



An Agent/Interaction Systems Framework for KM

By

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This paper is a working paper, or "straw man," circulated for purposes of collaboration within the KMC KM Modeling Committee. It is intended that that this paper be used by the Committee, along with contributions of other team members to arrive at a collaborative KM Modeling framework, a team product of the Committee.

A View of System Categories, Components and Motivations of Agents

Human-based agents ranging from individuals to the most complex human-based systems, and including the Enterprise itself, are system components. We need a vocabulary to begin to describe these components. Table One provides definitions and characterizations of some key concepts in the agent/interaction systems framework we will use to describe the Enterprise.

Table One -- Key Categories of the Agent/Interaction Systems Framework

Category Name	Definition and Characterization
1. Transaction	An action of a source agent directed at a target agent along with the reaction of the target agent.
2. Transactions	The cumulated actions and reactions of source and target agents including the cumulated physical movements of goods, services, and communications viewed from an interaction perspective. This definition applies to both individuals and groups as the initiators of transactions, and to both these and other types of agents as the targets. Examples of types of transactions or their properties are: <ul style="list-style-type: none"> • intensity of conflict behavior between and among agents, • intensity of cooperative behavior • volume of documents transmitted from one agent to another, or among all agents,

	<ul style="list-style-type: none"> ratios of messages received by an agent to messages sent by that agent.
3. Transactional Relations	<p>The generalized products of past transactions as they manifest themselves in relational properties defined on the attributes of agents, attributes which have been shaped by past transactions. Examples are:</p> <ul style="list-style-type: none"> extent of inequality of knowledge base distribution, extent of inequality of knowledge access resource distribution, extent of inequality of knowledge dissemination capability, extent of inequality of power.
4. Organizational Social Conditions	<p>Generalized products of past transactions either common to all agents in the system under analysis, or internal to a component of that system; which provides part of the context of on-going transactions. Some examples include:</p> <ul style="list-style-type: none"> extent of social disorganization, extent of cooperative communication, extent of conflictful communication, extent of absolute deprivation.
5. Individual Attributes	<p>The properties of human agents including biological, psychological and not so easily classified that are not directly specified as part of the relational system comprised of all human agents, of the social, and of the material environments.</p>
6. Value Orientations	<p>The general psychological predispositions to action of group agents. These are global properties of agents or the enterprise, reflected in the documentary products of past transactions including: art, film, media records, literature, political communication and other documents. This type of predisposition refers to phenomena having no specific situational or situational class referent, and therefore must be viewed as imparting to a group agent a tendency toward action which is diffused generally throughout many specific situations. Examples of value orientation concepts include Intensity of:</p> <ul style="list-style-type: none"> Achievement Orientation, Self-realization Orientation, Power Orientation, Mastery over Nature, Lineality (preference for a hierarchical style in social organization), Rectitude.
7. Configuration of Individual Level Value Orientations	<p>The configuration of general psychological predispositions of the individuals comprising an organizational system. These are social psychological preconditions for transactions and are more immediate predispositions toward group behavior than value orientations. Individual level general psychological predispositions, whether considered singly or as a value orientation</p>

	configuration, refer to no specific situational referent or class of such referents, but are abstractions from many such referents. Examples of these are close analogues of the examples of value orientation concepts, but it must be kept in mind that concepts within this category refer to individual level psychological phenomena, or to configurations of such phenomena, not to the group level category reflective of cultural products.
8. Long-term, Generalized Material Conditions	The physical characteristics of the organizational system providing a background for long-term social interaction. For example: climate, land, slowly changing physical resources, generalized characteristics of computer hardware and software infrastructure.
9. Components of Value Orientation Phenomena	Concepts in this category apply to both group and individual level, value orientation phenomena. Such phenomena have purposive, cognitive, evaluative and affective (emotional) components, and the interaction of the last three produces the purposive or goal-striving state, which precedes action. The cognitive component deals with perception and thought, including logic and expectations. The evaluative component deals with whether we should approach or avoid aspects of the world we recognize. And the affective component provides the intensity of feeling which will determine the strength of our approach or avoidance predisposition.
10. Social Conditions: Specific	These are products of past transactions analogous to generalized social conditions, but are relevant to specific issue areas such as knowledge management, knowledge dissemination, knowledge discovery, etc. Specific examples are: <ul style="list-style-type: none"> • extent of social disorganization in knowledge dissemination, • extent of cooperative communication in developing planning knowledge, • extent of conflictful communication in knowledge discovery, • extent of absolute knowledge deprivation.
11. Material Conditions: Specific	Physical characteristics of the organization that change more frequently than generalized material conditions, and are most salient to agents in providing a background for behavior specific to given issue areas and classes of situations. For example: transmission speed of network infrastructure, characteristics of knowledge management training facilities, characteristics of computer hardware and software infrastructure for knowledge management, and office physical arrangements.
12. Attitudes	Analogous to value orientations reflected in cultural products, but has some degree of situational or situational class, referent. For example: intensity of desire to discover new sales forecasting knowledge, extent of commitment to strategic planning prior to action, extent of commitment to goal of meeting specific profit targets.
13. Attitude	Analogous to value orientation configuration, but has some degree

Configuration	of situational or class referent. Examples of these are close analogues of the examples of attitudes, but it must be kept in mind that concepts within this category refer to individual level psychological phenomena, or to configurations of such phenomena, not to the group level category reflective of cultural products.
14. Components of Attitudinal Phenomena	Analogous to components of value orientation phenomena, the four categories of cognitive, evaluative, affective and purposive (conative) are represented here as well, but in this context they refer to more specific classes of situations.
15. Feedback Behavior	Applies to individual, group, and system level agents. It refers to direct modifications in an agent's decision making brought about by its own decisions, and resulting from its awareness of its own actions and their likely affects. Such behavior includes an attitudinal response to an agent's own decisions, and in the context of groups, an additional behavioral response at the group agent level of analysis. For example, an agent's decision to disseminate a particular piece of strategic knowledge may reinforce the agent's own goal striving to implement the policy suggested by that strategic knowledge.
16. system level behavior	The social conditions general and specific, and cultural orientations general and specific, common to all agents within an organizational system, and the pattern of externally directed transactions occurring among the agents designated as components of the organizational system.
17. Social Ecology	<p>All of the products of past transactions which present themselves to an agent in a behavioral context. More specifically, all the phenomena in categories 4, 6, 10, and 12 are included here, while portions of 9 and 14 referring either to value orientations or attitudes as cultural products are also included. Finally, that portion of category 16 not referencing transactions is also social ecology.</p> <p>Social Ecology can be further subdivided according to whether variable categories within a major category describe situationally abstract or concrete properties. Thus, the earlier categories above, (4, 6-9) refer to phenomena that are more abstract than the later categories (10-14). Similar distinctions between abstract and concrete properties may be applied to the transactional categories, and to individual attributes, as well as to social ecology.</p>

A first step in inter-relating the categories of concepts in Table One is provided in Figure One. In the figure, the terms within the Goal-directed Agent (i) box refer to phenomena in all categories of the theoretical framework, but are represented at a level of analysis *below* that of the flow depicted in the figure.

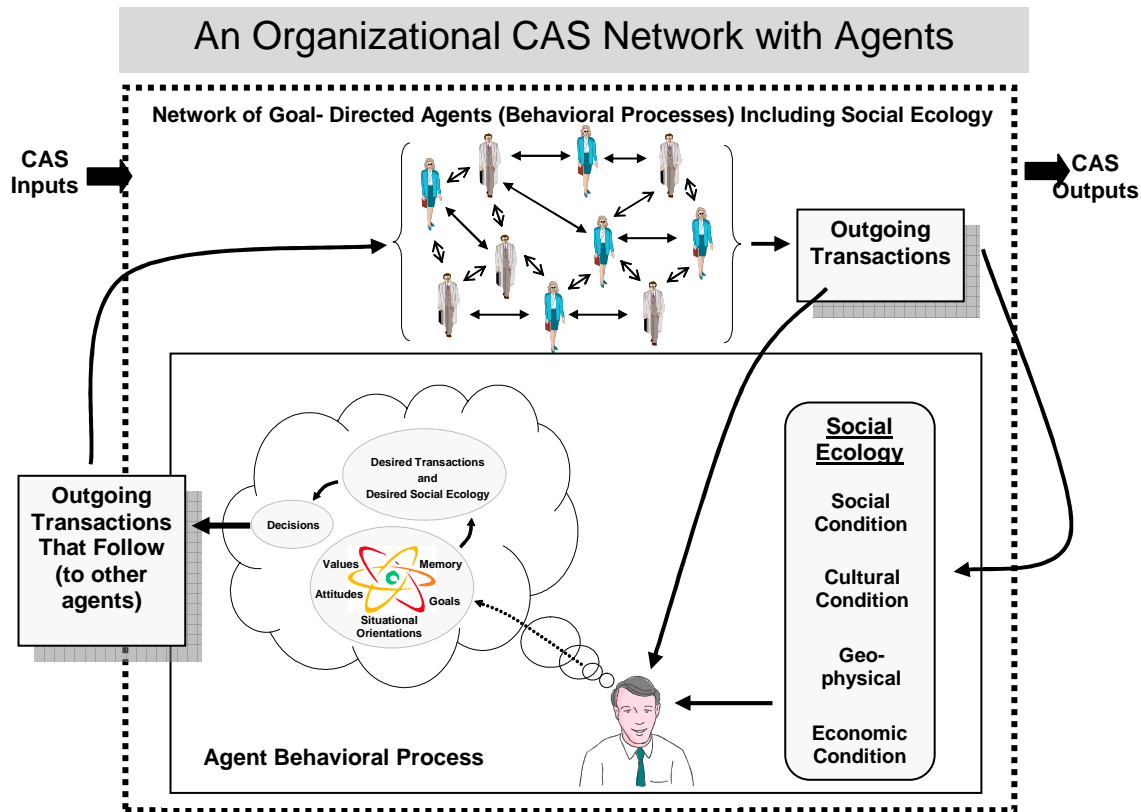


Figure One: The Flow of Behavior among Agents in Organizations
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Beginning on the right hand side of Figure One, transaction inputs received from other agents and previous social ecology determine the current social ecology of an agent. Next, transactions, social ecology, and previous decisions (goal-striving outcomes) are viewed as "impacting" on the goal-directed typical agent, whose internal process then produces decisions which result in transaction outputs from agent (i) directed toward other agents j, k, \dots, n . These transactions outputs are inputs into the decision processes of these other agents. The interaction within and among agents j, k, \dots, n , finally, produces transactions directed at agent (i) at a later time, and thereby closes the loop.

What goes on inside the goal-directed agent (i)? So long as (i) is a group level agent and its components are also groups, then the interaction process may be viewed in the same way as in Figure One, but specified at a lower level. But if one either eventually runs out of group level agents and arrives at the level of individuals; or alternatively, decides to move from a transactional to a motivational perspective on a group level agent (i), then the conception is somewhat different.

Figure Two presents an interaction process in a pre-behavior situation. Here the pre-behavior situation (encompassing phenomena distinguished in Table One) is filtered through the decision-making system of a given individual, or a group level agent,

specifically through value orientations and attitudes. This interaction between the external world and the agent's predispositional reality screens produces a "definition of the situation" which in turn feeds back to the predispositional levels in search of choice guidance. This guidance then determines the final situational orientation, which leads to behavior and to new feedbacks to the situational orientation, and to attitude and value orientation predispositions.

At this point it is useful to introduce the distinction between component and motivational subsystems. The word subsystem is frequently used ambiguously by systems theorists. Sometimes it is used to refer to agents who are components of a larger system. An organizational subdivision, an informal group interested in knowledge management, even an organization itself when considered a component of a larger grouping, may all be considered subsystems. We will refer to these as component subsystems. Component subsystems may or may not be hierarchically organized among themselves, or in their internal organization. The power relations characteristic of a component subsystem are an empirical question.

Motivational subsystems are the inter-relations among situational attributes, action predispositions and behaviors predicated of a system or its component subsystems. These are definable at differing levels of abstractness/concreteness. Goal-striving tendency

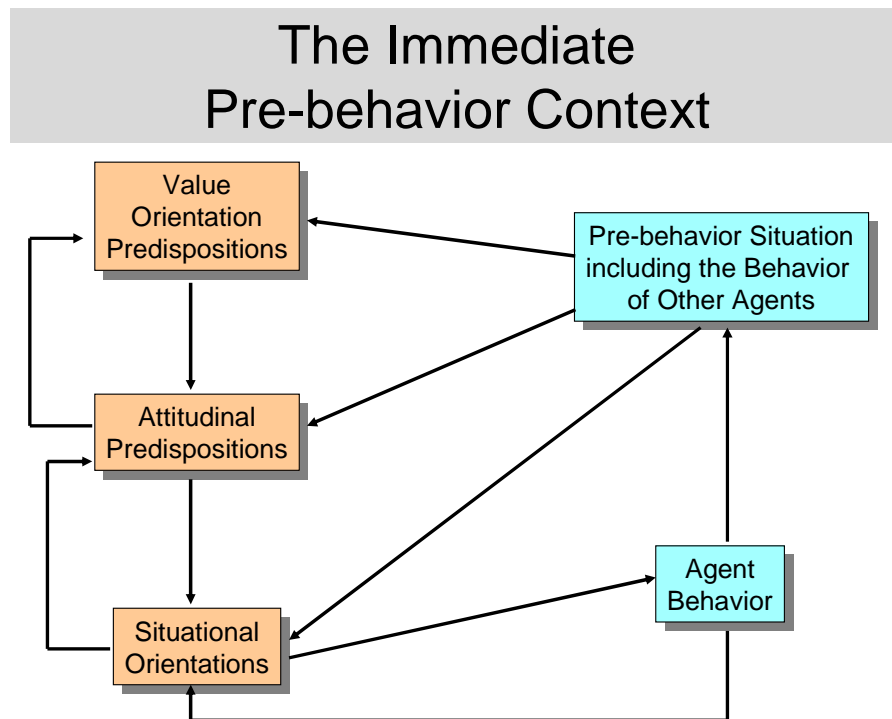


Figure Two: The Immediate Pre-behavior Context

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predispositions causally relate one level to another in this predispositional hierarchy.

The hierarchy of a motivational subsystem needs to be distinguished from the hierarchy of component subsystems. The depth and specificity of a motivational subsystem hierarchy will depend on conceptual decisions one makes about subdividing motivational processes within an agent. In contrast, a component hierarchy is an empirical hierarchy of power relations determined by interactions between and among agents and their resources.

Figure Three presents a more generalized conception of the idea presented in Figure Two. Instead of three levels of motivational functioning, it makes explicit the idea stated in Table One that attitudes have varying degrees of situational or situational class relevance. This idea implies that a hierarchy recognizing the possibility of multiple (arbitrarily specified) levels is a better conceptualization of the motivational process, than the three level concept of Figure Two. The real question is how many levels of motivation it is useful to specify in a given modeling context.

More on Motivational Subsystems

This section develops the motivational point of view in more detail and relates it to change and learning. First, we distinguish sharply between the goal-directed, purposive, or cybernetic components of the behavior of agents (systems or subsystems), and the social ecological, "drift," or non-control components. Individuals, groups, organizations, or systems may be viewed as goal-directed either because they define and pursue goals through an explicit decision process, or because systems behavior takes on a goal-directed character in automaton-like fashion as in an escalatory conflict process. In either case, behavior may be observed to be goal-directed or purposive because system actions: (a) move it toward the goal (steering mechanisms); (b) are perceived as effective in moving it toward the goal; (c) are habitual activities designed to regulate progress toward the goal in the face of disturbances (feedback or regulatory mechanisms); and (d) are novel behavioral activities designed to find a means of regulating progress in the face of disturbances (search behavior ensuing in learning).

In contrast to the goal-directed components of systems or agents, the social ecological factors provide the structure within which purposive activity must function. Social ecology includes the

- social,
- cultural,
- geographic,
- economic,
- habitual attitudinal, and
- behavioral predispositions produced by past system behavior.

Generalization: A Motivational Subsystem

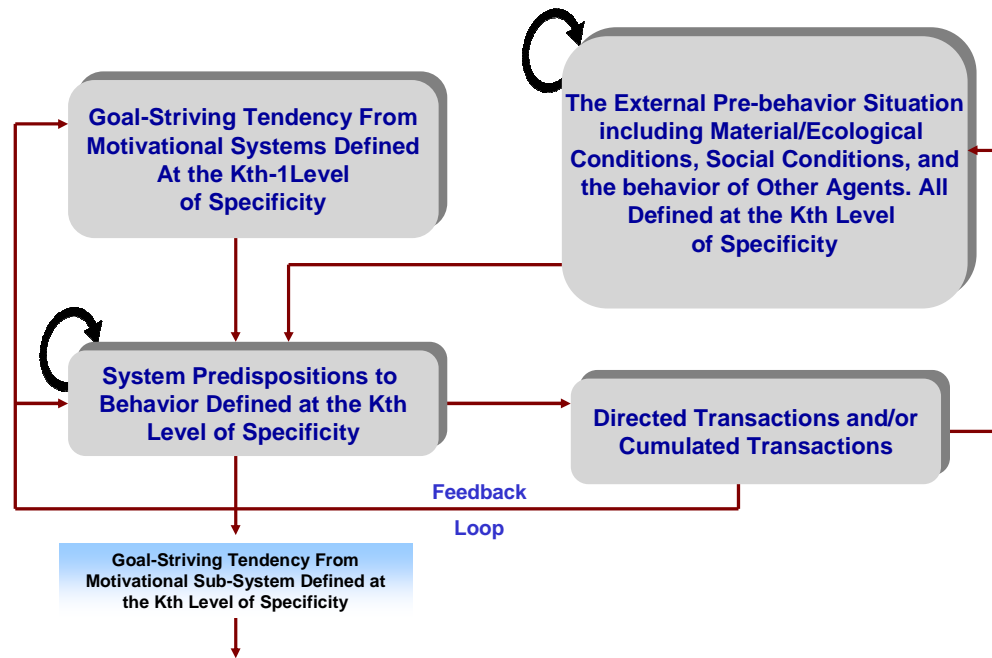


Figure 3: Generalized Concept of a Motivational Sub-system
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Such social ecological attributes of agents serve either as *resources* for the goal-seeking cybernetic component, encouraging its goal attainment, or as *deprivations* for it, functioning to provide *social resistance* or *inertia* to goal attainment efforts.

Next, we distinguish sharply between the consummatory and instrumental behavior of an agent or an organizational system.¹ Consummatory behavior refers to the activity of experiencing or consuming a goal, as in the festive celebration of a national holiday. Instrumental behavior refers to activity directed toward the corporate attainment of a goal, or to its maintenance if the group is already consuming it. Thus, instrumental behavior is co-extensive with goal-directed or purposive behavior as previously defined. Consummatory behavior is not the same as social ecology, however, because the former involves discrete social transactions, while the latter deals only with attributes. Still, consummatory behavior like social ecology is "purposeless;" it is a mere mechanical process, driven to an inevitable conclusion by forces still to be discussed.

So far motivation has been presented as a hierarchically structured process of motivational levels in continuous interaction with social ecology and transactions, which produces new social ecological and transactional outputs as a result of this interaction. Adding the concept of goal-directed instrumental behavior, we see such behavior as arising from *incentive systems*, or combinations of *predispositions or orientations aroused by environmental stimuli* (previous transactions and social ecology). Incentive

¹ David Birch and Joseph Veroff, *Motivation: A Study of Action* (Belmont, CA: Brooks/Cole, 1966)

systems are comprised of: *goal-directed tendencies* toward behavior (or purpose); the perceived *availability* of action alternatives; *expectancies* that particular action alternatives will give rise to particular consequences, some more and some less instrumental to the goal sought; *incentives*, or the negative or positive attraction, the intensity of affect or emotion, which the perceived consequences of particular alternatives have for the agent; and *motive*, or the intensity of negative or positive goal-directed tendency which some general class of conditions, to which the particular condition belongs, arouses. Goal-striving tendencies are a non-linear, rather than additive, function of availability, expectancies, incentives and motives.² Figure Four integrates the incentive system idea with the previous concept of motivational subsystem developed earlier.

Not yet explicit in the above conceptualization, is the near certainty that concrete agent *behavior will simultaneously be motivated by more than one incentive system*. A contemplated action, in other words, will be associated with an outcome having multiple and conflicting incentive values for an agent. Sensory, achievement, affiliation,

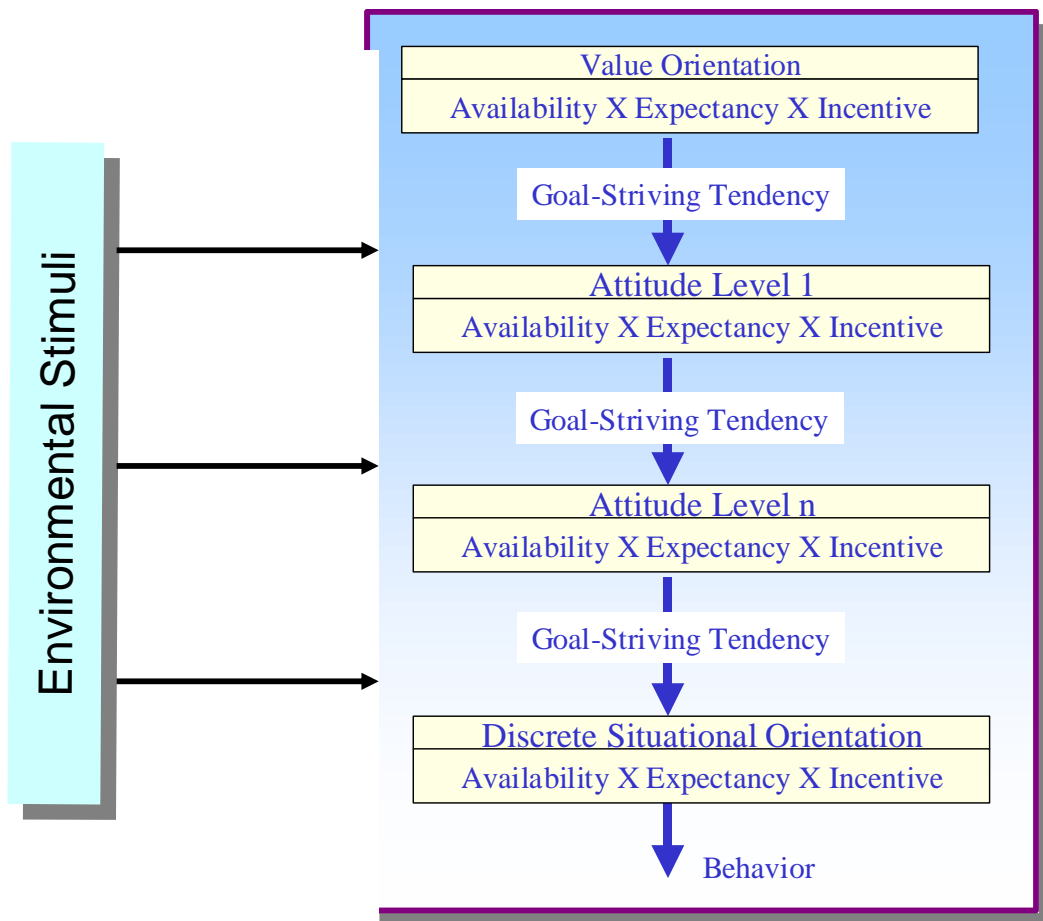


Figure 4: The Incentive System of an Agent
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² J. W. Atkinson, An Introduction to Motivation (New York: Van Nostrand, 1964).

aggressive or other combinations of incentive systems interact to shape instrumental behavior. Their inter-relations must be modeled in analyzing motivation.

In terms of Figure Four, and Table One, not one value orientation, but a number, will be aroused by a given set of social ecological and transactional stimuli. The interaction of availability, expectancy, and incentive components of value orientations, produces a set of G_1, \dots, G_n goal-striving tendencies of differing strength. In turn, each of these elements will interact with a number of attitude predispositions, and specifically with the availability, incentive, and expectancy components of each attitude, again producing a set of goal-striving tendencies. ***In general, at the most specific level of attitudes, only one such tendency will emerge as the strongest goal-orientation and hence, affect instrumental behavior at a particular space-time location.***

While the incentive system view may seem at first, to de-emphasize the evaluative component of predispositions and situational orientations in determining behavior, this is not so. Evaluation enters into the incentive system view through the idea of availability. That is, the goals or instrumental actions that are available to an agent, will depend in part on the agent's individual evaluative predispositions. The goals or actions evaluated as "wrong" or "illegitimate" will not be among those available in goal-seeking behavior. Or to put this another way, the degree of perceived availability of goals or actions will be partly a function of the degree to which they are positively or negatively evaluated by the agent.

It is possible to look at the effect of normative judgements on behavior in terms of the notion of conflicting (or interacting) incentive values. Agents are positively attracted by those states of affairs they judge moral, and repelled by those states of affairs they judge immoral. A condition may have high incentive or motive value from the standpoint of sensory or wealth incentives and negative incentive value relative to the goal of rectitude. This defines a situation of internal motivational conflict for an agent, but more importantly, it identifies the place of "conscience" in the agent/interaction systems framework. It is an incentive like any other; but one that is much more generally aroused, because of the many spheres of activity to which normative judgements may be applied.

The notion of incentive value, the negative and/or positive affect attached to an object by an agent, needs to be clarified. Affects are non-rational states such as wants, fears, anxiety, tension, and hope. Affects range from positive to neutral to negative³ on a continuum of emotional response. Looking at this continuum from the viewpoint of stages corresponding to ranges along it, Figure Five associates a set of stages identified by qualitative descriptors with positions on this affect continuum. The association with descriptors is intended to be suggestive of the meaning of the affective continuum notion and also to aid in the coming description of Motivational Dynamics.

Motivational Dynamics

³ For the negative portion continuum see C. N. Cofer and M. H. Appley, Motivation: Theory and Research (New York: John Wiley, 1964), Pp. 451-453.

The incentive system-instrumental behavior portion of the agent/interaction systems framework described earlier, provides the basis for an analysis of the dynamics of motivation in the context of agent transactions with other actors. Much of the description concerns motivational transformation from rational instrumental behavior to various forms of non-rational behavior in response to the stress of conflict. In the context of the enterprise such transformations may be uncommon, but the framework still needs to treat them as background for an analysis of organizational change based on motivational dynamics.

In the agent/interaction perspective of Figure One, transactions are a function of previous transactions, previous social ecology, and purposive activity of the agent. Previous transactions and previous social ecology comprise the *actual behavior* within the system affecting agent (i). The incentive value tendencies of the agent express the transactions and social ecology -- the actual behavior it "desires" for the future. This is the agent's *Goal State*. The discrepancy between the *Actual State* and the *Goal State* is the *Instrumental Behavior Gap* of the agent.

From the perspective of an agent, the discrepancy between the Actual State of the enterprise and its Goal State, both as subjectively perceived by the agent, is the *Perceived Instrumental Behavior Gap*. Further, the agent can distinguish in the Actual State (in Social Ecology), *resources* and *opportunities* as well as *cooperation* from others (in transactions). That is, the Perceived Actual State is seen as some mix of *social encouragement* and *social resistance or social inertia*.



Figure Five -- The Continuum of Affect

To social encouragement, the agent responds with goal-striving tendencies (purposes) and transactions perceived as contributing to attainment of the goal state. Such transactions are instances of *steering behavior*.

To social resistance the agent responds in a variety of ways, depending upon his expectancy concerning the ease or difficulty with which it can close the instrumental behavior gap given the *social resistance* encountered.⁴ If resistance is moderate and is seen as mere "blocking" in relation to the goal, the agent will respond with *coping behavior* designed to remove or overcome the effects of the interfering social ecology or transactions. The coping behavior involved may represent a habitual pattern of *regulatory behavior*; or it may represent a novel selection of decision alternatives, a pattern of *search behavior*.

Returning to the affective continuum of Figure Five, we can associate *coping behavior* in response to *moderate social resistance* with emotional *arousal*. Thus, coping behavior will remain operative until fairly intense affect occurs, caused by a realization that the instrumental behavior gap will be too difficult to close. When negative affect is very intense and social resistance is seen by the agent as intense and *stressful*, a stress threshold is crossed (at about the point of panic on the affective continuum) and the incentive system motivating coping behavior will cease to be important.

Long before this point however -- in fact, at the affective response stage corresponding to frustration, anger, and rage (*the frustration threshold*) there is a point of realization that the situation may be beyond the agent's capability to cope with. At this point, a generalized goal of defending agent self-identity becomes paramount, and a series of incentive systems form. All are organized around *consummatory goals*, whose function is reinforcement of an agent's self-concept. Each takes hold at a particular level of affect. The effect of these new incentive systems is to produce transactions not instrumentally motivated by the goal-state, but having consummatory value in themselves.

There are three types of consummatory incentive systems. The first type is the *aggressive* incentive system, the goal of which is *transaction behavior designed to injure others*, either physically, or through use of more generalized forms of influence. The aggressive incentive system is associated with a level of negative affect corresponding to frustration, anger, and rage, and perhaps extending to anxiety.

A second type of ego defensive incentive system is focused around the goal of temporary escape or *avoidance* of the obstacles, which have been undermining goal attainment capabilities. Affect accompanying this state is extreme fear and similar emotions. Panic occurs once the *stress threshold* is crossed⁵ and coping behavior and its accompanying instrumental incentive system cease to have motive force for transactions at this point in the motivational process. Transactions produced by the avoidance incentive system thus, are merely designed to allow escape from stressful stimuli.

⁴ Ibid.

⁵ As described in Ibid.

Finally, under extreme stress the agent is viewed as withdrawing from goal-seeking behavior, and therefore as removing itself from the frustrating obstacles which have caused the spiral of negative affect. Exhaustion, resignation, and apathy are emotions accompanying withdrawal.

An important aspect of the foregoing conceptualization is its relation to the issue of change in incentive systems. Again, when response to stress involves intense negative affect, there develops a tendency to withdraw from the goal state central to the agent's incentive systems. ***The longer the duration of intense negative affect and the more intense the affect, the more probable it is that withdrawal will involve a lessening of the strength of a particular incentive system, and a shift to greener pastures. That is, a search for new goals whose attainment does not involve stress.***

Social resistance and social encouragement, then, give rise to the following types of transactional behavior:

- a) steering,
- b) coping (regulatory and search),
- c) aggressive,
- d) avoidance, and
- e) withdrawal from goal-seeking.

Social encouragement results in steering. Social resistance, ***in conjunction with the agent's expectation about the degree of difficulty of attainment of the goal state***, results in the other types of behavior. Lastly, coping, aggressive, avoidance and withdrawal motives are transitional motive states because they are associated with the process of increasing resistance, stress, and negative affect that may result in change of the goal state.

The Dynamics of Organizational Change

In developing the conception of motivational dynamics, a number of important categories were distinguished that also provide a viewpoint on the scope of organizational change. These are:

- transactional patterns,
- social ecology,
- instrumental goal states,
- instrumental behavior gap,
- perceived instrumental behavior gap,
- social encouragement-resistance mix,
- the affective response to the last two items, and
- consummatory goal states.

The pattern of change in ***transaction patterns*** varies with the type of behavior adopted by an agent in response to situational orientations. ***Steering*** behavior occurs in response to a perceived instrumental behavior gap, social encouragement, and the further perception that goals are achievable. "Blocking" in the organizational environment brings steering to an end. If blocking is definitive enough, it also brings to an end the effort to

close the instrumental behavior gap. Or, if the agent has such a capability, blocking triggers **regulatory behavior**, a pattern of routine transactions whose purpose is to overcome the blockage.

Regulatory behavior will persist as long as an agent's perception of the difficulty of closing the gap does not increase. But the more the perceived instrumental behavior gap, and/or the social resistance increases, the higher is the probability that regulatory behavior will give way to a more adaptive learning process, a process of overcoming blockage through successful search behavior.

The persistence of search behavior and learning is also a function of changes in the perceived instrumental behavior gap and social resistance. As social resistance becomes more intense, search behavior and the possibility of learning declines, and the aggressive incentive system begins to operate. Since aggressive behavior is a consummatory process it tends to follow a "growth and decay" pattern.

The motivating force for aggression first grows with frustration; then it is "used up" with satisfaction of the aggression incentive. Avoidance behavior and withdrawal operate in a manner similar to aggressive behavior. The transactional processes associated with these incentive systems follow growth and decay patterns.

Change in **social ecology**, according to Figure Six, is determined solely by the previous pattern of incoming transactions. Through the spiraling of negative affect already described, change in **instrumental goal states** is determined by extinction processes. More specifically, change is a function of the perceived instrumental behavior gap, of the intensity of social resistance, and of the resulting intense negative affect leading to withdrawal. The "meaninglessness" of withdrawal then leads to a search for new instrumental goals.

Change in the **instrumental behavior gap**, in the **perceived instrumental behavior gap**, and in **social encouragement and resistance**, are all differing functions of past transactional patterns, social ecology, and instrumental goal states. The previous statement of these relationships reveals the mutual interdependence of the various categories of change-related factors listed above. This interdependence is also consistent with Figure One, which depicts organizational behavior as a circular flow relating the change-related factors with occasional feedback sub-loops.

Change in **affective response** is determined by the levels of encouragement and resistance at a previous time. An evolution toward extreme negative affective response is stimulated by intense social resistance toward an agent. Change in **consummatory goal state** is directly associated with the level of negative affective response of an agent. If anger is the response, the consummatory goal will be aggression. If fear is the response, it will be avoidance. And if apathy occurs, withdrawal will be the new goal state.

Thus all of the categories identified by the framework as central to organizational change exhibit mutual interdependence: the kind of interdependence which suggests the use of a

system of simultaneous differential equations to describe the relationships. Given the complexity of agent motivation, of interactions among agents, and of the growth and decay processes of consummatory goal striving, the system of equations would also be non-linear in character, and would require advanced estimation techniques such as adaptive critic neural networks to solve.

Finally, a small change in the framework introduces the notion of social power, a subject particularly significant for enterprises. The social power concept also focuses attention on the issue of the impact a particular agent is likely to have on the enterprise. In terms of Figure Six, the "drift state" of the enterprise relative to Agent (i), is the state of future transactions and social ecology, assuming that the agent engages in no purposive ("steering," "regulatory," or "search") behavior of any sort.

In other words, the drift state is the effect of previous transactions and social ecology on future transactions and social ecology, with purposive agent behavior "partialed" out of the analysis. Adding drift state to the previous concepts of actual state and goal state, we have the situation of Figure Six,

where the goal state is viewed at an earlier time t_0 , than the actual and drift states. The concept in Figure Six, coupled with appropriate means of calculating drift states,⁶ and of measuring goal states and actual states would yield a measure of the social power (in the impact sense of the term) of an agent. Using this concept, agents can calculate the previous impact their policy choices have had, and by generalizing this experience, they can learn which choices are more, and which less, effective in bringing about changes they want. In short, the schema can provide agents more reliable feedback about their search behavior. It thus, should increase organizational intelligence of agents in the enterprise, and perhaps of the enterprise itself.

⁶ See Richard W. Chadwick, "Steps Toward a Probabilistic Systems Theory of Political Behavior with Special reference to Integration Theory, in H. R. Alker, K. W. Deutsch, and A. H. Stoetzel (eds.) *Mathematical Approaches to Politics: An International Source Book* (San Francisco, CA: Jossey-Bass, 1973). Richard W. Chadwick, "Power, Social Entropy, and the Concept of Causation in Social Science," unpublished ms., 1972. Richard W. Chadwick, "International Trade and Economic Integration: Further Theoretical and Applied Developments in Matrix Analysis to Estimate the Effects of Background Conditions Versus Political Controls," Unpublished Ms. Cornell Aeronautical Laboratory, Buffalo, NY, 1971.

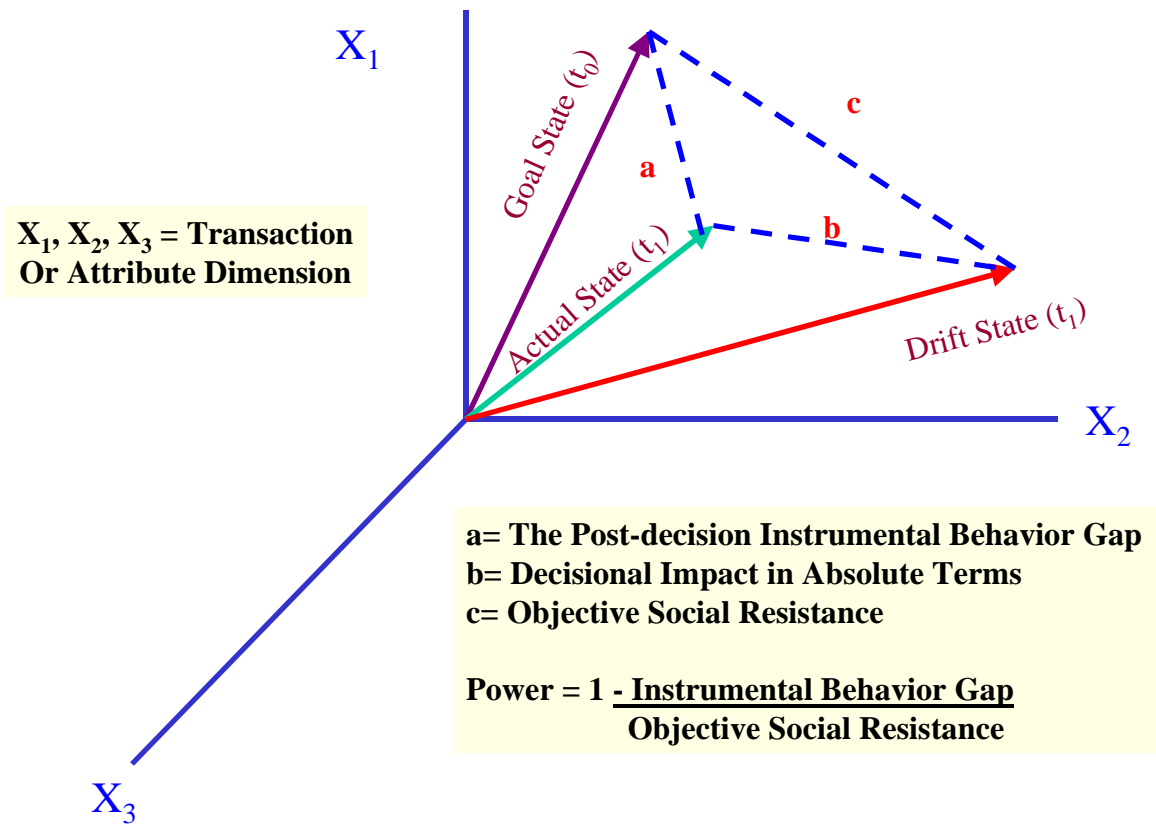


Figure Six -- A Concept of Social Power and Impact