

ORGANIZATIONAL INFLUENCE PROCESSES IN SOFTWARE PROCESS IMPROVEMENT

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ABSTRACT

In this paper we investigate organizational influence processes in software process improvement. We analyze an improvement effort through the lenses of organizational influence theory. Our analysis suggests that the framework can explain several significant organizational complexities in software process improvement. Further, the framework point to relevant actions for managers of software process improvement. This will have implications for the creation of effective software process improvement.

1. INTRODUCTION

In the last decade software process improvement (SPI) has emerged as the dominant paradigm for increasing productivity and quality in organizations developing information systems. The paradigm takes a starting point in the work by Humphrey, Paulk, Curtis and others at the Software Engineering Institute at Carnegie Mellon University (e.g., Humphrey 1989, Paulk et al. 1993) and their work on the Capability Maturity Model (CMM). The theoretical foundation of SPI is rooted in the technical perspectives of engineering management and total quality management. The high rate of failure of SPI initiatives have prompted some researchers to suggest that the SPI paradigm needs to be supplemented with socially-oriented theories of organizational change and politics, e.g., (Nielsen & Nørbjerg 2001).

The desire to supplement the technical rationality of SPI with a social perspective is not new. Bostrom and Heinen (1977) argued the importance of a socio-technical systems perspective to the success of IS change initiatives. Markus (1983) extended the argument by outlining reasons for considering power and politics as a key factor in successful IS change initiatives. More recently Ravichandran & Rai (2000) argue among other things that the success of quality management in information systems development (hence also SPI) largely depends on a sophisticated management infrastructure. Further, Aaen et al. (2001) have argued that the scale and complexity of organizational change under SPI necessitates a managerial rather than technical approach. However, while these are sound suggestions there is a significant need of empirical research that examine organizational factors that affect the effectiveness of SPI change initiatives.

In this paper we investigate organizational influence processes in SPI. We analyze a case of SPI. Our interest is in developing a better understanding of the form and contents of organizational influence processes and their impacts on SPI. In section 2 we present the framework of organizational influence processes. The research approach is outlined in section 3. The SPI case is described in section 4 while we analyze the influence processes in section 5. In section 6 we conclude the paper.

2. RESEARCH APPROACH

The research approach has been a combination of action research and longitudinal field research. A software process improvement project was initially designed as an action research project. In that respect, the action researchers intervened into an IT company with the purpose of collaborative problem-solving focused on software processes and with the purpose of contributing to research on SPI (Hult & Lennung 1980, Checkland 1981 and 1991, Baskerville & Wood-Harper 1996, Avison et al. 1999, McKay & Marshall 2001). A primary reason for choosing action research was that it was the intention to create immediate linkage between theory and practice for the benefit of the practical problem-solving and for the benefit of testing and building practice-based theories. Action research at its best does exactly that; it validates findings through immediate action. This is consistent with the SPI paradigm: measure-improve-measure.

The action researchers were not initially attending to the importance of the theory of organizational influence processes; that came gradually. In retrospect, it is apparent that in practice the organizational influence processes played a significant role and that these were understood in action by some of the organizational actors. Gradually we saw the emerging patterns of the organizational processes and were able to relate the patterns to theory.

The research that we report here is also informed by longitudinal field research. We use longitudinal field research to create further validation beyond what can be supported by immediate actions. Based on the research data we seek to provide contextualized understanding of the complex improvement processes we have studied. We take Pettigrew's (1995) stance to study organizational change in context, namely that it requires multilevel analysis (i.e., varying levels of analysis) and processual analysis (i.e., analysis of sequential, temporal and historical dependencies). Crucial is also the element of time in the longitudinal study of organizational change.

In our analysis of the research data we have focused on the organizational dependencies, the organizational influence processes and how they unfold over time. More specifically, we have been through the research data seeking first of all to crystallize the most significant dependencies and influence processes. We have then tried to see the patterns emerging in the data; patterns leading to effective or ineffective improvements. In the analysis we have taken an effective improvement to be an organizational change that is highly visible and pervades the relevant organizational processes to a large extent.

3. THE IMPROVEMENT EFFORT

The IT Company (ITC, the actual company remains anonymous) engaged in SPI with the management's explicit desire to increase productivity. ITC is rather old. It has come out of the accounting department of a bank. It is an information systems development company that has already seen several technologies come and go. Its main customer is still the bank. The rigorousness of banking procedures also pervades ITC's organizational culture though some changes to that have happened in the past.

The SPI project was staffed with a project manager and a consultant from the Methodology Department, two IS product managers, and four action researchers. After a few weeks ITC's software process maturity was assessed by the SPI project. The action researchers' assessment report pointed directly at seven improvement areas. One of these areas was project management.

The improvement of project management was organized and spearheaded by the two product managers in the SPI project, K and S. One of the action researchers, J, was involved throughout the effort.

The Methodology Department and top management had in the previous years tried without success to implement a project manager education and to change the project management culture. The group took on this challenge with the clear objective of effectively changing the practice of the project managers. They rather quickly decided that a complete education for project managers was needed. Further, they decided to establish a standard for good project management. The project management standard should not only contain the generic CMM Level 2 key process areas; it should be specific to ITC.

The improvement of project management was taken by most in ITC to be a huge success. The reasons were several. First, the project manager education became well established. Its success has been assessed systematically. It has now run 8 times and there is a long waiting list. Second, the project management standard has been established and it is in use for a number of related purposes.

In the following we emphasize the organizational influence processes put to work in the improvement of project management. There were open organizational influence processes like ceremonies, education, incentives, self-assessment according to the standard. There were informal influence processes like lobbying and mobilizing other managers.

3.1. Ceremonies

There were two important ceremonies in the improvement of project management: a kick-off seminar with the CEO and the award for the project manager of the year.

The kick-off seminar with the CEO was performed in each of ITC's three sites. The CEO hosted the seminar and gave the first presentation providing all the possible support to the whole set of ideas in the new project management culture. He stated explicitly and firmly that it was a top priority goal for ITC to initiate the project manager education and adhere to the project management standard. He and his site directors would expect cooperation and support from all project managers and product managers. K and S then outlined the contents of the project manager education and the project management standard. They made every possible effort to display how it had all been carefully designed to fit the exact needs of ITC. J's task was to persuade the remaining doubters in a presentation of state-of-the-art ideas in project management.

The seminar was basically one-way communication, but it had the expected effect on the audience. A very clear message was designed and delivered.

The award for the project manager of the year was designed as an incentive. Both finding the project manager of the year and the award ceremony was performed in public. Award ceremonies are rare in Danish companies and explicit competition between co-workers is often despised. The traditional assumption is that competition creates ineffective collaboration. On this background it was a radical step to introduce this ceremony.

The four sites chose different procedures for their nomination and selection. The specific procedure depended on the culture at the site; some by votes and some by committees, but there were in all four cases a description of the acknowledged contribution of the project manager of the year. The CEO among the four selected the project manager of the year for all of ITC.

The public award ceremonies were done in each site done at a large seminar where all systems developers, project managers, product managers, and division directors were present. The CEO then recognized the project manager of the year for all of ITC at a similarly large ceremony. Each of the sites' project managers of the year got a large cash award. The awards were by any standard big money awards in a company and in a Scandinavian culture where all peers get just about the same salary. The handing over of the money was a significant event to display in public. No one could

anymore doubt the top management's desire for change. Not only that, but top management also by the ceremony endorsed the project managers' peer-selection.

During the evaluation of the ceremonial aspects of the award processes at a meeting in the SPI project it became clear that the award ceremony was controversial and that the controversy was not over, but also that it had had the desired effect.

3.2. Incentives

The new incentives for the change of the project managers' practices were the award for the project manager of the year and the project manager education. The public award ceremony was an important incentive for the project managers. They were part of a professional community and wanted to be judged by their peers based on professional values. It added to the significance of the recognition that the nomination and selection was based on professionalism rather than the traditional management value system of deadlines and resources. Other public recognitions installed by top management could easily have been ignored, but this one could not. The top management then endorsed the peer-selection by providing the money for the award.

The incentive was suggested by K and S, but immediately supported by the CEO and the site directors. Other product managers found it too radical a change of culture. Their viewpoint was that good project management should be attributed to the project team and not to the project manager and it would therefore be misleading to give the award to a single person rather than the team. Others objected that the nomination and selection process would never be fair and therefore there should not be an award at all. Others again were pro award as they thought it would create due attention on project management.

The award incentive created a rather heated debate before the first award was presented. Project managers and product managers disagreed about the incentive structure through many lunches. The debate did not die after the first round of awards. It diverted into one strand debating in public the criteria for the award in general and another strand discussing more or less secretly the fairness of the specific choice of the project managers. Despite the resistance, the project manager of the year was also awarded the following year.

The project manager education (explained in detail in a later section) became part of the incentive structure because it proved to be a valuable education. It was and still is attractive for the project managers to be accepted at the education.

3.3. Self-Assessment

The project management standard came to play an important role in particular as it was used in the project managers' self-assessments. The project management standard was created because K, S and J felt that a common idea and conception of good project management would be necessary to unite many of the project managers' good attempts at improving their own practices.

It was thus conceived from the beginning as a standard for the project managers to live up to rather than a standard to be followed blindly. The project management standard was created through a participatory process at a two-day seminar away from work with 20 opinion-creating and experienced project managers and product managers. K, S, J and two other action researchers facilitated the seminar. The agreed standard consisted of ten key process areas formulated in ITC-specific terms (including most of the elements from the CMM level 2, but without much mentioning of the CMM).

The project management standard was then used for self-assessment among other things. The standard was turned into a large questionnaire in a Notes application and it gave immediate feedback. The feedback was a list of areas for improvement. The answers given were private, but aggregate data were collected and the project managers were told their position compared to the average. The self-assessments were repeated periodically or as part of post-project reporting. Some product managers (K

and S in particular) went as far as using the self-assessment and the standard as a tool in discussion with their project managers. In meetings with their project managers they would request updated project plans, systematic estimates, risk analyses, and similar tangible signs of proper management practices.

3.4. Education

The project manager education was significant in the change to a new practice. The project management education's content was determined partly based on the project management standard and partly by listening to the project managers needs. By designing the education explicitly in this way the project managers became more receptive towards the education in general and to the specific elements in particular. The education was designed by K, S and J to be attractive for a would-be project manager and for the inexperienced manager. Not all were supposed to take the education, but it was deliberately designed so that also experienced project managers would want to take the education though they were not necessarily allowed to.

K and S wanted the education to be highly credible in the eyes of the project managers and therefore designed the style, format, and contents carefully. For that reason they decided to use educators from within ITC that were experienced project managers, highly credible based on their track record, and could perform well as an educator. K and S were both present at the first run of the education to ensure coordination and a smooth operation. They also redesigned the education slightly based on the experience from the first run.

Later they gave an executive summary of the project manager education in a two-day seminar to top management and other product managers. The rationale was that if the project managers' managers did not know what to expect in reports they would never ask for it.

The project manager education was from the very beginning an immense success. The rumor of its quality soon spread and it became very attractive in the eyes of the project managers and would-be project managers that quickly signed up for the following runs of the education.

3.5. Informal Influencing

K and S did not have formal authority over project managers in the other departments. They tried, however, to find ways of talking to the opinion-creating project managers. Based on their knowledge of the organization they identified those project managers that other project managers would listen to, those creating the project managers' opinion about the education, the standard, and the incentives. These project managers they contacted and talked to and used some effort in lobbying them to be in favor of the changes. Many of these project managers were also invited to the seminar where the project management standard was designed participatively.

Active support from fellow product managers was also important to K and S. The project managers reported directly to the product managers. If the product managers did not ask for proper project management practices and if the product managers were not themselves familiar with these practices then it would be left to project managers to motivate a change of their own practice. K and S tried deliberately to mobilize many of the other product managers. Some could only be reached by indirect influence through top management. Again they tried to identify the trendsetters and those with which they were on good terms. K and S would seek the support proactively before all the ideas had been shaped in detail. Through a dialogue with the other product managers they would test different scenarios and try to incorporate powerful ideas or ideas suggested by powerful people. They also used the product managers' monthly meetings to inform about progress, the ideas, and state the need for active support for this to be successful.

To get the CEO's support and downward influence K and S approached him at several occasions explaining in detail what they needed for this to succeed. The CEO was from the very beginning

committed to the success of the changes. He also used several occasions to state the goal that project management should be improved by establishing the education and the standard. The action researcher J had three meetings with the CEO to provide additional support, argumentation and expertise. They briefed the CEO in detail before his meetings with the division directors and before the kick-off seminars. The CEO in turn gave K and S the necessary support, considerable resources (both money and other's time), and the stating of goals in public. The CEO in effect became the top sponsor.

K and S tried to influence the four divisions directors. The CEO and the division directors had top management's meeting every Tuesday. By talking to their own division director they would know the agenda for the coming meeting and they would brief him in detail about their ideas, the content of the effort and also what they thought should be done to change the project managers' practices. They would try to have decisions taken at the top management's meeting to support their course. At more than one occasion they were summoned to a top management meeting to report on their progress and to layout their ideas. A decision at a top management meeting was not a guarantee for anything, but without an approving decision at the meeting nothing could happen.

Altogether, they systematically tried to talk with all individuals and groups of managers that they thought could in any way influence the project managers to change their practices.

4. FRAMEWORK OF ORGANIZATIONAL INFLUENCE PROCESSES

The framework that has structured our presentation in the previous section and that we use for the analysis is based on the seminal compilation of theoretical and empirical studies of organizational influence processes done by Allen and Porter (1983). Organizational influence processes are networks of social actions that an individual or group enacts to influence another individuals or groups in order to achieve one or more goals. Organizational influence processes are inherent in all organizational activity. The dependence of members on each other for the achievement of individual as well as collective goals and objectives creates an intricate web of interdependencies in which organizational influence is integral to success. Whenever people work together to accomplish tasks the social context plays an important role. The capacity of any member of a work group to influence another depends on personal resources as well as the social and organizational context. A person's ability to influence varies depending on his/her position in the hierarchy of the organization, expertise, charisma, and so on. The formal structure of the workgroup provides a framework for vertical and horizontal differentiation, defining levels of authority, functional responsibilities and specialization. It also defines common direct influence processes, namely: *downward*, *lateral*, and *upward*.

What this formal structure does not define are the indirect or informal influence processes of the organization, often referred to as organizational politics (Drory & Romm 1990). By indirect influence we mean the situation in which an actor seeks an intermediary (or intermediaries) between her/himself and the target of the ultimate influence process. An indirect influence process can be either open or covert. An open indirect influence process is when an actor goes up the chain of command in order to exert influence over a peer that he/she has no formal authority over. In an open direct influence process the actor may be attempting to influence an individual or a group. Examples of influence processes targeting a group are such things as ceremonies, workshops, and incentive schemes. An example of informal influence process is spreading rumors, organizing secret coalitions or cliques. To summarize the main characteristics of organizational influence processes are:

1. Direction of Influence Process – Downward, Lateral, Upward;
2. Type of Influence Process – Open, Informal;
3. Nature of Influence Process – Direct, Indirect;
4. Target of Influence Process – Individual, Group.

These characteristics will serve as the general framework for identifying and analyzing the dynamics of organizational influence processes in the improvement project. It is important to state here that we are limiting our analysis to open organizational processes. We are not suggesting that covert influence processes have no impact on the success or failure. The inclusion of informal influence processes is beyond the scope of our research at this time. Before we start our analysis we will briefly discuss some important theoretical issues about the dynamics of open organizational influence processes.

2.1 Dynamics of Organizational Influence Processes

At one level the dynamics of open and direct influence processes are straightforward. This is because they usually follow defined lines of organizational communication or sanctioned by the organization. However, an important dimension in analyzing the dynamics of any organizational influence process is an understanding of the sources of power and influence that individuals and groups can have in an organizational setting. From a formal perspective, there are five important sources of power and influence, namely: authority, ability to reward, ability to coerce, expert knowledge, and control of critical activities (Dansereau & et al., 1983; Drake & Moberg, 1986; Kerr, 1983; Kipnis, 1983; Kotter, 1983; Mintzberg, 1983; Pfeffer, 1981; Thompson and Luthans, 1983). From an informal perspective there are two important sources of power and influence, charisma and social identification (Salanick and Pfeffer, 1977; Mechanic, 1963; Kanter, 1979). In an organizational influence process, each member of the workgroup would have at his or her disposal varying types and degrees of power depending on their status in the hierarchy, level of technical expertise, personality, task responsibility and social affiliations.

Successful use and management of organizational influence processes requires organizational knowledge, and great skill and competence on the part of the actor (Thompson and Luthans, 1983; Kanter, 1979; Kotter 1983). Each actor must understand the organizational context, the opponent and weigh carefully advantages and disadvantages of using specific resources in the influence process. Understanding the organizational context means that the actor must be aware of his or her zones of effectiveness and how to extend them with the help of allies. As Salanick and Pfeffer (1977) explain:

“Because power derives from activities rather than individuals, an individual’s or subgroup’s power is never absolute and derives ultimately from the context of the situation. The amount of power an individual has at anytime depends, not only on the activities he or she controls, but also the existence of other persons or means by which the activities can be achieved and those who determine what ends are desired ...”

The organizational actor must also understand the limitations of different influencing strategies in different situations. Unskillful and careless moves can be costly in terms of time and resources and failure in goal achievement.

2.2 Direction of Influence Processes

Downward influence processes are initiated when an individual in a superior position in the organizational hierarchy attempts to modify the behavior of one or a group of subordinates. An inescapable element of these processes is the fact that the initiator holds more formal authority than the target of influence, and quite often has the ability to reward as well as coerce. The extent to which the initiator utilizes his or her influence resources will vary depending on the circumstances. But the important point, however, is that both the influencer and the target is well aware of the imbalance in power. Consequently the target is more likely to yield to the influence of the initiator.

Upward influence is practiced when a subordinate attempts to get a superior to behave in a manner the subordinate desires. Although the subordinate is at a disadvantage with regard to reward and coercive power, he or she may have significant personal power based on expertise and charisma. The normal approach to upward influence taken by subordinates is persuasive argument. However, and other

approach is the manipulation of the environment and information flow about critical activities for which the subordinate is responsible. Upward influence processes are often intended to promote and protect self-interest, such as desirable working conditions, promotional opportunity and so on.

In contrast to the vertical dimension, the primary feature that characterizes *lateral* influence processes is the absence of clear and unambiguous hierarchical differentiation among the actors. For example, a manager or member of a workgroup may attempt to influence another at the same level, or a group may attempt to influence its peer group. In lateral influence processes none of the actors have at their disposal formal authority, reward or coercive power. Consequently, a great deal of lateral influencing is based on reciprocity, socialization rituals and norm compliance. The main strategies of lateral influence are cultivation, persuasion, and group pressure. Group pressure can take the form of active socialization or alienation. When a member of a workgroup rebels or practices ‘creative individualism’ that appears to threaten individual or collective goals, his or her peers may respond by persuading the individual to accede to the group wishes. However, if the rebel does not the group may alienate the rebel. In lateral influence the types of strategies employed can have significant impact on both the initiator and target.

5. ANALYSIS OF ORGANIZATIONAL INFLUENCE PROCESSES

When K and S wanted to influence the project managers they created a long chain of indirect influence processes. For example, in one such chain they persuaded the CEO to sponsor and provide resources for the establishment of the project management standard. They did this using all their potential upward directed power through persuasion, the CEO’s dependence on them, and the CEO’s perception of their expertise in this matter. They got J to talk to the CEO with the same objective; he being a well-known expert within the field would then support the arguments put to the CEO. After it was decided by the CEO that the standard should be created then much effort was put into devising a believable standard. The standard was thereafter used in creating credibility and comprehensibility during the ceremonies, in the incentive structures, in the education, and in the self-assessment. Later, the chain turns into a downward influence process instantiated by the CEO (with much support from K and S). Some of the CEO’s exercise of power would then be in terms of formal authority, but significant influencing would be exercised by means of goal setting, redistribution of resources, change of the organization, building perceived dependency, etc.

The significant organizational influence processes for the two improvement efforts are categorized and summarized in table 1. Other influence processes were performed, but are here deemed less significant.

	Directed at individuals	Directed at groups
Downward influence		Ceremonies for PMs: kick-off seminar and PM of the year: open, indirect Incentive structures for PMs: PM of the year and the PM education: open, indirect
Lateral influence	Self-assessment based on the PM standard: open, indirect Lobbying trend-setting PMs: informal, direct and indirect	PM Education based on needs, the PM standard, and credible educators: open, indirect Mobilizing other product managers: informal, direct and indirect
Upward influence	Creating the top sponsor: informal, direct and indirect	Getting top management approval: informal, direct and indirect

Table 1: The significant organizational influence processes in the case

From the framework we get a main distinction between organizational influence processes that are primarily downward, lateral, or upward. We also get a main distinction between whether the influence processes are directed at individuals or at groups. Based on these distinctions we categorize the organizational influence processes we have found in the case of improving project management. The ceremonies and incentive structures in the improvement effort are examples of pertinent influence processes that were created by K and J, but were implemented by top management as such worked downward. Both ceremonies and incentive structures were open and even debated by project managers trying to figure out whether the induced change was desirable. K and S also designed both influence processes to work indirectly rather than directly.

At the level of lateral influence processes we find several examples. Self-assessment was directed at the individual as the processes and their feedback were individualized. The massive effort by K and S at lobbying the project managers was on their agenda, but was nevertheless very informal and it worked both directly in their dialogues with the project managers and indirectly. The education is an example of lateral influencing based as it was on perceived needs, the project management standard agreed among peers and the use of peer educators. The mobilization by K and S of their peer product managers was to a large extent informal, both when addressing them directly at meetings and when working indirectly at them through top management.

The upward influence processes in the project management case are twofold. K and S systematically tried to turn the CEO into a sponsor and they created his role by influencing him informally, often and directly (at times assisted indirectly by J). The influencing of the division directors was often informal and both direct and indirect.

An analysis of the patterns of organizational influence processes in table 1 shows three properties prevailing in the project management improvement effort: reading the organization and designing organizational influence processes, and forceful lateral influence.

Reading and Designing

The creation of the network of influence processes in the project management case is a result of K and S's reading of the organization. They have witnessed several attempts fail in the past. To avoid this they realized the complexity of the change process and identified the individuals and groups that they needed to influence directly or indirectly. Such a reading of the organization depended on their capabilities as organizational actors, the organizational history and experience they have been through, and their position in the organization. Their reading did not come immediately, rather it evolved over time when they saw, which influence processes, had were effective and which were not. Based on their reading of the organization and its complex change processes they designed the influence processes. The network of influence processes and each of the influence processes in table 1 were designed carefully. Less would have been less effective.

Lateral Influence

In the project management case the main influence effort was directed at lateral influence processes. Within the lateral influencing in the project management case we even see a wide variety of influence processes. Self-assessment is open and indirect, but it is also becoming institutionalized and will persist after the change has ended. Similarly with the project management education, which is directed at the group of project managers and as an influence, process is both open and indirect. To create these lateral influence processes several other influence processes are needed; at the lateral level we have found the informal influence processes of lobbying the trend-setting project managers and of mobilizing the other product managers.

It is likely that lacking the lateral influence processes K and S would not have been as successful. They could not have created the change with the main thrust in downward and upward influence processes.

6. CONCLUSION

In this paper we have shown how organizational influence processes and the framework presented can be used to explain a complex network of activities in a way that leads from the change agents' intended changes to achieving these changes. The influence processes are not difficult to grasp, but they are difficult to enact. In the presented improvement effort it took all the skills of the two change agents to enact their influence processes and in the indirect influence processes they even relied on others to enact parts of them.

Without the framework there would be several crucial aspects of successful SPI we could not understand. The framework is as such a contribution to understanding SPI in general. It is a socially oriented supplement to the traditional technical rationality of SPI theories. At a more specific level it is a framework that tells a manager of SPI what specifically is needed to manage SPI and how it may be done. As such it is a tool for managing SPI as a complex change process. The analysis of the organizational influence processes in the case led beyond identifying the web of influence processes. In summary:

- The change agents must read the organization and the needed influence processes. Based on that they must design a web of influence processes and enact these.
- The change agents must possess the capabilities to read the organization and to design and enact the organizational influence processes.
- Vital influence processes are lateral and much therefore depend on the change agents' expertise and credibility.

So far the research has pointed to the presence of organizational influence processes and we have shown how these may look. It still remains to address the following among others:

- How should SPI managers in detail work with organizational influence processes?
- How can SPI managers be educated to possess the necessary capabilities or how may these be acquired otherwise?

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