Scenarios

PREREQUISITE TOOLS

None.

USAGE

PURPOSE

A scenario forecasts the future state(s) of a *system* based upon assumptions about interactions and external conditions.

USES

Scenarios may be employed to:

1) Identify and clarify major issues for debate among policy makers and interest groups.

2) Formulate a narrative for dynamic behavior of a social system, e.g., for interpreting Oval Diagramming (OVD, page 81).

3) Provide the input for techniques such as Gaming (GAM, page 124).

4) Provide a framework for normative forecasts of desired future conditions.

KEY DEFINITIONS

1) A *system* is a collection of components which interact to achieve a common function.

2) A *state scenario* describes conditions and events (the state of the system and the external context) at a single future point in time.

3) A *transient scenario* forecasts the changes in and the alternative actions on a system at various stages in the evolution of the system.

SHORT DESCRIPTION

A scenario is a narrative forecast of the future states of a system. It is developed from a description of the present conditions and an extrapolated forecast of future conditions. The forecast is based on the external constraints to change, and the likely interactions between system variables in the progression from current conditions to some future state.

A scenario may be either a *state scenario* for a single point in the future or a *transient scenario* tracing the evolution of the system over time.

ADVANTAGES

1) Scenarios help illuminate the interaction of psychological, social, economic, cultural, political, and military dimensions in a form that permits understanding many such interactions at once. They are especially useful for policy decisions.

2) Kahn and Wiener (1967) argue that scenarios call attention to the larger range of possibilities that must be considered in the analysis of the future.

3) Scenarios help stimulate and discipline the imagination.

4) Scenarios generally have an illustrative and pedagogical value for the decision maker.

LIMITATIONS

1) It is a formidable task to take into account and successfully predict the interplay of the various dimensions (e.g., social, political).

2) Scenarios suffer from uniqueness. they represent only the views of those experts who constructed them, and there is no guarantee that the future is accurately predicted.

REQUIRED RESOURCES

LEVEL OF EFFORT

The decision maker and the analyst collaboratively define the subject of the scenario. The analyst identifies, organizes, and interacts with a group of experts to understand the present system and to construct the scenarios.

SKILL LEVEL

The analyst and experts should be able to identify the major dimensions and attributes of the present system in order to identify new developments and understand their character and significance.

TIME REQUIRED

The time required depends on the complexity of the system being studied and the time span of the scenario. The analyst and the experts may spend several days constructing from three to five different scenarios which describe the same general situation.

DESCRIPTION OF TOOL

SUPPLEMENTAL DEFINITIONS

1) The *dimensions* of a system are collections of its attributes, where each collection represents a major aspect of the system, e.g., political, economic, social, or psychological.

2) The *attributes* of a system include the elements or components of the system and the interrelationships among them.

3) A *goal* is a value judgment which satisfies one or more human needs, e.g., "to promote equality in schooling."

4) A *driving force* is an attribute of a system which causes changes in the system state over time.

5) The *base system state* is the set of current conditions which describe the essential characteristics of the scenario. It is denoted by $S(t)$, where t is the present time.

6) An *intermediate image*, $S(t + n)$, describes the state of the system after a time interval n.

7) The *external context* represents the constraints on the base system.

REQUIRED INPUTS

Scenario construction requires prior agreement on the kind of scenario (either trend or state), the subject of the scenario, and the time span to be included.

The subject of the scenario is generally a system or sector of a country or region, e.g., the tourist industry or the energy situation for the country of Temasek or the social structure of a river basin population.

The time span varies according to the importance of the system under consideration. The time span of the scenario, for most situations, should cover at least 15 years to project beyond characteristics of the present situation. Future images become increasingly blurred as the time span is extended, effectively limiting a scenario to 30 years.

The analyst may wish to assemble a group of experts, each familiar with a major dimension of the system, though the scenario may be developed using a Delphi (DLP, page 168).

TOOL OUTPUT

The scenario technique generates a narrative description of the future state(s) of the system. The format is the *base system state* description and one or more *intermediate images*, together with a description of the *external context* and the *driving forces* behind the forecasted changes (see figure 1).

One or more scenarios may be constructed:

1) Several alternative state scenarios for a single point in time, or

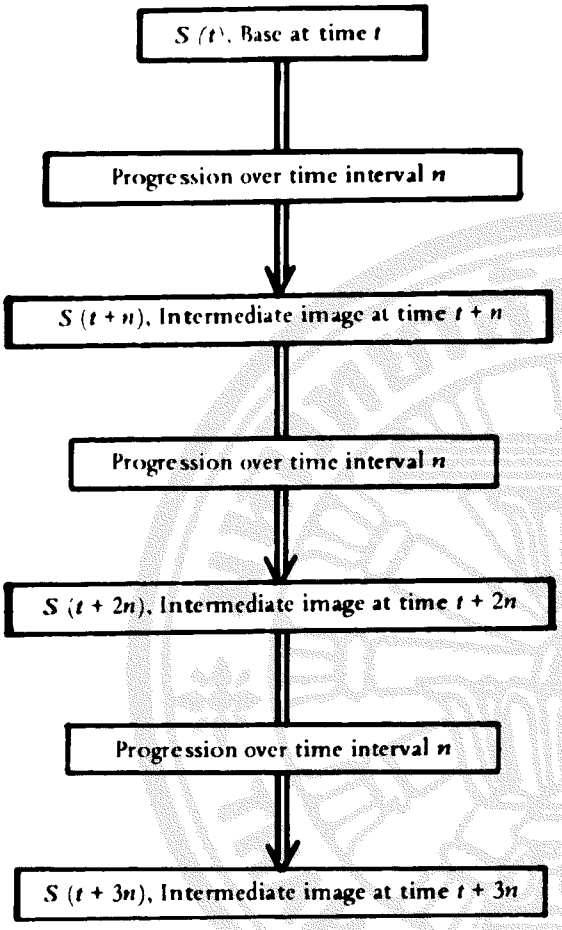
2) One (or perhaps two) transient scenarios which forecast the effects of different policies on the evolution of system conditions.

These scenarios may be compared and contrasted for review by decision makers and interested parties.

IMPORTANT ASSUMPTIONS

A scenario is constructed by extrapolating future conditions from present conditions and foreseeable driving

FIGURE 1
A Standard Format for a Scenario



forces for change. Consequently, a fundamental assumption concerning dynamic system behavior is implied: a system exhibits current conditions which are the result of all the previous current and prior forces on the system. However, social systems are self-organizing and anticipatory, and the current system state may be influenced by anticipated future conditions. Accounting for these factors in scenario construction requires that the analyst be aware of the possible effect of anticipated actions on the future state of the system.

METHOD OF USE

GENERAL PROCEDURE

The following steps describe the development of a transient scenario and are based on the work of Durand (1972) and Gerardin (1973):

1. **Construct the base system state.**
   - 1.1 Identify the major subgroups in the base system.
   - 1.2 Identify the attributes of the subgroups.
   - 1.3 Choose one of the attributes as the driving force for change in the system.

2. **Identify the external context.**
   - 2.1 Formulate hypotheses about the constraints on change in the base system state.
   - 2.2 Consider constraints which may change during the time span of the system.

3. **Develop the progression to the first intermediate image.**
   - 3.1 Identify any trends in the interaction between attributes of the base system for time interval n, where n is typically 5-10 years.
   - 3.2 Identify any changes in the external constraints for time interval n.
   - 3.3 If alternative or competing trends are likely, construct an intermediate image at time $t + n$ for each major trend.

4. **Construct the intermediate image.**
   - 4.1 Using the dimensions and attributes identified in step 1, describe the likely system state or conditions at time $t + n$.
   - 4.2 Take into account the forces for change, the external constraints, and the trends internal to the system.

5. **Repeat steps 3 and 4 until the desired time span has been covered.**
   - 5.1 The last intermediate image becomes the new base system state.
   - 5.2 To progress to the next intermediate image, consider changes for the interval from time $t + n$ to time $t + 2n$, etc.
   - 5.3 End the scenario with the last intermediate image.

If a normative scenario is being developed, the procedure in step 4 is inverted. Instead of predicting the intermediate image, the analyst tries to identify the alternative actions or policies that are necessary to achieve a desired system state. This is typically an iterative process, where first one set of policies, the internal trends of the system and the external context, are used to forecast a likely progression. The discrepancy with the normative system state is then used to indicate alternative policies until the desired and the predicted intermediate image merge.

EXAMPLE

A scenario was developed for the cattle industry in the country of Temasek. The goal was "to improve the quality of life for all Temasekians." Two criteria indicate achievement of this goal: a decrease of nutritional deficiencies among the population, and an increase in foreign exchange.

The *base system state* was described:

> Four subgroups have been identified: the herdsman, the middlemen, the meat-packing industry and the consumers of beef. The herdsmen are generally nomadic and own 90 percent of the cattle in Temasek. Cattle breeding and feeding practices are inefficient. The nomads have a strong emotional attachment to their cattle as they equate the ownership of cattle with prestige.
>
> The herdsmen sell their cattle to middlemen. The cattle reaches consumers after going through several levels of middlemen, thus inflating the price of beef.
>
> The meat-packing industry is small at present but is owned by a big multi-national company. The beef is packed mainly for export. . . .

The attributes of the subgroups were the value system of each subgroup, the economic linkages between the subgroups, and major institutions. The meat-packing industry was selected as the driving force for the scenario because it wanted to increase its growth rate.

The *external context* may be described as:

> There will be maintenance of favorable trading conditions with the developed countries. No adverse weather conditions will occur. . . .

Starting with the base and external context, the progression was formulated to give the following scenario:

> It is the year 1977. The demand for beef in developed countries is seen to increase greatly over the next seven years. To meet this demand a multi-national company invests 20 million dollars in a meat-packing plant geared for both domestic and overseas consumption of beef.
>
> Educational efforts are carried out to make the herdsmen settle and learn better cattle breeding and feeding practices. This will ensure a regular supply of beef for the meat-packing plant. There is considerable resentment by the herdsmen. Since only a few herdsmen react positively to the efforts, the herdsmen are not allowed to graze on land wherever or whenever they wish thus forcing them to settle.
>
> By 1982 the meat-packing plant has been established and most herdsmen have reluctantly settled. The multi-national company pays the herdsmen high prices for their cattle. The middlemen find themselves being forced out of their traditional supply links. The middlemen, who handle many foodstuffs other than beef, organize into a cohesive unit and in 1985 go on strike. There is mass hoarding of food by housewives and prices increase remarkably. The military is asked to provide trucks for the transportation of essential foodstuffs. . . .

Several such scenarios were formulated for review and evaluation by the decision maker.

THEORY

Scenarios are constructed based on a planning philosophy which might be called "futures-creative" (Gerardin, 1973). Scenarios are effective decision aids if the decision maker accepts such a planning philosophy. A future is to be designed which is in line with stated goals. A future will not be accepted if it is simply an extrapolation or extension of past events.

Scenarios have been used widely and are especially useful for policy making. Kahn and Wiener (1967) constructed scenarios for international political systems. Durand (1972) and Gerardin (1973) recorded several applications in France, including regional development planning. Kraemer (1973) cites a study in urban planning. Brown (1968) describes political scenarios done at the Department of Defense.

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