PEER-REVIEWED PAPER

STRATEGIC PLANNING IN PUBLIC SECTOR ENGINEERING ORGANIZATION

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ABSTRACT: In today's engineering and construction industries, the concepts of company loyalty, traditional competitors, and employee development are changing at a pace that has not previously been encountered in postindustrial times. In response to these changing concepts, private and public organizations alike are increasing their emphasis on long-term or strategic planning. This paper introduces strategy planning, describes the expected results of strategic planning efforts in engineering and construction organizations, and provides a case study illustration of the process for the City of Los Angeles, Bureau of Engineering (a 1,000-person public sector architectural and engineering organization). The case study describes the seven steps used by the Bureau starting with building a strategic planning team to ending with evaluation of the implementation effort. Lessons learned from the case study are used to identify several recommendations for future planning efforts in the area of strategic planning.

INTRODUCTION

In today's engineering and construction industries, the concepts of company loyalty, traditional competitors, and employee development are changing at a pace that has not previously been encountered in postindustrial times. In response to these changing concepts, private and public organizations alike are increasing their emphasis on long-term or strategic planning. For private organizations, focus acknowledges the need to identify and pursue new market and customer opportunities that are emerging throughout the global business environment. For public organizations such as municipalities and Federal agencies, strategic planning efforts are a response to the new roles that agencies will be performing in the next century, including greater emphasis on sustainable communities, mass transit, and environmental protection.

This paper introduces strategic planning, describes the expected results of strategic planning efforts in engineering and construction organizations, and provides a case study illustration of the process for the city of Los Angeles, Bureau of Engineering (a 1,000-person public sector architectural and engineering organization). The paper concludes with recommendations for future planning efforts based upon lessons learned in the case study.

WHAT IS STRATEGIC PLANNING

The history of strategy and strategic planning covers a broad timeline from ancient Greece to the 21st century. Organizations, practitioners, and researchers from every sector of the professional world have focused on strategy as a primary topic at some point (Chinowsky 1999). In contrast to mathematics, physics, or material science, strategy does not contain universal truths that can be documented through scientific theorems and proofs. However, as illustrated through the extensive history of strategic planning, scientific and management advancements have been integrally related to the field for centuries. From this development, strategic planning encompasses principles from a combination of quantitative and qualitative fields. On the quantitative side, management and industrial sciences have formalized the domains of operations, logistics, and finance. Complementing this quantitative rigor are the qualitative human dimensions of psychology, sociology, and human resource management. In combination, these quantitative and qualitative elements address diverse organization needs including professional, technical, and strategic demands.

Strategy Defined

The basic concept of strategy is that of an idea. Specifically, an idea that sets in place a path that responds

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to multiple internal and external influences (Porter 1979; Hamel and Prahalad 1989; Collis and Montgomery 1991). In contrast to the execution and control plans developed for individual projects, strategies are concepts that contain no intrinsic steps to achieve the final destination. Originally developed by rulers and military leaders attempting to broaden their empires, the concept of strategy can be traced to the beginnings of recorded history. Examples of strategies that remain a part of today's vocabulary or military foundation include the use of the Trojan Horse, the development of the warship, and the concept of the fortified castle. Each of these examples represented a new approach that responded to a current situation, predicted the needs of the future, or presented a new method for achieving a goal. The modern business interpretation of this concept is exemplified in industries as varied as telecommunications and grocery chains. The expansion of digital communications, global mergers, and the introduction of lean production have modified business practices to anticipate 21st century scenarios. These predictive ideas are not implementation plans, but rather, the visions from which specific action plans can be developed through strategic planning.

Strategic Planning: The Implementation Side of Strategy

To encourage the development of new strategies, numerous academic and business writers have proposed strategic planning models (Davis 1987; McCabe and Narayanan 1991; Mintzberg 1994; Lemmon and Early 1996). These strategic planning models provide specific instructions for approaching, executing, and evaluating the development of strategic concepts. For example, a common model emphasizes the need for an organization to:

1. Build a strategic planning team
2. Set the strategic planning objectives
3. Gather member input
4. Synthesize the developed ideas
5. Develop an implementation plan
6. Execute the plan
7. Evaluate the success of the ideas prior to the start of the next strategic planning timeframe

However, as with any topic that focuses on procedural processes, the number of strategic planning methods is increasing at a rapid rate. As such, the strategic planning process is slowly becoming synonymous with the entire field of strategy. This connection is incorrect. The strategic planning process is one element of the overall strategy topic. Strategic planning is the focused attention to the development of strategic concepts based on response to internal and external business conditions.

The Strategic Plan: Putting It All Together

Although the strategic planning process can be a major milestone for organizations, it is not the final conclusion required for implementation purposes. Rather, a strategic plan is required to outline the goals, objectives, mileposts, and evaluation criteria that must be followed to achieve the developed strategy. However, translating a strategy into a series of tasks that can be accomplished by individual departments is challenging. The time required to focus on broadening client bases or examining new revenue streams is often overridden by demands by projects for attention to budget, schedule, or personnel matters. Given this conflict for attention, a specific set of instructions is required to ensure that an organization remains focused on organization-level concerns. This set of instructions is the strategic plan. Encompassed within this plan are the measurable outcomes that both division and organization level managers can evaluate for progress and final achievement.

IMPACT OF STRATEGIC PLANNING

The impact of moving to a strategic planning focus is often first realized by an organization through an understanding that strengths exist, gaps exist, and priorities need to be set to focus upon these areas. In some instances, significant investment is required to move forward toward strategic objectives. In these instances, organizations must set priorities and balance available resources. For example, if an organization finds itself with gaps in education and competitive analysis, then a decision must be made as to which of these gaps requires the greater attention at the current time. Since each of these gaps will require an investment of time, planning, and monetary resources, the organization must determine where the resources will be allocated.

Often overlooked by organizations except in the context of market share or revenue projections, strategic evaluation emphasizes the need to evaluate the progress of each strategic area on a regular basis. Similar to an emphasis on business development evaluation, strategic planning evaluation is required to determine progress toward achieving strategic objectives. However, in contrast to the business development evaluation, strategic planning evaluation may not be quite so clear and well defined. Items such as education and core competencies cannot be measured in terms of dollars and market share. Rather, these strategic issues need to be evaluated in terms of organization progress and movement toward an ultimate goal. Evaluation criteria may be based upon outcome measures such as the increase in clients requesting services related to the core competency, or the number of new hires related to the core strengths. In any case, the evaluation criteria focus less on dollars and more on building a foundation for long-term success. Further evaluation of relationships between outcome measures is also possible by a cross-impact analysis (CIA) and mathematical models (Venegas and Alarcon 1997).

STRATEGIC PLANNING CASE STUDY

The Bureau of Engineering, with over 1,000 employees, is a part of the City of Los Angeles' Department of Public Works and is responsible for the planning, design, and construction management of Capital Improvement

Projects (CIP) including municipal facilities, stormwater, sewer, street, and other infrastructures projects. The Bureau is headed by an executive group comprising the City Engineer, Chief Deputy City Engineer, and two or three Deputy City Engineers. Beneath this level is the division head/program manager level. Division heads function as the leaders for each of the Bureau's programs. Division heads are responsible for all aspects within their particular program, both strategic and tactical. They are also responsible for problems that may be technical or specific to an individual project if they have program-level consequences. Finally, division heads provide guidance and support to each Project Manager and Project Engineer and are ultimately accountable for the success of all facets of the operations of all projects within their program.

Background

The Bureau's division heads are responsible for solving most Bureau problems. The solutions to problems are based on individual experience and expertise. In the past, however, short-term needs were satisfied with little consideration of long-term solutions to recurring problems. Problems were solved with immediate solutions for the division, rather than long-term solutions for the entire Bureau. Hence, definitions were created within each division, and ideas were not communicated between division heads. Although monthly division head meetings allowed discussions of problems and solutions, sharing of information rarely took place beyond a cursory level. Development of new project cost and schedule control tools was neglected, implementation of modern technology was slow, and increased customer needs were not identified. In short, organizational health suffered from this lack of strategic planning resulting in decreased day-to-day project performance. In 1996, the senior executive staff of the Bureau recognized this problem and began a focused strategic planning effort.

In the spring of 1996, the City Engineer and Chief Deputy City Engineer began to consider the creation of a separate group of Bureau staff to plan Bureau strategy. In September 1996, the Bureau's Strategic Planning Task Force (SPTF) was created—corresponding to the common model planning effort step 1: build a team (Davis 1987; McCabe and Narayanan 1991; Mintzberg 1994; Lemmon and Early 1996). The SPTF consisted of 18 staff members from a variety of civil service levels (junior staff to senior staff to executive level staff) and classifications (i.e., civil engineers, drafting technicians, clerk-typists, etc.).

Initial Planning Efforts

Over the next two months, the group began the strategic planning process in a traditional fashion and worked with the division heads and select Bureau staff to formulate a vision statement. The vision statement created is shown in Fig. 1. The SPTF took great effort to publicize the vision statement. The statement was conspicuously posted in all conference rooms and bulletin boards in the building. It was published repeatedly in the Bureau's biweekly employee newsletter, and was a topic of discussion in each division's monthly staff meeting. Comments, concerns, and questions from staff were addressed with written responses from the SPTF and the City Engineer and were similarly publicized to all 1,000 employees. Concurrent to publicizing the vision statement, the second task of the group was to identify Bureau customers and conduct a SWOT (strengths, weaknesses, opportunities, and threats) analysis. The SWOT analysis results are shown in Table 1. As shown in Table 1, the SWOT findings are similar to most other engi-

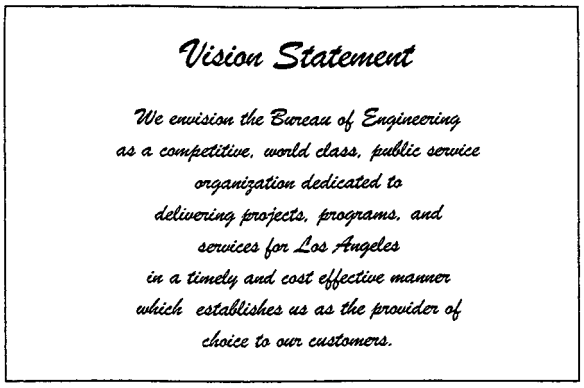

FIG. 1. Vision Statement

TABLE 1. Strengths, Weaknesses, Opportunities, Threats (SWOT) Analysis

SWOT element (1)	Element items identified (2)
Strength	Continuity
	No need for profit
	Core competencies
	Emergency response
	Knowledge of city processes
	Long-term view
Weakness	Poor planning
	Narrowly skilled employees
	Lack of training
	Communication
	Tribalism
	Divisional parochialism
	Risk adversion
	Lack of tools
	Lack of incentives
Opportunity	Pseudomonopoly
	No need for profit
	Upcoming bond measures
	Increased awareness of Drainage Needs
Threat	Consulting firms
	Other departments/bureaus
	Privatization
	Resource competition
Customer	Mayor and City Council
	Board of Public Works
	Construction contractors
	Designers
	Citizens of the city
	Utility companies
	Other city departments/Agencies
	Other cities
	Consultants
	Users of facilities
	Unions

TABLE 2. Strategic Issues

Strategic issue (1)	How it applies to Bureau of Engineering (2)
Marketing our services	Diminished work means diminished Bureau
	We need to build new partnerships
	Our business environment is changing
	Our competition is increasing
Develop processes to ensure commitment to project and service delivery	If our customers are unhappy, they will go elsewhere
	Project delivery establishes us as credible provider of services
Identify projects/services with maximum return on investment	We need to pick projects which give us visibility
	We need to be selective when accepting commitments that are too ambitious
Balance quality with cost effectiveness and timeliness	The Bureau must deliver projects with appropriate quality—stop overdesign
	Do not overinvest resources for limited margin of return
Right staff and right skills to meet commitments	Staff training allows us to meet our commitments
	Staff training positions us to be competitive
	Staff training provides us with flexibility to meet project deadlines
Customer satisfaction	To survive, Bureau must keeps its customers happy so they will not go elsewhere
	Satisfied customers open new markets
Increase financial management/responsibility/skills	We need to adapt bottom line mentality
	The new environment in AEC industry and city requires cost consciousness
	We must know our resources and constraints in order to be competitive
Create culture of personal responsibility	We need to work effectively as organization
	We need to stop blaming others when we can solve problem
	We need to change employees from problem identifiers to problem solvers
Foster proactive, not reactive culture	Bureau's mindset must change in order to increase credibility, prevent blindsiding, minimize crises, and foster creative solutions rather than ''Band-aids''

neering firms' SWOT analyses (Betts 1994; Etmanczyk 1995; Lewis 1995; Hensey 1996), but they include no emphasis on direct monetary profit (since the Bureau of Engineering is a public organization), less emphasis on development of a niche market (since with its size and wide breadth of knowledge, the Bureau is able and expected to design all elements of practically all types of projects), and a long list of potential customers (from within the large city, county, and state governments).

Based upon the vision and SWOT analysis, the SPTF then formulated a list of strategic issues that the planning effort needed to be based upon—corresponding to the common model planning effort step 2: set the objectives (Davis 1987; McCabe and Narayanan 1991; Mintzberg 1994; Lemmon and Early 1996). These issues and the reasons for their importance are shown in Table 2. These strategic issues are, again, similar to issues identified by most other engineering firms undertaking strategic planning efforts issues (Veshosky 1994; Warszawski 1996), but with an emphasis on marketing services (since again, the Bureau is capable of designing all elements of practically all types of projects and it has an inherent base of potential customers).

Creation of Subcommittees

In early 1997, the SPTF group began meeting on a regular basis (either weekly or biweekly) and created nine subcommittees to analyze each of the new strategic issues. The committees created were:

- Marketing Our Services to Key Customers
- Identify Services of Cost Effective Benefit to the Public
- Right Staff and Right Skill to Meet Commitments
- Develop Processes to Ensure Commitment to Project and Service Delivery
- Balance Quality with Cost Effectiveness and Timeliness
- Customer Satisfaction
- Increase Financial Management/Responsibilities/Skills
- Create a Culture of Personal Responsibility
- Create a Culture which Fosters Proactive, not Reactive Response

Subcommittee composition was similar to the composition of the core SPTF group, with each subcommittee consisting of between 10 and 20 members from a variety of civil service levels (junior staff to senior staff to executive level staff) and classifications (i.e., civil engineers, drafting technicians, clerk-typists, etc.). Volunteers for subcommittee assignment were solicited through publicizing the effort in the Bureau newsletter and through recruitment by subcommittee chairpersons. This step corresponds to the common model planning effort step 3: gather member input (Davis 1987; McCabe and Narayanan 1991; Mintzerber 1994; Lemmon and Early 1996).

Each subcommittee met regularly (usually weekly) over the next nine months. The subcommittees then presented progress reports to the STPF, which in turn gave guidance to the subcommittees with respect to responsibilities and coordinated work efforts. Over the course of the next 12 months, five of the nine subcommittees completed reviews to their assigned issues and presented final reports with recommendations. Each report consisted of a narrative and between six and 70 specific strategic planning recommendations related to the issue under study by the subcommittee. Sample recommendations from each of the five completed reports are shown in Table 3. Note that some recommendations are not as strategic as others (more tactical or system opti-

TABLE 3. Strategic Issues

Strategic planning subcommittee (1)	Typical recommendations (2)
Marketing our services	Prepare sales brochures for our marketable services
	Ensure that Bureau is placed on consultant lists of other agencies for RFP and RFQ distribution
	Provide public relations classes for supervisors; provide training for Bureau employees on successful marketing
Develop processes to ensure commitment to project and service delivery	Ensure adherence to scoping limitations
	Verify acceptability of budgets generated by Bureau's budget templates
	Utilize Bureau's in-house construction experts to train our engineers
Identify projects/services with maximum return on investment	Determine services in which Bureau of Engineering has expertise
	Revise Bureau telephone directory into services directory
	Determine what our competitors charge for their work and be willing to beat price, due date, and/or desired level of quality for that work
Balance quality with cost effectiveness and timeliness	Explore different methods of contruction project delivery other than traditional design-bid-build
	Utilize Deputy City Engineer staff meetings to address project status exception report items
	Ensure that uniform guidelines for reporting progress are established in all CIP programs
Customer satisfaction	Designate appropriate members of Bureau as liaisons to City Council member offices and to other key City Department Heads
	Implement use of customer satisfaction surveys at public counters
	Implement Memorandum of Understanding (MOU) system to be used for work done by Bureau for other agencies

mization related). The reason for this may be the nature of the issue under review—some issues are inherently more strategic—as well as the personality of the subcommittee chairperson—some people are more inclined to strategic thinking, while others tend toward tactical thinking.

Unfortunately, four groups never completed their reports. These groups did conduct meetings and did present analysis results to the SPTF, but no final reports were ever issued from these groups. Reasons for the lack of a final report include transfer or retirement of subcommittee members from the Bureau, loss of momentum for the team because of the extended duration of the task, and inability to collect data from uncooperative division heads.

Implementation of Ideas/Recommendations

To better understand the large number of recommendations from the SPTF subcommittees, the SPTF created focus groups consisting of the subcommittee chairs and selected SPTF members to categorize the 120 raw subcommittee recommendations into eight strategic Bureau themes—corresponding to the common model planning effort step 4: synthesize the developed ideas (Davis 1987; McCabe and Narayanan 1991; Mintzberg 1994; Lemmon and Early 1996). The 12 themes used to group the recommendations are:

- Category A = Work Program/Capital Improvement Plan Issues
- Category B = Unprogrammed Work/Prioritization
- Category C = Memorandums of Understanding (MOUs)
- Category D = Planning Issues
- Category E = Matrix Operations
- Category F = Time Charging Issues
- Category G = Employee Performance
- Category H = Training
- Category I = Customer Service/Satisfaction
- Category J = Quality Assurance and Quality Control
- Category K = Policy and Process Engineering
- Category L = Marketing

The synthesis from the focus groups also included combining similar subcommittee recommendations into a single recommendation, thereby creating a ''final'' list of 45 recommendations to be passed on to the implementation group.

Implementation began in late 1997 and has proven to be the most difficult part of the process. A new group called MOST (Managing Our Strategic Transformation) was created to oversee and emphasize the implementation effort. MOST consisted of the Deputy City Engineers, eight division heads and assistant division heads, and two management consultant facilitators. The group was selected from senior Bureau staff, since these people would have the experience to formulate implementation policies for the strategic ideas, plus, more importantly, these people would have the required civil service authority to effect any required organizational or policy changes. The group met twice monthly over a year and a half year period with the group's primary function being implementation of approved recommendations from the SPTF. The MOST organizational effort corresponds to the common model planning effort step 5: develop an implementation plan (Davis 1987; McCabe and Narayanan 1991; Mintzberg 1994; Lemmon and Early 1996).

Each MOST member was assigned between three and twenty-five of 45 recommendations with assignments based upon their individual expertise and divisional responsibility. The MOST implementation assignees were then responsible to work with the SPTF and original SPTF subcommittee chairs to develop implementation plans, timetables, and monitoring methods. This strategic planning step corresponds to the common model planning effort step 6: execute the plan (Davis 1987; McCabe and Narayanan 1991; Mintzberg 1994; Lemmon

and Early 1996). The MOST group tracked their members' implementation progress across five milestones shown below:

- Milestone 1 = Initial plan complete
- Milestone 2 = Draft report complete
- Milestone 3 = Draft review complete
- Milestone 4 = Final report complete (with implementation plan)
- Milestone 5 = Implementation review, assessment, and adjustments

Overall performance for all 45 recommendations is tracked on a two-page document. An excerpt from this document is shown in Fig. 2.

Assessment of improvements from any strategic planning effort is difficult (Venegas and Alarcon 1997) with tangible benefits of the process particularly difficult to measure for a not-for-profit public organization. The Bureau of Engineering has used three techniques to evaluate improvements—corresponding to the common model planning effort step 7: evaluate the success of the plan ideas (Davis 1987; McCabe and Narayanan 1991; Mintzberg 1994; Lemmon and Early 1996). These three techniques are:

- Focus group interviews with cross sections of Bureau staff
- Individual interviews with primary customer representatives
- CIP program and project performance (with respect to production, budget, and schedule)

For the Bureau, implementation progress has been slow, but focus group interviews with Bureau staff have shown an increase in employee morale and a greater sense of opportunity and career within the Bureau. Individual interviews with primary customer representatives have indicated increased communication and responsiveness by the Bureau personnel. CIP program and project performance (with respect to production, budget, and schedule) has markedly improved, with fewer staff delivering more projects in similar time periods as compared with prior years, and a dramatic increase (from 30 to 50%) in meeting the annual CIP goals for the Street, Stormwater, and Municipal Facilities programs.

LESSONS LEARNED

In addition to providing guidance for the future of the Bureau of Engineering, the strategic planning process also provides lessons learned that can be used in future strategic planning efforts within the Bureau or within other engineering organizations. The lessons learned are summarized below:

- The concept of strategic planning works. Overall Bureau health and performance has improved. Fewer staff are needed to deliver the same number of projects, CIP program project delivery has improved, customer satisfaction with respect to project performance and communication has increased, and employee morale is up.
- The communication requirement was underestimated. Keeping a staff of 1,000 informed about routine events is difficult. Keeping a staff of 1,000 informed about conceptual issues related to strategic planning is even more difficult. Any large effort should have a dedicated staff to publicize, document the process, and hold ''brown-bag'' sessions at the division level to keep staff informed and participating.
- Implementation takes time. Engineers in the Bureau are used to seeing tangible progress for efforts expended. Strategic planning is a long-term pro-

MOST/STRATEGIC PLANNING ASSIGNMENTS
Partial Status Summary

No.	Category *	Strategic Planning Subcommittee Recommendation	Assignee	Completed Milestones **					Comments
				1	2	3	4	5	
6.	B	Establish a prioritization criterion or method to be used for the selection of the Bureau's capital projects.	Houck	4/6/98	12/6/98				
7.	C	Formulate the creations of the necessary MOU's with other departments involved with the project delivery.	Holland	4/16/99	4/16/99				
12.	E	Implement one project management control system	Houck	4/16/99	5/10/99	5/10/99	5/10/99		
18.	E	Develop Matrix Team Member guidelines and procedures; Developing a detailed scope of work for each project	Houck	4/16/99	4/16/99				
19.	E	Improve internal program/division polices and procedures.	Houck	4/16/99					
23.	H	Take a lead role in achieving cost control by institutionalizing continuous improvement/critical thinking programs.	Haraga	4/16/99					
28	J	Develop a measurement of design quality which can be applied during all project phases.	Robins						
44.	L	Advise the City Engineer to assign appropriate employees in the Bureau to act as liaison to Council Offices and key departments.	Houck	4/16/99					
45.	L	Instruct the Marketing Group to concentrate on the "specific" services for their initial marketing effort for the Bureau.	Houck	4/16/99					

- Category Legend

Category A = WPRR/CIP Issues
Category B = Unprogrammed Work / Prioritization
Category C = MOU's
Category D = Planning Issues
Category E = Matrix Operations
Category F = Time Charging Issues
Category G = Employee Performance
Category H = Training
Category I = Customer Service/Satisfaction
Category J = QA/QC Ideas & Comments
Category K = Policy & Process Engineering
Category L = Marketing

** Milestone Legend

1 = Initial Plan Complete
2 = Draft report complete
3 = Draft review complete
4 = Final report complete (with implementation plan)
5 = Implementation review and adjustments

FIG. 2. Implementation Milestone Tracking Form (Select View)

cess with the implementation of ideas taking years. Progress occurs slowly and as such is not recognized as easily as other engineering efforts (i.e., profiling a sewer line).
- Participation should be rewarded. After the initial appeal of trying something new, years of work lie ahead for managers undertaking a strategic planning process. In order for the process not to become another ''flavor of the month'' fad, participation must be encouraged and given just as much priority as completion of everyday ''priority'' items. A separate implementation group seems to be an effective means to give emphasis to the implementation side of the strategic planning effort, as well as to further publicize the effort and garner greater support.

The Bureau of Engineering's strategic planning process uncovered some areas where additional research is needed. Further development of new and additional tools to measure success is needed. These new tools must evaluate both subjective and objective organizational health measures. A second research need is greater education for engineers in the area of strategic planning. Specifically, if engineers are not aware of strategic planning concepts, then organizations will not have the opportunity to benefit from advanced management concepts.

CONCLUSION

Engineering and construction organizations are taking steps to increase their focus on strategic planning issues. Undertaking the moves required to achieve this progress may be painful for some organizations, but this discomfort should be tempered by the thought that the organization is setting in place a roadmap for the future. In contrast to organizations that ride the waves of the marketplace, the organization that institutes a strategic planning perspective will be setting its own direction and path through the changing waters of the market. It is through this independence, aggressiveness, leadership, and vision that organizations will move to the forefront of the construction industry and ensure themselves an opportunity to respond to the constant changes in the global marketplace. This paper has described the basic purpose, methods, and expected results of strategic planning efforts in engineering and construction organizations and provided a case study illustration of the process for the City of Los Angeles, Bureau of Engineering. Based upon the case study, several recommendations for future planning efforts were provided that may lead to other organizations achieving benefits similar to those identified for the city of Los Angeles.

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