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Understanding and Optimizing Team Learning

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"Despite its importance, team learning remains poorly understood." - Peter Senge

This paper presents the newly developed "Organizational Engineering" method for modeling, measuring, predicting, and guiding team behavior. The model contributes important understanding to certain elements of team functioning left incompletely addressed by Senge's theory of Team Learning. The concepts outlined in this paper have been extensively proven in field settings and are specific in nature. Their integration with the more generalized theories of Senge can be used to create organizational systems that have a higher probability of achieving desired results.

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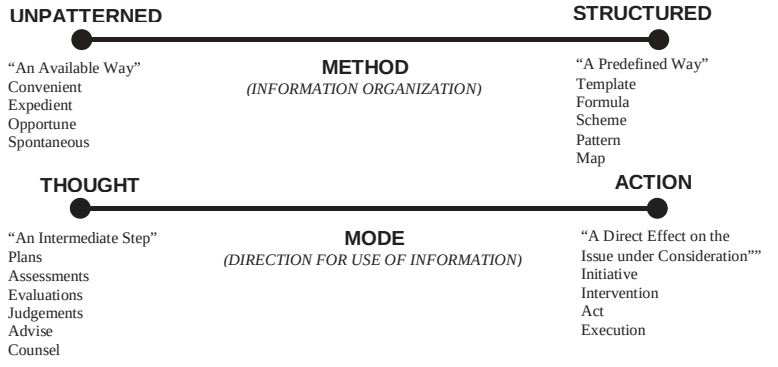
Information Processing Perspective

Dr. Gary Salton, principal author of this paper, has developed a method for accurately predicting team behavior by identifying a set of operational parameters that gauge team member interaction and output. The theory maintains an input/output model of team member interaction, i.e. that the output of one team member (including behavioral output) becomes the input for another team member. The character of the transmissions between team members determines not only the relative facility of communication, but also the probable outcome of a group process.

On the level of the individual team member, the relationship of information input and output is definable by specific strategic postures used in decision-making. These strategies are determined by two large-scale factors that control information flow and guide the direction of decision processes.

LARGE SCALE DETERMINANTS OF INFORMATION PROCESSING



The first factor is "method" which is used to select and organize the information relevant to a decision. Individuals may use a structured, logical, proven approach in problem-solving, or alternately, they may use an unpatterned method to rifle through input data and construct the elements of a solution. The election of a "structured method," for example, helps insure comprehensive examination of an issue, but can cost time and limit the possibilities for new discoveries. The limitation on discovery is a natural result of applying a structure that guides the user along predefined paths. An "unpatterned method," on the other hand, increases the risk of omitting important considerations, but can provide gains in processing speed and increase the chance making a new and beneficial discovery.

The second variable in the equation is "mode" directs the use to which the information will be put. The first is "thought mode," with output typically consisting of plans, assessments, evaluations, observations, and other intermediate-level outcomes not directly impacting the issue at hand. The second is "action mode" with behaviors usually targeted at directly affecting the problem without intermediate steps. For example, individuals who prefer the "action mode" will tend to choose to work on an issue directly rather creating plans that might be executed by others.

At a basic level, these elements combine to form four categories called "strategic styles." These are summarized in Table 1. The names of the styles have been chosen to avoid valuating connotations and to minimize the risk of introducing "labeling issues." The characteristics described in the table are seen in individuals who maintain a particular strategic posture at an extremely high level. In practice, most people have more moderate commitments so that the behavioral expressions, while present, are less pronounced.

TABLE 1

SUMMARY OF STRATEGIC STYLE CHARACTERISTICS

Reactive Stimulator	the RS typically works rapidly, with low detail, focusing on near-term objectives, and seeking tangible results. RS's operate in *action* mode using *unpatterned* methods.
Logical Processor	the LP minds details closely, produces regular and steady output, and works best where assignments are clear, precise, and well-defined. LP's operate in the *action* mode using *structured* methods.
Hypothetical Analyzer	the HA focuses primarily on analyzing problems and developing solutions. Typical outputs include plans, assessments, and evaluation. HA's operate in the *thought* mode using *structured* methods.
Relational Innovator	the RI generates ideas, identifies relationships between divergent concepts, and quickly integrates them into theories and systems. RI's operate in a *thought* mode using *unpatterned* methods.

Method and mode have been demonstrated to operate as continuums that are useful in assessing probabilities of individual action. In practice, a person's behavioral repertoire includes elements from each behavioral pole. The degree to that a person holds a particular combination describes the probability that any given response will conform to the characteristics of that strategic posture. The relative probabilities of all strategic postures available to a person can be depicted graphically using a "strategic profile" of the kind shown on Chart 1.

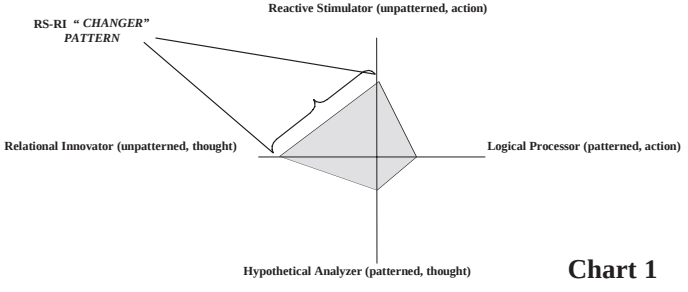


Chart 1

The graph aligns the strategic styles with its axes so that the common modes of the styles are always adjoined. For example, because the Relational Innovator and Reactive Stimulator styles both employ an unpatterned method, they are placed next to one another thus defining the upper-left quadrant. To continue the example, the Changer Pattern area in the quadrant they form indicates the probability that the

individual will employ unpatterned methods of thought and an action response in addressing a given issue. The pattern is called "Changer" because unpatterned methods lack the predetermining influence of structure. Therefore, the relative chances of new and potentially groundbreaking initiatives increase. The availability of both thought and action modes combine to increase the likelihood that the initiative will be operationally defined and attempted. The usual result is externally visible change. Each of the three other quadrants has a distinctive pattern which yield similarly well-defined and observable effects (Salton, 1996, 1999, in press).

Strategic Styles and The Organizational "Brain"

First, it must be recognized that team learning or organizational knowledge always has a focus. It is not the abstract pursuit of knowledge for its own sake. It is purposeful. This is what Senge means when he defines "team learning" as "the process of aligning and developing the capacity of a team to create the results its members truly desire."(Senge, 1990)

Organizational Engineering defines a team as multiple people who share a common purpose and a common destiny. The common purpose gives the group its focus. The common destiny provides the motive for working cooperatively on that focus. However, the specific strategic profiles of the group's members determine how that common purpose will be specified and how the common destiny will be pursued.

Initiation

The metaphorical "organizational brain" can be seen as having fractal characteristics. A miniature portion is found to varying degrees in each of the individual members of the organization. However, each person has a unique profile for acquiring and processing information and contributes differentially to "organizational knowledge". This implies that each member is sensitive to different variables on the input side and, so too, will process and output their information in different ways. This information will subsequently be used by others in the group and can be expected to either expand or restrict their options and actions. The variables multiply when one considers that each person exists in a unique environment at work and elsewhere. In effect, each person is a sensor, processor, and a transmitter of a stream of unique information flows. The specific "wiring" of the individuals determine what an organization will learn, what it will retain, and the manner in which it will recall the knowledge for application to a future issue.

As an example, consider how an individual with a heavily committed Reactive Stimulator (RS) style can affect team learning. Because the action-oriented RS learns quickly of his or her success or failure, and because these individual levels of success are highly visible in any group, bits of knowledge of the RS's process and product are quickly transmitted. The knowledge passed in the case of failure is knowledge of the problem rather than of the solution. However, the knowledge transmitted by the RS's actions will tend to be relatively disorganized since the RS uses unpatterned methods. It is also likely to be unreflective since the RS favors action rather than thought.

Each of the other basic strategic postures operates in it's own fashion, but with a similar "transmitting" effect. For example, the Hypothetical Analyzer (HA) sees problem-resolution is a source of satisfaction. When an HA is stimulated, a data collection process begins. The issue at hand is usually investigated thoroughly. The collected details are carefully assessed to generate an organized plan, assessment, or evaluation to be presented to others. The knowledge generated by the HA will tend to be highly organized since the HA employs structured methods). The output will typically be an intermediate, rather than final component since the HA favors thought over action.

The effect of strategic styles on team learning has been witnessed extensively in the field. For example, the co-author of this paper has worked extensively with a medium-sized subsidiary of a major firm in the Midwest. After applying the Organizational Engineering technology, the strengths and vulnerabilities of several teams were identified and accepted as accurate by the groups involved.

The leadership group immediately recognized their bias toward structured, action-based processing LP style that tended to confine them to known processes. They "bargained" with other groups and reconstituted the team to include greater representation of the idea-oriented RI strategic style by trading team members among themselves. As a result, previously unrecognized options began to appear in the form of cost saving options and revenue generating initiatives. Other teams in the group enjoyed other improvements as the capabilities they bargained for began to have positive effects. The unit began to enjoy steadily increasing production and lower costs. A growth strategy was initiated in a group that had previously had trouble maintaining status quo. The growth strategy was then acted upon and the second largest producer in the region was acquired and integrated into the subsidiaries operation. The net result was that a subsidiary that had been a marginal producer is now among the best in their class within parent firm.

The implications of this brief exposition are apparent. The strategic postures of the people positioned in the group's information processing stream will determine the kind of information acquired and the nature of the resultant information available for group processing. If the organization positions individuals favoring structured methods in the input part of the stream, the organization will tend to acquire highly organized and heavily filtered input knowledge. If it chooses people who are inclined toward unpatterned strategic postures, it will acquire somewhat disorganized input, but that input will be less "predigested." There is no right or wrong. Both kinds of information can be valuable. The relative value is given by the organizations needs and internal structures.

Intra-Team Processing: Input

Having acquired knowledge from the environment, the next phase of team learning becomes important-intra-team transmission and processing of information. Because team members each have their own strategic profiles, consideration must be given to how these different strategic postures interrelate.

For example, when knowledge is transferred to a Relational Innovator for processing, the RI will probably see an opportunity for the exercise of creativity. The probable response will be the generation multiple new and unique ways to address the issue. The RI will tend to those aspects of the informational inflow that lend themselves to the generation of ideas that the RI values. The issued output can then feed back as new information to be filtered through the specific strategic preferences of other group members receiving the RI's output.

If a Logical Processor (LP) is the recipient, the focus will probably be on how stability, consistency, and predictability can be maintained in the face of the new information. The LP will be sensitive to aspects of the issue that might disrupt the current status with its process, procedures and methods. An LP might be expected to offer ideas that tend to preserve the current processes while accommodating the new issue. As with all of the strategic styles, they are sensitive to those aspects of the issue most consistent with their strategic predisposition.

The overall character of team learning is now becoming visible. All of the participants are "learning" about the same subject or goal, but in different ways. In effect, together they are developing a multi-dimensional view of the issue at hand. That view is not resident in any single person but within the group as a whole. This is the process that underlies what Senge describes as "a larger pool of meaning accessible only to a group" (Senge, 1990).

Again, the implication for designing organizational learning structures is clear. Once information is acquired, the strategic predisposition of the team members to whom it is passed matter greatly. For example, if information was acquired by an RS (unpatterned strategy, disorganized, raw information) and passed to another RS, the resultant knowledge is likely to remain in an unpatterned form. This means that retrieval is likely to be difficult and, if accomplished at all, incomplete. Conversely, if the RS knowledge is passed to an HA the information is likely to be carefully assessed and well organized. Retrieval probabilities are improved. However, it is unlikely that the new knowledge will be quickly applied since the HA favors thought over action. Similar predictions can be made for any of the other strategic postures. Field experience of the co-author has demonstrated that these predictions prove highly accurate actual practice. Similar validation has been received by the principal author in large scale, nationwide exposure of the new technology.

An example of this phenomenon can be sourced from a recent decision of the principal author who is a strong unpatterned, action orientated RS. In reviewing the condition of his organization's processing and retention systems it was clear that continuing to maintain mechanism's suitable to RS processing in the face of increasing volume would result in organizational collapse, sooner or later. In response an individual with strong HA tendencies was retained.

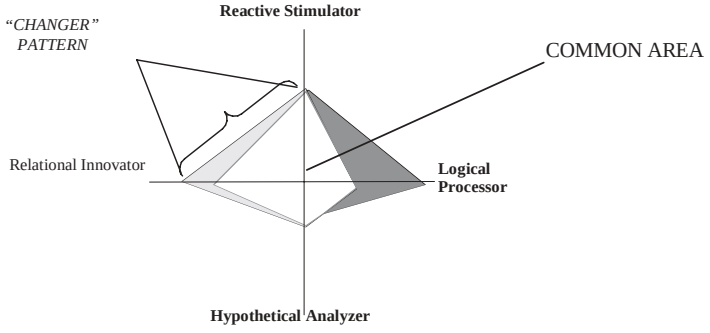
The results were almost instantaneous. Organization began creeping into every nook and cranny of the organization's operation. File cabinets were purchased, system desktops suddenly had logical and consistent structures. Electronic files rapidly took on an organization that could be understood and accessed by anyone. Even the phone system gained a logic, a condition that would never have even entered the consciousness of the principal author. A system had been created that allows the author's organization to embrace much more volume while continuing to the rapid response capabilities that had been imbedded in its strategic posture.

It can be observed that "ordinary business sense" could have yielded the same result as described above. However, "ordinary business sense" would not necessarily have pinpointed the importance of introducing someone with a structured planning orientation of the HA style. Without the style-processing awareness that Organization Engineering can provide, "ordinary business sense" might have chosen an individual with a structured action orientation of the LP. While both work within a method of structure, as clearly demanded by the situation, the LP (e.g., a typical emergency room manager) is focused on the ordering of systems to respond to short-term action demands. The HA (e.g., a typical CPA) maintains a longer term, analytical focus targeted at accommodating variables not yet in evidence, but which could be of consequence in new or unexpected conditions. In the absence of an ability to recognize this specific need, the immediate issue could have been resolved in a way that actually pre-limited the processing-, memory-, growth-related possibilities of the start-up organization.

Intra-Team: Output

As with the case of the individual, team output is governed largely by the probabilistic interaction of its individual strategic processing profiles. For example, if all of the individuals in a group share a strong RS strategic style, the likely output of the group will be a string of staccato-paced, action-oriented initiatives to address the issue until one of them works. If the group were HA's, the probable response would be detailed and all-embracing analyses and plans. In these examples, the members share a common structural view and can reasonably be expected to attempt to employ that particular viewpoint in resolving common issues.

If a group contains an assortment of profiles, the output will be determined by the overlap of the individual profiles of the people involved. It is usually in this area of overlap that all parties can agree on a problem-solving approach. This condition is illustrated in Chart 2.



In the above illustration, the most probable response of this two-person group will conform to the "Changer" pattern-the quadrant with the largest surface area that the team members have in common. This pattern combines the idea generation of the RI and the action orientation of the RS. Both of these strategic styles use an unpatterned method and so a fast response using a minimum of detail is the likely commonly acceptable response from the group of two people. The same basic methodology can and has been applied to groups of all sizes with consistently accurate results.

It should be noted that the "Common Area" overlaps each quadrant of the joint profile. This means that there is at least some basis for joint agreement in each of these areas. The "Changer" pattern is distinguished only because it is the most probable. On any single decision, the group may settle in any one of the quadrants. However, in the course of many transactions, the group depicted in Chart II will most often behave in a manner consistent with the "Changer" pattern. Organizational Engineering methodology is probabilistic, not deterministic.

Once again, the implications for organizational learning design are in evidence. The co-author of this paper has repeatedly witnessed almost instant changes in the character of group output as teams were restructured to yield predetermined behavioral changes. Similarly, the principal author has received field reports of hundreds of applications of the technology executed by many different people which witness similar results.

The most important implication by far is that organizations should design teams so that the probable group output matches the input needs of the other groups which it "feeds." As is the case with the individual, the output from any given group is likely to be the input for another. The larger organization is merely the network of these input-output chains.

Senge's Three Critical Dimensions

Having introduced Organizational Engineering, Senge can now be considered. He states that team learning has three critical dimensions. The first of these is the "need to think insightfully about complex issues" (Senge, 1990). Organizational Engineering suggests that the insights available to a group will be, to some appreciable measure, determined by its information processing characteristics. Organizational Engineering theory shows that the "insight" described by Senge can have many dimensions-all equally "valid." However, some will serve the larger organization better than others will. Organizational Engineering methodology lends specificity to "which is which."

Organizational Engineering theory concurs with Senge that groups can take actions which expand their ability to access different dimensions of a problem. However, they differ on just what those actions should entail. Senge recommends individual, psychologically based initiatives such as "seeing each other as colleagues" (Senge, 1990). Organizational Engineering relies on structural devices to govern information flow in a definitive manner and does not rely on the intentions and subjectivities of team members.

For example, rules are a commonly used structural device for affecting the behavior of a group. They have the merit of being explicit and not requiring anyone to change their viewpoints, personalities, or opinions. They merely require behavioral compliance. They are typically structured to offset a natural vulnerability of the group. Because the concept is so simple and non-invasive, Organization Engineering makes frequent use of rules to help direct groups toward desired objectives.

Organizational Engineering recognizes the value of rules. However, it also recognizes their limitations and unintended consequences. On the limitation side, the instant-action orientation of the RS frequently causes them to violate the rules, even those that they helped create and to which they fully agree. Structure does not carry weight with a highly committed RS and hence they typically do not reference it. Since rules are structure, there is a tendency to overlook them. It is not necessarily malicious. The information processing strategy being used by the RS simply tends to bias them into a rule-breaking posture.

These frequently used structural devices are treated extensively within Organizational Enginnering (Salton, 1996, pp. 167-207). These devices are faster, more flexible, and more precise than psychological interventions. The important point here is that both Senge and Organizational Engineering agree that positive action can be taken by a group to parameterize an issue so that all relevant facets can be considered. The difference is that Organizational Engineering offers specific options while Senge relies on generalized directions.

Senge's second "critical dimension" for team learning is the "need for innovative, coordinated action."(Senge, 1990, p. 236) Organizational Engineering undertakes

to resolve the same issue identified by Senge but in an explicit fashion-explaining the "what" and "why" of group behavior The graphic in Chart II, for example, describes not only the degree of inherent coordination in a group, but also the direction that coordination is likely to take. Using the theoretical framework of Organizational Engineering and its operational tools, the degree and direction of action can be consciously manipulated. In addition, it can do in a way that violates no team member's personal privacy or preferences. People are left untouched; only relationships change.

Organizational Engineering counsels against the kind of universal prescriptions and judgments that Senge sometimes makes. For example, the value of the consistent, predictable, and disciplined Logical Processor strategic style can be illustrated by personal reference. For example, one might ask, "If you had an operating team about to do brain surgery on a loved-one, would you want the team to do exactly what they had successfully done 999 times before or would you want them to try a new, innovative method?" Without regard to strategic posture, most will recognize the value of the disciplined, rigorous, precision inclined LP. It is probable Senge's universal "need for innovative . . . action"(Senge, 1990, p.236) would not be a high priority in the brain surgery example. This "one size fits all" model does not fit within an Organizational Engineering context.

Similar observations can be made about the value of the "coordination"(Senge, 1990) element of Senge's universal prescription. For example, Senge cites championship sports teams as a metaphor for acting in spontaneous coordinated ways. Each team member is conscious of the other and can be counted on to act in ways complementary to other members. Organizational Engineering agrees that this can be one route to success, but another might be found in splitting the team into subgroups to portion out team function in accord with the preferred styles of its members. Using Senge's metaphor, Organizational Engineering might recommend that players on a football team be broken up into offensive and defensive squads before instituting processes to promote spontaneous coordination. The blind pursuit of "coordination" could blind teams to the option of splitting the group up so that the demands of coordination could be avoided. Nothing in the milieu described by Organizational Engineering is universal except its theoretical underpinnings. Beyond that, precise engineering must be fitted to the specific team and problem under consideration.

Senge's third and final "critical dimension" is the "role of team members on other teams"(Senge, 1990). By this he acknowledges that the interconnectedness of teams in terms of the acquisition or application of knowledge. He ascribes this to the process of inculcation realized through two-way communication practices such as dialogue.

However, without a consideration of the overall strategic posture of the group, this process can easily fail. For example, a disciplined, structured action LP-dominated group will probably find the approach and communications of a spontaneous RS group to be sloppy, chaotic, and wasteful. The inculcation process would probably be slow, expensive, and tension-filled-if it were to occur at all. "Dialogue" and good intentions are not likely to be sufficient to overcome the structural impediments created by two very different views of how things should be done. Further, even if one of the groups could be successful in inculcating their style-based values, the organization would lose the assets inherent in the lost style. In sum, the unspecified processes recommended by Senge provide little assurance that positive results will obtain.

Organizational Engineering offers many methods to bridge this kind of gap. One entails the use of facilitators to help strategically divergent groups connect. This is called the "honest broker" method and takes its inspiration from diplomacy. The method calls for an intervention by some party whose profile encompasses significant style elements of both the target groups and who has no "stake in the game." The "honest broker" can "understand" the parties involved parties because he or she shares them to some degree. The preferred communication patterns of the principals can be similarly accommodated (e.g., level of detail, speed of transmission, degree of logical structure, etc.) The "broker" translates the information from one "strategic language" to another. Not everyone can be an effective "honest broker" in a particular situation. However, the tools available through Organizational Engineering describe a methodology by which an effective one can be selected.

Take an example where one individual was a strong RS using unpatterned action-minimal detail, fast, "satisficing" strategy. Another is a strong HA using structured thought-detailed, thorough, measured pace, optimizing strategy. Unattended, this could be a recipe for continuous friction-with or without dialog. Now, posit a third party whose profile embraces a portion of both the RS and HA postures. This person is likely to see merit in the position of both principals. That person is in a position to recast the knowledge of each into a form more readily acceptable to the other.

The co-author has had multiple experiences with the "honest broker" strategy in operation. In one situation with an energy-related company, one team found itself divided into two groups. One favored new ideas, quickly applied; the other favored proven methods, methodically applied. The supervisor of the group had a profile that embraced both of these dimensions and this enabled him to effectively facilitate their interaction. He would quietly absorb the position of one of the groups and then restate and confirm what had been said using the preferences of the other group. For example, in restating the ideas of the change-oriented group to the more conservative group, he might add something like "after we've confirmed that the capacity of our production facilities will not be bottlenecked by the new volume." While the change-oriented segment had never said actually said those words, they readily agreed that the supervisor's summary was accurate. In appending that state-

ment the supervisor acknowledged the other segment's need for detail and precision. The supervisor did not have to "learn" this skill. He merely had to access two aspects of his strategic profile in sequence.

Needless to say, this process is not costless. Three people are involved instead of two. In addition, the solution resided on the presence of a particular supervisor. If supervisors were to change there would be no assurance that the accommodation would be perpetuated. Like most things in Organizational Engineering, engineering "trade-offs" are required to realize the desired result.

Conclusion

The space available here precludes a full specification of how the "organizational brain" works and how to optimize its function. However, the overall direction of the process has been indicated. Organizational Engineering theory can be applied to expand upon the ideas offered by Senge. The system of filtered information processing lends specificity to the sometimes vague prescriptions Senge makes in the absence of a systematized description of team learning. In addition, Organizational Engineering's networks of input-output flow form a natural system which can be understood in terms the other methods such as nature's templates that Senge identifies in The Fifth Discipline (Senge, 1990).

In summary, Organizational Engineering theory and method can be integrated along with Senge's learning organization paradigm to help firms and institutions become more efficient, precise, and effective. This integration merits further exploration by those who are now committing resources to the realization of Senge's vision.

Endnotes

Senge, Peter M. (1990). *The Fifth Discipline: The Art and Practice of The Learning Organization.* New York: Currency Doubleday.

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The principal authors' current database consists of approximately 7,900 individuals and 900 groups to which the technology has been applied and the results recorded. Included within this database are all organization levels from CEO of Fortune 500 firms to hourly workers. Organizational types have spanned a spectrum that includes profit making firms, nonprofit associations, universities and medical institutions among others. Geographically, the data has been gathered from throughout the United States with some representation from Europe, Asia and the Middle East.