

Title	Shifting Boundaries on the Knowledge Landscape : Creativity towards Innovation
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Citation	
Issue Date	2005-11
Type	Conference Paper
Text version	publisher
URL	http://hdl.handle.net/10119/3849
Rights	2005 JAIST Press
Description	The original publication is available at JAIST Press http://www.jaist.ac.jp/library/jaist-press/index.html , IFSR 2005 : Proceedings of the First World Congress of the International Federation for Systems Research : The New Roles of Systems Sciences For a Knowledge-based Society : Nov. 14-17, 2005, Kobe, Japan, Symposium 1, Session 3 : Technology Creation Based on Knowledge Science JAIST COE Program(3)

Shifting Boundaries on the Knowledge Landscape: Creativity towards Innovation

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ABSTRACT

Research on organizational and individual creativity has gained interest not only among scientific researchers, it has also become an important topic in the popular media on business and management. Why this upsurge in interest? Part of the answer comes from the nature of science and business today, especially in competitive fields where the pressure for innovation and maintaining a competitive edge dictates the entity's survivability. Creativity leads to the creation of intellectual building-bricks such as: ideas, concepts, insights, and discovery that through the process of knowledge creation eventually become new theories, approaches, tools, products, and services that motivate innovation. Innovation is thus the social adoption of creative undertaking. This paper argues that it should be possible to distinguish the patterns of innovation according to their level of creativity, the implementation environment, and the outcomes.

Keywords: knowledge creation, creativity, innovation, pattern of innovation

1. INTRODUCTION

According to Landes [1] and Malecki [2], the study of the phenomena of innovation started with the examination of the dissemination of innovations in France in 1903 and in England and Germany soon after. The USA started a study on innovation in the 1920s as part of anthropology, and in the 1930s through examination of the dissemination of hybrid corn. Further Landes identified communication as a fundamental factor in the dissemination of innovations.

Beginning in the 1960s, American and Canadian sociologists and political scientists shifted from study of dissemination of individual innovations to study of higher-level adopters, such as the Governments - see [1, 2, 3, 4, 5]. They considered whether the circumstances or characteristics of the adopters determined whether they were initiators, early adopters, late adopters or laggards in their adoption behavior. Landes speculated

that there is a possibility that innovation adoption did not follow a unique path with each event, but that it adhere to a characteristic form or pattern of behavior. The traits of early adopting governments were examined, and the characteristics of governments and the nature of populations were suggested as possible causal factors. Governments with reputations for innovativeness were only partially explained in this way. In the case of Japan, however, Malecki [2] asserted that there was indeed a governmental trait or pattern of innovativeness. Putnam [5], however, showed that it was an intrinsically embedded social value system that directs the path of innovation.

A different stream of study considered the patterns of innovation within organizations. Linked to the thinking of psychologists such as Margaret Boden [6] and Varela (e. a.) [7], who followed Maslow's footsteps on the concept of *the self-actualizing individual*, they related innovation to personal motivation. A personal trait here, *self-efficacy*, allows individuals to remain in control, self-motivated, effective and innovative in most situations.

Management science, on the other side, put emphasis more on individual leadership roles in changing the organizational structure, organizational culture, and employees' motivations so that change and innovation could be introduced more easily. Here, factors such as leadership and techniques creating irresistible forces for change were identified, almost always with the view that there was one best way to run any organization and to create innovation. These ideas had at least the potential to describe organizational functioning in creating innovations in terms of patterns rather than merely as the product of innovation decisions that achieved pre-determined outcomes. Patterns acknowledge and integrate the effects of combinations of individuals, organizational culture, structures, and ideas at work in organizations.

During the 1970s, some historian and theorists of change, including Landes, began moving away from concentration on both organizational and individual traits and roles. Instead, they started to see change as a

process. These efforts to explain change have used organizing concepts, such as contextualism; population ecology models; organizational life cycles; power in organizations; political models of change; social action theories, the organization and situation as defined by individuals. Melluci [8] for instance had used political and social action models of change, individual perceptions were seen to play a tremendous role by Watzlawick [9], etc. These ideas had at least the potential to describe organizational functioning in creating innovations in terms of patterns rather than merely as the product of innovation decisions that achieved pre-determined objectives. Patterns acknowledge and integrate the effects of combinations of individuals, organizational culture, structures, and ideas at work in organizations. This paper attempts to expand the notion of innovation occurring in patterns by developing some hypotheses and performing analyses.

2. METHODOLOGY AND HYPOTHESES

With the purpose to investigate the value of interrelating the individual and the collectivity, this paper relies on Boden [6], Watzlawick [9], Gorayska [10], and Osborn [11] to develop a model that operationalizes the linkages between individual values, organizational environment, and outcome. This paper attempts to identify innovation patterns created in different *individual motivation*, *organizational culture* and *environments*. This approach allows us to observe at one time three major forces that influence innovations and to explore the nature of the patterns formed. For this purpose, we firstly defined the criteria for the three dynamics. Next, motivation, organizational culture and challenge are formed into eight innovation patterns, which relate the dynamics. Subsequently, example of each pattern is identified. Finally, the implications of the eight patterns for the creativity, implementation and outcome of innovations are explored.

2. 1. Hypotheses

Four hypotheses are proposed in this paper:

1. Innovation occurs in patterns.
2. How people are motivated, the culture of a government organization and the magnitude of challenge are key relationships in determining patterns of innovation.
3. Innovation patterns predict the creativity of the ideas considered, the implementation environment and implementation challenges to be faced, and the fate and impact of innovations.

4. The innovation patterns help to identify the key issues to which special attention should be paid during the implementation process.

2. 2. Criteria for Individual Motivation, Organizational Culture, Challenge

Based on Boden [6] and Watzlawick [10] analysis, criteria for the three dynamics are identified below.

Motivation. *Intrinsic task motivation* is to be created through: (1) meaning (value of work goal or purpose), (2) competence (self-efficacy), (3) self-determination (autonomy in initiation and continuation of work, plus self-determined goals), (4) impact (influence on work outcomes). As the variety of definitions for motivations show, individual motivation is not static. *Extrinsic motivation* include: (1) productivity (efficiency), (2) service-enhancement, (3) organizational control, and (4) risk avoidance, (5) influenced by individual, job, work environment, and external environments, (6) arbitrary rewards and goals. What motivates someone in one personal state and one environment will not be identical to what motivates them in another, but individuals tend to have patterns of motivation—to be typically intrinsically or extrinsically motivated.

Organizational Culture. A *bottom-up culture* is characterized by: (1) Empowered relations, (2) Decentralization, (3) Organizational *slack* (excess capacity), (4) Professional/people and task/business cultures, (5) Emphasis on interpersonal communication patterns, (6) Some degree of democratic control in the workplace. A *top-down culture* is characterized by: (1) Hierarchical relations and a focus on the control or authority structure (2) Centralization and formalization (3) Role and power cultures (4) Emphasis on formal communication patterns, (5) Emphasis on structure, (6) Provision of direction to innovate from above.

Challenge. Challenge basically has two aspects, *risk* and *relative advantage*, and can be distinguished between a *minor challenge* and a *major challenge*.

3. THE PATTERNS

The model of innovation incorporates the dynamics of individuals, organizational culture and the challenge into patterns. Interrelating the three dimensions constructs a map of eight innovation patterns that have been named reactive, imposed, active, necessary, proactive, continuous, buy-in, and transformational innovation (Table 1). They are described below.

Table 1. Innovation Patterns Based on Motivation, Culture and Challenge Dynamics

Innovation Pattern	Motivation	Culture	Challenge	Example
<i>Reactive</i>	Extrinsic	Top-down	Minor	Budget adjustment
<i>Active</i>	Extrinsic	Bottom-up	Minor	Our Missing Children
<i>Necessary</i>	Extrinsic	Bottom-up	Major	Naval Repair Unit
<i>Imposed</i>	Extrinsic	Top-down	Major	Literacy Policy
<i>Proactive</i>	Intrinsic	Bottom-up	Minor	Public - Private Sector Partnerships
<i>Continuous</i>	Intrinsic	Bottom-up	Major	Health Promotion Program
<i>Buy-in</i>	Intrinsic	Top-down	Minor	Capacity Building Program
<i>Transformational</i>	Intrinsic	Top-down	Major	Papua copper mine take-over

Extrinsically motivated innovations are often oriented to solving problems. The innovations are either programmed ahead of time or introduced in response to stress, distress, or any other stimulus from environment. Among 150 innovations studied, Leonard [12] found that almost 49% were responding to internal problems, 30% ahead of crises and 19% to political factors. Katz [13] also found a similar figure. The crises and political factors have been identified created extrinsic motivation. When innovations of minor challenge are created in a top-down culture in combination with extrinsic motivation, *reactive innovation* results. The mixture of a top-down culture and major challenge with extrinsic motivation forces innovation on employees and produces *imposed innovation*.

Extrinsic motivation can also occur in bottom-up cultures, though one of the objectives of such cultures is often to induce and facilitate intrinsic motivation. This combination could occur, for example, when exterior forces such as budget deficits affect on organizational units. Although in such a situation staffs are not intrinsically motivated, they can organize to deal with the challenge in a bottom-up fashion. This unusual combination of extrinsic motivation with a bottom-up culture produces *active innovation* when combined with minor challenge. Extrinsic motivation combined with a bottom-up culture and major challenge produces *necessary innovation*.

Intrinsic motivation produces different kinds of behavior: There is more problem-seeking and more problem-solving at the local level than when people are extrinsically motivated. Intrinsically motivated innovations oriented toward problem finding often grow out of *looseness* in the organization according to Boden. They result from personal initiative, when individuals have or create the time to focus on something besides their immediate work: In such cases, the individual takes steps to deal with organizational or governmental problems either because the problem interests them or because the process to solve the problem interests them.

Leonard found 49% of the innovations he studied were responding to internal problems and 33% of the innovations were created in response to opportunities. A combination of intrinsic motivation with a bottom-up culture and minor challenge produces *proactive innovation*. Proactive innovation can also be seen as problem focused, but the creation of solutions before agreement to solve the problem has been achieved within the organization places it in a less-convergent, active, problem-solving category.

The combination of intrinsic motivation with a top-down culture and minor challenge creates *buy-in innovation*. In an environment where individuals are intrinsically motivated but there is a top-down culture and major challenge, *transformational innovation* is created. Intrinsic motivation combined with a bottom-up culture and major challenge creates *continuous innovation*. In continuous innovation major change is created both through cumulative minor changes and through periodic major changes.

4. DISCUSSION ON PATTERNS

Bandura [14] and Landes has suggested that the course of diffusion of innovations is best understood as a product of interactions among psycho-social determinants, network structures, and properties of innovations, and that structural and psychological determinants of adoptive behavior should be addressed. These factors are very similar to individual motivation, the organizational culture and the challenge of an innovation identified in this paper.

A pattern of thinking or culture is, according to Capra [15], “a configuration of relationships characteristic of a particular system.” The study of patterns therefore focuses more on form rather than substance. Although the systems approach does not emphasize structure, patterns are consistent ways of doing things. In that regard, the three factors can be seen as being in

relationship. The individuals within an organization relate to themselves (individual motivation), to each other (culture) and to the innovation (challenge). Together these relationships among the individual, collectivity and challenge interact to form the eight patterns identified in this paper. They do so, however, within a context that consists of the processes of self-regulation, both *autopoietic* according to Maturana [15] and responding to stress, distress, or stimulus impacting from the environment or from the sources within the organization.

The work of Putnam [5] on civic culture and its relationship to good government, innovation and progress raises the question of whether organizational culture and societal culture are related. Although this paper did not deal with this issue, the context provided by governmental, private and non-profit organizations is important. If it were true that organizations tend to replicate societal patterns, and that method of interacting within organizations mirror methods of communicating in societies, organizations could be expected to have vicious and virtuous circles internally. This would help to explain the innovation adoption patterns of organizations.

The relationships as proposed in this paper are identified as *motivation*, *organizational culture* and *challenge* of the innovation do not stand-alone. They are influenced by factors in the innovation dynamic like the process of self-regulation, sources of order /stimulus, outcomes as they become a source of feedback, and the environment as it influences the organization. Hence, innovation is likely to occur in patterns similar to those already established in the organization, and possibly those already established in the society. Because the same forces are at work on the innovation, the organization and the society, innovation is embedded in and may tend to imitate the patterns around it. However, because innovation also involves creativity, will, change, and new combinations of patterns, unique action occurs. The amount of unique behavior is what the innovation pattern is largely reflecting. Of primary importance is the role of patterns, as Maturana [16] emphasized, "The central characteristic of an autopoietic system is that it undergoes continual structural changes while preserving its web-like pattern of organization."

Just as Putnam has found, societies have consistent configurations of relationships, organizations have patterns of ways of doing things - including innovation - growing out of the dynamic interaction of individuals, organizational culture and the challenge presented by the innovation.

5. TRACE OF PATTERNS IN THE EXAMPLES

The patterns constructed in this paper suggest that the factors motivation, culture and challenge can be identified.

Recognition

The question to ask here is whether the factors and patterns can be recognized in the real world. While the distinction between intrinsic and extrinsic motivation has important implications for innovation, as discussed in this paper, Capra [15] found that it was difficult to distinguish them. Social and organizational psychologists, Watzlawick for example, could not distinguish clearly between intrinsic and extrinsic outcomes (not motivations as such). As a result, the utility of intrinsic and extrinsic motivation as practical tools could be in doubt. This presents a potential problem for the innovation patterns model being developed in this paper, as the model is meant to be a guide for practical applications.

Identifying Examples of the Patterns

The next issue to deal with is whether examples of the patterns can be found in the real world. The starting point of this paper is that examples do not map in a one-to-one fashion onto every possible criterion, instead multiple maps onto several criteria.

Reactive Innovation: Introduction of operating budgets in the Government. For many years, according to Friedmann [17], many Governments including Canada used a line item budgeting system in which each type of activity (e.g. salaries, travel, capital) was approved separately. In the 1970s program budgeting was introduced in a variation of the so-called Policy and Program-Based System (PPBS). By 1980s it had been abandoned, and line item budgeting was re-introduced. In the mid-1990s a variation on line item budgeting was implemented, called operating budgets. Operating budgets permitted funds to be transferred between salary and non-salary (excluding capital) budgets. Operating budgets were introduced following a period of cost cutting during the 1980s and early 1990s, as the government moved into a period of major cuts to government expenditures. They allowed departments more flexibility in dealing with cuts, and facilitated lay-offs and contracting-out.

Operating budgets were an initiative of the Treasury Board Secretariat, introduced in a top-down manner. TBS staffs were extrinsically motivated by the need to deal with the large government deficit and the need to give departments tools to deal with government's fiscal

strategy. The operating budget innovation presented a minor challenge to staff, as it facilitated both the TBS' objective of reducing budgets and the departments' objective of dealing with smaller budgets. It did not require departmental approval. The challenges faced by staff were small and involved minor changes in power relationships as the transfers still required Treasury Board approval. The challenge posed by this budgeting innovation was thus minor. The impact on hierarchical relationships was minor and changes were incremental.

Active Innovation: Return Our Kids. Return Our Kids was initiated by organized parents and guardians with the help of non-profit organizations (NPOs) in Indonesia to deal with the lost children mainly by 'illegal adoption' after a tsunami disaster over Aceh region in the end of 2004 that left most of the kids saved from the tsunami out of proper support for living. These 'illegal adoption' cases were often committed by foreigners who subsequently took the child out of the country and beyond the reach of Indonesian law. These Acehnese parents and guardians and their supporters organized through Return Our Kids, create a program to search for these children across borders.

The goal of the program is to help locate illegally adopted children and return them to their proper guardians. This initiative lately evolved to be a national task-force body that involves the Indonesian Customs Agency, the National Police, Immigration Ministry, the Department of Foreign Affairs and International Police (Interpol) as well.

Indonesian public officers involve in the task force are those with regulatory and some police-like authorities, and a role-based, top-down culture. This culture received a shock with the appointment of a non-directive woman, Nursyahbani Katjasungkana, as head. With no one telling them what to do, and with no additional resources or compensation, these public officers responded to the request of the parents and the kids relatives, agreeing to take on the added responsibility of the program. The initiative was therefore extrinsically motivated but was responded to in a bottom-up manner. It presented a minor challenge since it involved minor changes to operations and incremental change, and is therefore an example of active innovation not required by the environment.

Necessary Innovation: Naval Repair Unit. Naval Repair Unit repaired ships for and is part of the Indonesian Naval. It was a top-down culture itself and was in complicated Union - Management relationship as such. The Indonesian Naval, its main employer, was a power, top-down culture. In 1990s the Repair Unit faced

major budget cuts and the possibility of closure of some of its repair docks in the Eastern Indonesia. Facing this problem, the Union Leadership attended a National Joint Council (NJC) meeting. NJC is a nation-wide council that includes in its membership senior-level central agency management representation. At the meeting the Union Leadership saw a presentation on a change model known as a strategic alliance. Based on earlier experiences working together on a quality program, the Union Leadership approached Management with the idea of creating a strategic labor-management alliance, which eventually agreed. Together they developed strategies for dealing with a common problem - the need for substantial cost-cutting measures - and agreed to Union Leadership membership in several committees, including the local Human Resources Committee. Total management control of human resources, especially staffing, and the lack of a seniority system, was a source of Union - Management conflict. In face of looming disastrous problems, and despite the top-down national and local organizational cultures, Management was willing to accept the Union Leadership's suggestion and manage in a bottom-up manner at the micro-level. The challenge faced by Union and Management was major: It involved a major shift in current ways of operating and some changes in power relationships.

Through agreed cost-cutting measures, Union Leadership and Management avoided lay-offs during the first round of cutbacks. In an environment of scarcity, the Union Leadership and employees of Naval Shipyard East chose to create both the strategic alliance and effective solutions. The alliance created a much more positive working environment that included workers participation in resolution of human resources issues. While the budget cuts and eventually lay-offs were externally imposed, the partial solutions were intrinsically motivated and had a good deal of employee support.

Imposed Innovation: Literacy Policy. Literacy Policy was the Indonesian Province of Papua's response to the 1980 National Year for Literacy. In 1980, Papua's primary literacy program was started as a State - sponsored Adult Basic Education (ABE) program for those who had not completed primary school. Those who succeeded in the program received a primary school diploma and optionally can continue to secondary school. Although the program was provincial, it was funded by the National Government. However, national funding for the program had been declining over the 1990s.

The high rate of illiteracy in the province was highlighted during the National Year for Literacy. The provincial government formed the intention to improve this pattern, in the context of declining resources, a provincial deficit, and one of Indonesia's poorest provinces. Literacy Policy was thus an example of innovation induced by stress. It was extrinsically motivated: The high illiteracy rate demanded a response, but sufficient funds were not available.

In answer, the provincial government, a top-down culture, in a top-down fashion, decided to adopt a new decentralized model for literacy training. The literacy program was transferred to the control of local non-profit organizations. These organizations, largely with the help of volunteers, created partnerships with private sector companies, secured space for classes for free, hired teachers and delivered the programs. The Province limited its role to employing program developers through community colleges and funding the instructors, at a non-professional level. All other costs were covered by local partners. Although local literacy organizations wanted more role in literacy policy-making and delivery of programs, they had serious doubts about the approach and their added role without assured compensation. They believed that change was necessary, however, and were hopeful that the changes would create a stronger community base and involve clients more effectively. The community groups had bottom-up cultures of the task.

The new program worked very well; the number of people involved in literacy programs increased five-fold and the students' results on tests went up considerably. Additional resources were brought into the program at the local level, from the private not the public sector. Through decentralization and devolution of responsibility for delivery to community agencies, Literacy Policy converted literacy training from a top-down to a bottom-up culture. While the motivation of provincial officials in the context of the decision was extrinsic, and the non-profit organizations officials' initial motivation for the change was extrinsic, the commitment of both provincial and organizations officials to improved literacy was intrinsic. Implementation in this fashion was a major challenge for the public servants and the organizations officials, since the agreement of numerous non-government organizations (NGOs) was required, new funding had to be found, and a new paradigm had to be adopted—literacy training had never been delivered in this way before. For public servants it involved a major shift in the current ways of operating and thinking about the government's functions and changes in power relationships with a group outside the government.

Proactive Innovation: Development of Public/Private Sector Partnerships Data Base in Public Work. Along with the national program of decentralization in the early 1990s, Public Work Department (PW) of Indonesia decided to create a flatter organization by eliminating ten per cent of the executive positions in the government. Under the government's Work Force Adjustment Policy, which then applied to executives and non-executives equally, staffs were declared redundant and given between six months and a year to find another position.

One executive in PW who had been declared redundant was allowed to work full-time for a year on the development of a public - private sector partnerships database that he had earlier initiated. He secured funding through a different program and was able to recruit staff - some of them on practice work assignments from local universities - to assist him to develop and research an interactive database. It was a unique data base at the time, when public-private partnerships were a new way of doing business for government departments. The database provided information on good practices and was valuable to many. While PW did not provide sponsorship for the project, a NGO posted the information for a time. The NGO provided space on its website for the database, although the issue of keeping the database up to date was never materialized, and the database was removed within a few years. The executive in case spent some time at a management school working on the project, and created the partnership with the NGO to post the database on the Internet. Eventually he left PW, and went to work as a private consultant.

The partnerships database is an example of proactive innovation. The executive was intrinsically motivated and he developed the project in a bottom-up fashion. The challenge presented to the government and the work unit by the innovation was minor, since PW did not adopt or fund the innovation. Any organizational credit or benefit realized from the database went to the NGO. The challenge to the individuals involved and the NGO was also minor since it involved operational decisions, incremental change and no changes in power.

Buy-In Innovation: Capability Building Program (CBP). Beginning in the late 1980s, the City of Batam, in Indonesia began a process of restructuring of the city administration. It explored the idea of a Total Quality Management program, but did not introduce one, instead introducing a human development plan initiated under a CBP. Led out by the Office of Planning, three staffs were hired to implement this management training

program and later a training program for a wider group of staff. Its purpose was to introduce a cultural shift.

The city's program was introduced in a top-down manner. Out of the Office of Planning, staffs were initially enthusiastic and intrinsically motivated to improve services to the public. However, over time the staffs found it hard to continue to find ways to maintain enthusiasm on an ongoing basis. Staffs did not take control of the opportunities and the program did not develop its own momentum. As with many other suggestion programs, management implemented very few of the ideas developed by staff. The city broke down its overall effort to improve service and operations and motivate staff into small groups by developing a number of separate programs, and thereby succeeded in keeping the challenge to a minor level. Had Batam faced the challenge of creating a culture of continuous improvement, this would have been a major challenge. It failed to address this challenge and instead faced the minor challenge of introducing and maintaining a CBP for several years. Batam therefore addressed a minor challenge and created buy-in instead of continuous innovation.

Transformational Innovation: Papua Copper Take-Over. Following exhausting negotiations for power redistribution and extension of mining rights with the biggest copper mining in the world, Freeport McMoran Indonesia (FMI) during the late 1990s, in 1996 the Government of Indonesia (GOI) introduced legislation that allowed it to assume ownership of the industry. It did not use this power, but rather purchased a controlling interest of the industry. Provincial ownership was consolidated in the FMI. The government was subsequently able to expand the industry, maintain head-office control, and introduce a number of new initiatives such as a Work Environment Board that involved sharing of power among workers and management.

The FMI take-over was therefore done in a role-based, top-down manner. The initiators had intrinsic motivation to find a way to secure better economic earning from the industry in the province, expand the industry and create head-office control. Staff in the Department of Mining and Energy, the responsible department, did not share this motivation, seeing their role as one of service to the industry. The challenge was major, involving policy and structural changes, the challenge of a major shift in the department's ways of thinking about its functions which remained unmet, and a change in power relationships with a group outside the government. The result was a major change in policy

and power relationships, and the impact on the industry was major.

Continuous Innovation: Health Promotion Program. The health promotion program (HP) of the Netherlands has attempted to introduce health promotion programs into health system. In the process, HP created a new profession, *health educator* (Katz [13]). More recently it has also introduced prevention programs. The Health Promotion Directorate grew out of the National Commission investigates of the possibility of legalizing marijuana in the early 1970s. Over the years the directorate created a series of new programs. Under a Democrat government from 1980 to 1984, alcohol and drug, nutrition and anti-smoking programs were created. Under Socialist government from 1984 to 1993, special short-term initiatives were created, related to specific diseases such as HIV/AIDS and Alzheimer's disease, problems like family violence, and special population groups such as children and seniors, etc.

Internally HP did not have one culture: It functioned internally and toward its clients as a culture of the task, but toward the rest of the department and the public health system, it functioned as a power culture. Because it consistently conducted consultations with NGOs and later provinces, HP was more inclusive than most national programs. At the same time, HP also assumed leadership in determining the direction of health promotion and public health in the Netherlands. The Directorate's strong strategic and tactical leadership, political flexibility, financial resources, community-based power base, and understanding of communications allowed it to create *continuous innovation* over the course of thirty years. The HP program involved intrinsic motivation, a bottom-up culture with NGOs and a major challenge - changes in strategy and policy, in the existing ways of operating, and in power relationships.

6. CONCLUSION

The analysis presented is concerned with how the relationships among individual motivation, organizational culture and magnitude of challenge interact in an organization to form innovation patterns.

An idea is not an innovation - an innovation does not exist until it has been successfully implemented. Long-term survival of an innovation depends on its becoming internalized and institutionalized, and is bound up with the political climate. Although public servants cannot initiate all innovations, they do initiate some and could initiate many more, given the right

climate. The impact and fate of these patterns would be an appropriate next issue for consideration.

Reactive, imposed, active, necessary, proactive and buy-in innovation generally produce low creativity and minor impacts. When high creativity and major impact occur, they usually do so in one of three ways - through use of power from the centre; through ongoing, cumulative changes that produce a continuous impact; or through discontinuous, large leaps that produce a transformational impact.

The advantage of a model that integrates motivation, environment and magnitude of challenge is that it points to where an organization may have problems, and in which of these three domains it may need to act in order to encourage innovation. Proponents of an innovation that observed their governments following a reactive pattern might, for example, choose to take a more bottom-up approach and to assume bigger challenges.

Future research should focus on analyzing additional cases to confirm the existence of each pattern and to address whether the patterns are different in their outcomes. The research should ask whether the predicted outcomes were in fact found, and whether it is possible to pin-point a specific domain or domains - motivation, culture or magnitude of challenge - where intervention was most needed and most effective in encouraging innovation.

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This work is partially supported by the 21st Century COE Program titled 'Technology Creation Based on Knowledge Science' at the Japan Advanced Institute of Science and Technology