

## Emergence and sustainability in a decentralized organization

### Introduction

Continuous development is a key issue for long term competitiveness and sustainability of organizations on a changing global market. It has been known for decades that organizations with loose and flexible structure, and more horizontal than vertical information flow containing exchange of experiences rather than instructions have better chances to survive in a changing environment (Burns and Stalker 1961). We believe that decentralization is one way to reach these characteristics, that there is a need for development of new theories concerning organization and management to understand and be able to manage such organizations, and that complexity theory is a good base for such theories. In this paper we will show some results from on-going research studying the sustainability of a decentralized company using emergence as a perspective of understanding.

There are several reasons behind our choice to study a decentralized organization, including increasing demands on organizations to be flexible, as well as, changes in the workforce of the western society. Change processes on societal level are leading us into a world where rapid emergence is more common. Information is more accessible for everyone, more and more action is decided using communication in networks and the boundaries between different activities and organizations is diminishing. This global connectivity between organizations, markets and humans logically increase the speed of change and increase the demands on flexibility and creativity for organizations to be long term competitive. A decentralized organization where employees make local decisions without consulting their leaders is much more agile than a centralized organization. Further, the workforce of the western society is more and more educated, and have higher demands than materiel outcome of their work. A decentralized organization, with distributed responsibility and bottom-up processes, make use of their increasing competence and make it possible for them to reach self-fulfillment at work. At last, there has been a development towards flat and lean organization of work giving the lower levels of managers an increasingly demanding work situation, with a lot of subordinates and scarce support. Giving more responsibility including some tasks traditionally performed by managers to employees, is one way to deal with managers work situation.

The paper starts with a rather long theoretical part describing our understanding of an organization as a complex system. The central assumptions are that decentralization and emergence is a way to reach sustainability, that interaction and relationality (Backström and Döös 2008) are a central feature of the organization, and that an organization has ideally to have a dynamical balance between autonomy and integration of its members to make emergence possible. Emergence, relationality and autonomy/integration will be given focus in the theory section.

The assumptions are operationalized and tested in an empirical study of Apoteket AB. The Result section is divided in two parts. In the first "Resource management based on emergence" we test the assumptions that a dynamical balance between autonomy and integration is important and that emergence and sustainability is connected. The second

part “Emergent goal formulation” look into the connection between relationality and emergence. The conclusion is that our assumptions are validated by our empirical study and further work in this line is encouraged. We also suggest further research about relationality, e.g. developing a tool for simulations of the consequences of re-organization projects.

## Theory

Processes and structures in organizations and among groups can be fruitfully interpreted as manifestations of complex systems. Theories of complex systems have been suggested as a useful base in studies of sustainability in working life (Backström, van Eijnatten et al. 2002). In those theories work groups are conceived as complex systems consisting of individuals who express autonomous ways of thinking and acting and who are integrated into the collective and organizational context.

### Complex system theory

Theories of complex adaptive systems understand the world as built of hierarchies of systems within systems. Each system is a stable agent that at the same time is an autonomous and independent wholeness in relation to its subordinate agents in a hierarchy and an integrated and dependent part in relation to its superior level of the hierarchy.

A system composed of agents can be in three different phases: ordered, complex or chaotic. It is in the ordered phase when interacting agents do not influence each other so much. The industrial system uses standardization, specialization and centralization to ensure that teams reach this phase. These three strategies are similar to the ways to reach the ordered phase described by persons studying the KF-landscape; ensuring interaction of low quantity (few interactions) and low quality (little information transferred, one source dominates, different information is interpreted as the same etc.) (Solé and Goodwin 2000 pp 76-77). In the ordered system there is no or very limited development of the organization by the system itself. Possible change has to be driven by agents external to the system, e.g. managers or consultants. If the internal agents are autonomous in the ordered phase the system will disintegrate. If they are not so autonomous the system will not develop, there will be neither adaptation, learning nor creative new and unexpected actions.

A system is in the chaotic phase when interacting agents influence each very strongly and promptly. The system will disintegrate and disappear also in this case, but because of another reason. In the ordered phase autonomous agents will develop individual organizations inconsistent with the systems organization, and thus leave the system. The organization of the system will be strong, but most agents will not follow it, and thus leave the system. In the chaotic phase however, there will be no organization of the whole system, because every interaction will shape its own organization and thus a new small system.

In the complex phase the agents of the system influence each other enough to make it possible for information to reach and be understood by a most of the systems agents, but not more than making it possible for a most of the agents, most of the time, to have a consistent understanding of phenomena central for the system. Such central phenomena that emerge in interaction and organize the agents of a system will in this paper be called order parameters.

### *Emergence and order parameters*

Order parameter is originally a mathematical concept; it is a way to reduce the amount of information needed to describe a complex system (Haken 1996). The traditional way to handle complicated systems is to analyze, i.e. divide the system in understandable parts and describe each part, and synthesize, i.e. make a sum of these descriptions. But complex systems have macro features emerging out of the interaction of the parts (the whole is greater than the sum of the parts) this will be lost when you only look at one part at the time. An alternative strategy is to find an order parameter at macro level, which describes the most important features of each agent at micro level. The mathematical proofs of the concept are valid only close to instability points, but it has empirically showed to useful even far from such points. An order parameter emerges when fluctuations of agents strengthen and stabilize each other and thus forms a pattern at macro level which wins the competition with all other possible patterns. This pattern will then control actions of all agents.

Complex systems may self-order because of energy or information transfer so that new dynamic states of matter originate. There are a limited number of order parameters (ibid) that stabilize and integrate the system into a state of matter. An order parameter is changing slowly relative the behavior it is connected to, except in moments of phase transition.

An order parameter is formed by self organized emergence occurring when autonomous individuals interact. And, at the same time, the order parameter is enslaving the individuals and by that integrating them to a system (ibid). It is a circular causality, where the order parameter is both formed by behavior of individuals and forming behavior of individuals. The order parameter is in the center of a life-giving dynamic between autonomy and integration. The order parameter is a regime at aggregated level which is not random, but characterized by regularities and integration. It is emerging from multiple autonomous choices of individual agents which are correlated through transactional interaction with each other.

Prigogine & Stengers (1984) write about the importance of the autonomous choices of the individual: "A system far from equilibrium may be described as organized not because it realizes a plan alien to elementary activities, but, on the contrary, because the amplification of a microscopic fluctuation occurring at the "right moment" resulted in favoring one reaction path over a number of other equal possible paths. Under certain circumstances, therefore, the role played by individual behavior can be decisive. More generally, the "overall" behavior cannot in general be taken as dominating in any way the elementary processes constituting it. Self-organization processes in far-from-equilibrium conditions correspond to a delicate interplay between chance and necessity, between fluctuations and deterministic laws." (p. 176).

There are also other concepts than order parameter used to describe a phenomena at aggregated level that emerge in interactions at lower level and at the same timer control this interaction; Organization (Maturana and Varela 1987), Emergents (Sawyer 2005), Context (Duranti and Goodwin 1992), Culture (Shweder 1990), Group idea (Olsson 2008). In our studies of organizations we divide the order parameters in three classes; culture, praxis and relatronics. Culture is the patterns of thinking developed during work and shared by members of the organization. It contains norms, values, myths, legitimizing theories, language and the understandings connected to the work, e.g. goal formulation. Praxis is the shared patterns of

acting, the institutionalized (Berger and Luckmann 1966) habits, and the different ways to divide work between each other and cooperate in normal work. Relatronics is the composite existence of relations in a workplace that are of importance in and for the performance of the core operational task, it is an organizational infrastructure for communications (Backström and Döös 2008 and below).

There are different levels of order parameters. A human being is at the same time involved in different processes of different length and with different pace, and all these different processes may have different order parameters. In a group meeting, for example, a weave of different group ideas will function as order parameter for shorter or longer periods of the meeting. On a higher level, in a project, including several meetings with individual work between, an order parameter of the project may emerge.

Parts of an organization is design by someone with a purpose, other parts are emerging from inside by itself (Capra 2002). To give prerequisites for and influence the emergence of order parameters is a specific task for managers, complementing other tasks like administrate to ensure that the organization continue to function as planned, and drive change projects and individual competence development to ensure that the organization adapt to changes in the environment (Backström, Granberg et al. 2008). The task of leading emergence has a focus neither on the system nor the individual, but on the collective. The normal leader-follower duality is replaced by a collective including the manager and all subordinates (Drath, McCauley et al. 2008). The ideal is a collective with members having different roles, but following the same order parameters and acting with heedfulness towards the whole organization (Hagström, Backström et al. 2009). The role of the leader in the collective is to represent the wholeness, the goals of the organization, the visions of the top-managers, and the long term perspective in the communication. The role of the others is to represent their specific competence and understanding of the local situation they are in. The manager has to give prerequisites for this collective to emerge; e.g. develop the communication habits of the collective and support solution of role conflicts (Åteg, Wilhelmson et al. 2009).

### *Relatronics*

States of matter in complex systems reflect the correlation of a given system with its surroundings. Maps may be used as a metaphor for this reflection. According to Marion (Marion 1999) complex adaptive systems possess mechanisms for imprinting environmental stimuli within itself and for referring to those imprints at future times. "Because of this ability to map the environment for future reference, persistent relationships can evolve, self-organize." (p 71). Mapping means memory and memories of past interactions within an organization maintain relationships over extended periods. The flow of information between the surroundings and the workplace, and the ensuing interaction, create and recreate the fairly stable inter-personal relations of relatronics.

Relatronics contain differences in tags (Holland 1995), i.e. differences in probability of interaction, between different individuals. Interaction between certain agents is reinforced through autocatalysis when an interaction is rewarding for those involved. In that the interaction is rewarding, it is catalyzing itself and repeated. The concept of autocatalysis originates from chemistry. A catalyst is a substance that increases the speed of a reaction. The presence of a catalytic converter increases the probability of precisely the reaction that the converter catalyzes. Autocatalysis entails that the substances formed in a chain of

reactions are catalysts for just these reactions and strengthen them. This resembles how the learning process of the brain is understood, where acquired knowledge is settled in the different strength of the connections between neurons (Haykin 1999). In a similar way, knowledge is settled in that individuals have variously strong relations with different colleagues, thus the specific relational of the system emerges.

Because of autocatalytic interaction interactions between certain agents becomes more likely, takes place with greater energy, and stabilizes the whole. The presence of the interaction's products in the form of an order parameter as a relational, further reinforces the aggregated system and its characteristics. Thus, the organization does not consist solely of individuals, but also of certain processes that create and reproduce it as a totality. The relational means that the sum is more than its parts. A good relational is one that facilitates just those interactions that are of value to core operations, i.e. the interactions that enable the organization to manage information in excess of the capacities of its component individuals for information handling.

The competence of a system and the degrees of freedom in relation to new solutions depend on the complexity of the system. Crude complexity for a network can be simplified into two variables: density of interaction, and how centralized or distributed contacts are (Asseldonk, Hartigh et al. 2003). Putting it simply, it can be said that centralized networks are governed by the node to which most are linked, and therefore cannot utilize the network's potential complexity. Distributed networks, by contrast, are more dynamic; information can "wander around" within the network, be changed, and affect its various parts in different ways. Density or the number of contacts per individual may then be supplemented by the extent to which these contacts influence each individual (Kauffman 1995).

Common experiences of interaction, and thereby the perceived potential for future interaction, exist as an intangible link between two persons, and as an intangible network within an organization. A mental map grows up along well-worn paths that lead to interaction with others. In light of the above, a workplace's relational can be regarded as a fluid and dynamic structure consisting of potential interactive processes at work that are used for the moment and based on previous experiences of interaction. Of relevance here are:

- The choice of whom to interact with. A mental map emerges of useable communication pathways; the individuals know in advance what they can expect to get out of any one contact and can choose to contact the right person for the issue at hand.
- The start of the interaction. Having developed routes for communication, knowing how to make contact, makes it easier to start an interaction. And there is less need to play a prelude before coming to the issue.
- The interaction itself. There are thought networks that are in part linked and in part shared. That is, via correlating interaction, similar ways of thinking and acting have been developed, and this facilitates the interaction.

Assurance of the quality of a relational is facilitated if an organization has a visible infrastructure, of which people are aware, that invites communication/interaction within operations. Organizational infrastructure is used as a metaphor for the idea of an underlying

system for communications, i.e. an invisible basic structure, but one that has been raised to consciousness, forming a shared mental map of communication pathways. It may for best fit with requirements be grown up and continuously reconstructed on the basis of performance of work. It is the task of everyone to see the opportunities in and make use of this infrastructure. It has a resemblance to a hologram in that each and everyone has a rather weak picture of the relational of operations as a whole. The relational does not exist in the form of tangible links between people, rather as mutually nurtured relations that afford continued interaction.

### *Autonomy and integration*

For co-workers to be at the same time both autonomous, deciding by their own, and integrated, controlled by the organization, seems to be contradictory. But complex systems are energized by the dynamics between such conflicting states or dualities (Lewis 2000; Sánchez-Runde and Pettigrew 2003). The ideal at system level is a balance between them, but this is only a statistical equilibrium of disequilibria. At individual level autonomy and integration will seldom be at balance, in some situations autonomy will be high and in other integration. But it may be important for sustainability to have a potential to develop high levels of both autonomy and integration. Autonomy and integration are two rather abstract concepts. Below is our interpretation of them for a work organization. Autonomy is based on decentralization, competence and motives to contribute. Decentralization gives the employees the right to take responsibility and make decisions according to his/her own understanding of the local situation without first consulting a manager. If most employees have this right and uses it we may call the organization decentralized. There also is a need for enough competence and maturity to be able to take the responsibility given by a decentralized organization. If at least one in the work group/department has this it may be enough, depending on communication and social support in the organization. Competence will be further discussed below under the heading "Adult development theory". Our experience is that those two bases are not enough, there are decentralized organizations where employees have enough competence but still does not take responsibility. We believe that taking responsibility and contribute to the development of the organization means an extra effort from the employee, and that it thus needs motives to do it.

Integration is based on communication, reciprocal development and heedfulness towards the whole. For order parameters to emerge interaction has to be of good quality. Basically there has to be reasons to communicate, e.g. shared responsibilities, and there has to be arenas, e.g. a meeting structure and meeting places. A good social climate is also important, there has to be interaction with transaction, meaning that the interacting individuals influence each other. More advanced interaction ideally has to fulfill a duality of two conflicting qualities. The first quality is diversity. Each team member has to be willing and able to both express and argue for his/her perspective and understanding in the interaction. The diversity quality is important to be able use all relevant individual competence of the group in the emergence of the order parameters. The second quality is convergence. Each team member has to be willing and able to both understand and be influenced by the others. Convergence is needed to be able to talk about the same thing and build enough collective power to really change the order parameters. Reciprocal development is important for employees to think that interaction is motivated. If the order parameters emerging in the reciprocal interaction process will have influence over the development of work, i.e. this development is not hindered by e.g. the management, the interaction will be

meaningful. Heedfulness towards the whole is important. Otherwise there is a risk that the emerging order parameters are locally optimized and not making the organization more competitive. For heedfulness to develop there is a need of transparency making it possible for employees to see and understand the whole organization and feed-back of results of both group and organization level.

### **Apoteket AB – the company of the study**

The study was performed 2004 at Apoteket AB, the state-owned Swedish pharmacy chain. It had a monopoly on selling pharmaceutical drugs in Sweden. 2002 revenues were approximately 3.500 million Euros. Apoteket AB's 2001 business plan was to begin a re-organization process for the entire company. This plan included:

- New divisions to be developed;
- More time to be used for competence-demanding tasks such as guidance concerning drugs and of pro-active health care;
- A shift in the focus towards the customers; and,
- A shift from planning and control towards involvement and meaning.

The pharmacies studied belonged to the division Apoteket Hälsa (Pharmacy Health). This division includes all 800 pharmacies in Sweden situated outside hospitals, with about 10,000 employees. The division was divided into 10 geographical regions, and each region into districts, which is the lowest level in the organizational structure. Each district typically includes 5-10 pharmacies. The District Manager is the first-line manager with responsibility for approximately 70 employees. Conversely, there was no longer a supervisor overseeing each pharmacy; this lowest level of hierarchy was taken away and the approximate number of managers was reduced from 800 to 144.

Apoteket Hälsa has further developed the re-organization with thoughts similar to those of integrated autonomy. The instructions for the districts managers include: "Everybody takes the risk and will act autonomously within the frames of the laws and regulations, and guiding principles and policies that are well known to each co-employee". The task of the district manager was described as not to supervise daily work, but to design an organization with distributed responsibility. The greatest possible amount of responsibility and authority should be situated as locally as possible. A balanced scorecard was developed with goals in five specified areas: Finances, Customer Service, Processes, Colleagues and Co-Workers, and Development.

The design of the organization of each pharmacy district was a decision made by each district manager. The result was that the districts had almost the same conditions, tasks and types of customers, but had different types of organization. The study included four pharmacy districts, each with different organizational solutions. Two middle managers selected the districts which were at the forefront of the re-organization in their respective districts. These districts are:

1. The district with Team Organization: 73 employees in five pharmacies;
2. The district with an Integrative Organization: 43 employees in five pharmacies;
3. The district with Learning Organization: 56 employees in four pharmacies; and,
4. The Ordinary district: 82 employees in eight pharmacies.

The names of the first three districts reflect their characterization, as interpreted by the middle managers when they were first presented to us. The researchers, as indicative of each district's function, later confirmed these characteristics. The fourth district was introduced as the district with reflection groups; however, since it turned out that this activity was not in full operation when the study was performed, this district was re-named Ordinary (for further descriptions of the districts see Backström 2009).

## Methods

Multiple sources of evidence (Yin 1989) have been used to provide a more solid base for conclusions. These include:

1. Semi-structured interviews with district managers, about 1 hour long, around 5 themes; Organizational structure, Information flow, Management control, Leadership, and Learning.
2. A questionnaire given to all employees (254 persons, answering rate 89%, frequency of missing answers 2-14 %). The questionnaire has three sections. The first with questions about autonomy, integration, leadership style, and the organization's ability to adapt and innovate. The second with a few open ended questions, e.g. about the three most important goals of the organization. And the third with questions concerning who of your district colleagues you interact with about different kinds of subjects, it contained a "rooster" naming all colleagues (Wasserman and Faust 1994).
3. Material from Apoteket's scorecard system 2nd quarter 2002 to 1st quarter 2004) including; Efficiency measured by the operational costs divided by the weight of volume, and Customer Satisfaction measured by Apoteket's own Scorecard survey.

## Resource management based on emergence

Centralized resource management, based on designed structures and processes, is one way to reach sustainability. Japan, circa 1650-1868, is an example of successful centralized resource generation (Diamond 2006). A condition for this success is a ruling class prepared to use long-term strategies with strong short-term disadvantages (ibid p 305). The Shoguns of Japan, who believed that their descendants were to heritage the power, were examples of such long-term committed leaders.

Translating the example of Japan to work life, in order for sustainable centralized resource production in companies to function, managers have to have a long-term commitment to the enterprise. This is not the case in most companies. Modern corporate governance is characterized by impersonal ownership and frequent change of CEOs. In a study of 683 non-financial UK listed companies from 1993 to 1998, the turnover rate of CEOs was over 13 % (Hillier, Linn et al. 2005). Of the 2,500 largest companies worldwide, close to 15% appointed a new chief executive in 2004 (McKeon 2005). If sustainability based upon centralization seems to be questionable in modern work life, how about a decentralized solution?

Decentralized resource management, based on emergence, is a fundamentally different way to organize for generation and regeneration of resources. An example of successful decentralized resource generation is New Guinea Highlands with 7000 years of sustainable food production in an isolated area: a unique historical record (Diamond 2006). New Guinea Highlanders have developed an advanced agri- and silvi-culture. Traditionally, decisions are reached by everyone sitting down together talking. There are big-men with influential

personalities; however there are no chiefs. Sustainable decentralized resource production is dependent upon interaction giving members of society the possibility to see and take interest in the entire society (ibid p 427).

Our conclusion is that sustainability based upon centralization may not be applicable in most modern work life, and historical examples of sustainable decentralized generation and regeneration of resources exist. Integrated autonomy for employees is an ideal feature of a decentralized organization. Integrated autonomy of the parts of a system logically makes it a complex adaptive system, and thus a system that follow nature's way to reach sustainability. Thus our hypothesis in this study is that a dynamical balance between autonomy and integration is needed to reach emergent resource generation. Two of the research questions used in a study of Apoteket AB were:

1. What are the prerequisites organizations and managers must have in order to obtain emergent generation of resources? Is our hypothesis concerning a dynamical balance between autonomy and integration valid?
2. Is an emergent organization for generation of resources a possible way to obtain sustainability in modern work life? Does organizations following with a dynamical balance between autonomy and integration better development of results?

Resource generation is measured as a company's ability to adapt and innovate and sustainability as a growth in both efficiency and customer satisfaction.

#### *Pre-requisites for emergent generation of resources*

The Integrative Organization has a higher value of Hinders for Autonomy than the other districts. This may be due to concertive control in this district (Barker 1999), as indicated by an earlier study (Göransson 2003). Low autonomy and high integration in this district may cause an unbalance on the system level. The Team Organization district may have an unbalance in the other direction: high autonomy and low integration.

The districts with Learning Organization and Ordinary Organization have the similar score of medium for both Autonomy and Feeling of Integration; both organizations may have a balanced situation when it comes to autonomy and integration. However, there is a substantial difference between the two when it comes to the time their manager spends on the transformational task.

The results indicate that the Learning Organization has the best pre-requisites for complex dynamics and, therefore, for decentralized resource generation. For the other three, it is unclear, and depends upon what is most important: autonomy, integration, the balance between them, or an urge for bottom-up transformation.

#### *Existence of Resource Generation and Sustainability*

The Learning Organization has the top scores when it comes to resource generation, especially the ability to innovate and the ability to adapt. The Ordinary Organization has the lowest scores for resource generation. The other two districts can be found in the middle.

The efficiency of all four districts was about the same for the first two years after the organizational renewal of Apoteket AB. In the third year, however, there was an increased efficiency for all districts with the exception of the ordinary organization that maintained approximately the same efficiency. After an organizational renewal, it naturally takes some time before a change in output can be seen.

The implementation of a Team-Organization seems to have had almost immediate positive effects upon customer satisfaction. They had an acute problem - with one pharmacy being too big - which was solved by the re-organization. The Learning Organization district did not change its operative organization very much; consequently, its customer satisfaction is about the same as it was in the beginning. However, after two years, there was a considerable increase in customer satisfaction, which may be due to continuous improvements initiated by their Learning Organization. The Integrative Organization showed a marked decrease in customer satisfaction in the beginning, which may be due to the renewal being most revolutionary in this district. In the third year, however, they have almost returned to their initial figures. The customer satisfaction has steadily increased during the three years for the Ordinary District. Compared to the changes of the other districts, however, this increase is less pronounced than the decrease of efficiency. They may have gained customer satisfaction at the expense of more costs per weight of volume - most likely personnel costs.

### Emergent goal formulation

Another research question in the Apoteket AB study concerned if the relationships of an organization may make it possible to understand the emergence of different formulations of the goal of the organization. This question has yet only been studied for one of the four included districts; the Ordinary district.

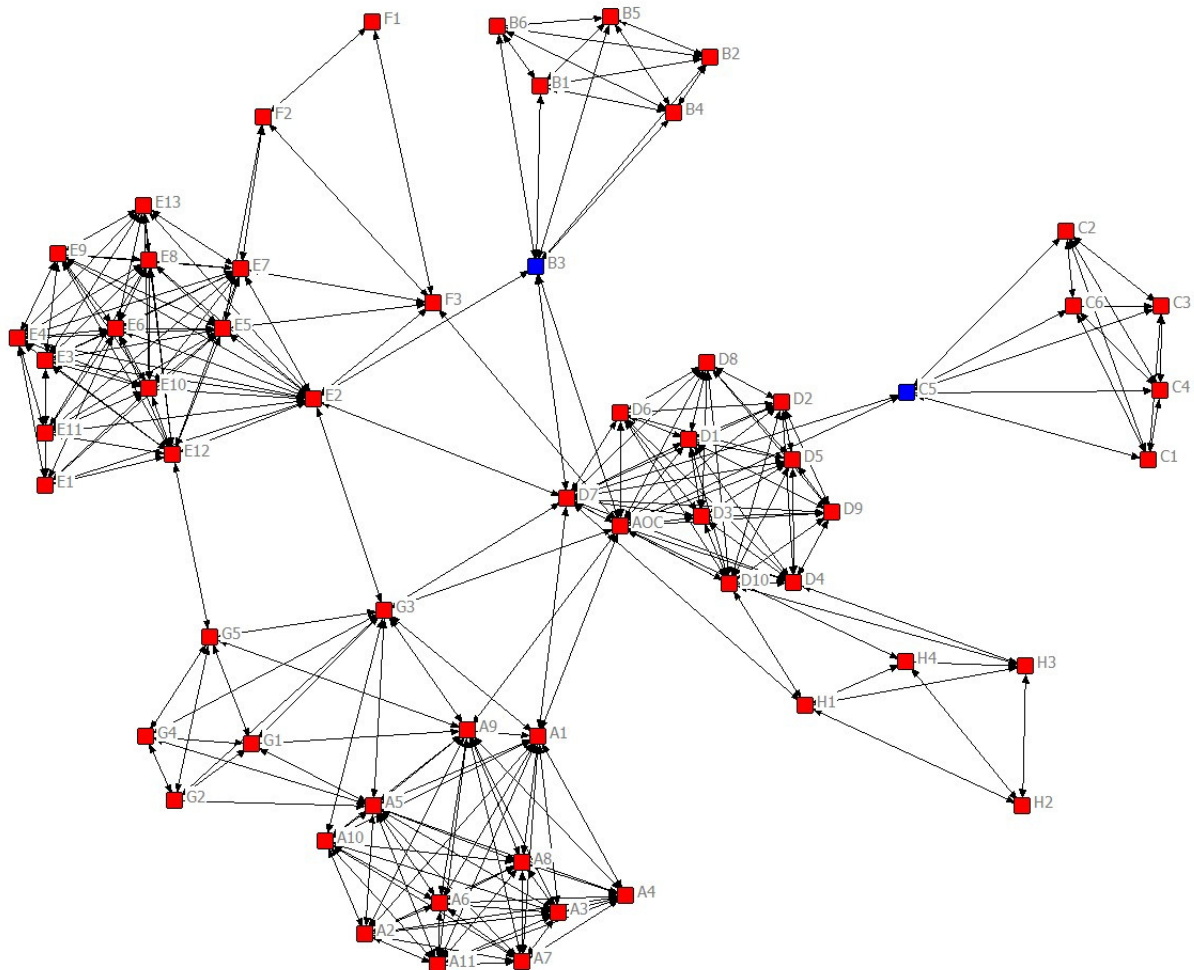
Goals are formulated at different levels of an organization. The goals most strongly communicated from central management of Apoteket AB and thus from District Managers, at the time of the study was: Customer Focus and Satisfied Customer. But each employee makes his/her own interpretation and formulation of the goals. If an organization is highly centralized and designed all employees will have the same formulation of goals as their manager. We believe that goal formulation at employee level is partly emergent in interaction between employees. Thus will employees close to each other in the relationships probably have similar formulation of goals and employees far from each other different goals. Differences in formulation of goals may be important for an organization's sustainability. They have to be similar enough to make integration and cooperation possible, but on the same time, diversity is needed for flexibility and creativity.

According to the study above the Ordinary district is the most designed and least emergent district of the four studied. Does that mean that all employees formulate the same goals when answering the questionnaire? To study design and/or emergence of goal formulations at the Ordinary district we will divide in social groups, i.e. groups of persons that interact a lot with each other. Three principal different results are possible:

1. All employees give similar formulation of goals. These goals will probably be the ones communicated by the district manager and is a sign of a centrally controlled and designed organization. The autonomy in the organization is too weak for emergence to occur, the organization is rather ordered.
2. Members of each social group formulate similar goals, but different groups formulate different goals. This could indicate a process of emergence when common understanding may emerge in interaction while working. Both autonomy and integration is possible and this may be an organization in the complex phase.

- Employees give different formulations of goals independently of membership in social groups. This indicates that neither central communication of goals nor emergence of goal as an order parameter is functioning. Each employee has to find a goal formulation of its own. This may be an organization in chaos. Or our analysis of the relations has failed and there is another arena for emergence of interpretations of goals than the social groups we have found.

The Ordinary district consists of five work places; pharmacy A-H. Each employee is a dot in the figure 1. The tag of the dot consists of a letter (A-H) indicating the pharmacy he/her works in and a number without meaning. A line between two dots indicates that both has answered that they frequently interact with each other. Four social groups were identified with the help of software for analyzing social networks (Borgatti, Everett et al. 2002) using a criteria that their members interact much more with each other than with colleagues outside of the group. The social groups consists of seven employees from pharmacy A, five from B, five from C and seven employees from pharmacy E.



**Figure 1.** Each employee of the Ordinary district is represented by a dot. The tag of the dot consists of a letter (A-H) indicating the pharmacy he/her works in and a id-number without meaning. A line between two dots indicates that both has answered that they interact with each other once a week or more often.

The four different social groups have different understanding of the goal of the organization. Two of the group gave formulations similar to the ones communicated by the managers; Custom Focus and Custom Satisfaction. One group formulated more goals concerning their own competence and work motivation. The last group were more diverse in their interpretations; some talked about competitiveness and productivity of the pharmacy and others where the goals communicated by the managers.

The results indicate that the centralized formulation of goals has a rather strong influence on employees understanding of the goals of the organization. Three of four social groups are heavily influenced by the manager's communication. This strengthens the understanding of the Ordinary district as a rather designed and ordered organization given by the study of autonomy and integration above. One of the groups seems to be a bit chaotic. Some of its members follow the central understanding and some had formulated their own goals, or kept to goals earlier formulated by managers. Only in one of the groups has a group specific understanding of the organization's goal emerged. This group seems to have autonomy and at the same time they are integrated in their group. But there is a need of much further analyses before we understand the dynamics of this organization good enough.

## Conclusions

The conclusion is that our assumptions are validated by our empirical study. A dynamic balance between autonomy and integration is important. The empirical results strengthen this hypothesis. The three districts that implemented organizational activities towards integrated autonomy all have better resource development than the Ordinary district. The Learning district has the strongest resource generation suggesting that it is important to have a balance on system level when it comes to integration and autonomy.

Decentralized emergence of resources is a possible way to reach sustainability in modern work life. The empirical results give a positive response to this question. The three organizations with higher resource generation also have a better development in efficiency. The picture when it comes to customer satisfaction is unclear; however, at least two of the three districts show good development, and this is also an indication of sustainability.

A high degree of autonomy and integration, a balance between autonomy and integration on the system level, and an urge for bottom-up transformation co-varies with a high degree of resource generation. A high degree of resource generation co-varies with a high degree of sustainability. Further studies must be made to test and develop this model.

Relatronics and emergence are connected. Different social groups, working with the same type of work in the same organization, have a different understanding of the goal of the organization. This indicates order parameters emerge in the relatronics.

The results encourage the use of complex system theory in studies of organizations in work life. Studying order parameters that has to do with thinking (e.g. interpretation of goal of organization), acting, and relating (e.g. relatronics), and the prerequisites for their emergence (e.g. integration and autonomy) is a useful way to understand organizations and their dynamics.

In an on-going study at a highly competitive and decentralized bank we use complex systems theory to study stability and dynamics. The focus is on the question what competences are needed on individual as well as collective level to ensure development in a decentralized organization where central initiatives for development is prohibited. It is partly based on the fact that change mechanisms such as the dynamic and balance between autonomy and integration are described in similar ways in both complex system theory and adult developmental theory.

We are also going to search for research grants to develop the concept relatronics and a tool for managers to observe relatronics and simulate the consequences for the relatronics of a re-organization. We have seen that a lot of re-organization project fail because nobody observes that the relatonic is destroyed by the change.

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