Partaking as a Tool for Knowledge Creation and Sharing in Practice

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Abstract: In this paper evidence that sustain the importance of partaking in promoting knowledge creation and sharing, is gathered from a recent study of optimisation of a corrugated cardboard machine. The investigating method is action research combined with the theoretical views of the SCOT approach (Pinch and Bijker, 1989; Latour, 1987; Law, 1992). It is revealed how inclusion of workers in discussion concerning their workplace, promotes an ownership to their work. This was accomplished by creating a trusting environment allowing workers to speak open and freely (Webb et. al, 2002). Hence knowledge creation and sharing concentrates on those who need the knowledge which is developed. In reality what happened in this project was a redistribution of power and influence (Lukes, 1974).

Keywords: Learning and knowledge process, Scot, involvement, power creation, trust

1. Introduction

This paper demonstrates the importance of partaking in promoting knowledge creation and sharing in practice. When this happens it causes a change in power structures by giving more responsibility to workers. The case presented in this paper shows how it was necessary to restructure power in order to develop a high degree of employee involvement. This was one of the effects of involving employees in an internal project, which aimed to increase the production efficiency of a corrugated cardboard machine in a paper and cardboard mill. The paper and cardboard mill had been striving to fulfil their strategic vision – 'We shall inspire and improve' – in order to enable the company to take a leading market position by 2008 (Company Leaflet for internal distribution). The idea behind this vision was that a strong focus on inspiration would improve the daily work, since this would lead to an increase in worker motivation and job satisfaction. The top management team formulated the company vision, and all employees were informed about the vision in a large barbeque party defined as a kick-off meeting. The company continued to work with their vision for one year after the kick-off meeting, but as time progressed, the momentum in this work was lost. In order to speed up their work with their strategic vision the company started to search for ways to revitalise the process. At the same time a regional research programme was announced which was aimed at increasing the innovation capacity of regional companies within the nutrition- and paper industries by focusing on the inclusion of workers in discussions on work challenges and problems. This programme was called the Value Creation 2010 Research Project (VS2010). The paper and cardboard mill therefore decided to join the VS2010 project.

As a result of their entry into the VS2010 research programme, researchers were invited to the company to discuss how they should work to realise the company's strategic vision. Consequently, with the aid of the researchers the company defined four internal projects. 1) One project was to focus on how to improve internal communication in the company. 2) Another project was to focus on problems related to sick leave and work towards reducing this. 3) A third project was to focus on improving the work environment and improve work climate. 4) The last project was aimed at increasing production efficiency in general, but should start with increasing the efficiency of, the heart of the company according to the production manager, the company's corrugated cardboard machine.

2. Reflections over method and data

The empirical data used in this paper is taken from a recent study carried out in a paper and cardboard mill to optimise a corrugated cardboard machine. The process began in November 2005 and is still going on. The epistemological background for this investigation was the SCOT approach in combination with communities of practice (CoP) (Pinch and Bijker, 1989; Latour, 1987; Law, 1992; Wenger, 1998). Our study was carried out using action research (Levin and Klev, 2002). Data were collected in the form of interviews, observations and meetings with the employees and managers working at the corrugated cardboard machine over a period of six months. The first months were used to interview all employees working at the corrugated cardboard machine. The researcher participated in the two daily work shifts at the machine. In this way the researcher developed an overview of the work processes at the corrugated cardboard machine, got to know the employees who worked

Reference this paper as:
Tolsby J and Kirkebak P(2007) "Partaking as a Tool for Knowledge Creation and Sharing in Practice" *The Electronic Journal of Knowledge Management* Volume 5 Issue 1, pp 115 - 122, available online at www.ejkm.com

with the machine and earned their trust. In addition interviews were conducted with the production manager and the foreman to identify technical challenges and machine production potential. As a result of these activities a report was written which described the current challenges at the corrugated cardboard machine and how these challenges could be met. This report was then presented first to the employees at the machine to get their feedback and to anchor the process at the shop floor level.

3. Defining an inclusive learning approach

In accordance with Illeris (1999) we claim that learning is both about experience, practice, skills, knowledge, attitudes, and emotional reactions. Illeris (1999) has tried to tie together some of the different perspectives on learning. He says that learning comprises the results of the learning processes, the cognitive processes taking place within each individual, the social interaction between the individual and his/her material and social surroundings, and finally learning as a synonym for teaching. He narrows down this broad definition by saying that learning basically consists of two related processes, which influence each other. Firstly, the co-play between the individual and its surroundings including interaction with different types of media (e.g. a book, a tape, a computer), and secondly the internal cognitive acquisition- and preparation process leading to something being learned, a learning result (Illeris, 1999, p.15-16). In this paper Illeris' (1999) definition of learning is used. We define learning as having taken place when a project worker is able to reconstruct, reapply and explain how a particular solution solved a particular problem during the product development project. Thus learning involves some *negotiation of meaning*, it has been made *tacit* (been internalised within the individual) (Easterby-Smith et. al. 1999; Polanyi, 1983) and it has been *reified* (materialised in some way) (Wenger, 1998). This implies that learning occurs through *social interaction* (Wenger, 1998; Lave and Wenger, 1991). Wenger (1998) later explored in more detail how practice is more than just a learning process; the community of practice is created as a continuous process of negotiation and renegotiation of meaning and this process forms our identity. His idea is that members of a community of practice participate in a shared activity or enterprise. But, he emphasises that participation embraces 'all kinds of relations, conflictual as well as harmonious, intimate as well as political, competitive as well as cooperative'. It also includes 'our ability (or inability) to shape the practice', and furthermore, 'participation goes beyond direct engagement in specific activities with specific people. It places the negotiation of meaning in the context of our forms of membership in various communities. It is a constituent of our identity' (Wenger, 1998: 57). Learning is, under these conditions, considered to be a social process, which occurs as a result of the interaction between the people attached to the project. The results of the learning process materialise through identifiable changes in the produced product, or in changes in the processes related to production or both. But an inclusive learning approach involves taking into consideration how power constellations influence decisions, and acknowledging that power and knowledge are inextricably intertwined. Therefore power structures will influence what is known and who knows. Our point of departure for an analysis of power and knowledge is based on the three dimensions of power elaborated by Lukes (1974); power may not only exist in an actual conflict, or when actors constrain themselves from raising certain issues because of different barriers, but also when people's needs and desires are shaped by agents of power so that the outcome is not in their real interest, Klev (1993). Lukes (1974) identifies three dimensions of power as follows:

- In Lukes' first dimension of power he sees a person A as exercising power over a person B in a manner that is contrary to B's interests.
- In Lukes' second dimension of power, power is something that suppresses decisions and issues where there is an observable conflict of Interest, typically when policies are formed based on what should be included and what should not be included.
- In Lukes' third dimension of power, he claims that control of knowledge is critical to the exercise power.

Lukes' first dimension of power focuses on behaviour in the decision making process, where there is an observable conflict of interests between the participating actors, in determining who wins and who loses in clearly defined issues. The absence of anyone in the debate, their non – participation – is interpreted as being due to their own apathy, and not due to a process of exclusion from the political process. Knowledge may be understood as the resources that can be mobilised to influence debates and to create new knowledge. However, little attention is paid in this definition of power to those who are not represented in the decision making process, nor to how forms of power affect what types of problems come to be a part of the agenda. Bacharach and Baratz (1970) criticised Lukes' first dimension of power by arguing that this dimension has a strong behavioural focus, in terms of identified human actors. In Lukes' (1974) second

dimension of power, power suppresses decisions and issues when there are observable conflicts of interest, typically when policies are formed based on what should or should not be included. In Lukes' (1974) third dimension of power he claims that control of knowledge is critical to the exercise of power. Knowledge mechanisms such as information control, secrecy, education, socialisation, and the creation of political beliefs and ideologies become important in creating an understanding of how power operates. This three dimensional framework of power has been a useful way of understanding power and knowledge creation. It focuses on all the various constellations of interest; the first two dimensions concentrate on the view of the interests of the individual. In this paper we are interested in showing how power manifests itself as a division between the management's overall vision and the work processes taking place at the corrugated cardboard machine. We are particularly concerned with the dynamics between periphery and core, in terms of power differences, as regards different actors or actor groups and their chances of having a say in processes that concern them.

4. Restructuring power at the corrugated cardboard machine

This case study of the corrugated cardboard machine started in mid November 2005. The scope of the project was defined after discussions with the employees working at the cardboard machine where the aim was to increase the efficiency of the machine by 25 percent. The project group consisted of the foreman and the external researcher, who decided to investigate the potential for increasing the efficiency of the cardboard machine by 25 percent. After some preliminary investigations it became obvious that the achievement of this large increase in efficiency was realistic. But, the researcher pointed out at this stage that this would not be a quick fix for the company. Implementation would take time and both the technical staff and the organisation itself would have to cooperate in order to fulfil the efficiency potential of the machine.

4.1 First project meeting

At the first meeting in the paper mill the project group discussed challenges and problems related to a low utilisation of the cardboard machine. It became apparent that some ways to increasing efficiency, mostly of a technical character, were already known. However, the company had so far not been able to implement solutions to increase the efficiency of the cardboard machine. Despite a rather open atmosphere in the meeting nothing was said about the reasons why a systematic examination of the matter had not been formerly undertaken. It was decided that the project group would consist of the foreman of the cardboard machine and the external researcher.
Furthermore, the project group decided to determine how a 25 percent increase in efficiency at the cardboard machine could be achieved. The project group agreed that a 25 percent increase was very ambitious, but acknowledged that an ambitious aim was needed to attract attention to the project within and outside the company. Hence, the rest of this first meeting was dedicated to discussing how different problems and consecutive solutions effectively could improve performance on the cardboard machine.

4.2 Second project meeting

At the second project meeting, which was arranged by the production manager, all employees working the two daily shifts at the cardboard machine participated. The foreman, the union representative, and the researcher also participated. The purpose of this meeting was to anchor the project with the employees, to ensure their engagement and participation in identifying problems and solutions to problems. The production manager presented the new project and told the employees about the aim to increase efficiency at the cardboard machine by about 25 percent. The employees responded irritably that they had made suggestions for improvements for a long time without being heard. The employees were suspicious about what was happening, and some of them expressed fear that the researcher was the top management's representative and was thus intent on finding ways of reducing the number of operators working at the cardboard machine. The atmosphere was tense with a heated discussion. After a while the union representative, the foreman and the researcher took more active part in the discussion and the atmosphere changed. At the end of the meeting the employees were much more positive towards the project. The production manager, the foreman, the union representative and the researcher felt that it was up to them and in particular the researcher to establish the necessary trust between the project group and the employees working at the cardboard machine if the project were to succeed.

4.3 Collaboration with staff at the cardboard machine

As the project proceeded the collaboration with the staff at the cardboard machine improved, and the necessary trust between the staff and the investigating researcher was established. The employees contributed with positive feedback to

the researcher, based on how they perceived the work challenges related to the cardboard machine and how efficiency could be improved. The researcher spent a lot of time in the company with the employees, and was present at all their shifts. The atmosphere has been open and good. At one point, the employees on the evening shift told the researcher: 'We will manage this project together' (Employee statement). Gradually the focus the staff had on the machine changed from purely technical problems to also include organisational challenges. Communication gradually improved in an atmosphere characterised by strong trust. Consequently, the investigating researcher's phone number was handed out to all employees at the cardboard machine. In this way the employees were able to report to the researcher whenever an interesting development occurred at the cardboard machine. During the working process only actors working directly at the cardboard machine were involved in the work. However, the project group, even at the board level of the company, continually informed the rest of the organisation in order to avoid any negative reactions from individual actors or actor groups.

4.4 Implementation of project results

The project group understood very early in the project that the successful implementation of the potential solutions to improve the efficiency of the cardboard machine by 25% could only take place through a strong anchoring of these solutions with the staff on the machine. Consequently, before the project results were presented to the management, the staff working on the cardboard machine was gathered to approve the potential technical/organisational solutions. This took place in an open discussion in a trusting atmosphere, creating a common understanding of what would be presented to the management. Shortly thereafter, the operators working at the cardboard machine took part in a workshop. There, the project group presented questions challenging them to prioritise a task list to improve the efficiency of the machine, assigning each item to a responsible actor. Surprisingly only organisational elements were mentioned in the discussions. During the workshop the production manager turned up, announcing that the operators had free reigns to start up the improvement work. His only restriction was that the cardboard machine had to be kept running.

5. Discussion

The study demonstrates the importance of including workers in discussions concerning their workplace. Through a broad participatory process the workers became aware of how they could contribute, and they developed a sense of ownership in relation to the process (Wenger, 1998). This was achieved by building trust between the researcher and the workers, and creating a safe atmosphere where the workers could speak open and freely. Three important prerequisites that helped to achieve knowledge sharing were established at the beginning of this project. Firstly, only those working with the cardboard machine were included in the process. Secondly, no representatives from management were included in the process. Finally, the researcher was entrusted with the project by the management. In this way the study of this project is an example of a bottom-up process that demonstrates how the fundament for knowledge creation and sharing needs to be anchored at the level where the problems occur and where the solutions to the problems will be implemented. This way of approaching knowledge creation and sharing is based on who is supposed to know and who needs to know (Webb et. al., 2002). In reality what happened in this project was a redistribution of power and influence (Lukes, 1974).

Power is here understood as defined by Dahl (1969), Bacharach and Baratz (1970) and Lukes (1974), giving us an understanding that power may not only exist in an actual conflict, or when actors constrain themselves from raising certain issues because of different barriers, but also when people's needs and desires are shaped by power agents to make the outcome not to be in their real interest, Klev (1993). In the studied case we saw that already in the first and second project meetings signs of constrains and a display of power. Since, employees working at the cardboard machine were aware of the weaknesses of the machine and how to commence them, but did not feel they were heard since no attempts had been made to increase the efficiency of the machine. Furthermore, the employees saw the introduction of the new project to make the machine more efficient with the use of an external researcher, as an additional power execution. It was only when the employees realised that the invited researcher was not there as a representative from management. This manifested it self most clearly in the second project meeting where the atmosphere changed from tense to more positive. This of course was also a result of assurance from the researcher that he was not the top management's representative aiming for reduction of the number of operators at the machine. In this way through the meetings between the researcher and the personnel working at the cardboard machine, trust between the parties was established. We see this as a fundamental, for being able to restructure power. How can a practice develop unless there is a minimum of trustworthiness present in the

relationships constituting that practice? Trust must be considered in a discussion of what element make the social practice between superiors and subordinates happen. According to Karen Jones (1996) trust consists of two elements, 1) A cognitive and 2) An affective. She sees the first element, cognition, as based upon understanding the conditions that makes us trust in the other. This is based upon "optimism about the goodwill and competence of another" (Jones, 1996: 7). The affective element of trust is based upon how emotions "are distinctive ways of seeing a situation" (Jones, 1996: 11). Therefore the affective element influences "one's willingness to rely on the other seems reasonable" (Jones, 1996: 11). Therefore our interpretation is that to develop a new practice where responsibility and decisional power is moved further down in the organisation, need consider both cognitive and affective aspects.

In line with Bertalanaffy (1998) a system is a structured assembly of components and sub-systems, which interact through interfaces. The elements and their interactions constitute a total system. Organisations are open systems and interact with their environment. They exhibit the character of steady state, wherein a dynamic interaction of systems elements adjust to changes in the environment. In the socio – technical systems perspective one tries to understand problems within an organisation as matters deriving from the relations between the social and the technical sub-systems (Trist and Bamfort, 1951). The organisation is viewed as a system. The social system is humans in the organisation and the relations between them. Levin, Fossen and Gjersvik (1994) claim that this first of all has something to do with the individual's needs and wishes related to his of hers working conditions, and secondly with inter-human relations as, safety, support, involvement, status, power and social networks. As Susman (1983) argues, the socio-technical system design is a search for the best solution, involving the same time conflicting requirements of the technical and social systems. This often means that one has to compromise with the requirements of a perfect technology, in order to get a well - functioning social system. It may be necessary to make other technical choices in order to achieve a joint optimisation of the overall system. From this, a technological innovation will take place in the interplay between humans and machines, in the search for a joint optimisation.

Emery and Emery (1974) claim that socio-technical design concept serve as a reference when analysing parts of a whole, where the whole is represented by the industrial production of an enterprise. This context requires a selection to be made regarding how to use the technology, independent of its complexity.

A formulation of socio-technical design is given by Elden et al (1986): 'A socio-technical design implies that the human is regarded as a social individual with necessary and important relations to fellow workers, superiors and subordinates. The human being is part of a larger community. He or she has capabilities of both thinking and of carrying out manual tasks. At the same time the individual can develop itself through learning based on new experiences. The technology has to be designed in such a way that is useful when utilised by human beings'. An important prerequisite for the acceptance of the researcher's investigation of the cardboard machine amongst the employees was the establishment of trust but also the fact that the investigating researcher had substantial knowledge about paper and cardboard production. The researcher had both a university degree within the field and long practical experience from the paper and packaging industry. Furthermore, by using an action research approach the establishment of the weaknesses and corresponding improvements of the machine, there was a dialogue with the employees working at them machine. Through this dialogue the employees were given the opportunity to demonstrate their own knowledge, and being listened to. In short they were given influence, which led to specific changes in the machine. Hence, their suggestions were for the first time actually made real.

For an engaged researcher phronesis will be the intellectual activity related to participation in a practical activity aimed at clarifying problems, risks and possibilities. To be able to conduct a successful action research process the researcher need a personal disposition that signals humbleness, reflection and authority to the environment. In this way it is possible to achieve 'local interaction, negotiation and talk' (Engstrøm, 1998; 2-3). As can be read from the case with the cardboard machine, this local interaction occurred and as the project and its result manifested itself the employees saw themselves on the same side as the researcher "We shall manage this together". Consequently, partaking promoted knowledge sharing. Consequently, a researcher depends on a close engagement to the studied environment and needs to understand how employees define what is meaningful for them. To accomplish this, the researcher needs both substance knowledge and process knowledge to arrive at different stages in the action research project. But, it is the practical abilities and personal traits of the researcher as a facilitator

that lay the foundation for the action research process, and will in the long run be senior to any substance knowledge. Understanding how these factors influence the research process, will equip both researchers and those being researched, with a more thorough understanding of how integrity and involvement may intervene, without either of them suffering during the research process.

Gaventa and Cornwall (2001) claim that it is fundamental for understanding, power and how this influence decisions, to acknowledge that power and knowledge are inextricably intertwined. Therefore power influence what will be known and who will know. In line with Dahl (1969) to exhibit power over another person means to administer a pressure forming the other's behaviour. According to Gaventa and Cornwall (2001) change processes can challenge deep-rooted use of power. When we are conceptualisation Action Research (AR) as social processes Levin (2002) claims that we have to deal with the Social Construction of Technology (SCOT) of Bijker (1987), to identify that construction of new technology depends on the involved social actors. Taking this position further, our attention is directed to the Actor Network Theory, ANT (Latour 1987; Callon and Law 1982; Law 1992). The basic idea in ANT is to study how actors construct their network to promote their own interests. The power play in this construction process and the results can only be understood in terms of which actors have what kind of power, and what type of resources are available for creating the change. In line with the ANT thinking, actors enrol in the social processes, where interests and power are played out to influence what the result of the change process should be. To understand the implications of power it is necessary to define what we mean with power in this paper. In Lukes' (1974) first dimension of power, focus is on behaviour in the decision making process, where it is an observable conflicts of interests between participation actors, to determine who wins and who looses in clearly defined issues. The absence of anyone in the debate, their non – participation is interpreted as their own apathy, not as a process of exclusion of the political process. Knowledge may be understood as resources to be mobilised to influence debates and to create new knowledge. Bacharach and Baratz (1962, 1963) criticised Lukes' first dimension of power by arguing that this dimension has a strong behavioural focus, in terms of identified human actors. At the cardboard machine there was an observable conflict of interest between the participating actors, given that historically problems related to the machine had previously been raised, but been ignored. This created an atmosphere of suspicion and indifference undermining attempts to distribute responsibility and stimulate knowledge sharing. Additionally three requirements supported the partaking process. Firstly, only those working with the cardboard machine were included in the process. Secondly, no representatives from management were included in the processes at the corrugated cardboard machine. Finally, it was the research first had to earn the management trust in order to proceed with the project, and this was achieved in part by his technical background giving him authority and secondly by continuously informs management about project progression.

In Lukes' (1974) second dimension of power, power is something that suppresses decisions and an issue, which there is an observable conflict of interest, typically when policies are formed, based on what should be included and what should not be included. It was apparent during the first two project meetings, that there was an observable conflict of interest between the employees at the cardboard machine and the project manager. Only after the union representative, foreman and the researcher started to engage in the whereabouts of the cardboard machine by emphasising collaboration with the employees, did conflicts of interest start to dissolve. In Lukes' (1974) third dimension of power he claims that control of knowledge is critical to the exercise power. Knowledge mechanisms as information control, secrecy, education, socialisation, and the creation of political beliefs and ideologies become important to create an understanding of how the power operates. At the cardboard machine the control of information was obvious since there was a clear top-down control of the activities and influences on the work at the machine. Hence, the employees' attitude were hostile, since they had previously had not been heard. A change in this attitude was accomplished as a result of gradually changing the information flow to a bottom-up flow.

The implications of these perspectives on power are that the engaged researcher needs to understand and deal with the display of power between actors, their different interests, decisions and results. It is necessary to understand, how power influences the situation in which the action research process takes place. Being able to identify and knowing how to even out the power balance are therefore seen as crucial for the role of the researcher, to induce social change. Alvesson (2002) claim that 'even if power is not solely negative, the concept draws attention to how someone is being subordinated and shaped in accordance with a particular regular force, giving priority to certain interest and neglecting

other' (pp. 122). Our research support this claim by focusing on the division that power introduces between what we define as the periphery and core in the studied organisations. In all learning processes there will be partakers who have a personal interest in participating, and these persons have the power to decide what the content of the learning process should be, and thus influences what is being learned. This is what we can find it the actor-network-theory (ANT) (Latour, 1987; Callon and Law, 1982). Vital in the ANT is that actors construct networks to further specific viewpoints, and where the essence is the power play during construction of the innovation process. This result becomes a documentation of what actors had access to what resources during the innovation process (Levin, 2002). It is possible to reverse a negative balance between power, influence and knowledge distribution if employees are included in decision processes. Furthermore, inclusion needs to be followed by action thus there needs to be a direct relationship between solutions to problems and their implementation. Only through implementation is it possible to foster a positive atmosphere where the periphery feels they are included and can actually see the effects of their problem solving efforts. In this way what is achieved at the cardboard machine, as interpreted by the employees, are the power of example. This will pave the way for a new regime of power, where knowledge and learning processes adds to the power of those how experience the problems on a daily basis.

6. Conclusions

This paper has proven how the success of knowledge creation and sharing in an organisation depend on addressing concrete problems and involving those facing the problems in their solution. The project group analysed the possible causes of low capacity at the cardboard machine, focusing on technical elements. During this investigation it became apparent that the organisation knew about many of these technical challenges, but few changes had been implemented to improve the machine. Thus, the low efficiency of the cardboard machine could not be blamed solely on technical problems; part of the explanation could be found in the organisation itself, in particular the lack of communication between management and employees. This is consistent with the socio-technical thinking necessary for bridging the gap between technology and the organisation. According to Levin et. al. (1994; 2002) this is called a socio-technical approach. Susman (1983) claims that socio-technical design involves a search for the best solution, which often leads to opposing demands from the technical and social systems. This means that relations between the technical and social systems must be optimal in order to arrive at good solutions involving compromises from both parties (Trist and Bamforth, 1951). This also applies to the case study of the cardboard machine and this relationship is illustrated in Figure 1.

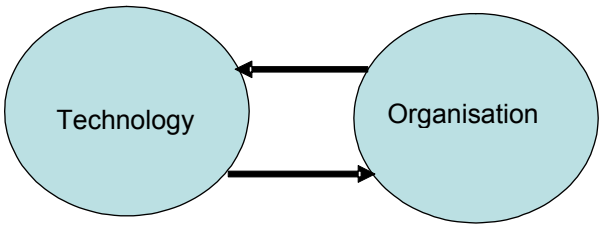

Figure 1: Illustration of the Socio-Technical Relation

One of the consequences of the corrugated cardboard project, a technological transfer project, was that it forced through necessary organisational changes in the company. Using a technological project, it was possible to restructure power, start a learning process and convince the management that this was a fruitful approach that eventually would lead to an increase in efficiency at the corrugated cardboard machine. It is worth noting that these processes relay heavily on trust, not only at the shop floor level, but also on trust from the managerial level. Thus this study demonstrates the importance of anchoring the fundament for knowledge creation and sharing at the organisation level where problems occur and where solutions need to be implemented. Consequently the approach used in this research is a bottom-up process. This way of approaching knowledge creation and sharing, concentrates on those who need the knowledge and who faces the daily problems.

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