PRIMARY CONSULTANT OPTIONS FOR CAPITAL PROJECT PLANNING: A MARKET ANALYSIS AND SELECTION METHODOLOGY

by

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Submitted to the Department of Civil and Environmental Engineering in Partial Fulfillment of the Requirements for the Degree of

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ABSTRACT

This thesis hypothesizes that market dynamics obfuscate identification of optimal project delivery mechanisms. In particular, selection of primary planning consultants can benefit from a rational methodology. Market dynamics reflect changing characteristics of both owner organizations and the projects that they require. The construction industry adapts in response to market change, altering products and services in an attempt to satisfy precipitated demand. Resultant construction industry dynamics, however, outpace the market's ability to perceive industry changes, due to the market's limited involvement with the construction industry, both temporally and spectrally.

Current practice includes a variety of options for planning, program management and project strategizing. This thesis reviews the current market of advice available; various professions are examined to elicit biases inherent in each, contrasting perceptions of the function of initial planning. A qualitative analysis provides insight into desired capabilities of initial planning consultants as a function of project and client characteristics. Methodical analysis enhances awareness of project and owner parameters, their influence on planning consultant qualifications, the consulting options available to the owner, and ultimately project-specific compatibility.

This thesis implies the need to counter inherent owner bias through explicit focused evaluation of relationships between project strategy and business strategy. As a result of this and other issues, initial planning consultants' roles are increasingly that of facilitator/manager. A corresponding shift in required capabilities is indicated away from technical expertise and conceptual capabilities toward those attributes associated with superior facilitation skills.

Thesis Supervisor: Dr. Henry G. Irwig
Title: Senior Lecturer, Department of Civil and Environmental Engineering

KEYWORDS

Construction Industry, Programming, Planning, Pre-planning, Construction Management, Architecture.

TABLE OF CONTENTS

CHAPTER 1
INTRODUCTION

DEFINING THE RESEARCH PROBLEM AND METHODOLOGY

In this chapter, the environs from which this study evolved are seen as increasingly complex, dynamic and misleading. The construction industry in general, the planning market in specific, is not noted for formal auto-analytical publication. Given this, the genesis and the mission of the research fall out.

Experience indicates information gaps between providers and consumers and between the various provider professions. This paper focuses on one particularly important phase of capital project delivery, initial planning. Initial planning is influenced by the increasing complexity of planning problems as well as increasing complexity of owner organizations. These demands are encouraging the formation of new types of initial planning experts. The speed of market changes, as well as that of project and owner characteristics, obscures the clarity of owners' perspective. Each profession publishes information to support their individual objectives, but the industry as a whole lacks objective information pertaining to this issue. The thesis' mission is to assist the bridging of the information gap, to enable enhanced project, and ultimately industry, efficiency.

This chapter consists of introductory information. First, the author's definitions are presented for a series of important, and potentially ambiguous, terms which appear throughout the paper. The objectives of the thesis are then formally presented, including a disclosure of the author's perspective on the subject. Subsequently the research is introduced; the focus is more precisely identified and the methodology reviewed.

1.1 - DEFINITIONS

1.1.1 - Definition of "Initial Planning"

"Planning" is both ubiquitous and nebulous. Many terms are used in the construction industry: project planning, pre-planning, programming, feasibility study, conceptual

design, strategic facilities planning, etc. Unfortunately, individuals have different ideas of what each of these terms indicates. The author's definition is provided to focus the reader on the intended issues while indicating the variability of the planning process on any given project. A graphical representation is provided in Figure 1A.

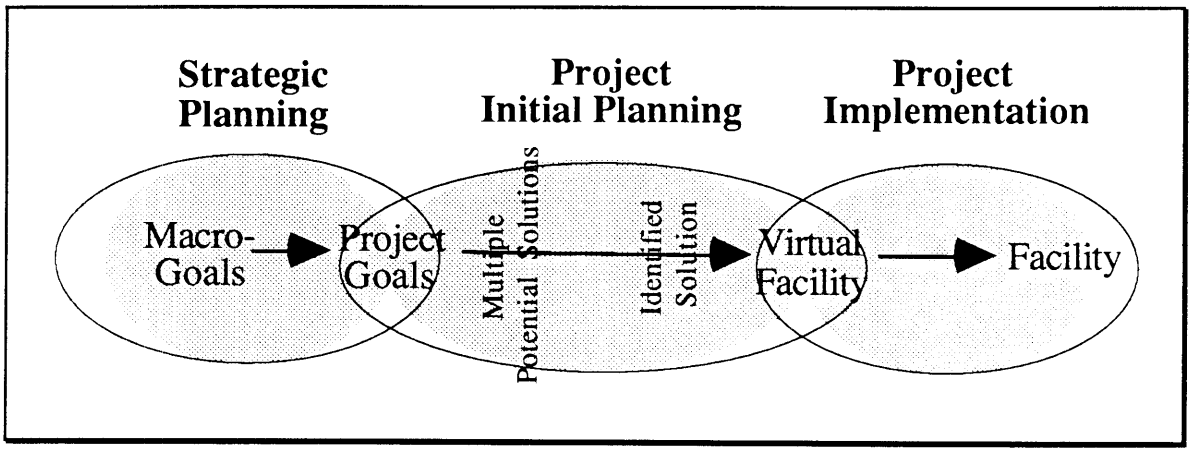

Figure 1A - Initial Planning as Interface of Strategic Planning and Project Implementation

Initial planning is the primary phase of any capital project delivery process. It includes the analysis and determining of the owner's strategic objectives in relation to the capital project. (Here, the author's definition diverges from most construction industry professionals' definitions.) From refined project objectives, solution concepts are generated. The concepts are analyzed with regard to both product and process; their parameters are compared to established parameter priorities. Finally, the owner makes a decision identifying the solution to be implemented. The role of the initial planning consultant is to provide expert input, facilitate the process, develop solutions and provide guidance. Project implementation follows, including design of process and product, followed by construction.

Notwithstanding the foregoing, the initial planning process is never executed as presented above. The process is not linear, but is iterative. Information feeds back to modify the objectives and presumptions on which the analysis is based. Progress is not steady, but occurs instead in jumps both forward and backward. Furthermore, the makeup of the planning group is dynamic, both formally and informally. Parallel advances occur, merge, diverge and ultimately a decision is made. As such, the graphical representation in Figure 1B may better define the initial planning process. The goal is the center; the irregular tightening spirals indicate the proximity of the project definition to the goal at

any time, and the number of distinct solution paths. Overlaid on this, the goal is shifting as the project becomes defined.

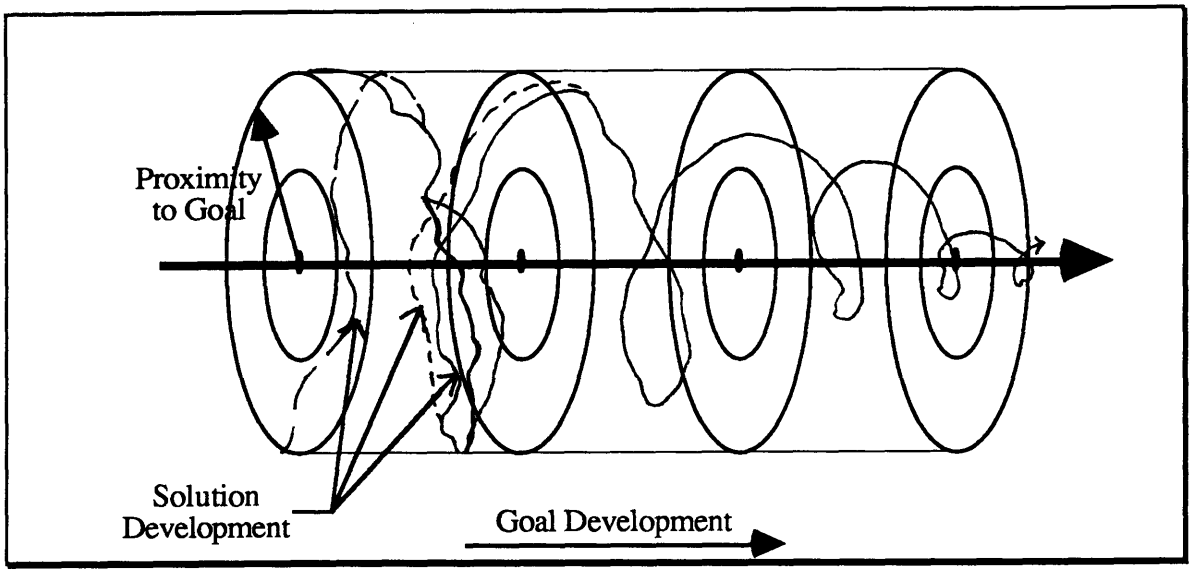

Figure 1B - Initial Planning as Nonlinear Process

1.1.2 - Definition of "Project"

The term "project" is commonly used both in reference to a physical entity and to the process intended to result in a physical entity. Of note is the *intention* of resultant construction. Often, projects are terminated by internal or external factors prior to actualization. Dictionaries define the noun as a plan or an undertaking requiring concerted effort.[1] The construction industry combines and expands these two definitions. For clarity, this paper views the project as the physical manifestation, while the project delivery is the process. See Chapter 3 for a detailed definition of overall delivery process. See the discussion of research focus below for elaboration and definition of the project type.

1.1.3 - Definition of "Owner"

Throughout this thesis, the term "owner" is used to refer to the client of the initial planner. The complexity of project ownership makes a standard definition, based on

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[1] Davies, p. 563.

possession, incomplete and misleading. For example, financing structure suggests the financier as the owner. At issue is not the rights or title to a capital project. Instead, the focus of this document is on decision making; thus the owner is defined as the party with which decision making authority rests.

In this paper, the owner controls the flow of decisions relative to a project. Elaboration of this simple definition is troublesome. Presumably, the owner has some financial or strategic interest in the final product, but not necessarily. An owner may be a court appointed panel directed to facilitate the delivery of a project. In this case, the owner benefits only personally from the success of the process. An owner may be synonymous with the user, but not in the case of a speculative development project. Thus, for the purposes of this paper, the owner need not have title to, gain benefit from, or use the resultant facility. Furthermore, the planning process, as noted above, may not be intended to culminate in a physical product. Thus, the owner is simply the entity controlling the decision making relative to a planning effort.

1.1.4 - Definition of "Consultant"

Throughout this thesis, the term "consultant" is used to refer generically to a formally hired advisory agent. In practice, the initial planning consultant can take many forms both in the relationship to the project or owner and in assigned role. For the purposes of this thesis, the consultant is presumed to be a professional planning advisor-facilitator, hired on a fee-for-service basis by an owner to assist, coordinate, and apply expertise to the planning of capital projects. The planning consultant's roles are explored in Chapter 3.

1.2 - Thesis Objectives

This thesis is a vehicle to enhance owners' market perspective and industry professionals' interdisciplinary understanding. The primary audience is the typical owner organization, involved infrequently in projects of the type delineated in Section 1.3. For these owners, the present rate of market dynamics inhibits clarity of perspective. The resultant reliance on familiar delivery methods inhibits capitalization of market offerings, creating unnecessary mismatching of owner needs and consultant services. Moreover, the traditional roles and responsibilities of the various professions providing these consulting services are changing. Reliance on outmoded allocations of project risk and project

control leads to unrealistic expectations, disappointment and disputes. Thus, it is imperative that owners be aware of the dynamics of the marketplace.

With knowledge of the options available to an owner, compatibility of owner and project characteristics with these market options is a logical subsequent area of attention. The research presents an overview of the nature of owner characteristics and project parameters. The evaluation framework emphasizes the importance of owner self-analysis.

Secondarily, the consulting professions themselves are uniformly lacking understanding of the roles, biases and perspectives of their counterparts. The professions can benefit by better understanding themselves, other professions and owners' organizational and project characteristics. In addition, unique approaches to planning strategy discussed are applicable across professions.

1.2.1 - A Tool for Owners

The construction industry is traditionally practice oriented, focusing on individual expertise. It has not been particularly market responsive or market forming. Neither technology nor competitive research drive service suppliers. Instead, owners' demands drive the market. Until recently, market response has been quite slow. Fragmentation within and between professions involved guarantees this. Increasingly, the construction industry is changing in response to market pressures. Change creates new options for buyers of construction services. The buyers of construction related services must understand their own needs and the options available to fill those needs in order to get good service in the short run and advance the overall industry in the long run.

The primary intended use for this research is to provide a tool for owners. The infrequency with which owners become engaged in capital projects, the changes in the professional services markets, and the limited documented descriptions of the professions all limit the owners understanding of their options. Owners, particularly those inexperienced in project delivery, enter into the planning process without full knowledge of their options, basing the selection of the initial planning consultant on limited experience, coincidence or superior marketing efforts. As such, a significant decision is often made with insufficient information.

1.2.1.1 - Project Success and the Owner

Owners, more than any other project team members, determine the success of projects.[2] Even with development in project consulting, owners retain control over the direction of planning efforts and determine the makeup of project teams. As such, owners must be aware of their influential role, endeavor to collect a suitable team and then direct that team toward project success.

Recognizing the critical nature of initial planning decisions, owners benefit from attention paid to process strategy. Ironically, most owners are reluctant to invest additional money and effort in the early project stages.[3] As discussed below, it is critical that owners understand the value of efforts expended during initial planning. Even if an owner is frequently involved in project delivery, they may not be familiar with the specifics of particular projects, such as project type or size. In any case, a planning consultant is critical. The use of a third party agent dramatically increases a project's chance of success.[4] The scale by which success is measured, the determination and prioritization of project objectives, is strongly influenced by third party agents. Thus, informed selection of these agents is critical.

1.2.1.2 - Application of Insight to Practice

This thesis provides owners with general understanding of biases, foci and motivations of various professions from which initial planning consultant are chosen. In addition to improved consultant selection, the presented insights can assist owners in ongoing relations with various professions involved with projects. Owners, recognizing inherent biases of initial planners and other consultants, can more effectively work with these professionals. This will facilitate interpretation of consultants' suggestions and positions throughout the process, particularly in the event of conflicting advice or dispute.

1.22 - Perspective for Professions

This thesis is intended to promote interdisciplinary understanding. Professionals providing initial planning can benefit from an understanding of their own biases and

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2 Sanvido et al., p. 47-48.

3 CII #85, p. 70.

4 Sanvido et al., p. 101.

limitations as well as those of the other professions. In addition, ideas are presented that may enable initial planners from each profession to improve the service they provide and, thus, their strategic interests.

1.2.2.1 - Understanding Each Other

Despite the advances made throughout the construction industry, isolation of the various professions remains unfortunately prevalent, leading to poor interdisciplinary understanding. Limited perspective perpetuates traditional inter-professional antagonistic relationships associated with competitive bidding. The persistence of this characteristic of the industry, in light of the growth of cooperative contractual structures, is indicative of the isolation of the professions, both in education and in practice. This thesis is intended to facilitate interdisciplinary understanding among construction industry professions. Effective communication is facilitated through understanding of the languages and perspectives of various team members. With efficient communication, not only can teams provide excellent service, but they can also further understanding of each other. Respect and trust then flourish.

1.2.2.2 - Improving Service

Any given profession can improve the services that they provide at any point in the delivery process through better knowledge of the entire process. Inherent in the traditional delivery method, and most other methods, is isolation of various professions providing inputs. Presumed linearity of the process allows for the segmentation of phases. Overlap of professionals in each phase is typically minimal: strategizing is separate from designing, which is separate from construction. Familiarity with each other enables professionals to efficiently communicate and, moreover, abdicate control of particular issues to the most qualified.

Of more tangible benefit to the professions, this thesis provides examples of how some innovative firms are approaching the challenges of initial planning. Firms within a given profession may be aware of their competitors' approaches, but are less likely to know of their extra-disciplinary counterparts' ideas and methodologies. By assimilating strengths or insights of other professions' perspectives with one's own, service differentiation can enhance competitive advantage.

The initial planning professions also benefit through better understanding the context from which their services are chosen. In the vast majority of cases, the owner determines the strategic need for a given project before creating a project team. The consultants typically consider the needs as givens and work to successfully attain their perception of these needs. Understanding the context in which the initial planner selection is made can assist that professional to provide more objective assistance; the consultant should not assume that his professional biases are favored by the owner.

1.23 - The Author's Motivation

In addition to the missions of the thesis previously mentioned, the author presents here the personal motivations for this research direction. Personal experience has shown that reports of this type are often strongly influenced by authors' experiences and biases. These are not typically made patent, which forces the reader to either accept the conclusions as purely objective, or read between the lines to discern the author's mindset. The following is an attempt to eliminate this problem.

1.2.3.1 - The Author's Professional Biases

As this is a study of professions' biases and orientations, those of the author must be disclosed. Although a conscious attempt has been made throughout the research and writing of this thesis, objectivity is elusive. As the author has interpreted the interviewees' insights in light of their mental models, so too should the reader consider this work in light of the author's.

The author was educated as an architect and a civil engineer. However, professional practice concentrated on providing architectural services. Although the author was employed by a developer and an engineer, these were relatively insignificant in that they were for short duration early in his career. The interdisciplinary perspective of the author is evidenced by and in part lead to his study of more broad issues in the construction industry. This thesis is the culmination of these studies. Also of consideration is the author's intended subsequent employment in construction management. Together, these points indicate that if the perspective typical of architects is present, it should not dominate the author's biases.

1.2.3.2 - Thesis-Specific Biases

The author is committed to the advancement of interdisciplinary understanding throughout the construction industry. This study presents an opportunity to enhance the author's and readers' knowledge. Not surprisingly, the working hypotheses reflect the presumed need for extra-professional exposure. Although the study does not rely on this presumption, the reader should be aware of the author's stance when interpreting the conclusions.

1.3 - RESEARCH FOCUS

The construction industry is comprised of an extremely broad range of project types and sizes. A comprehensive study of initial planning methodologies would include the entire spectrum from small and pedestrian to mammoth and highly complex. For this study, however, the focus is limited to a small segment of the overall industry: medium-sized private building projects. This segment facilitates translation of insights to other segments due to general familiarity. It is also a segment that is recently characterized as being changed by the pressures of its clientele. Although other project types may have more advanced planning methodologies, this segment presents a planning challenge which is complex, yet of limited scope. Also, it must be noted that the author has experience with and interest in this market segment.

1.3.1 - Building Industry

The building industry provides a market segment characterized by presumed familiarity. Building projects are ubiquitous; many projects in other market segments have building components. Examples are support buildings in petroleum projects, building components of transportation projects such as airports, and even temporary structures for heavy construction projects. In terms of value of construction put in place, buildings are forecast to comprise 82% in 1994 including residential buildings, or 53% excluding residential.[5] Whether actual or perceived, most construction professionals feel a familiarity with building projects.

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[5] O'Brian, p. 14.

Building projects are somewhat generic in that the delivery process, or at least some of its systems, are similar to those of other construction segments. An example is the relation of a building's structure to that of a bridge project. Through both the generic nature and the familiarity with this segment, the study can be useful to professionals from other construction industry segments.

1.3.2 - Private Work

Although many recent advances have been made in the public arena, the vast majority of public work remains constricted by methodologies imposed by law. By contrast, private project delivery methodologies are increasingly responsive to free market pressure, adopting innovative process strategies. Very often, the organizational and strategic lessons learned by the clients' industries are translated to capital project delivery. As such, private projects constitute an attractive market for planners from a variety of professions. In addition to providing the richest history to study, the private market continues to advance the industry at an increasing rate.

1.3.3 - Medium Size Projects

Medium sized projects are herein defined as ranging in value from $5 million to $50 million. This range captures a large volume of projects of various complexities. Although the range is large, this delineation effectively characterizes a type of project. Lesser value projects typically involve significantly less complex planning; projects of greater value involve more intensive planning.

Medium sized projects drive the physical and organizational sophistication of the construction industry, even though by project numbers they comprise a very small percentage of construction. The influence of this genre is evident in the percentage of total built square footage attributed to larger projects. Over 80% of non-residential space built today is in buildings larger than 50,000 square feet; roughly 30% is larger than 100,000. Surprisingly, buildings of these sizes comprise only 5% of the number of buildings built.[6] This indicates dominance in terms of volume, and therefore value, of mid-size projects. Half of all non-residential projects are in the $5 million to $25 million range.

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[6] Gutman, p. 31.

Medium sized projects involve recognizable and understandable planning processes. Larger project analyses are too complex to effectively study due to their complexities, number of conflicting agendas and objectives, and the duration of the planning process. On the other hand, smaller projects typically involve less formal planning methodologies. These too are not easily captured in study. Because of relative simplicity, the smaller projects' planning methodologies are stable. Medium sized projects present a dynamic subject, most appropriate for study.

1.4 - Research Methodology

From the outset, the approach to a descriptive analysis of a highly fragmented industry appeared problematic. Generalizations about owners, projects and professionals are dangerous, however, only if taken out of context or as absolute. The research methodology accepts the limitations of generalizations and focuses on creating informative comparative or self-evaluative ideas. A broad literature search was conducted, but the core of the information result from interviews with industry leaders.

1.4.1 - The Literature Available on the Subject

Both planning theory and intra-profession discussion are well represented in the literature. However, the inter-disciplinary analysis of professions providing initial planning services to the construction industry is not. A small number of tangentially relevant studies exist. The more relevant are briefly discussed below. These studies are cited in this document, but do not directly address the research subject.

The Industrialization Forum Occasional Paper Number Three includes a report by David Haviland examining the "project initiation" phase and making recommendations.[7] The report stated that initial planning must be recognized as a distinct phase, that owner organizational changes must be made to facilitate the exploration of all possible solution avenues, that decisions should not be made without "hard data" concerning cost, schedule and quality implications of options, and that biased people should be limited in their control over the planning process. This ultimate recommendation leads to the recommended division of the initial planning process into two stages: needs analysis and

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[7] IF Team et al, p. 29-32.

programming. A programmer is identified as the appropriate consultant in the first stage, while a manager is seen as critical to the second. Further explanation of these roles is not included.

The Construction Industry Institute has published a number of studies which investigate the organizational issues of both the owner and service provider during project delivery. (See Bibliography for a listing of these reports.) Included are studies of the organization of project teams, the planning process itself, methodologies for organizing the owner's project team, and other related issues. However, the focus of these reports is intentionally quite broad, including a wide range of project types and sizes. Consequently, the conclusions and methodologies are generalized. Even so, insights presented are often applicable, as seen in the references throughout this study.

1.4.2 - The Interviews

Early in the research planning, interviewing was identified as the most appropriate means by which to collect perspectives on initial planning. The literature available provides little in-depth understanding of the inherent biases of the various professionals. Most industry professionals, the author included, assume an understanding of these biases and the resultant approaches to planning. In an effort to maintain objectivity and gain broader perspective, interviewing was used. The interviewee pool as well as the interviewing process were structured as described below.

1.4.2.1 - The Scope of the Interviewees

The professions chosen to be interviewed for the research comprise a cross sectional sample of each of the various professions involved in initial planning of capital building projects. Moreover, most were chosen because of some distinguishing reputation or unique approach to project planning. In this way, the interviews provided both information for general comparison of the professions as well as more specific planning innovations within each profession. These distinguishing approaches or strategies indicate the direction of progress within each profession and, more importantly, suggest the overall evolution of the industry.

Of course, this strategy provides perspectives only from successful and somewhat unique industry practitioners. However, the conclusions are still valid for application to a

broader sample of professionals; the biases inherent in the professions are generally consistent throughout each, within bounds and with exceptions.

The interviewees totaled 19; the breakdown from each profession was as follows:

- 5 Construction Management Professionals
- 4 Design Professionals
- 3 Development Professionals
- 4 Specialized Management Consultants
- 3 Owner In-house Professionals

The consistency of enthusiasm expressed by interviewees is testimony to the concern for this thesis' issues felt throughout the industry. All interviewees had obviously contemplated the issues relative to initial planning at length prior to the author's contact. Many referred to their "homebrewed homily" or "company view" on the topic. The area of enthusiasm expressed by the interviewees responses was generally allowed to dominate the direction of the interviews. Consequently, the interview coverage varied depending on the profession and interests of the interviewee.

1.4.2.2 - The Interview Methodology

The interviews for the various professions were loosely structured around a common script. The script consisted of a series of questions based on working hypotheses, as is seen in Appendix A. Although the script is comprehensive, each interview did not individually cover its entirety. The areas of the script discussed in any given interview reflected the interviewees' experience and focus. As the process proceeded, any gaps were concentrated upon so that professions represent their perspectives on each issue.

The interview script was derived from the author's working hypotheses. The purpose of the interview was to verify or disprove the various issues included in these working hypotheses. As such, the questions were designed to elicit response without indicating intended answers. The questions were designed to direct the discussion. The results were broad discussion, not specific answers. The tone of the interview was determined by the interviewee, however all interviews were quite informal. Informal discussion of an area of mutual interest, rather than formal linear interview was the mode.

CHAPTER 2
INDUSTRY DYNAMICS

Any analysis of a contemporary business issue must first set the stage with an introduction to the evolution of the issue thus far. The following brief history of building industry structure is intended to familiarize the reader with general traditions as a means to perspective of current changes. For comprehensive historical accounts of the construction industry see Walker.

The structure of the construction industry with respect to project delivery has been historically stable. The recent history, relative to the history of construction, is characterized by increasing rate of change. Figure 2A, based on Walker's work, indicates the rate of these changes over time. Dynamics of industry structural changes are responses to changing market demands, supra-market influences, and advancing technologies. As these causal influences change, the market follows.

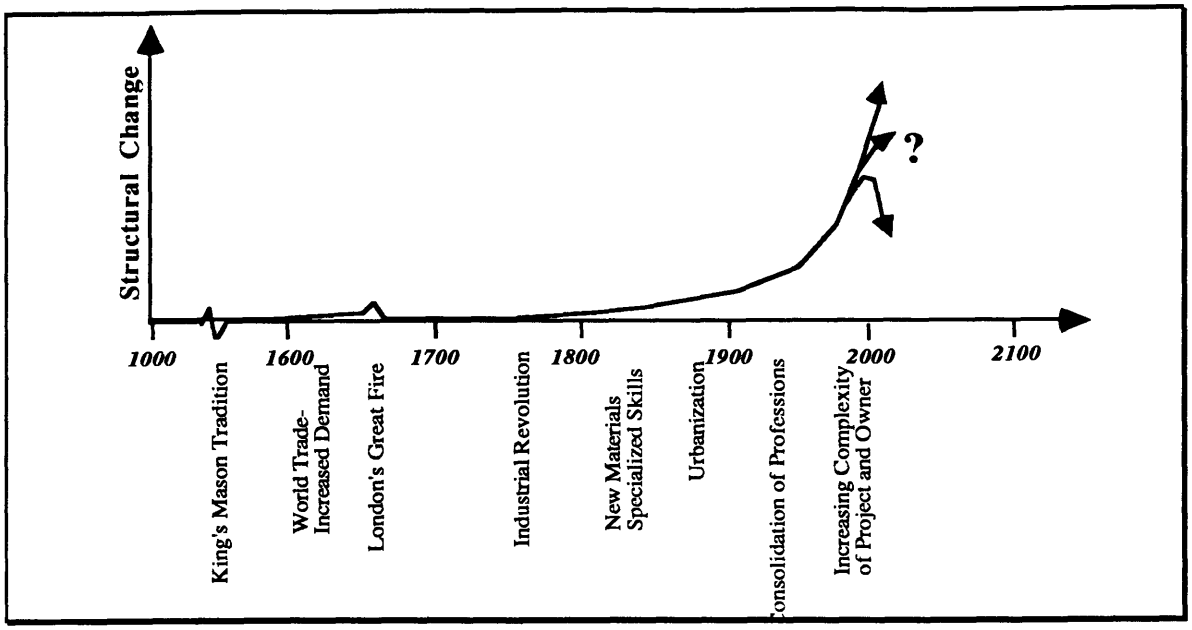

Figure 2A - Construction Industry Structure as Increasingly Dynamic[8]

2.1 - HISTORY OF THE INDUSTRY

In this brief account, the history of the construction delivery mechanism is reviewed. The "traditional" role of the architect is revealed as a recent development in relation to the history of construction. However, the "traditional" model does form the springboard for discussion of contemporary changes.

2.1.1 - The Masterbuilder

The structure of the industry began to take shape during the middle ages. The large religious projects undertaken during this era influenced the structuring of the delivery organization. Specialized trade guilds became well defined. Each guild coordinated its operations, but overall coordination was provided by a single person, the masterbuilder.

The masterbuilder was a multi-disciplinary expert. The role included what today would be considered the roles of architect, engineer, and construction manager. No other supervisory position was used. As such, the physical planning function was not

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[8] Adapted from Walker, p. 19-26.

complicated by organizational complexity. The masterbuilder planned in relative isolation, responding to the owner, typically the local political/religious structure. The masterbuilder system provided a simple implementation structure, but planning concerns were vastly less complex than those of contemporary projects. (A review of the project complexities described in Chapter 4 indicates relatively few project-related planning concerns. However, the owner-oriented issues are presumably quite significant, but not the concern of the masterbuilder.)

2.1.2 - The Myth of the Design Tradition

It is a widely held belief within the industry that a long-standing design-oriented tradition dominated historically, and has recently begun to diminish. This was certainly not the case in the time of the masterbuilder; that role was typically filled by a mason. The myopia of the design tradition is based on recent patterns in specific market segments.

Until recently, the architect was not involved in planning and design of a great deal of project types. Gutman points out that in the late nineteenth century, the majority of office buildings were designed by engineers, and that factories, their associated housing, and even religious buildings were typically not designed by architects. In fact, the battle over professional sovereignty between engineers and architects has continued in the courts in recent years.[9]

The persistence of the myth of the design tradition is rooted in the character of market needs following World War II. Post war United States saw rapid expansion of economy and businesses. Capital flowed and construction boomed. In response, the number of architects was trebled in five years.[10] The market needed to build, and financial constraint was not the dominant concern. The aesthetic and spatial skill of the architect were well suited to the market need: space.

2.1.3 - The "Traditional" Delivery Structure

The structure for capital project delivery that became popular in the post World War II era has been termed the "traditional" structure. The traditional structure involves a

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[9] Gutman, p. 17.

[10] Fernandez, p. 1.

project organization consisting of a separation of planning and design expertise from construction expertise. This presumes functional synergy of the planning and design phases.

The stability of the environment surrounding construction concerns in this period encouraged the development of firms with organizational structures that capitalize on stability in order to enhance productivity and efficiency. More bureaucratic and hierarchical organizations tend to respond to such an environment. These firms tend to be characterized by centralized decision making and formalized patterns of professional behavior.[11]

The "traditional" model is structured around an expert consultant/fiduciary role for the architect, as coordinator of planning efforts, designer and manager of design efforts, and overseer of the construction process. The various sub-consultants report to and are the responsibility of the architect. During construction, the builder implements the process as defined by the architect via contract documents. The architect oversees the construction process, resolves conflicts, and polices the builder for compliance with contract documents, or some interpretation of them. Figure 2B depicts the roles of the architect in the "traditional" delivery structure.

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[11] Mintzberg, p. 270.

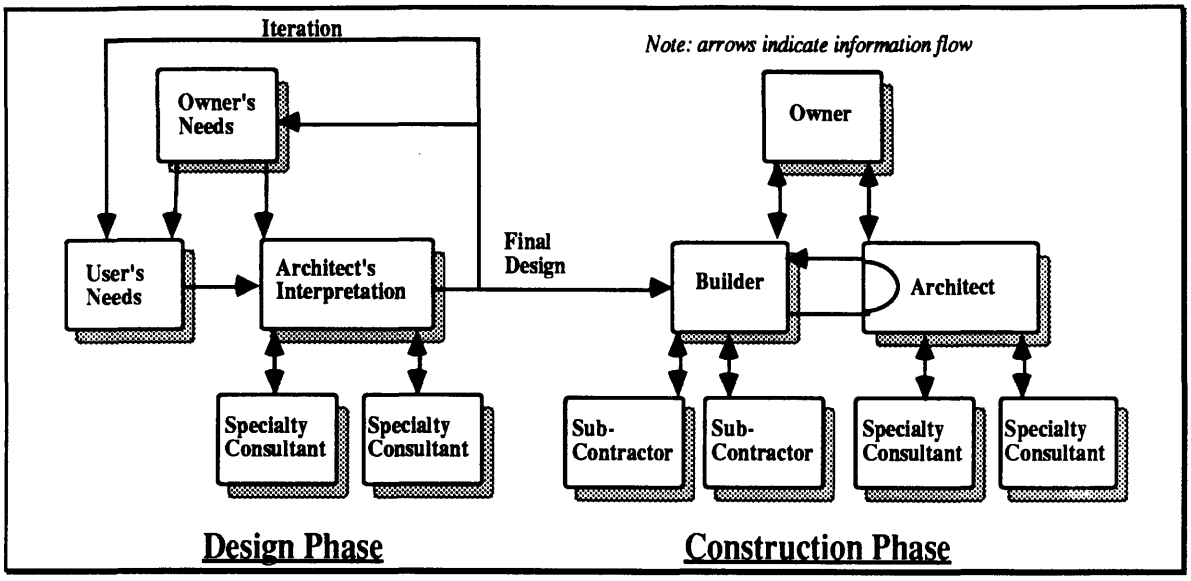

Figure 2B - The "Traditional" Delivery Structure

The planning phase implications of the "traditional" structure are the correlation of architect's skills with owner's needs. As discussed in Chapter 6, these skills are primarily creative and spatial, not organizational or financial. The architect as planner, and the "traditional" model, are only successful in a market which exhibits needs that correlate with these offered skills. As the environment surrounding capital project delivery changes, so do the required planner skills.

2.2 - PRESENT DYNAMICS

The immediate environmental dynamics surrounding the construction industry drive the services offered. Construction related services are market dependent, reacting to economic conditions and client business trends. The following describes the recent history of these market determining factors and relates the current trends in the construction industry to them.

2.2.1 - Supra-Industry Shifts

The construction industry supplies to and gains inputs from a broad external environment. Economic trends, technological advances, strategic shifts and related supra-industry trends all have significant impact. These items are the drivers which create industry trends which in turn directly influence planning professions.

2.2.1.1 - Economic Downturn

The most evident recent change in the economy is national and, to some extents, international stagnation. The construction industry is dramatically affected by economic conditions, particularly in the commercial segment. Capital projects are not generated as a continuum in response to need, but in tremendous steps. The steps must be justified not only by current need, but also by expectations of future growth. Stagnation implies little growth; "lumpy" investments are therefore not justified. One architect recently noted that the present size of the construction market is only two-thirds the size of a few years ago.[12] In fact, the situation is probably worse, as indicated in Figure 2C.

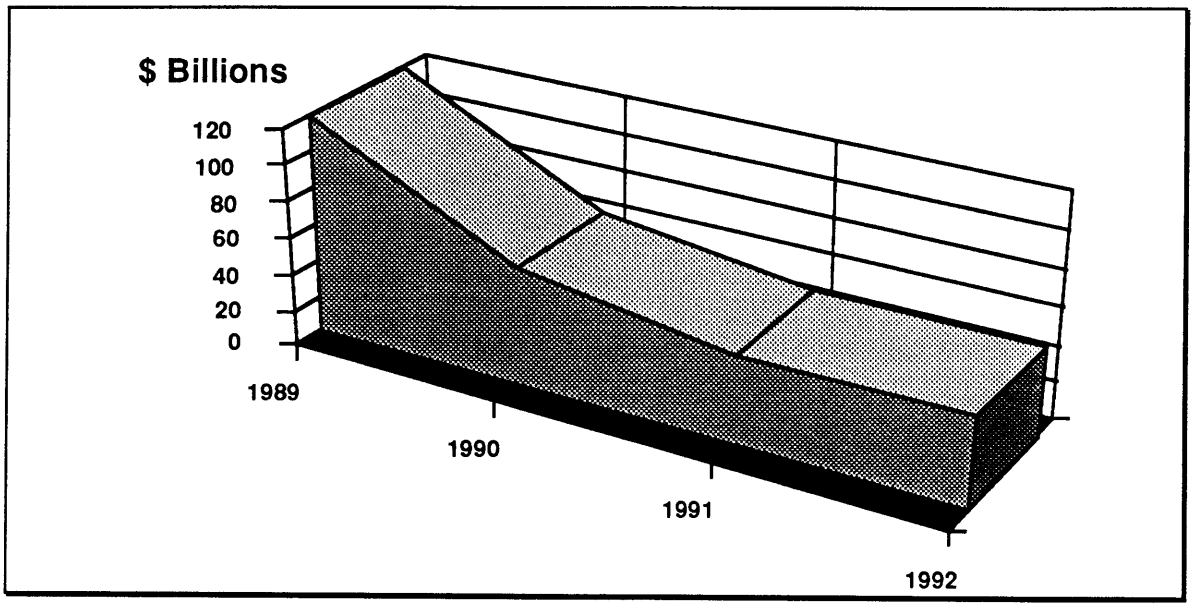

Figure 2C - Recent History of U.S. Building Contract Revenues[13]

2.2.1.2 - Technological Development

Technological advances broadly influence the construction industry. Although this is not a unanimously held belief in the industry, evidence is clear. Technological advances enable enhanced analysis and communication , raising client expectations. Facsimile, computer aided drafting, cost databases, computer software advances, probability

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[12] Architecture, 1/93, p. 106.

[13] ENR annual CM reports.

regression analyses, portable computers, smart tools, advanced materials, and innumerable other technologies influence the delivery of capital projects.

In particular, the "great equalizer of the 21st century"[14], the computer, accelerates initial planning market changes. Computers provide the same analytical abilities to anyone who has access to basis data. As data becomes increasingly available, once proprietary or profession-specific information is distributed throughout the industry. As an example, programming information for biotechnology facilities, the traditional data of specialized architect-planners, has been digitized for access by construction manager-planners.[15] The digitized information is simplified and generalized limiting its direct application to specific prototypical projects, yet providing an appropriate level of specificity for initial planning. The resulting homogenizing of capabilities erodes the value of traditional expertise.

2.2.1.3 - Global Competition

Recent advances in communications have expanded the boundaries of competition for industries. Firms have been forced to reconsider low cost positions within markets, re-evaluate breadth of service, and focus on optimized use of resources. Outsourcing of operations that are not core competencies implies downsizing. Accelerating global changes give long range projections high variance; owners are less likely to invest in capital projects when risks are higher. Optimized use of resources implies creative alternatives to the capital intensive construction of new projects. Although this tends to decrease actual new construction, planning efforts involved with those projects are increased.

2.2.1.4 - Capital Market Changes

Closely linked to the economy, the state of capital availability and cost of capital impacts the structure of construction projects. Presently, the cost of capital to corporations and institutions is significantly lower than that to developers. Developers are less likely to be sought out for their traditional capital resourcing expertise. Construction projects are more appropriately financed through corporate bond issues or similar vehicles. Of

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[14] Frennette.

[15] Pineo.

course, this conflicts with the resistance to build due to uncertainty about the future. Again, in-depth analysis of considerations like depreciation and resale value is increasingly required during initial planning phases.

2.2.1.5 - Liability and Insurance Crisis

Practitioners never fail to highlight their concern over the growth of professional liability claims and the resultant insurance crisis. A recent study indicated that in 1992, 82% of all architecture firms had liability claims pending.[16] The insurance industry has responded by establishing exactly what conduct will result in loss of coverage. However, in practice the fluidity of liabilities between professions inhibits understanding of each individuals' exposure. Each project has differing risks as allocated by contract. Very often, the practitioners are unsure of the ramifications of the nuances of contractual language, inadvertently accepting risk without just compensation. A growing tactic to avoid this problem is to shed liability whenever possible. The trend has shifted risk away from the designers and down the chain of constructors to the subcontractors. Owners shed risk in sometimes grossly unjust fashion, as is evidenced by the use of no-fault-forfeiture clauses[17].

Liability allocations affect the structure of the industry. Over-conservatism is reflected in the increased use of sub-consultant specialists while overview suffers. If one of the professional's primary concerns is to reduce their liability, the professional can not act as a true fiduciary for the client. Inappropriate indemnification throughout the industry elevate legal considerations above business considerations, obscuring professionalism. As owners increasingly attempt to shed both design and construction phase liability, the result is a shift toward design services contracted directly to the builder entity.[18] This indicates the continuing decline in the professional relationship between architect and owner of the "traditional" structure.

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[16] GSD p. 37.

[17] Miller, No Fault..., p. 27.

[18] Miller, Architect/Engineer..., p. 96.

2.2.1.6 - Cultural Indifference to Architectural Design

A recent poll indicated that only 13% of the British population could name three architects; the second most frequently identified modern British building was St. Paul's Cathedral.[19] (Built at the end of the seventeenth century, this is clearly not a member of modernity.) Of course, this is not to say that these same people are not impacted by good design, though they are not aware of it. The studied designs of mass-market appeal structures, such as casinos, reflect common view of notable architectural design. The poll indicates an enormous rift between the architects' view of design as sacred and the perspective of the ultimate user.

2.2.2 - Market Demands

The conditions within the client industries determine priorities when considering capital project investments. The above described supra-industry factors combine to create the present business conditions of consolidation, strategic focus, and fiscal accountability. These trends have significant impact on construction services. Change is evidenced by

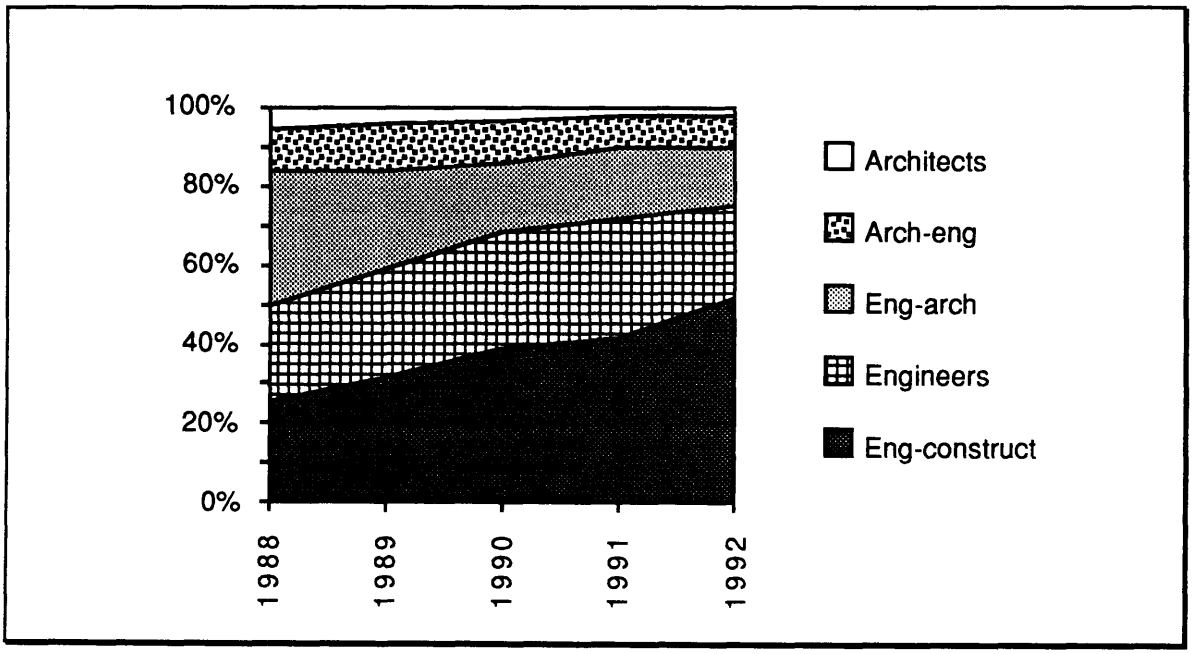

Figure 2D - Allocation of Design Fees[20]

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[19] Gallup Poll Monthly, p. 34.

[20] ENR Annual report on top design firms.

Figure 2D's indication of recent demand for design services including civil projects. The growing popularity of engineering-construction firms indicates market demand, in that market segment, for accountability and control via single responsibility. The building market with which this thesis is concerned is roughly represented by the design fees attributed to architects and architect-engineers along with some fraction of that attributed to engineering-construction firms. Although the fraction of fees to the architecture-based professions is diminished as a result of increased civil work, the change in allocation between the two is statistically insignificant.

2.2.2.1 - The Corporate Days are Over

Throughout the post World War II period, supra-market influences of economic prosperity and low cost of corporate capital allowed for loosely structured and limited analysis in planning of capital projects. Corporations and institutions responded to facilities needs by building and owning. The projects were viewed as necessary support of business goals. As such, owners did not require the security of precise cost and schedule estimates. Coffers could respond easily to any deviation from ballpark estimates provided during project planning.[21]

With recent economic slowdown, corporations actively analyze capital project alternatives to determine the most strategic approach. Often, this involves leasing from developers. The growth of large-scale speculative office buildings, as well as other types of buildings, dramatically changed the level of security required from planning analyses. As a stand-alone business venture, each project is analyzed to confirm adequate rate of return on equity invested. This requires comprehensive complex analyses of market demand, finances, opportunity costs, and costs associated with delivery and operation of the capital project itself. These costs are no longer simply funded out of some larger pool. Even corporations that continue to build and own recognize the efficiencies of treating projects as if they were commercial developments.

Although this change is quite complete in the corporate segment, institutional owners are just beginning to recognize the financial imperative of capital project planning. Recent developments have begun to force institutional clients like hospitals and universities to

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[21] Owens.

function more competitively. As these institutions are capital facility intensive, this trend implies imminent modification of project delivery. One prominent architect stated, "The institutions are beginning to act like developers, pushing the process, holding up final payment..." [22] Construction industry professionals have the opportunity to drive the market in this situation by applying intensive analyses typically reserved for commercial project planning to the institutional market segment.

2.2.2.2 - Investor Demands

Investors, particularly banks, are demanding accountability throughout capital project delivery. This trend is a response to recent losses suffered by the banking industry from bad real estate investments. Regardless, banks are often demanding more oversight of financial aspects of planning process and cost tracking throughout delivery. In effect, banks are driving financial expertise imperative in planning and implementation of capital projects.

2.2.2.3 - Direct Costs Increasing

The cost of capital projects per square foot continues to increase. The market is increasingly concerned with the amount of capital tied up in physical facilities. A recent study noted that the typical service business in the 1980s "saw its ratio of occupancy costs to revenues more than double, its real rents increases by 50%, and its space use per employee grow by 80%."[23] Space ranks second only to personnel as leading expense.

The total annual construction put in place in the United States is estimated at roughly $400 billion.[24] This represents approximately 7% of the country's gross domestic product of roughly $6 trillion.[25] Of this total, approximately $140 billion was due to building construction projects. Investigation of corporate capital tied up in physical facilities has been estimated at 20 to 40% of total net worth.[26] The market is increasingly cognizant of these assets, demanding increased value from planned and existing facilities.

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[22] Payette.
[23] Apgar, p. 124.
[24] Construction Review, p. v.
[25] Johnson, p. 47.
[26] Feinberg, p. 96.

2.2.2.4 - Indirect Costs Being Realized

The indirect costs associated with capital projects are functions of worker productivity, work flow efficiency and business unit synergy. To varying degrees, the market is recognizing these values as appropriate aspects of project planning. The more global concerns of business unit synergy is a fundamental aspect of corporate strategic planning, affecting capital projects in basic ways. Enhanced project value via planning and design which facilitates workflow efficiency and encourages higher worker productivity is less universally recognized as an integral aspect of initial planning. However, recent publications indicate the trend toward greater understanding of these values.[27] All these issues imply a broader scope of analysis during initial planning.

2.2.2.5 - Opportunity Costs Exploding

Opportunity cost is the potential return from an alternative investment, with similar risks, of the capital dedicated to any given project or what that money could earn elsewhere. Contributing to the focus on opportunity cost are cost of capital, return from the stock market, and the low return and high risk typical of capital projects.

Although the current cost of capital is setting record lows, investors must currently measure opportunity costs against other investments. As this report is written, stock markets in the United States and around the globe continuously break record highs. Concurrently, the real estate market continues to yield low returns with very high risk.

Concern over opportunity costs drives the need for financial analysis and schedule analysis during initial planning. The financial analysis is required to indicate the actual costs associated with options as well as returns required by the enterprise's level of risk. Schedule analysis of options is required to indicate timing of capital outlays, so that hard opportunity costs can be determined.

2.2.2.6 - Outsourcing Trend

The trend toward outsourcing of planning functions is perhaps the most significant influence on the initial planning market. One of the primary responses adopted by any

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[27] Steele, p. 30.

business entity in an increasingly competitive situation is analysis of core competencies and the associated outsourcing of non-strategic functions. Outsourcing is simply contracting with external organizations to receive a given service. The effect is that increasingly, people working in and for organizations will actually be on the payroll of independent outside contractors.

For the delivery of capital projects, this has meant an increased reliance on external consultants particularly during initial planning stages of project delivery. Until recently, most large corporations and institutions had significant in-house capital project teams including planners, designers, and construction administrators. Many firms were growing so fast that in-house capabilities were considered strategic. This has been less prevalent in recent years. Current trend is outsourcing of capital planning functions. Reports have indicated that as much as 50% of the Fortune 1000 corporations expect to contract out real estate operations.[28] A skeletal communication/facilitation function remains, but the analysis expertise is increasingly provided by external consultants.

2.2.3 - Industry Response

As an industry, construction professions are slow to change. Industry fragmentation, low profit margin, multiple party processes and project orientation all contribute to the notorious rigidity of the traditional delivery model. However, the beginnings of dramatic changes throughout the industry are evident. Individual professions are becoming more attuned to their markets, and are responding with more tailored services. More importantly, but to a lesser degree, the relationships between various professions contributing to the delivery process are improving.

2.2.3.1 - Intra-Professional Changes

As is discussed in Chapter 6, industry response has primarily been through development within traditional structures. Evidence includes the growth of construction management out of the general contracting tradition and design professions' embracing of computer aided drafting systems. Construction management responds to market demand for construction expert fiduciaries; use of CAD reflects market demand for design flexibility. Whether contractual or technological, the professions are developing traditional services

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[28] Urban Land Institute, p. 13.

to respond to perceived market demands; of course, both perception of market demand and possible response are limited by professional focus, as is addressed in Chapter 6.

Professional focus inhibits market responsiveness; changing demands of the marketplace are slow to create real change in services offered. To varying extents, professions involved in initial planning are production-oriented. Focus on traditional craft hinders ability to respond to market changes. Those organizations that best reach the stage of market-orientation are able to prosper as market requirements shift. (This discussion refers to Fisher's business policy evolution model presented in his book, *Marketing for the Construction Industry.*)

Present **Typical of Construction Industry Firms**		**Future** **Market Demands Re-orientation**
1 **Production Orientation**	**2** **Sales Orientation**	**3** **Market Orientation**
Focus on operational expertise	Focus on product	Focus on satisfaction of customer's needs
Marketing seen as demeaning	Sales emphasis, some crude marketing	Marketing to identify customers
Product success performance targets	Sales results performance targets	Customer satisfaction performance targets

Figure 2E: Fisher's Evolutionary Stages of Market Orientation

With regard to initial planning, some firms from each profession are actively developing market responsive services, while many others remain production-oriented. This research indicates the inertia of craft mentality throughout the industry as stronger than the momentum of service development. Various trade publications often feature articles concerning the development of initial planning skills for their particular professional audience, but framed by the production-orientation of that particular profession.

In spite of the inertia of craft-orientation, some market leaders have been able to develop genuine market responsive planning services. Primarily, this has been through dissolving

the traditional biases of the particular profession through infusion of alternative perspective, particularly at the strategic apex. For example, enhanced perspective can be through infusion of business and real estate expertise at the top management level of an architecture firm, strategic business and marketing orientation in a contracting firm, or construction skills in a development firm. In general, leadership vision is critical to the organization's market-orientation. As professions become more market responsive, inter-organizational structural shifts occur.

2.2.3.2 - Inter-Professional Changes

The recent past has witnessed accelerating changes in allocation of services to various professions involved in project delivery. Extrapolation of traditional roles has dominated, although new organization types have emerged as well. Primarily, the market no longer views planning and design as inherently similar and continuous. Instead, these are typically identified as unique phases with distinctly different objectives. As such, the skills required to execute the initial planning phase are not the same as those required for the design phase. As discussed above, confusion in the wake of these increasing changes is the impetus for this avenue of investigation.

2.2.3.3 - Supra-Professional Changes

The development of the industry is also being spurred by forces beyond individual professions. The development of non-traditional advanced degree programs at major universities enables development of industry specific education as well as research. Moreover, slowly changing curriculum of traditional professional programs reflects the gradual response of academia to the market demands of its graduates. However, these changes require great effort; market responsive education is generally limited to a small number of small programs. Curiously, the number of graduating architects has recently increased dramatically, far surpassing demand.[29] The overflow's migration to related professions enhances interdisciplinary perspective, leading to more market responsive organizations.

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[29] Gutman, p. 125.

2.3 - Chapter Conclusion

This chapter describes the history of project delivery change as market driven. Recent increased dynamics of market demands has spurred the development of various alternatives to the "traditional" project delivery system. The inertia of this fundamentally production-oriented industry shows signs of giving way as market-orientation is evidenced in some firms. Market-orientation is expected to enable more effective industry response to complex demands stemming from economic, technological, financial, and other supra-industry forces. Specific manifestations of market-orientation are explored in Chapter 6.

CHAPTER 3
INITIAL PLANNING

In this chapter, the initial planning process is introduced in relation to overall delivery and dissected into fundamental components. Finally, with an understanding of the topic established, its history is presented as context for further discussion. As previously presented in Figure 1A, initial planning is the interface of strategic planning and project implementation. It is an extension of the business or strategic planning effort and should not be considered as part of the subsequent implementation phases. The analysis involved in initial planning ought to reflect the leverage of reliant decisions.

3.1 - INITIAL PLANNING IN PERSPECTIVE

To put initial planning into proper perspective, a descriptive analysis of the overall delivery process is presented. Initial planning involves fundamental analysis and definition of any subsequent implementation options. As such, initial planning has an inherently fundamental influence over the ultimate value of the project relative to the totality of owner requirements. Optimization of subsequent phases of delivery can not correct sub-optimal initial planning. In addition, the costs typical of this phase are minuscule by comparison to subsequent phases. As such, the net value resulting from initial planning efforts is by far the highest of any phase of project delivery. Unfortunately, this phase is often the most neglected.

3.1.1 - Initial Planning Relative to Project Delivery

Throughout the relevant literature, capital project delivery is depicted as fundamentally project-oriented. The resultant project, as well as the presumed strategic need for the project, are not questioned. This thesis presents an alternative planning-oriented perspective. From the vantage point of planner, neither strategic need for a project nor a resultant construction effort are presumed. As such, the delivery process begins before project generating need is defined, and very often results in something other than construction of a facility. First, a review of the prevalent models of project delivery is presented, followed by a broader interpretation.

Project delivery is commonly depicted as a process of increasing project definition. Both physical product and construction process are intertwined in this. Depending on the type of project, a certain amount of project and process definition exist at the outset. For example, inherent definition in a parking garage project is higher, both in terms of product and process, than that of a pharmaceutical plant. From inherent definition, refinement continues until the actual project is completed. Figure 3A represents this view of project delivery. In the "traditional" procurement method, the delivery is through purchase of discrete products: initial planning services, design services, and construction services. In reality, these products are not discrete, but overlap; the process is not linear, but circuitous. Moreover, prior to initial planning, definition is null.

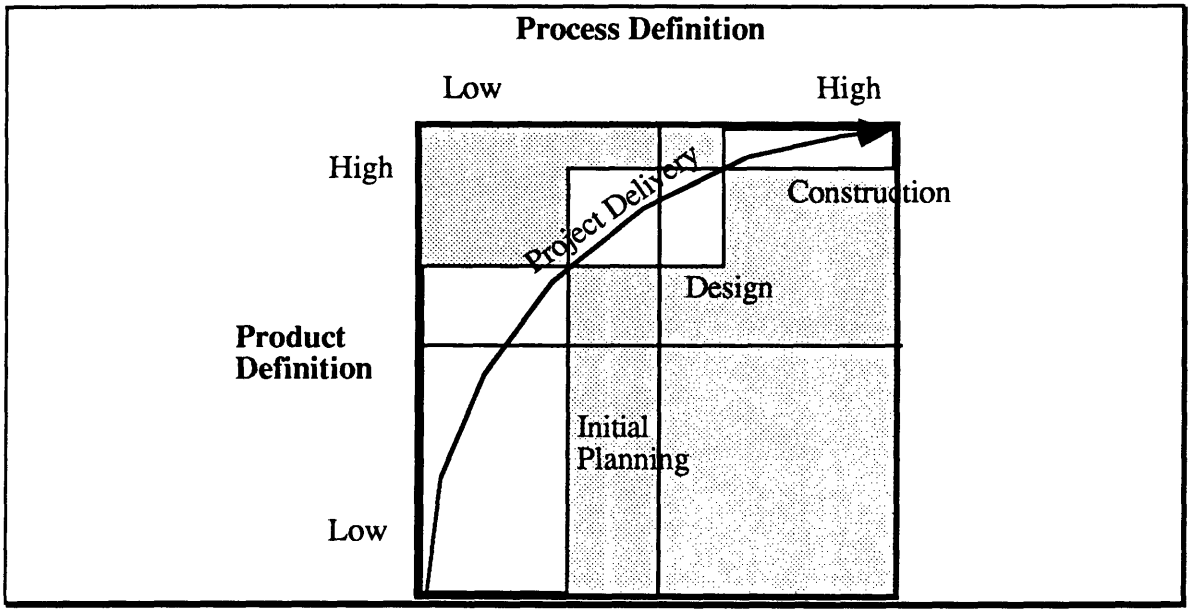

Figure 3A - Project Delivery as Definition Process[30]

By contrast to the above typical portrayal, this thesis hypothesizes that delivery of capital projects begins before the formal planning phase and continues into operation of the facility. Three defined but overlapping stages are involved: planning, implementation, and operation. Each of these stages is comprised of definable but overlapping phases as indicated in Figure 3B. Owner concerns throughout the process are included as reference to personal experience.

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[30] Howell, p. 14.

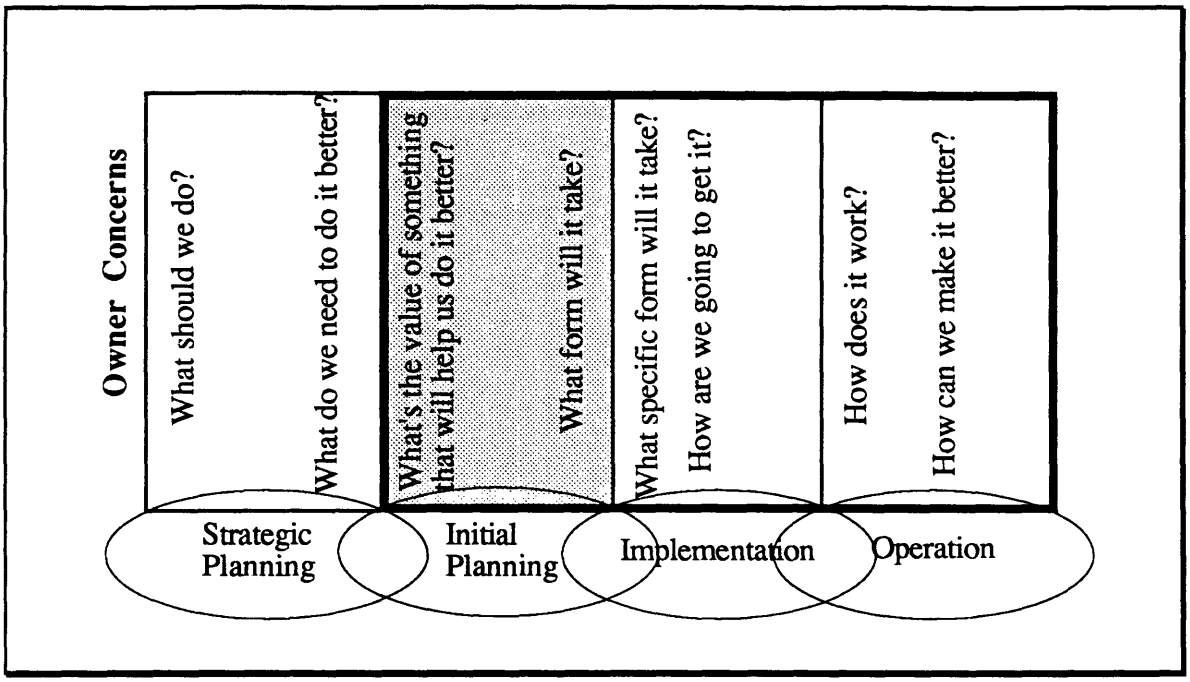

Figure 3B - Project Delivery as Continuum from Strategic Planning through Operations

3.1.1.1 - Planning

The planning stage for a project comprises the analysis of a problem and a determination of the best course of action to solve the problem. More specifically, a strategy related requirement for a capital facility is defined, the project related parameters are detailed, the project options are synthesized and presented for the owners' decision.

The definition of a capital project actually begins before formal project planning. Business planning and initial project planning are, to varying degrees, integrated phases of the planning stage. The degree to which the two are integrated is determined by the strategic significance of capital assets to the overall business. The planning stage includes the analysis of strategic requirements, forecast of physical needs, analysis of construction and real estate markets, financial and legal analysis based on identified parameters, analysis of delivery strategies, synthesis, distillation of the options with comparative analysis, and finally the decision.

3.1.1.2 - Implementation

The implementation stage involves the realization of the project as defined during the planning stage. The boundary is usually unclear as the detailed definition phases typically begin during the distillation of project options. This is required for the development of parametric comparisons. Implementation is the focus of the construction industry; design and construction phases are involved. Design consists of the development of increasing level of detail and definition, arriving at a stage of virtual facility. Architects break this process down into distinct phases for structural clarity, but the divisions are artificial. The continuum of definition is schematic design, based on the program developed in planning, the design development phase, and the construction document phase. However, the design phase continues throughout the construction phase. Figure 3A shows the continuing definition of product throughout the construction phase as subcontractors and suppliers determine the minutia of their components.

The construction phase consists of interpretation of design efforts, translation into process information, analysis of costs and strategies, team organization, materials procurement, actual construction and facility start-up. This is the actualization of the abstract. The construction phase reveals aspects of reality that influence the ongoing design process. The process is neither linear nor fully defined at its outset. The goal again is moving and the process to reaching it continues to react to this change and other influences. Technical, managerial, financial, and external complexities force the efforts away from the goal. At its completion, the physical facility exists, but the strategic need that generated it is still not fulfilled. Operation is required for fulfillment.

3.1.1.3 - Operation

Facility operation does not imply the completion of the planning efforts relative to overall needs for the facility itself. Instead, a multitude of forces continue to affect the goal for the facility and the needs of the organization. Retrofitting of the facility is continuous and, to varying degrees, begins immediately after operation commences. Deficiencies are determined via operation; planning continues on a micro level. Thus, it is important for both owners and professionals to keep in mind the constant dynamic of project goals.

3.1.2 - Initial Planning as High Leverage Arena

The Business Roundtable *Report B-1* reported a payoff of 10-20 times the added investment from increased design phase efforts. The same organization's *Construction Industry Cost Effectiveness Study* stated that inadequate scope and design definition during the initial planning stage is the leading cause for cost overruns.[31] The resultant costs include both hard costs of rework and the soft costs associated with disruption of work flow.

Although this author puts little faith in the accuracy of these numbers (they are based on a limited survey of large industrial projects) the potential pay-back on any project is virtually guaranteed by the composition of project costs. Design phase costs, including initial planning, typically constitute 5-10% of project costs; therefore, a 5-10% increase to design costs translates to only 0.25-1% increase in overall project cost. Figure 3C indicates the relative expenses involved in capital project delivery. As example of this relationship, increased value of $100,000 on a $30 million project will justify such added design phase efforts.

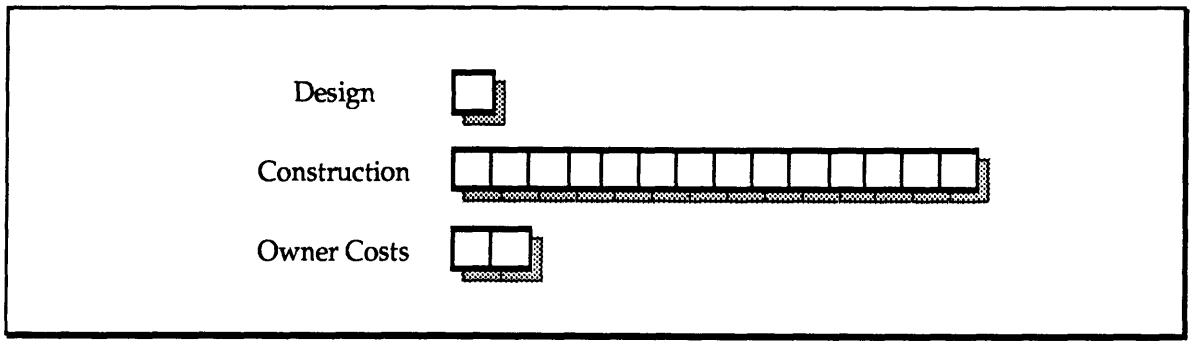

Figure 3C - Relative Project Costs[32]

3.1.2.1 - Influence Diagram

High leverage is associated with even small decisions early in the planning process. The value-added by one slightly clever idea can far outweigh that of many brilliant ideas later on in design or construction. Numerous examples of this potential were provided by the

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[31] BRT CICE, p. 6.

[32] BRT Report B-1, p. 4.

professionals interviewed in the course of this research. Unfortunately, more stories are told of inappropriate decisions made during initial planning and the ensuing uphill battles that last the duration of the project.

Figure 3D shows the author's rendition of the now ubiquitous influence-expenditure curve diagram. The graphic was made popular by both the Business Roundtable Reports on Construction and the Construction Industry Institute. In general, most of these diagrams depict the rapid decrease in the influence of decisions as the process proceeds through planning, design, construction and operation. This curve is not, as is commonly shown, a smooth inverted S-curve, but instead is lumpy. The rapid drops follow project defining decisions. Of note is the dramatic diminution of influence toward the end of the planning phase, and the relatively insignificant expenditure at that time. By the time the project enters implementation, the direction is well established and the fundamental design parameters are established (such as a 50,000 square foot office addition in a certain location, designed to a known level of amenities, with an established budget, etc.)

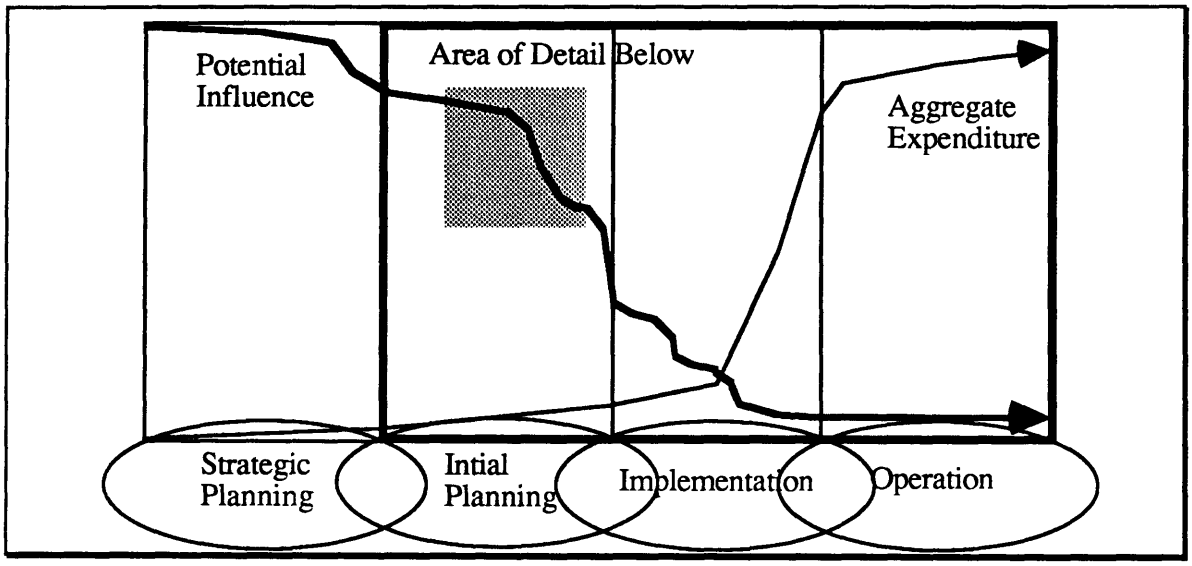

Figure 3D - Influence-Expenditure Curves

The influence diagram is further explored in Figure 3E. A closer analysis of one of the decision moguls illustrates the difference between ideal and actual planning. The idealized shape is that of a series of steps; influence remains constant until the decision is made. This reflects a pure objectivity, without prejudices, when investigating and considering data. The group's ability to follow any one of many avenues is not diminished by the process of collecting and analyzing relevant data. Only when a tact is

chosen is the influence of later decisions decreased. Of course, this ideal is not possible. Merely considering an option biases the decision making body. Proximity to the ideal indicates level of comprehensiveness and objectivity of planning.

Furthermore, the ideal initial planning influence curve remains constant throughout this phase and drops dramatically only at planning completion. This represents an idealized process in which all avenues are explored and comparable data on each are considered when choosing the final conceptual plan for the project. Although this is not realistic (life is too short) the concept indicates an impossible goal which the owner and planning consultant should keep in mind throughout the process.

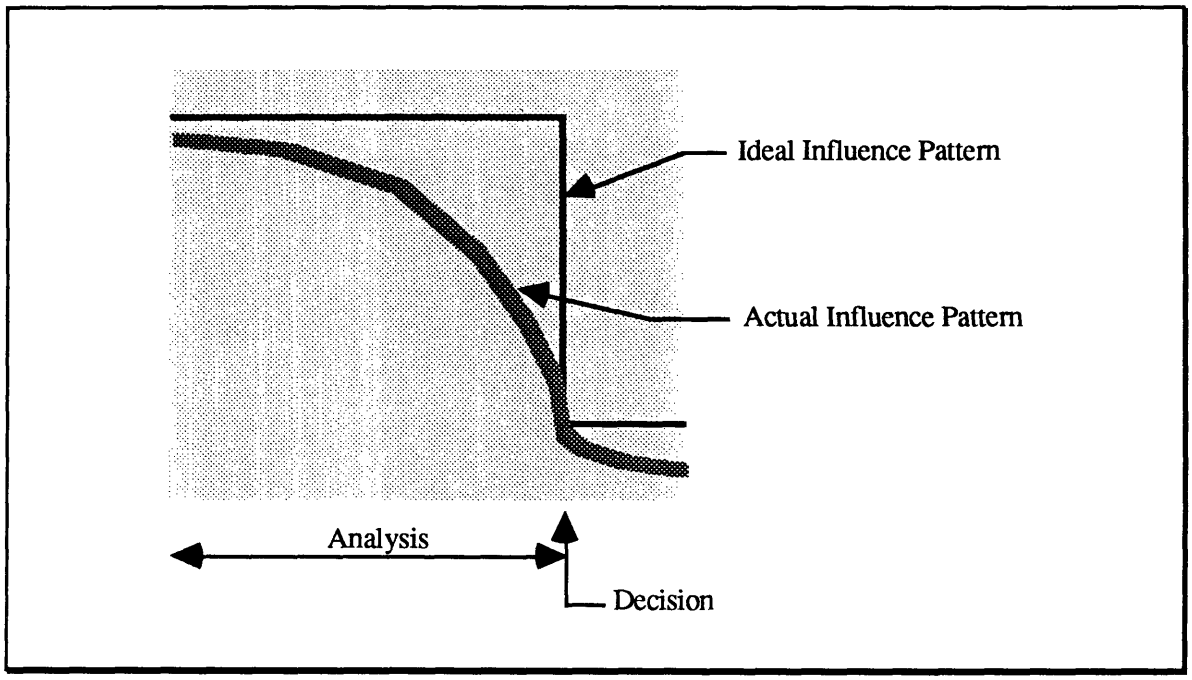

Figure 3E - Detail of Influence Curve

The ability for the project to retreat to a state of less definition is also an option that the owner and planner must maintain. Pressures from within and without the planning group typically inhibit such an option. The wise planning group will maintain this option, though, particularly in light of the relatively low expenditure loss associated with this tactic versus the high cost of sub-optimal product. This option should be more prevalent, considering the many accounts of flawed initial planning decisions and the significant associated consequences.

3.2 - The Initial Planning Function

Above, the delivery process was discussed with emphasis on the relationship of initial planning to the other phases. From this point forward, the discussion will focus on the initial planning phase. The area of interest is presented in terms of the process involved, the issues involved in those processes, and the role of the initial planner relative to these processes and issues. Finally, a brief history of initial planning consulting and decision making is presented. With an understanding of the function and the history, one can better analyze present planning demands.

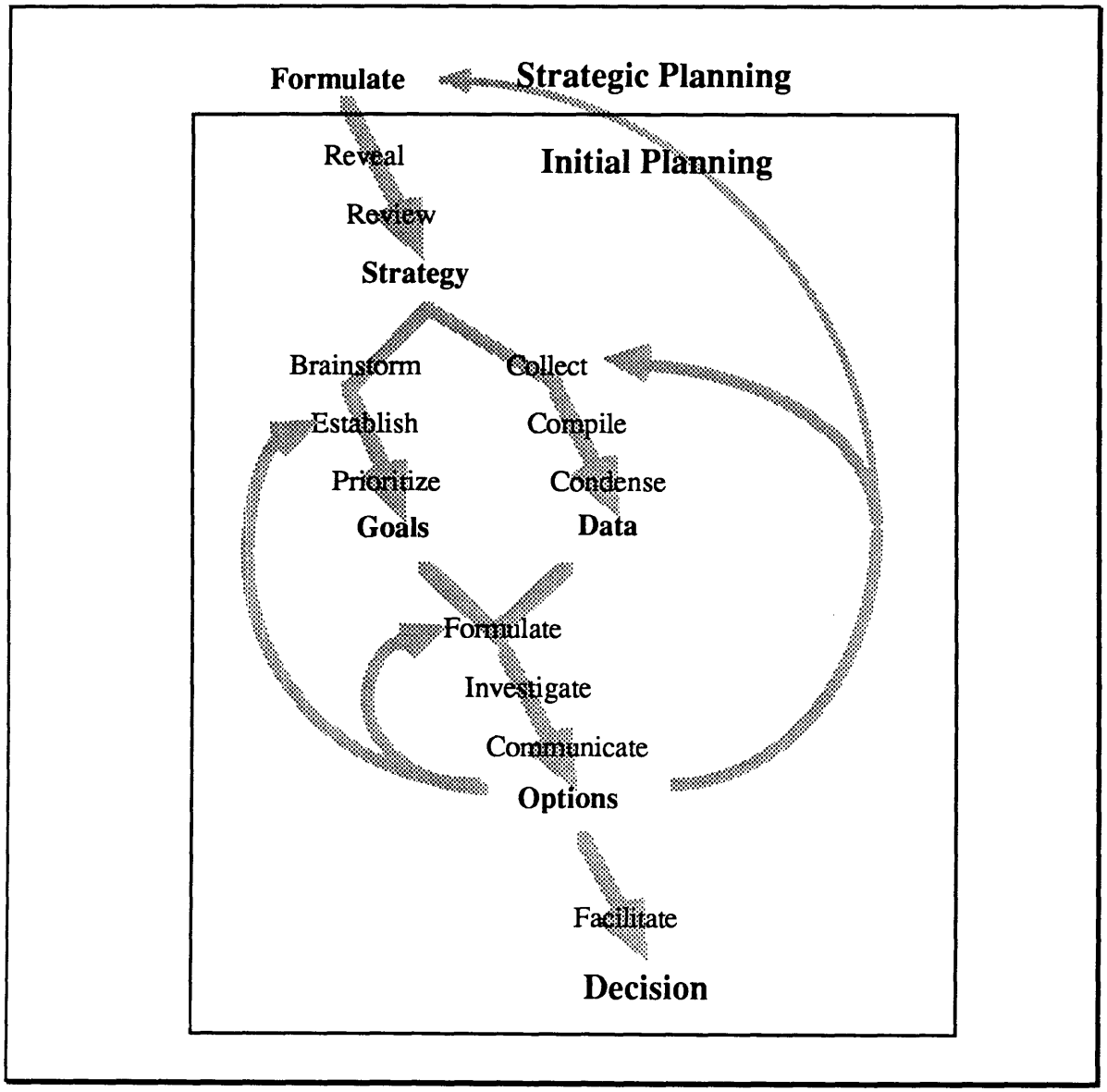

Figure 3F - The Initial Planning Process

3.2.1 - The Process of Initial Planning

The planning function is in fact not centered on decision making as much as collecting, sorting and analyzing information from which decisions can be reached. This decision support facilitates the decisive action of the decision making body. The task of the planner is to formulate and present the options clearly. Often though, the planner is expected to influence the decision makers toward the optimal option.

Associated with each of the interrelated areas of concern, identified below as aspects of initial planning, are a series of tasks related to the basis strategy, the owner goals, the data involved, the options resulting, and the decision making. This process is graphically represented in Figure 3F. Primarily, the initial planner is concerned with revealing the basis strategy and then relating it to capital project issues. Subsequently, project goals and relevant data are investigated. Goals proceed through brainstorming with all strategically interested parties, through a definition process in which they are established as pertinent, then through prioritization, to define relative imperative. Typically subsequent to this, data is collected, compiled into compatible form and condensed to a comprehensible framework. From the goals and data, options are formulated, analyzed for comparison, and communicated to the interested parties. Finally, the decision is facilitated. At any point, the process can become reiterative; the timing of tasks is not necessarily linear or in the presented order. In addition, within each major decision track are multiple smaller ones. In effect, the process is carried out at a number of levels simultaneously.

3.2.1.1 - Relation to Strategy

Owners typically generate a general project definition based on a strategic problem or need prior to consulting any planner. This project definition is general and unstructured; priorities among many objectives are loosely defined. The initial planner develops definition through the subsequent stages. Definition is ongoing throughout implementation and operation.

Relating the presumed project definition to the basis owner strategy is required for effective planning. Business planning and initial project planning are, to varying degrees, integrated phases of the planning stage. The degree to which the two are integrated is determined by the strategic significance of capital assets to the overall business. For example, the market positioning of a hospital is strongly related to the location,

amenities, equipment, appearance and other physical facility factors. In such a case, the initial planning of a capital project must be intimately connected to business planning. Planning must primarily respond to the ground rules as outlined in the strategic plan. More interestingly, initial planning may reveal inconsistencies or strategic sub-optimizations which feed back to business planning.

Initial planning involves the processes of revealing and then reviewing the owner organization's strategy. Revealing often leads to the revelation that the strategy is unclear, not universally understood, antiquated, or inappropriate. In the interviews conducted for this paper, the author was repeatedly amazed by the professionals' experience with their clients strategic plans: very few have solid plans. If their is a plan, or after one is established, the initial planner reviews the strategy to familiarize herself. This strategy forms the basis for the subsequent focus for project goals.

3.2.1.2 - Goals for the Project

With the basis strategy established, the development of project goals begins. Brainstorming allows all possible concerns and objectives to be entered. From this goals are established. Prioritization of various goals, not an insignificant task, is facilitated by challenging the various goals established. Establishing priorities is made difficult by inconsistent perspective within the organization and between owner organization and planning consultant. This reinforces the effectiveness of clearly establishing universal understanding of the basis strategy. Within any corporation exist functional groups centered on related areas of operations. Each sub-organizational group can have its own priorities relative to the project. In fact, within each functional group, multiple members may have varying views of project priorities. Explicit comparison of member and group priorities has been shown to be beneficial.[33] Thus, a primary challenge of initial planning is to facilitate a general consensus of owner project priorities. Effectiveness in this role is directly proportional to the compatibility of the owner project objectives and the professional biases and priorities of the planner.

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[33] CII #12-1, p. 11.

3.2.1.3 - Data Management

There are many sources from which relevant planning information is derived. When compiling information, opinions must be substantiated with factual data, even if consensus exists. Opinion is by nature of a higher order of inference than should be acceptable for such an analysis.[34] Most often, the inputs are in the form of generalizations made by the planning team members. Generalizations must be investigated to determine the underlying factual data. Inputs such as " these departments must be adjacent" or "we always use competitive bidding" must be reduced to factual data that describes in specific terms underlying causes for these generalizations.

Effective planning involves translation of vast amounts of information into a language which is useful to the analysis. A manufacturing model interprets this translation as conversion of customer requirements into design requirements. Design requirements are then translated into parts characteristics.[35] The analogy to initial planning of capital projects is direct: needs or constraints into project parameters then into physical characteristics of the actual project.

3.2.1.4 - Options and Decision

Potential options must be identified in response to the goals and data resulting from prior activities. In so doing, the planning consultant is selective; decisions are made. But the difficult decisions are left to the owner. Choices emerge as options are analyzed, evaluated and comparisons made. The planner must make clear estimated variance in the attributes associated with each option. This critical issue of probability of outcome is often overlooked. With this data, the decision makers can make educated decisions with known levels of risk.

The planning consultant must consider the option of doing nothing; of not building. Peter Druker indicated the importance of this option.[36] For the initial planner in the construction process, this option is traditionally not part of the scope of analysis. This thesis is, in part, a response to this deficiency. As is further explored in Chapter 6, the

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34 Senge.

35 Hauser, p. 73.

36 Druker, 360.

more traditional production-oriented construction industry firms are more likely to be affected by this "build bias."

A concern of the initial planner is the need to keep all team members from diverse backgrounds informed of and involved in the process. The challenge of this reverse translation of analysis complexity into receivable form is critical to facilitation of informed decisions by the owner organization. Inherent in translation of information is a conversion of input requirements into possible responses. Multiple requirements are compiled and some measure of importance is identified for each. (This weighting is perhaps the most difficult area of consensus.) A series of responses is generated which seek to satisfy needs inputs as satisfactorily as possible. A cross-check identifies the existence and strength of relationships between needs and responses. The technique of Quality Function Deployment provides a formal methodology for the above described analysis.[37] Figure 3G depicts the two dimensional matrix employed to identify correlation of needs to responses. The responses then become inputs to subsequent stages of the analysis process. In initial planning, multiple concurrent analyses of this type are required.

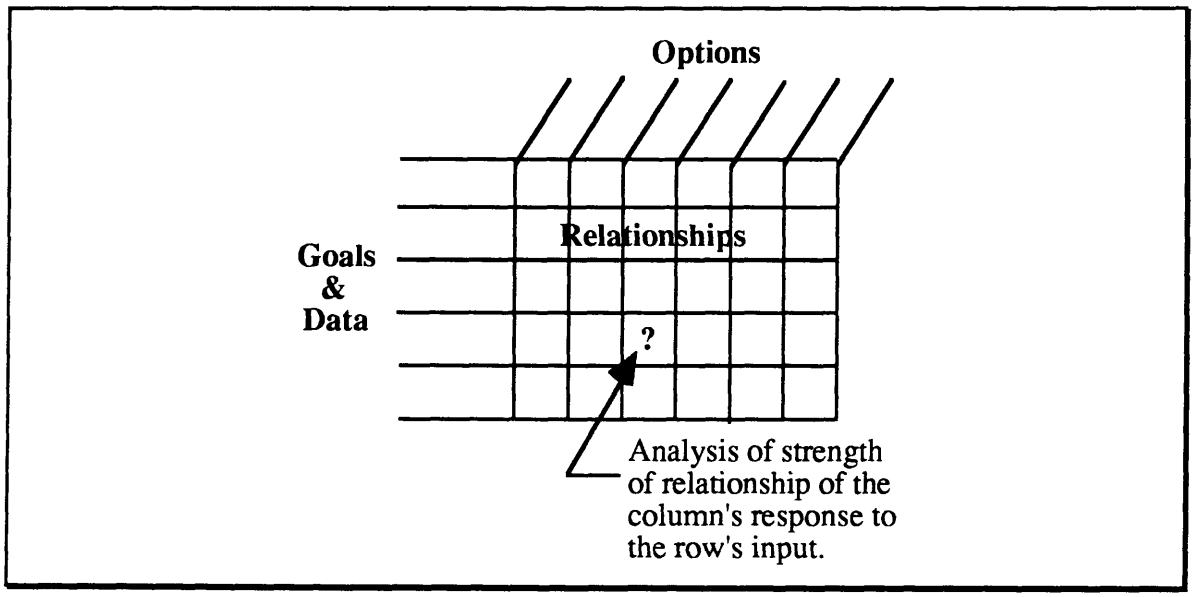

Figure 3G - Investigation of Options through Quality Function Deployment

[37] CII #69, p. 27.

3.2.2 - The Aspects of Initial Planning Issues

Planning includes the analysis and synthesis of information related to four areas of concern: financial, strategic, physical and implementational. Figure 3H is a partial listing of such concerns leading to the ideal project definition, represented as the target.

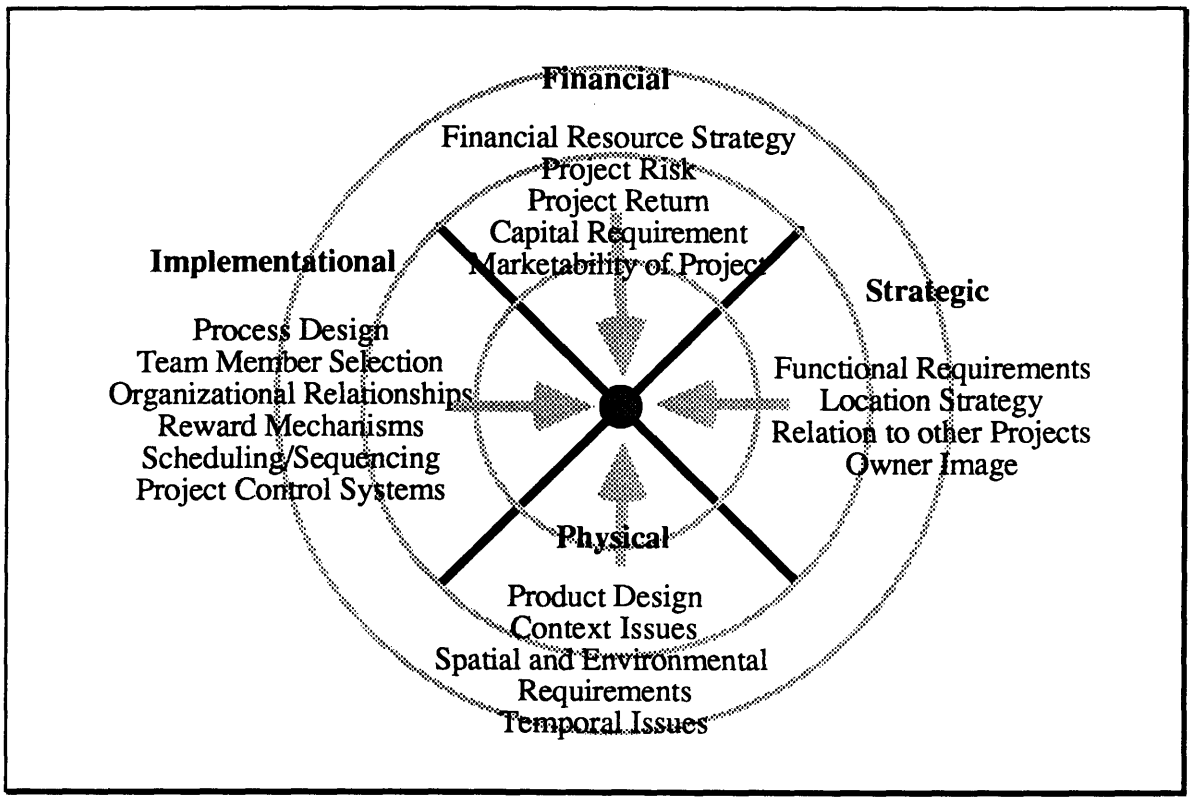

Figure 3H - The Four Aspects of Initial Planning Issues

The definitions presented below of these aspects are intentionally brief and general. As the term *aspects* implies, this is not an issue-based analysis. *Issues* are herein considered as concerns which require decisions. An issue is whether or not to do something, like include a certain department in the scope of a project. Aspects of such an issue, not the issues themselves, are categorized as financial, strategic, physical or implementational. Categorizing the vast number of planning issues, if not impossible, would lead to over-simplification. Simplification is not helpful; the very essence of initial planning is complexity and inter-relatedness.

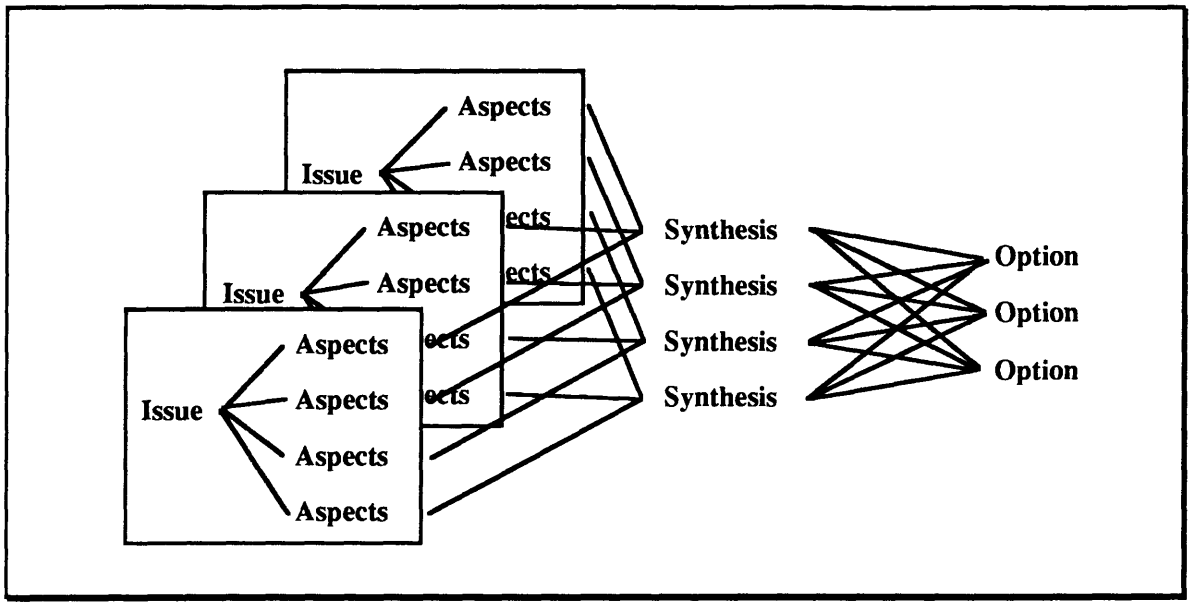

Figure 3J - Graphic Definition of Aspects of Planning Issues

Figure 3J graphically clarifies the definition of aspects of planning issues. Three issues shown represent a high number in reality. Each issues has four aspects, identified above, associated. The similar types of aspects, financial for example, are synthesized. These syntheses then combine in different ways into the multiple solution options. In effect, the questions are dissected into aspects which can be integrated, leading to potential solutions. Although this presentation is highly abstracted into a rational linear process which is not representative of actual initial planning, it conveys the definition of the terms used throughout this thesis.

The example issue, "should department X be housed in this facility" has various aspects associated. Financially, there is a feedback to the cost of the project and therefore influences resourcing of capital. Strategic aspects include potentially enhanced support of the owner mission if the department is included. Physical aspects are obvious; and implementational aspects include sequencing of the department's relocation and may influence more fundamental implementational concerns if the scope of the project is significantly increased by the department's inclusion.

The author's framework represents a holistic perspective of initial planning. Typically, planning models focus on one or perhaps two of these aspects, depending on the author's

profession and audience.[38] Most commonly, physical aspects are presented as primary, with implementational and less frequently strategic aspects included as secondary. This thesis hypothesizes that each of the four aspects presented are equally fundamental, requiring equal emphasis during planning. This view is grounded in the author's perspective of the total value of a project and value contributed by each aspect of planning issues. Though it is difficult to separate the value-added influences of aspects of planning issues, adequacy of response to all these aspects determines project value, monetary or otherwise. Neglecting any of these four aspects of planning issues reflects a narrow view of value composition of projects.

3.2.2.1 - Financial Aspects

The financial aspects of initial planning issues are focused on resourcing of capital required for projects which in turn determines capital budgets. This is not to be confused with cost control aspects, which are herein considered implementational. Financial aspects are broadly defined as any aspect of analysis, facilitation or innovation which affects the capital structuring of the venture. Obvious examples include issue aspects directly related to attracting and securing financing. Supporting analyses ascertain the risks versus benefits of project involvement. These analyses draw on a wide range of issues involving all other aspects of planning. Manipulation and integration of data which supports financial resourcing implies a specific direction or objective that is financially oriented.

3.2.2.2 - Strategic Aspects

Strategic aspects of initial planning issues are focused on owner needs: the basis for planning efforts. Strategic aspects involve all concerns that draw upon or feed back to the general strategy of the owner organization. The mission of the owner organization must direct objectives of the project; strategic aspects transmit this vital link. Less obvious is the input of other aspects of planning to the strategic mission. For example, physical issues, for example physical attributes, must reflect owner image derived from the basis strategy. This represents a strategic aspect to a primarily physical issue.

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[38] Pena, Howell, Gibson, Laufer.

Desires and constraints of strategic aspects are intrinsically tangled. Strategic constraints represent absolute benchmarks that are critical to project success whereas strategic desires may be an expansion of the constraints. For example, a constraint may be the need for a facility to integrate various remote core functions whereas a strategic desire may elaborate to include additional support functions. A series of constraints are typically associated with a strategic concern, but these fall into other concern categories. For example, a temporal aspect to a desire (operation in 18 months) is also an implementational constraint.

3.2.2.3 - Physical Aspects

Ultimately, project delivery is actualization of some physical product, or at least is intended to be. The actual spatial needs of various components within the owner and user organizations are of fundamental importance. The physical aspects of planning issues are very complex and interdependent. Any given issue can have a multitude of physical aspects associated. For example, a technology employed can drive spatial design. In the case of self-contained mobile immuno-suppressed animal barrier caging, a new technology, the use dramatically changed spatial and environmental design and protocol for the use of these facilities. The effects of issues on physical attributes of a project are the definition of the physical aspects of planning issues.

3.2.2.4 - Implementational Aspects

Implementational aspects of planning issues are centered on the realization of project objectives. Direct planning issues include who to hire, when to hire them, how to allocate risk and responsibility, how to structure team and process, and how to reward team members. However, many subtle influences affect these decisions; these influences are the implementational aspects of planning issues. Of course, these aspects are found throughout planning issues. As example, the primarily strategic issue of including a certain department in the scope of a new facility has implementational aspects. This decision may have associated with it tight scheduling control, flexibility of design and construction, or special assistance in designing the facility. Each of these implementational aspects drive the determination of the implementation solution options such as who to hire, etc.

Ironically, by the time the initial planners are considering these concerns, at least one important process defining issue is moot: the initial planner entity and its relationship to the owner and the process. This thesis is a response to this dilemma.

3.2.2.5 - Inter-relatedness of Planning Issues

Most planning issues have aspects associated with each of the four areas discussed above. As such, the planning issues influence many different decisions. To make this inter-relatedness explicit, figure 3K provides an indication of the interaction between issues for hypothetical new and renovation projects. Arrow direction indicates the influential aspect of issues primarily associated with the source end of the indicated flow. Arrow size indicates relative influence. Note the influence of physical issues in renovation projects; limitations in this area often drive even strategic planning aspects of such projects.

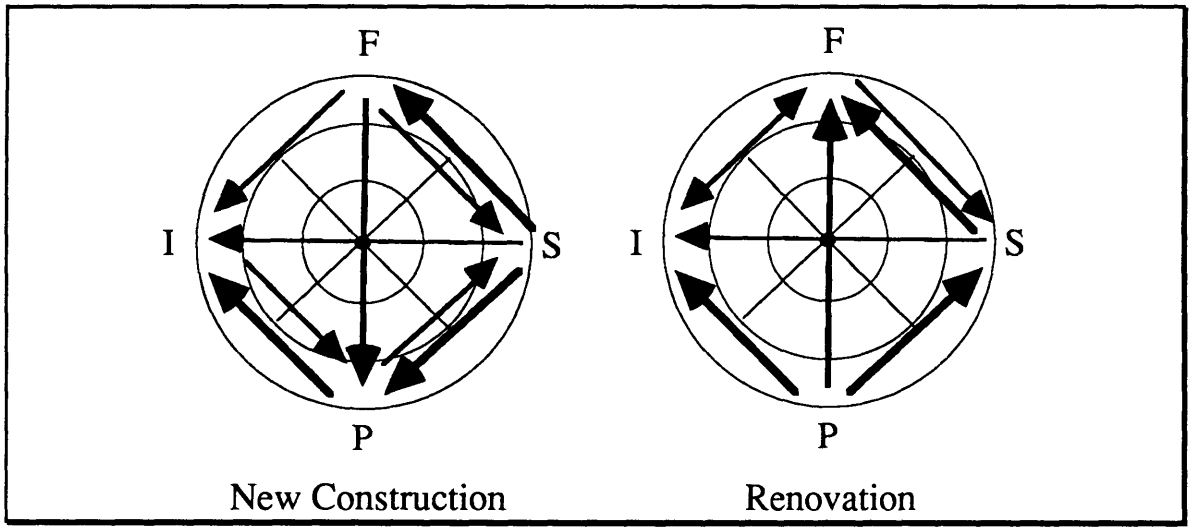

Figure 3K - Inter-relatedness of Aspects of Planning

3.2.3 - The Initial Planner's Role

The initial planners' role is specific to the particularities of the project and owner organization. This ranges from objective facilitator to hired lobbyist, from detail analyst to direction taker. However, a few common issues are important to understand: the planner as expert consultant, facilitator/group member, and innovator. The generic skills

required of any such complex task are technical skill, human skill, and conceptual skill.[39] These skills generally correspond to the roles identified. Technical skills involve expert knowledge or ability to solve discrete problems. Human skills are more concerned with the interaction among people and organizational dynamics, incentives, and information flow involved. Conceptual skills enable integration of data toward unique solutions. The specific required planner roles respond to owner characteristics, project parameters, and professional biases. After the roles are presented, analysis frameworks for projects and owners are presented, followed by a survey of planner options. This discussion of planner roles forms the basis for discussion of the analysis of planner options presented in Chapter 6.

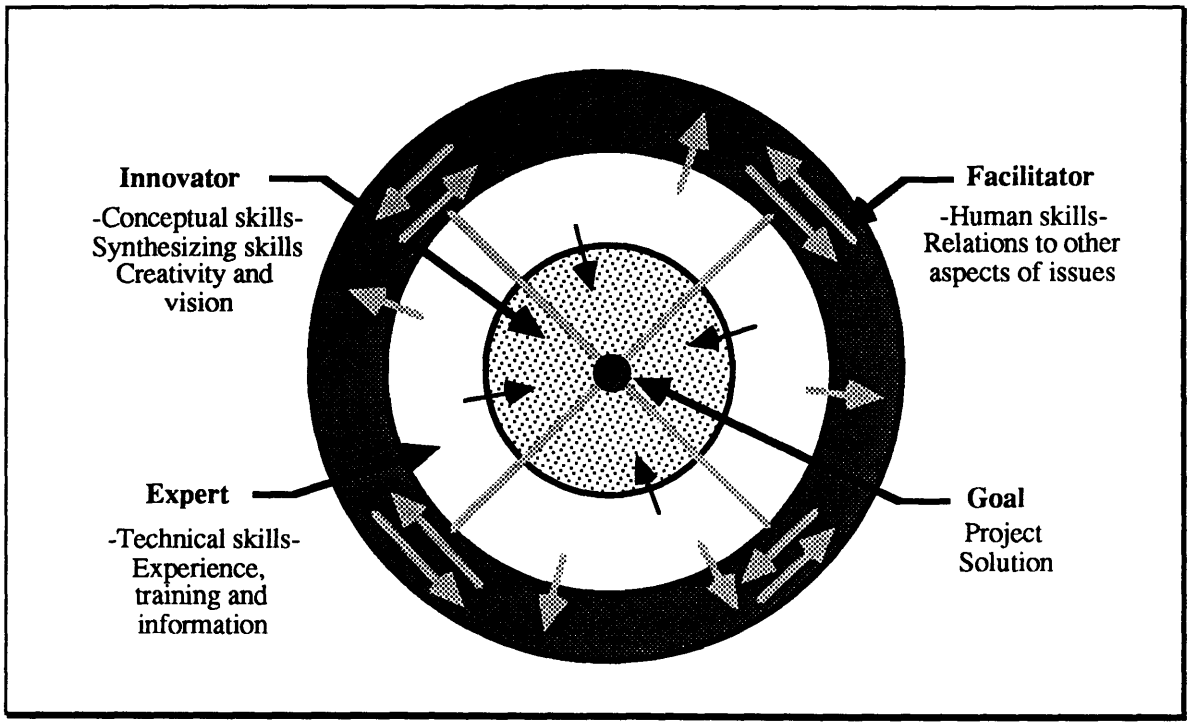

Figure 3L - Roles of the Initial Planner

Figure 3L presents the three roles of the initial planner in a graphic manner. A brief review of this diagram is warranted as this figure will appear repeatedly throughout the latter chapters. The middle doughnut, in white, represents the role of expert. To a large degree, this role is primary. Expertise is extended outward to the role of facilitator in

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[39] Katz, p. 56.

order to integrate a given expertise with others. This is represented by the small arrows radiating out of the expert ring and those transmitting around the outer facilitator ring. Expert knowledge is directed inward, toward the goal, to enable innovation. The innovator role is closest to the goal; the focus of innovation is directly on discovering the goal. At the center, the goal represents an idealized project solution, attained only through comprehensive innovation involving all the aspects of planning issues presented above.

3.2.3.1 - Planner as Expert Consultant

The planner is typically primarily hired to provide expertise, analysis and advice relative to a perceived need. Consultants offer a variety of services the nature of which can be characterized by the approach to consulting. The perhaps more familiar approach is the consultant as expert, applying expertise to a given situation. In this case, the technical skill proficiencies of the planner are critical to effectiveness. Technical skill includes the ability to understand specific concerns that comprise the inputs. Technical skills acquired through experience weigh heavily. No planning professional has the breadth of experience to have the scope of technical skills required to recognize and weigh all of the aspects of issues that are involved in the planning process. Thus, a recognition of one's technical skill limitations is of great importance to the planner, indicating a need for interaction with other experts. This alludes to human skill requirements, discussed below.

The expert consultant planner is presented with the problem, and the solution is generated in relative isolation from the client. This model for consulting services is anachronism in the construction arena. However, it is very common in highly specialized technical fields such as process engineering. Even though this form of consulting is not common in initial planning, there is a component to initial planning consulting that corresponds to this model. Consultants technical skills are typically viewed as critical to effective planning; however, one could argue that human skills are of greater significance. (This is further explored in Chapter 7.) As discussed below, technical skills are required to enable human skills to be effective. Moreover, technical skills are fundamental to the application of conceptual skills. In conclusion, technical skills form the basis for human and conceptual skill application to a given situation; basis information is technical.

3.2.3.2 - Planner as Facilitator

In the expert consultant model, client interaction is limited to data collection and solution distribution. The alternate approach is consultant as facilitator, extensively interacting with the client throughout, extracting data and forming solution options. This is clearly more appropriate for complex problems in which problem definition is not discrete. For example, in complex building projects, the intricacies of problem definition are refined throughout the planning and design phases. Facilitation expertise is critical in the process of data extraction as well as the formation of appropriate solutions. Thus the expert consultant model is inappropriate for capital project planning. However, this is not to say that expert knowledge is not critical. Most often, expert knowledge enables effective facilitation and innovation.

Human skills include the managers ability to work as a group member and develop cooperative relationships within the team. This skill requires an ability to influence, even when no formal authority exists. In addition, the ability to recognize one's own biases and perceptions of individual team members must be recognized. Without this, stereotyping limits planners' ability to recognize and weigh data and other inputs. Also of note, human skills are critical in bringing together a newly formed group, transforming it into a performing entity. Many barriers must be overcome.

A primary human skill task is development and maintenance of communication throughout the planning team. Unobstructed lines of communication are the result of interpersonal, political, technological, and team building talent. Because opportunities for restriction of communication are ever present, and risks associated with even a minor communications breakdown are high, this is a critical area of a planner's skill.

As a consultant, the initial planner has a range of objectives which are related to the above service approaches. The expert model objectives are the provision of requested information, solutions to a given problem, diagnoses which may redefine the problem and summary recommendations. The consultant as facilitator model's objectives include assisting implementation of established solutions, building consensus and commitment, facilitating client learning and improving the client's organizational effectiveness.[40] With

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[40] Turner, p. 122.

the exception of the final two objectives, all consultant objectives of both models apply to the initial planners' role in the delivery of capital projects.

Also of note is the degree to which the consultant is expected to or able to influence previous decisions. Prior to the hiring of the consultant, the owner organization makes a few critical decisions generally defining the project. Thus, the planner potentially faces the upstream uncertainty that preceding stage outcome is unsound, inoperable or unstable.[41] A component of the planner role is influence over an owner's strategic decisions made prior to initial planner involvement. The value-added associated with this role is great, but both technical and human skills are required.

3.2.3.2.1 - Planner as Group Member

The purpose of the following brief discussion is to familiarize the reader with common characteristics of group decision making. Consideration of foreseeable qualities of any specific group working on initial planning can influence selection of an initial planning consultant. As such, a few notes on group behavior are required.

The efficiency of planning groups is strongly influenced by the forces internal to the group as well as that of the planning consultant. Argyle described the factors leading to group cohesion and performance as harmony of personalities, commonalty of interests and backgrounds, proximity of members, leadership skill, and the extent to which the task requires cooperation.[42] For the planning group on a building project, the need for cooperation is often the only one of these characteristics present! As such, cohesion tends to be lacking, having detrimental effects on performance.

Group behavior has been extensively studied. The advantages and disadvantages of group decision making processes here are adapted from Hunt.[43]

> *Advantages*: Collective skills and experience, idea and information generation is greater, member cross checking, task division, motivation and commitment is enhanced, compromising tends to avoid extreme

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41 Laufer, p. 22.
42 Argyle, p. 166.
43 Hunt, p. 47-68.

solutions, the combined perceptions of the group are more stable and less biased than that of any given individual.

Disadvantages: Tendency of the group toward the majority perspective without adequate consideration of minority perspective, tendency of group members to convince each other of the veracity of a bogus solution, communication breakdowns, compromise may be ineffective, increased duration of processes, inability to identify members' strengths in order to effectively utilize group diversity, increased gross time commitment of person-hours, inconsistent level of understanding of the issues, personal clashes and social issues, monopolization by dominant members.

The purpose here is not to fully examine these important issues, but to point out the general scope of complexities involved in group analyses and decision making. Owners and professionals alike should familiarize themselves with these concepts and be aware of the implications in practice. Identification of common disadvantages of group work can minimize their effects.

3.2.3.3 - Planner as Innovator

The third role of the planner is the least understood and arguably the most important. The innovator role is primarily a function of conceptual skill of the consultant. Conceptual skills involve the ability to see the entirety of issues, organizations, and planning processes. This is overview skill, or strategic thinking ability. It is the critical skill required of the planner and probably the most rare. In referring to the senior management role, Katz points out that conceptual skills are of paramount importance, while human and technical needs can be provided by lower level managers. This is true to an extent for initial planning consulting, although process facilitation of initial planning demands stronger human skills than that of general managers. Planning requires the ability to assimilate and digest broad ranges of data, synthesize these into solution options and understand each options' influences, strengths and weaknesses. Conceptual skill is most rare due to the following: training is increasingly specific and individuals are increasingly specialized, conceptual skills do not develop as a natural result of industry practice, they are largely intuitive and difficult to acquire. Technical skills are required to understand the data; human skills are required to facilitate the process; but without conceptual skill expertly derived information may be extremely well analyzed, but it can not be effectively synthesized into an effective solution. (Of course, this presumes that the

solution is initially unknown and that the focus of the planning effort is to establish it. This is not always the case.)

3.3 - History of Initial Planning

Now that the reader is familiar with the function of initial planning and the roles of planners, the history of initial planning can be presented. The present and future of this function derive from its history. The history of initial planning is brief as the tasks involved in what this thesis defines as initial planning were historically simple, handled through simple owner organizational decision processes. Thus the initial planner was historically the owner. To a large extent, this model persists today.

3.3.1 - Before Architects

The middle ages saw the development of the precursor to the modern building professional in the role of the King's Mason. This person was responsible for oversight of numerous simultaneous projects. As an agent of the owner, he worked directly with the royal representatives to ensure the projects suited the owner's objectives.[44] As such, the planning function was mainly contained within the owner organization, with minimal involvement of an industry expert.

3.3.2 - Architect as Planning Consultant

The common perception of the role of the architect as initial planner in the "traditional" delivery method (see Section 2.1.3) is inaccurate. Given the definition of initial planning provided above inclusive of strategic planning and programming (see Sections 3.1 and 3.2), owners provided the bulk of initial planning in-house. Architects were consultants to the latter phases of this process. This issue is presented to clarify that the scope of contemporary initial planning is greater than that of the "traditional" planner's role. Specifically, financial, strategic and to a large degree implementational aspects of current initial planning generally was not considered the role of the planner. Instead, the owner in the "traditional" method was able to effectively manage the tasks of initial planning on

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[44] Walker, p. 20.

an ad hoc basis because of the relative simplicity of owner organization, product itself [45] , and lockstep approach of the process.[46]

The planning service provided by architects throughout the eighteenth and nineteenth centuries included most of what is now provided by sub-consultants. The advent of skyscrapers of eight and even ten storeys necessitated the consultation of structural engineers. In this world of relatively comprehensible project complexity, the architect was capable of representing the range of inputs to initial planning analyses. Architects had sufficient expertise with financial analysis and schedule estimating because historical data was directly applicable. Few new techniques, materials, or strategies were employed as the stable environment did not demand any.

Competition between professions for control of the planning process, however, is as old as the professions themselves. Most notably, the battle between architects and engineers has swung back and forth; presently the delineation of services is relatively stable. But as recently as 1986, the domain of these two professions was in flux.[47] Recently, construction professionals have established a presence in this market. Interestingly, these firms are typically comprised of individuals with engineering backgrounds.

3.3.3 - The Erosion of Architect as Planning Consultant

While the purview of architects has generally increased in recent history, their role on any given project has decreased. Of note is the changing role of the architect in initial planning. The head of a prominent architecture firm stated:

> "We're being attacked the strongest in predesign services, where we've lost quantity take-off capabilities, and cost-estimating capabilities..."48

Figure 3M indicates the squeeze currently concentrating on the "traditional" system initial planning services from architects. From the top, management consultants are expanding strategy-based services into the traditional realm of architects. From below, construction managers are developing consulting services based on technical knowledge traditionally

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45 Glover, p. 9.
46 Irwig, p. 83-84.
47 Gutman, p. 62.
48 Architecture, 1/93, p., 106.

reserved for support of construction services. From the side, developers are offering broad skill sets to provide planning services similar to those traditionally provided by architects.

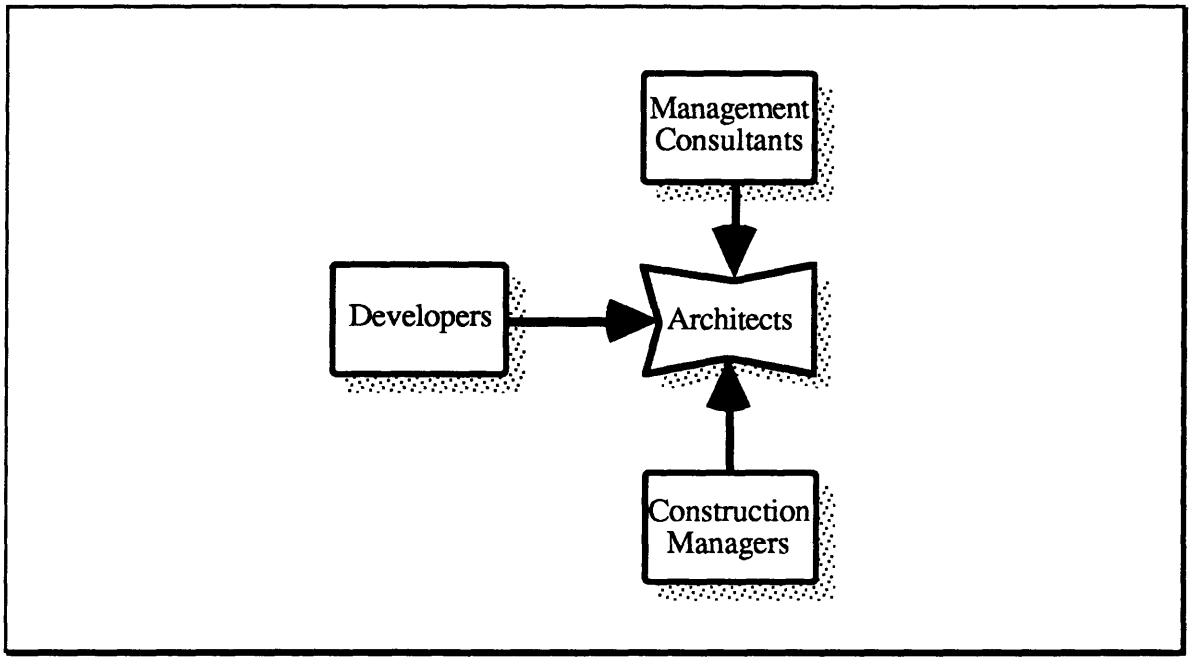

Figure 3M - The Initial Planning Services Squeeze

The traditional image and function of the architect is continually mutated by trends within the construction world. Among the ten causal trends identified by Gutman in his seminal work, *Architectural Practice, A Critical View*, are changes in the composition of analyses demanded during planning and design, increased size and complexity of projects, and more rational bases for decision making by client organizations.[49]

Shifting demand in services required of initial planners indicates that traditional architects are less likely to have the capabilities to provide these services. Because the demands of planning involve many disciplines beyond the realm of architects, many owners see the fundamental challenge of planning as managerial, hiring consultants more capable in this regard, namely developers, construction managers and management consultants. These

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[49] Gutman, pp. 13, 31, 50.

professions are generally viewed as possessing superior managerial skills.[50] (See Chapter 6 for an analysis of typical planning capabilities of the aforementioned professions.)

Many clients now believe that the individual professions are knowledgeable only in limited areas as defined by technical skill strengths.[51] It follows that the increasing specialization of architects results in diminution of their presence outside those specialties. In addition, construction managers and developer-as-consultant are newer and less defined professions in the initial planning arena. Thus the cultural entry barrier of tradition is insignificant, indeed negative.

In response to growing competition from other professions within the construction industry, a recent tactical trend has increased the erosion of architect as initial planner. Architecture firms have concentrated on the only part of their practices not threatened, their core competency, the aesthetic aspect of design. This specialization distances these professionals from the holistic perspective required for effective planning. Moreover, the prominence of the artist-architect in the media and throughout our culture helps to deflate any association the profession has with effective management. The artist-architect is viewed as possessing conceptual design skills, without technical nor human skills. Initial planning, a role of analysis, management and innovation, appears incompatible with these qualifications.

In summary, the masterbuilder architect model is increasingly rare. Industry periodicals are filled with articles lamenting, blaming, and proposing solutions to accelerating loss of architects' responsibilities. From the designers' perspective, the architectural quality of the product suffers; thus society looses. As Gutman notes, "...losing jobs to package dealers, construction managers and contractors ... is critical because so much of the economic and political power over building projects, and therefore over design, is concentrated in these functions." [52] The head of a prominent architecture firm offers his vision: "It's time for us to assess what we can do to regain a position of strength. I think the form and the definition of what an architect is ... even ten years from now will be different from what the architect is today."[53] Indeed, erosion of the architect as initial

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[50] Snyder, Winston, Small.
[51] Gutman, p. 16.
[52] Gutman, p. 68.
[53] Rook, interview.

planner may accelerate as owners become more comfortable with other professionals in this role. Architects are increasingly perceived as invested in artistic design. Thus, owners do not trust architects with the bulk of initial planning concerns.

3.3.4 - Chapter Conclusion: The Challenge for Planners

This chapter indicates the challenges facing planning consultants and the implications of meeting them. A great deal of project ultimate value is established in the initial planning phase; thus the value-added from better consulting is significant. Moreover, studies indicate high frequency of subsequent delivery problems attributable to insufficient or flawed initial planning. However, effective planning is confounded by multiple challenges.

Characteristics of both the process and the people involved in initial planning inhibit success. Primarily, success of project planning process is reliant on appropriateness of basis strategic planning efforts and on the extent to which basis strategic planning directives are translated to project planning. As such, project planning should explicitly include review of strategic planning; although this is estimated to be extremely rare in practice. The indicated need for procedural change presents a fundamental challenge to effective project planning. In addition, the planning process is described above as highly complicated, multi-parametric, iterative and unstructured. Overlaid on this is the complexity of the planning group. This chapter indicates a directly proportional relationship between planning group members' objectivity and the effectiveness of planning efforts. However, objectivity is elusive, as is more precisely outlined in Chapter 6. In summary, the roles and expertise required of planning consultants reflect the facets of the planning challenge. The facilitator role is demanded by the complex group dynamics present and the absence of cohesion factors within planning groups. Synthesis of issues into options demands strong innovation capabilities; yet specialization and inability to develop makes this characteristic rare. Increasing challenge is hypothesized to have deteriorated the effectiveness of response from the "traditional" delivery system, leading to the development of alternative consultant options. To understand the changing role of the initial planner, one must understand the changing nature of projects and, perhaps more importantly, the increasing complexity of owners, as presented below.

CHAPTER 4
PROJECT CLASSIFICATION

Throughout the construction industry, participants perceive a trend of increasing complexity. The literature and the interviews conducted indicate that both projects themselves and delivery processes involve more and more interconnected issues, influences, challenges. The complexity is such that many believe that no single person can understand all or manage all concerns.[54] Following definitions presented in Chapter 3, complexity is the number of issue aspects and inter-relationships among them. Estimation of this complexity prior to beginning initial planning is useful. An owner can better understand the task ahead, the project itself and the appropriate qualifications for the initial planner. Analysis of complexity requires disaggregation; a system is presented below. Complexity needs to be understood in order to efficiently organize efforts at every level of the industry. Yet, discussions of this issue tend to generalize project and delivery complexities, or focus on the most apparent manifestations of the trend, namely physical complexities.

This chapter presents a catalog of sources of project and project delivery complexity. The objective is to make plain both scope and details of issues involved, as overview for those familiar with the subject and as introduction for those new to initial planning. A level of generalization is, of course, required to make this task feasible. With these parameters identified, a project's complexities can be roughly forecast. This provides an indication of the planning task's difficulty and begins to focus initial planner selection on the unique needs of a project. General level of complexity together with critical specific issues indicate technical, human, and conceptual skills required. Compatibility is further addressed in Chapter 7.

First, a general discussion of project complexity trend is presented. With this in mind, specificity of project and delivery complexity is addressed. Note that those project delivery parameters associated with the owner organization are addressed separately in

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[54] Stowe, Frennette, Middleton, Fray.

Chapter 5. Although conceptually a subset of project/delivery complexity, these issues are sufficiently significant so as to merit a separate analysis.

4.1 - Project Complexity Trend

The industrial revolution generated need for buildings of greater size and technological sophistication. The successful standardization and prefabrication of iron and glass components for Paxton's Crystal Palace in 1850 signaled the acceptance of new material technologies, organizational methodologies, and resultant increased project size. Subsequent steel and elevator technology popularized larger buildings. Larger buildings demanded increased technological sophistication to make them habitable and safe. The delivery process was complicated as buildings became larger, more technologically advanced, and increasingly located on dense urban sites.

Complexities characteristic of today's projects results from size of projects and a multitude of other issues. The catalogue below indicates the range of sources. As the challenges resulting from project scale become routinely met, other complexity drivers dominate. Mechanical infrastructure, schedule exactitude, disruption avoidance, and physical constraints, to name a few, are increasingly challenging aspects of today's projects.

4.1.1 - Project Scale

Gutman indicates four key reasons for the increase in size of building projects in recent years: escalating land values, new technologies, larger client organizations, and capital availability.[55] An historical framework for these issues is presented in Chapter 2.

Escalation of land values, particularly within dense urban settings, incentivizes developers to fit as much usable space into a site as is possible. The response is increased building height. Market need for increased height drives the technology allowing for more height. The ability to put even more space onto a site feeds back as a further increase in property value. In this way, a positive feedback loop leads to exponentially increasing property values, building technology, and building size. (see Figure 4A.) Of

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[55] Gutman, p. 32.

course, other factors such as cost and availability of technology and market demand for space limit this exponential growth.

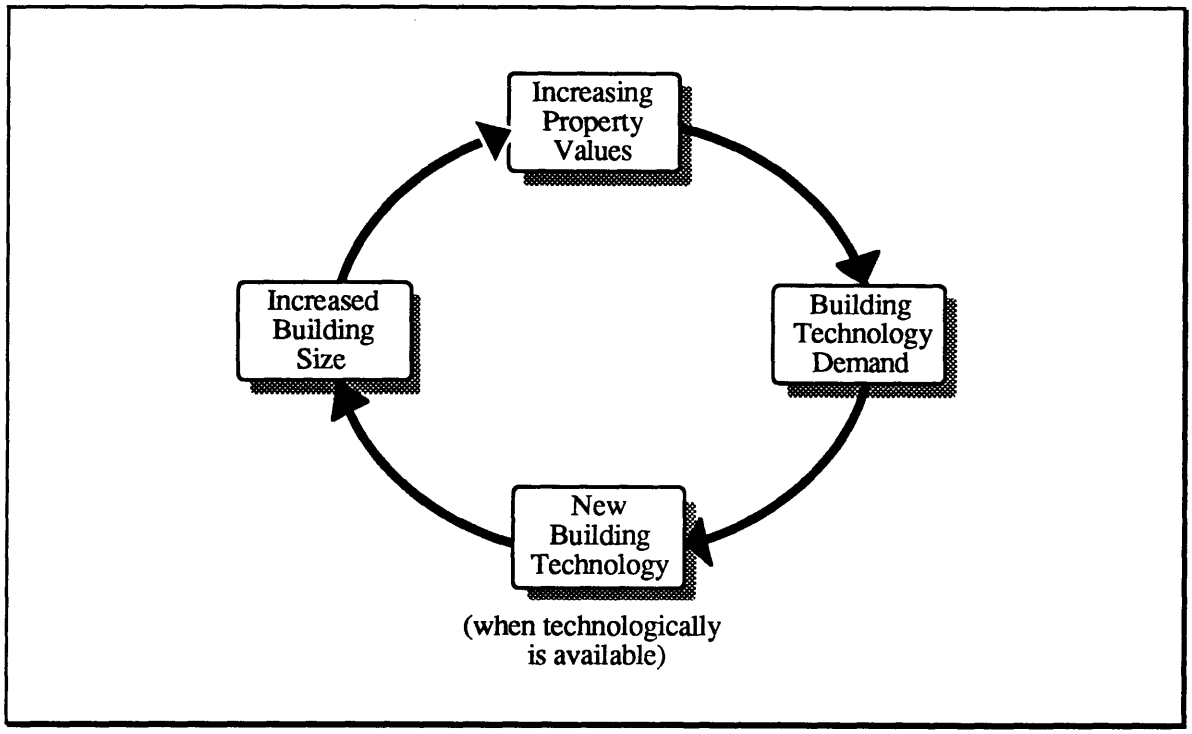

Figure 4A - Effect of Property Values on Building Size

Growing organizations require larger facilities to house their operations. As economies of scale continue to provide producers of both goods and services with greater competitive advantage, the facilities they demand increase in size. Examples range from the pedestrian to The Mall of America. The latter type of project requires enormous capital expenditures. Through both government incentives, in the form of tax laws and banking regulation, and the speculative market of real estate investing, tremendous capital outlays are available.

4.1.2 - Other Complexities

Presently, the complexities involved in a project and its delivery are more frequently unrelated to project scale. Instead, a variety of other market influences drive overall complexity. Recent buildings are typified as technologically sophisticated in all systems and in general design terms. Even an apparently simple parking garage is often physically quite complex including systems for security, fire prevention, carbon

monoxide detection, ventilation, and others; even the apparently simple concrete structure may involve pre-stressed or post-tensioned beams and sophisticated seismic resistance features. In addition to physical manifestations of market requirements, industry trends and market requirements create process complexity. Market expectations include lowering costs of construction and operation of buildings, shorter delivery duration, and decreased owner risk. Industry trends affecting project complexity include increased prefabrication, a factor of schedule pressure and labor cost, and increased subcontracting of project work, a factor of the cyclicality of the industry and the specialization of tasks.

4.2 - Mapping Project Intensity

Within any given genre, project classification can be viewed as a function of complexities involved. General project complexity includes a multitude of specific issues, each of which can be assigned a qualitative estimate. (As indicated above, delivery concerns related to owner organization are included in a separate segment of this model, which is presented in the subsequent chapter.) This taxonomy aggregates project and delivery complexity as physical, temporal, financial, market interface, and external. Within each of these areas are more specific issues; an approximation of the level of complexity and project criticality can be assigned to each specific issue. Typically the various aspects identified are interrelated; thus the definitions and indicated implications overlap.

The resultant mapping indicates defining areas of project intensity. In isolation, project intensity mapping facilitates understanding of the project itself and enables insights into delivery strategy. In Chapter 7, project intensity is correlated with planning concerns. The resultant is an estimate of financial, strategic, physical, and implementational aspects associated with project planning issues. From this framework, technical, human and conceptual skills required of the initial planning consultant are estimated.

4.2.1 - Physical Complexities

Physical complexities are the least abstract, most defined and readily estimated at the initial planning phase. As such, an analysis of project and delivery complexity commences with the estimation of the following more recognizable indicators. Physical complexities are the result of scale challenge, technological sophistication, or site challenge.

4.2.1.1 - Scale Challenge

The aspect of physical complexity due to scale is relatively easily estimated prior to actual project design. However, in addition to actual project size estimation, the project must be related to any macro project, and degree of modularity must be estimated.

4.2.1.1.1 - Physical Size of the Project

Project size provides an obvious indicator of scale challenge. Both absolute size and size relative to the industry standard for the project type must be considered. Interestingly, deviation from a standard size in either direction alludes to increased project complexity.

4.2.1.1.2 - Relation of Project to Macro System

The degree to which the project is to be integrated into or is the prototype for a larger facility system also indicates scale challenge. In the case of renovation or addition projects, the relation to the entire existing facility must be considered. Estimation of this factor must consider the project at hand, the greater whole, the interface between the two, and the possible impacts of future facilities.

4.2.1.1.3 - Degree of Modularity

High modularity significantly reduces the physical complexity of large projects. Modularity exists on many levels: a project may be comprised of a number of similar buildings, floors of an office building may be identical, or a particular module such as a hotel room may be repeated. Low modularity can result in high scale challenge even in a relatively small project.

4.2.1.2 - Technological Sophistication

Technological sophistication must be considered as a ubiquitous concern. Consideration must include the totality of the physical project, not just mechanical and electrical infrastructure. The technological aspect of physical complexity is highly correlated with the project type: hospitals projects are high and warehouses are typically low. However, cursory analysis may be misleading. A simple hospital project may involve no unusual elements and plenty of space for physical component coordination. Conversely, a high quality storage warehouse could involve sophisticated security, control, mechanical, and

fire suppression systems. Analysis according to the following provides more accurate estimation of the technological complexity involved.

4.2.1.2.1 - Prototypical Elements

Prototypical elements exist on many project levels. The overall physical definition of the project, individual systems or components can be prototypes. However, prototypical systems and components include not only unique or unusually customized elements, but also standard elements used in an atypical manner. Estimation of the prototypical elements of a project to the component level of detail is often not feasible at the planning stage. Yet, technological intensity of prototypical elements can dramatically influence physical complexity of a project.

4.2.1.2.2 - Tolerances of Systems Specifications

Design tolerances of systems represent a level of technological complexity required in planning, design, and management challenges associated with highly engineered systems. Like prototypical elements, low tolerance systems dramatically influence the technological complexity of the physical project. Areas of consideration include mechanical, electrical, spatial, and juxtapositional design tolerances.

4.2.1.2.3 - Integration of Physical Systems

The degree to which systems are integrated provides an indication of technological sophistication of a project and, moreover, the required management of the delivery process. Integration of systems can be a result of system dependency or physical coordination. Dependency is seen in the integration of electrical and mechanical systems for monitoring and remote controlling. The degree of required coordination of systems is relative to associated spatial requirements and allocations. For example, the use of architectural concrete necessitates the careful coordination of the structure with other systems, such as electrical. The otherwise simple coordination of light switches in a wall must be carefully coordinated.

4.2.1.2.4 - Aesthetic Focus

Throughout the implementation phase, projects experience a struggle between aesthetic and functional concerns. The level of aesthetic focus assigned to a project implies a level of technological sophistication

required to support the aesthetics. For example, if aesthetic priority necessitates the use of clear glazing, other systems' technological sophistication must accommodate the resultant solar gain. More directly, aesthetic priority often results in functionally inappropriate uses of building materials or systems. This can range from the elimination of a roof's cap flashing to the functionally inappropriate expression of functionality of Paris' Pompidou Center. Physical complexity is increased as a result of the technological sophistication required to support these functionally inappropriate aesthetic design features.

Degree of aesthetic focus can be estimated through analysis of its sources. External requirements for aesthetic focus often result from regulatory organizations, neighborhood pressures, or political pressure. External complexity is addressed more comprehensively below. Aesthetic focus may also possess strategic value for the owner. This can take the form of enhanced financial value of the project, in the case of creating market distinction for an office building, or some other strategic value to the owner organization, such as a statement of market leadership. Finally, aesthetic focus can result from an owner's philosophical commitment, or the need to satisfy an important user's aesthetic sensibilities. Of course, all of these drivers must be related to the financial resources available for this aspect of the project.

4.2.1.3 - Site Complexity

All projects intimately relate to their site, whether new construction or renovation. The site provides the context for the project including relatively inflexible constraints. Site conditions, particularly hidden conditions like subsurface or hidden conditions in existing buildings, represent large risks which affect project cost, schedule and actual design. As such, site complexity constitutes a significant factor of physical complexity. Estimation of specific aspects of site complexity, however, can be difficult.

4.2.1.3.1 - Hidden Conditions

Hidden conditions risk is the result of both undocumented and documented conditions. Subsurface undocumented conditions can include hazardous materials, ground water, unfavorable soil conditions, uncontrolled fill, ledge rock, and abandoned foundations. In renovations,

existing facilities pose similar risks including hazardous materials, undocumented modifications, and variance of construction from design drawings. These risks can be quantified only through exploratory investigation. Documented conditions include existing foundations that may required underpinning, existing utilities traversing a site that may require repair or may not be located exactly as documented, and foundations of adjacent structures which may be effected by construction. In existing structures, the condition of systems and the location of components create risks; for example, structural steel may be out of plumb, reinforcing may be missing, or piping may be corroded. Risk associated with all these issues, and many others not identified, can only be roughly approximated. Estimation of related complexity is difficult, but visual inspection, local knowledge, and managers of adjacent facilities can provide clues.

4.2.1.3.2 - Suitability of Weather at Site

Unusual climactic conditions can have a significant impact on the physical complexity associated with both the delivery process and the resultant facility. A barren knoll subject to heavy winds and lightening will hamper construction efforts, complicate the engineering, and perhaps impact the facility's operation. Estimation of this factor must include both delivery and design implications.

4.2.1.3.3 - Spatial Complexities

Site topography, access to transportation routes, relationship to adjacent facilities, and natural features such as streams or trees and existing facility geometry, adjacencies, and circulation paths represent some of the spatial aspects of a project's site. Complexity is the consequence of overlaying other project parameters, such as square footage or multiple entrances, onto these issues. Complexity of the delivery process, such as insufficient staging area, disruption avoidance, or vehicular access restrictions, must be considered. In addition, spatial complexity is often related to regulatory and subsurface considerations.

4.2.1.3.4 - Completeness of Site Information

Level of information available concerning a physical site and existing construction related to a project is an indication of complexities associated

in the planning process. The more comprehensive the level of information available, the lower the unknowns concerning the site. Primarily, if a site is not known, complexity associated is high as all other planning efforts must reflect the flexibility required to adapt to any site. Also of concern are proximity and accessibility of an identified site. Accessibility concerns include obstructions on-site or adjacent. Delivery process complexity is decreased if planners can become familiar with the topographical, adjacencies and subsurface conditions of a site.

4.2.1.4 - Programmatic Complexity

Physical complexity is also driven by programmatic sophistication of a project. This is indicated by the degree to which future uses are to be considered, the intended life of the project, and the complexity of the immediate uses.

4.2.1.4.1 - Uses and Their Inter-relatedness

The number of distinct programmatic elements involved in a project indicates physical complexity. A simple program, such as a parking garage, indicates lower physical complexity than a mixed use building. However, the mixed use building's programmatic elements are minimally integrated. By contrast, the integration of the distinct programmatic elements of a hospital project indicates far greater physical complexity. In renovation work, relation to programmatic elements outside the delineation of a project affects complexity.

4.2.1.4.2 - Design Life

The intended life span of a project provides another indication of physical complexity involved in its delivery. A wide variety of factors must be analyzed to ascertain the required design life if it is not determined. Planning must consider financial and design impact of a longer design life. Interestingly, a design life shorter than industry norm also presents delivery challenges. The implementation implications of impermanence are generally unfamiliar and uncomfortable to industry professionals. Careful planning and management required increase delivery complexity.

4.2.1.4.3 - Programmatic Flexibility

Physical complexity is related to programmatic flexibility. Spatial and environmental systems' and their delivery is complicated as future needs are estimated and accommodated. Typically, a facility will far outlive the need for which it is generated. However, owner's perspectives of capital project planning rarely include facility utilization beyond immediate programmatic needs.[56] A planning consultant, as true fiduciary, must have the ability to broaden an owner's perspective. As an owner, however, estimation of required programmatic flexibility is difficult.

4.2.2 - Temporal Complexities

Temporal complexities involve the schedule implications for project planning and implementation. Both adequacy of time and continuity of the process indicate the temporal complexity involved. Increasingly, timing of projects is critical in terms of impact to operations and opportunity costs.

4.2.2.1 - Adequacy of Time

The amount of time allocated for various project phases relative to industry norm is an indication of temporal complexity. Inadequate planning time will dramatically increase risk of delivery of a sub-optimal product. Inadequate implementation time requires knowledge, attention and skill to manage successfully, but poses a less significant threat to overall project success. Aspects of this temporal complexity factor can be qualitatively estimated. In addition to the overall adequacy, timing flexibility and timeliness of decision influence this parameter. Note the inter-relatedness of these factors with organizational complexity, discussed in Chapter 5.

4.2.2.1.1 - Flexibility of Specific Milestones

Rigidity and criticality of project milestones, such as start date, interim milestones such as phased completion, and final occupancy date influence temporal complexity. Optimized project delivery requires candid expression of relative criticality of these dates and financial implications associated with missing them. For example, an unstudied decree of an

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[56] Owens.

inflexible occupancy date might lead to the selection of an initial planner contractually bound to that date, perhaps a design-build construction manager. However, sub-optimal results may follow if in reality that date is somewhat flexible and the owner's needs are dynamic. Note that inflexible milestones will increase temporal complexity even in situations with overall time adequacy.

4.2.2.1.2 - Timeliness of Decisions

Only in very rare situations are all owner directed decisions made on schedule and without subsequent correction. Evolution of owner needs, understanding of project potential, and difficulty of translation of needs to facilities all conspire to create rework. The degree of rework generated over the course of a project dramatically influences the managerial difficulty involved.[57] However, estimation of expected rework can influence design and implementation strategies so as to minimize the disruption of the process. Estimation of the level of certainty of needs and finances provides an indication of this factor of temporal complexity.

4.2.2.2 - Project Continuity

Projects rarely proceed according to the most efficient design and implementation path. Instead, various factors from within and without a project influence the timing of decisions and phases of implementations. An estimation of the degree of project continuity provides an indication of temporal complexity involved.

4.2.2.2.1 - Dependency on Uncontrollable Events

A relatively unmanageable aspect of temporal complexity of project delivery is a project's dependency on uncontrollable events. For example, construction start might be contingent upon some external factor like completion of shell space by another owner. Estimation of this factor includes consideration of the project's relationship to external complexity factors and a conservative allocation for unforeseeable dependencies.

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[57] Dispoka.

4.2.2.2.2 - Extent of Phasing Required

Another less obvious temporal complexity factor is associated with the shuffling of operations in a renovation and/or addition project or phased occupancy in a new construction project. Accurate estimation of the extent of phasing required, however, is relatively feasible. The extent of phasing is proportional to spatial needs of ongoing operations relative to spatial availability for those operations. Relocations involved in phasing constitute a type of dependency on uncontrollable events as well as increased rigidity of project milestones. As such, temporal complexity is increased. In projects with ongoing operations and phasing, temporal complexities can be multiplicative.

4.2.3 - Financial Complexities

Financial complexity can not be viewed in isolation, but is intimately inter-related to many other aspects of projects. Indication of financial complexity is found through analysis of the budget, level of financial assurance required, and availability of financial resources.

4.2.3.1 - Budget Complexity

Budget complexity is presented here as an element of project delivery complexity. However, the financial aspects of each of the multitude of complexity factors are inextricably related. Budget adequacy and flexibility represent one half of the equation; the financial needs associated with other complexities constitute the other half. Inclusion of this complexity in the project classification model, though somewhat redundant, reinforces the importance of analysis of financial concerns.

4.2.3.1.1 - Budget Adequacy

Degree of budget adequacy indicates financial complexity relative to physical complexities discussed above. Both gross budget adequacy as well as adequacy relative to delivery phases affect budget complexity. Although budget adequacy represents a primary project complexity driver, its estimation prior to initial planning is elusive. Approximations, such as project cost per square foot relative to similar projects, provide only a general indication. Even physically similar projects can have very different delivery process and owner related complexity concerns.

4.2.3.1.2 - Budget Flexibility

Budget flexibility provides an indication of expected financial complexity. Important aspects of this factor include flexibility of gross budget, flexibility relative to the various sub-system or phase allocations, and the point in the project delivery when these budget aspects may become inflexible.

Both gross and specific allocation flexibility indicate the extent to which unanticipated site conditions, program refinement or other changes will impact the delivery process. Furthermore, rigidity relative to the various project delivery phases may restrict project optimization. For example, an inflexible planning budget may preclude planners from pursuing a superior solution option if it was identified late in the process. The net value associated with this expenditure could be significant. Clearly, the implications of budget flexibility ripple throughout project delivery.

Gross and/or specific element budgets are solidified at different points on different projects. Budget flexibility ought to be correlated with the level of fiscal certainty established in service contracts. Inappropriate correlation, such as a cost plus fee contract and low gross budget flexibility, create financial complexity.[58] Thus estimation of budget complexity must include any internal or external restrictions which lead to inappropriate budget or contract flexibility.

4.2.3.2 - Assurance

Financial aspects of project delivery are complicated by restrictions required by the owner. Often this is a function of owner characteristics, as discussed in Chapter 5. However, project characteristics influence an owner's perspective of financial restrictions required. Perceived financial project risk is a function of a multitude of complexity issues. Financial restrictions below provide indications of financial complexity of a project.

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[58] Gordon, p. 162-164.

4.2.3.2.1 - Security Balance

Financial security requirements include bonding, retainer, contingency, liquidated damages, insurance, indemnification, and other contractual forfeitures. The financial complexity involved corresponds to efficiency of risk allocation. Improper allocation, such as no-fault-for-delay forfeitures, increase financial complexity. Primarily, acceptance of such a risk must be carefully analyzed for its financial implications. Also of note is the associated adversarial aspect, affecting delivery and leading to disputes. However, equitable financial security restrictions can reduce financial complexity. For example, bonding and insurance reduce financial variance thereby simplifying the diversity of scenarios included in planning. Complexity related to this factor, primarily a function of owner sophistication, is ideally a function of perceived project risks.

4.2.3.2.2 - Supervision

The level of financial reporting required for owner supervision also indicates the financial complexity of a delivery process. Estimation of this factor includes financial supervision requirements during planning budgeting, design estimating, and implementation phases. It also relates to financial tracking of planning and design phase services themselves. Undue restrictions increase financial complexity. Estimation of this factor must consider potential supervisory changes during project anomaly, such as cost or schedule overruns, as well as supervision required during normal operation.

4.2.3.3 - Availability of Financial Resources.

Availability of financial resources, also a function of owner characteristics, is related to market perception of project risks and benefits. Financial complexity results from financial inadequacy at any phase of delivery. Estimation of this factor thus includes projection of resources available for planning and design, construction and permanent financing. Uncertainty of availability at any point can dramatically affect project delivery complexity. The level of complexity of other project aspects increases as a result of the financial implications of resource inadequacy.

4.2.4 - Market Interface Complexities

Project delivery is influenced by the nature of the interface between project and construction industry market. From an owner's perspective, a low level of service certainty, a measure of the expectation of services required for a project, leads to increased project complexity. Service certainty is a function of general market capabilities and owner ability to attain services that are better than those typically available. Market interface complexity associated with service certainty is indicated by the strength of an owner's negotiation position when contracting for construction related services and the adequacy of services typically available.

4.2.4.1 - Strength of Negotiation Positions

Planning, design and pure construction management services are typically selected based on qualifications, not fee. The strength of the owner's negotiation position, however, can determine the consultant's level of service. Staffing priority and general responsiveness are influenced by factors indicated below. Thus, a planner is pressured by owner strength of negotiation position and subsequently must incorporate this market interface complexity into planning strategy.

4.2.4.1.1 - Project Attractiveness

The attractiveness of a project must be considered, as seen by both planner and subsequent parties involved in delivery. Strength of an owner's negotiation position results from potential rewards to consultants. These rewards may be either financial or strategic, such as recognition of association with a prestigious client, market entry into an attractive niche, or strategic alliance with other team members. An estimate of attractiveness due to financial or recognition reward is feasible prior to team member selection. Rewards of strategic alliance and new market entry are, of course, specific to potential firms. In addition to being difficult to estimate, a degree of risk is associated with these tactics.

4.2.4.1.2 - Future Work

Potential for follow-on work can be a strong incentive for consultant performance.[59] The influences and planning aspects associated with future work potential are similar to those discussed above. Future work potential creates negotiation position strength from issues beyond the immediate project. Again, increased negotiation strength reduces market interface complexity. Estimation of perceived future work are related to project, not owner. Potential future projects which do not lend themselves to transfer of a consultant's past performance do not significantly enhance an owner's position. Initial planning strategy must consider the potential efficiency enhancement associated in relation to strategic and implementation aspects of planning.

4.2.4.1.3 - Availability of Qualified Consultants

The above negotiation leverage factors evaporate when the field of possible consultants or builders is limited. Geographic, technologic, or financial resource limitations may restrict the field of suitable candidates. This can significantly increase a project's market interface complexity. Planning consultants should be knowledgeable as to any such limitation and be capable of strategizing so as to minimize any adverse impact of such a situation.

4.2.4.2 - Market Capability

4.2.4.2.1 - Project Type Familiarity

Industry familiarity with a project's areas of significant complexities provides an indication of market capability. Similar to availability of qualified consultants, this is a measure of how common the defining project parameters are. Evaluation of project complexities must be relative to market familiarity within the given project type. For example, light steel framing is extremely common and, thus, has a high level of market capability associated. But use of light steel framing in a residential addition has high market interface complexity associated because that particular technology is not familiar to the small scale residential market.

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[59] Heery, p. 56.

4.2.4.2.2 - Success Rate of Project Type

Market capability is evidenced by the success rate of similar projects. Measures of success include the functionality of a project, schedule and budget variance of the completed project, and the level of litigation associated with the project type. Planning must consider the success rate associated with the project type when establishing levels of conservatism of planning associated with each complexity concern.

4.2.5 - External Complexities

Projects and their delivery must be considered within the context of their environments. In addition to the market environment discussed above, extra-project influences contribute to project complexity. Regulatory, economic, and socio-political factors comprise the relation of a project to its environment. Although influences of these factors are insidious, estimation of effects is relatively feasible. However, the estimation must consider the dynamic nature of these factors and forecast accordingly.

4.2.5.1 - Regulatory

Regulation from both government and industry sources influences a project at every level. The minutia of these regulations can not possibly be considered when estimating resultant project complexity. However, an estimate of the impact of regulation can be based on deviation of regulated project parameters from an industry norm. Unusual situations or design elements should be examined for the influence of related regulation.

4.2.5.1.1 - Governmental

Governmental regulation is influential throughout the delivery process. Sources include federal, state and local regulations affecting both product design and process. Degree of project complexity resulting varies widely, dependent on other project concerns. For example, zoning regulation increases project complexity only if needs necessitate violation of the regulation. Some regulation can drive project complexity. For example, verification of appropriate construction and cleanliness is regulated for specialized pharmaceutical manufacturing facilities. Such regulation forms a fundamental aspect of project definition and delivery. In general, the amount of relevant regulation indicates the project complexity resultant.

4.2.5.1.2 - Industry

The construction industry itself generates regulation affecting project complexity. Labor regulations and to a lesser extent professional practice guidelines must be considered. The former can dramatically influence delivery complexity. Estimation of potential effects is possible due to regional consistency and static nature of these regulations.

4.2.5.2 - Economic

Economic concerns include the general condition of the construction industry as well as the cost of money. Perhaps more than any other factor, these trends, and the potential resultant complexities for a project, are not easily estimated. However, approximation is adequate for this analysis of project parameters.

4.2.5.2.1 - Market Conditions

General market growth provides an indication of possible project complexity. Generally, an expanding economy precipitates increased construction activity thereby reducing professional availability. Conversely, a declining market may see increased competition between overstaffed construction firms. This scenario indicates counterintuitive increased project complexity; supply adjustment indicates insolvency. A subcontractor failure during a project creates a significant increase in project complexity. Instability of market conditions in either direction indicates potential complexity.

4.2.5.2.2 - Exchange Rate, Interest Rate

Capital projects are typically debt intensive. On multiple levels, from primary financing to a supplier forwarding parts to a subcontractor, interest rates affect transactions. High interest rates or unstable interests rates increase the economic factor of project complexity.

Related to this, the influence of fluctuation of foreign exchange rates is not limited to projects abroad. Many project components, from steel to computerized controls, are imported. The extent to which a devalued dollar complicates the delivery process is relative to the value percentage of imported components. Financial strategies typically reserved for foreign projects, such as hedging, may be employed to avoid currency speculation when this percent is significant.

4.2.5.3 - Socio-political

Complexities associated with social and political aspects of a project can significantly increase overall project complexity. Although an estimate of this factor must be specific to a locale, the project type may indicate potential conflicts. Resultant complexities are related to temporal complexity resultant from reliance on uncontrollable events.

4.2.5.3.1 - Community Support

Level of local support for a project indicates complexity associated with permitting and approval processes. Included in this factor are estimations of support from the local area or neighbors, the regional community and the business community. The strengths of these communities as well as their potential leverage influences this estimation. A major element is the amount of effort required to attain support. The type of project together with type of community generally indicates an expected level of community support.

4.2.5.3.2 - Political Support

Political support is again related to type of project, and the effects the project is expected to have on the community, economy, and prestige of an area. Although this can be estimated, the changing political landscape as well as potential leverage of political power can increase the complexity associated. Political support, of course, is also a function of the owner's political relationships.

4.3 - PROJECT COMPLEXITIES MAPPING EXAMPLES

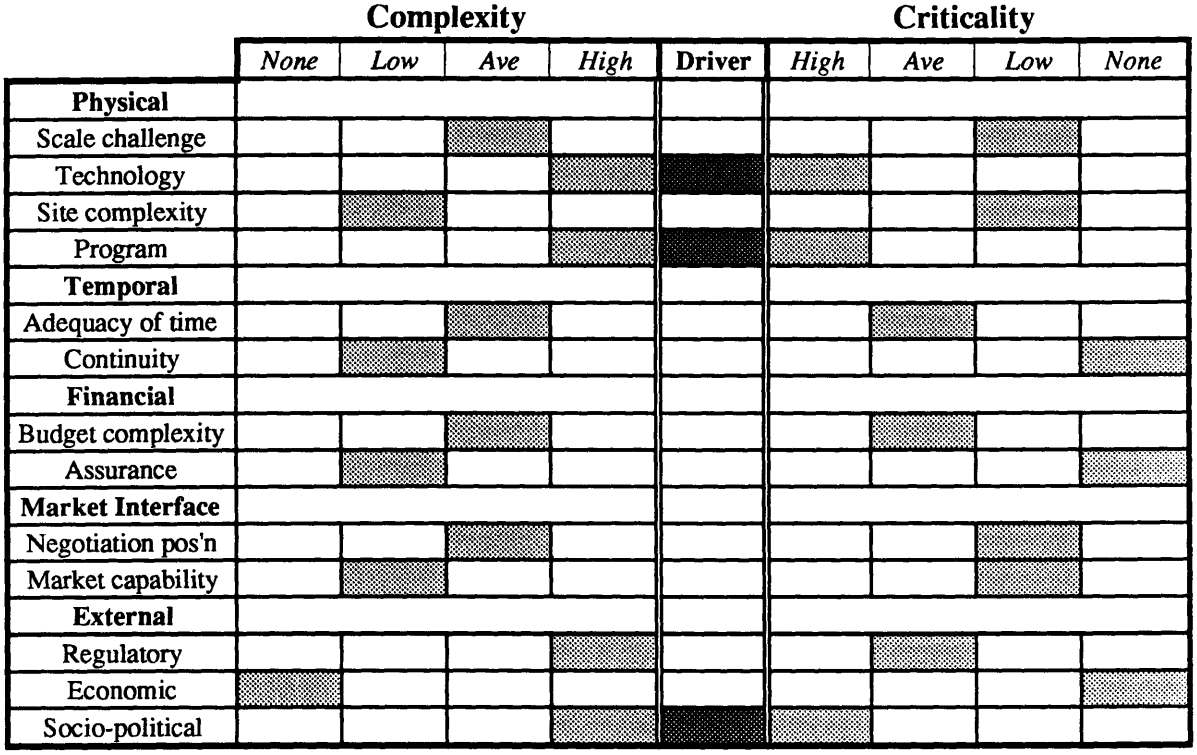
This section presents examples of mapping of project complexity for the following hypothetical projects: a research laboratory for a start-up company, an academic teaching building for a university, and a renovation for a hospital. In each case, the components of project complexity outlined above are addressed; an estimation is made of inherent complexity as well as criticality of that aspect relative to project objectives. Each case begins with a description of the project. Subsequently, the results are consolidated in example maps. Finally, the parameter estimations include brief descriptions of the logic behind the mapping. These analyses are continued in subsequent chapters; the owners are classified in Chapter 5 and consultant compatibility is estimated in Chapter 7.

4.3.1 - Case One: Research Laboratory

Case one is that of a relatively small research facility for a fledgling biotechnology company. The facility is to be located in a developing industrial area on an open lot. This project is perceived to be the first such facility of many to come. Aesthetically, a simple design is considered appropriate by the owner, yet they are concerned about appearances. As this is a start-up company, cash is scarce, yet relatively flexible due to a large institutional investors' presence. The potential is high for increasing the size of the facility in the near future, as the company grows. Programmatically, the facility must house a number of different facilities, required for different types of research work performed. As such, the building will have a number of related but unique laboratory facilities each requiring different intensive infrastructure systems. As the technologies that researchers use change, their infrastructure needs change. Thus, the company does not yet know exactly what is required in the new facility.

The time available to complete the project is very adequate; the company has signed a final lease on their current space, though. In addition, the company has scheduled a dedication ceremony which will involve investor representatives and local politicians. Financially, the funds available are slightly inadequate for the scope of work required; but the company thinks it can economize and maintain both scope and budget.

4.3.1.1 - Project Complexity Mapping Example #1: Research Laboratory



4.3.1.2 - Mapping Example #1 Logic

Physical Complexities

Scale challenge

- Physical size of the project - significantly smaller than norm
- Relation of project to macro system - none
- Degree of modularity - little repetition at any scale

Technological sophistication

- Prototypical elements - custom equipment, atypical use of standard items both critical to planning process and success of project
- Tolerances of systems - high degree of control required, low variance critical to success of project
- Integration of physical systems - system interdependencies and physical coordination both create complex situation, critical to success
- Aesthetic focus - moderate, aesthetics to help attract best scientists

Site complexity

- Hidden conditions - presumed low
- Suitability of weather at site - open site, high winds, threat of lightening, moderate temperatures
- Spatial complexities - level site, adequate vehicular access, adequate staging areas
- Completeness of site information - no boring information available

Programmatic complexity

- Uses and their inter-relatedness - highly complex, many related elements
- Design life of the project - company will either outgrow or fail within 10 years
- Intended programmatic flexibility - some flexible space desired

Temporal Complexities

Adequacy of time

- Time allocated - considered industry standard for project size
- Flexibility of specific milestones - dedication and occupancy dates are rigid
- Timeliness of process and product decisions - research needs are in flux

Continuity of the project

- Dependency on uncontrollable events - no known constraints
- Extent of phasing required - none

Financial Complexities

Budget complexity

- Budget adequacy - budget is moderately inadequate
- Budget flexibility - budget is somewhat flexible

Assurance

- Security balance - no complicating circumstances
- Supervision - no unusual requirements

Market Interface Complexities

Strength of negotiation positions

- Project Attractiveness - entry or expertise in growing niche market is attractive
- Future work "carrots" - potentially, but neither scheduled nor certain
- Availability of qualified consultants - low availability due to physical complexity

Market capability

- Project type familiarity - no unusual circumstances
- Success rate of project type - moderate, schedule and budget variance is common

External Complexities

Regulatory

- Governmental - high, special regulations for type of laboratory work
- Industry - low, non-union area

Economic

- Market conditions - stable market
- Exchange rate, interest rate - stable and low interest rates

Socio-political

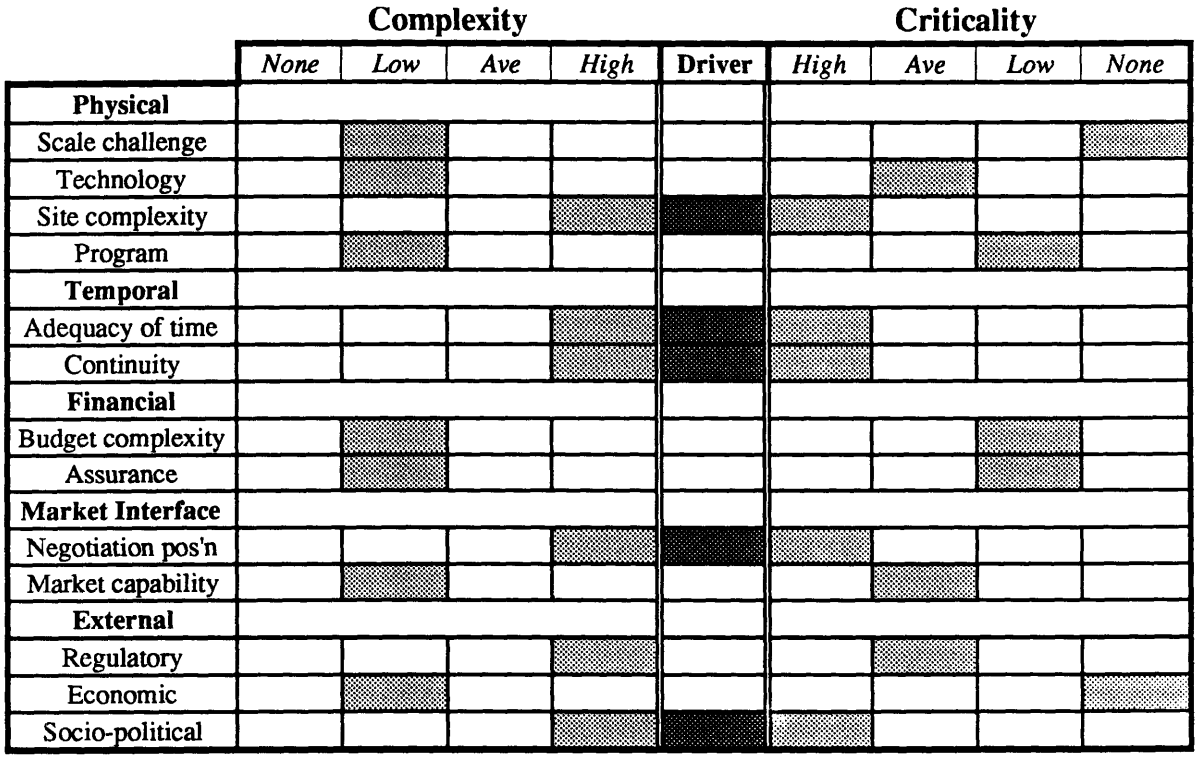
- Community support - potentially complex, fear of contamination from facility
- Political support - desire "high tech" image for area to attract businesses

4.3.2 - Case Two: Academic Facility

Case two is that of a new teaching facility for an old and venerable university. The project is to be located on a tight urban site along an important pedestrian walkway through the campus. The scope of the project is significant, yet the owner requires minimal disruption of campus life and research in nearby laboratories and libraries, as well as minimal visual impact of the resultant facility. Programmatically, the facility will house a number of similar classrooms and lecture halls, some with audio/visual systems.

It is expected that in order to accommodate the owners conflicting desires, the facility will be partially subterranean. This could be difficult, though because little is known of exactly what services or other items are located in this area of this ancient campus. Regardless, the facility must be completed for the beginning of an academic year, leaving little time for completion. Successful completion will give the project team a distinct advantage in the selection for many subsequent projects that the university is considering. Success, however, is dependent on the prompt decision making ability of the university bureaucracy. Schedule delays or changes, even if caused internally, are notoriously attributed to the external project team.

4.3.2.1 - Project Complexity Mapping Example #2: Academic Facility



4.3.2.2 - Mapping Example #2 Logic

Physical Complexities

Scale challenge

- Physical size of the project - nothing unusual for project type
- Relation of project to macro system - moderate programmatic, spatial and infrastructure integration to campus but not critical to project success
- Degree of modularity - repetitive elements

Technological sophistication

- Prototypical elements - none
- Tolerances of systems - nothing unusual, standard for classrooms is similar to offices and other common space uses
- Integration of physical systems - some system integration, controls to campus system, but physical coordination should not be complex
- Aesthetic focus - moderate to high, underground spaces are somewhat technologically complex

Site complexity

- Hidden conditions - many campus services are known to be located in the area of the project, old campus implies delicate infrastructure and abandoned foundations
- Suitability of weather at site - no unusual circumstances
- Spatial complexities - cramped site, existing facilities adjacent, vehicular access is restricted, inadequate staging and equipment space
- Completeness of site information - no way to know conditions and locations of items without excavating

Programmatic complexity

- Uses and their inter-relatedness - low complexity
- Design life of the project - project to last 75 to 100 years
- Intended programmatic flexibility - some flexible space desired

Temporal Complexities

Adequacy of time

- Time allocated - very tight schedule
- Flexibility of specific milestones - occupancy date is very rigid
- Timeliness of process and product decisions - bureaucracy has difficulty agreeing

Continuity of the project

- Dependency on uncontrollable events - construction may be restricted to certain times to avoid disruption of adjacent activities
- Extent of phasing required - no programmatic phasing, but logistical phasing will be necessitated by site constrictions

Financial Complexities

Budget complexity

- Budget adequacy - budget is adequate
- Budget flexibility - university has history of funding project enhancements

Assurance

- Security balance - no complicating circumstances
- Supervision - no unusual requirements

Market Interface Complexities

Strength of negotiation positions

- Project Attractiveness - prestigious owner, strategic for marketing of service-oriented firms
- Future work "carrots" - owner is continually planning and building
- Availability of qualified consultants - large number of qualified firms available

Market capability

- Project type familiarity - no unusual circumstances
- Success rate of project type - moderate, schedule and budget variance is common

External Complexities

Regulatory

- Governmental - moderate complexity from state and local code requirements
- Industry - strong control by unions, history of union disagreement with university

Economic

- Market conditions - stable market
- Exchange rate, interest rate - stable and low interest rates

Socio-political

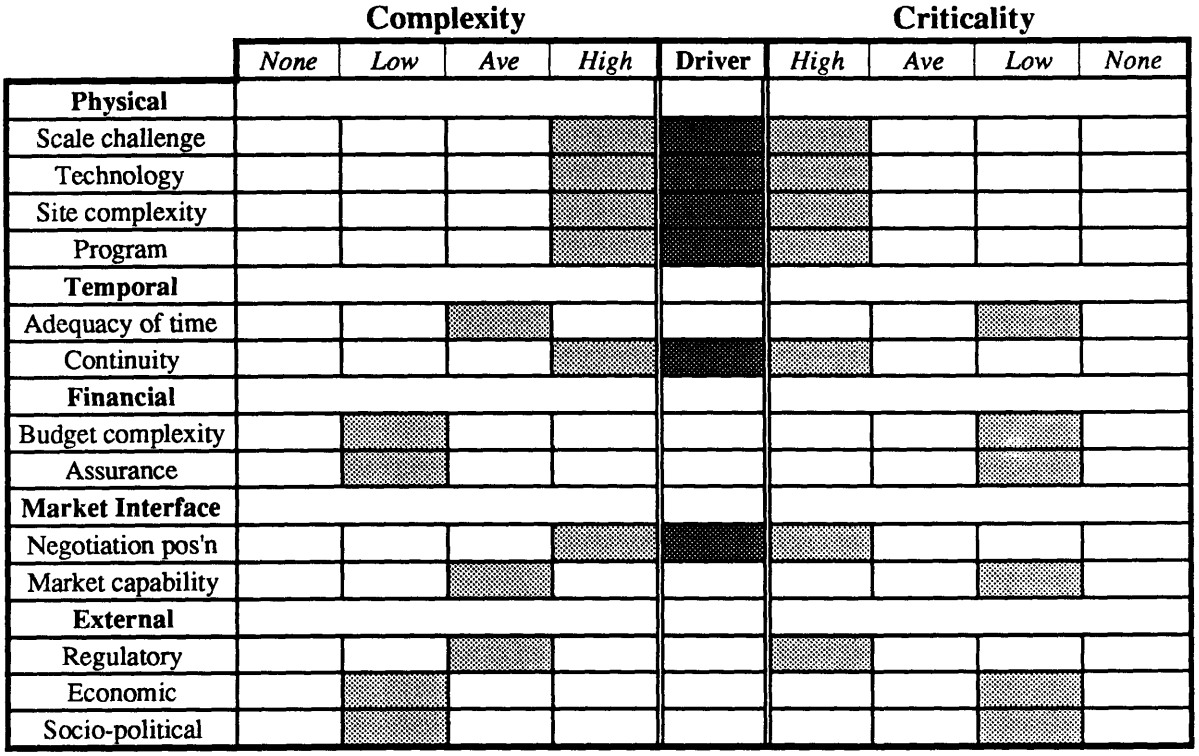
- Community support - area residents constantly at odds with university and fight any expansion plans regardless of specific case, student factions are expected to oppose the project in an effort to save a elm tree
- Political support - uncertain, project will be viewed as part of a much larger expansion effort

4.3.3 - Case Three: Hospital Renovation

Case three is that of a renovation project for a large hospital. The project includes the renovation and relocation of a half dozen or so specialty clinical treatment departments. Some of the departments already occupy the site, while others are housed elsewhere. As is usually the case at this institution, the various departments are at odds as to spatial allocation and location relative to circulation and views. Based on the preliminary spatial requests, the program is significantly larger than can be accommodated in the available space. Sharing of centralized facilities appears to be impossible due to the unique requirements of the various departments' programmatic elements, both spatial and environmental. The infrastructure required to support these unique facilities are intensive, and will be difficult to accommodate due to low floor-to-floor heights.

The existing facility is quite old for a hospital and has been through numerous renovations and system changes. As such, little is known as to what services are to be found hidden within the walls or where those that are known to exist actually are located. In addition, a variety of hazardous materials are expected to exist, including a great deal of asbestos. Accordingly, the owner has not established rigid completion dates for the various departments; however, it is very evident that the project will require extensive phasing and shuffling of departments. During this shuffling, avoiding disruption of ongoing operations is absolutely imperative.

4.3.3.1 - Project Complexity Mapping Example #3: Hospital Renovation



4.3.3.2 - Mapping Example #3 Logic

Physical Complexities

Scale challenge

- Physical size of the project - very typical renovation size
- Relation of project to macro system - intensive, must integrate with hospital circulation, infrastructure, egress system, related programmatic elements such as doctors' offices, aesthetics
- Degree of modularity - little repetition at any scale

Technological sophistication

- Prototypical elements - custom equipment, atypical use of standard items both critical to planning process and success of project
- Tolerances of systems - high degree of control required, low variance critical to success of project
- Integration of physical systems - tight mechanical spaces above ceilings, physical coordination creates complex situation, but ceiling heights mandated by code
- Aesthetic focus - low priority

Site complexity

- Hidden conditions - many unknowns within walls, floors and ceilings will not be observable until demolition
- Spatial complexities - inadequate space available at construction area and in general, inadequate vehicular access to general site and none to construction area, no easy route for material delivery to construction area, inadequate staging areas
- Completeness of site information - design drawings for some of the past renovation work, but little as-built drawings

Programmatic complexity

- Uses and their inter-relatedness - highly complex, related infrastructure and program elements
- Design life of the project - average, 15 to 20 years
- Intended programmatic flexibility - none

Temporal Complexities

Adequacy of time

- Time allocated - no established restrictions
- Flexibility of specific milestones - no specific constraints
- Timeliness of process and product decisions - treatment needs constantly change and hospital is likely to change project design to accommodate the state-of-the-art

Continuity of the project

- Dependency on uncontrollable events - very complex: disruption of hospital operations in general and in adjacent facilities must be avoided, any infrastructure work must be coordinated with around-the-clock operations
- Extent of phasing required - extensive, phasing of departments creates dependencies on departments' abilities to be relocated, out-of-sequence work will routinely be required

Financial Complexities

Budget complexity

- Budget adequacy - hospital will establish budget after planning is completed
- Budget flexibility - budget is quite flexible

Assurance

- Security balance - no complicating circumstances
- Supervision - no unusual requirements

Market Interface Complexities

Strength of negotiation positions

- Project Attractiveness - entry or expertise in growing niche market is attractive
- Future work "carrots" - continuous construction work at hospital, hospital likes to establish close ongoing relationships with firms to facilitate workflow
- Availability of qualified consultants - high availability

Market capability

- Project type familiarity - no unusual circumstances
- Success rate of project type - moderate, schedule and budget variance is common

External Complexities

Regulatory

- Governmental - high, special regulations for type of work, adherence is critical but not very difficult
- Industry - union area

Economic

- Market conditions - stable market
- Exchange rate, interest rate - stable and low interest rates

Socio-political

- Community support - neutral
- Political support - neutral

CHAPTER 5
OWNER CLASSIFICATION

As was noted in Chapter 4, owner characteristics partially determine both project delivery complexities and the ideal capabilities of planners required for projects. In fact, owner characteristics are influential enough to warrant a separate discussion. To this end, this chapter presents a framework for analysis of owners. The objective of such an analysis is primarily to help owners better understand themselves, specifically how their planning consultants' capabilities ought to reflect their inherent needs. In addition, performing this analysis can augment the consultant's understanding of their client's needs. The discussion begins with an overview of owner characteristic trends and the resultant demand trends. Subsequently, a framework for classification of owner organizations is presented.

5.1 - OWNER TRENDS

The following discussion of owner trends builds upon the more general issues of supra-industry shifts and the resultant market demands presented in Chapter 2. Developments presented in the prior discussion include the changing nature of economic conditions, cost of capital, and strategic need for faster delivery. Coincident enhancing of owner sophistication is a response to these macro issues. More sophisticated owners, in turn, drive the construction market to respond more effectively to these issues. At the same time, however, owner organization are becoming more complex. This places additional demands on initial planning consultants as delivery processes become obfuscated.

5.1.1 - Sophistication Trend

Owner sophistication is an important and formative trend. This development, a response to increasing project complexity and cost, is enabled by talent availability and enhanced by the outsourcing trend. As indicated in Chapter 2, owners are increasingly concerned with growing capital costs associated with projects and, as a result, are working to maximize project utility, or net worth. Cost reduction is not the sole focus; the other side of the equation, value to the owner, is increasingly important. Attaining higher value

products, in addition increasing project/delivery complexity, demands more precise input from owners. Typically, owners must possess greater sophistication with regard to delivery of projects in order to either coordinate the process, successfully facilitate the process as coordinated by another entity, or even foresee the value in employing such an external coordination entity. To attain required sophistication, owner organizations are taking advantage of the over-supply of construction professionals, especially architects, which is noted in Chapter 2. A recent trade magazine noted the trend toward more architects and construction experts working as owners' representatives, either directly or as outsourced services.[60] The result of outsourcing is somewhat counterintuitive; by doing so, owners decrease underutilized staff while increasing the effectiveness of key personnel.[61] These key personnel, as contracted owner representatives, actually increase the average relevant sophistication of owner organizations.

Organizational and technological sophistication trends indirectly support an owner's project delivery sophistication. Competitive pressures caused by economic downturn and global competition have focused many owners on increasing the efficiency of their organizations. Much has been written about the resultant flattening of organizations, streamlining of decision making processes, and reallocation of authority. Simultaneously, technological advances have enabled enhancement of communications within organizations, facilitating the management of complex projects or large teams. These developments effectively leverage an owner's delivery-specific sophistication; sophisticated project managers have more centralized data, thus better control over the process.

However, the owner sophistication trend may still be in its infancy. A recent study of owners' approaches to capital facility delivery concludes that most owners are surprisingly unsophisticated, viewing capital project delivery as a series of goods to be exchanged, rather than interactive problem solving. This study found that owners' attention to initial planning in particular was dramatically enhanced in emergency situations, in projects preceded by failure or in cases with extremely compressed scheduling.[62] Unless owners perceive significant risk or have learned from previous neglect, planning continues to receive inadequate attention. Perhaps the trend toward

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[60] Architecture 1/93, p. 104.

[61] Small.

[62] Howell, p. 5.

increased schedule pressure, along with the failures of unsophisticated project approaches will continue the development of the owner sophistication trend out of its infancy.

5.1.2 - Complexity Trend

Coincident with the growth of project size and complexity is an analogous and perhaps causal trend in owner organizations. In organizations, increasing size generally implies increased complexity. As size increases, tasks become more specialized, administration becomes more extensive and the various units or departments become more differentiated.[63] As a result, the number of functional areas impacted by and therefore interested in a project is greater.

Representatives from each of these differentiated departments contribute their limited perspectives to the process, creating coordination, communication and mediation challenges for the initial planner. The consequent reduced role of strategic apex representatives increases these planning challenges. Management by committee, with group decision challenges as outlined in Section 3.2.3.2.1, is likely to become more prevalent as organizations grow. Problematically, planning group size reflects the complexity and size of the organization, perhaps more so than that of the project. Even a small project for a large owner may involve representatives from differentiated functions, even though project interest may be individually quite small. Consequently, the size of planning input and decision making groups is often quite large, often reaching 20 or 30 members. This is far above the ideal size for group decision facilitation of 6 to 8 members.[64]

Larger organizations' more intensive coordination devices can dramatically impact the effectiveness of the planning group. The planning group itself typically must remain loosely structured in order to effectively respond to the complex and changing environment involved in project planning. But larger organizations tend to have more formalized communications structures, determined by regulations and protocols.[65] Superimposition of this formalized behavior on the planning process can inhibit effective

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[63] Mintzberg, p. 230.
[64] Hunt, p. 152.
[65] Mintzberg, p. 233.

flow of information, surfacing of issues, determining of objective priorities and, ultimately, decision making.

Large and diverse planning groups are susceptible to the phenomenon known as group polarization or Groupthink. The decisions made by the group will be either more risky or more cautious than the individual members would make on their own. This is a reflection of the predominant attitude within the group.[66] Often, the project planning process, due to the large risks involved, tends toward conservative solutions. Overly conservative group decisions may not reflect optimal level of risk acceptable to an owner. According to Argyles factors of group performance presented in Chapter 3, this trend deteriorates the effectiveness of planning group performance. Increasingly, strategic facilitation strength is required in initial planning consulting.

5.1.3 - Resultant Market Demands

Owners' buyer power is primarily responsible for redefining the professions providing services in the construction industry.[67] As is typical in highly fragmented industries, particularly with low profit margins, the industry generates little change internally. Instead, the owners' needs influence the provider business through a kind of Darwinian evolution pattern.

Recently, alternative services of planning and design professionals in the delivery process have begun to be rewarded and thus influenced to evolve. Studies have not quantified the growth of the initial planning function in isolation from total planning and design functions, but interpolation of studies of planning and architectural design markets indicate a significant increase in professional services per dollar of construction cost, about 30% per decade.[68] This indicates a trend toward increased analysis and initial planning. As demand increases, the attractiveness of the market is enhanced, encouraging non-traditional planning services to evolve. Those services that effectively respond to the demands of more complex projects for larger organizations are rewarded and develop.

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[66] Brown, p. 663-665.
[67] Saint, p. 67.
[68] Gutman, p. 7.

As would be expected from the above, initial planners are required to provide more interdisciplinary knowledge in order to facilitate integration of inputs from multiple diverse planning group members. Of note is the increased owner interest in firms with more diverse skill sets and capabilities. This is particularly evident in the success of large national and international consulting firms which offer "comprehensive" project services. The multi-disciplinary staff of their home offices is viewed as a strategic resource to these firms and their clients, allowing owners to benefit from breadth of experience, depth of analytical capabilities and broader perspective of the consultant team.[69] Interestingly, larger more complex owner organizations often demand larger more complex consultant organizations.

5.2 - Owner Classification Model

This thesis hypothesizes that significant influence on project delivery is the characteristics of owner organizations. Included are the more general issues of organizational structure and financial conditions of the organization as well as specific capabilities related to project delivery. Although the latter is somewhat relative to project characteristics, this thesis generalizes these capabilities independently of any specific project. These characteristics have a significant influence on planning process and, thus, on the ideal capabilities of initial planning consultants. This, taken together with Chapter 1's depiction of the relationship of project success with the influence of owners, warrants attention.

An owner organization is not, of course, synonymous with an owner organization's representatives involved in a capital project's delivery. Representation of the owner organization can range from single point contact to a large and diverse sampling of an organization's subsets. Very limited owner organization representation is generally appropriate only in situations in which project and organization are quite simple. For example, planning efforts for a low complexity project, such as a simple warehouse, for a low complexity owner, such as a small company, may involve only the company's president. More typically, project and owner complexity drive owner involvement toward groups consisting of representatives from all affected functions. (See Section 5.1.2.)

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[69] Snyder.

Regardless of the form of an owner organization's involvement in project delivery, characteristics of the entire entity reflect on those of the representative group. The representative group applies the organizations more global policies and technologies to the planning process along with the members' skills. As hierarchy and associated direct supervision have a great deal of inertia, formal organizational structure and associated coordinating mechanisms, the context for the temporary group, are generally maintained. Central to these issues, representative groups tend toward mutual adjustment as a coordinating mechanism as informal communication is more effective in complex circumstances. But the degree to which this shift occurs reflects the strength of the overall organization's formal hierarchy.

Owner classification is comprised of three areas: attributes resulting from the structuring of an organization, its financial condition and the level of sophistication specific to capital project planning. Various components comprising these areas are presented below. Subsequently, example hypothetical organizations are analyzed following the cases introduced in Chapter 4. Chapter 7 discusses the correlation of the results of these analyses with selection of initial planning consultants.

5.2.1 - Influence of Organizational Structure

The structure of an owner organization, both internal and in relation to external components, affects the planning process. The means by which an organization controls operation and decision making is extrapolated to the delivery of capital projects. As capital project development is typically pursued infrequently by owners, it is unlikely that any well formulated pre-existing control structure exists. As a result, organizational characteristics of planning representative groups are strongly defined by those of their parent organizations.

Formal systems are important to maintain the focus of planning efforts. On the other hand, capital project delivery is inherently strategic, therefore the decisions involved are the least routine and formalized of any decision processes.[70] Although strategic, an owner's top management typically can not afford the significant time required to fully participate in development of projects; both delegation and control are required. These

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[70] Mintzberg, p. 60.

conflicting pressures determine the extent to which the group approaches the project-oriented ideal structure. As diagrammed in Figure 5A, the planning group's ideal structure is typically very different from the parent structure from which it is derived. The delegation and control mechanisms present in the parent structure prevent, to some extent, the formation of the ideal group structure. This concept is further addressed below.

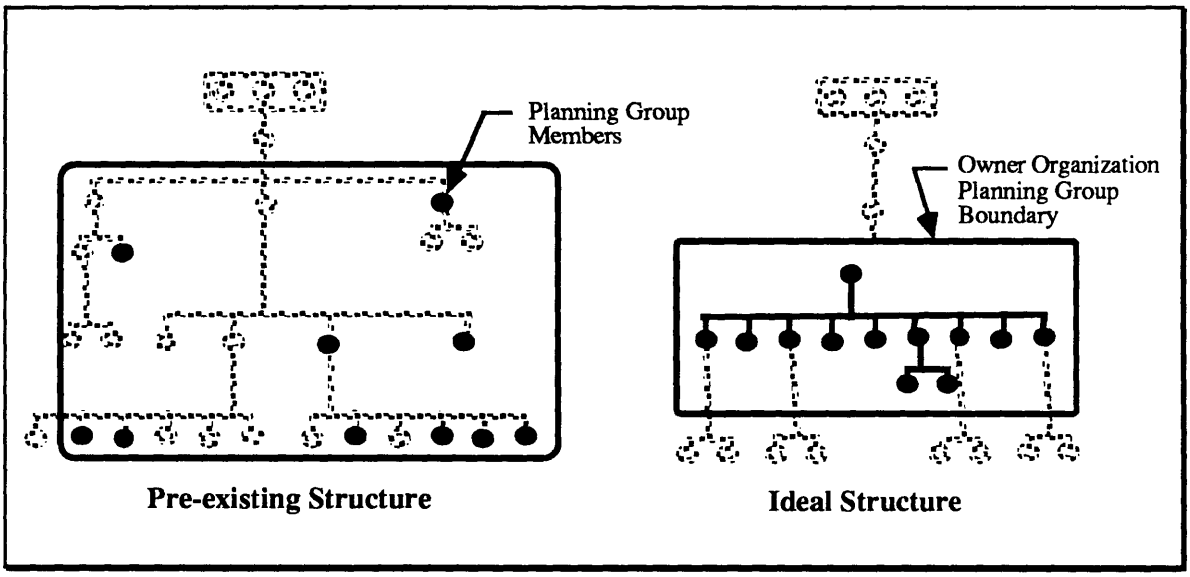

Figure 5A - Organigrams of Actual and Ideal Owner Organization Planning Group

Various issues of planning require different support and are facilitated by different aspects of organizational structure. From the rigid formality of a strict hierarchy to the organic flexibility of a roundtable, various aspects of planning efforts desire a wide range of organizational characteristics. The analysis below considers key structural concepts in initial planning, highlighting the influence of organizational structure.

5.2.1.1 - Unity of Mission

Teamwork is founded on the precept that the whole is greater than the sum of its parts. To effectively utilize the parts of a team, the entire structure must function as a whole. In any complex organization, though, significant entropic forces limit this cohesiveness. Unity of mission for any project persists through communications efforts and partially shared objectives. These are dependent on an owner organization's structure, primarily influenced by the effect of size, complexity and decision structure on the ability to synthesize team components.

Perhaps the most apparent resultant of increasing organizational complexity is the difficulty securing unity of capital project mission. The trends toward complex projects and owner organizations implies increasingly varied perspectives of project objectives by the various horizontally specialized group members. Complex organizations' functionally differentiated units tend to have multiple objectives, often conflicting, when approaching an issue. The perception of common good is influenced by each individual's function, level and perception of functional and organizational gain. As Figure 5B indicates, the various group members are drawn by their individual differentiated unit and specialized job perspective. Indeed, the resultant diversity of input is vital to the planning effectiveness, yet the challenge to cohesion of mission is obvious.

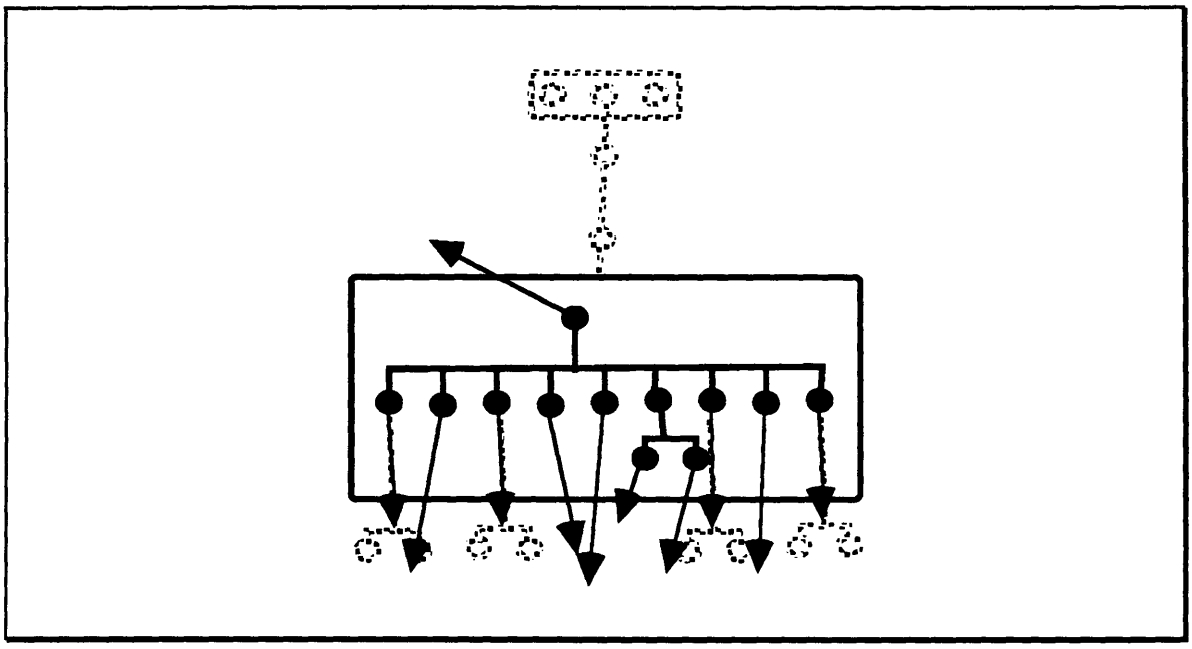

Figure 5B - Differentiated Focus of Group Members

Formation and maintenance of unified missions is generally unattainable in the absence of some formalization. Most typically, a degree of direct supervisory leadership from the strategic apex of an organization is focused on the planning group. Corporate culture, a form of behavioral formalization, can establish unity and focus as well. For example, an organization's financial orientation can establish the overriding priority of cost savings over quality. These mechanisms for unified mission are graphically represented in Figure 5C.

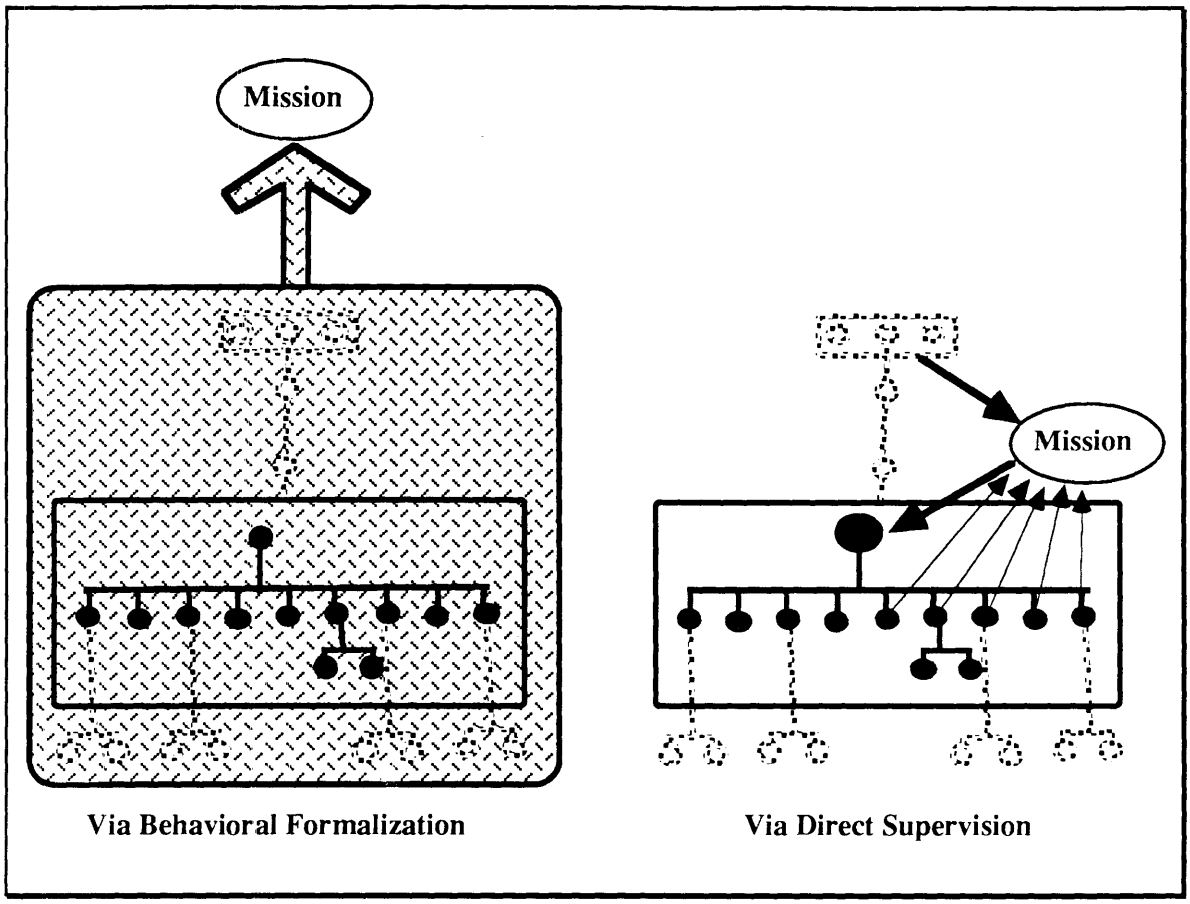

Figure 5C - Mechanisms for Unity of Mission

Classification of owner organization characteristics is therefore concerned with inherent ability to facilitate unity of planning mission throughout a planning group. If not possible internally, external planning consultants must facilitate consensus. This weighs heavily in consultant selection, as discussed in Chapter 7.

5.2.1.2 - Strategic Orientation

A prevalent and influential parameter determining objectivity of decision making is the task-oriented focus of many managers involved in the planning of capital facilities. Very few owners adequately consider the strategic aspects of existing facilities or new building projects.[71] The absence of strategic orientation in project management members of owner organizations transforms the planning phase into an extension of the

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[71] IF Team, p. 3.

implementation phase. Project defining parameters, as related to an owner's strategic plan, will be translated into physical projects without analysis, feedback, or reinterpretation relative to more specific information.

Unless the strategy formulating component of an owner organization is involved in the process or middle managers possesses characteristics of top management, the focus of project delivery is likely to be on implementation. Task focus biases owners toward solutions that facilitate successful task completion. This is not necessarily synonymous with attaining strategic goals. Estimation of this objectivity factor is based on an analysis of the qualifications of managers who will be directly involved in the project delivery process.

5.2.1.3 - Decision Making Ability

Owner representatives to a planning team must respond rapidly to changing conditions throughout the process. As planning focuses on definition of a project's parameter and options, a multitude of refining decisions are made. Decentralized control facilitates owner representatives' effective response to complex and changing conditions.[72] For this reason, ideal structure for a planning group is quite organic, with information flow mainly via mutual adjustment, as is indicated in Figure 5A. An organically structured group's effectiveness is determined by the members' ability to communicate informally and make decisions. Moreover, the weakest link has a significant effect on the overall level of effectiveness, particularly in the case of the owner link. Figure 5D depicts sub-optimal reliance on decision making external to the planning group.

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[72] Mintzberg, p. 183.

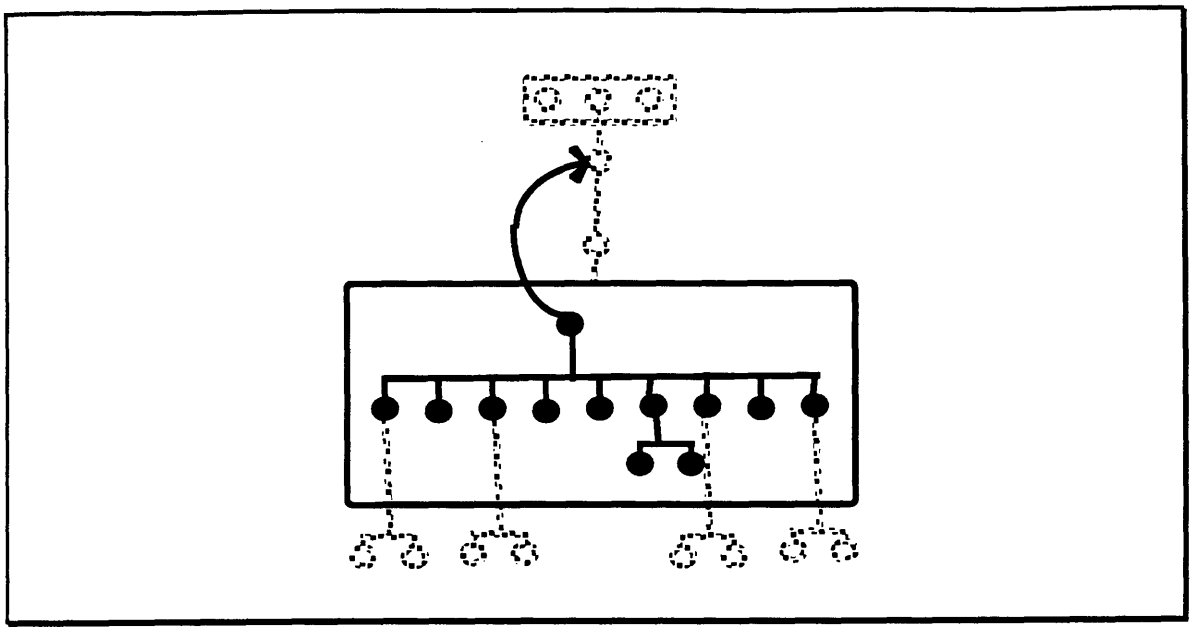

Figure 5D - Extra-organizational Decision Making

Estimation of the freedom of a group member to make decisions is a function of not only formal definition of decision responsibilities, but also perceived risk associated with decision making. Decentralized decision structure puts more decision making risk on lower tiers, which tends to lead to an unintended objective of individuals to avoid accountability. This assumption is founded in the notion that large institutions are driven by individuals' fear of failure.[73] The resultant over-cautiousness tends to sub-optimize the process through over-analysis, over-design and bias toward low risk options.

5.2.1.4 - Extension of Team to External Resources

An owner representative's ability to create a team out of the various members of a planning group has a significant effect on planning process and, of course, selection of a planning consultant. As discussed above, the planning group's ability to act as an informally structured organic entity implies effectiveness of the team aspect of the group. Due to the composition of planning groups, extension of this concern to external resources is critical.

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[73] Small.

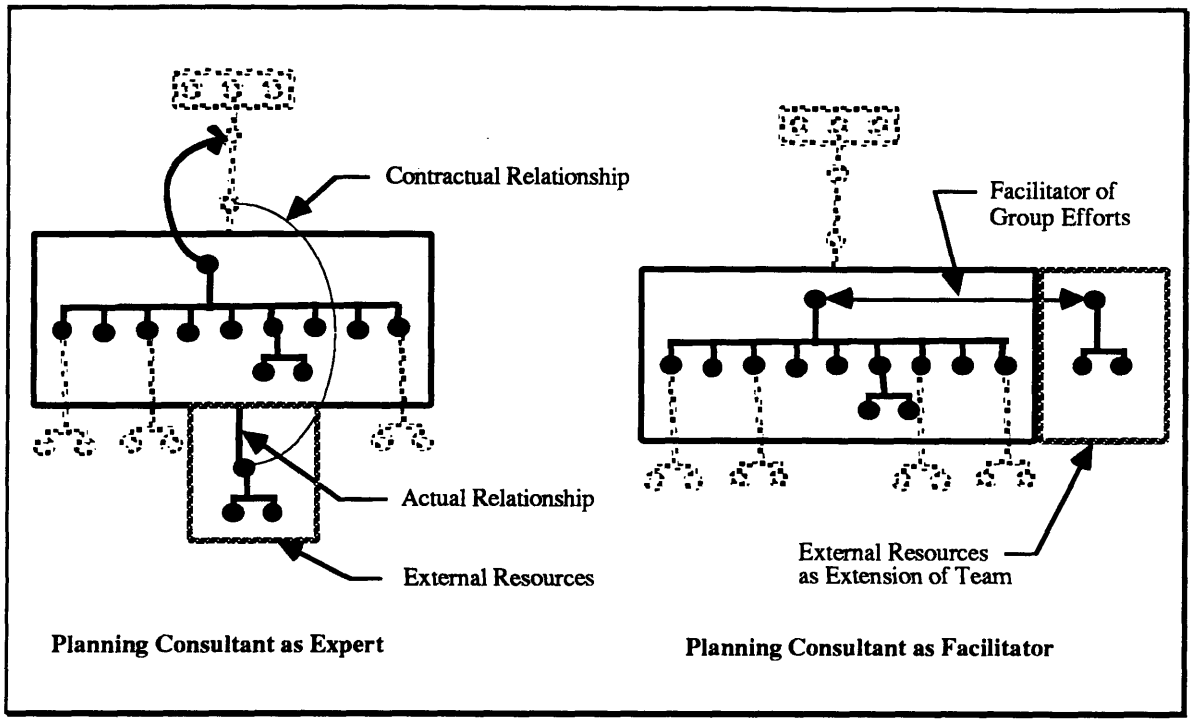

Figure 5E - Owner/Planning Consultant Relationships

The range of formal to informal relationship to external resources is determined by owner organization control system, from rigid to loose. A rigid control mechanism using direct supervision implies a perception of external consultants as pure technical experts. (At the other extreme, an organization may allow its consultant to structure the process according to their perception of effectiveness, as in the case of the expert facilitator. See Section 3.2.3 for a description of these consultancy models.) Again, degree of centralization of decision control in an overall organization indicates the formality of relationships within the planning group, including those to external resources. Reliance on extra-organizational decision making implies that the planning group can not function independently, therefore external consultants typically can not effectively function as facilitators. On the other hand, a decentralized organization's planning group members desire the integrative capacity of the external facilitator to interpret, integrate and communicate information relative to their expertise along with that of other differentiated units.

5.2.1.5 - Involvement of Ultimate Decision Maker

Regardless of the effectiveness of a planning group in isolation, its parent organization may not implement optimal solutions identified. Again, the concept of decision making

centralization influences this potential. Decentralized organizations are more likely to act according to the recommendations of a planning group. Centralized organizations are more influenced by perspectives of the ultimate decision makers, presumably strategic apex members. In this situation, involvement of the strategic apex in actual planning process is critical. The ultimate decision makers must be aware of the process that leads to the selection of options in order to assess the options' values. If not, political weight may drive the decision making toward sub-optimal results.

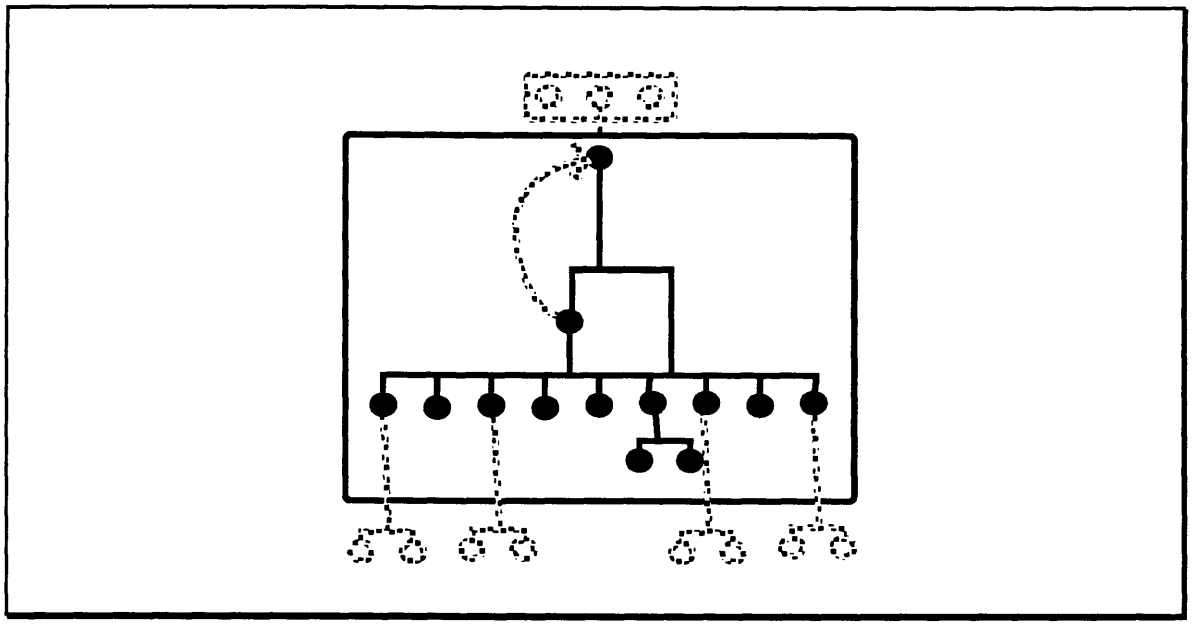

Figure 5F - Inclusion of the Centralized Organization's Decision Maker

5.2.1.6 - Accessibility of Data

The ease of communication within an organization influences complexity of delivering a capital project. Accessibility of information sources as well as that of decision makers is critical to the process. Accessibility is a function of the level of involvement of these key groups, time available for their involvement, communications structures of an organization, and data culture of an organization.

The methods by which information is stored and shared throughout an organization indicates accessibility of relevant data. This can range from divisional hoarding of information to limited access to centralized digital data. Clearly, all relevant information is not digitizable; however, a great deal of exploration and assessment involved in initial

planning is based on quantitative or graphic data. The level of accessibility indicates ease of collection of such data as well as skills required of initial planning consultants to do so.

5.2.1.7 - Democratic Orientation

Relative power within an organization often determines outcome of group decisions. Although no organization is purely democratic, the extent to which each constituent's concerns are considered influences effectiveness of planning efforts. In the case of initial planning of capital projects, this consideration is complicated by interrelationships between various internal and external organizations. As indicated in Figure 5A, members from various level within the organization as well as from outside the organization are equalized in the planning group. Consequently, ability to generate a democratic atmosphere is critical to team building. The inertia of relative levels of power in an owner organization determines effort required.

The generation of a democratic structure is facilitated through communication, trust and persuasion. Establishing a team with ideal structure then depends on facilitation. Trust can only be established through consistent display of equitable focus, consideration of member inputs and knowledge of the various areas of member expertise. The facilitator role described in Chapter 3 requires objectivity and general knowledge; these attributes are generally found only in the strategic apex of organizations. Thus, if the power differentials of an owner organization are high, the planning effort demands either the presence of the strategic apex or external planning constants possessing strong facilitation capabilities.

5.2.2 - Financial Resource Access

Access to and flexibility of financial resources at various phases of project delivery is discussed in Chapter 4 in relation to project parameters. Here, this is considered not as a function of the perceived risk of a project, but instead is considered as a condition of an owner organization, independent of any particular project.

Increased access to financial resources reduces process restrictions. In house or other relatively accessible sources of capital enable project delivery to proceed in an effective manner. Restrictions of funding is most typically the encumbrance of demonstrating project appropriateness to an external party. This is of particular importance in the initial planning phase; an owner's ability to adequately analyze options is typically dependent on

their ability to fund such an analysis. As project viability can not be demonstrated prior to initial planning, external funding of this phase is not common. Similar to access, flexibility of financial resources influences efficiency of delivery process. Flexibility determines the level of cost overrun risk that an owner can accept. Highly flexible financial resources allow an owner to accept risk, as covering overages is not crippling. Thus, the restricted access to financial resources drives an owner to spend less time on initial planning, establish project definition quickly, and quickly enter the implementation phase where external resources are more abundant. Implications to the selection of planning consultants are presented in the Chapter 7.

5.2.3 - Planning Sophistication

In this thesis, sophistication is not a measure of intelligence, savvy or business sense. It is ability with regard to a particular issue: capital project delivery. Estimation of owner sophistication should be based on that which is available to be applied to the particular project at hand, not the general level.

A primary component of the level of sophistication of an owner organization is its ability to comprehend the components of project intensity mapping discussed in Chapter 4. Project complexities and their criticality partly drive planning processes. Thus, this factor indicates the owner's ability to recognize the need for planning in general and need for assistance in planning.

Performing project complexities analyses described in Chapter 4 can introduce the project planning drivers, but no analysis can disclose the totality of issues that will inevitably surface throughout the planning and implementation of a capital project. As such, the perceived level of project complexity is inherently lower than actual. Related is the perceived versus actual value of comprehensive initial planning services. Owner sophistication is indicated by these two ratios.

Figure 5G graphically represents owner sophistication as revealed through the perception of project complexity. Line A represents the ideal scenario; perception of the value of initial planning is identical to the actual value regardless of the percentage of project complexity perceived. Line B represents a fairly sophisticated owner; even with no perceived complexity, a value is associated with comprehensive initial planning. With some understanding of the complexity involved, the value of planning is fully

understood. Line C represents a more typical scenario; perceived value is directly proportional to percent of complexity perceived, but is never fully comprehended. Line D represents the unsophisticated owner. The value of comprehensive initial planning is not perceived until the perceived complexity is a significant percentage of actual complexity. The perceived value of planning does not approach actual. The result is little effort expended during the initial planning phase and sub-optimization of the delivery process and final project.

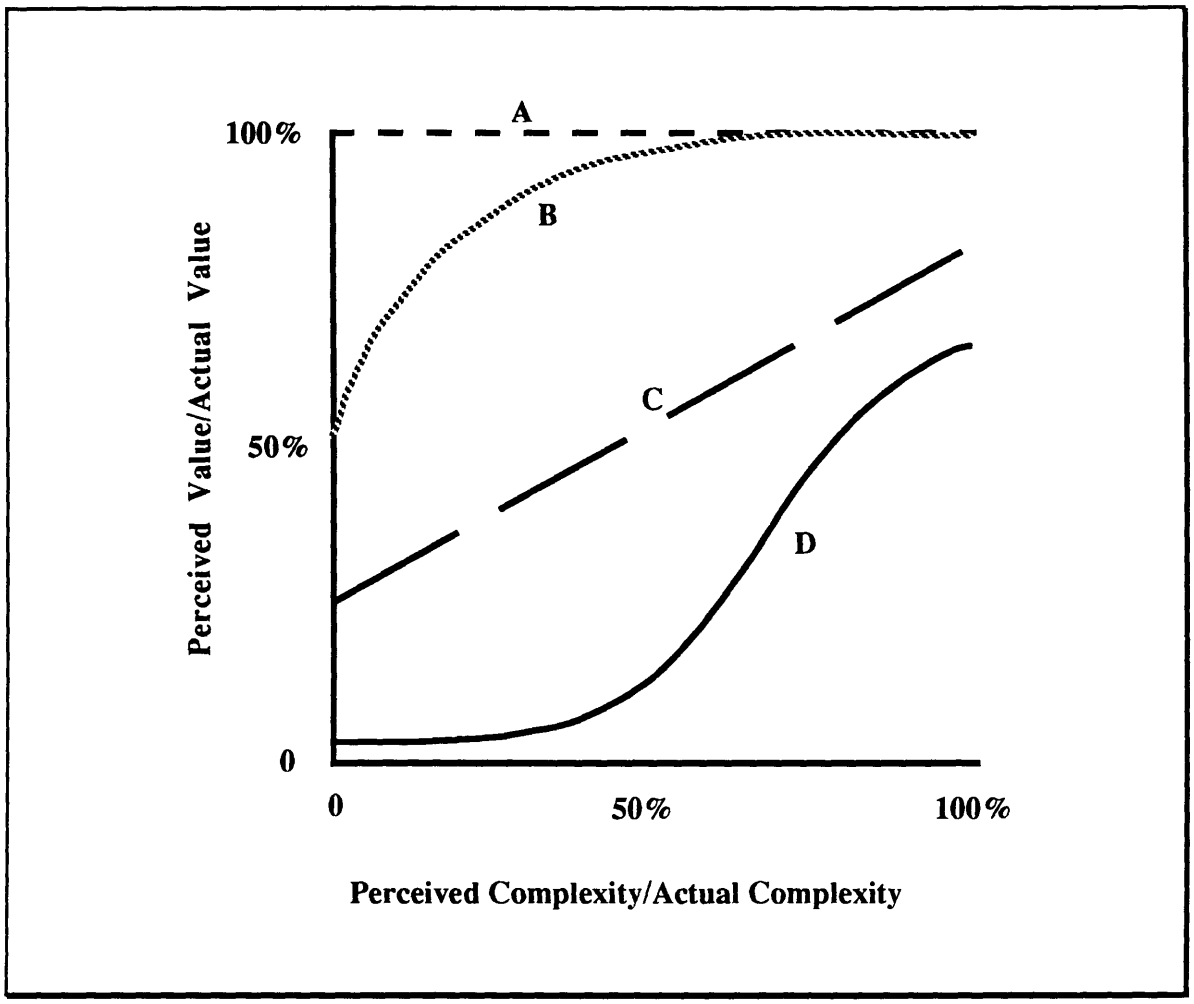

Figure 5G - Project Perception as Measure of Sophistication

The self-analysis required to estimate one's ability to ascertain project complexity is, however, quite unusual. In addition to objectivity difficulty inherent in auto-analysis, an owner must base the analysis on an estimation of the percentage of a situation that is perceived. The tip of the iceberg analogy can be entertained, but the basis for this

estimation is itself elusive. However, there are factors which provide indication of an owner's ability to ascertain project complexity. Relevant experience is particularly indicative.

5.2.3.1 - Experience

Relevant experience may be general or specific. Generally, an owner's familiarity with the delivery of capital projects is indicated by frequency with which these types of projects are pursued. Those owner organizations which take on capital projects more frequently have more experience and are more sophisticated with regard to capital project delivery. Experience with projects of similar complexity profile is, of course, significant.

Limited experience with project delivery in general or with the project type at hand does not necessarily enhance owner sophistication. Limited experience tends to obscure the one-off nature of capital projects and their delivery. As such, the complexity profile of previous projects may be applied to the project at hand. Projects are misread, efforts are misguided, and complexity tends to be minimized. As such, limited experience must be considered as potentially encumbering.

In estimating an owner's level of experience with delivery of capital projects, analysis must include each stage of delivery as well as each role the owner may have played. (See Section 3.3.1 for a discussion of the stages of delivery and Section 3.2.3 for roles involved in planning.) For each aspect of these stages, four levels of familiarity are possible.

If a client is unfamiliar, they may not understand the need for analysis itself, much less the need for expert consulting. If a client is familiar with the process, they may understand that expert consulting is required to both perform the analysis and manage the process. General familiarity with the delivery of capital projects implies an understanding of project limitations. These limitations include, most notably, the one-off nature of projects and the inherent time-cost-quality trade-off. If a client is experienced with the management of the analysis process, expert consultants are required to perform the analysis. If a client is experienced with the analysis process itself, they may do it in-house.

5.2.3.2 - Objectivity

Owner sophistication relative to capital project planning is partially determined by objectivity relative to analysis and decision making. Biases are inherent in any human activity; in project delivery, they result from past experience, strategic orientation, and cultural norms. Ascertaining an objective estimation of one's level of objectivity is enigmatic. However, closer examination of the factors involved can be revealing.

5.2.3.2.1 - Level of Experiential Inertia

Capital project delivery experience generally increases an owner's level of sophistication, as is discussed above. With regard to objectivity, however, experience is not necessarily of benefit. Comprehensive project experience with a variety of project types emphasizes the value of reconsidering anew issues and options at hand. On the other hand, limited or repetitious experience can influence an owner to directly apply previously successful decision paths to new, perhaps unrelated, situations. Experience simultaneously induces an owner to explore all options possible in some situations and to directly follow past decision logic in other situations. The management function is focused on differentiation of situations which are known, and as such can employ past decision logic, from new situations which require examination prior to decision making. Objectivity is a function of the accuracy of this differentiation.

Although it is difficult to estimate from within, the experiential inertia of an owner organization is revealed through variance of experience. The analysis must consider experiential variance of project type, project phase, and owner role. Low variance in any one category, regardless of that of the other two, suggests inhibited objectivity.

5.2.3.2.2 - Cultural Bias

An owner's objectivity is limited by both internal and external cultural bias. Internally, an organizational cultural bias is related to the experiential inertia as well as company norms. A cultural bias exists for each individual of an owner organization as well. The professional bias of an owner's decision makers reflects the professional background and experiences of these people. These biases, the general topic of Chapter 6, can be sustained long after professional practice. Review of generalized

biases associated with various professions indicates potential limitations to objectivity for an owner's decision maker.

5.2.3.3 - Confrontation Sophistication

Owner sophistication relative to capital project planning is in part a function of their confrontation sophistication. Capital project delivery is a process typified by conflicting recommendations, objectives and needs. Various team members each function according to their professional objectives. This invariably leads to conflicting recommendations, overlapping territorial claims, and inter-organizational animosity. A common pattern is identification of a previously latent restriction on a team member's ability to efficiently meet their contracted obligations. Ideally, the bulk of these issues are deterred via team building skills, yet many conflicts come to the fore and require confrontation sophistication of the owner, or some empowered owner representative.

Primarily, negotiation skills determine confrontation sophistication. Components of negotiation skills are elusive. Estimation of skill level can be based on frequency of involvement in complex negotiations and history of success. Also of note, ability to negotiate is related to organizational complexity of a client. For example, a manager may avoid conflict if it threatens her relationship with a superior. On a more global level, a non-hierarchical decision making group may find conflict difficult to resolve and, thus, may tend to avoid it.[74] An owner estimating their ability to negotiate must also consider the frequency of litigation and arbitration related to construction projects. Confrontation sophistication required increases dramatically if this situation is reached.

The client's reputation constitutes a component of confrontation sophistication. Without necessarily possessing any ability, perception by others may deter confrontation. One must consider both the degree of reputation (none to widespread) and the perception itself. A widespread reputation of either extreme (tough negotiator or pushover) influences confrontation sophistication regardless of actual negotiation abilities.

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[74] Macomber.

5.3 - Mapping Owner Classification

The following presents a synthesizing methodology for analysis of owner parameters relative to capital project planning. The hypothetical projects presented in Chapter 4 are analyzed: a research laboratory for a start-up company, an academic building for a university, and a renovation for a hospital. In each case, the components of owner classification outlined above are addressed and an estimation is made. Results are consolidated in example maps. Subsequently, these maps will feed into the selection methodology for initial planning consultants presented in Chapter 7.

5.3.1 - Case One: Start-up Research Company

As is presented in Chapter 4, case one's owner is a first-time participant in the delivery process. The firm is quite small with no existing organizational structure other than the skeletal structure set up to coordinate company inception. This structure is temporary, however, as roles and personalities involved will change when the company goes into operation.

Characteristics of note are the involvement of ultimate decision makers, the level of relevant experience and the confrontation sophistication. As investors, yet not determined, will form the ultimate decision making entity, their involvement is obviously lacking. This is not a driver of owner classification, though, because the selection of the initial planning consultant can have little effect on this condition. Confrontation experience is quite low as the people involved in the skeletal organization, most academically oriented, have little relevant experience. The accessibility of data for planning is indicated below as medium. However, the actual users are not yet selected; the classification makes the presumption that the planning data available through the skeletal organization represents the eventual needs to be satisfied.

Parameter	Driver	Low	Medium	High
Unity of Mission				
Strategic Orientation				
Decision Making Ability				
Extension of Team to External Resources				
Involvement of Ultimate Decision Maker				
Accessibility of Data				
Democratic Orientation				
Financial Resource Access				
Experience with Project Planning				
Objectivity toward Project Planning				
Confrontation Sophistication				

5.3.2 - Case Two: Academic Facility

Case two is that of a new teaching facility for an old and venerable university. The owner organization is quite large and complex. Decision making is somewhat decentralized to the capital facilities division, a support sector unit; although significant decisions must be made by the strategic apex. Due to the multiple differentiated units affected by the project, the unity of mission is not very high. Political maneuvering threatens the effectiveness of the planning group's efforts.

The experience of the university with projects in general and specifically with similar projects is quite high. However, the experiential inertia of such an organization threatens their objectivity. Also of concern is the owner's confrontation sophistication. At all levels, the owner tends to avoid conflict.

Parameter	Driver	Low	Medium	High
Unity of Mission			▒	
Strategic Orientation			▒	
Decision Making Ability			▒	
Extension of Team to External Resources			▒	
Involvement of Ultimate Decision Maker			▒	
Accessibility of Data				▒
Democratic Orientation			▒	
Financial Resource Access				▒
Experience with Project Planning				▒
Objectivity toward Project Planning	▓	▒		
Confrontation Sophistication	▓	▒		

5.3.3 - Case Three: Hospital Renovation

Case three is that of a renovation project for a large hospital. The owner organization is extremely large and complex. Decision making concerning capital allocations is highly centralized, yet many differentiated entities are involved in the planning of facilities. Specialization, and related perspective of objectives, is present not only in the operating core of service provider departments but also in the differentiated departments in the support component of the organization. Political influence dominates the direction of planning efforts. As such, external consultants are relegated to the role of expert consultant, with little strategic or facilitation input.

Parameter	Driver	Low	Medium	High
Unity of Mission				
Strategic Orientation				
Decision Making Ability				
Extension of Team to External Resources				
Involvement of Ultimate Decision Maker				
Accessibility of Data				
Democratic Orientation				
Financial Resource Access				
Experience with Project Planning				
Objectivity toward Project Planning				
Confrontation Sophistication				

CHAPTER 6
PLANNING CONSULTANT OPTIONS

Sun Yat-sen noted, "It is not the practical workers but the idealists and planners that are difficult to find."[75] The philosopher and revolutionary was referring to the planning of a new government, but the same holds for the planning of a new facility. Ever-increasing project complexity drives professional differentiation, producing consultants with deep technical ability but limited scope of expertise. Davis noted, "the more deeply involved an individual becomes in the detailed knowledge and skills of one specialization, the more likely he is to view all aspects of planning, producing and maintaining the built environment through the paradigm of that one specialization."[76] The generalists, able to integrate all specialties, are difficult to find.

Various options are available providing initial planning services, and each has its own characteristic strengths and weaknesses. Many participants in the construction industry are augmenting and/or tailoring their skill sets in order to provide more market-oriented consulting services. As owner expectations reflect the supra-industry dynamics discussed in Chapter 2, alternative approaches are increasingly marketed. Although a great variety of terminology is employed, primarily as a means to differentiate services, initial planning consultancies are extrapolations of either traditional construction industry participants or general management consultants. The range of options is generalized below as architect, construction manager, developer, management consultant, and owner in-house.

This chapter provides a horizontal market analysis of these professions providing initial planning consulting. The various professions' core planning capabilities are identified as the basis for extrapolation into more comprehensive initial planning services. Strengths and weaknesses typical of the professions are identified; from this, the strength of each

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[75] Sun Yat-sen, p. 719.
[76] IF Team, p. 15.

profession is estimated with respect to the various roles and issues involved in initial planning.

The range of services provided within each planning consultant profession varies widely. Comprehensive analysis of these fragmented professions is beyond the scope of this analysis. For the purposes of this study, abstracting generalizations are necessary. These generalizations are not, however, arbitrary, but reflect information collected through relevant literature, interviews, and personal experience in the construction industry. As with any generalization, however, the data presented and conclusions drawn should not be considered prescriptive or specific. Instead, this analysis is meant to provide an overview of a dynamic market, yielding general overview to owners and planners alike.

For each profession identified, this thesis argues the presence of intrinsic biases; their ultimate sources are hypothesized. Professional training, characteristics of core services, and usual reward systems are identified as causes of professional bias. Bias can be seen as either cognitive, due to the way inputs are processed, or motivational, due to one's perception of reward. Each profession is discussed in relation to these two basic classifications of bias. In large part, these biases differentiate the various professions' initial planning capabilities.

6.1 - ARCHITECTS

Architects typically focus on their core competency, physical design, often providing initial planning consulting. In fact, the traditional design role of the architect extends into the early stages of project definition. Architects remain popular consultants particularly for the development of master plans and analyses of programmatic requirements. In addition, some architects are expanding the definition of design to include non-traditional aspects of initial planning.

However, market data indicates the steady decrease of the use of architectural services in general. Figure 2D indicates the steady decline of architecture and architecture/engineering firm's fees as a percentage of total professional fees. The market around this mature industry is changing relatively rapidly. As such, the profession must either extrapolate services or retrench to core architectural services in order to survive. Research indicates that some firms are embracing one or the other of these strategies. As

such, the discussion of the development of the architect's role in initial planning is limited to those firms dedicated to extrapolating from core capabilities.

6.1.1 - Definition of "Architect"

Architects can be defined by their responsibilities during capital project development: expertise and management of planning, development, and documentation. This is not a common definition; dictionaries reflect popular perception. However, the role of architects is often misunderstood even by those intimate with the construction industry. As opposed to the common perception of architects as purely aesthetically oriented, their role is usually that of coordinator/facilitator of the multitude of political, regulatory, technical, functional, spatial, and aesthetic issues that contribute to the design of a facility. The vast majority of architects' time is spent coordinating design inputs from sub-consultants and generating legally contractual design documents. Both coordination and documentation, though guided by aesthetic and functional parameters, do not correspond with the popular definition.

6.1.2 - Traditional Planning Services

The traditional scope of architectural services includes vital aspects of initial planning. Traditionally, expert consulting has been concentrated in the physical aspect of initial planning with lesser expertise in strategic aspects. Figure 6A indicates the architectural profession's general areas of expertise, typical extra-expertise facilitation required, and focus of initial planning innovation. Refer to Figures 3H and 3L for a presentation of the planning role/aspect target.

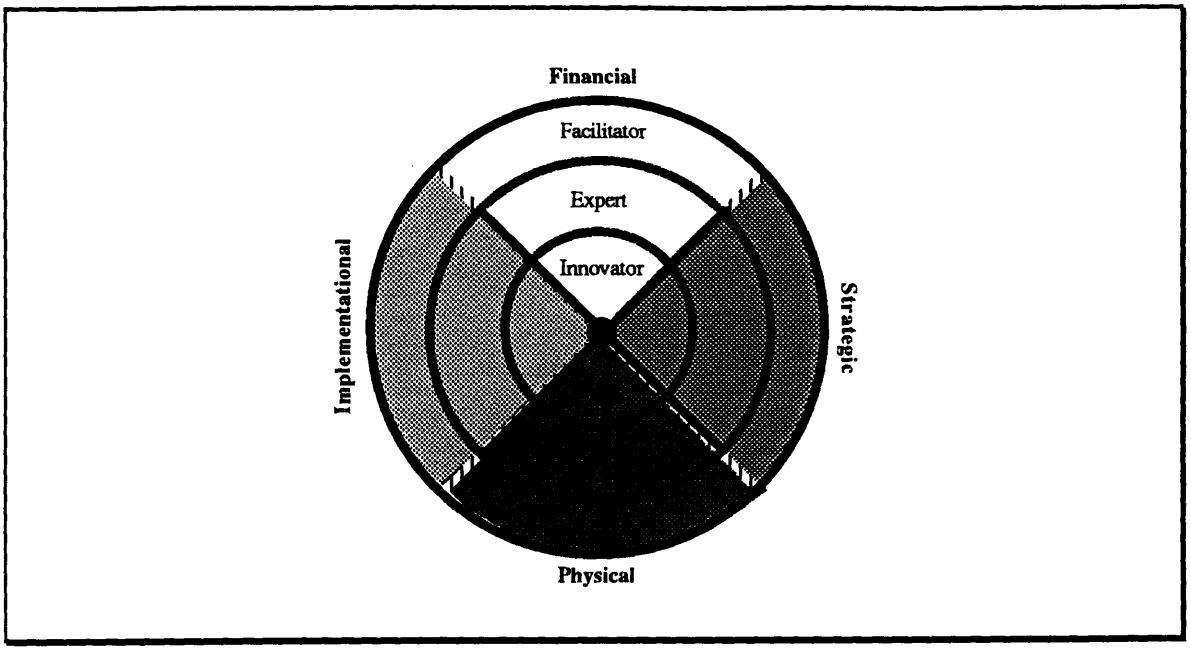

Figure 6A - Planning Role/Aspect Target for Traditional Architectural Services

Schematic design phase services provided by architects typically include aspects of initial planning. As delineated by the AIA (American Institute of Architects), schematic phase services include a "review...of alternative approaches to design and construction of the project."[77] Included are comparisons of fundamentally different approaches to the project's siting, massing, primary systems, and strategic alternatives such as ability to expand the facility or change its use. Such comparisons consider both potential gains from each option and costs, monetary or otherwise, associated.

The services described above could be interpreted as fundamental initial planning. In practice, however, only a cursory analysis of these alternatives is included in basic services. Owners devote considerable attention to analysis of their needs and resultant project conceptualization prior to the schematic design phase. Often, the architect is involved, but the architect's involvement in deeper or more fundamental study is not considered in practice part of basic services.

The traditional role of architects as planners is evidenced in the AIA list of additional architectural services. Included are needs analyses, programming, financial feasibility

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[77] AIA Document B141 1977, p. 3.

studies, comparative evaluations of sites, services relative to future facilities, coordination of other owner agents, and various financial analyses.[78] Taken together, these services comprise much of what has been defined as initial planning in Chapter 3. However, there are conspicuous omissions. Comparison to the financial, implementational, physical, and strategic aspects of initial planning reveals gaps; in practice, a less complete range of services is typically provided as depicted in Figure 6A.

6.1.2.1 - Strategic Planning

Strategic planning, as a part of business management, consists of analysis of internal parameters and matching of these to exterior conditions. As such, holistic perspective, parallel analytical ability and conceptual skills are required of planners. Architectural practice is analogous; architects' skill sets closely resemble those of strategic planners, at least in structure. Architects are used to the facilitator role associated with the traditional programming role of eliciting needs and relationships. Conceptually, architects must process many inputs to devise solutions. But the analogy is incomplete; financial and business expertise are not typical of the profession. Thus, the architect has the relationships, human skills and conceptual skills to effectively incorporate strategic aspects of planning into their initial planning services; however, much of this potential is lost through insufficient financial and business related technical skills.

Architects and their services are, however, inherently strategic in nature. The time horizon is quite long, related to building life. This key aspect differentiates the strategic from the tactical. Analysis inputs are quite diverse, differentiating the resultant from functional objectives. Capital facilities represent the physical interface of an organization and its environment. Thus the design of the facility is directly analogous to the more general strategic design of the interface between an organization and its environment. Yet the strategic aspect of architects' initial planning services typically remains implicit.

6.1.2.2 - Physical Planning

Architects traditionally provide expert consulting in the early phases of specifying an owner's physical needs and designing the solution. Through interviews with users, inspection of existing facilities and studies of similar facilities and related publications,

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[78] AIA Document B141 1977., p. 5.

architects develop programmatic design. Included are specific spatial and environmental requirements as well as relationships between these spaces. The experience of architects can be applied to a conceptual problem to ascertain specific spatial and environmental needs associated.

Importantly, programmatic needs analyses often go beyond the definition of solutions, and interface with strategic issues. Often the crucial value of analysis is in defining the problem. A systematic study of a user's conception of needs can reveal flaws in an assumed solution. The questioning of an owner's basic assumptions can enhance understanding of the true nature of a problem and perhaps redefine a project's goals.

This does not as much result from application of past experience as it does from application of an alternative perspective. Owners are generally consumed by their specific corporate or institutional goals which, by nature, are limited in scope. By contrast, architects are trained to investigate and internalize a broader perspective. Architects' general strength in this regard is in the extrapolation of spatial and temporal project boundaries.

Architects' traditional services include planning the relationship of a project to future uses and future projects. Their strength in this regard is also the resultant of a broader view of projects. Whereas a client may perceive a project as filling current needs, architects are typically very aware of the duration of a facility. The difference may be between a 5 year perspective and a 50 year perspective. This alternative perspective can have a significant effect on initial planning, leading to enhanced future value of projects.

6.1.2.3 - Implementational Planning

Architects' traditional services do not typically explicitly involve planning of implementation issues. The AIA standard contract mentions only the coordination of work performed by other agents of the owner.[79] However, architects' traditional role indirectly determines implementational methodologies. Though feedback from the implementation phase is limited, architects' arm's length involvement with the construction phase affords a moderate level of implementational expertise.

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[79] AIA Document B141 1977., p. 5.

However, architects' biases form barriers to utilization of implementational expertise. Strong cognitive bias of final product concern over the process of realizing a product inhibit implementational focus. This is the result of educational and professional focus. Perception of implementation issues as a distant second to physical issues is widespread. One architect displayed this: "Ultimately who gives a damn if the design is a week late?"[80] Other industry professionals view architects as typically harboring disrespect for construction expertise.[81] Interestingly, an illogical motivational bias also contributes to process planning de-emphasis even though market demands often reward based of process performance. This is partially the result of a common perception held by less sophisticated owners that architects are responsible for project design and construction flow.[82]

A significant percentage of the construction methodologies used on a given project are determined by default via the architect's design. For example, initial planning's siting or phasing of a project has related construction implication such as construction around adjacent structures, locating staging areas and temporary facilities, and scheduling relocations of owner functions. Similarly, the details of architects' designs determine a great deal of the specifics of a construction process, such as shop finishing woodwork prior to installation. The architect considers process implications of these decisions, but that consideration is in partial vacuum and with a focus on the end product.

Planning of the contractual organization for a project is also limited by architects' traditional role during initial planning. Architects experience motivational bias to maintain project control via independence from the construction side of the contractual relationships. As such, organizational strategies which change this traditional control are usually discouraged. By default, the traditional three party arrangement is established according to the AIA's standard formats.

Within these confines, architects can effectively council as to the type of construction organization, contract and award system most appropriate for a project. Included is the decision between construction management and general contracting. Role conflict with construction management typically leads to cognitive bias toward general contracting.

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[80] Anonymous.

[81] Stowe.

[82] Frennette.

On the other hand, perception of reduced professional liability generates a behavioral bias toward construction management, although this is less influential. In the decision between lump sum and cost-plus-fee and negotiated versus competitive bid, there is a slight motivational bias toward cost-plus-fee and negotiated contracts due to associated enhanced design flexibility. The aforementioned are important considerations to which architects bring relatively unbiased perspective. But without inclusion of alternatives like design-build or turnkey, fundamental implementation strategy analysis is incomplete.

The future of architects' implementational planning capabilities is unclear. Primarily, reduced involvement during the actual construction phase, a result of construction management popularity and architect liability concerns, threatens part of the basis for architects' traditional planning capabilities. As this involvement decreases, construction expertise is less important to architecture firm staffing, thereby decreasing the importing of such skills. Also decreased is architects' exposure to the construction phase, thereby decreasing learning opportunities. De-emphasis of implementational aspects of planning could have unintended consequences. The perceived value of architects' input is, in part, determined by practicality of design; construction managers' expertise in this area and subsequent involvement in any given project highlights architects' weakness in this area, thereby eroding credibility.

6.1.2.4 - Financial Planning

Within the AIA's listing of services traditionally available through architects, financial feasibility studies are included as well as detailed estimates of construction costs and operation costs.[83] In practice, though, architects are rarely relied upon for financial planning of any depth. Estimators and quantity surveyors are often sub-consultants to architects, but financial analyses by architects themselves are rarely commissioned. Although architects are privy to a great deal of financial information from which historical data could be compiled, detailed financial analyses are not considered integral to architectural practice by academia, licensing boards, or professionals themselves.

While some innovative firms are addressing this issue, the profession in general can not offer complete initial planning services as a result of this fundamental limitation. As

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[83] AIA Document B141 1977., p. 5.

construction costs continue to rise, clients become increasingly concerned with financial analyses and resource strategizing. As a result, architects are increasingly relegated to subordinate roles during initial planning.

6.1.2.5 - Other Strengths of Architect's Initial Planning Services

Architects are notorious for working late into the night immediately prior to design completion in order to include last-minute design changes. This practice reveals a distinct strength of the architectural profession relative to initial planning: acceptance of change. The design process is characterized by overall gradual definition with simultaneous repetitive dramatic changes with regard to specific components. As such, architects' cognitive bias system discounts rational progress-oriented methodologies emphasizing instead compilation of input data and delayed formation of solutions. The phenomenon of anchoring, or developing a bias toward a premature solution based on limited early information, is minimized. However, this propensity can be detrimental in highly complex or schedule-critical projects in which dependent project team members rely on linear, not iterative, project definition.

A fundamental tenet of implementation theory is the imperative to involve implementors in planning. As such, involvement of architects in planning phases facilitates transfer of specific and general information from planning to implementation. Moreover, motivation is enhanced by the fostered sense of ownership of the design parameters formed in initial planning that guide the design stage of implementation.

Finally, it should be noted that architecture is the only initial planning option that is rigidly professionally regulated. Although licensing is required to function as a builder, no such requirement is made of construction managers, developers, or management consultants. This is not meant to indicate any superiority of service level; instead, regulation only provides a minimum level of service one can expect. This minimum, unacceptably low, does not offer any significant incentive for owners to choose architects over other planning professionals.

6.1.2.6 - Weaknesses of Architect's Initial Planning Services

Any discussion of the strengths and weaknesses of the architectural practice must include discussion of the widespread divergence between architects' vision of their market and

actuality. With few exceptions, the profession is plagued by perceptions which are anachronistic. Study has shown the inaccuracy of the presumed and advertised popular characterization of the architect's role as one of power, freedom and autonomy.[84] Yet, architects generally cling to this view, often to their detriment. The outgrowth of this inconsistency is the well documented diminishing trust with owners and with other professions.

A recent architecture journal noted, "Many architects are neither trained nor experienced in business practices... lack of business savvy has lead clients to regard architectural services as a commodity for which it is easy to find substitutes."[85] As discussed in Chapter 2, the market increasingly demands accountability of consulting services through broad vision of owner objectives. The architectural profession is providing services that do not correspond to market demand. Architects themselves reveal this in their preference for sophisticated clients. The outsourcing trend in owner organizations is intensely disliked. One architect described working for a non-construction based client representative as a nightmare.[86] Instead of responding to the market demand with increased expert guidance, the profession resists, allowing others to fill the gap.

6.1.3 - Development of the Profession

Though many architecture firms are retrenching into their core competency of design, a few are aggressively responding to the changing market. Building on their belief that architects are the best qualified, most highly educated professional in the initial planning arena, some firms are extrapolating expertise into the strategic aspects of planning. Figure 6B indicates the resultant service target.

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[84] Gutman, p. 2.

[85] McKee, p. 107.

[86] Architecture 1/93, p. 105.

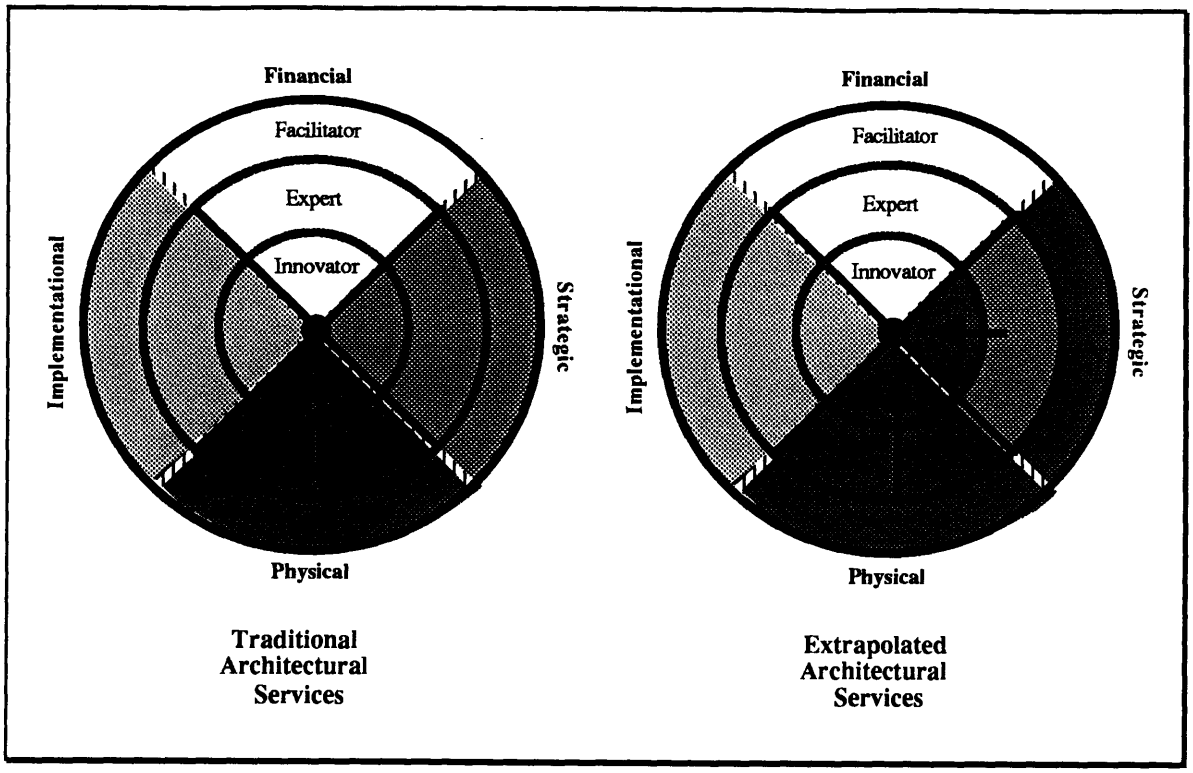

Figure 6B - Planning Role/Aspect Target for Expanded Architectural Planning Services

6.1.3.1 - Extrapolation into Strategic Services

Some architecture firms have expanded planning focus to explicitly include a traditional area of secondary strength, the strategic aspects of planning. As expertise with regard to this aspect is attainable only through extensive education and experience, these architects have focused on the strategy facilitator role, thereby limiting entry barriers. A major architecture firm in the southeastern United States market is used here as a model for this trend.

Strategic facilitation is intended to assist an owner's understanding of the relationship between corporate goals and capital projects. As described in Chapter 3, master plans for capital facilities ought to grow out of broader strategic plans. As such, capital facility initial planners best serve owners by ensuring that an owner's objectives relative to a project correspond to their overall strategic objectives. Review of this correlation often reveals inconsistencies. In one firm's experience, very few owners have explicit active strategic planning and those that do often do not explicitly relate strategic plans to project

planning. This firm has been surprised to find that even world-renown companies and institutions often do not have strategic plans in place.87

Expanded architectural planning role potential is evidenced in the following example. For a national manufacturing concern, the initial planners role focused on implications of a strategic plan to consolidate operations. The project was fairly well defined when the planners were hired. As the planners began collecting information, the strategic plan was reviewed. Inconsistencies identified led to a complete reassessment of project requirements. The planners' service included a location master plan which identified appropriate geographic locations for the new headquarters as well as related major manufacturing and distribution facilities. The architecture firm's facilitator role even included sub-consulting a management consulting firm to provide strategic expertise including assessment of industry market trends. After the strategic plan's ramifications on project planning were established, the project concept was modified accordingly and more traditional programming commenced. The leader of this firm sees services of architects, specifically those of his firm, as the catalyst for projects. This firm's goal is to make people realize that they need architects, but not the traditional type. In his words, "Rather than just design, we're putting the financial, marketing, sales, legal, and environmental teams together, to make something happen. It's exciting to me, because I think it puts us [architects] back in the leadership role with the program managers and construction managers and all these guys out there that say 'we want to be king'. We [architects] should be king." [88]

6.1.3.2 - Developing Financial Capability

Although no profession-wide trend is apparent, some architecture firms have developed recognition as having atypical planning abilities with regard to financial aspects of project planning. The role of facilitator can be enhanced through developing or importing related technical skill. As discussed above relative to strategic facilitation, architects need not have the technical skills required to fill the expert consultant role to effectively facilitate. One such architect described a focus on developing financial capabilities: "We find the perfect combination for this new paradigm is both an MBA (Master's of Business

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87 McLellan.

88 Architecture 1/93, p. 104.

Administration) and Master's in Architecture." [89] This type of education is extremely rare in the profession, yet those few can enhance the value not only of themselves, but also of the other architects working on planning and subsequently involved in the implementation design phase.

6.1.3.3 - The Tenacity of Production-Orientation

Perhaps the most significant determinant of the future of the architectural profession is the degree to which the profession transcends production orientation. Market-orientation implies the dilution of professional strengths. The strong sense of professionalism instills commitment to the design craft which, perhaps, inhibits intended change.

The beginnings of a wide-spread professional trend is seen in trade publications and academia. As example, the Graduate School of Design at Harvard University recently held a year-long symposium examining the present and future of architecture. These dialogues concern themselves with the changing role of architects as pivotal to a changing structure of fiduciary roles in the construction industry. Unfortunately, the solutions presented do not seem to display any heightened understanding of actual market demand. As evidence, the Dean of the Faculty of Design stated "If the design problems presented by society continue to transcend "normal" practice to a significant degree, then leadership in decision-making can hardly be expected to be regained. A repositioning of practice, then, will necessarily require two things: first, advancements in design itself, and, second, further collaboration and cross-disciplinary knowledge."[90] This points out two general issues. First, architects generally do not recognize the value of other professions providing similar services. Second, that the profession is generally unaware of the paradox of attempting to recreate authority through design excellence. This quote reflects the tenacity of production orientation; market demands are presumed to coincide with practice strengths.

Production orientation is also attributable to the influence of the professional associations. The journal of the American Institute of Architects, *Architecture*, recently included an article entitled, "Educating Bureaucracy: Architects must help transform institutional administrators into advocates for good design." The author discusses the

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[89] Rook.

[90] GSD News, p. 37.

problem of the clients' "...preoccupation with their own views of reality: budgets, schedules, procedures, and politics." [91] The article urges architects not to respond to these client concerns, but instead to transform the clients' focus toward the architects' area of production expertise. Thus the profession's advocate reinforces production orientation. These examples are indicative of the tenacity of the production-orientation throughout the architectural profession. The concerns pointed out are valid, but must be considered in relation to the totality of the owner's project objectives.

6.2 - CONSTRUCTION MANAGERS

Construction management presently constitutes the strongest area of growth in project planning. Although statistics are scarce, this perception is common throughout the professions involved in capital facility delivery. One statistical indication, albeit somewhat outdated, is a 1978 survey of building owners which found that one in five prefer to hire a construction manager prior to hiring an architect.[92]

The field developed in response to market demand for financial control in a time of high inflation.[93] Construction management services adapted as interest rates and focus on cost of money subsided. Traditional construction-oriented services expanded into physical and strategic aspects of planning; simultaneously, construction managers extended their capabilities into various planner roles. In so doing, involvement expanded beyond the construction phase to the design phase in the form of constructibility consulting as well as further up the value-added stream into initial planning.

Construction management in general has developed in cycles over the past few decades. As a percent of total construction billings, the profession shows an oscillation period of roughly 4.5 years as well as a steady growth trend.[94] No specific data is available concerning construction management's involvement in the planning stages of projects, but this general data indicates a growing acceptance of fiduciary consultant roles for construction professionals. More specifically, the allocation of construction management

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[91] Lewis, p. 39.

[92] Building Design and Construction, 2/79, p. 35.

[93] McLellan, Owens.

[94] ENR 6/15/89, p. 32. In all data compiled by ENR, the construction manager definition is consistent with the author's; the firm is financially liable for their fee only, does not contract with subcontractors, and assumes none of the contractual responsibilities of a general contractor.

services depicted in Figure 6C indicates the dramatic increase of construction management services provided by contracting based firms. While the volume of services provided by pure construction management firms, those providing only such services, and design-based firms have remained fairly steady, services by contracting-based firms have grown six fold in four years. This indicates the growing acceptance of the consulting role for the construction professional. The construction professional's role in initial planning is postulated as proportional.

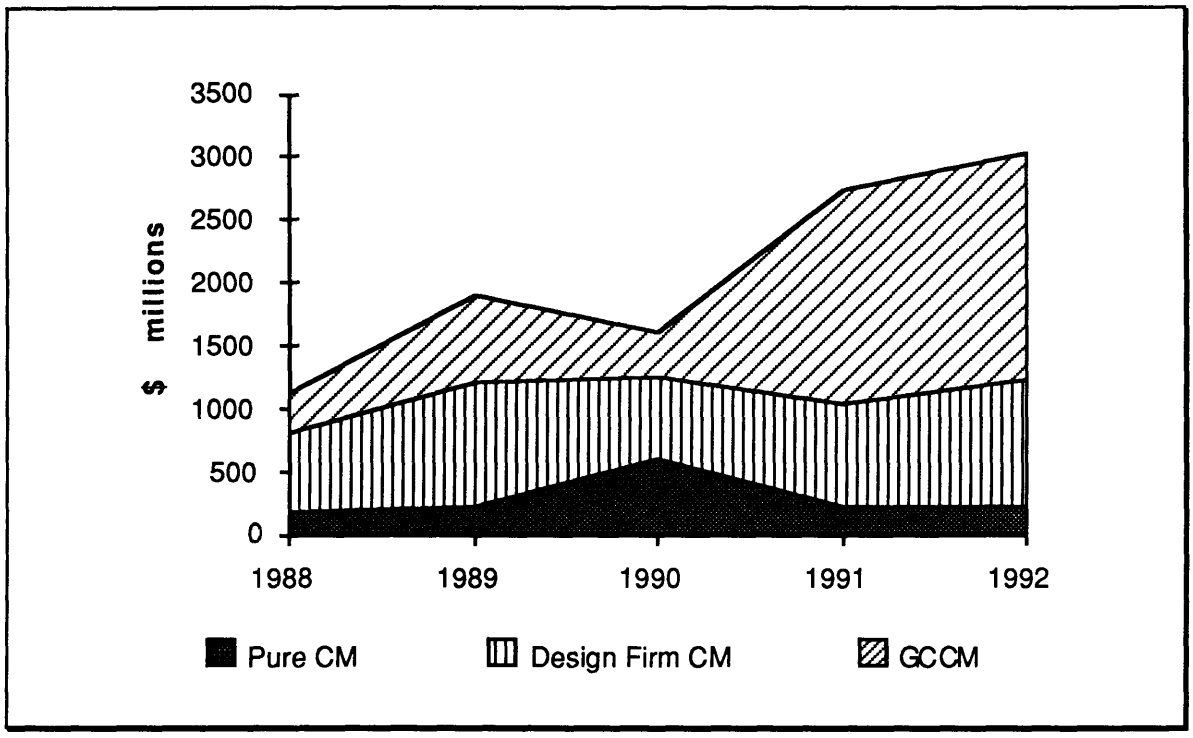

Figure 6C - Allocation of Construction Management Fees [95]

6.2.1 - Definition of "Construction Manager"

A definition of construction manager must allow for the great variety of services provided by firms identifying themselves as construction managers. The profession is a relatively new outgrowth of the general contractor role, although a small percentage of construction management firms grew from architecture and engineering roots. The construction manager typically provides coordination of implementation phase efforts, with an

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[95] ENR Annual CM Reports, Note the omission of Engineer-Contractors whose large fees reflect trends in large-scale public infrastructure projects, which are beyond the scope of this thesis.

emphasis on the actual construction phase. The term "construction management" is commonly applied to a range of services from those indistinguishable from general contracting to pure agency consulting services which resemble architectural management services. Typically, a consulting-for-fee arrangement is assumed and contracts are let directly through the owner. In many respects, the structure of the construction manager's relationship is similar to that of the architect/engineer. Contractually as well, liability is limited to fees involved plus negligence from errors or omissions; the standard of performance is based on good professional judgment relative to market standards, not on implied warrantee.

In practice, lack of established professional guidelines obscures the identification of true construction managers. Many traditional contractors present themselves as construction managers for purely marketing purposes. Moreover, some construction managers are simply catering to a market desire for predictability by selling unqualified predictions. For the purposes of this thesis, the definition is limited to those firms actually providing the expertise identified below as agents of the owner.

6.2.2 - Construction Professional as Fiduciary

The popularity of pre-construction services, the agency construction manager, and contracting for fee all indicate the growing trend of the construction professional as fiduciary to the owner. The focus of these services is away from historic commodity-orientation of competitive bid general contracting, toward service-oriented professional owner representation. A fiduciary is a person to whom power is entrusted for the benefit of another. The fiduciary is expected to act in the owner's interest, at the sacrifice of her own interests, typically according to some professional guidelines. The lawyer, as fiduciary, will dissuade the client from a risky deal, even if the lawyer stands to lose income in so doing. The fiduciary must first understand the owner's objectives and priorities in order to guide the owner through unfamiliar complexities to what is best.

The shift toward a more fiduciary role is related to the macro-market trend toward outsourcing. The owner, with less financial and implementational expertise in-house, looks to the construction manager to provide it, at a net cost savings to the owner organization.

The official emergence of the construction professional as the owner's fiduciary is present in the wording of the 1978 version of the AIA's standard contract between contractor and owner for cost-plus-fee construction services, Document A111. Article 3 states, "The contractor accepts the relationship of trust and confidence established between him and the Owner by this agreement...to perform the work in the best way and in the most expeditious and economical manner consistent with the interests of the Owner." [96] This establishes the fiduciary role of the builder. However, the architect's contract had traditionally established the architect as professional fiduciary.

Central to the fiduciary role is protection of the owner's interests in light of conflicting interests of other parties. Architects traditionally perceived this charge as protection of the owner's interests in the face of the cost reduction objectives of the competitively bid general contractor. The fiduciary builder now sees their role as representing the owner's interests against the design-oriented objectives of the architect. A professor of professional studies commented on this arrangement, "Well, if everyone is a fiduciary, then no one is a fiduciary."97 Indeed, the perception of owner interests vary as a function of professional biases. Multiple representation means no one speaks for the owner.

The critical factor to any fiduciary role is trust. Construction managers must establish trust in light of their usual core competency, construction services based on a percentage of costs. Some firms have sidestepped this difficulty by establishing separate service-oriented companies, or by providing no construction based services at all. The majority, however, must engender trust through consistent performance. Performance must reflect the range of owner objectives, without undue focus on implementational aspects of planning issues.

The fiduciary role implies a complete commitment to the owner's agenda. The construction manager as a professional attempts to establish professional status in light of a lack of professional definition. As there is no standard, the owner assumes some risk. However, as the profession becomes more recognized through consistent services, this issue erodes.

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96 AIA Document A111, p. 2.
97 GSD News, p. 40.

The professional must be in a contractual situation that enables her to act as a fiduciary. Any hard number, guaranteed maximum price or otherwise, puts the construction professional in a position in which they can not possibly perform as a fiduciary. In fact, the only truly appropriate arrangement is a fee-for-service arrangement, unrelated to construction costs.

6.2.3 - Traditional Construction Management Services

Construction management service typically focus on the construction phase of project delivery. Cost, delivery strategy, schedule, construction technique and systems micro-design are all controlled by the construction professional. These implementation phase core services largely determine the planning capabilities of the construction manager.

Services provided vary widely along with contractual arrangement. The American Society of Civil Engineers Subcommittee on Construction Management identifies practically every identifiable project task as the domain of construction managers. Initial planning services listed include development of conceptual estimates, schedules and risk analyses. Programming tasks identified range from those concerned with construction, development of preliminary tracking systems for example, to study of design configuration, to development of capital budgets and insurance programs.[98] Although this scope of services is quite rare, this article points out the multiple combinations of construction management services possible. Construction management at-risk involves the construction risk of the general contractor, while agency construction management consists of provision of expert advice for a fee, unrelated to the construction risks and to a large extent unaccountable for such risks. For the purposes of this analysis, construction management is considered only without risk, for fee. Any other situation implies a compromised fiduciary relationship.[99]

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[98] ASCE Journal 6/79, p. 139-155.

[99] Mottur.

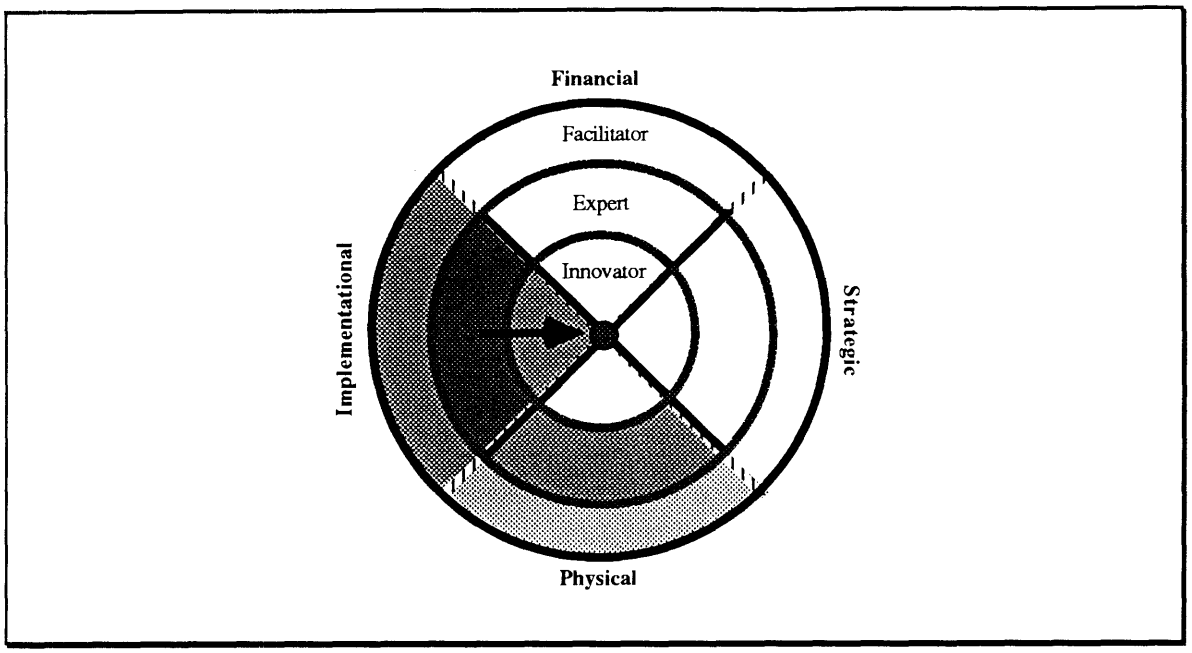

Figure 6D - Role/Aspect Target for Traditional Construction Management Planning Services

6.2.3.1 - Strategic Planning Aspects

The process separation between strategic planning with its application to initial planning and the construction stage of implementation indicates the inherent barrier to construction managers' capability with respect to strategic aspects of initial planning. Traditional involvement is focused on short-term owner objectives; cognitive and motivational bias is toward the tactical. The traditional separation from the strategic phase and, with a lag, the associated tactical biases are, however, steadily eroding due to increased participation in earlier phases of the delivery process.

6.2.3.2 - Physical Planning Aspects

The construction manager's traditional connection to the physical aspects of planning create moderate expertise in this area. The involvement of construction managers in pre-construction consulting, typically late in the design documentation phase, exposes the profession somewhat to the design process. In addition, physical definition, even with separation of architect and builder involvement, continues throughout the construction phase in the form of increased detail of plans through shop drawings and actual construction. Thus, the construction manager has an intrinsic understanding of the

physical aspects of planning, even though this ability may be unrecognized even from within.

Construction managers' moderate physical planning expertise typically is not fully realized. Traditional role separation and conflicting perspective of project objectives tends to form cognitive bias away from physical aspects of planning. From the perspective of architects, construction managers are prone to aggressively pursue implementational aspects of planning prematurely, resulting in optimized delivery of sub-optimal products.[100] Thus, their bias toward implementational aspects of planning overwhelms any physical issue capabilities.

In addition, the facilitator role is typically limited by the traditional focus of builders' human skills. In the traditional construction process, the builder's human skills are focused on the relationships with the upstream construction process input entities, namely subcontractors, vendors, suppliers and labor forces. Some focus is also directed toward interaction with the design team, but typically little is directed toward the owner organization. Thus, cognitive bias hampers construction managers' facilitation of initial planning even within aspects in which expertise exists.

6.2.3.3 - Implementational Planning Aspects

The construction management profession is noted for its ability to effectively plan and control the construction phase of delivery. Increased use of sub-contracting makes process coordination capability essential. As such, the profession is differentiated by strong implementational expertise. Constructibility analyses are an increasingly popular vehicle for application of this expertise during the design phase. In addition to methodology expertise, process planning is strong particularly schedule estimation and control. The construction manager has strong cognitive bias toward the successful implementational aspects of project planning.

The origins of construction management was in large part a response to market demand for enhanced financial control capabilities. As the entity primarily responsible for the spending of money on a project, the construction manager is intimately involved in the

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[100] Frennette, McLellan.

allocation of financial resources. This control capability is a differentiating implementational capability of construction managers. Comparative financial analysis is critical to the exploration of various physical, implementational, and strategic options. Thus, the at-risk construction manager, given enough control, can provide financial assurance to the owner.

This emphasis on implementational aspects can, however, be detrimental to overall planning. Corresponding is a strong motivational bias toward solutions which are least likely to create schedule and other implementation problems. As with any focused expertise, the application of insights in partial vacuum can lead to sub-optimal solutions. Moreover, the focus of the profession is on the implementation of set plans. An inherent cognitive bias is an aversion to changes to the plan being followed. As noted earlier, the initial planning phase is typified by change of project definition as project inputs are increasingly refined. This apparent incompatibility is mitigated by construction managers' focus on change as a progress disturbance whose effects must be minimized via proactive planning and rapid plan modification. Thus, although the construction manager is inherently change averse, the management of change is a defining strength. An additional cognitive bias resultant from strong implementational strength is a tendency to apply standardized and preconceived ideologies and methodologies regardless of the specifics of the situation.[101] Generally, experiential inertia, perceived risk and strong culture inhibit implementational innovation.

Again, as with physical aspects of planning, the construction manager typically is less effective in the facilitation role than the expert consultant role due to the inherent construction orientation of human skills. See above discussion.

6.2.3.4 - Financial Planning Aspects

Financial planning is not generally the purview of construction managers. However, strategic alliances with developers, or the presence of a developer unit of a corporation enables construction managers to effectively provide expertise, innovation and facilitation related to the financial aspects of planning issues. These capabilities are discussed below as part of the analysis of the developer option.

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[101] Snyder.

6.2.3.5 - Other Strengths of the Construction Manager as Initial Planner

As noted in the discussion of the architect option, the implementors' involvement is a critical factor to the success of any planning exercise. The construction manager, as manager of all or part of the implementation phase, should be involved in the planning.

6.2.3.6 - Other Weaknesses of the Construction Manager as Initial Planner

The presence of an intermediary between the design process and the owner organization can create inefficiencies. In situations in which the aesthetics and functionality of the product are important to the owner or some external influential body, such as community, the intermediary may be displaced. On the other hand, this is also a situation where implementational and financial oversight may be critical to maintain focus within the greater framework of strategic objectives.

The key to construction management services is the development of a contractual relationship between the owner and the construction manager which does not tempt the construction manager to act with bias. This is practically impossible, however, if the construction manager has any risk in the construction itself. This is also confounded by the profession-related biases of the individuals within the construction management organization.

6.2.4 - The Development of Construction Management Services

Construction management services are increasingly expanding into the planning process. With the introduction in 1993 of standard contract forms developed by the Construction Management Association, the trend away from role confusion was signaled. The contract gives the construction manager specific responsibilities for all estimates, including those related to the early design process, thereby clearly establishing the construction manager's role in the early planning effort.[102] The areas in which this profession is increasing its initial planning presence is quite broad.

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[102] ENR 6/21/93, p. 31.

6.2.4.1 - Development of the Facilitator Role

Many construction managers have realized the value of enhancing their capabilities as facilitators. The ability to effectively communicate not just upstream in the construction value chain, but also downstream to the owner, users, and designers broadens planning capabilities. Traditionally, contractors do not translate their calculated data into a form that is more owner-friendly. Information must be presented in the terms that are important to the owner, not just the forms convenient for the construction managers operations. Thus the cost of a programmatic component parametricized to cost per square foot, or cost per work station is important, not simply the cost for all the flooring tile on the job or concrete. Marketing this ability helps to differentiate service-oriented firms from the rest.[103] Figure 6E indicates the resultant roles. Note that moderate innovative capabilities are enabled via the enhanced facilitator role. This is due to the oversight of information flow of the facilitator. As such, enhancement of the facilitator role represents the greatest area for leverage of traditional construction management capabilities.

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[103] Henderson.

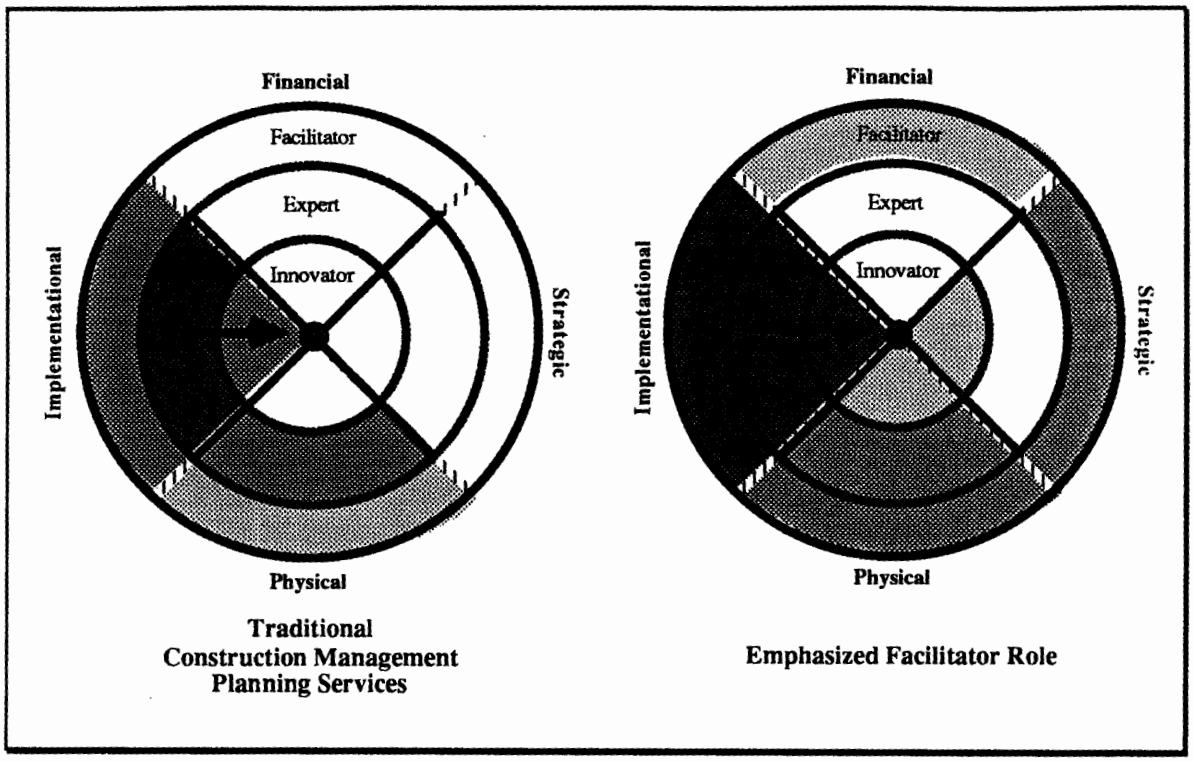

Figure 6E - Role/aspect Target for Emphasis of Facilitator Role in Construction Management Planning Services

6.2.4.2 - Enhance Physical Capabilities

A glance at the planning aspect/role Target for construction management indicates the potential for further development of capabilities with physical aspects of planning. Though extrapolation into architectural services appears attractive due to low entry barriers and low operating costs, few construction managers are pursuing this option, primarily because of competency dilution, low profitability and limited market demand for such comprehensive services.[104] Instead of developing expertise, firms are establishing enhanced facilitator capability through diverse range of professionals working within the construction manager's core competencies.

A natural result of the construction manager's desire for enhanced physical planning capabilities and the oversupply of architects in the marketplace is the current trend toward architects working for construction managers. An additional motivation for the inclusion

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[104] Winston.

of architectural experience is the ability to build upon the construction manager's expertise, facilitation and innovation with regard to the physical aspects of initial planning. In addition to these transplants providing expertise, some firms even codify physical planning expertise through computer programs.

6.2.4.3 - Enhance Strategic Capabilities

Closely related to the development of the facilitator role is enhanced strategic capabilities. In some cases, the construction manager is tackling the political challenges internal to owner organizations in order to provide valuable services to primary and secondary clients even if the primary client does not want the secondary client to look good. The resultant strategy employed in one example was to facilitate communications with both primary and secondary clients by using the focus of the potential of the combined forces. The two adversaries began to work together toward the goal of impressing their common boss.[105] This keen facilitation on the part of the construction manager creates owner value that is unrelated to the immediate project while enhancing the construction manager's chances for project success and image with the owner organization.

6.2.4.4 - Extrapolate Focus of Implementational Inputs

As discussed in Chapter 4, the complexity of the project is partially determined by sources external to the scope of the actual project delivery. Construction managers are expanding the focus of analysis to include such factors. An example is a case in which a cost-benefit analysis was performed to determine the appropriate staffing for a division of the owner's operations. In this case, a precursor to a critical path activity was the completion of the computer infrastructure design. The construction manager suggested that the owner hire an additional computer system designer; the added cost to the owner of the employee was offset by the savings in the critical path for the delivery of the facility.[106]

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[105] Stowe.

[106] Stowe.

6.2.4.5 - Focus on Implementational Innovation

An example of radical implementational innovation is the team building approach adopted for a pharmaceutical operation in Rhode Island. In this case, a comprehensive team of all professionals, contractors and trade councils was created immediately following the formation of strategic need. Under the leadership of the construction manager, the team provided all roles relative to physical, implementational and financial aspects of planning. Strategic aspects were determined by the owner. The innovation focus was chiefly centered on the implementational aspects. The construction manager is uniquely capable of implementational innovation of this type.

6.2.4.6 - Enhance Financial Capabilities

A trend is the enhancement of the construction manager's capabilities with regard to financial aspects of planning. Both financial expertise and financial innovation roles are being explored. Implementational strengths have been expanded into the financial arena concerning opportunity costs. Schedule delays can have estimated costs to owner operations associated. In this way, the construction manager transforms the scheduling expertise, an implementational aspect, into a financial expertise. As opportunity costs can be quite significant, this area of financial expertise carries weight.

In particular, financial innovation is increasingly facilitated through the association of development operations. These operations typically take the form of separate companies within the parent organization. The developer role enhances the construction manager's perspective; the president of a firm noted, "We understand the project both as an owner and as a pure CM."[107] The financial resourcing innovation leads to turnkey projects in which the owner does not own, but leases a custom facility from the construction manager/developer. Typically at the end of a 20 year lease the owner has the option to buy the property. This is particularly appealing to high growth owners whose cost of capital, due to high debt, is higher than that of the construction manager/developer. In addition to the financial capabilities required, this process tends to put the construction manager in a situation where strategic expertise is required to ascertain whether the risk of owning the facility is offset by the certainty that the owner will make lease payments. Clearly, the risk assumed by the construction manager/developer is greater.

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[107] ENR 6/15/89, p. 33.

6.2.4.7 - The Role of Technology in the Development of Construction Management Services

Information management and processing is critical to initial planning in general and to construction management services in particular. Computer-based information technology is undoubtedly the future of this realm. As such, professionals throughout the construction industry perceive the development of computer skills and infrastructure as critical to competitive advantage.[108]

The use of computers to perform value-added services is expected to generate a period of overlapping capabilities, competition and finally a shake-out. Construction managers are particularly vulnerable to the potential loss of financial expertise that intelligent computers can cause. The architect, in control of drawing generation and therefore data contained therein, is in a position to create financial expertise via knowledge-based computing systems. This potential could preempt the expertise of the construction manager.[109] As such, the construction management profession is most likely to develop strong computer infrastructures. Surprisingly, many otherwise sophisticated construction management firms have been slow to develop computer capabilities beyond word processing, cost estimating and scheduling. Surprisingly few employ CAD or integrative job cost accounting systems.

The growth of advanced technologies influences the expert role and the facilitator role. Access to data forms expertise in many cases. The general availability of previously localized data will erode this aspect to the definition of expertise. Instead, the focus will turn to what is seen in the data, innovation roles, and how the information is communicated, the facilitator role. In this area, advanced communications technologies are directly transforming the structure of teamwork. Also, general computing capabilities facilitates the translation of information into forms understandable to the various audiences. As such, technology impact the facilitator role both directly and indirectly.

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108 Winston, Frennette, Stowe, Remley.

109 Winston.

6.2.4.8 - Program Management

The services involved with program management are not universal. Regardless of a common definition for the term, however, the market is increasingly interested in these more comprehensive planning and implementation services.[110] A recent example of a construction based firm providing comprehensive program management is the case of a start-up biotechnology operation's new facility in Cambridge, Massachusetts. The Boston-based construction manager provided service from initial planning to contracting the movers. The construction manager assessed the client's needs, searched and identified a suitable location, planned and coordinated design of the new facility, contracted the construction work, purchased the furniture, oversaw the start-up and coordinated the move-in.

As such, the construction manager provided the facilities manager's function for a firm too small to consider hiring its own such manager. This defacto outsourcing created an opportunity for the construction manager to apply skills to the broader task of program management. The traditional construction role provided a significant fraction of the work by construction manager profit. The real value-added, though, was the expert consultant/facilitator role of the initial planner and program manager. Figure 6F indicates the broad extrapolation of traditional planning capabilities. Physical expertise was strengthened via outsourced expertise, and in-house focus was on the strategic aspects as well as the facilitator role. The supplementing of these two dimensions enabled the construction manager to provide nearly comprehensive innovation. Creative financial innovation was not part of the services.

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[110] ENR 6/21/90, p. 31.

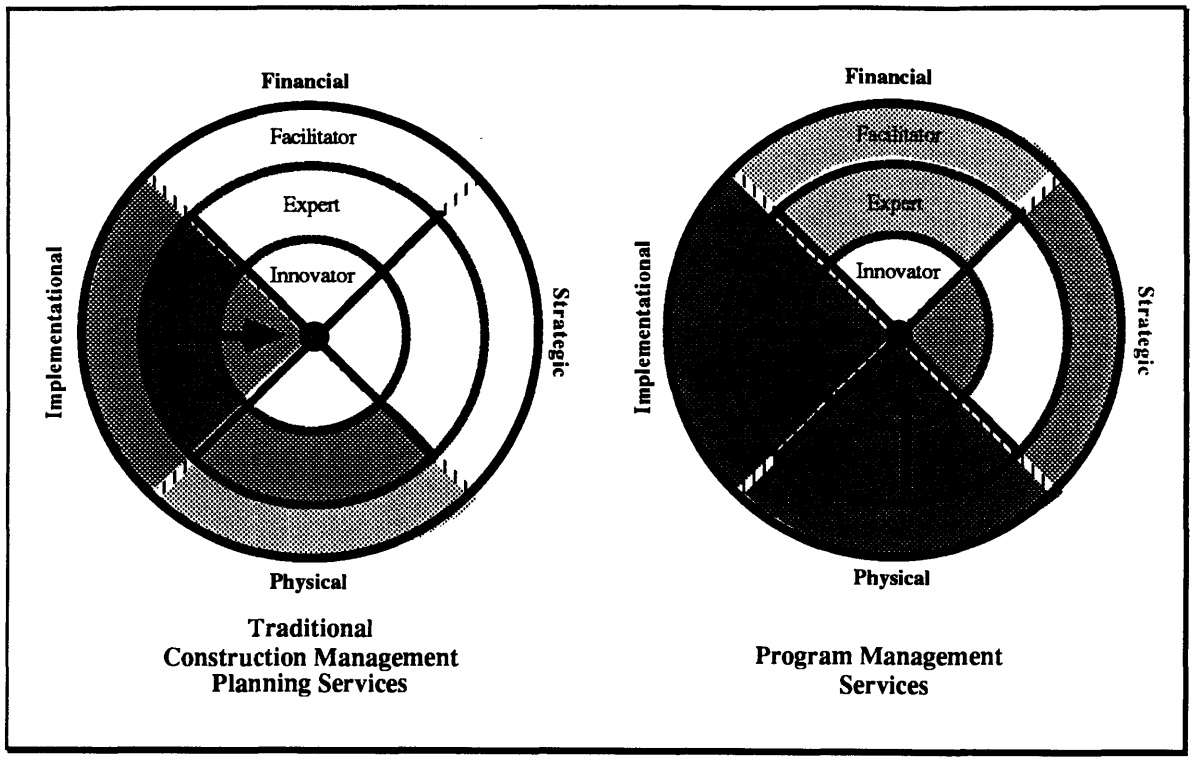

Figure 6F - Role/Aspect Target for Program Management Services by Construction Manager

6.3 - DEVELOPERS

Developers' core competency is building assets, not providing a service for a fee.[111] Traditional development requires the provision of capital and the expertise to manage the delivery process. Without hesitation, professionals note that if they had their own buildings to develop, they would not be offering their services to others. However, many developers presently offer management services for the delivery of capital projects. This is the result of both the oversupply of buildings, particularly of speculative office buildings in the northeast, as well as the cost of capital trend discussed in Chapter 2. As developer capital is more expensive than other sources, the developer is presently concentrating of the management of development with other people's capital. A 1990 study indicated that revenue from counseling services by real estate professionals accounted for 16% of gross revenues for the 5% of all firms that provide these services. The same study indicated that in the decade between 1980 and 1990, the number of real estate firms reporting that their primary activity was service oriented, including

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[111] Middleton, Owens.

counseling, appraisals, and property management, doubled while the number primarily focused on development was halved.[112] As reversal of this trend does not appear to be eminent, developers must successfully argue that their planning and management services are superior to the other various professions'.[113]

6.3.1 - Definition of "Developer"

A developer, in the context of this study, is a capital project delivery consultant whose basis of experience is the management of the delivery of their own projects. The developer, as consultant, applies excess capabilities to external projects; excess capabilities are the result of an unattractive development environment. As such, the developer is a displaced owner, offering planning and delivery management capabilities to other less experienced owners.

6.3.2 - Traditional Services

A recent survey of real estate service firms found traditional services provided in order of frequency as site or space selection, project feasibility, strategic planning, and lease analysis.[114] These services can be viewed as primarily oriented on the strategic and financial aspects of initial planning. Site or space selection, technically concerned with physical aspects of planning, more closely correspond to this thesis' delineation of the strategic concerns of marketability and relation to other operations. Project feasibility and lease analysis are both primarily concerned with financial aspects of initial planning, though lease analysis typically is not applicable to the scope of this study. The developer also possesses moderate capabilities with respect to the physical and implementational aspects of initial planning, as indicated below.

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112 Profile of Real Estate Firms, p. 14.

113 Owens.

114 Kimbler.

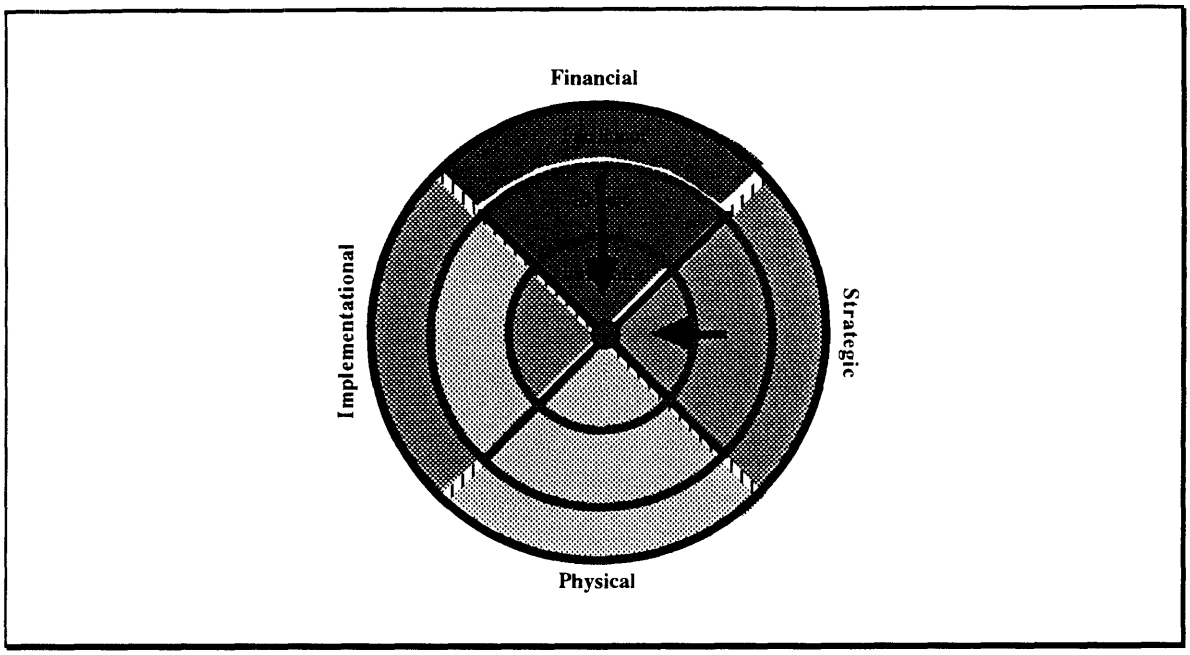

Figure 6G - Role/Aspect Target for Developer Planning Services

6.3.2.1 - Strategic Planning Aspects

The developer's strength in strategic aspects of planning are both due to direct involvement in strategic planning and indirect strategic perspective. Cognitive bias from core business experience tends toward interpretation and analysis in strategic terms. Clearly, the developer's direct involvement in strategic planning implies unique expertise among the various initial planning professions. As such, the developer is most likely to consider the project specific owner objectives in relation to the underlying strategy.

The value of the general strategy-mindedness of developers presents itself in the counseling of owners to incorporate long-range perspective into planning in addition to short-range perspective of satisfying immediate needs. Consideration of marketability of facilities constitutes an element of the strategic aspect of initial planning that is generally unique to the developer. Other planning professions are not involved with this aspect of the industry, so do not possess the technical skill required to consider such issues. Even if other professions attempted to consider product marketability, lack of market familiarity inhibits accuracy of judgment. More importantly, the owner is generally unlikely to explicitly consider this issue, yet the value of the project could be dramatically

affected.[115] Thus, the strength of the consultant's strategic bias can be instrumental in altering the owner objective priorities to include this often important factor. For such consideration of which the owner may be blind, the planner's related influence is critical to comprehensive consideration in planning.

6.3.2.2 - Physical Planning Aspects

Though generalizations, as noted above, are potentially misleading and always incomplete, the developer biases below indicate interesting strengths and weaknesses with regard to the physical aspects of initial planning. Strength is seen in the developer's tendency to relate physical concerns with strategic requirement through rational analyses.[116] However, this conceptual skill strength is diffused because of the limited technical skill associated.

Characteristics of typical development operations create cognitive biases. Although developers have direct experience leading the conceptualization of their own projects, the planning focus typically does not reflect the planning objectives of the owner with which this thesis is concerned. The developer's traditional focus concerning physical planning aspects is market appeal and maximized leasable area. This perspective on physical planning aspects is clearly displayed in the description of the role of the architect in traditional development projects provided in a developer's handbook. The architect is to "...provide for the maximum density potential to ensure the economic success of the project and package it attractively for the market and the local authorities." [117] These biases must be contained as most owner objectives do not correspond to them.

The developer's role as facilitator of physical aspects of planning issues is relative to the cognitive biases of traditional development projects. Involvement with speculative projects engenders a cognitive bias away from consideration of the specificity of spatial planning, or toward the perspective of a facility as repetitive "core and shell" spaces.[118] By definition, no specific user is involved in the planning of these projects. As such, facilitation of user requirements do not occur as part of project planning. Although initial

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115 Owens.
116 McLellan.
117 Alenick, p. 3-12.
118 McLellan.

planning typically is not concerned with the specificity of individual spaces, familiarity with the specificity of spatial concerns and user requirements is required in order to effectively consider the impact of the actual program during initial planning.

6.3.2.3 - Implementational Planning Aspects

The developer's capabilities concerning the implementational aspects of initial planning are in some cases focused on the conceptual aspects of innovation, and in others on the specificity of technical expertise. Innovation capabilities typically include strong conceptual skills regarding regulatory codes and permitting processes. In these more strategic concerns, the developer is well qualified as expert consultant and facilitator as well. However, concerning the technical aspects of the construction phase, the developer is typically limited due to traditionally limited involvement and, therefore, limited technical skills in these areas. For example, detailed scheduling and estimating capabilities are not common capabilities of developers.

6.3.2.4 - Financial Planning Aspects

Developers typically possess strong capabilities in all planner roles with respect to the financial aspects of initial planning. The industry trend toward outsourced ownership of facilities, or build-to-suit, enables the developer planner to perform the innovator role concerning the financial aspects of initial planning. This trend, as discussed in Chapter 2, is a function of the owner's inability to predict long term facility needs, because their markets and therefore operations are constantly changing. Related, the traditional build-to-own arrangement is declining in popularity. As a result, the capabilities of the developer are increasingly in demand as the areas of security required of planning analyses adjust.[119] As a stand-alone business venture, each project is analyzed to confirm the rate of return on the equity invested. This requires comprehensive complex analyses of market demand, finances, opportunity costs, and the costs associated with the delivery and operation of the capital project itself. The developer is capable of these analyses.

Financial planning capabilities of the developer are affected by the nature of typical development operations. Most obvious is the cognitive bias away from consideration of

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[119] Owens.

life-cycle costs. Many developers do not own and operate their projects, but instead develop with the intent to quickly sell. As such, operation and maintenance costs are unfamiliar concerns.

6.3.2.5 - Other Strengths of Developer's Initial Planning Services

The general capability of the developer as facilitator in all areas of initial planning stems from management of the myriad concerns of their own development projects. The developer is therefore typically a generalist, with working knowledge of much of the specialty concerns of the delivery process. Experience as facilitator with the range of concerns and specialties involved in development projects transfers to the role of facilitator of the planning of other's projects.

The traditional development project necessitates a strong sense of decisive leadership from the developer manager. Although judgment of this quality is case specific, generally the initial planning consultant is the best positioned leader of the planning process. As is discussed in Chapter 5, the owner is generally incapacitated by political concerns, organizational complexities, or simple inability; as such, the initial planning consultant is expected to lead.

6.3.2.6 - Other Weaknesses of Developer's Initial Planning Services

In traditional developer operations, the decision making process is relatively streamlined, as financial accountability is assigned. This creates a cognitive bias toward rationalized decision-making structure which can impact the planner's role as facilitator.[120]

A common perception of non-developer construction professionals is the view that the developer's presence constitutes increased hierarchy, overhead of communication, over-management and therefore less ultimate value.[121] Though the developer may be involved in the management of the delivery process throughout construction, the developer is not an implementor in the same sense as the architect or construction

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[120] Snyder.

[121] Frennette.

manager. Thus, not only is the true implementor not intimately involved in the planning, as discussed above, but the additional party constitutes an added layer of hierarchy or, at least, increased communication requirements.

6.4 - Management Consultants

The management consultant represents a relatively new option for owners seeking initial planning consulting. Relative to traditional construction industry professions, the entire management consulting industry is quite young, generating out of engineering-oriented firms in the post World War II era and only developing into a popularly recognized industry within the last two to three decades.[122] Management consulting's entry into the planning of capital projects, however, is much more recent; in fact, the very limited but rapidly growing incidence of this option indicate that it is presently in the formative stages of development. Many firms are applying strategic planning experience to facilities planning, mostly in the manufacturing and transportation arenas, but increasingly the market focus is expanding to include other project types.[123] A growth area for management consulting firms is assistance on large undertakings that continue for a year or more, such as re-engineering or implementing control systems.[124] As the popularity of management consulting services grows with respect to general planning and assistance with large change projects, the value of management consultants' services is increasingly seen by large organizational owners as appropriate to apply to the planning of a large capital project. The organizational owner, as discussed in Chapter 5, views capital facilities as assets to be managed. As such, the planning involved in project delivery is seen as analogous to the management consultants' core services.

Delineation between management consultants and other consultants is not precise. Particularly in the case of some pure construction management firms, the pigeon holing of some firms into one of the categories presented in this thesis would be misleading. Therefore, the reader should be aware that the terminology used here does not necessarily reflect any industry-wide norm; as is the case throughout the industry, standards are rare. In practice, subsets of an organization may act as management consultants as described below, while other elements may function more like the other professions identified

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122 Barcus, p. 12.

123 Remley.

124 Barcus, p. 14.

herein. As such, an abstracting definition is adopted for the purposes of this analysis, as indicated below.

The management consultant's potential as initial planning consultant differs from that of other professions. Clearly, the management consultant's traditional focus on strategic concerns is unique. In addition, the roles associated with planning are well developed, with the exception of the expert consultant's technical skills specific to capital project development. As indicated below, development of this profession may generate a very attractive option for capital project planning, given the trends identified in Chapter 2.

6.4.1 - Definition of "Management Consultant"

Organizations which refer to themselves as management consultants run the gamut from large general service firms to one-person specialists; the services offered vary equally from strategic planning to specific process design. For the purposes of this study, management consultants are more rigidly classified as pure agency consultants, focused on the business considerations of their clients' operations, providing general strategic guidance based on situation analysis and application of management theory. Focus within this general definition varies from the external, such as market prediction, to the internal, such as organizational structure and operations, to many more specific area of interface between the internal and external concerns of an owner.

Definitions of management consulting found in business literature vary with regard to specific content, but all stress the imperative of the independence of the management consultant from the client. Common phrases are, " ...a practitioner must not assume the role of management or any role that might impair objectivity."[125] and " ...the source of value to the client is the independence and broad business perspective."[126] The objectivity of the management consultant, a defining characteristic, differentiates this planning option from others.

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[125] Munn, p. 379.

[126] Rosenberg, p. 160.

6.4.2 - Current Practice of Management Consultant Planning Services

The management consultant's primary focus on the strategic aspects of initial planning issues dominates the consideration of their capabilities. In general, established routine and preconception of project goals are eliminated by the cognitive bias toward project definition through strategic analysis. In situations in which the owner's concerns are significantly different from those typical to capital project development, the management consultant provides the objectivity and perspective required to accurately interpret and actualize the owner's needs. Figure 6H indicates these initial planning strengths. Note the weaknesses coincide with the capabilities of the traditional construction industry professions.

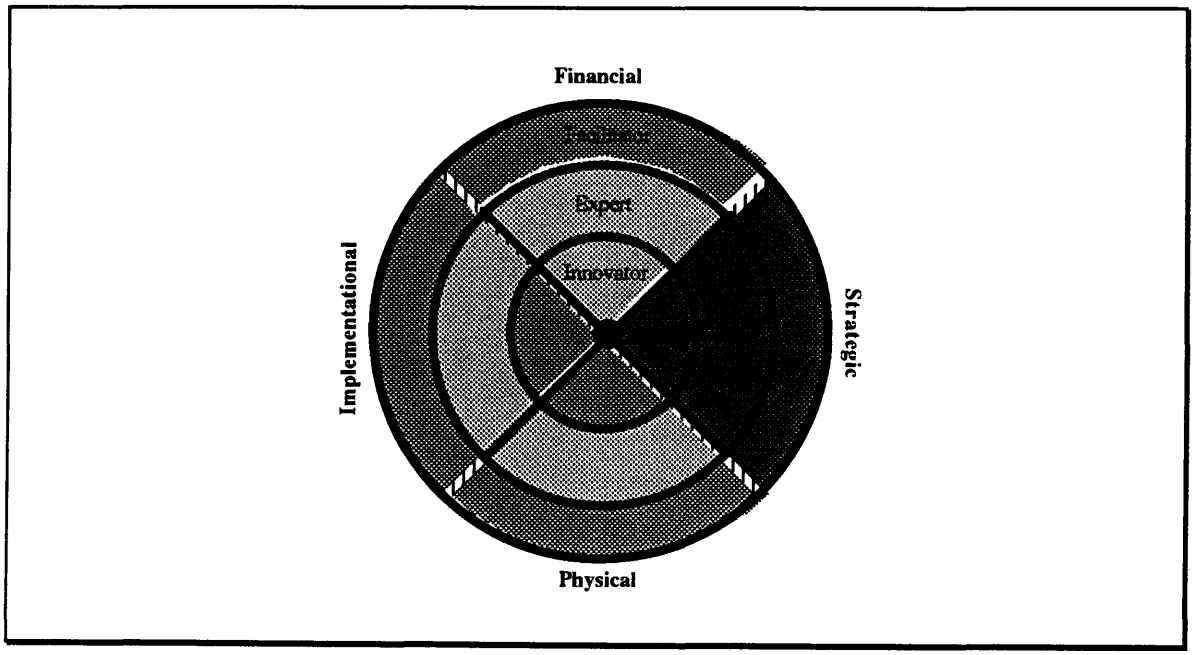

Figure 6H - Planning Role/Aspect Target for Management Consultant Services

6.4.2.1 - Strategic Planning Aspects

Quite clearly, management consultants offer uniquely strong planning services with respect to strategic aspects of issues. Cognitive bias, developed through education and experience, is reflected in a tendency to approach issues or problems from a theoretical perspective, applying conceptual skill to ascertain causal influences, as opposed to symptom resolution. This is of particular value in many situations where, as one

management consultant put it, "The board of directors gets carried away with an idea; they don't consider the strategic plan correlation."[127] Without the probing characteristic of the management consultant, the objectives presented to the initial planner are more likely to be accepted without question, leading to potentially sub-optimal results. Strategically oriented professionals can provide a valuable check on project objectives' priorities without the emotional attachment that owners' in-house strategically oriented people may have.

However, an owner is unlikely to forecast or immediately perceive the value of someone questioning their perspective; thus owners are unlikely to identify this as a required capability of capital project initial planning consultants. Indeed, management consulting professionals confirm that their initial scope of services very rarely indicates the need for correlation of project objectives with more global strategic imperatives.[128] Only after the planner has begun the planning process and formed a relationship with the owner is it possible to identify any strategic inconsistencies.

The broad base of facilitation and innovation relative to strategic concerns is particularly appealing for projects with diverse complexities. The typical diversity of issues in strategic planning invariably become manifest in conflicting objectives, leading to multiple options for the plan. The function of the strategic planner is to make sure all issues are surfaced and analyzed as part of the formation of all potential options.[129] Cognitive bias results in the propensity to identify all potential options, not just a compromised solution. As an example, the diverse complexities of a recent project included such issues as multi-facility security, food services, transportation, operational coordination and organizational development, in addition to the more traditional complexities generally associated with the design and implementation of a large scale capital project. For this range of interrelated issues, the owner considered management consulting to be uniquely qualified, both due to ability to address each concern equally well and due to ability to question existing assumptions in the development of solution options.[130] Included in the options must be consideration of alternatives to construction.

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127 Remley.
128 Fray, Remley.
129 Fray.
130 Snyder.

The management consultant is the least likely to be motivationally or cognitively biased toward solutions that involve actual construction.

6.4.2.2 - Physical Planning Aspects

Management consultants' initial planning capabilities in the areas of physical and implementational concerns share the following; technical skill, and therefore ability to perform the expert consultant role, are traditionally quite limited due to infrequent involvement in planning of capital projects. Furthermore, these skills are not easily accessible so must be imported into consulting firms. Other types of planning consultants indicate that this transplanting of technical knowledge does not create technical capabilities equivalent to those from where the transplants come. The individuals are cut off from the source of their technical skills; existing skills become outdated as involvement with and exposure to the sources of these skills are severed.[131] The organization is not capable of feeding this technical knowledge to the planning consultants due to limited involvement in the actual estimating, scheduling, designing or building. Of course, management consultants do not share this perspective, yet recognize the superior technical knowledge of architects with respect to physical aspects and construction managers with respect to implementational.[132]

6.4.2.3 - Implementational Planning Aspects

The above discussion of physical planning aspect capabilities indicates the limitation of management consultants as expert with respect to the implementational aspects of planning. However, capabilities as facilitator and innovator in this area are notable. The objectivity of management consultants with regard to the more strategic aspects of project implementation creates strength in the associated innovator role. For example, both the architect and the construction manager display biases toward the leadership role of their professions on any given project. Management consultants, by comparison, exhibit little bias; planning is more likely to reflect the true objectives of owners.

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131 Stowe, Winston, McLellan, Lash.

132 Mottur.

6.4.2.4 - Financial Planning Aspects

As a result of strong conceptual and human skills, management consultants generally provide moderately strong capabilities in the innovator and facilitator roles with regard to the financial aspects of project planning. They are more apt to include in the analysis not only the direct costs involved with the delivery process, but also the soft costs involved including the long-range costs. The strategic perspective leads to a more comprehensive perspective of the inputs to financial aspects of initial planning. In one example, the owner was impressed with the management consultant's persuasion to establish long range costs as a primary consideration in financial analyses.[133] As with physical and implementational issues, the general area of least strength is the result of limited relative technical skills. Concerning the financial aspects of planning issues, management consultants rarely possess the extensive experience or intuitive capabilities required relative to financial resource procurement issues.

6.4.2.5 - Other Strengths of Management Consultant Planning Services

"They're more objective, no question about it." [134] Management consultants are not implementors, thus have no vested interest in the form of resultant plans. Typically, involvement of management consultants is limited to the initial planning period. As such, management consultants do not exhibit motivational bias toward solutions which maximize construction. On the other hand, the importing of technical skills has the unintended consequence of importing similar cognitive bias.

However, no one is absolutely objective. Even management consultants try to alter the structure of projects to their advantage in order to highlight their strengths. This is not necessarily to the detriment of the owner. But management consultants want follow-on work as do any consultants, whether in the form of extension of involvement on a given project or elsewhere in the owners' operations. As with any profession, it is necessary to get the next job to stay in business.[135]

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[133] Snyder.
[134] Owens.
[135] Winston.

The strength of management consultants' capabilities as facilitators differentiates this option from all others. As discussed in Chapter 3, the planning process increasingly involves management of a large and growing number of individuals. Management consultants' strong communications and organizational structure understanding facilitate this complex task. As opposed to the architect or developer, the perspective is broader and the focus is on comprehensive analysis, not the development of specific aspects of planning. Traditionally, management consultants are aware of the function biases of the various members of the owner organization.[136] For example, financially oriented members tend to see issues through the lens of capital costs. The design of planning processes is therefore focused on the elimination of these biases. Management consultants are well versed at facilitation of complex organizations with conflicting perspectives.

Management consultants must be completely familiar with current management trends, technologies, and market trends in order to provide their core competencies. This is in stark contrast to the managerial sophistication typically associated with the construction industry in general. As one construction manager put it, "We are Neanderthal with respect to technology and organization." [137] Management consultants are uniquely capable of incorporating these often fundamental strategic concerns into the overall initial planning for capital projects. For example, an organizational or communications consideration could fundamentally effect project definition.

For large firms, management consultants' variety and depth of capability available to be applied to a given situation are attractive.[138] The management consulting industry is considerably less fragmented than the other planning options' industries. The size of many of the leading firms provides flexible and varied capabilities. When required, the core planning team can call upon these resources to expedite detailed analyses or provide specific expertise. The resultant effectiveness and various areas of technical skill are not reflected on the role/aspect target.

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136 Fray.
137 Winston.
138 Snyder.

6.4.2.6 - Other Weaknesses of Management Consultant Planning Services

As stated above, management consultants' involvement in capital project delivery typically is limited to the initial planning phase. The subsequent implementors, the designers and builders, are effectively distanced from the planning process, if not completely removed from it. The resultant is ineffective transfer of project-specific knowledge gained by the planners to the implementors. This transfer typically relies heavily upon documentation; this not only requires great effort for documentation, but also can not reflect the subtleties of the resultant plan nor the process that led to it. As such, the subsequent implementors are more likely to have to redefine certain aspects often revisiting options which had previously been eliminated. Of course, the use of management consultants as initial planner does not rule out the ability to involve the implementors in the planning phase, although this is less likely.

6.4.3 - Development of Management Consulting Planning Services

As stated above, the emergence of management consultants as initial planning consultants for capital projects is quite recent. The analysis above in fact presents the latest developments in the industry, as no traditional basis in construction exists. Speculation as the potential for this form of planning consulting is therefore based on limited information.

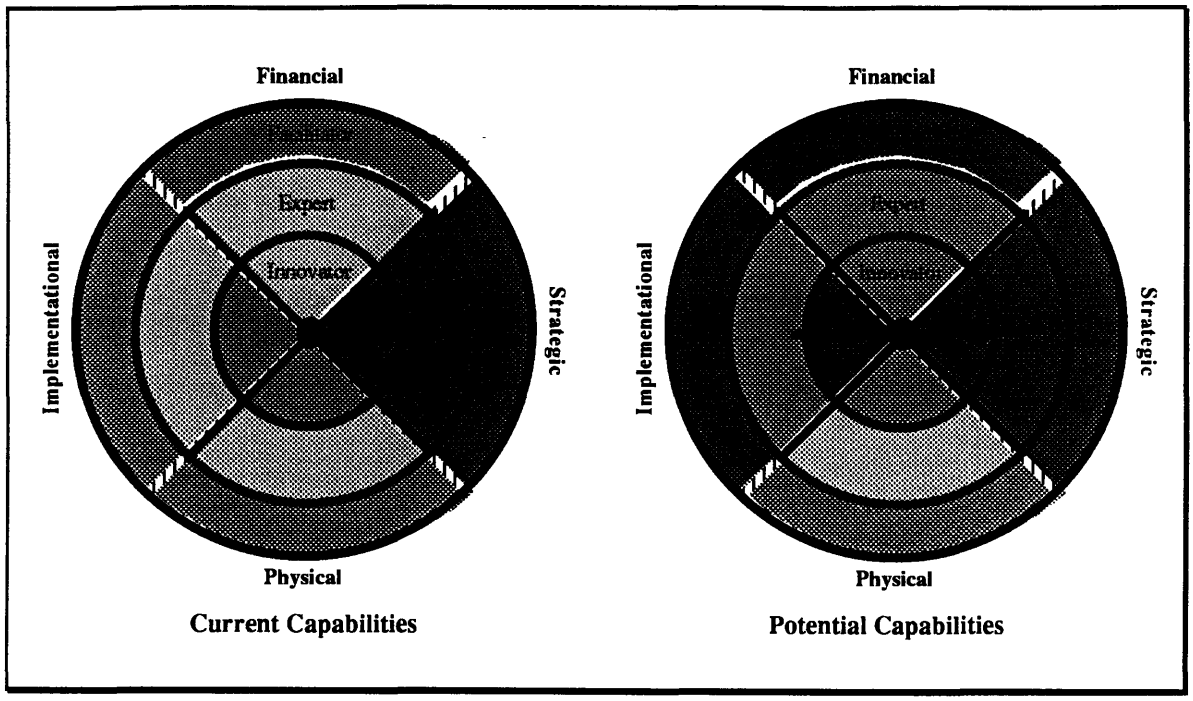

Figure 6J - Planning Role/Aspect Target for Future Potential of Management Consultant Services

Management consulting firms appear to be focused on the development of their planning capabilities. Specifically, those areas identified above as less strong, the traditional areas of construction industry technical skill, are the focus of development. Current recruiting and hiring at the prominent management consulting firms indicate a shift away from the traditional recruit to a more specialized one. Traditionally, these firms have been primarily interested in recent graduates from business-oriented master's degree programs. Currently, these firms are also interested in hiring people with experience in the construction industry, perhaps with less business-oriented education.[139] This indicates an intention to develop the technical skills with regard to the physical, implementational and financial aspects of planning. Figure 6J depicts the resultant potential capabilities related to this trend. The nearly comprehensive innovator capabilities are of note. Also of note is the expert role with regard to physical and financial aspects of planning; management consultants are unlikely to fully incorporate traditional architectural or developer expertise.

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139 Smith.

6.5 - In-house Planning Capabilities

Intra-organizational owner project planning capabilities are, in some respects, historically intrinsic to the delivery process and, in other respects, a new development. The source of project planning, corporate strategy, is of course determined from within the owner organization. Similarly, the specific basis for particular project planning, the identified general need, also stems from the strategic focus of top management. Thus, the owner organization is inherently focused on the strategic aspects of project initial planning. Historically, owner organizations performed the bulk of initial planning without any external assistance. Indeed, in the case of simple projects, external initial planning consulting is often limited to the physical aspects of programming issues.

The presence of divisions within owner organizations that focus on the management of capital facilities has been standard in corporations for many decades. Recent development, however, is the expanding realm of responsibilities of historically management-oriented departments into more strategic and analytical issues, including many aspects of project planning.[140] This is evidenced in the trend of hiring personnel with a variety of professional qualifications associated with project planning. The involvement of the new field of facilities management indicates an area of continued expansion of in-house planning capabilities.

The recent change of owner in-house planning capabilities is seen in the development of capabilities in the other aspects of planning issues: physical, implementational and financial. In-house development of any type of capability is inconsistent as a result of the outsourcing trend discussed in Chapter 2. However, sporadic developments presented below are noteworthy as examples of response to market demands.

6.5.1 - Generalized Characteristics of In-house Capabilities

Capital project planning capabilities of owner in-house planning personnel can not be meaningfully abstracted; large variance of capabilities, both in general and with regard to specific aspects of initial planning, inhibits generalizing of specific capabilities. Yet

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[140] Gutman, p. 51.

certain observations can be made relative to the structural relationship of in-house planning consultants to projects.

Large owner organizations develop in-house capabilities in response to their specific planning needs. Ongoing project planning is required in light of the changing environments of organization discussed in Chapter 2. These include dynamics in technologies, communications, regulations, reorganizations, mergers, down-sizings and a variety of other facility influencing changes. In-house project planning reflects some enhanced efficiency over outsourced capabilities, presumably do to atypical planning needs. As indicated in Chapter 2, many owners have realized cost savings and/or enhanced planning services as a result of increased outsourcing of these capabilities. Maintenance of in-house capabilities reflect either sub-optimal operation or specific needs that are not commonly available

6.5.1.1 - Strategic Planning Aspects

The relationship of in-house planners to their parent organizations implies distinct potentials as well as difficulties concerning strategic aspects of project planning. Primarily, as part of the owner organization, in-house planners are continually exposed to expression of strategic plan, either explicitly or implicitly via the growth and operation of the company. Continual exposure to the planning of projects also implies an inherent sense of the parent organization's objectives as related to project planning. As such, in-house planners are familiar with the strategy, even in situations in which no explicit strategy is formally defined. This familiarity should facilitate consistent translation of strategic goals into project planning.

However, this relationship also has negative aspects. Most importantly, the strategy making component of owner organizations are typically very distinct from and superior to project planners.[141] Even in organizations in which the senior level facilities division is part of the strategic apex, evaluation of the project objectives by the planners is quite limited. The qualifications of the personnel of these departments indicates that strategic capabilities are not of primary concern; instead administrative expertise and practical experience are imperative. This inhibits questioning of project or more broad strategic

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[141] Brevard, p. 90.

objectives and the consequent refinement relative to projects. A major component of initial planning, relating project objectives to more global strategic goals, is less likely to occur. In the case of unclear owner strategy, planners must operate on their limited perspective of the objectives of the organization's strategy. Worse yet, biases are often present concerning the worth of planning in general; this is the result of ignorance and a traditional skepticism about planning as well as the information barriers between professionals of differing disciplines.[142]

6.5.1.2 - Physical and Implementational Planning Aspects

Physical and implementational aspects of project planning are generally the dominant concern for in-house planning personnel. Often architects, contractors, engineers and other construction-oriented professionals contribute to these departments. The oversupply of architects has led to an increased presence of these trained professional employed by in-house owner facilities divisions. Often, these professionals contribute one of the basic functions of these departments, the planning and management of small scale alterations and renovations that are constantly required to adapt spaces to the changing needs of the organization. Thus familiarity with physical and implementational aspects of planning is generally present. In-house planners are generally capable of facilitation of the physical aspects of planning, but incapable of acting as expert consultant.

6.5.1.3 - Financial Planning Aspects

Generally, the financial aspects of project planning are determined external to the project planners, thought the financial specialists in the organization. Breakdown in the role of facilitator can result from the separation of the financial resourcing expertise from the financial allocation tasks, generally the role of the facilities division. Thus, the structural relationship of the groups concerned with the financial aspects of initial planning can create limited capability in the facilitator role.

Intimate knowledge of the operations of the organization creates strong financial planning capabilities with respect to the life-cycle costing of projects.[143] To a certain extent, this

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142 Ibid.

143 Winston.

expertise is available through external consultants, but varying approaches to facility management translate into varying value of maintenance reduction and life-cycle costing. For example, scheduled replacement renders use of extended life components inefficient. Intimate knowledge of how the firm operates is useful in analyzing such long-term cost benefits.

6.5.1.4 - Other Strengths of In-house Planning: Facilities Management

In the past, owners' in-house facilities managers provided support for planning, design and construction teams. In many cases, these people operate as the owners' representative to these processes, providing more than just support. The development of the latest initial planning consultant option, the facilities manager, is an extrapolation of traditional owner in-house capabilities.

The Library of Congress defines facility management as "the practice of coordinating the physical workplace with the people and work of the organization; integrates the principles of business administration, architecture, and the behavioral and engineering sciences." A survey conducted by the International Facility Management Association found that its typical member is a "generalist manager" supervising in-house and external specialists. Over half have management backgrounds.[144] Facilities managers, as expected, function on a more general level than construction industry professionals. The scope of facilities managers' perspective includes building operations, long-range planning, and special projects. Foci are unit location and proximity, financial implications, worker productivity and work flow of operations, with construction as a low priority.[145] The services of architects, construction managers, developer managers or management consultants are specializations to which facilities managers can turn for more specific construction expertise.

The above describes well-rounded managers with broad perspectives of an organization's relationship to physical facilities. The fact that facilities managers are in-house gives them the best understanding of organization-specific concerns. A prime concern of in-house facilities managers is minimizing the need for more and different spaces and

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144 IFMA, p. 2.

145 Architecture 10/93, p. 107.

systems. Thus, the facility manager has motivational bias away from solutions that involve construction. The "build bias" prevalent throughout the construction industry is countered. The balance of this no-build bias against that of specialized consultants can enhance the overall objectivity of the planning team resulting in more optimal planning results.

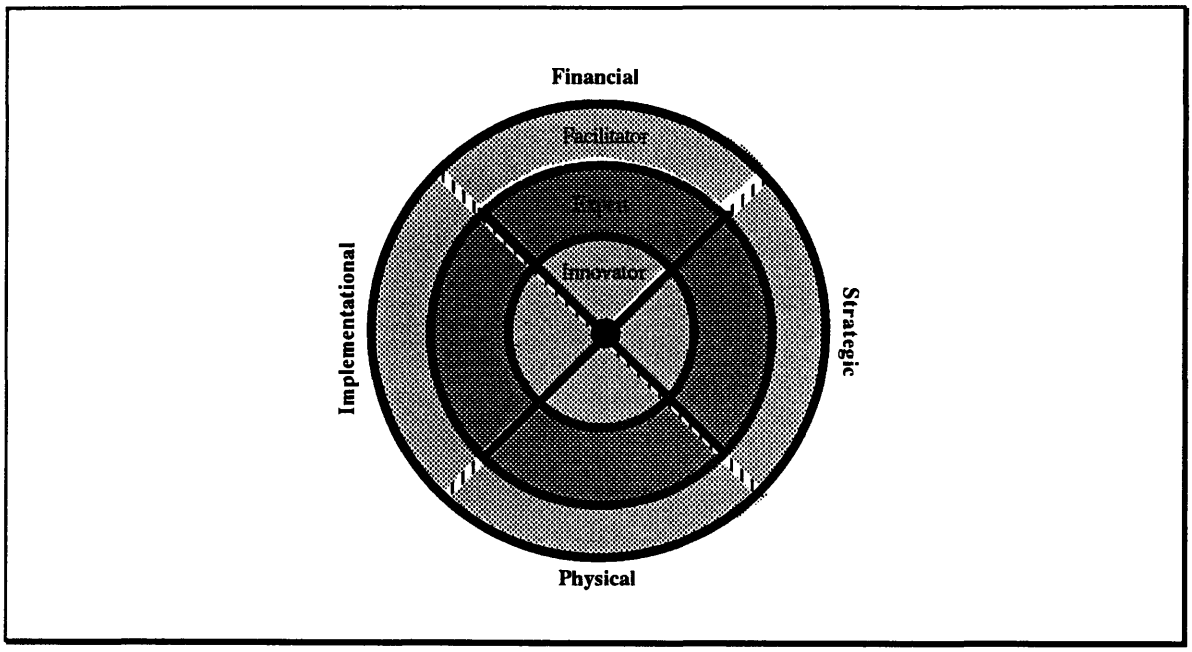

Figure 6K - Planning Role/Aspect Target for Facilities Management Potential

6.5.1.5 - Other Weaknesses of Owner In-house Planning

The facilitator, if internal to the owner organization, is inherently biased by their function within the structure. Within owner organizations, various functional departments view project planning through function-biased perspective. The role of the planner, as discussed above, is to discourage these biases and encourage comprehensive perspective. For example, financially oriented and real estate-oriented people typically have different views of project objectives and, more fundamentally, whether to build at all.[146] The objectivity of an external planner as facilitator mediates these opposing perspectives. An

146 Owens.

analogy can be made to strategic planning, where the process facilitator is always external to the organization.[147]

The objectivity of an external party is particularly relevant in the frequent situations of "edifice complex." This term is used to describe the desire of top corporate or institutional leadership to create a facility as a monument or signaling device. One professional planner noted, "In more cases than you would imagine, a CEO wants to build something either because he's just come into power or he's retiring, like Mitterrand."[148] The objectivity of external planning consultants is useful in creating relationships between these decisions and true strategic concerns. Explicitly relating preconceived owner project objectives to company strategy allows one planner to encourage the questioning of trivial objectives.[149]

A distinct planning weakness of in-house planning is the practitioners' distance from the construction industry. As their involvement is limited to specific projects for one owner, perspective of industry developments reflects only this involvement. In-house organization is unlikely to be fully aware of industry change and even less likely to embrace any. As with most internal operations, in-house facilities divisions need competition to remain sufficiently productive and efficient. As this is rarely the case, focus turns inward toward the operating norms of the organization, not toward the developments in the industry. For example, an in-house facilities management division is unlikely to employ recent technological developments, many not having implemented computer drafting system capabilities.

Related to limited industry focus, the average level of personnel employed as in-house facilities managers and planners is generally of moderate qualification relative to that typical in the various consulting professions. As stated above, lack of competition tends to degenerate effectiveness. In addition, confinement to a particular project type tends to limit challenge, or at least the perception of it. As such, the most talented professionals are unlikely to pursue careers within owner organizations. The focus of the outsourcing trend is core competency; if an organization is not the best at any aspect of their operations, they should outsource to someone who is. This trend is in part due to the

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147 Fray.
148 McLellan.
149 McLellan.

owner organizations' realizations that in-house planning operations are less effective than those now available externally.

6.6 - Summary of Options

The following presents a summary of the capabilities, biases and future trends of the various initial planning consulting options presented above. Current capabilities are displayed in Figure 6L, a comparative combination of previously discussed target diagrams. Note that in-house planning capabilities are not represented as generalization of diverse capabilities is not meaningful. As is indicated in Figure 6L, each profession is identifiable by their characteristic strengths in relation to the four aspects of planning issues. With regard to the roles required of planning consultants, however, little consistency is seen.

The cognitive and behavioral biases that, in part, generate the role/aspect target strengths can be distilled into a single measure. Strengths in the south and west quadrants, physical and implementational aspects, indicates a bias toward the building process, herein termed "build bias". Strengths in the north and east quadrants, financial and strategic aspects, indicates an opposite bias away from building or "no-build bias". The individual professions can be located roughly along the continuum between the extremes of this measure, as depicted in Figure 6M. Notice that developers are located toward the "no-build" end of the spectrum as they often profit more from and take on less risk with the locating and leasing of existing space for an owner.

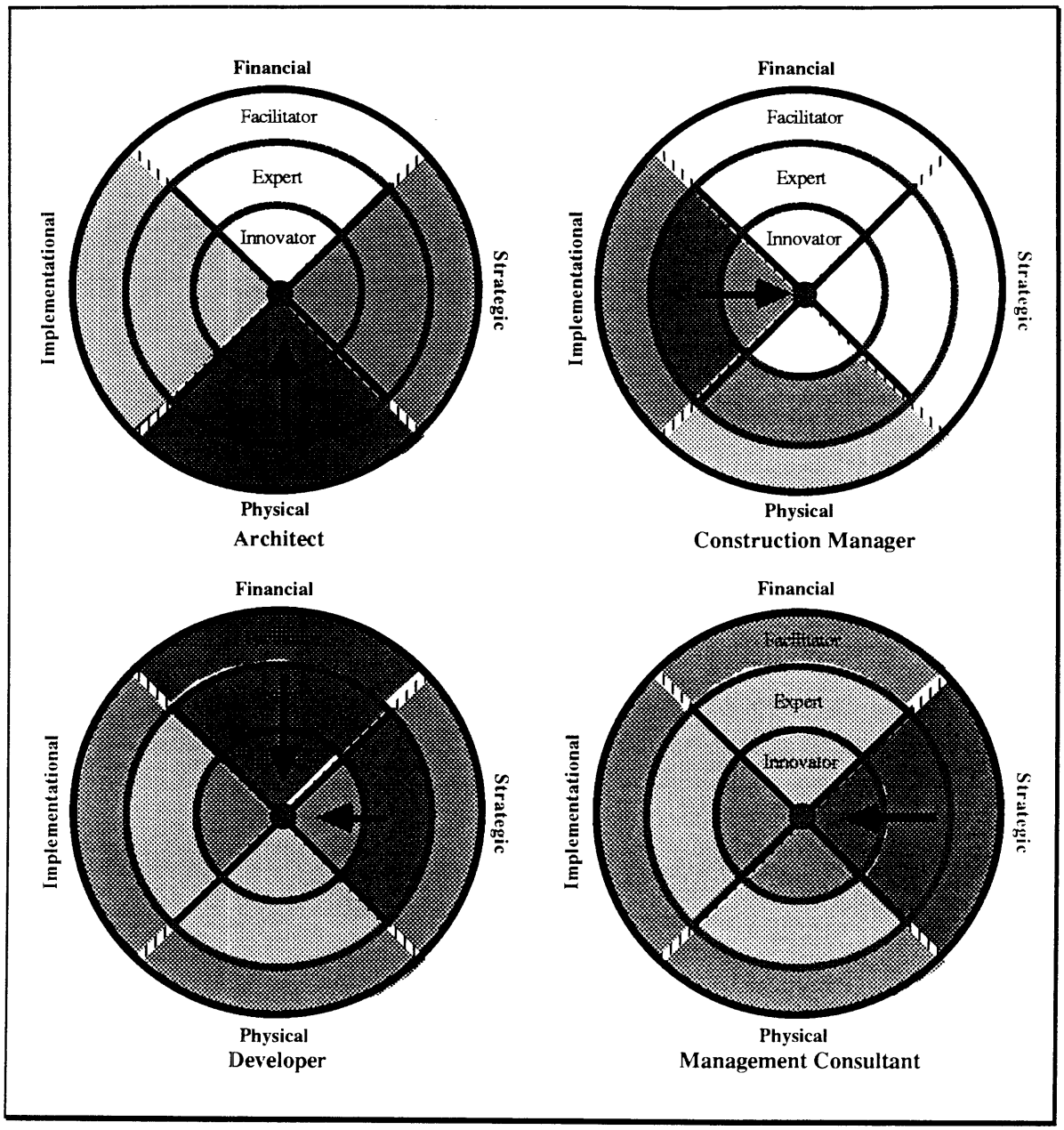

Figure 6L - Comparative Role/Aspect Target for Current Planning Services

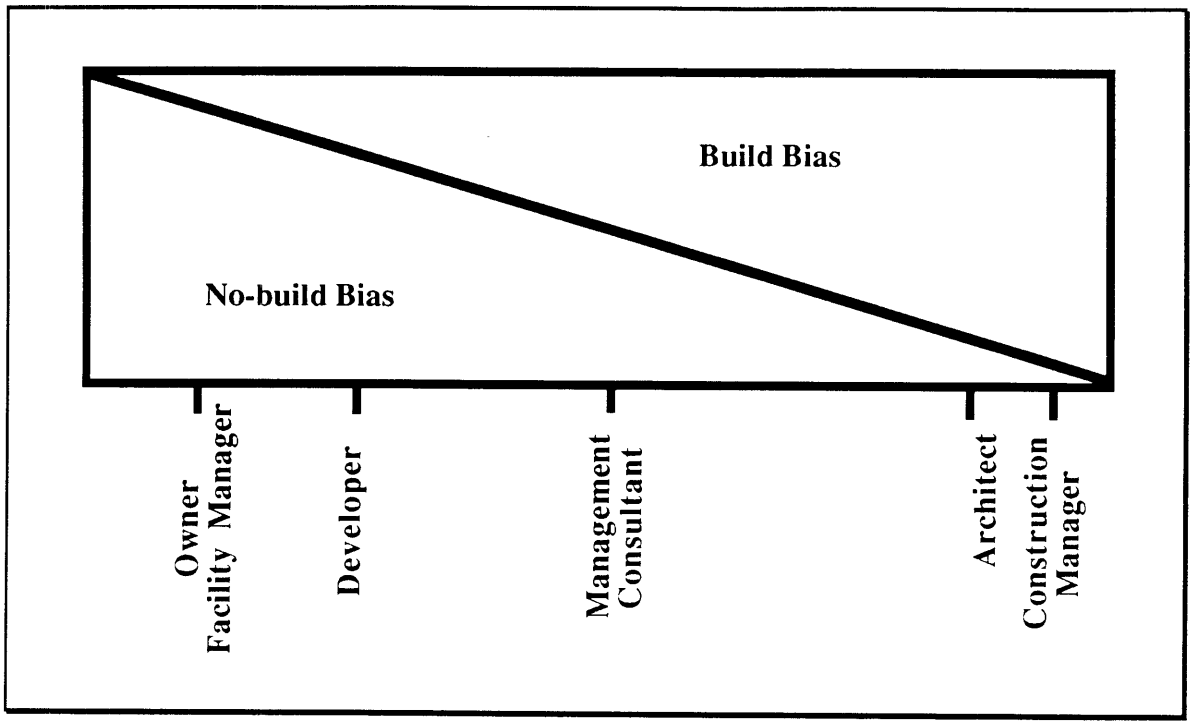

Figure 6M - Continuum of "Build Bias"

Finally, an indication of the future developments and growth of the various professions offering planning consulting is presented in Figure 6N. The common trend toward interdisciplinary capabilities relative to both aspects and roles is evident.

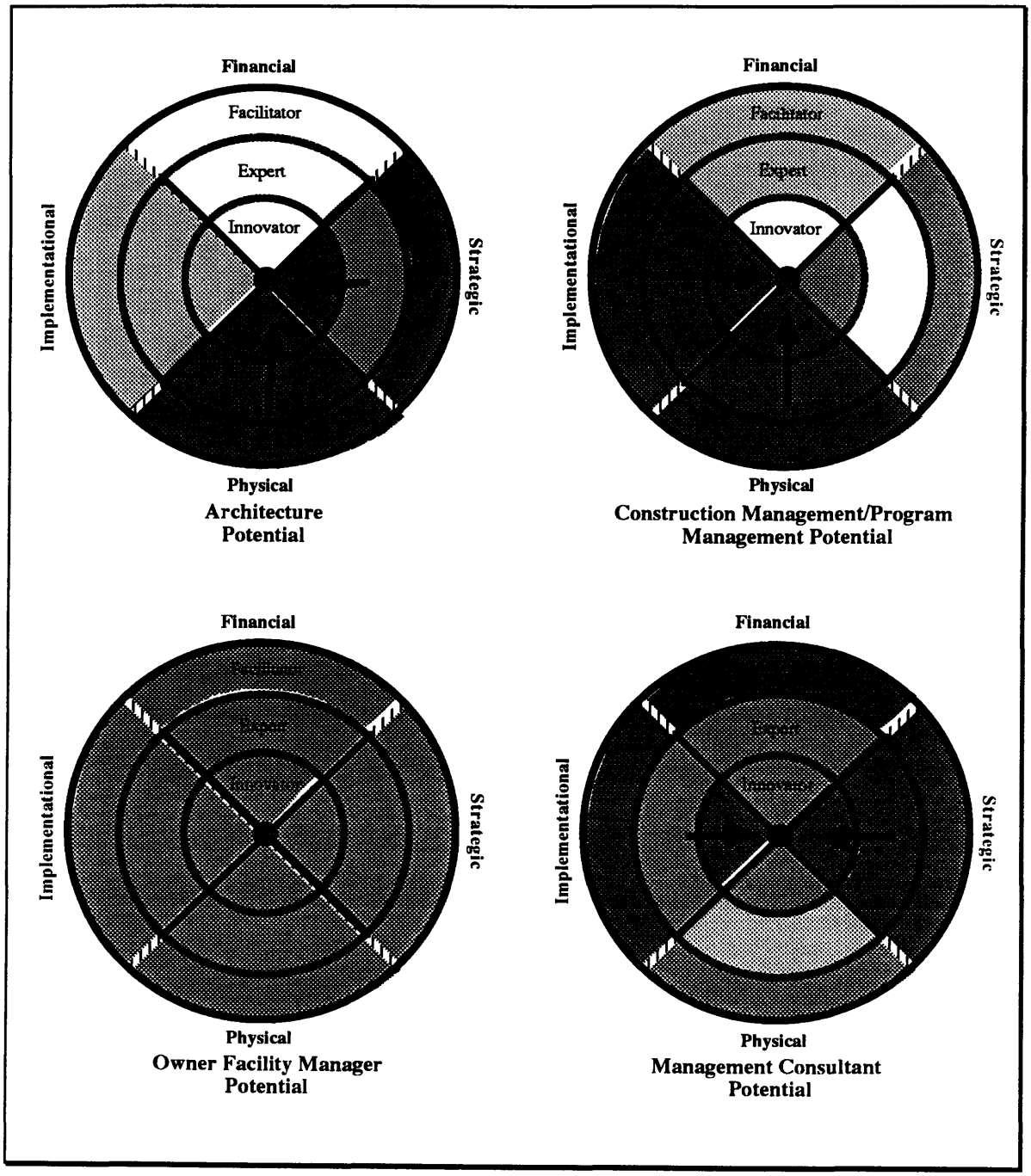

Figure 6N - Future Potential of Planning Options

CHAPTER 7
COMPATIBILITY MODEL

Along with and in response to the supra-market and industry specific dynamics identified in Chapter 2, the market of available initial planning consultants is increasingly dynamic. Previously non-traditional consultant options are becoming commonplace. Each of the various professions providing initial planning consulting services portends to offer a superior mix of relevant expertise. However, this thesis indicates that a universally superior planning consultant is not possible. Universally superior services would require strong capabilities in all roles with regard to all aspects of initial planning. Bearing in mind the current and potential planning consultant options presented in Chapter 6, this universally appropriate consulting option does not and probably will not exist. As such, suitability of consultant's capabilities is determined by specific characteristics and resultant planning concerns resulting from unique project and owner conditions.

The barriers to selection of appropriate initial planning consultants are numerous. Primarily, owners must have adequate sophistication to perceive the need for such advice. Secondarily, owners must understand both the project drivers as well as their own capability and needs. Finally, an understanding of the differences between the various types of professional services offered is required. Opportunity exists for sub-optimal decision making on this critical issue . In light of the challenge of this task, it is not surprising that decisions are often based more on colleagues' recommendations that systematic analysis.[150]

This thesis presents a rational analytical methodology indicating appropriateness of each various option of initial planning consultants for given capital projects. As noted above, selection in practice is often unrelated to owner or even project parameters, but is instead based on marginally relevant experience either within or external to an organization. By comparison, this thesis' methodology is both project and owner specific. Selection of

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[150] Kimbler.

initial planning consultants is ideally based purely on compatibility of project and owner parameters with consultant experience, bias and capability.

7.1 - Model Methodology

The selection methodology presented below builds upon the analysis presented above: project and owner drivers are identified, analyzed, synthesized and the resultant planning requirements are compared to the strengths of the market options to approximate compatibility. The methodology for establishing drivers, or challenging and important parameters, is presented in Chapters 5 and 6. Once established, the drivers are analyzed in order to determine associated planning aspect challenges and the roles likely to be required of the planning consultant. Each drivers' resultant information is expressed in terms of the now familiar planning role/aspect target introduced in Chapter 3. Synthesis of the resultant information from all drivers describes the likely overall planning challenges, indicating appropriate consultant capabilities.

7.1.1 - Driver Normalization

Drivers identified in the project intensity mapping and owner classification processes indicate the areas of concern which can be expected to generate formative planning issues, challenges and stumbling blocks. Each of these drivers is analyzed in order to determine general areas of foreseeable planning issues and, thus, the types of skills required to address these issues. Qualitative judgments of concern for each of the twelve sectors of the role/aspect target are estimated as essential, high, low or none. The assigned estimates, although imprecise, should not be arbitrary. Ranking should be reached by consensus of those owner representatives most familiar with the issues at hand. similar to the estimation of drivers. In order to form a more comprehensive indication, particularly in cases with few drivers, less important project and owner parameters may be included in the analysis.

Importantly, this qualitative analysis determines the weighting of areas of concern relative to all the project drivers, not simply within any given driver analysis. Drivers may be of unequal importance, thus the influence of a given driver's associated planning concerns on the overall estimation of planning concerns and challenges reflects its relative importance in relation to all others. Less important parameters are normalized through the qualitative weighting assigned to them.

The 24 potential drivers do not have associated rigid planning aspect/role concerns or consultant requirements. Instead, related planning issues are influenced by the specifics of particular projects and owners. Thus, a given driver has associated similar but not identical planning role/aspect concerns on different projects. Consideration of the planning concerns for each driver must include the influence of all parameters, particularly that of other drivers.

For example, the driver "adequacy of time" is most likely the result of issues primarily centered on implementational aspects of planning such as how to organize the project to achieve the goal within the allotted time frame. Secondary aspects of concerns may be physical, strategic or even financial; the skills required to address these issues vary but are likely to be centered on the technical and conceptual abilities with regard to implementational aspects of planning issues. For more comprehensive examples, see the case studies which follow.

7.1.2 - Synthesis of Planning Consultant Capabilities

After each driver is analyzed as described above, synthesis of the results describes the relative composition of planning concerns and challenges. By simply overlaying the various resultant planning role/aspect capability targets, a picture of the planning concerns is generated. However, the resultant is likely to indicate critical challenges throughout the target, particularly in the case of complex projects. Thus the simple overlaying methodology is likely to indicate the need for near ideal planning consultant qualifications which, of course, is not available.

A more useful analysis is possible through the application of numeric values to each of the qualitative measures determined in the driver normalization process. An exponential scale of 2^{x-1} is applied which indicates the relative importance of the qualitative estimates of essential, high and low; quantitative measures are one (2^0) for low, two (2^1) for high and four (2^2) for essential, as indicated in Figure 7A. Simple summation estimates the relative importance of each of the twelve sectors in the planning role/aspect target.

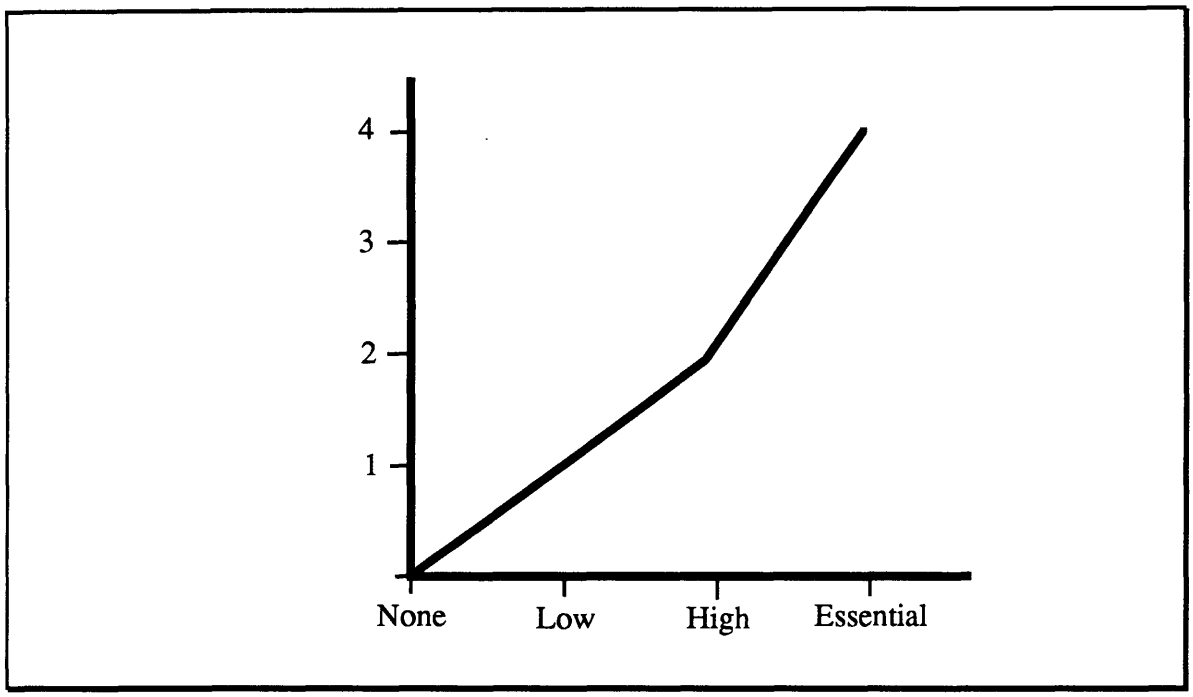

Figure 7A - Conversion of Qualitative to Quantitative Values

A subsequent summary of synthesized planning concerns indicates general aspects and skills likely to be required of a project's initial planning consultant. Sums of numerical estimates according to both dimensions of the target, aspects and roles, show relative importance of each generalized aspect or skill. As indicated in the examples below, this may be helpful in determining any area of general skill or capability of significant importance to a given project.

7.1.3 - Comparison to Market Availability

Finally, the resultant overview of planning concerns and challenges is compared to the estimated capabilities of the various consultant options. An ideal fit is, of course, unlikely. However, comparison to the generalized capabilities identified in Chapter 6 indicates likely appropriate candidates for a given project. Analysis of specific candidate consultants must be conducted in order to estimate actual capabilities with regard to the various roles and aspects of the planning process as those presented in Chapter 6 provide only a general indication of typical ranges of capability.

7.2 - Compatibility Model Examples

The following is a continuation of the three hypothetical cases introduced in Chapter 4 and continued in Chapter 5. The methodology for selection of initial planning consultants presented above is applied to each of the cases. The resultants indicate generally compatible planning capabilities and, thus, most likely consultant options. Refer to the case information in the preceding chapters for introduction to the following analyses.

7.2.1 - Case 1: Research Laboratory

Case 1's project intensity mapping and owner classification indicates relatively few drivers. Physical complexity is dominant, particularly in relation to the other three drivers. Not surprisingly, physical aspects of planning issues weighs heavily in consultant selection.

7.2.1.1 - Project Driver Analysis

The drivers indicated for Case 1 are the physical complexities associated with technology and program as well as external socio-political concerns. These issues are critical as the functionality of the complex technologies employed is required for facility operation; down-time has high opportunity costs associated. Similarly, delayed start-up caused by public or political opposition has high costs associated. Refer to Chapter 4 for a description of these causal issues. Each driver is addressed below.

The physical technology driver is a result of custom equipment required for the operation of the future facility, atypical use of standard equipment, and low environmental tolerances required throughout. Planning issues related include design implications, construction implications and the relationship between the two. Also of note is the inter-dependencies between the strategy that is generating the need for the facility and the limitations of the technical systems. For example, a technical limitation may feed back to alter an aspect of the strategic basis for the facility. The weighting of the various segments of the role/aspect target is graphically represented in Figure 7B below. Physical technical skill is, of course, estimated to be essential. Physical conceptual skill requirement is judged as high, but not essential, because the complexity of the technology used is not new to the market. Implementational technical skill is also estimated as high, in response to the complexity of construction involved and the influence of this

complexity on the planning process. In addition, the human skills of facilitator are likely to be required in order to effectively integrate analyses focused on the strategic, physical and implementational aspects of the resultant issues.

Program complexity is the result of the number of uses to be accommodated and the interrelationships between them. Again, the influence on planning concerns is primarily the resultant of physical aspects of related issues. Design expertise as well as conceptual skills are likely to be required to integrate the highly complex program. In addition, the relationship of the program to its parent strategic need is reflected in the desirability of strategic expertise and facilitation capabilities, as indicated in Figure 7B.

Socio-political concerns stem from both political support for the project as well as potential public opposition. As expected, strategic facilitation capabilities are considered essential. In addition, strategic as well as physical expertise capabilities, although not essential, are likely to be required in order to assuage public concern through intelligent representation of the technical safeguards included in facility design. In effect, the physical concerns identified above extend into this socio-political concern.

7.2.1.2 - Owner Driver Analysis

The owner drivers identified in the analysis of Chapter 5 are financial resource access as well as the owner's lack of experience with project planning. Financial resource access limitations mean that little funds are available for the planning effort and that a cost overage is potentially crippling to the owner organization. Refer to Chapter 5 for more detailed discussion of these issues. As indicated in Figure 7B, financial aspects of planning issues weigh heavily; the focus is on the innovative capabilities of the planner. This is likely to be required to minimize the influence of this restriction. Also of note is the estimated importance of strategic facilitation required to discourage the owner's tendency to minimize planning efforts.

The owner's lack of experience with project planning compounds the desirability of strategic facilitation capabilities. Their experience is such that they can not fully appreciate the need for or proper extent of project planning. Facilitation capabilities relative to all planning aspects are likely to be required in order to reflect the comprehensive and interrelated concerns and complexities involved in planning. The owner's inexperience indicates need for a consultant capable of representing all the

aspects of issues so that the owner can question internal biases through understanding of the complexities and interrelationships involved in the planning process.

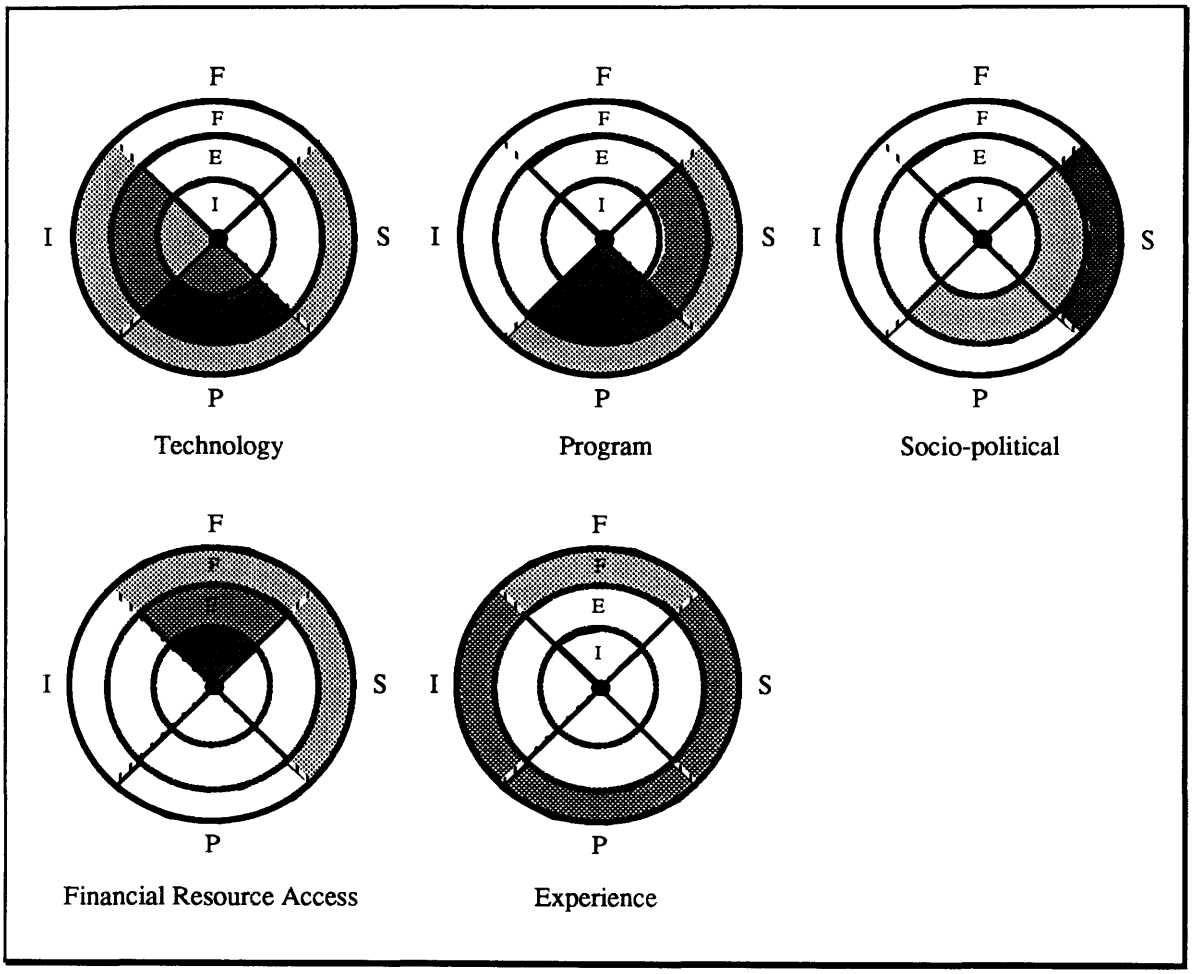

Figure 7B - Case 1 Driver Analysis

7.2.1.3 - Synthesis and Indicated Selection

From the above analyses, synthesis of the drivers' influences on planning concerns is performed. Figure 7C includes both the simple overlay of qualitative estimates of the individual drivers as well as a quantitative compilation based on the exponential scale discussed above.

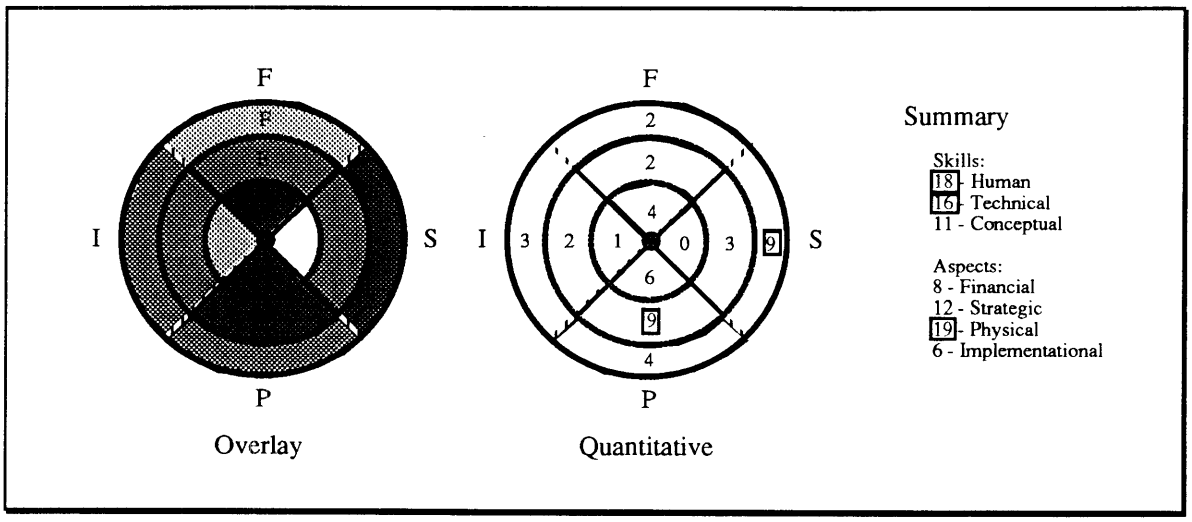

Figure 7C - Synthesis of Case 1 Planning Requirements

Reflecting the technical, programmatic and external complexities of the project together with the challenges stemming from owner inexperience, the synthesis indicates the desirable capabilities of the selected initial planning consultant as strategic facilitation skills and physical aspect expertise. The summary reveals the general capabilities required of the consultant as centered on human and technical skills and physical aspects of planning issues. Comparison to the generalized planning strengths typical of professions presented in Chapter 6 indicates correlation of estimated planning consultant requirements with capabilities of both architects and management consultants. Thus, either of these choices appears appropriate given the project itself and the owner organization. Neither option can be expected to fully satisfy the project/owner driver causal concerns indicated as likely. The architect option is more likely to satisfy physical aspects of planning issues, such as the imperative functionality of the resultant facility, but capability to address financial issues is less likely. On the other hand, the management consultant option is likely to adequately address the strategic issues and external relations, but less likely to adequately incorporate physical concerns. Comparison to the profiles of trend setting firms discussed in Chapter 6 indicates a superior match with advanced architectural firms, particularly those that have extrapolated services into strategic concerns of project planning. Selection of such a firm appears to be appropriate in light of the owner needs identified.

7.2.2 - Case 2: Academic Facility

Case 2's project intensity mapping and owner classification indicate relatively high project complexity particularly with regard to temporal issues. As described in Chapter 4, the value associated with timely completion of the new facility is significant due to the owner's dependency on the use of the new facility in the new school year. Other drivers, however, make selection based solely on this important concern inappropriate. As indicated below, facilitation capability desirability stems from the politically complex and sensitive character of the institution described above along with the characteristic mindset of owner representatives involved.

7.2.2.1 - Project Driver Analysis

The project drivers indicated in Chapter 4 for Case 2 are the physical complexities associated with the site, the temporal complexities of adequacy of time and continuity, the market interface complexity of negotiation position and the external socio-political concerns. Each driver is addressed below.

The physical concern of site complexity is the result of a tight urban location with existing adjacencies, unknown conditions, limited access and incomplete documentation, as indicated in Chapter 4. Issues resulting from this driver involve primarily implementational and physical aspects. Implementational aspects of planning issues include the influence on actual means of construction given the restrictions and unknown conditions as well as the allocation of risks involved. Indicated implementation skills of the planning consultant include the likely essential innovation capabilities as well as technical expertise. Physical concerns focus on how to accommodate the program considering the implementational concerns. Strong technical skill as well as facilitation capabilities are desirable. In addition, interrelationships with strategic aspects of planning concerns indicates likely requirement of capabilities in this regard. For example, site complexity may create limitations which influence strategic considerations, like what to include in the scope of the project.

The temporal complexity concerned with adequacy of time is the result of short project duration as well as inflexible milestone dates. Given the importance that the owner associates with this parameter, implementational expertise and innovation are very likely to be required to ensure proper planning concerning these constraints. In addition,

facilitation capabilities are judged to be universally required in order to integrate all other aspects of planning issues with this critical concern.

Temporal continuity is severely affected by the requirements indicated in Chapter 4 concerning ongoing adjacent activities. Again, implementational capabilities are estimated as essential. Human skills, both related to the implementational and strategic aspects of planning issues, are likely to be required to integrate related concerns. Continuity limitations appear severe enough to feedback to strategic planning issues, perhaps leading to the relaxation of the continuity limitations themselves. Facilitation capabilities of the planning consultant related to both aspects are deemed important.

The project related negotiation position, the result of a prestigious owner and potential future work, indicates the desirability of the planning consultant's implementational capabilities, particularly that related to the contractual structures and incentives created within. Related strong innovation capability and expertise, as well as facilitation skills are indicated as desirable in order to take full advantage of this market interface potential. Strategic facilitation skills are of secondary importance, desirable in light of the relationship of this project to the whole of the owner's projects.

The socio-political concerns indicated in Chapter 4 stem from both internal and external project opposition. In light of the owner's political sensitivity both internally and externally, strategic facilitation capabilities are estimated to be essential to ensure effective relations between the planning efforts and the opposing parties. Innovation is judged to be equally essential, desired to better develop innovative solutions which satisfy all parties.

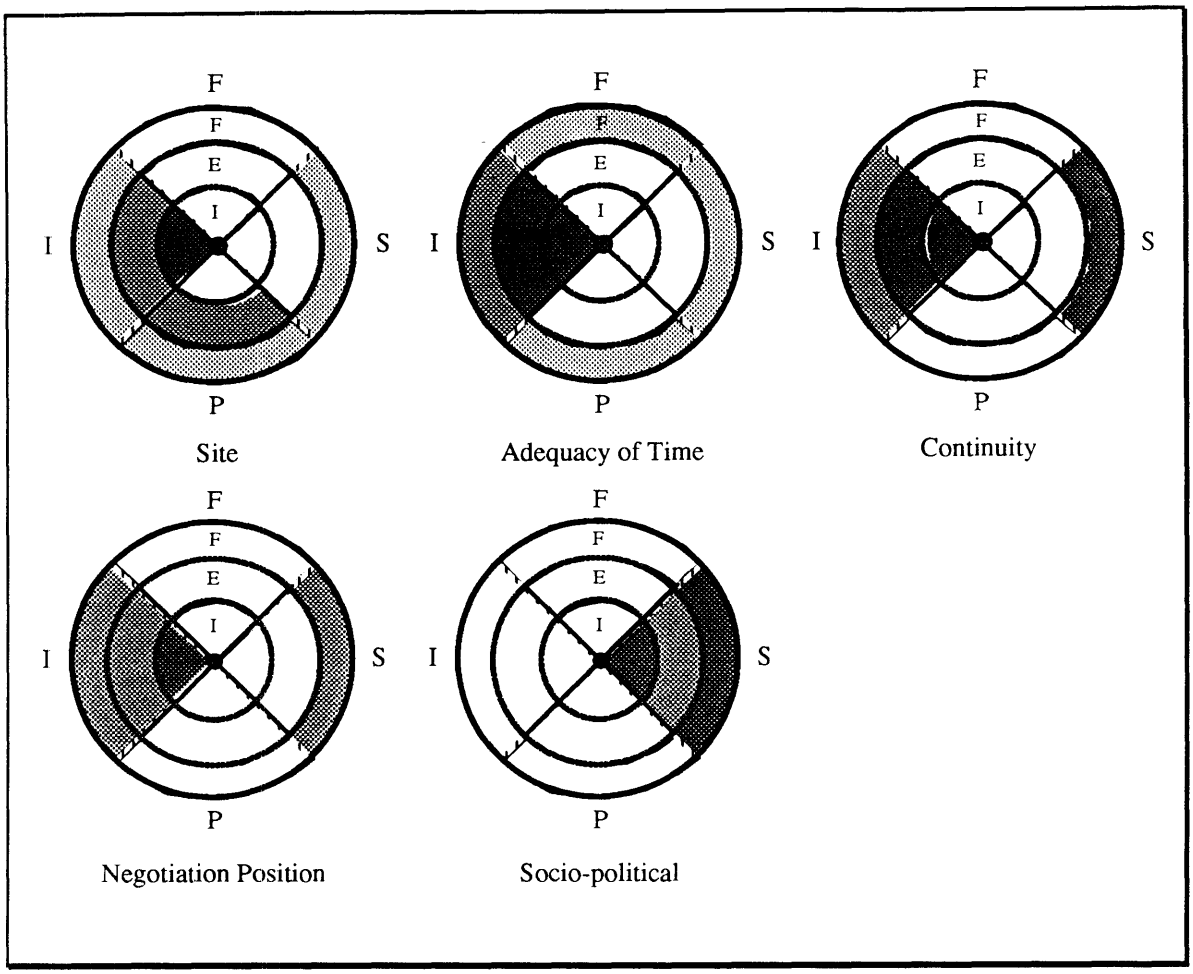

Figure 7D - Case 2 Project Driver Analysis

7.2.2.2 - Owner Driver Analysis

Owner drivers indicated in Chapter 5 analysis are the result of low owner objectivity as well as confrontation sophistication. Objectivity problems are the result of frequent exposure to similar projects and planning methods. In order to counter this, the planning consultant should possess moderate facilitation capabilities relative to all four aspects of planning issues. Thus, the consultant can understand and then communicate all the aspects of issues so that the owner can understand issues beyond the limitations of their objectivity. Confrontation sophistication deficiency indicates an inability to communicate effectively. This is countered through the facilitation capabilities of the initial planning consultant. Moderate human skills relative to all the planning aspects are desirable. Analysis of the near-drivers of the owner organization support these estimates

as relations within the large planning group and those outside the planning group are politically sensitive. Facilitation skills are very likely to be essential.

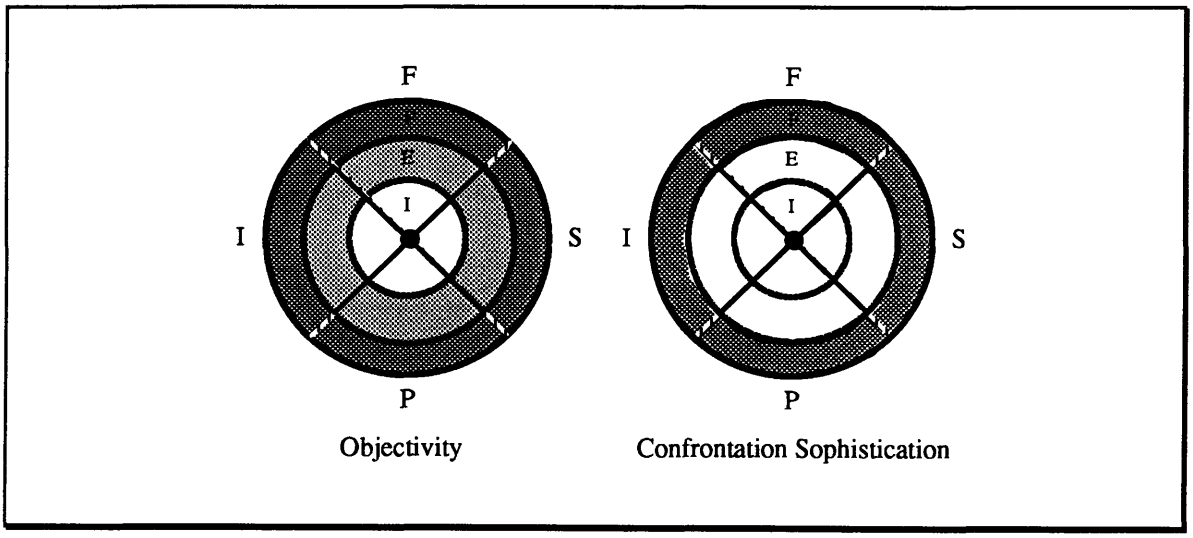

Figure 7E - Case 2 Owner Driver Analysis

7.2.2.3 - Synthesis and Indicated Selection

From the above analyses, synthesis of the drivers' influences on planning concerns is performed. Figure 7F indicates both the simple overlay of qualitative estimates of the individual drivers as well as a quantitative compilation based on the exponential scale discussed above.

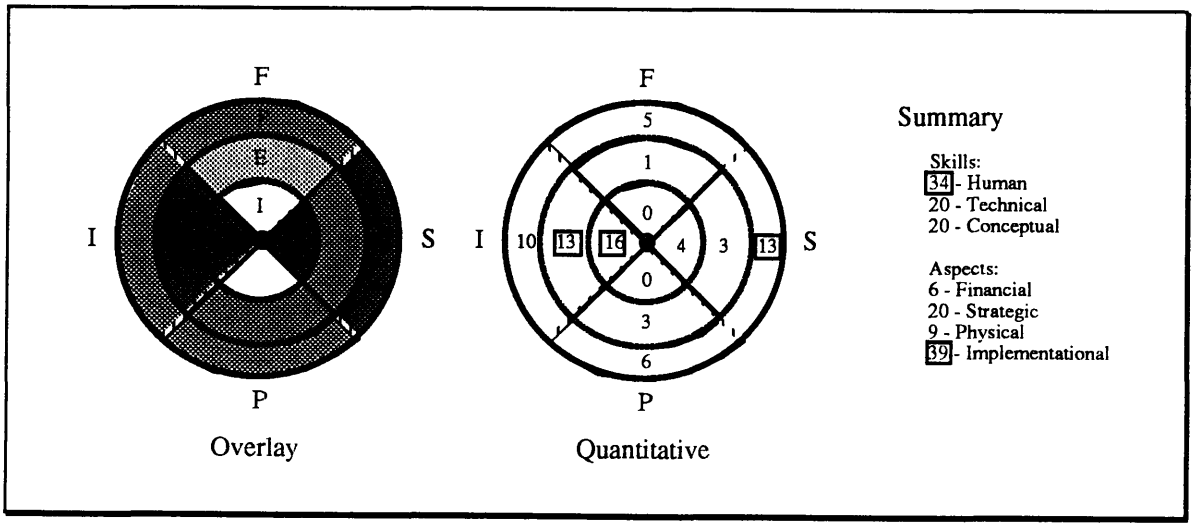

Figure 7F - Synthesis of Case 2 Planning Requirements

The dominant drivers associated with temporal complexities of the project and relationship complexities of the owner organization are influential in the synthesis above. This indicates the foreseen importance of strategic facilitation skills and, moreover, the overwhelming imperative of strong implementational capabilities of the initial planner. Comparison to the planning strengths typical of professions presented in Chapter 6 indicates the general correlation of these requirements with the typical capabilities of construction managers, although the desirability of a strategic facilitator is unlikely to be satisfied by traditional construction managers. In this regard, management consultants ought to be considered for their generally strong capabilities with regard to the strategic and facilitation roles. In addition, the moderate implementational capabilities typically found with management consultants, due to the importation of technical skill, may be adequate for the initial planning needs associated. However, comparison to the profiles of trend setting firms discussed in Chapter 6 indicates a superior match with construction management firms providing program management services. Selection of such a firm appears most likely to provide effective planning guidance considering the identified issues.

7.2.3 - Case 3: Hospital Renovation

Case 3's project intensity mapping and owner classification reveal many drivers, indicating a relatively challenging planning process. A discussed in Chapter 4, physical complexity characterizes the project and its delivery; thus, planning consultant capabilities with regard to the physical aspects of planning issues weighs heavily in the selection. However, this important criteria should be considered in relation to all driver indications; as discussed below, strategic and implementational capabilities are also indicated as desirable. Moreover, this case demonstrates the influence of owner parameters on consultant selection. The hospital's organizational structure is expected to inhibit the effectiveness of the planning process, particularly the decision making involved. To counter this probable condition, a prominent facilitation role is likely for the initial planning consultant.

7.2.3.1 - Project Driver Analysis

Referring to the detailed discussion presented in Chapter 4, the drivers indicated for Case 3 are the physical complexities associated with scale, technology, program and site, the temporal complexity of continuity, and the market interface complexity associated with the owner's negotiation position. Each of these is addressed below.

Scale complexities are not the result of actual project size, but are instead related to the project's integration within the greater campus of the hospital, spatially, programmatically and technically. In addition, the project is expected to have a very low degree of modularity; each element will be relatively unique. As such, related planning issues are expected to focus less on the challenge of implementation than on that of physical integration. Such planning challenges are likely to require strong innovation capabilities to enable effective solutions to the many individual yet interrelated concerns. This conceptual skill is facilitated by technical skill; thus, expertise with regard to physical aspects of planning issues is desirable. In addition, issues stemming from scale complexity, particularly in light of the other physical complexities identified, relate to and influence implementational and strategic aspects of other planning concerns. Relevant facilitation capabilities are desirable.

The physical technology complexity driver is the result of a number of factors. Physical technology complexity stems from the anticipated use of prototypical items, low tolerances of technical systems and anticipated challenges coordinating infrastructure systems. Associated planning issues, such as how the systems affect the project, are expected to have significant physical and implementational aspects. What the product will be and how to achieve it are central. Also important is the strategic aspect of related issues, such as how technological issues limit strategic options. The resultant indicated consultant capabilities likely to be required are presented in Figure 7G: physical innovation capabilities are expected to be most critical.

Site complexity is related to hidden conditions, spatial inadequacies, and incomplete information. Planning issues are anticipated to have significant implementational aspects, such as how to plan with limited information and how to construct with limited space. Also of note is the anticipated physical aspects of issues, centered on the influence of this driver on the conceptual design of the project. In addition, a significant strategic aspect is likely to be involved as spatial limitations lead to reinvestigation of the need for inclusion within the project of all identified elements. Related conceptual skills are deemed essential. Finally, the interrelationships between the various aspects of these issues are likely to require facilitation capabilities in order to properly consider the totality of influence of this driver.

Programmatic complexity, another primarily physical concern, is the result of the complex inter-relatedness of the various programmatic components. In addition to

physical, strategic capabilities are desirable for effective analysis of individual program elements' needs and their synthesis. Facilitation capabilities are also desirable for information flow and communication involved in related analyses and negotiations involving representatives of the multiple programmatic elements involved.

The temporal complexity driver of continuity stems from the ongoing operations surrounding the project and the extensive phasing required. Primarily, planning issues are expected to demand expertise and innovation concerning implementation. Physical aspects are also relevant as are strategic. The continuity limitation is expected to drive physical design and strategic need analyses toward more feasible solutions. Thus, facilitation capabilities are desirable as are physical expertise and innovation; innovation of physical aspects can reduce the implementational complexities faced.

The identified negotiation position driver results from the attractiveness of the project type to practitioners as well as potential for future work. In order to take advantage of this situation, the planning consultant should possess the implementational capabilities to effectively structure relationships and work packages. Contractual expertise and innovation as well as the facilitation capabilities are required to effectively communicate both directly with the owner and indirectly with the market of potential contractors, designers, etc.

7.2.3.2 - Owner Driver Analysis

Owner drivers identified in the analysis included in Chapter 5 stem from the influence of organizational structure; they are unity of mission, strategic orientation, decision making ability and extension of teams to external resources. As indicated below, these drivers imply a need for strategic capabilities of the initial planning consultant, as well as general facilitation skills.

Low unity of mission stems from the differentiation of the various component groups that make up the owner organization along with the lack of any explicit unifying mechanism. As such, various contributors to the planning process see the strategic imperatives according to their own needs first, with common goals a distant second. To counter this

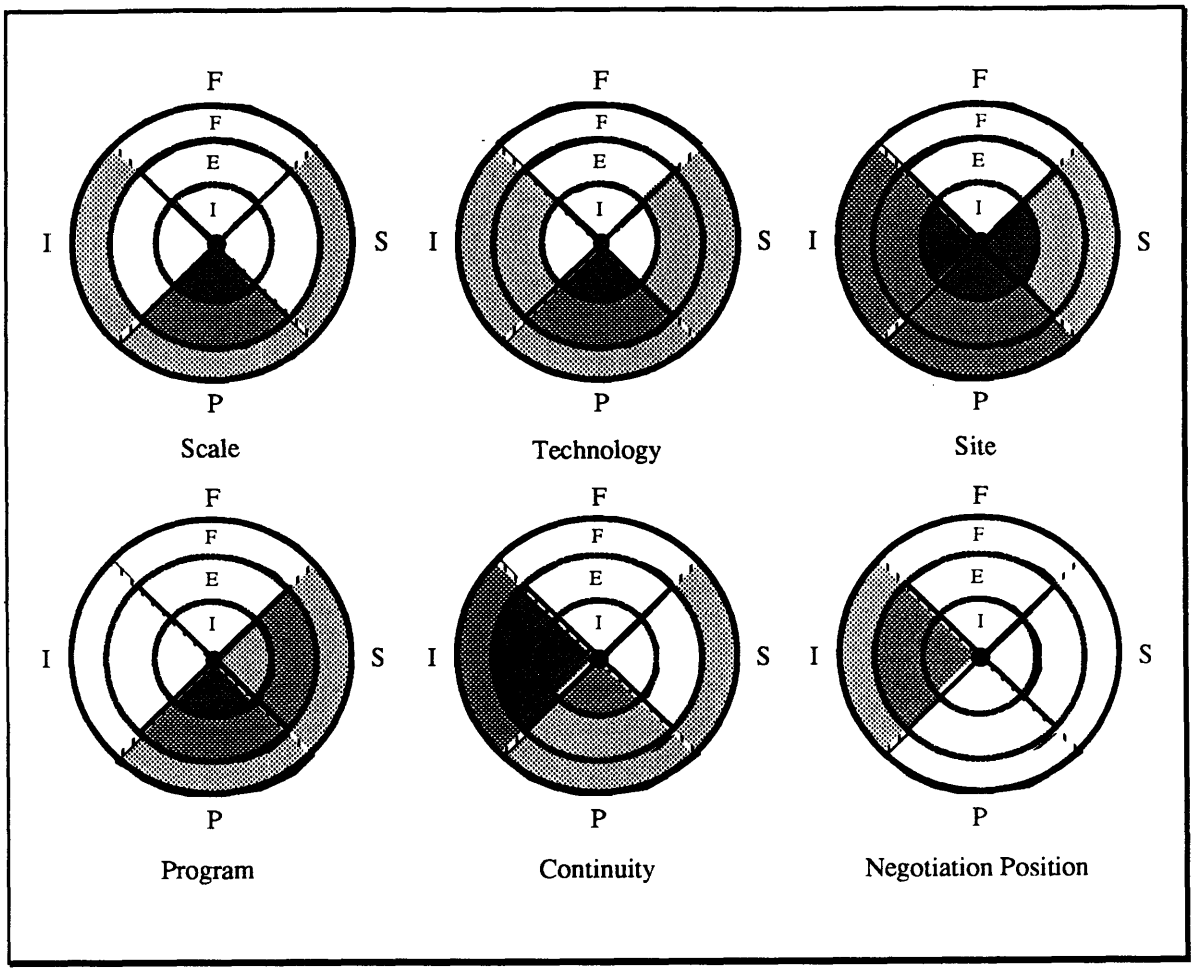

Figure 7G - Case 3 Project Driver Analysis

likely entropic force, the initial planning consultant should possess strong strategic capabilities. Strategic facilitation skills are obviously desirable; strategic innovation is also expected to be required to find novel solutions to what appears to be an impossible task.

The low strategic orientation of the owner stems from their continuous involvement in day-to-day operations; in-house facilities personnel as well as doctors are, by necessity, more concerned with the immediate critical issues than long-term concerns. A focus on tactical issues results. Strategic capabilities of the initial planning consultant are judged to be essential to counter the tendency of the owner to focus on the short-term or tactical. General facilitation skills are desirable as well, particularly for the consultant to understand and provide for the tactical concerns of the various owner components.

The driver low decision making ability also is a result of the influence of the owner's organizational structure. The consultant's strategic capabilities are judged as desirable to effectively lead the owner to decisions. General facilitation skills are also expected to be required in order to communicate to the decision makers the entire scope of issues which influence decisions. The consultant must be able to both lead the owner to the appropriate decisions and work within the bureaucracy that inhibits effective decision making.

Finally, the owner's rigid and formal organization structure leads to limited extension of the planning team to include consultants. External consultants are expected to be considered to be technical advisors to a limited portion of overall planning issues. In order to effectively operate in this environment, the planning consultant should possess strong strategic facilitation capabilities and technical skills. These are judged to be required to work within the confines of limited involvement and then to convince the owner of the value of effectively restructuring the planning group to facilitate the process. General facilitation skills are likely to be required to enable the consultant to effectively include all dimensions of issues, thereby pointing out the danger of the owner's limited perspective, particularly in relation to strategic aspects, as discussed above.

7.2.3.3 - Synthesis and Indicated Selection

From the above analyses, synthesis of the drivers' influences on planning concerns is performed. Figure 7J indicates both the simple overlay of qualitative estimates of the individual drivers as well as a quantitative compilation based on the exponential scale discussed above.

The synthesis indicates the importance of strategic facilitation skills and physical innovation capabilities of the selected initial planning consultant. The summary reveals the general skills and aspect capabilities required of the consultant as centered on human and conceptual skills, and strong capabilities with respect to strategic aspects of planning issues. Strategic aspect dominance is primarily the result of the owner's internal weaknesses in this area together with the importance of this aspect of planning issues in relation to the politically sensitive environment of the hospital organization. Comparison to generalized planning strengths presented in Chapter 6 indicates the probable correlation with capabilities typical of management consultants providing initial planning

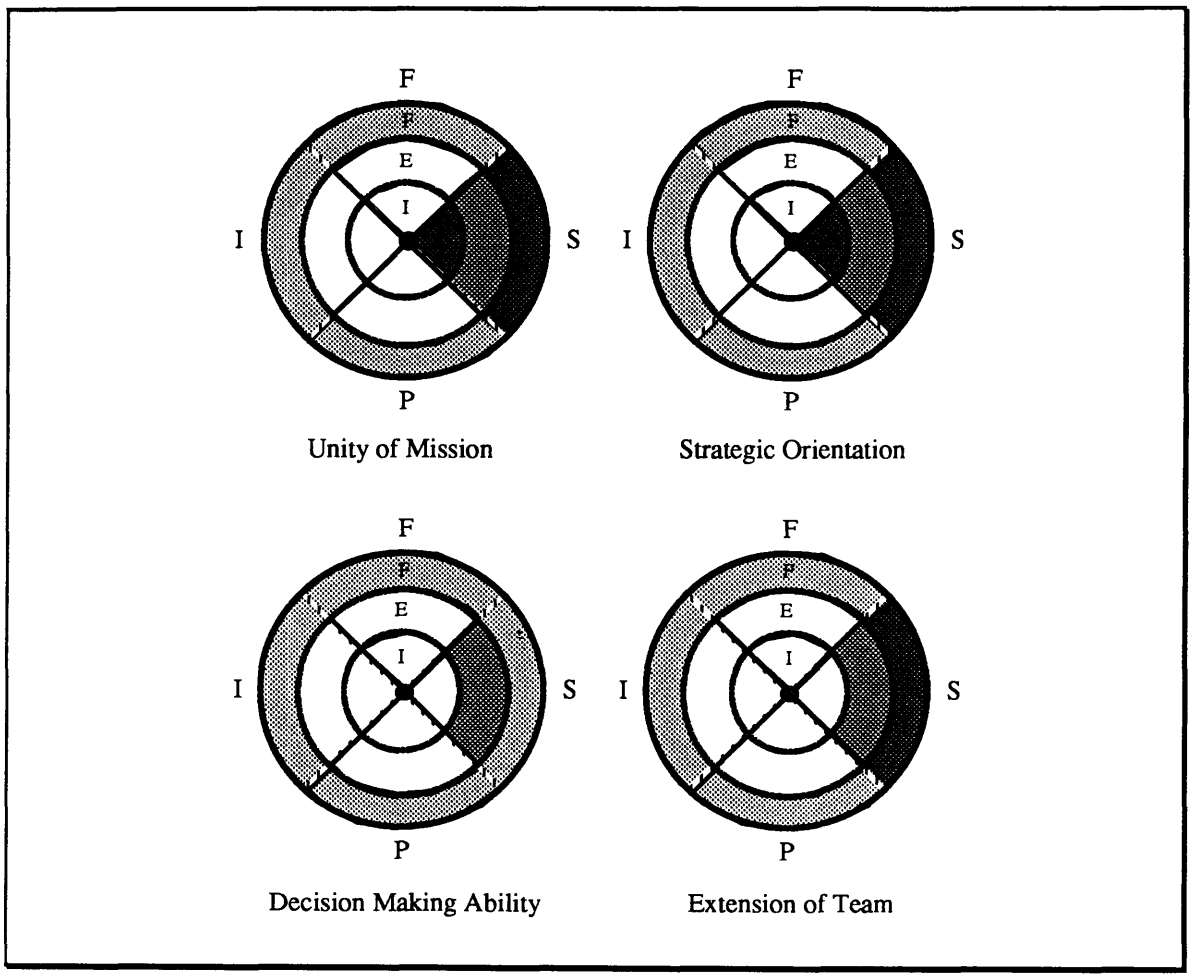

Figure 7H - Case 3 Owner Driver Analysis

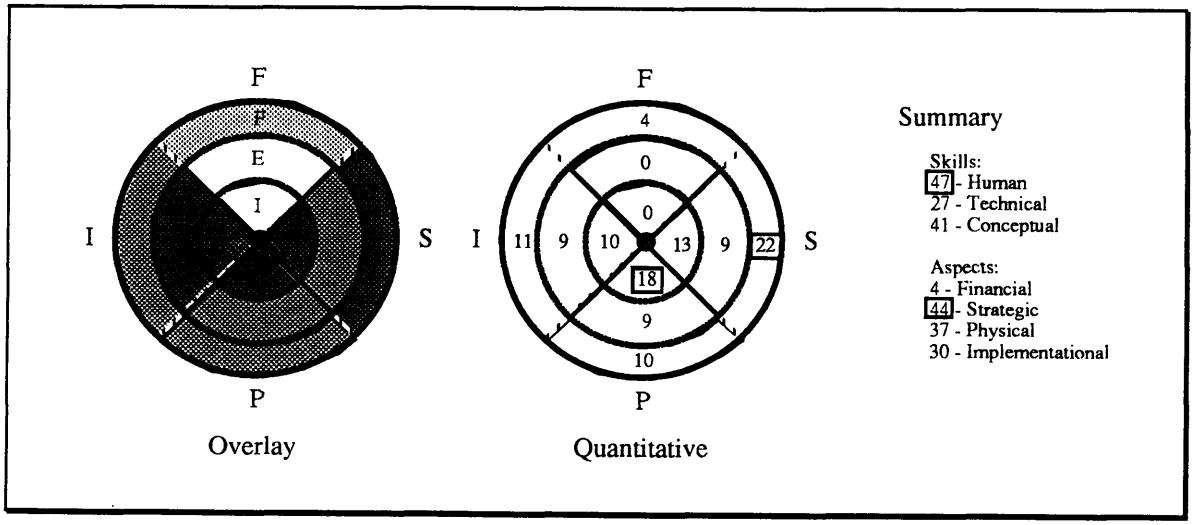

Figure 7J - Synthesis of Case 3 Planning Requirements

consulting services. Given the strong strategic capabilities as well as physical and implementational capabilities indicated, this choice appears appropriate. Furthermore, comparison to the profiles of trend setting firms, also discussed in Chapter 6 indicates a superior match with advanced architectural firms, program management construction managers, and potential services of management consultants. Investigation of availability and capabilities of trend-setting architecture and construction management firms appears most appropriate.

7.3 - CHAPTER CONCLUSION

The objective of the above initial planning consultant selection methodology is to expand owners' mental model of project planning . As in the planning process itself, the analysis is reliant upon qualitative and somewhat subjective measures. However, the value of the analysis is not significantly decreased by this subjectivity. Instead, the framework is intended to enhance awareness of issues involved in project delivery in general and consultant selection in particular. An owner need not be overly concerned with precision of estimates as the model should not be considered deterministic or prescriptive. Learning through investigation is more valuable than the indicated results.

Due to the imprecision of the selection methodology, specific conclusions drawn from the example cases are not appropriate. However, a general conclusion gleaned is the relative importance of facilitation capabilities. Project drivers indicate need for facilitation capabilities as a result of inter-aspect implications of critical drivers. For example, presence of a scale driver indicates that related planning issues are anticipated to be primarily centered on the physical aspects of related planning issues. In addition, the complexities associated with a scale driver involve implementational and strategic aspects of planning issues. As such, facilitation capabilities are estimated to be required of planning consultants. Moreover, the influence of owner drivers consistently indicates an associated desirability of facilitation skills in consultants. Those owner drivers associated with an owner's organizational structure, primarily determined by communication concerns within an organization, indicate planning group facilitation difficulties greater than those typical. As Chapter 3's review of group effectiveness parameters suggests, planning group facilitation difficulties are generally significant in the absence of such owner drivers. As such, effective group management can significantly enhance project planning effectiveness.

CHAPTER 8
CONCLUSION

8.1 - THESIS SUMMARY

The core hypothesis presented herein is that recent and increasing market dynamics obfuscate identification of optimal project delivery mechanisms. In particular, selection of initial planning consultants can benefit from rational methodology. Market dynamics are shown to be primarily driven by owner organizations, project needs and society's technological capabilities. The construction industry adapts in response to market change, altering products and services in an attempt to satisfy precipitated demand. Resultant construction industry dynamics, however, outpace the market's ability to perceive industry changes, due to the market's limited involvement with the construction industry, both temporally and spectrally. Market and industry changes deteriorate the applicability of historically successful decision models. In the case of the selection of an initial planning consultant, a critical and formative decision, owners can benefit from the application of the rational analysis and selection methodology presented herein. Methodical analysis is thought to enhance awareness of project and owner parameters, their influence on planning consultant qualifications, the consulting options available to an owner, and ultimately project-specific compatibility.

8.2 - IMPLICATIONS OF RESEARCH

Comprehensive analysis of all influential factors is a fundamental premise of the methodology presented. Comparison of the parameters identified to much of the related literature indicates omissions in previous studies which may result in incomplete analyses and flawed conclusions. Primarily, project planning should explicitly follow an organization's general strategy. Deriving this strategy and maintaining focus on it requires both strategy focus and facilitation capability in a planning consultant. The characteristics of an owner organization have significant influence on this process; thus they must be considered as determinants of consultant selection criteria. The inclusion of

strategic and owner issues in this study redefines the qualifications of planning consultants with the intention of more accurately reflecting market desires.

8.2.1 - Strategic Facilities Planning

Reflecting a characteristic predisposition of the construction industry, most related literature understates the importance of the strategic component of project planning. In contrast, this thesis hypothesizes the need to counter owner bias and ignorance through explicit focused evaluation of the relationship between project strategy and overall business strategy. Management consulting experience indicates that this function, in order to be effective, must be managed by an entity external to an owner organization. As such, initial planning consultants may enhance their quality of service by first convincing owners of the benefit of strategic evaluation. This implies the desirability of consultant familiarity with theory and practice of strategic planning and understanding of strategic implications of project and delivery design in order to effectively relate business and project strategies.

8.2.2 - Consideration of Owner Organization

This thesis differs from related literature in its inclusion of the influence of owner parameters in analyses of project classification. Owner drivers are hypothesized as having significant implications in the process of initial planning, including the determination of organizational structure of a planning group, the relationship between a consultant and planning group, and the nature of decision making involved. As such, inclusion of owner characteristics, in the form of owner drivers, is intended to abet successful identification of planning consultant qualifications.

As example, case study number 3 indicates the influence of owner drivers on consultant selection. Taken in isolation, the project driver analysis estimates the primary consultant qualifications as mostly physical and implementational capabilities. Inclusion of owner drivers emphasizes the desirability of strategic capability and facilitator role requirements.

Inclusion of owner drivers typically drives the selection criteria toward the capabilities of management consultants and developers. Review of owner drivers highlights strategy and facilitation aspects of the planning process. As would be expected, communications and decision making capabilities determined by organizational structure tend to demand

strategic orientation and, perhaps more importantly, human skills in initial planning consultants.

8.2.3 - Implications for Consulting Services

8.2.3.1 - Influence of Market Dynamics

The increasing dynamics in the market for planning services and the related shifting requirements of planning consultants indicates a tendency for such firms to remain flexible. However, the construction industry in general is historically characterized as relatively stable, encouraging the development of bureaucratic and hierarchical firms typical of the "traditional" delivery system discussed in Chapter 2. As changing demand creates an increasingly dynamic environment, more flexible organizations tend to respond more effectively. This indicated shift toward smaller, more adaptable firms engaged in flexible strategic alliances is predicted and evidenced in literature.

8.2.3.2 - Responding to Market Shifts

For initial planning consultants to be more successful, they must respond more effectively to market desires. Adaptability and foresight are not common characteristics of the construction industry. Firms can take advantage of the inertia of the general market by adapting to current market demands. Prediction of future market conditions and associated risk of investing according to prediction, is not necessarily required. Simply perceiving current conditions and responding to them can establish relative advantage.

To this end, the market dynamics identified in Chapter 2 imply required response by initial planners. For example, technological development is driving communications capabilities and data availability throughout the industry. This indicates an increased demand for planners to effectively communicate and interpret; interdisciplinary facilitation skills emphasized. Increasing global competition indicates market desire for better strategic capabilities, particularly innovation skills in order to help owners compete more effectively. The liability and insurance crisis indicates desire for enhanced aptitude with contractual issues involved in project planning. Finally, increasing external demands from investors, communities and governmental agencies indicate market desire for greater facilitation capabilities. This thesis hypothesizes that such an analysis can provide insight for establishing strategic advantage within a given market segment.

8.2.3.3 - Importance of Management Capabilities

A common thread runs through the aforementioned implications of this research: planning consultants' role is increasingly that of facilitator/manager. A corresponding shift in required capabilities is indicated away from technical expertise and conceptual capabilities toward facilitation skills. Indicated causes for this shift include the issues discussed above concerning owner complexity, project complexity, barriers in conveyance of reliability, technological developments and external accountabilities. In addition, the organizational environment of the planning group, comprised of greater numbers of members, each perceiving and inputting information according to individual bias, indicates desirability of initial planning consultants capable of managing such a process.

8.2.4 - A New Planning

8.2.4.1 - Ideal Organizational Structure

As described in Chapter 5, the ideal organizational structure of the initial planning group is hypothesized to be that of an adhocracy which includes all involved and affected parties and decision makers, with minimal reversion to direct supervision required for decision making. To engender such an organization, an initial planning consultant must design the process from its inception; the alternative, entering into and shaping a pre-existing organization, is significantly less effective.[151] Familiarity with organizational theory, a strategic aspect of planning issues, is indicated as an increasingly important qualification of planning consultants.

Objectivity of the planning group, both of owner participants and external consultants, remains elusive. The selection methodology presented herein indicates the goal of balanced biases of the project planning group through selection of a planning consultant that effectively nullifies owner bias through opposing perspective. The resultant, though theoretically effective, may be delicate and potentially unstable, again indicating desirability of facilitation capabilities. An alternative is the formation of a discrete organizational phase conducted solely by members of the strategic apex, as suggested by

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[151] Fray.

the Industrialization Forum[152] However, closer analysis reveals potential sup-optimal decision making at the project's outset as a result of the limited perspective and inherent bias of the members of the strategic apex. Rather than avoid multiplicity of objectives, the management function enables disclosure of biases and perspectives in order to more appropriately incorporate suitable concerns in an open forum. This tends to optimize solutions and facilitate relations among the various parties affected, thereby best supporting the primary function of an owner.

8.2.4.2 - Ideal Initial Planning Consultant

This research indicates that interdisciplinary capabilities of planning consultants facilitate effective management of the multi-faceted issues which comprise planning processes. Diverse technical and innovation strengths which enable facilitation through knowledge appear more important than strong technical and innovational skills focused on any given aspect of planning issues. Well-rounded generalists are increasingly sought for such roles by all of the various professions.

Cross-discipline partnerships, currently employed for design and construction phases, are shown to be appropriate for application to planning efforts on highly complex projects. Formation of quasi-firms comprised of representatives with strong technical and innovational capabilities concerning the various aspects of initial planning issues could effectively respond to complex planning problems through the integrative force of a generalist facilitator.

8.3 - Additional Research Required

More extensive research is required to fully explore the primary hypothesis presented in Section 8.1. Broad surveys of project needs, consultant capabilities, and success rate of planning efforts are required. A survey of owners determining perception of required capabilities of planning consultants would indicate the frequency with which various roles and areas of strength are sought. Comparison to survey findings of actual consultant capabilities would indicate market correlation of professional services, enabling consultants to tailor capabilities to more accurately reflect market demand.

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[152] IF Team, p. 3-8.

The effectiveness of strategic facilities planning deserves further investigation. Such a study would indicate the existence and quality of owners' strategic plans, the consideration of such plans in project planning and a measure of success as a function of such consideration. Measurement of compatibility between project and owner drivers and the consultant type selected for initial planning could be analyzed along with a concurrent analysis of planning success in order to determine the veracity of the methodology presented herein.

8.4 - The Bigger Picture

Development of non-traditional planning consulting in the construction industry is hypothesized to be analogous to the characteristic stages of technology adoption. Initially, a new technology is applied to enhance efficiency of a traditional methodology. Only after the technology is digested and its potential widely understood is the methodology itself altered to reflect the potential of the new technology. Similarly, non-traditional planning consultant "technologies" are presently applied to traditional project delivery methods. Growing supply enables increased frequency of non-traditional consulting services, spreading familiarity with the various options and an increased understanding of the potentials of each. Simultaneously, analogous adoption of non-traditional methodologies are being explored in all other phases of project delivery. Planning consulting dynamics must be considered as one element of the evolution of project delivery. More fundamental industry structural change should be expected as the market begins to explore the potentials of integrating non-traditional planning, design and construction options.

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APPENDICES

APPENDIX A - INTERVIEW SCRIPT

HYPOTHESIS: THE INDUSTRY'S BIAS TOWARD BUILDING NEW SPACE INFLUENCES THE CONSULTANT'S ANALYSIS OF ALTERNATIVE SOLUTIONS

Are you aware of any projects that simply should not have been built or should have been significantly scaled-down?

Leasing in an existing facility would have been more prudent?

Renovation would have been more prudent than new construction?

How best can the initial planning consultant negotiate with a difficult client: to protect the client from themselves?

For example, a client thinks they need a building, but it becomes evident during planning that their scale does not warrant this. Should the consultant counsel them against new construction?

What professions are more likely to be able to do this?

Has your firm ever been involved in a situation in which the client was counseled to not build?

to renovate?

to dramatically reduce the scope?

to postpone construction? (to take advantage of economic or strategic advantage)

to lease? (indefinitely postponing new construction)

Should the consultant intentionally insulate himself from this bias?

How?

Do you see this bias as a significant or growing industry problem?

Do MCs make better initial planning consultants because they are not effected by the build bias?

HYPOTHESIS: INDIVIDUALLY THE PROFESSIONS ARE MOVING TOWARD INTERDISCIPLINARY EXPERTISE

What barriers inhibit your firm from becoming more interdisciplinary in expertise?

Have you been or do you foresee yourselves becoming involved in any initial planning partnerships with other professions?

What were the roles?

Strategic for marketing?

HYPOTHESIS: VARIOUS PROFESSIONS OFFER DIFFERING SERVICES BASED ON THEIR TRADITIONAL ROLES AND THE BIASES INHERENT THEREIN

Do clients usually know what they need?

has it been very important to be able to analyze or re-evaluate the client's needs?

Ever counsel to re-evaluate needs?

have things changed much as a result?

Usually do, but don't know how to get it?

any trend that you're addressing?

What is the relative emphasis of process and product?

Ever have a client that knew how to get the final product, but just didn'/t know exactly what they needed?

Is this typical?

Has it been more of a challenge to plan the methodologies of delivery or to determine just what the client needed?

any trend that you're addressing?

Has concern beyond the immediate project scope been important?

Even if the client was not concerned?

For what project types and client types was this more important?

has it been important to push for increased net value of the project even if the cost or scope had to be increased to do so?

What professions are more apt to think beyond the immediate project's scope?

Any war stories of managing through this? with sub-consultant?

What has been the time horizon when planning?

follow direction of client?

Differed for different project or client types?

immediately calculable present value of project?

Plan for the future?

Has concentration on spatial efficiencies been integrally important?

Basic programming

Master planning, campus planning

Vision of future projects and relation of current to future

What project and/or client types benefited more from spatial skills of the architect in the initial planning?

What other professions are skilled in this area?

What professions are capable of managing this input?

Where do you get this knowledge to input into the planning when you're the initial planning consultant?

any trend?

Has aesthetic design been integral to initial planning efforts?

what types of projects and clients benefited from this skill?

What has been the value of this design relative to other tangible values?

What professions are capable of managing this input?

Where did you get this knowledge to input into the planning when you're the initial planning consultant?

At what point in the process has this been an input?

is this ideal?

any trend that you're addressing?

Team building, strong communications skills important? both up and down the value chain?

More so on any particular types of projects/clients?

How has leadership been best achieved?

single counseled authority for decision making

cooperative brain-storming technique?

How important have strong negotiating skills been for leadership?

Does this vary with the type of project?

more bottom line project benefited?

more quality oriented project hindered?

How important has familiarity with team building techniques been: partnering, negotiated contracts, constructability integration?

Has strategizing communication structure, data management been important?

any trend that you're addressing?

Has construction process strategy consulting in initial planning been important? (hierarchy of subs, risk allocation, team structure strategy, contract strategy)

More so on any particular types of projects/clients?

Where did you get this knowledge to input into the planning when you're the initial planning consultant?

any trend that you're addressing?

Has construction technique and product knowledge in initial planning been important? (steel vs. concrete, up/down, flying formwork)

More so on any particular types of projects/ clients?

Where did you get this knowledge to input into the planning when you're the initial planning consultant?

any trend that you're addressing?

Has knowledge of the overall delivery process been important? (from concept to occupancy)

or is expertise of initial planning more specific?

any trend that you're addressing?

Has financial analysis been important?

Financial viability of a commercial venture?

Financial analysis of various alternatives to solving the clients problem? Beyond costing?

Tax implications?

Life-cycle costing?

Future values?

Effective value of associated risks?

Effective value of strategic qualities? (potential expansion, name recognition, employee/investor attractiveness)

More so on any particular types of projects/ clients?

What professions are more skilled in this area?

Where did you get this knowledge to input into the planning when you're the initial planning consultant?

any trend that you're addressing?

Has financial resource strategizing been important?

More so on any particular types of projects/ clients?

What professions are more skilled in this area?

Where did you get this knowledge to input into the planning when you're the initial planning consultant?

any trend that you're addressing?

Has regulatory process expertise been important? (govt. or industry)

More so on any particular types of projects/ clients?

What professions are more skilled in this area?

Where did you get this knowledge to input into the planning when you're the initial planning consultant?

any trend that you're addressing?

Has innovation been important? (or is experience better, knowing what works?)

methods , organizational, management, contractual techniques

More so on any particular types of projects/ clients?

What professions are more skilled in this area?

Where do you get this knowledge to input into the planning when you're the initial planning consultant?

any trend that you're addressing?

Has your role been as an outside agent? or part of comprehensive service?

Is it a disadvantage to the overall team or process to have the initial planning consultant be an outsider?

Added layer of communications complexity?

How inefficient is transfer of knowledge to those ultimately responsible?

In fact, not from the industry at all?

Not particularly familiar with the nuances of the process?

COMPARE YOUR FIRM'S SERVICES IN INITIAL PLANNING TO THOSE OF:

Architects

What is the role of the architect in initial planning?

When brought in?

Reports to whom?

What are the distinguishing characteristics of architect's services?

How does the architect's aesthetic concern relate to the rest of the initial planning effort?

Is architect biased?

Does aesthetic direction dovetail with other guidance?

To what extent does the client typically share the architect's aesthetic concern?

Does your firm replicate these capabilities?

Is this aspect of the service outsourced?

At what point in the initial planning analysis does the outsourced architect become involved?

Do Architects emphasize long-range planning?

To what extent do architects plan beyond the scope of the project?

Do clients typically appreciate this or is it a nuisance?

To what extent is the architect concerned with the process of design and construction?

Do architects compromise design for process efficiencies?

Is this a strength or weakness? Does this depend on the type of project or client?

Do Architects facilitate team integration?

Are Architects good communicators with clients?

with sub-consultants?

Do architects create a shared mission and effectively lead to it?

What are the architect's weaknesses with initial planning?

weak with financial analysis?

schedule and cost estimation?

cost reduction efforts

For what project or client types are architects more appropriate consultants during initial planning?

Construction Managers

What is the CM's role in initial planning?

When brought into the planning?

Reports to whom?

What are the qualifications of CMs? strengths and weaknesses?

To what extent are CMs concerned with the process of project delivery? Is this a strength or weakness?

Is the CM focused on the final product: functionality and appropriateness?

Is the CM concerned with cost reduction?

If so, through what means? through enhancing ease of construction process?

Do CMs emphasize accurate schedule and cost control?

How important is this in initial planning?

More so on any particular types of projects/ clients?

Does your profession emulate this quality?

Do CMs provide construction process strategy expertise?

Are CMs biased by personal capabilities, known strategies?

how does your profession provide input on this?

Do CMs emphasize construction technique and product knowledge?

Are CMs biased by personal capabilities, known strategies?

Do CMs emphasize a more immediate time horizon when evaluating programmatic needs?

Is this better for the client? the process? the product?

Characterize CMs as communicators:

Good down the value chain?

Only fair up it?

Are CMs good leaders, team builders?

What project and client types are more appropriate for CM leadership during initial planning?

Developers

What is the role of the developer in initial planning?

when brought in?

reports to whom?

What are the qualities that distinguish developers as initial planning consultants?

What project or client types are more appropriate for developer leadership in initial planning?

strengths and weaknesses?

How relevant is their experience with leading the conceptualization of their own projects?

Do you have experience working for developers as owners? good or bad?

How does this experience influence your assessment?

Was there an emphasis on their profit? to the detriment of the project, process or other's profit?

Do developers provide overall process management expertise?

Does their role give them a more comprehensive view of the process?

In what way is their perspective limited?

Are developers good communicators down the value chain?

Are developers good communicators up it?

Are developers good team builders and leaders?

Is the use of "managing by the contracts" more appropriate than by cooperative team building?

Is this the developer's style?

Are developers relatively aggressive negotiators?

Do developers emphasize financial value:

product as a commodity?

Do developers emphasize reducing costs? and maximizing value?

Do developers provide strong financial analysis?

Do developers provide strong financial resource strategy expertise?

Life-cycle cost analysis?

Is the developers' planning analysis time horizon biased toward the short term?

Do developers provide strong regulatory process expertise?

How important in cost containment to developers?

What is developers' attitude toward value of initial planning?

Management Consultants

What is the role of the MC in initial planning?

When brought in?

Reports to whom?

What projects/clients are more appropriate for using MC?

MCs are not influenced by the "build bias" therefore maximize present value, not just project value?

Does their isolation from the rest of the project enhance their objectivity?

Are they in turn biased by the biases of their sub-consultants?

Do MCs constitute a competitor to you in getting initial planning contracts?

Is the MC's experience with other industries applicable to the construction process?

Do MCs emphasize team structure?

communication structure?

data and process management?

Do MCs emphasize innovative solutions?

Do MCs possess strong design or construction process knowledge thus are weak communicators down the value chain?

MC constitutes additional communications complexity which tends to decrease the overall team efficiency?

HYPOTHESIS: PROFESSIONS ENCOURAGE EMPHASIZING THIS STAGE

How have the costs associated with the initial planning process been contained? has this been an important issue?

(q to elicit their focus on the importance of initial planning without biasing due to the wording of the question itself)

Has increased initial planning work saved work later in the project? (rework, organizational changes, construction technique)

If so, what professions' scopes were reduced?

Was this advantageous? More so on any particular type of project or for any particular type of client?

HYPOTHESIS: INITIAL PLANNING STAGE IS INHERENTLY HIGH-LEVERAGED

On your projects, what has been the relative importance of the initial planning phase?

Have clients typically known exactly what to build before this phase?

Have clients typically understood their options before this phase? or at least had a feel for the number of potential solutions?

To what extent have projects changed during this phase?

What types of changes were made?

Significant success/failure stories concerning initial planning phase?

Relative to the project cost, has the cost involved in initial planning been significant?

On what type projects or for what type client has it been of significant cost?

HYPOTHESIS: MORE TIME AND EFFORT SHOULD BE SPENT ON INITIAL PLANNING

How sensitive has the time required for initial planning been to the project complexity?

Simple projects versus on a more complex project?

How much does the complexity /sophistication of the client affect this?

Current projects require more than those 20 years ago?

Will projects in 10 years require even more front-end analysis?

In 10 years, any particular type of project require more front-end work?

HYPOTHESIS: AWARENESS IS INCREASING

Has your profession been an advocate for increased attention to initial planning?

Do you see any other professions doing this?

Have clients allocated enough time and resources?

Have you seen a trend?

not enough - client or project dependent?

too much - client or project dependent?

Have you seen a point of diminishing returns?

What was the loss associated?

Did the loss ever outweigh the savings?

Was the cost of professions the significant issue or opportunity cost?

HYPOTHESIS: VARIOUS PROFESSIONS ARE MANEUVERING TO CAPTURE MORE OF THE INITIAL PLANNING MARKET

How has your profession's role changed in the last 10 years?

More respected? more leadership? trust?

Do you predict a changing role for your profession?

What should your profession be providing?

Is this a widely held vision?

What are your profession's qualifications?

What barriers exist to providing these services?

What is the significant competition to your profession?

How is your profession, as an industry, pursuing an increased initial planning role?

What is the goal for your firm relative to these services?

How has this changed over the last 10 years?

Service viewed as strategic support to core business?

Service viewed as separate core competency?

What is intended for future of these services?

How is your firm pursuing this?

Is your firm's work, goal or method of pursuit unusual within your profession?

Do you see changing roles for other professions in the initial planning consulting market?

Which may be increasingly utilized and why?

Which may be less popular and why?

HYPOTHESIS: ALL PROFESSIONS WANT GREATER VALUE ADDED POSITION

Has there been a strategic significance to early involvement?

Opportunity to correct common mistakes?

Opportunity to build trust with the client? impress them with abilities?

Better chances of additional work on that project?

Have the profits been more attractive as a result?

APPENDIX B - PROJECT MAPPING FORM

	Complexity					Criticality			
	None	*Low*	*Ave*	*High*	**Driver**	*High*	*Ave*	*Low*	*None*
Physical									
Scale challenge									
Technology									
Site complexity									
Program									
Temporal									
Adequacy of time									
Continuity									
Financial									
Budget complexity									
Assurance									
Market Interface									
Negotiation pos'n									
Market capability									
External									
Regulatory									
Economic									
Socio-political									

APPENDIX C - OWNER MAPPING FORM

Parameter	Driver	Low	Medium	High
Unity of Mission				
Strategic Orientation				
Decision Making Ability				
Extension of Team to External Resources				
Involvement of Ultimate Decision Maker				
Accessibility of Data				
Democratic Orientation				
Financial Resource Access				
Experience with Project Planning				
Objectivity toward Project Planning				
Confrontation Sophistication				

APPENDIX D - COMPATIBILITY ANALYSIS FORM