hospitals and hotels easily recognize the need for careful up-front analysis of design issues and will often employ architecture firms to develop their programs. Owners of owner-occupied office facilities usually want quality programming in order to achieve facilities management objectives. Clients with little experience with the building industry generally appreciate the guidance an architect can provide through the programming process. Developers are the least likely to recognize the need for architectural programming services because many believe they know precisely what is needed in the market and thus see no reason to explore alternatives and weigh potential trade-offs. While some residential clients may not want to pay extra for programming, they need the service, even when they are just remodeling a few rooms.

Discussing the benefits of programming during initial interviews sometimes broadens the vision of resistant clients and helps them understand why they need to contract for these services.

**Preliminary studies.** Some clients will need financial feasibility, site suitability, and/or master planning services prior to architectural programming. Financial feasibility studies explore market conditions in relation to specific sites and development plans in order to show whether a particular project will be viable. These studies can be led by architects but often require the expertise of other professionals. Site suitability studies may also be required prior to purchase of a particular property to make certain that the site is properly zoned, has needed services, and is appropriately sized and configured for a proposed project.

Architects are ideally trained to conduct site suitability studies because of their design skills and knowledge of applicable land use and building codes and regulations. Where geotechnical issues are involved, civil engineering consultants may be brought in. Landscape architects should be consulted on projects where there are significant site planning issues.

Clients with a large site and an extensive program that will develop over time should develop a master plan before programming for any particular building or facility. Architects who provide master planning services followed by complete architectural programming services are in an excellent position to prove their value to the client and thus to be assured of obtaining the commission for design services for each phase of master plan implementation.

**Architectural programming.** Architectural programming can include all of the above studies but generally commences after they are complete. It tends to focus on specific facilities identified in the master plan and includes all of the areas mentioned in the previous sections: value identification, goal setting, discovery of related facts, and development of specific project requirements. These are all developed in collaboration with the client, user, and community, but depending on the nature of the project, specialists may be required to develop some of the information. Specialists may include kitchen consultants, laboratory consultants, security consultants, data and communications specialists, and transportation and parking specialists.

Some architects specialize in offering programming services, and other professionals, including social and behavioral scientists, systems analysts, interior designers, and building management and operations specialists, have entered the field. Some programming consultants, including architects, specialize in particular building types or functions, such as hospitals, sports complexes, hotels, justice facilities, laboratories, security systems, clean rooms, and kitchens.

**Costs of services.** Architects who offer programming services have had increasing success in negotiating fees to cover the cost of these services because owners recognize that the resulting buildings better serve their needs. Indeed, architecture firms that offer programming as a primary service are often recognized by their peers as producing quality architecture. Fees for programming vary. Highly technical buildings such as hospitals or laboratories can command higher figures than commercial and moderate-size institutional buildings. Fees for master planning also vary depending on the expected deliverables and project types.

### Values in Architectural Programming

*Human:* functional, social, physical, physiological, psychological

*Environmental:* site, climate, context, resources, waste

*Cultural:* historical, institutional, political, legal

*Technological:* materials, systems, processes

*Temporal:* growth, change, permanence

*Economic:* finance, construction, operations, maintenance, energy

*Aesthetic:* form, space, color, meaning

*Safety:* structural, fire, chemical, personal, criminal

*Robert Hershberger, Architectural Programming and Predesign Manager (1999)*

## VALUE-BASED PROGRAMMING MATRIX

VALUES	GOALS	FACTS	NEEDS	IDEAS
Human				
Environmental				
Cultural				
Technological				
Temporal				
Economic				
Aesthetic				
Safety				
Other				

## SKILLS

On smaller projects, one person from the programming firm can usually handle all of the programming tasks. On larger projects, the programming team will generally include a senior architect, who handles sensitive client interviews and work session presentations (or at least introductions); a project programmer, who conducts interviews with key personnel, develops questionnaires (if needed), analyzes data, and oversees development of the programming document; and junior programmers, who do literature searches, conduct user interviews, conduct observational studies including site analysis, and assist the project programmer in developing the program document.

Specialized consultants are used to develop the criteria and parameters for particular spaces or facility types, such as laboratories, airports, prisons, kitchens, and hospitality/entertainment complexes. The involvement of specific personnel should be carefully developed in a programming work plan.

Programmers must be familiar with the fundamentals of the architectural design and building processes and be alert to the design and construction implications of program statements. But they must also have specific knowledge and skill to be effective at programming.

Expertise in information gathering is the heart of the programmer's domain and requires the ability to

- Conduct efficient literature searches
- Employ active listening skills to conduct diagnostic interviews
- Record meaningful data during a walk-through study
- Develop comprehensive space inventories
- Obtain trace evidence
- Conduct systematic observations
- Know when and how to develop and administer questionnaires

Strong verbal and management skills are necessary for group interviewing and work session leadership. Here again, active listening skills are vital, but the ability to direct the course of the session and to lead people of diverse opinions to consensus is even more important.

Data analysis skills are equally important. Knowing what to collect and then how to convert the raw data to useful information is essential to effective programming. Skilled programmers learn how to avoid "data clog," a favorite term of programming pioneer Willie Peña. The programmer must learn to collect only the needed data and then know how to convert them into meaningful (reliable and valid) information that can influence design of the project.

Knowledge of space size standards for various building types is a fundamental requirement for programmers. Before going into the work session, they must know what the standards are for a building type as well as what space the client actually has, so they can guide the client to agreement on appropriate net space needs for a particular facility. They must also be aware of appropriate efficiencies for various building types and quality levels to be able to apply them to net totals to arrive at gross square footage requirements. Efficiency

factors are often less than 70 percent for many building types. But clients rarely understand how much of a building area is consumed by such space as halls, walls, utility chases, and closets. The programmer must have the knowledge and skill to guide the client through this part of program development.

The programmer must be familiar with current construction cost information and with general project delivery timelines. In some cases it may be necessary to consult general contractors or cost estimators in order to develop realistic preliminary costing and project schedules. Where clients require full financial feasibility studies, consultants with backgrounds in real estate development and banking often are used. At this early stage, it is common to provide a contingency budget of 20 or 30 percent of the expected building cost because so many factors (land cost, soils, easements, etc.) are unknown. This percentage will be reduced as the project progresses and more is known, so that a common contingency in the master planning would be 15 percent, dropping to 10 or 12 percent in programming and 5 to 7 percent for construction.

Finally, writing skills are needed to capture and delineate the qualitative and quantitative aspects of the client requirements. An architectural programmer must be able to communicate programming information verbally and visually to the client, the users, the community, and the architect who will design the project.

**Equipment.** Given that virtually all architects will have a computer that can produce finished drawings and a word-processed report, the only special equipment needed for architectural programming would be a digital or Polaroid camera. No other special equipment is necessary.

## PROCESS

Architectural programming is inherently a team process. At a minimum, the programmer and client determine the program, but more often several persons from the programming firm, an array of users, and sometimes community participants are involved. The scale of the project (e.g., a building interior, one building, a building complex) will have a strong effect on team size and composition. Other factors include the type of facilities and level of specialized functions that will be required and possibly constraints on interaction with the client and users.

### Client and User Values

Programming is the time to identify, consider, debate, reject, accept, and prioritize values such as institutional purposes, functional efficiency, user comfort, building economics, safety, environmental sustainability, and visual quality. These identified values and concerns can have a profound effect on the ultimate form of a building. If the program is driven primarily by concerns for functional efficiency, as is the case in many owner-produced programs, organizational decisions made during programming will significantly affect the form of the building.

If the program evolves more from the social and psychological needs of the users, prescriptions for form will also be inherent in the identified spaces and their sizes, characteristics, and relationships. If the program responds primarily to economic concerns, it is possible that numerous material and system opportunities as well as potentially unique spaces and places will be eliminated from design consideration during programming. A carefully conceived and comprehensive architectural programming process will help to ensure that all of the appropriate values have been identified and prioritized.

The values identification portion of architectural programming offers the client an opportunity to resolve important questions or make critical decisions about how the client's organization relates to the built environment. As well, consideration should be given to how the client's values relate to the values of the community, the values of the users of the facility, and the values of the design professionals with whom the client is working. Considering these value relationships can help the programmer manage potential conflicts of values and identify opportunities for a fuller expression of common values.

### Project Goals

Once the primary values have been identified and prioritized, it is possible to develop specific project goals. What organizational objectives should be accomplished by providing a

new, expanded, or renovated facility? Should the resulting building be a statement of the organization's desired image? Should it be a model of efficiency? Or should it be more loosely organized, allowing for serendipitous events or even changes in how operations are conducted? Should it be environmentally sensitive, a showpiece of "green" architecture? What is the target for overall project cost? When should the facility be ready for operation? Goals in these and many other areas need to be set during programming.

## Constraints and Opportunities

Achievement of the goals will be made easy or difficult by the characteristics of the organization's operations as well as those of the site. Information must be gathered that identifies the specific nature of the constraints and opportunities. Is there enough land on which to locate the proposed facility? Is it in the right location in terms of visibility, access, service, and the like? Can the existing facilities be easily converted to new uses? Are the organization's cash flow and/or reserves sufficient to ensure that the construction and start-up costs can be managed? Questions of fact must be considered before realistic projections for new and renovated spaces can be made.

## Facility Requirements

When the important values and goals of the client, user group, and community and any related facts have been identified, then and only then should the identification of specific space needs begin. Unfortunately, many client-provided programs are developed without adequate consideration of important institutional values and goals. Personnel assigned to prepare the program tend to proceed directly to identification of user needs and space requirements. Those preparing the program may be unaware that their personal value systems are influencing the decisions they are making and that a more conscious identification of institutional values and the setting of specific project goals would have a profound effect on how the specific needs of the project are developed. Often a few known and pressing facts tend to dominate the decision process, while other facts remain uncovered, even though they may be more important relative to the organization's mission.

Steps for identifying the space needs of a specific facility include the following:

- Identify required spaces
- Establish the size and relationships of these spaces
- Develop appropriate factors for estimating efficiency
- Project budget and schedule requirements

When determining factors for estimating efficiency, allow for nonprogrammed areas such as halls, walls, restrooms, service areas, two-story spaces, and the like. Base budget and schedule requirements on previously identified values, goals, and facts in order to get the most accurate guide for the design of proposed new facilities.

## Information Gathering

Five types of information gathering are used in architectural programming: literature search/review, interviewing, observation, questionnaire/survey, and group sessions.

**Literature search/review.** This task comes first in the programming process, beginning even before the commission is awarded, to give the programmer background knowledge of similar facilities and a general familiarity with the client's mission and language. The literature search includes gathering reports on existing facilities along with site surveys, construction documents, and other relevant documents that the client may possess. It also involves obtaining relevant government documents, including applicable codes and ordinances, as well as recognized building and planning standards, historical documents and archival materials, trade publications, research literature, professional publications, manufacturers' publications, and even sources in popular literature and on the Internet.

**Interviewing.** In most cases this is the core activity in programming. It begins with the client interview. At this interview, the programmer can learn more about the client's values and

goals, refine a work plan and schedule, and ascertain whom to contact within the client organization. Interviews with key personnel, other users (clients, patrons, customers, etc.), and interested community members follow. Successful interviews are carefully planned. The programmer first tries to identify the basic values that will affect the design of the facility—human, cultural, environmental, technological, temporal, economic, aesthetic, and safety-related. In planning interviews, the programmer should consider what data could make a design difference, who could provide the most useful information, who has the authority to make decisions and establish priorities, the amount of time and the size of the budget that are available, and how interviewing will relate to other information-gathering techniques that may be used, such as observations or surveys.

For larger organizations, the programmer usually reviews the organizational chart with the client to identify the key officers, department heads, and other persons likely to be knowledgeable about facility needs or in decision-making positions. Others within the organization who might be interviewed include department managers, members of special committees, maintenance people, a sampling of typical employees, and employees with special needs. Those who use or visit the building but do not work for the client organization, such as suppliers, service people, fire officials, or customers, also may have important input. Interviews may take place in an individual or group setting.

Whoever is interviewed and however the interviews take place, the objective is to obtain complete and reliable information. It helps to conduct the interviews in or near the client's or user's existing environment. This setting tends to make interviewees more comfortable in answering questions, and also makes it easier for them to focus on their own architectural environment. Interviewing techniques vary widely and should match the data-gathering objectives.

**Observation.** This task is another information-gathering technique that programmers should use. A walk-through observation of the existing facility with the property or facility manager is an excellent way to orient yourself to obvious programming requirements. A space inventory, including plans and annotated photographs of existing spaces, equipment, and furnishings, can provide important baseline information. The programmer photographs and measures existing spaces and documents existing furniture and equipment to better understand the space requirements. Trace observation documents wear and tear on existing facilities (surfaces, furniture, fixtures, and equipment) and may tell an important story about traffic and circulation patterns, use levels, and other factors that should be accounted for in the program. Behavioral observation (time-and-motion studies) can document the functions that the building occupants perform and the adequacy of the space accommodating them. For example, the programmer may observe that a hospital room has an inadequate turning radius for a wheelchair when a visitor chair is placed in the room. Quite often the programmer will be told during client or user interviews that a particular space is a problem, prompting subsequent observational study of the space to determine the cause of the problem.

**Questionnaires and surveys.** These are yet another information-gathering tool used in programming. Surveys are an efficient way to gather facts and quantitative details in a large organization. Furniture and equipment needs of individual users, for example, can be ascertained through a written survey form. The questions must be carefully developed using a systematic process that includes pretesting, or there is a good chance that the resulting data will be meaningless or at least difficult to analyze.

**Group sessions.** These are the final way to obtain needed information in architectural programming. It is important to conduct at least one group work session (usually several) as a feedback mechanism to allow the client and users to consider, debate, and eventually resolve and agree upon the true nature of the architecture problem—to reach a consensus as to which values, goals, facts, needs, and ideas should influence the design of the facility. This is a type of group interviewing process that typically involves feedback of information obtained from the other information-gathering methods. Techniques include brainstorming new ideas and rejecting as inappropriate some of the information collected earlier, concluding with prioritizing the goals and needs for the project. It is not only a way of gathering information but also a method of obtaining agreement.

## Data Analysis

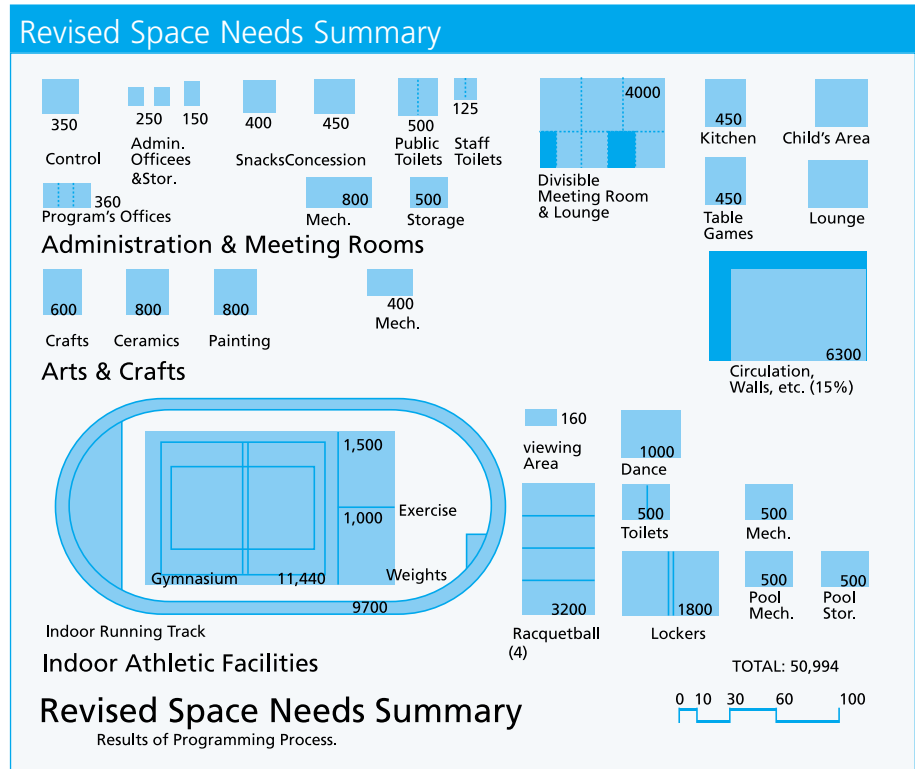
Throughout the data-gathering process it is important to organize data so that they can be retrieved and analyzed quickly and easily. A key technique is to seek and record only

information that will be vital in making design decisions. Based on analysis of all information gathered, the programmer will develop performance and design criteria for the facility. Space requirements, space relationships, circulation, ambient environment, safety and security, needed surfaces, furnishings, flexibility, and site information are among the issues usually addressed. Graphics such as matrices showing space allocations and relationships and bubble diagrams showing adjacency relationships are also developed.

During analysis, the programmer will identify major unresolved programming issues and begin to develop some preliminary ideas about options for their resolution in the final building program. Some writers have referred to these ideas as “precepts” (a term implying a combination of *preliminary* and *concepts*, yet still clearly preliminary to conceptual design). Here the programmer’s task is to develop options (precepts) for solutions, to help with their evaluation, and to recommend the most effective alternatives. For example, in a residential facility such as a nursing home or a juvenile justice institution, there might be a trade-off between privacy and isolation in residents’ bedrooms. Options might be single, double, or multiple-occupancy bedrooms. A recommendation might be to have a mixture of rooms to allow for occupant or staff choice. The programming team presents the various options or precepts to the client and guides the client through evaluation of the alternatives. As with interviewing, there are many different ways to structure these presentations, and the approach should be tailored to the needs of the client organization and the particular project.

### Deliverables

The usual deliverable is a written architectural program, which is a comprehensive report that includes documentation of the methodology used, an executive summary, value and goal statements, the relevant facts, data analysis conclusions, and the program requirements, including space listings by function and size, relationship diagrams, space program sheets, stacking plans, precept drawings, and flow diagrams. Photographs or even videos may be used to illustrate space planning requirements. A comprehensive program will also include project cost estimates and a project schedule.



“Programming” was originally published in *The Architect’s Handbook of Professional Practice*, 13<sup>th</sup> edition, ©2000 by the American Institute of Architects, published by John Wiley & Sons, Inc.

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The AIA provides a contract document designed especially for these types of architectural services. The AIA suggests a two-part agreement:

**B102–2007, Standard Form of Agreement Between Owner and Architect without a Predefined Scope of Architect’s Services** provides terms and conditions only.

**B202–2009, Standard Form of Architect’s Services: Programming** provides the architect’s scope of services only.

Together they equal a complete owner-architect agreement.

AIA Document B202<sup>TM</sup>–2009 establishes duties and responsibilities where the architect provides the owner with programming services. The architect’s programming services are set forth in a series of iterative steps, from a broad identification of priorities, values and goals of the programming participants to working with the owner to confirm the owner’s objectives for the project. The programming services also include information gathering to develop performance and design criteria, and developing a final program of project requirements. B202–2009 is a scope of services document only and may not be used as a stand-alone owner/architect agreement.

For more information about AIA Contract Documents, visit [www.aia.org/contractdocs/about](http://www.aia.org/contractdocs/about)

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