A Framework for Theory Applicable to the Education of Landscape Architects (and Other Environmental Design Professionals)

Carl Steinitz

Carl Steinitz is an Alexander and Victoria Wiley Professor of Landscape Architecture and Planning at the Graduate School of Design, Harvard University.

Abstract: This paper presents a six-level framework that organizes *questions* associated with a landscape design problem. Each has an associated modeling type. The framework can be used to integrate applicable knowledge and also to identify areas where contributions of theory are needed. It is proposed that an appropriate project method can result (in large part) from the articulation of the six levels of models in reverse order from, and prior to, the actual carrying out of a project. It can be further argued that both effectiveness and efficiency are dependent upon the progression of the project through all six levels. Finally, if the linking of question and model is useful, the framework can be the basis of a strategy of professional education.

Foreword[1]

Our role as educators is to offer our students the opportunity for three kinds of learning: (1) the building of competence in changing or conserving the landscape, (2) the building of experience and confidence in doing so, and (3) the building of the theoretical constructs that underlie the above two. The development of the third leg of our self-justification—theory—is by far the most important and represents in all fields the most fundamental and traditional role of the university. I agree with the speaker at the 1987 CELA workshop who said that "theory is what we teach them when they walk in the door." (I wish I believed that this were true.) One reasonable test of our academic departments would be to determine what theoretical constructs our students have when they leave the university and enter the world of practice.

I believe strongly that our definition of theory must be broadly encompassing. Theory must inform how we think, what we know about what we do, and what we teach. I find it uncomfortable to observe our over-reliance on personal definitions of theory. However creatively, experimentally, and comparatively derived, theory must be tested against a broader interpersonal experience.[2]

Landscape architecture necessarily involves several areas of theory, all of which influence design.[3] These include ecological theory, aesthetic theory, historical theory, perceptual theory, ideological theory, design process theory, the theory that underlies construction and plant selection, and the legal theory that underlies professional practice. Too often these are idiosyncratically defined and presented (if at all), and they are rarely integrated into our educational methods and curricula. More often they are competing for attention and allegiance, either as broad areas (for example, ecological versus aesthetic) or within broad areas (minimalist versus postmodern, "Eastern" versus "Western").

Since I believe that we should foster an integrative approach (not a uniform one for all students, but one in which any student can integrate the vast majority of academic work in building competence, confidence, and theory), I propose that we cease our often narrow definitions of theory and examine ourselves more broadly in terms of the questions we ask, what we know about what we do, and what we teach.

A Framework for Theory

The following notes outline a framework for organizing some of the *questions* associated with altering the landscape. It can be used to organize applicable knowledge—models—directed toward landscape change and to identify areas where contributions of theory are needed.

The framework has been incubating for several years, while being tested and adapted in my research, teaching, and projects. It has been influenced by the literature on environmental modeling, creativity, and professional practice, and by conversations and correspondence with Kevin Lynch, Peter Rogers, Garrett Eckbo, Richard Toth, Anne Spirn, and Angus Hills, with their diverse but valued perspectives. In part, the search for an overarching framework evolves from my belief that, despite individual differences and some collective-professional differences in emphasis, there is an overwhelming and necessary structural similarity among the *questions* asked by and of landscape architects and other environmental design professionals, and thus in their needs for theory.

Six types of questions can be identified. Each can be considered a *level of inquiry* relating to a *theory-driven modeling type.* In order to play its neces-

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Six types of questions can be identified. Each can be considered a *level of inquiry* relating to a *theory-driven modeling type.* In order to play its neces-

sary role in a design process, each modeling type—whether explicit or implicit, formal or informal, precise or vague—must be based in usable and valid (or presumed to be valid) theory. All levels of inquiry are cast in the context of history and past personal experience, and all lead into the increasing uncertainty associated with future time.

The six levels of inquiry and their associated modeling types are listed below in the order in which they are usually applied:

I. How should the state of the landscape be described in terms of content, boundaries, space, and time? This level of inquiry leads to *representation models*.

II. How does the landscape work? What are the functional and structural relationships among its elements? This level of inquiry leads to *process models*.

III. How does one judge whether the current state of the landscape is working well? The metrics of judgment—whether beauty, habitat diversity, cost, nutrient flow, public health, user satisfaction—lead to *evaluation models*.

IV. By what actions might the current representation of the landscape be altered (whether conserving or changing the landscape): what, where, and when? This level of inquiry leads to *change models*. At least two important types of change should be considered: how the landscape might be changed by current trends, leading to *projection models*; and how it might be changed by implementable design action, leading to *intervention models*.

V. What predictable differences might the changes cause? This level of inquiry shapes *impact models*, in which the process models are used to *simulate* change.

VI. How is a decision to change (or conserve) the landscape to be made? How is a comparative evaluation to be made among alternative courses of action? This level of inquiry leads to *decision models*.

(*Implementation* could be considered another level, but this framework considers it as a feedback to level I, the creation of changed state-representation models.)

The needs for theory are seen in the kinds of questions that illustrate the levels of inquiry. It may be instructive to present these examples in "reverse" order since, in my view, it is a more appropriate way of introducing theory in general, as well as a more effective way of linking theory with method in any project circumstance.

VI. *Decision:*
- How will we know if we have a good design?
- How will we know if we have the best design?
- Whose decision is this? The designer's? The client's? The general public's? Unknown future generations'? The landscape's? The trees' and animals'?
- By which combined values will judgments be made? Beauty? Ecology? Profit? Health? Cost? Energy efficiency? Social equity, etc.?
- Will it be long term? Short term?
- How does the student see it? To fit into the mold of tradition? "To thine ownself be true . . ."? Peer respect? Faculty respect?

V. *Impact:*
- How is change to be measured?
- By whom is it to be measured? By the designer? By experts? By formal models?
- Do design juries adequately "test" the impacts of change?

IV. *Change:*
- Can we teach inspiration? Can we teach "creativity"?[4]
- What would happen without design intervention?
- How can the study of historic or comparative precedent provide models for change?
- How do we teach selection and adaptation?
- How does the designer choose between caricature and compromise?
- Can drawings adequately represent change? And in a changing context?

III. *Evaluation* (given the needs of decision models):
- How do we assign value distinctions to the landscape?
- What do they mean?
- What is the basis for saying "That is a beautiful landscape (or design)"? . . . or an ecologically healthy one, etc.?

II. *Process* (given the needs of impact models):
- How well do we understand how the landscape works (whether a regional watershed or an urban street corner)?
- How well do we understand how it is perceived and used?
- How will we describe these relationships? By rules of thumb? By systems analysis models?
- How much complexity or precision is worth how much effort? Is "dry land" enough? Or do we need hydrology and soils science?
- Do we presume our process knowledge to be stable over time and space? Over cultural geography?
- How does the landscape interact with other landscape-shaping forces: Economics? Sociology? Technology? Law? Architecture?

I. *Representation* (given the needs of change models):
- What is the language of representation?
- How do qualities get represented?
- What are effective media of representation?
- What elements and attributes constitute a landscape?
  form? color? texture?
  tree? fountain? mountain?
  point? line? area?
  space? movement?
  matrix? corridor? patch?
  district? edge? node?
  mystery? coherence?
  images? music? words?
  static space? time? motion?
  private imagery?
  public meaning?
  What *is* landscape?

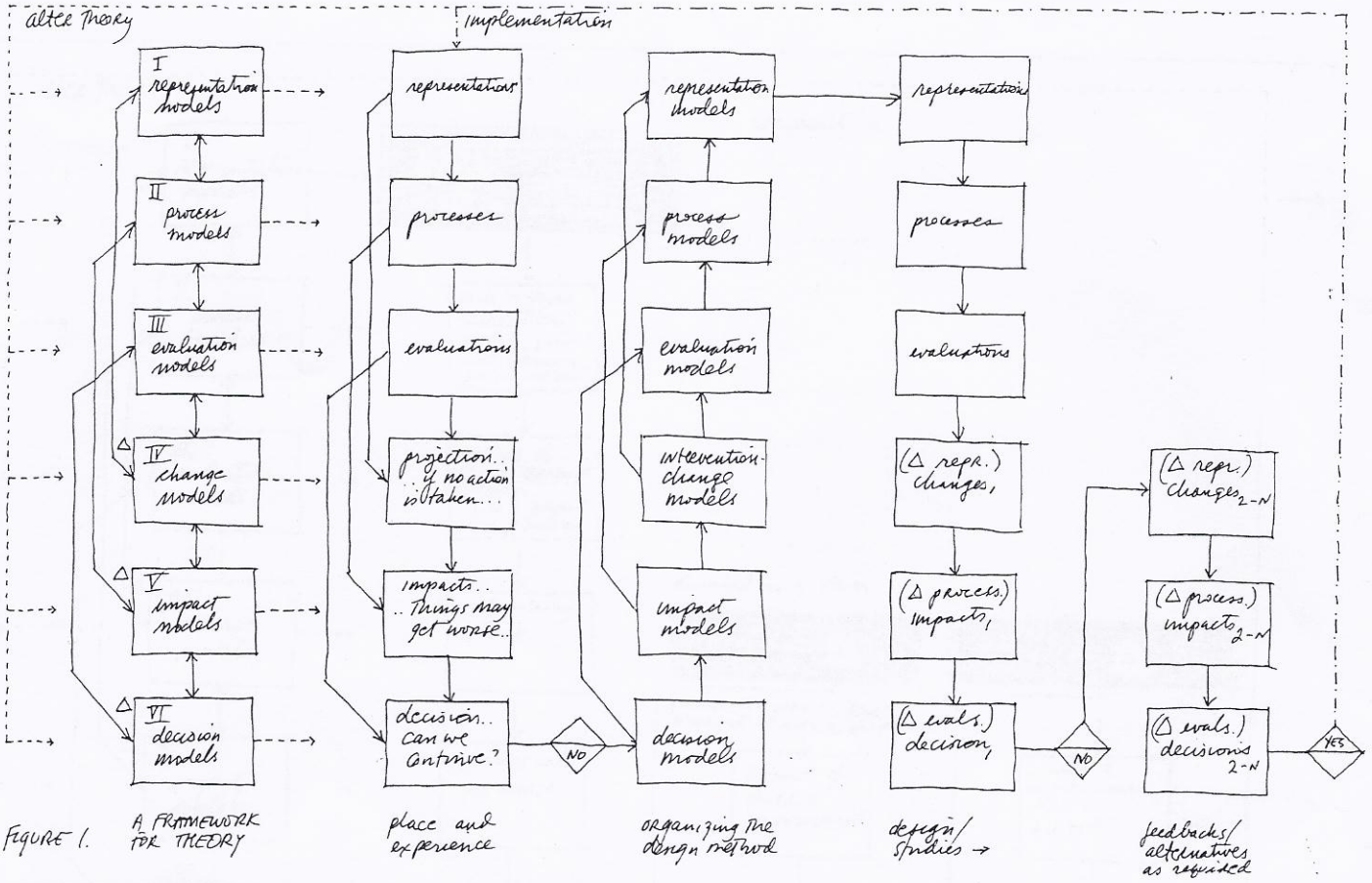

Figure 1. A Framework for Theory: General Structure.

Relationships among the six levels of inquiry are shown in Figure 1. It would be advantageous to organize a landscape (or other) design study *in reverse order* through the levels of inquiry. To decide to make a change (or not), one needs to know how to evaluate alternatives (VI). To be able to evaluate alternatives, one needs to know their comparative impacts from having simulated changes (V). To be able to simulate change, one needs to know what changes to simulate (IV). To be able to consider changes to test (if any), one needs to evaluate how well the current situation is performing (III). To be able to evaluate the situation, one needs to understand how it works (II). And in order to understand how it works, one needs representational schemata to describe its current state (I).

To be effective[5] and efficient, a landscape (or other) design study should progress *forward* at least once through each level of inquiry and modeling type: (I) representation, (II) process, (III) evaluation, (IV) change, (V) impact, (VI) decision. At the extreme, two decisions present themselves: no and yes. A no implies a backward *feedback* loop and the need to alter a prior level. All six levels can be the locus of feedback. The first three—representation, process, and evaluation models—are rarely altered, presumably because a profession knows its substance. Of the latter options, (IV) "redesign" is a frequently applied strategy; (V) "mitigation" (via *ex post facto* redesign) and (VI) "education of decision-makers" are commonly less effective. A design study would normally use as many feedbacks as needed to achieve a "yes" decision. A "yes" decision implies *implementation* and, one assumes, a forward-in-time change in the (I) state-representation models.[6]

Illustrations of the Framework

To illustrate the framework for theory, three diverse applications are concisely presented:

1. A study of the Loop Road in Acadia National Park
2. The history of Central Park, New York City
3. The design of a garden for the Spanish chess champion (an invention)

The diagrammatic exposition of the theoretical structure within which each of these examples fits is intended to illustrate that the framework for theory can be broadly applied in the intellectual and professional territory of landscape architecture. Indeed, the

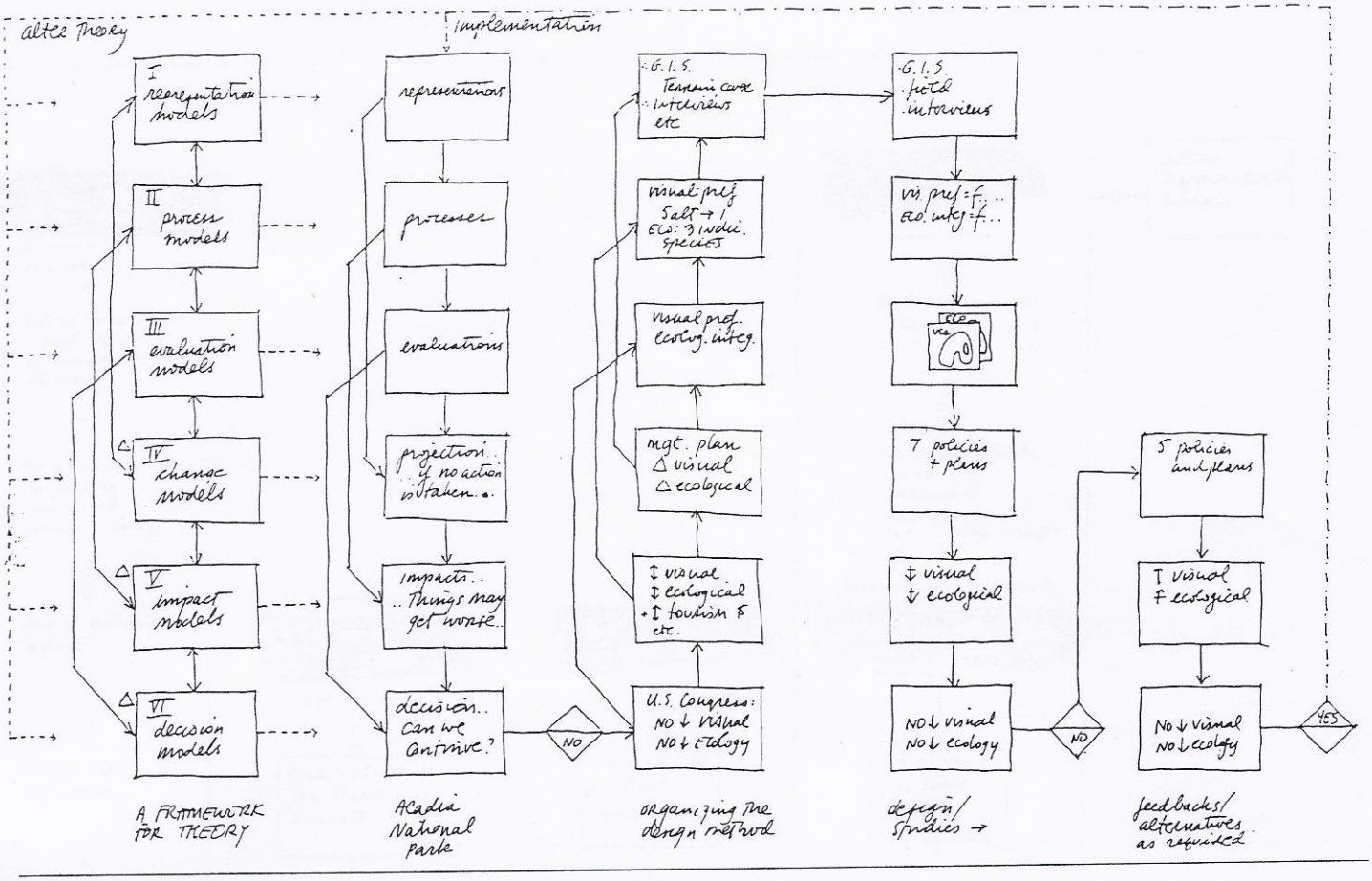

Figure 2. A Landscape Plan for the Loop Road, Acadia National Park, Maine.

framework not only can be helpful in explaining and presenting these diverse examples, but, as has been postulated, it can be the basis for the organization of the design-related studies that generated these kinds of projects in the first place.

The Loop Road. The framework as applied to a study of the Loop Road in Acadia National Park[7] is presented in Figure 2. The cornerstone of the new management plan being developed by the National Park Service for Acadia National Park, toward which this study was directed, is the mandate from the United States Congress that Acadia National Park be established "to conserve the scenery and the natural and historic objects and the wildlife therein, and to provide for the enjoyment of the same in such a manner and by such means as will leave them unimpaired for the enjoyment of future generations" (VI). Thus any landscape change must consider the effects on both the visual preference of visitors and residents and on the ecological integrity of the island (V). Both of these, however, can be altered through the management plan, as can aspects of tourism on Mt. Desert Island, Maine (VI).

The study compared six alternative models in explaining visual preference. It considered three indicator species models in its definition of ecological integrity (III, II). Thus the representations of the park were based upon the needs of these models and had to include interviews, field studies, and a detailed geographical information system whose principal elements were terrain and land cover (I). When the study was carried out, the data bases were organized (I), the models were implemented (II), and they were organized to allow evaluation of the current conditions in the park (III) as well as predict impacts of proposed changes.

Twelve experiments were conducted along the Loop Road, the route used by most visitors to experience the landscape. Each of these experiments was simulated by using videographic editing techniques and was incorporated into the interview process (thus calibrating the visual-preference models and enabling the positive or negative impacts of the experiments to be judged). Seven policies and plans (IV) that could result in detrimental change to either or both the visual and ecologic character of the park were simulated (V) and rejected (VI). Five proposals

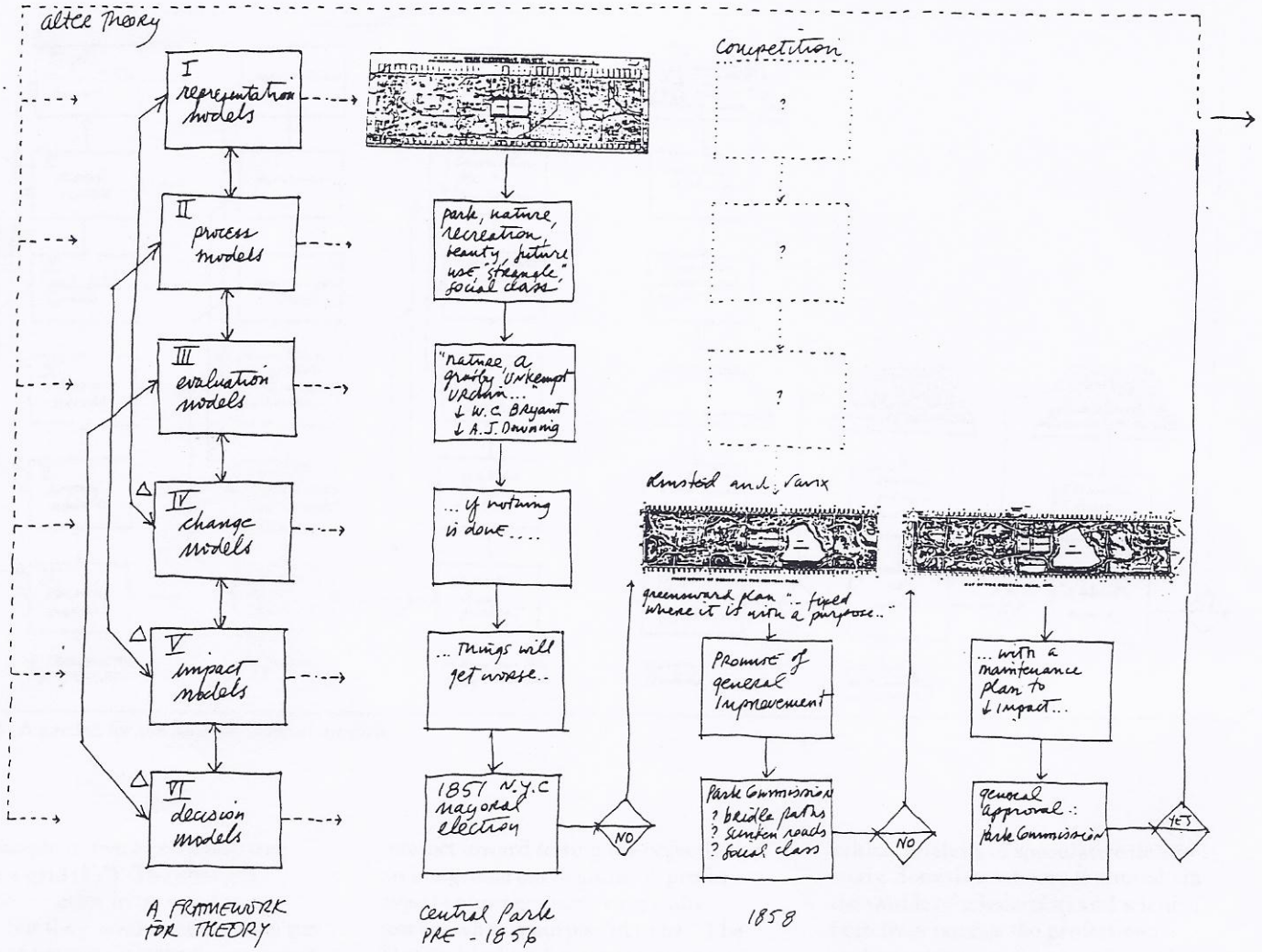

Figure 3. A History of Central Park, New York City.

directed at improving the park's visual and ecological conditions were simulated and tested for their impacts (IV, V). These positive changes became the central elements of the landscape management plan for the Loop Road, which the National Park Service is currently implementing (VI).

Central Park. The framework as applied to the history of Central Park, New York City, with notes from a single reference source,[8] is presented in Figure 3. The framework is applied even though Central Park has been changed by many designers and decision makers over its lifetime.[9] A brief history of the Park illustrates that theory can also change when seen over a long period of time. Before 1856, the site of Central Park was "nature, a grubby unkempt urchin" (I). Within the context of recreational open space in New York City (II), it was negatively evaluated by such luminaries as William Cullen Bryant and Andrew Jackson Downing (III).

The Park became an issue in the 1851 mayoral election in New York, and as a result a competition was announced (VI). The Greensward Plan by Olmsted and Vaux (I to IV) was the winner among 33 entries. It promised improvements in all aspects of the Park (V), but it was initially rejected by Park commissioners (VI). Several design aspects had to be reconsidered (IV). These were changed, and the re-evaluated (V) and approved (VI) plan was implemented by 1868 (I). It has been frequently cited as an important example in landscape design history, notably as a model of change and as a model of the positive impact of open space use in a metropolitan area.

By 1900, however, the ways in which the Park was used (II) and evaluated had changed (III), and many aspects of the Park were evaluated negatively. Between 1900 and 1972, more than 33 major projects were proposed (IV), including a stadium in

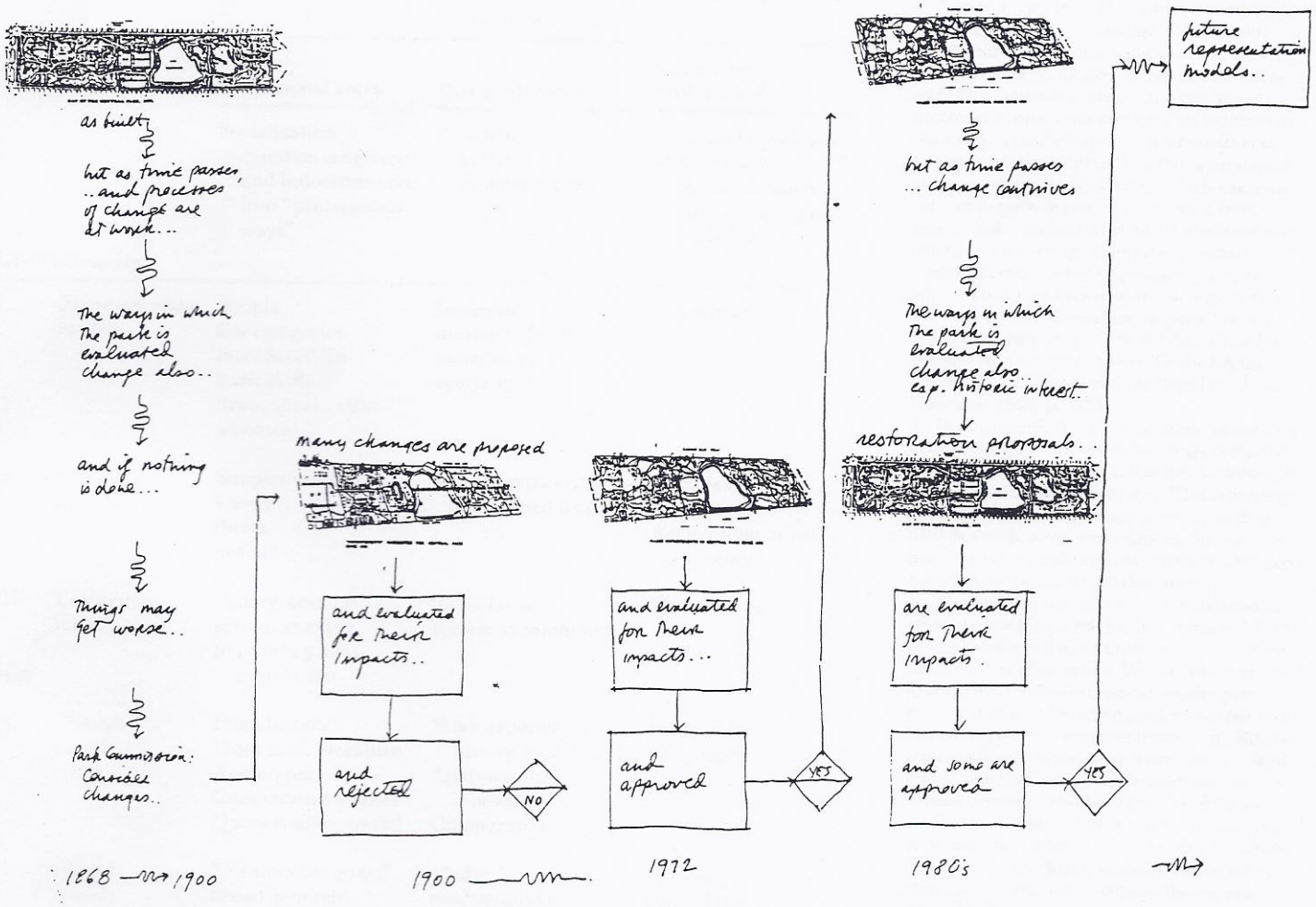

Figure 3. Continued.

1919, an airport in 1919, a radio station in 1923, an armory in 1940, restaurants in 1960, and a large housing project in 1964. Each of these was evaluated for its impacts (V) and rejected (VI). However, during the same period, 55 "improvements" were proposed (IV), evaluated for their impacts (V), accepted by the Park commissioners (VI), and subsequently implemented (I). These include the zoo, a skating rink, and many athletic facilities.

In the 1980s, as time continued to pass and as the landscape was showing its age (II), the ways in which the Park was evaluated again began to change (III), particularly in respect to an increased historical awareness. During the 1980s, several historical restoration plans (IV) were proposed and approved (V, VI), and these are slowly being implemented, thus in some ways bringing the Park design full cycle (I).

A Chess Garden. Given the broad readership of this journal, let us also consider the invented example in Figure 4 from the realm of garden design. The retired Spanish chess champion has an old existing garden (I), which has become unkempt (II). Thus he considers it inappropriate to his status and increasingly ugly (III), and the prospect of its continued decline (IV, V) causes him to decide that it should be changed. He wants a "chess garden" of high symbolic value and increased ecological diversity, and he is willing to pay a higher cost (VI). He tells this to his landscape architect, a cousin from Madrid (VI–I). In carrying out the design study, the landscape architect inventories the current garden for its site conditions (I). It is agreed that the current garden has no symbolic value, that it is ecologically inappropriate, and is difficult to maintain (II, III).

The first change is to level the site (IV). This affects everything in the garden, but the sun, soil, and water conditions remain (V). The garden must be remade (VI). By design, it is proposed that the garden be changed

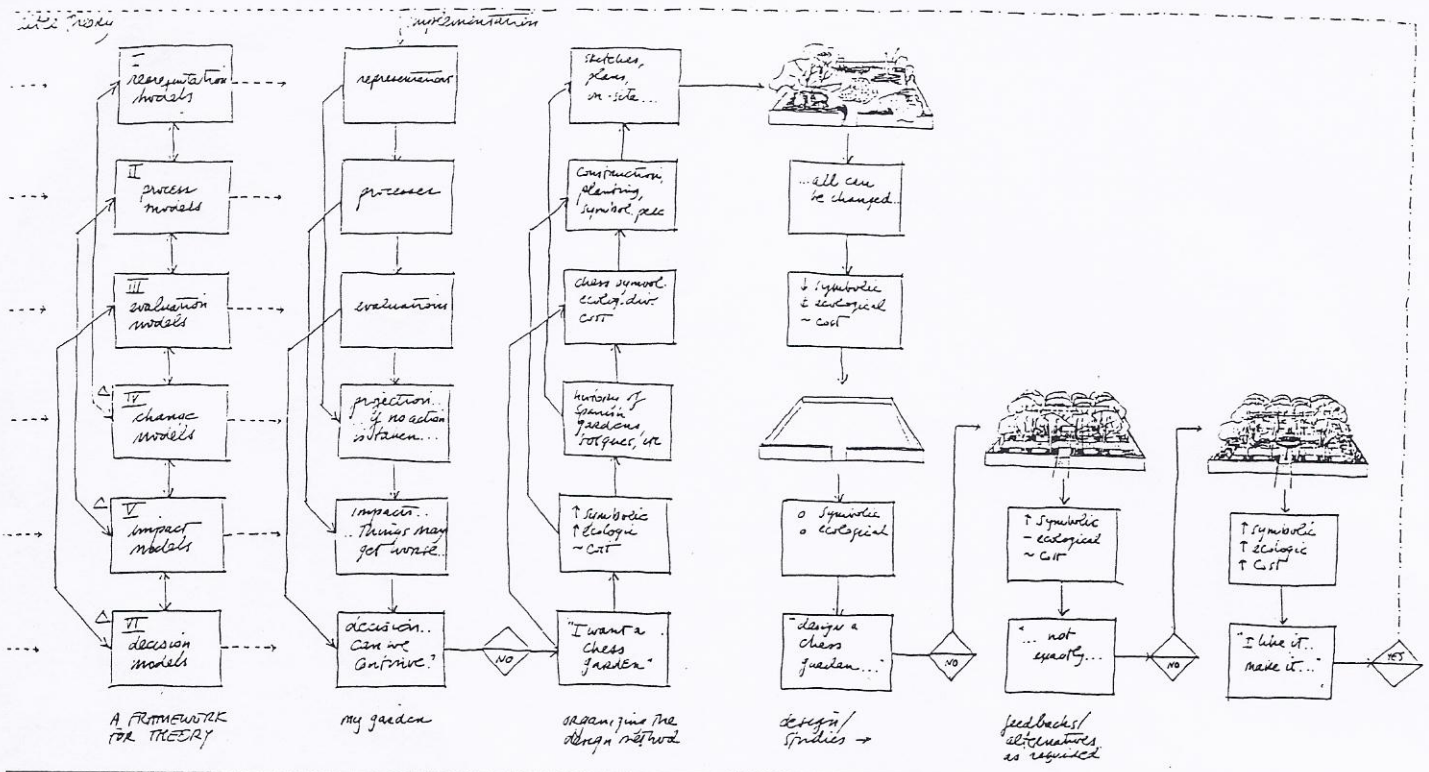

Figure 4. A garden for the Spanish chess champion.

into a bosque of two alternating tree types in a grid (IV). The changes would be superior in terms of symbolism, but they would not improve the ecology of the site (V): the design is not adequate (VI). The design is then redone, diversifying planting and adding a fountain in the center (VI). This, in turn, increases the symbolism (to the client). It increases the cost, but it also substantially increases the ecological diversity of this small space (V). The client can afford it, he likes it, and he decides to implement the design (VI), thus changing the existing garden (I).

The Framework as Related to Education

From an academic perspective, the framework described in Figure 1 can be addressed in different ways and related to different levels of professional education. Table 1 illustrates how the levels of inquiry and the needed levels of professional education interact toward setting the objectives of an integrable curriculum. A professional entry perspective typically teaches what is purported to be "The Design Method," a conservative path from level I through level VI (albeit frequently called "data-analysis-synthesis-evaluation"). A post-professional approach is more likely to be speculative, recognizing diversity of method and the need to fit the approach to the problem, a thinking-path from VI through I, followed by action from I through VI.

The world of critical scholarship and creative practice may take an iconoclastic attitude towards the state of theory itself. From this viewpoint, any level is an appropriate starting point or focus in the framing of questions and in the search for answers. We must recognize that theory is itself subject to change; models associated with each level of inquiry can be added to, replaced, confused, or clarified over time. Sometimes project implementation results in built work, that alters theory via professional or public interest. Sometimes theory is altered via critical analysis of speculative design study. Sometimes theory is altered via the worlds of scholarship and science, both from outside the professional realm and from within it. All aspects of theory and all levels of inquiry are subject to change via expanded knowledge.

Each of the above perspectives has an appropriate role in an active and vibrant professional realm. Each has a necessary role in professional education and in practice.

Afterword

I have tried to show how the many important aspects of our work can possibly be made to fit together. Even though the reader will note that this paper emphasizes the organization and application—as opposed to the content—of theory, I believe that many readers will be able to identify themselves and their work with aspects of the framework, in how and what they teach, how they conduct research, and how they practice their profession.

TABLE 1.
Framework for Organizing Levels of Education

		Level of education		
		Professional entry	Post-professional	Leadership professional
		Socialization: common language and indoctrination into "professional ways"	Autonomy: mastery independence	Creative experience and research: reconsideration and reshaping of profession
Level of inquiry				
I.	Representation models	Simple few categories introduced list basic skills draw, speak, write technical	In-depth mastery of skills many ways specialized	Innovative
II.	Process models	Simpler rules known direct in field	More complex and articulated models	Complex Articulated Recognition of voids in theory
III.	Evaluation models	Beauty, cost, etc. system as exists to fit into professional roles	Speculative system as might be	Hypothetical
IV.	Change models	From history From prof. literature Archetypes Comparative studies Quick studies, broad	From experience, history, prof. lit. Adaptive and innovative Comparative	Innovative Thorough
V.	Impact models	"Reasonable guess" broad generalizations case studies	"Judge" models/quant. & qual. in-field studies	"Know" compelling argument empirical
VI.	Decision models	Be given a problem statement faculty professionals registration boards	Define problem statement nonprofessionals faculty professionals	Define problem self professionals faculty mentors
		conservative	speculative	theoretical

If the generalizations presented in this paper are valid, then the proposed framework may be useful. I believe that the viability and influence of landscape architecture as an area of professional education and practice will depend in large measure upon how well we move toward a firmer and more integrable theoretical base.

Acknowledgments

I thank Irene Fairley, Richard Toth, Michael Binford, Craig Johnson, Gerald McCue, and TenBroeck Patterson for their comments on draft versions of this paper.

Notes

1. Edited in part from C. Steinitz, "Some Notes on Design Theory," *Proceedings,* CELA, 1987.
2. "**Theory** . . . **1.** originally, a mental viewing; contemplation. **2.** an idea or mental plan of the way to do something; hence, **3.** a systematic statement of principles involved: as, the *theory* of equations in mathematics. **4.** a formulation of apparent relationships or underlying principles of certain observed phenomena which has been verified to some degree: distinguished from *hypothesis.* **5.** that branch of an art of science consisting in a knowledge of its principles and methods rather than in its practice; pure, as opposed to applied science, etc. **6.** popularly, a mere hypothesis, conjecture, or guess: as, my *theory* is that he's lying." *Webster's New World Dictionary of the American Language, College Edition.* Cleveland and New York: The World Publishing Company, 1968, p. 1151.
3. In this regard, there is a confusion in our uses of the word *design.* In one sense, *design* is treated as noun and object; most frequently a physically defined landscape environment. This represents a different context for design theory than *design* used as a verb, as an active process, in our case that of making landscape environments. We need both, but we should not confuse them.
4. This is a very serious pedagogic question in all design teaching, and in other "creative" fields as well. I believe that we cannot teach the essential mysteries of creativity. We can help students to challenge themselves, we can expose precedents and models for action, and within our own limitations we can recognize innovation. But creative innovation is not necessarily "good"—and that recognition sets up the conundrum and the tension between "testable theory" and "speculative theorizing." Models and invention both have important roles in education and both have limits: on the one hand, we cannot know everything, and on the other, to quote the late sage Abbie Hoffman, "isms are wasms."
5. I believe this to be a necessary, but not sufficient, principle to assure effectiveness.
6. Some readers may find this framework excessively linear. Obviously, there can be several paths into a project. Among those that have been observed are "seeking inspiration from the place" (from level I), "seeing the solution immediately" (from level IV), and "selling the client a preconception" (from level VI). I contend that even these, implicitly or explicitly, pass through the framework at least once en route to a completed project. Furthermore, I believe that these are variants on the framework and are best managed by experienced professionals who have gained and internalized responses to the several levels upon which they can reliably and efficiently draw. In other words, I believe that design is most likely to succeed when it is prepared for well.
7. C. Steinitz, "Toward a Sustainable Landscape Design Where Visual Preference and Ecological Integrity are Congruent—and What to Do If They Are Not," *Proceedings* 1988 IFLA World Congress and 1988 ASLA Annual Meeting. Washington, D.C.: ASLA, 1988.
8. H. H. Reed and S. Duckworth, *Central Park, A History and Guide.* New York: Clarson N. Potter, 1967.
9. See C. Steinitz, "The Trouble with 'A Strong Concept, Fully Worked Out.'" *Landscape Architecture,* November, 1979.