TECHNOLOGY POLICY PROCESS TO COPE WITH THE COMPLEXITY OF ENTERPRIZE TECHNOLOGY STRATEGIES

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ABSTRACT

At the first part of this paper, we summarize the first of our series papers(Haruna, 1999), where we applied Harold Lasswell's concept of the policy process and the policy scientist who supports the process, and proposed the idea of technology policy process and staff because technology development process has to be understood as such a complex decision process as pointed out by Lasswell(1971). And we summarize the second of our series papers (Haruna, 2001), where we analyzed the key factors in implementing technology policy staff and the effects of digital media-enabled innovation of organizational decision field. The investigation was due to the decision model by G. T. Allison(1971) and to Transaction-cost Politics Model by A. Dixit(1996). The present paper mainly clarifies what factors TPS has to takes into considerations in the task of organizational goal -clarification in technology policy process. We examine several models of organizational vision creating process and reach an extension of the creating process by use of Peirce's idea(Moor,1972), that is, in other words, an extension of the goal-clarifying activity in Lasswell's policy process model. This extension brings about a broader aspect of recognizing the "apparatus of capture" defined by DELEUZE and GUATTARI (1980) as a strategic mechanism to integrate (merging) market and technology. The final part of this paper is concerned with efficiency of the process, where business platform and technology platform appears as an alternative realization.

Keywords: enterprise R&D management, technology policy staff, collaborative goal-clarifying process, Harold Lasswell, Charles S. Peirce

INTRODUCTION

In this innovative era of IT technologies, competent R and D management technologies are required. The conventional way focuses on how to select and utilize an optimal idea for a specified set of objectives along an established business concept. It is incompetent with the requirement of current R&D management (Rosenbloom and Spencer, 1996).

The R&D management technology which contemporary enterprises need is closely related to the capability of her growth under uncertainties. It is the technology to identify and foster new big business by merging technology and market and to require flexible management from technological and business aspects as well. It is not a field where top-down selection and focus takes place in the early stage of a project, but a field where active participation are welcome from all participants. It is a field where any proposed idea will effectively be selected and be fostered, and where it is possible to take an appropriate pro-action, if necessary. Also, it is a field where, as for what is important, the organization does not stick to what was once decided, but can adapt to the changes of her environments and always invites opinions from broad participants. Moreover, R&D management must be so flexible that even value-axis can make progress after the start of project in order that she can find a strategic way to merge technologies and markets into a new business strategy which should dominate the competitors' after all.

A setting of the present age is a change from closed hierarchical system to open flat-type one. Innovations of information technology, which emerged in this century, brought about amazing economic developments and expanded the range of the people who can engage in creative jobs. In the front-half of the century, organizations were structured hierarchically, because of the efficiency under established environments. The more deeply hierarchical structure pervaded in the society, the more individuals became professionalized. As the result, the horizontal mobility of individuals decreased and organizations were incapable to catch up with the speed of societal changes and where the societal total productivity degraded. However, recent further developments of information technologies such as internet technology are accelerating the advancement of informational society that comes up with a more innovative society.

Nowadays business and industry are expecting a revolutionary expansion of business chances. We expect new information appliances and services, more effective sales channels for consumers with more efficient supply chains and so forces. At the same time, we expect diversification of the method for making use of those chances. For instances,

we expect diversities of business and technology platform as well as growing of open markets of research engineers and research outcomes. There, all research outcomes, technology know-how and even captured business opportunities of a company may not be harnessed within the company, but be dealt as some barter for collaboration/exchange with another company while focusing on his/her core business. We must take advantage of this change of business environment and increase our adaptability for increased speed of technology and market changes through improvements of development process and collaborative activity.

The conventional method of managing R&D activity is strategic and focuses on "focus by priority" which aims to reduce the number of alternatives in order to improve the efficiency. The method assumes that R&D strategy should adapt to the pre-determined business strategy and that the pre-determined business strategy enables effective use both of intra-organizational and of extra-organizational research outcomes. But this strategy has an intrinsic deficiency because synergetic effect of market and technology may be difficult for business strategist to find through investigation during early phase of a project. The attainment needs more complicated and sophisticated collaborations among technologists, market researchers and business decision-makers.

In a better way, participants might find answers through a spontaneous and heuristic way with mutual interactions. Hopefully, the more chances the process give, the better it be. R&D engineers of the organization could be more active as important participants of the creation process unless he feels subordinate to the business decision with regard to the total strategy when he lives in the exciting age of societal innovation by information technology. Besides, organizational efficiency may degrade crucially due to diversity of alternatives unless a company takes more appropriate ways of learning, planning and executing rather than a way which depends on individual's ability. We need ways where more professionals can collaborate to solve the problematique in order to get a new market. In a word, we need a collaborative field for creation. There, core persons may be a person, a couple of persons, or more.

We can invent various collaborative creation fields in future. In this paper, we propose a field of policy process and policy scientists who support decision makers in co-creative technological innovative process to cope with the complexity,

The R&D process with Technology Policy Staff is an answer for the above, which utilizes societal innovative changes owing to emerging IT technologies. The organizational staffs

participate in a creating activity in person while observing ongoing situation with the third person's eyes, and constructs the recognition map (the context) in order to mobilize both the explicit and potential participants, if necessary. It aims for organizational active idea-creation, intellectual collaboration among broad participants, as well as phase-conscious, effective and flexible R&D management and execution.

TECHNOLOGY POLICY PROCESS AND TECHNOLOGY POLICY STAFF

The author tried to adopt the concept of Lasswell's policy process(Lasswell, 1971), and built a model "Technology Policy Process" that represents the information flow in the social process of participants, the business decision process, and the intellectual tasks guided by Technology Policy Staff.

The purpose of the technology policy activity includes

- anticipation of problem,
- mobilization of the motives and knowledge ,
- to act with speed and realism.

A conceptual map of technology policy process must provide a guide to obtaining a realistic image of the major phases of any collective act. We recognize the overall R and D process of information industry as a social process shown in Fig.1, which was proposed by Lasswell (ibid.). For our purpose, we can use the social process map with a more detailed presentation of decision as a sequence of seven phases. The model of the decision process, which is a de facto standard in the discipline of policy sciences, distinguishes seven power outcomes as in Fig.2. It should not be understood as a sequence of activities that must be executed in a fixed order, but a set of distinctive activities that should be reviewed in the technology policy process (ibid.). For example, a self-review by the TPS may find that the cause of delayed start of a project was insufficient effort for promotion by the TPS himself, but not the lack of the creativity in the system alternative proposed by the research group in the intelligence activity phase.

Lasswell suggested that an adequate strategy of problem solving in the phase of intelligence activity encompasses five intellectual tasks: Goal clarification, Trend description, Analysis of conditions, Projection of developments, and Invention, evaluation, and selection of preferred goals (ibid.). The iterations of these five intellectual

tasks make the goal more preferable to the decision-maker of the organization. However, can we answer the following qustions?

Is there time and are there facilities that might be mobilized to generate the needed knowledge in time? Can decisionmakers be supplied with critical estimates of what is likely to happen (a) if they do nothing or (b) if they follow a given policy option? Can they be supplied with creative suggestions about the policy alternatives to adopt?

The author understand that the process to merge researchers' aspects and business decisionmakers' aspects into a comprehensive recognition map is very complex in terms that we cannot help making temporary and uncorrectable decisions and call the process as technology policy process. Often decisionmakers overlook important bodies of knowledge unless initiatives are taken to change their cognitive maps. Therefore we introduce Lasswell's concept of policy science approach that strives for three principal attributes, *contextuality, problem orientation, and diversity of methods employed* and that let system scientists support the decisionmakers in order to cope with complexities of the process. We call the system scientists as technology policy staffs. Their primary roles must be roles of mediators and mentors. The primary goal of TPS's efforts is "getting the projects to a point where they could seriously be said to have "started" in the minds of most participants". These activities must be executed by and made open ("make-it-open" policy) to the participants with speed and realism. The relations among social process of all participants, policy process of decision-maker, and TPS's supporting process were shown in the structural diagram by making input/output relations clear in the previous paper. This conceptual map of technology policy process is useful for providing a guide to obtaining a realistic image of the major phases of the collective act of R and D management process in information industries (Haruna, 19999).

In the previous paper, the author described "Key Factors in Implementing TPS", and mentioned to the innovations of decision field, which lead to the increase of influences of Technology Policy Staff on the participants and make the concept of Technology Policy Staff more applicable to the real world through resultant changes of organization's structure and power (Haruna, 2001).

ORGANIZATIONAL CO-CREATION PROCESS FOR GOAL CLARIFYCATION

How can goal-clarifying tasks be configured in the intelligent phase of technology policy process? It would be simple, if an eligible TPS could build up a vision from his belief, enlightenment members of the organization, and guide them to clarify their own goal based on the vision. However, essential enablers of R and D activity are individualistic creation by miscellaneous participants and their well-organized communication and collaboration, but not an eligible TPS's vision. Therefore it is important to understand spontaneous creation process in organization and to give guidance in time.

Individual's Creative Process in Organization

Spontaneous creation process is difficult to control, and we have to give guidance based on the recognition that the process includes several phases shown in Fig. 3.

According to Peirce (Moor, 1972), the action of thought is excited by the irritation of doubt, and ceases when belief is attained, so the production of belief is the sole function of thought (process of fixation of belief from desire, idea, or doubt). And Peirce writes that let a man venture into an unfamiliar field, or where his results are not continually checked by experience, then some general study of guiding principles of reasoning would be sure to be found useful (process of shaping vision、that is a primary source of leading actions, from belief).

The process as described above is concerned with an individual's creation process. In order to apply it to organization, we must understand "fixation and shaping process" more precisely, since we need a model of organizational vision creation process that should be an extended Peirce model of individual's vision creation process.

An extended Peirce Model of Vision Creation Process

What model is useful to understand the relation among experiences, the contexts, and a vision to be created in organizational co-creation process?

Whether the words "to make a vision" are correct or not, the words "Value System Design" are a wrong phrase. The question of "does all vision need specified value system?" will be remained for the discussion somewhere else.

John N. Warfield writes in the postscript of his book "A SCIENCE of Generic Design"(1994) as follows;

> It is easy to say that the dilemma can be corrected by value system design. But when real organizations are involved, and organizational culture dominate the value systems, even well-meaning and ostensibly supported efforts may come to naught, as Bushe has demonstrated in his study of attempts to install statistical quality control in an American manufacturing organization.

Lasswell argued that it is the fundamental of the policy process to clarify the contexts and to share the recognition/understanding in order to share value systems. It must be more comprehensive than to share value systems.

Ruhmann argued on the same problem in his book "TRUST---the mechanism to reduce the societal complexities" and clarified the reason why TRUST is indispensable for group -conception or co-creation in dynamic and complex policy process (Ruhmann, 1990).

John Warfield writes as follows in chapter 4 "MANAGING COMPLEXITY THROUGH SYSTEM DESIGN: The Use of the Science" in his book (Warfield, 1994);

---Necessity conditions for managing complexity include the control of escalation of complexity, the reduction of cognitive burden on the designers, the elimination of the destruction set, and the provision of the enhancement set.---

As a conclusion, we reach to a diagram shown in the Fig.4.

Several Models of Organizational Co-creation Process

Harold Lasswell writes in chap. 4 "Diversity: Synthesis on Methods" of his book "A Preview of Policy Science" as follows;

---One of the most radical and promising departures in the evolution of the policy sciences is a technique at once adapted to examining the present conjecture of events, and to giving full weight to the axis of time. The reference is to *developmental constructs*. The essential purpose is to enable the policy analyst, and hopefully the decision-maker, to find his way in the complexities of the total situation in which he operates. The preparation of a developmental construct does not ignore complexity; it proposes an orderly way of revealing the significant contours of reality.

Karl Marx formulated the assertion that our historical epoch was characterized by the movement from capitalism to socialism, hence, in power terms, the passage of power from the bourgeoisie to the proletariat. The nature of developmental construct can be

most quickly grasped by indicating how it compares or contrasts with the way he formulated the assertion---.

---First, here are some points of similarity. The Marxist model concentrates on *fundamental features of the total context* with which Marx was concerned. Lesser features were de-emphasized as a means of concentrating attention on value shaping and sharing, and on basic social institution.

A second characteristic of the Marxist model is implied: it describes important states of affairs in the past and future, and hence *provides criteria for examining contemporary changes as movements toward or away from the selected initial or temporal patterns.*

A third point is that a construct is *prepared in the light of available knowledge and continually appraised as knowledge expands.* Marx was a brilliant scholar who subjected himself to the discipline of examining the physical, biological, and cultural disciplines of his day. His monumental formulation was no fruit of elementary wish-fulfillment.

We come now to the difference between the techniques and partial approximation exemplified by Marx. First, the construct is *tentative and exploratory,* not dogmatic. Words that refer to future events are inferences from the existing supply of scientific and historical knowledge, and of provisional projections. They are not, however, science. They do not conjoin theory and data, since data are not available about the future. The data are predicted, not summarized. Above all, a construct is not dogmatically held. It is not said to be inevitable. It is not even put forward with the primary purpose of forecasting; rather, construct is understood to afford a present modification of communicated events at the focus of attention. A future consequence may be the initiation of acts that prevent a forecast from coming true. This is the problem-solving demand to "create" or "invent" the future, not to remain passively contented with the forecasting role ---.

Kiyoshi Miki, a Japanese practitioner and philosopher, tried to develop a new method which requires turn of the doctrine itself based on the experiences from Marx's method of constructing a theoretical model for describing the features of the doctrine (Uchida, 2000).

Kiyoshi Miki's descriptions in chap. 4 of this essential writings " Marxist's morphology of humanity" presents a very important model of the way how humankind interacts with his environments. Each experience requires him for any logos to represent himself

corresponding to his growth. But, the logos is intrinsically "different" from the experience. Although experience requires some ideology, that is "different thing", for his own growth, the "different thing" must come out in a recognizable habitat which fosters his own experiences. In other words, the experience comes out from himself and moves into "the different thing" and this "different thing" is what is made of his experience. That is, to move into "the different thing" must come up with "to come back to the self ". Therefore, the relationship, that Lenin used to love, between two concepts of self-growth and objective consciousness has to be understood dialectically as mentioned above. And requirements for dialectical aufheben of ideology and experiences always seem to require scientific analysis of experiences in the existing conditions. Consequently, ideology, because of the requirement of dialectical aufheben, has to make changes and developments of one's experiences as well as to make changes and developments of oneself. The development of experiences and the development of ideology set limits on one another. This is the reason why, so to say, "turn of doctrine" is required during the process of generating an ideology.

The method as described above is appreciable in the meaning that it tried to present a theoretical way of organizational creation process and suggested the temporality of the vision/goal. However it does not seem to advance thereafter.

In the next, we understand an important role of co-created and shared vision through the followings sentences, chap.2 “Continuation and event” and chap.4 “Trust in terms of reduction of complexity" of Niklas Luhmann's book "VERTRAUEN"(1990).

---The base of describing our world is the present status of real experiences which exists actually, and this base makes it possible for time, the world, and extremely irregular complexity itself to exist to be recognized. All possibility of complexity is reduced through this present status to the possible realities that can be experienced. The existing recognition which is related with the present realities helps to grasp and simplify the extreme complexity and to regulate irregularities.

The existence which can be related with the present realities makes it possible for the world to be interpreted, structured and simplified, and for the events to get values in terms of information and to merge with human activity into an alternative selection process. Trust solidifies the continuity of existence of events and makes it possible for human beings to live and act along with the large complexity of events. ---

For instance, when TPS either receives a comment of agreement from a dependable participant or feels agreeable with a dependable participant's recognition concerned with a new issue, TPS can feel more confident with his beliefs and proceed to the further step.

Now, we have to distinguish Luhmann from Lasswell. Luhmann was concerned with the method where a co-created model played a decisive role in the decision process. On the other hand, in Lasswell's method, a model is used to recognize the temporal situation. We have to remember the Lasswell's argument that he presents a method to clarify a dominant contour of the reality. Either a policy which requires discussions of a perfect justice or a policy which assumes to prescribe a decisive final answer may be too difficult to be adopted in this complex society. The author believes that Lasswell proposed a progressive and practical method.

In the foregoing, we investigated several past inheritances concerned with the relations among status recognition, analysis of the context, and act of goal clarification, and found quite a few of different methods. The next problem will be whether we can put those in any order of superiority, or whether we have to accept intrinsic diversity of methods.

Michiko Arima reconstructed a model of individual's creation process. In section 4 "Synecism and Anatomy of its interpretations" of chap.2 "Peirce's Semiology and Linguistics" of her book "Peirce's philosophy", she described that Peirce proposed the concept of Synecism which is the activity of continual combination of three salient aspects(Arima, 2001).

---The first aspect is iconic, as fuzzy as physical experiences or instinctive interpretation of the results of science and technology's experiments, and closely connected to creativity. The second is of the features of index, represents pragmatic relationships, and is realistic. The third is symbolic, linguistic as well as conceptual, and is related with the process which combines the iconic with the index, and is classified into context-oriented and context-free according to the way how it is related with the context of the process. Person of "context-oriented" is "consistent, circulatory, selfish and dominant" and is usually high social conscious due to the mind of shared contexts. On the contrast, person of "context-free" is "logical, explicit, and innovative" in one way, but "imprudent in passionate arrangements, volatile to accident or contingency" in another way. ---

The above sentences tell that creative process of individuals includes various aspects in nature. In parallel it suggests that each actor of each organization is characterized with his own native features in his creative process, as business decision-maker may be more

interested with indexes as well as symbolically context-oriented, and as research engineers may be either iconic or symbolically context- free.

Arima argues further and introduces the well-known following function. The way how the feeling and passion of the primary aspect are related to the object of the secondary aspect depends on the intermediary of language (or its alternative symbol) which is social symbol. The feeling and passion which are going to emerge as the product of the primary aspect will neither disappear nor lose themselves, but will be carried over into "their own field" (differentiated) to be held soundly, only if those are symbolized integrally (by synecism) in a linguistic symbol which is socially agreed. That is to say, self-consciousness is produced as the result of representation by language.

In the above, we visited the creation process of individuals guided by Peirce and almost found an entrance to the creation process of an organization. In the latter, a person who belongs to one of its sub-organization has all three aspects in person, but he is more familiar to some particular aspect of the sub-organization which he belongs to. Therefore, we should not understand that any sub-organization lead creation process of the organization, but all sub-organizations is expected to collaborate in the field of collaborative creation process with his particularly dominant capabilities.

As for the total design of organizational creation process, we describe strategic integration processes in the next section after visiting another way in the followings.

Another Way of Building TRUST

Lasswell wrote on the way to resolve the conflicts among participants in policy process in chap.6 "Professional Services: The Constitutive Policy Process" of his book "A Preview of Policy Science" (Lasswell, 1971). It can be applied to our case of creating a shared vision through iterative exchanges of participants' views in an organization.

---The following analysis narrows the focus to a fundamental dimension of the problem of planning of power allocations. *How does one clarify and give effect to common interests and to the resolutions of uncertainties and conflicts among them?* For Convenience exposition we consider first some principles that relate to the allocation of authority. They are followed by principles of control.

(1) *Arrange for common interests to prevail over special interests.*

(2) *Give precedence to high-priority over low priority common interests.*

(3) *Protect both inclusive and exclusive interests. Give preference to inclusive interest when protection of the purportedly exclusive interest involves significant value deprivations of the larger community.*

(4) *Give preference to the resolution of conflicting assertions of exclusive interest by the participants whose position is most substantially involved.*

(5) *In addition to authority, allocate base values of sufficient magnitude to enable authority to be controlling.*---

Those principles present a way to satisfy a part of the necessary conditions for managing complexity given by Warfield, such as the control of escalation of complexity, the reduction of cognitive burden on the designers, the elimination of the destruction set, and the provision of the enhancement set. Those can be understood as principles of managing participants of vision clarifying process in the collaborative field.

STRATEGIC INTEGRATION OF THREE MODELS IN ORGANIZATIONAL CO-CREATION PROCESS

Organizational co-creation process for goal clarification can be shown in Fig.5. It can be compared analogically with individual's creative process. This process requires answers for the following three problems.

Problem 1; what is a good vision shared in enterprise R&D process?

Problem 2; who is responsible for integrating/socializing function in clarifying a shared vision?

Problem 3; what is an effective collaborative decision-making field for goal-clarifying process?

Problem 1; what is a good vision shared in enterprise R&D process?

An example of a good vision from the context-oriented aspect may be a good vision for the business decision-maker's, such as a technological idea which bring about a success in terms of taking a big sales contract near at hand, or an idea related to an effective production-cost reduction scheme. Another example of a good vision for R&D organization may be identification of a new technology that is highly possibly able to lead a new emerging sphere of the science and technology in the world. The other one for

marketing organization may be creation of a hypothesis on a potential market that is expected suddenly to grow after two years later. On the other hand, an example of a good vision from the context-free aspect may be creation of architecture with high universality from an application engineer's aspect.

In comparison with several good visions exemplified as above, the most acceptable in terms of logical persuasiveness must be a vision from integrator's aspect, that is, a vision which satisfy the requirements of the larger participants.

Problem 2; who is responsible for integrating/socializing function in clarifying a shared vision?

What is a vision from integrator's aspect? It must depend on the way how to merge technology development activity, market exploring activity, and business activity into integrated enterprise activity.

It is well known that linear developmental model can not catch up with the speed and complexity of technology and market change. Assume that you believe in Peter Drucker's Law "whoever can provide a component which is indispensable to complete a system but not available as yet, will get money". Then you must make a promising business even by publishing a junk-bond in order quickly to get money to develop the system in speed, so far as you find such niche market and develop the most needed system in the shortest period. In the case that we can adapt corresponding functions of our organization to environmental changes with small inertia, this sort of vision may be feasible. But, most of usual business with its considerable size will see that it is unpractical.

Can we use the idea of "Apparatus of Capture" of DELEUZE and GUATTARI (-, 1980) for an alternative integrator?

We know four types of R&D engineers in enterprises, type A(research engineer in the classic system, retained scholar), type B (developer of current products, labor (R&D worker)), type C (research engineer acting in a realm of some combination of technology, market, and business division, with mission of attaining cannibalization of big products, in such fields as CMOS and Storage, smithery or metallurgist in the definition by Deleuze and Guattari), and type D (explorer of new technology or market, nomad). What types of engineers do we need? How can we design our apparatus of capture?

In the case of development of a new field (technology, market), what is found by nomads has to be managed in order gradually to grow as a key component of a sound system,

through the process of creating a crude structure by combining it with other components and of consolidating the structure towards something manageable within the organization, that is, of being caught into a system of labor's work. Should improvements of this process be recognized to be difficult?

In other words, we have to take into consideration the policy process to let APPARATUS OF CAPTURE effectively work by catching something valuable and incorporating it into the organization. This is a different problem from a policy process to stabilize an organization (to counteract against a forecasted inadequate consequence of the present policy) or as a policy process to resolve a problem. Further, this difference is different from one between a problem and a problematique. We have to pay attention to different types of problematiques. Organization has to create an alternative strategy based on broader views. For instance, it should not require only reasoning for selection, but also a way of letting employees act more consciously and aggressively.

In a relatively simple example of this case, a strategy to resolve a problematique may be to set up a problem in order to focus on a scope and increase the consciousness of the participants to solve the problem.

Another example may be the case such as CMOS or Storage, where it is the mission of R&D group to achieve an innovation, although some target may formally be pursued by collaborations of technology, market, and business. This may correspond to an example of metallurgist and smiths of DELUZE and GUATTARI (1980). It implies expectation of appearance of a research engineer with a vision, that is, a creation of vision. In this case, it, needless to say, is indispensable to make it sure whether the original problematique has been resolved or not after the corresponding problem has been solved.

A more difficult, in terms of management process, case may be related to exploratory development of any new (technology, market, or business) field, since it requires organizational cut-and-try (execute and think) process. DELEUZE and GUATTARI gave a process model of "APPARATUS of CAPTURE" as an organizational cut-and try process. They showed how a nation captured new war machines from neighboring nomads. Also, they showed how capitalistic society captured monetary stocks from taxation systems. Enterprise has to develop any counterpart model of apparatus for capturing new technologies efficiently.

This concept of "Apparatus of Capture" seems to take it for granted that a prescribed vision is not a necessary condition for resolving most sets of problematique. In the case

of restructuring an organization, we often observe that some apparatus of capture starts reactively and that people alternately execute and think in cut-and-try because they can not find the way to solve the problem beforehand. In such cases, people expect that integration of information that is the outcome of each exploration may suggest a broader sight of map which gives some direction for the succeeding exploration.

Concerning the relationship of recognition of status (experiences), identification of dependable contexts, and clarification of goal, Lasswell argues that such a solution has to be created that reduces the gap between one future which is forecasted in the case of no counteraction and another future which is described by Developmental Construct, in other words, a goal which has the specified preference of value vector of the participants related to the context. It is understood that this model is adaptable for the above mentioned cases of problematique. This model which consists of map and direction may be interpreted as a model of APPARATUS of CAPTURE as described in the followings.

What is found by nomads has to be managed during the process of creating a crude structure by combining it and other components and of consolidating the structure towards something manageable within the organization, that is, of being caught into a system of laborer's work. The activity of identifying and creating a new market requires to encounter while wandering, to construct piece by piece a patchwork, and to try to transform it to industrial fabric once it suggests any promising pattern for industrialization. Here, we don't see any inevitability in terms of historical, societal, or economic reasoning. Rather, we are afraid of countless seeds of accidental violence to cut off the thin chain of enterprise R&D process. This capturing process of exploration, patchwork, and transformation is the goal-clarifying process and is difficult to manage, isn't it?

Now, the investigation on the problem 2 will be closed with the conclusion that goal-clarifying activity has to be managed in organizational policy process.

Problem 3; effective collaborative decision-making field for goal-clarifying process

The concepts of platform (technology platform, business platform) and technology policy staff are worthwhile for effective capturing process and field. The followings are three strategies to implement the concept of platform.

Strategy 1: technology platform (Rosenbloom and Spencer, 1996);

(1) Highly productive research requires the corporation to build the organizational capabilities--firm-specific knowledge, communications of practice, and technology platforms---that are needed to realize its strategic visions, if any. A technology platform, depending upon the industry, may be expressed in the design of a core product, a critical manufacturing process, or the organizational routines of a service operation.

(2) Research management must deal with both technological and market uncertainties and

with their interactions. New technological concepts are continually tested within a larger vision of future markets through a series of practical learning experiences of limited scale with customers. Reconfigurable as well as extensible platforms, or ensembles, of technologies is indispensable to build prototype systems, which then engage the cutomer in collaborative development. Also because opportunities are multiplied if the platform permits ready recognition and easy substitution of important components, the architecture of a technology platform is critical.

(3) A collaborative development team works with a lead customer to come to a shared understanding of a important problem that may be solved by an emergent technology. Based on the team's understanding of the customer requirements, a working solution is designed and implemented. This system is evaluated through use, which usually elicits underlying requirements that were not articulated in the first round. This leads to a new round of redesign and evaluation. Collaborative learning can present a mjor learning opportunity for advancing the state of the art of a business solution. Collaborative development team offers a way to explore emergent markets and emergent technologies. This helps to produce products that are naturally attuned to real world product envuronment integration and thus serves to "pull" rather than " push" new technologies.

Strategy 2: bigger theme;

The reason why we talk about two dimensionalities of research (invention of new technology and identification of new market) and business is because the differentiation between heuristics and integrative engineering and the differentiation between direct experience and systematic knowledge comes from the differentiation between research and business. Heuristics and direct experience scarcely creates a big outcome unless it is combined with any integrative engineering and systematic knowledge. The combination needs a strategy. In the case that enterprise can start a field with possibilities of a big success, new problems that may be identified through process of integrative

engineeringand systematic knowledge referencing and new research themes that may be found through problem solving process will interact and produce a limitless creative space all over the corporation. It may be a highly effective strategy to merge research and business development into a fusion of explosive successful outcomes. To initiate a business development project of possibilities of a big success earlier than the competitor must be an extremely effective strategy for R&D management.

Strategy 3: continuos investments on technology platform (Rosenbloom and Spencer, 1996);

The platform is derived from sustained technology investments that are guided by the research vision and bounded by the strategic intent of business. Research mangement must deal with both technological and market uncertainties and with their interactions. Reconfigurable as well as extensible platforms, or ensembles, of technologies is highly required. Even exiting discoveries may become scientific artifacts if the organization cannot relate them to customer needs and then design, manufacture, distribute, and support the new products and services they enable. Technology leadership will turn out to be a shortcomings when it is not matched by overall innovative performance. The most general way is to serve the customer with simplest or focused implementations of the core cocepts. In addition, it is the responsibilities of the R&D organization to read the technology forces of change; to interpret them in the context of present and future markets and corporate work processes; and to stimulate strategic actions in response to them. While the direction of technology and market can be anticipated, this is not sufficient for success. The dynamic skill that is required is the ability to be positioned well when technology change leads to the emergence of a market. It is the ability to read the time confluence of economic, social, political, and technological forces, which are like small tributaries coming together into a swelling stream, that is vital to the corporation. Once the confluence of events is right for a market to emerge, the ability to respond rapidly is essential.

Venture capital investments can be included in a sort of investment schemes for technology platform.

As for the other aspects of effective collaborative decision field, Technology Policy Staff will be discussed in the following session. The concept of BRAND can be understood as an extended scheme for capturing process. It is an enterprise strategy that puts the highest

priority on customer relationship management. It is beyond the scope of the present paper.

THE ROLES OF TECHNOLOGY POLICY STAFF

In the previous paper (Haruna, 2001), the reasons why and how technology policy staff is necessary and key factors in implementation were presented in detail. Particularly, growth as the ability to approach previously chosen goals which is closely related to the increase in the will and power characteristics of the system was relatively more concerned. The more rigorously the system is able to exclude all outside resistance in its way, the more likely it may be to reach the particular goal chosen. In this sense, will and power represent the ability to harden and deepen the temporary commitment of attention and resources, and are essential instruments of short-run steering performance, autonomy, and growth even under uncertainties. There we analyzed TPS's roles for the process as follows;

* As a supporter of strategy creation process, he supports clients to find their ways by their own perspectives, has to build appropriate *incentive-schemes* to empower incentives of participants in order effectively to enlighten and mobilize various participants. For instance, low-powered incentives due to limited and asymmetric information must be overcome. On the other hand, appropriate commitments of decisionmakers or technology policy staffs are effective for higher-powered incentives of the participants.

* "*Trust*" is very important. Its importance was and is deeply described in the previous papers as well as in the present paper.

* TPS should be conscious to make the best use of his position of power elite *independent from power politics.*

Now we take into consideration different kinds of characteristics of the environments, because in the present paper we explore into the goal-clarification/changing process. We investigate the other aspect than "trust" by using the model of organizational goal clarifying process that was analyzed in the previous sections of this paper. When we heuristically found the following issues, the model, Peirce's creative process model, and a short sentence in Kahl Deutsch's book, "THE NERVES OF GOVERNMENT, models of political communication and control" were suggestive (Deutch, 196x). Deutch wrote, "A combined growth in power and in the awareness of limits; in depth of memory and in

openness to new ranges of information; in social, intellectual, and emotional resourcefulness and creativity; and in the capacity for integrative behabior; these, taken together, may well be most conductive to survival in international politics."

(1) Organization can utilize various schemes for mobilizing knowledge and judgement for finding new desires from within organization in the phase of goal-clarifycation. Schemes in proposing process include opportunities to present proposals in symposium, effective selection team, multi-phased proposing process to help superior proposals grow gradually, and so forces. Specified independent group is necessary to collaborate with professions within the oragnization in order to utilize ideas from the outer sources.

(2) In the phase of fixing desire to belief, it is desirable to build an environment where technology policy staffs and professionals who share a mission of developing new business or new products can frequently exchange knowledge and opinions. In this environment, they must understand that information is both informational(the communication of a sign as information) and communicational(the transmission of the words as order-word) and that technological idea or market information includes iconic content that is dificult to be represented in text. Therefore participants should be more careful especially in the phase of this fixation process about that how intensionally words might be transmitted rather than about how correctly content will be communicated. Also because of the dificulty of transmitting iconic order-words, a reseach engineer who invented the idea or a sales person who found the promising market are desired continually to participate as one of key menbers in the succeeding phase. It is an important role of the decision maker and TPS to symbolize iconic content, to mobilize participants and their knowledge, and to foster seeds of vision.

(3) In the phase of fostering vision from beliefs, it is useful to mobilize knowledge and opinions of various participants. If a business man is suggested a technological idea, he may explore and give additional requirements based on the assumption that he makes his business of the idea. His requirements must be a stimulus for engineers to devise further ideas. Such interactive process grows vision. TPS facilitates the process and must be conscious of and make use of complementarity among the various participants.

In this phase, selection of habitat to plant a seed in is a big decision. It is necessary to decide to invest in business platforms in the case of the technology with possibility of big business. Business division usually is apt to stick to the current technology platform and business platform simply because of unfamiliarity to the alternatives.

This phase needs conscious empowerment in its intrinsic nature in order to cope with the speed of change. But sometimes the awareness of limits may be critical. Therefore the institutional aspects, that is organizational structure and the process, is the most critical factor of management of this phase.

(4) Hi-jacking of theme is almost impossible to defend in spite of its large negative effects, if it takes place. So far it remains for further research.

CONCLUSION (IMPLEMENTATION)

Several prototypes by the author showed that the concept of TPS is effective. Consequently, a formal organization that is responsible for the role of TPS has started in 2001 and is growing as expected in R&D group of an enterprise.

In conclusion, the author would like to say,

the concept of technology policy process and its staff TPS that is application of the concept of policy process and policy scientist by Lasswell,

the results of analysis of TPS's role by using three models of Essence of Decision by G. T. Allison, and key factors in implementing TPS in order to build a collaborative field by using the concept of Transaction-cost Politics by A. Dixit,

has begun to demonstrate their approximate correctness in a real world.

Previously we reported that innovation of decision field owing to the digital-media enabled information system is a strong enabler of applying Lasswell's concept. In the present papers a model of organizational conception process in the vision creating phase was proposed by merging Peirce's model of belief fixation and idea clarifying process of pragmaticism, Lasswell's model of policy sciences, and the author's experiences. This model shows how an organization builds up conceptions through a policy process in the field of collaborative creation with a policy scientist who supports the decision maker. Introduction of the concept of "APPARATUS OF CAPTURE" of DELEUZE and GUATTARI into the above process makes it possible to take into consideration effectiveness of the process.

As for analysis of TPS's role in making the collaborative field for goal-clarifying more effective, the author has just started to set the assumptions from results of his experiments

and has a plan to pursue it with a new organization. The plan should include analysis of the role of emergent information technologies with the relation to the proposed model of organizational conception process in the vision creating phase. Because we are observing the demonstration of the capability for emergent information technology to make the reach of iconic space broader as well as time-independent, it will be extremely exciting to see what kind of innovation will appear in the decision field.

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Technology Policy Process

Participants (to be identified) →seeking to maximize values(gratifying outcomes)
→utilizing institutions
→affecting resources.

Fig.1 R&D process as a social process

Intelligence → Promotion → Prescription → Invocation → Application → Termination → Appraisal

Fig.2 R&D process as a decision process

Desire/Idea/Doubt➔ Fixation process (thought) ➔ Belief➔reasoning process➔ Vision ➔ Guiding and nutrition process➔Plan➔ capability and resource➔Action

Fig.3 Individual's Creative Process in Organization

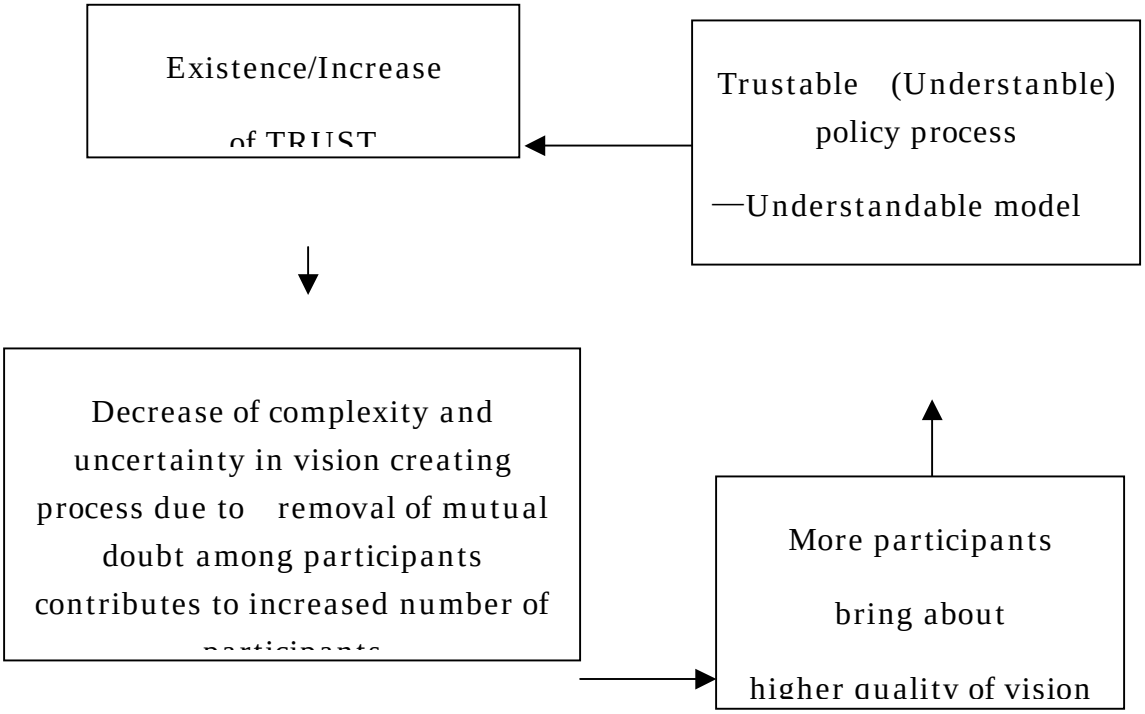

Fig.4 Organizational Co-creation Process and TRUST

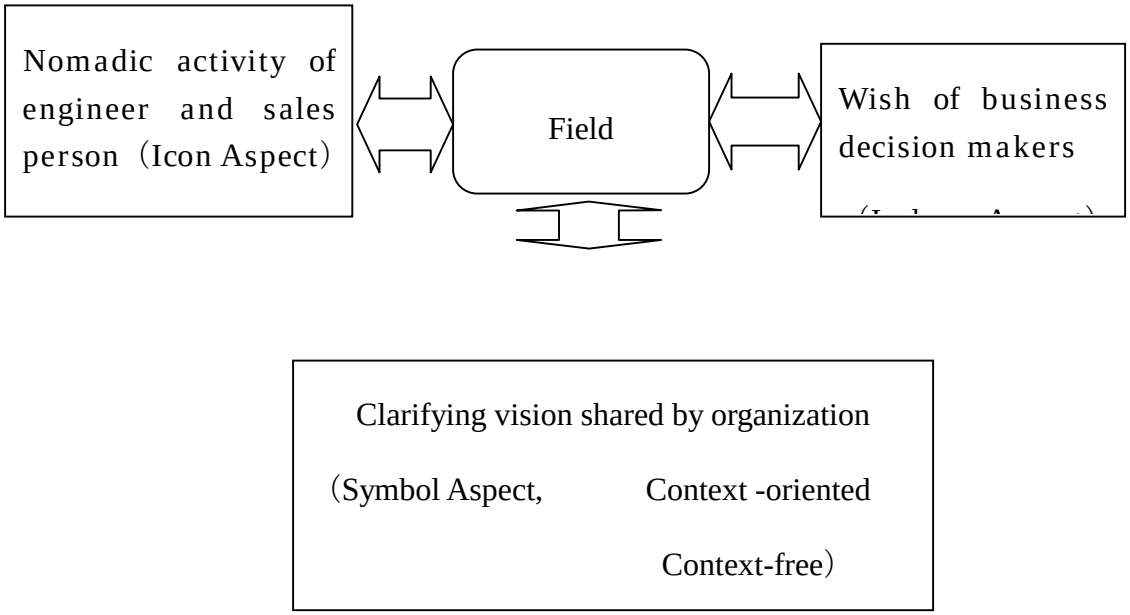

Fig.5 Organizational Co-creation process