
Current State of Methods and Processes of Planning: How Plans Are Made

Executive Summary

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Purpose of this Study and Findings

The purpose of this study was to

Our findings can be summarized as follows:

- There does not exist a universally viable approach to planning. Furthermore, due to the diversity of interests in the planning literature, it is also very difficult to come up with a universally acceptable classification of planning problems. An attempt is made in this study.
 - However, there is a general consensus that planning is a decision making process, and that it is imperative to develop a general theory of planning, which will eventually lead to establishment of science of planning ("planology").
 - From a pragmatic point of view, it may be more conducive to emphasize only at devising generalized planning approaches to semi-structured problems, since no such universally acceptable approaches may be viable for ill-structured problems; and there already exists specific procedures for well-structured problems.
 - To this end, we felt that it will be useful to establish a website, Library of Online Resources on Planning (LORP): <http://www.lorp.net/>. The aim of this collection of annotated links is to ease the access to resources that address issues relevant to the theory and practice of planning. Types of materials included are Web sites, articles, course pages, professional organization and conference sites, lists of related resources, and forums and listservs. Annotations are meant to aid the user in identifying the relative usefulness of a given resource before that site is accessed. For instance, the annotation of a Web site should include a brief description of its purpose and contents as well as links to significant material on the site. The annotation of an article will contain a summary and a listing of major points.
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Library of Online Resources on Planning

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The URL of a suggested link and its annotation can be send to obenli@csulb.edu (Submissions may be edited for length and clarity.)

In a recent article in *The New Yorker*, Adam Gopnik (2004), reviewing recent books on World War I, states: “The Germans were not [...] following a preset plan; they were making it up as they went along, sometimes in a state of panic produced by the absence of a plan.” In war all shortcomings are magnified, and disastrous consequences are almost always apparent to all concerned. Business world has many similarities with warfare (consider, for example, the references to Sun Tzu’s *The Art of War* in the business literature.) It is not difficult to observe this “sense of panic” in unplanned business environments. However, this “making it as they went along” phenomena is observed in many public works, as well as most personal lives.

As the following brief review will document, although there is an overwhelming push for a universal approach to planning from both academics and practitioners, there does not seem to exist a viable, universally applicable, pattern of planning in the open literature. Main reason for this seems be that planning is one of those human capabilities that cannot be formalized. As Wilkins (1988) points out that “reasoning about actions is a necessary element of intelligent behavior. A person can scarcely participate in a conversation or go to a store for groceries without reasoning about how actions taken will affect the surrounding world. In unfamiliar situations, people can invest significant effort in deliberating how to proceed. Decades of research in AI and related disciplines have shown this particular human capability to be extremely difficult to formalize. Reasoning about actions is, however, an essential component of intelligent behavior.” AI’s interest in this issue is to design future intelligent computer systems. A universally applicable procedure for planning is very akin to programming an “intelligent” computer.

After presenting the types of planning that are the main focus of this study, the primary approaches to planning will be presented. Then it will be argued that most possibly there will never be a universal approach to planning and that it may be more practical to emphasize a specific class of planning problems. Paper ends with concluding remarks.

Section

3

Types of Planning

Adapting Archibugi (1996)'s classifications, the main fields of activity in which planning are applied can be summarized as follows:

Physical Planning (including urban and environmental planning): This field of activity arose from the need to plan the physical development of cities. Claire (1973) summarizes the objectives of physical planning as:

- *Provide for anticipated land uses of various types in appropriate locations and arrangements with respect to each other as the demand in the foreseeable future indicates.*
- *Reserve adequate space in appropriate locations for movements of persons and objects in a transportation system and utilities systems to served proposed land uses.*
- *Analyze natural resources and plan their proper utilization.*
- *Protect valuable surface or underground resources from obstruction to access for use or extraction.*
- *Preserve available sources of water and add to them where necessary to supplement supply.*
- *Arrange for adequate open space in natural conditions where appropriate for man and other living creatures.*
- *Establish legal means by which the above objectives are guaranteed.*
- *Provide for additions or revisions of the above objectives as subsequent events require.*

Social Planning: Social planning originated and found its primary applications in local and community levels. It covers a broad range of socio-cultural issues, such as education, health, social integration, and crime. It has the general characteristic of planning from the bottom, as opposed to top-down, centralist approach of many planning activities. Social planning is usually based on

voluntary and participative action. According to Archibugi (1996), social planning has the potential of integrating and unifying technological and political points of view in planning.

(Macro-)Economic Planning: First application of this type of planning was during the First World War, due to the need to manage scarce resources. Later it continued in the form of “imperative” (Soviet-style) planning, and “indicative” planning that started in France and Japan, and then followed in The Netherlands, Norway and some other European countries in order to achieve more rational management of capitalist and market economies. In the United States, National Planning Board of 1934 can also be seen as an experiment in indicative planning. PPBS (Planning, Programming, Budgeting System) used in the Federal Government can also be viewed as an example of indicative planning, though it may be better characterized as operational planning, to be discussed next.

In macro-economic planning a set of quantifiable variables, such as income distribution, employment, productivity, investments are identified. Then based on macroeconomic theories, specific criteria are optimized using mathematical optimization techniques. The work of Jan Tinbergen in The Netherlands and L. V. Kantorovich in the (former) Soviet Union and examples of this type of planning. When applied to development in “developing” countries or regions, it is referred as **development planning**. This term is also used regarding the planning relationship between developed (“North”) and developing (“South”) countries.

Operational Planning: Operational planning consists of planning of single projects and planning of entire operational divisions in public sector as well as managing business enterprises. When applied in large commercial firms it is referred to as corporate planning. Archibugi (1996) refers to it as “application of engineering to social projects and to any form of public administration [as well as to management of enterprises and large firms.] Operational planning has two fundamental aims or objectives: the first is a measure of efficiency, such as minimization of costs or time, or maximization of profits or some other form of payoffs – to which Archibugi refers to as “internal evaluation.” The second measure its impact or its effect on its surroundings (that is, economic system in general, physical environment, on social conditions, etc.) and its compatibility and coordination with other projects: “external evaluation.” (Archibugi, 1996) The former measures the efficiency and the latter the effectiveness of the projects.

When applied in the military context, operational planning is referred to as **military planning**.

The nature of modern warfare demands that armies plan and fight as a team. For various fighting elements to win a battle they must have a single unified planning and execution framework. As the forces are being downsized, efficient planning is an absolute necessity. A typical such system is *Joint Operation Planning and Execution System* (JOPES, 1995). It provides standardization to the joint planning system used for the execution of complex multi-Service exercises, campaigns and operations. JOPES is the Chairman of the Joint Chiefs of Staff's (Chairman's) joint planning system. It covers the planning spectrum from the National Command Authorities (NCA) through the Chairman, to the combatant commanders (the CINCs) and the joint task force commanders. JOPES governs all aspects of conventional joint military operations planning and execution. It is the tool used by all echelons of planners and operators to speak a commonly understood language

Section

4

Nature of Systematic Approaches to Planning

Although one cannot find a universal “template” for planning, there is considerable amount of work on developing a theory of planning, or science of planning (“planology”). For researchers working on planning, there seems to be two strands, or starting points:

- Design (engineering or town/city planning), and
- Decision making (military and managerial).

Richard Muther and Gerald Nadler typify researchers starting with what basically are engineering design problems to arrive at general principles of planning. City (urban) planners (in the United States) and town planners (in Great Britain and in Continental Europe) who are essentially architects designing cities, among them Chadwick, Faludi, Archibugi, starting with urban design issues aim to develop a planning methodology.

Latter strand is probably best typified by Sun Tzu and followed by many anonymous planners in the military; and Russell Ackoff in the area of corporate planning.

Reviewing the literature, one sees that most of the fundamental work by both groups was made in the 1950s and 1960s. This is not surprising since both operations research and cybernetics were living their heyday during those decades and it is quite natural that their integrative characteristics to affect the development of a unifying approach to planning. In the following paragraphs the works of three most relevant researchers are briefly summarized.

Andreas Faludi's major publications (1973a, 1973b, 1978) on planning, systematically summarized all of the issues emerging from the practice of planning, and the lack of integration among many approaches and directions developed during the 1950s and 1960s. Faludi sees planning as promoting human growth by the use of rational procedures of thought and action. According to him planning does this in two ways:

- It identifies the best way of attaining ends, and
- It contributes to learning, hence to future growth.

Since the human growth is a process, planning can be identified as a vehicle for controlling and accelerating that process. Faludi perceives planning as analogous to "science". Planning and science, says Faludi, "... propel this process of man becoming master over his world and himself along a path towards further human growth." The ultimate objective of planning theory, according to Faludi (1973a) is meta-planning:

"This must be based on consciousness of planning agencies, that is on their awareness of their structure and procedures and their effects on planning, thereby taking cognizance of social science findings. Meta-planning may thus be described as the most direct pursuit of human growth. Only where growth is based on consciousness is it truly deliberate. Therefore, the Promethean view of man as guiding his own growth may be interpreted as meaning man planning his own planning, thus underlining the importance of planning theory."

Franco Archibugi of Planning Studies Center, Rome, is a prolific proponent of a new integrated planning discipline or planning science ("planology"). In his numerous works he covers this issue from many viewpoints. He proposed (Archibugi, 1996) the following lines of further refinement and elaboration for an integrative and unified approach for planning (after pointing out the "diffuse, creeping uneasiness [that] has pervaded all the participants of this new discipline" (Archibugi, 2000)):

- a. the elaboration and strengthening of the unitary procedure scheme in the preparation of plans; with the relative indication of the phenomena (variables) to be quantified in the various phases of preparation of a typical integrated plan;*
- b. the strengthening and definition of schemes of the systemic inter-relationship between the various levels of planning and, thus, of the various plans;*

- c. *the design of institutional procedures (and relative institutions) for plan bargaining at all levels; not to mention the design of consultation systems of the opinions and preferences of the participants interested in the plan;*
- d. *the design of suitable information systems (and of their management) that correspond to the preselected variables and to the accounting systems instituted (according to the previous points); and*
- e. *the design of monitoring systems and those of evaluation of the operational capacity of the plans, and of a periodical review and updating of same.*

In his recent book, Archibugi (2002) further discusses these “integrative” procedures emphasizing that planning is essentially based on “action-oriented analysis and doing, rather than on observation-oriented analysis and being.” In other words, planning science (“planology”) is based on normative, or prescriptive, rather than descriptive analysis.

Russell L. Ackoff, as one of the pioneers of Operations Research, he was instrumental in laying down the foundations of Operations Research as an applied science of management. Ackoff (1999) states that “[p]lanning is one of the most complex and difficult intellectual activities in which man can engage. Not to do it well is not a sin, but to settle for doing it less than well is.” Ackoff believes that any planning we do requires at least as much art as it does science. And he is as much interested in improving the art as he is improving the science. He states: *“The principle contribution of scientists to planning may not lie in the development and use of relevant techniques and tools but rather in their systemization and organization of the planning process, and the increased awareness and evaluation of this process that their presence produces.”* According to Ackoff, planning is a very special kind of decision making. Specifically *“... planning is a process that involves making and evaluating each of a set of interrelated decisions before action is required, in a situation in which it is believed that unless action is taken a desired future is not likely to occur, and that, if appropriate action is taken, the likelihood of a favorable outcome can be increased.”*

Ackoff advocates “interactive planning”, as opposed to the two more commonly used types of planning: reactive and preactive.

- Reactive planners “focus on increasing their ability to undo changes that have already occurred.” Preactive planners “focus on increasing their ability to forecast changes that will occur.” While interactive planners “focus on increasing their ability to control or influence change or its effects, and to respond rapidly and effectively to changes they cannot control, thereby decreasing their need to forecast.”
- Reactive planning is primarily concerned with “removal of threats,” while preactive planning is concerned with “exploitation of opportunities.” On the other hand, interactive planning assumes that “threats and opportunities are created by what an organization does as well as what is done to it.”

- Reactive planners try “to do well enough, to ‘satisfice,’ to enable the organization planned for to survive.” Preactive planners try “to do as well as possible, to “optimize,” to enable the organization planned for to grow.” However, interactive planners try “to do better in the future than best that is currently possible, to ‘idealize,’ to enable the organization planned for to develop.”

According to Ackoff the following five phases of interactive planning are:

Formulation of the mess	Determination of what problems and opportunities face the organization planned for, how they interact, and what obstructs or constrains the organization’s doing something about them. The output of this phase takes the form of a reference scenario.
Ends planning	Determination of what is wanted by means of an idealized resign of the system planned for. Goals, objectives, and ideals, are extracted from this design. Comparison of reference scenario and the idealized redesign identifies the gaps to be closed or narrowed by the planning process.
Means planning	Determination of what should be done to close or narrow gaps. This requires selecting or inventing appropriate courses of action, practices, projects, programs, and policies.
Resources Planning	Determination of what types of resources and how much of each will be required by means chosen, when they will be required, and how are they acquired or generated.
Implementation and Control	Determination of who is to do what, when it is to be done, and how to assure that these assignments and schedules are carried out as expected and produce the desired effects on performance.

Dilemmas in Unifying Planning Approaches

Archibugi (2001), in order to limit the terrain of planning theory, proposes a number of “postulates” of which the first one is: *Planning theory is essentially based on action-oriented analysis and doing, rather than on observation-oriented analysis and being.* That is, planning involves “prescriptive” rather than “descriptive” analysis. Essentially, planning is a decision making process. As very concisely put by Newman (1951): *Planning is deciding in advance what is to be done.*

If planning is a decision making process, then it may be useful to look at some issues in the analysis of decision problems. Evans (1991) defines decision as a mapping of the current state of a system to a desired state of the system. The structural complexity (as opposed to the computational complexity) of the decision problems depends on how much we know of the current and proposed states of the systems. Simon (1977) classifies decision problems based on this aspect:

1. Well-structured problems (both current and desired states of systems are thoroughly known),
2. Semi-structured problems (either one or the other, but not both of the of the states of the system is thoroughly known), and
3. Ill-structured problems (in which both states are not thoroughly known).

If one combines this classification of decision problems with Anthony's (1965) hierarchy of management activities: strategic planning, tactical planning, and operational control, it is reasonable to conclude that operational control generally involves well-structured problems, tactical planning issues are semi-structured and the strategic planning is an ill-structured decision problem.

In their seminal paper, Rittel and Webber (1973) argue that “[t]he search for scientific bases for confronting problems of social policy is bound to fail, because of the nature of these problems. They are ‘wicked’ problems, whereas science has developed to deal

with 'tame' problems. Policy problems cannot be definitely described. Moreover, in a pluralistic society there is nothing like the undisputable public good; there is no objective definition of equity; policies that respond to social problems cannot be meaningfully correct or false; and it makes no sense to talk about 'optimal solutions' to social problems unless severe qualifications are imposed first. Even worse, there are no 'solutions' in the sense of definitive and objective answers." Clearly what Rittel and Webber refer to as 'wicked' problems are 'ill-structured' problems; and 'tame' problems are the 'well-structured' problems.

For almost all well-structured planning problems we do have well-established 'procedures'. For example, 'assembly line balancing problem', though computationally intractable, thus an NP-Hard problem in the computational complexity sense, it is a well-structured decision problem in since its 'current' and 'desired' states are well known. Hence, it is possible to design a computational procedure to 'plan' an assembly line, in the sense that is completely defined in the 'assembly line problem', whose output does not require any further analysis or judgment by the decision makers. Other hand, the 'wicked' ill-structured problems may never be amenable to systematic, universally acceptable planning procedures; while semi-structured problems such as tactical planning may permit systematic and universally acceptable approaches. Some highly successful examples in the area of plant layout and facilities planning exist, such as Muther's Systematic Layout Planning, and High-Performance Project Planning (Muther, 2000).

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