A Team Decision-Making Support Archetype Based on the Inverse Problem

A. N. Raikov
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Abstract—This paper describes one strategic negotiation technology using the intellectual potential of an expert team along with sustainable consensus building when working out a managerial decision based on the convergent cognitive archetype.

Key words: strategic negotiations, team intellectual potential, expert judgment, consensus building, convergent cognitype.

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INTRODUCTION

Under conditions of globalization and acceleration of market dynamics, the directors of public authorities and corporations are forced to look for ways of facilitating group and individual managerial decision-making. This is caused, in particular, by unpredictable fluctuations in the characteristics of the market’s needs for products and services. Future planning is always becoming more intertwined with consumers’ thoughts, feelings, and transcendental mental states. Unforeseeable market developments need ever more new resources to increase company competitiveness.

In these conditions, less and less time is devoted to managerial decision-making in a situation where it is constantly becoming more difficult to foresee the future. Hence, strategy-building is turning into a fad. In the past, outside consultants were invited to work out a strategy or companies kept their own specialists. Now, people more often stick to the rule that a group of people who have a problem can solve it best by their own efforts, one should only correctly regulate this process.

To do this one should use patterns, templates, and archetypes developed by science and perfected in practice. The author has verified this by conducting many strategic negotiations on various problems in government agencies and corporations using his convergent cognitive archetype (convergent cognitype).

TEAM POTENTIAL

When money, ideas, or material resources are lacking, then creating a team gives one a unique advantage over other people and organizations. Setting up a team is connected with people’s specific features. Note that team building starts from trust, which cannot be formalized. It ensures, first of all, people’s protection from external threats and general security. Team building should take into account the expected results, conflicts, obligations, and liabilities taken up by the participants. Balanced representation of all these elements in the team demonstrates a leader’s or leading group’s ability to set up and maintain a team’s activities, and manage motivation. Most team attributes elude logical description, metric representation, or quantitative measurement. They often bear an affective, cognitive, or qualitative character.

At the same time, it is through formalization of team building and collective decision-making that consensus building is facilitated for a team’s goals and participants’ actions. Formalization tools are a special procedure for running negotiations and specific information—technological support. The latter may take the form of a situational (cognitive) center intended to “squeeze” the decision-making time [1].

The organization staff themselves can make a decision or work out a strategy fairly quickly. To do this they may invite an appropriate moderator–consultant who knows the order in which consensus is to be built.

Then, a representative strategic group is selected among the staff, and this group can make a high-grade decision in one day. The experience of quick strategy development shows that the strategic group may consist of the organization’s leading managers, who know the main aspects of its work. The group often consists of 5–35 people.

STABILITY OF CONSENSUS BUILDING

Two factors, stability and goal orientation, (convergence) are the main criteria characterizing the quality of consensus building process. Negotiation stability is necessary for them to not “break down,” and goal orientation is needed in order to achieve the consensus effect, given fuzzy goals and limited time resources.

The process of consensus building between negotiation participants can be hypothetically represented as the interaction of the energies of their free mental
fields. Then, the process of achieving a group consensus for solving managerial problems can be characterized by transformation dynamics:

- phenomenological variable sets of a non-geometrical nature (dreams, desires, life energy, potential, temperature, entropy, thoughts, feelings, spirituality, etc.);
- variables of a geometric nature (diagrams, schemes, signs, symbols, archetypes, predicates, formulas, phases, positions, coordinates, velocity, acceleration, etc.).

A similar situation can be presented in the form of a dynamic Hamiltonian system that singles out sets of components distinguished by homogeneous properties [2, 3]. For this system there is a Lagrangian; the situation behavior can be described using a Lagrange equation of the second type, and the stability of its development may be assessed by exploring the behavior of the Lyapunov function \( V \).

The creative behavior of a closed system develops gnostic tendencies and increases entropy (dreams, desires, or chaos) and changes in the elements of geometric nature (archetypes, structures, or forms), generates knowledge and communications, and accelerates mutual understanding. Given certain system state parameters it is possible that its development stability can be lost, i.e., increased chaos leads to increased system uncertainty in terms of management and the system is increasingly degraded.

System stability can be increased by bringing some phenomenon, such as a fluctuating consumer dream, into the external sphere of a chaotic information source. In this case, as we can show [4] that the stability of behavior (development) of the first system out of those listed can be defined using the following relationship:

\[
dV/dt = P^*P + (S_{int} - S_{exch})^*(S'_{int} - S'_{exch}) < 0,
\]

where: \( P \) and \( P' \) stand for the level and velocity of bringing the team in order (plans, logic, processes, archetypes, etc.) respectively, \( S_{int} \) and \( S'_{int} \) are, respectively, the level and velocity of internal disorder aggravation, \( S_{exch} \) and \( S'_{exch} \) are the level and velocity of information inflow from an external source of chaotic information (fluctuating dreams, designs, or desires). The pattern characterized by this relationship helps increase the stability of the consensus building process when forming a team action strategy.

**GOAL ORIENTATION OF CONSENSUS BUILDING**

Management of the decision-making process should converge to a certain aim, i.e., it should be targeted, although the aims may be blurred and poorly specified. To do this, speaking from our experience, the following methods should be applied on a regulated basis: cognitive psychology, inverse problem solving, fuzzy topological spaces, theory of catastrophes, evolutionary calculations, and other intellectual information technologies.

A Convergent cognitype may serve as the main construct. The cognitype construction can be reduced to selecting the universal characteristics of the problem’s formalized structuring (for the part accessible for formalization) that help create the necessary conditions for the problem discussion processes to converge to the desired outcome.

To reflect a reality that defies metric representation, topological spaces are used, where the concepts are represented as “points,” neighborhoods, sets, etc. The points may be “separable” from one another using the operation of their neighborhoods’ fuzzy intersection [5, 6]. All of real life is penetrated with these spaces. In this context, the cognitype metaphor of the team cognitive decision can be presented in the form of a figure.

In the figure above a group of people with their thoughts and feelings are solving a problem, in which \( x \) stand for resources; \( y_0 \) stands for a fuzzy objective, and \( A^{-1} \) for the operator (way, method, process, or algorithm) for resource transformation to reach the objective. This is an inverse problem in non-metric space. When people’s emotions and thoughts are largely decisive, the distances between concepts–points cannot be measured, and one can avoid instability of the problem-solving process only by bringing in qualitative information. In this case the cognitype approach is helpful. Then, on the basis of topological formalisms [7, 8], simple recommendations may be given which help accelerate consensus building when taking decisions:

- objectives, means, and actions should be separated from one another;
- objectives may be left fuzzy, however, one should specify the main objective and external/internal objectives;
- the means set should be split up into a finite number of parts;
- all the aspects of the problem solving should be controlled and means and objectives should be coherent;
- do not leave trivia out.

These are the necessary conditions to ensure goal orientation of problem-solving process and tasks when making group decisions. However, these conditions by themselves are not enough, problems are solved by a group of people bringing in information as yet unexplored by them. This information is dictated by per-