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Peter Drucker stated that nowadays less than one fifth of the workforce are blue-collar workers doing manual work, while white-collar workers doing knowledge work make up the majority of the workforce. Yet when it comes to our understanding of a knowledge worker’s productivity, we are, today, roughly where we were in the year 1900 in terms of productivity of the manual worker. Organization design of knowledge work is still shaped to a large extent by ideas on how to manage manual work. In this article, we will explore the main differences between manual work and knowledge work in order to gain new insights on how to enhance the productivity of knowledge workers as dramatically as in the case with manual workers over the last century.

We will argue that in the case of manual work, organizational design was mainly driven by division of labor, focusing on organizational structures like the U-form and the M-form. Integrating governance mechanisms played a secondary role. Further, governance mechanisms were focused on transactional solutions, that is, on monitoring and monetary rewards. In contrast, in the case of knowledge work integration of distributed cross-functional knowledge is crucial. Therefore, organization design has to start with integrating governance mechanisms while organization structure follows. The most important integrating governance mechanisms are no longer based on transactional but on transformational solutions that focus on the willingness and motivation of knowledge workers to cooperate voluntarily. Thus the new principles of organization design that meet the challenges of efficient knowledge work aim at community-based collaboration. We will analyze the theoretical insights on which such collaboration can be based and discuss three evolving organizational designs in order to demonstrate the implementation of these insights.

DIFFERENCES BETWEEN MANUAL AND KNOWLEDGE WORK
What are the main differences between manual and knowledge work? Basically, all work inside firms is teamwork. Together, team members can produce a higher output than the sum of the separate outputs of each team member working independently. This is just as true for manual workers jointly lifting cargo into a truck as it is for knowledge workers jointly designing a new software product. A team or a firm thus creates what is commonly known as synergy. The more effort exerted by one person, the more productive other members of the team become.

At the same time, creating synergies constitute what is called a social dilemma. It characterizes situations in which the actions of rational and self-interested individuals lead to situations of collective irrationality in which everyone is worse off. This is often the case in teams since it is hard to determine what input each of the team members has contributed to the joint output. Some team members may free ride at the cost of others. Thus the purpose of the team – to produce more than the sum of what members could produce individually – may not be achieved. Synergies may not be created. This is the reason why solving social dilemmas is at the heart of management in firms.

In manual work, the traditional way of solving social dilemmas was to give a supervisor the right to punish shirking. This is exactly what Frederick Taylor preached. Managers could supervise workers and assess their individual productivity efficiently. A strictly horizontal and vertical division of labor made supervision work. Since this prevents information asymmetry between the managers and the workers, it enabled managers to control inputs and to measure outputs of employees, and to reward them accordingly. Therefore, in the case of manual work, organization design starts with determining clear-cut tasks and responsibilities. The dominant organizational form in this case is the U-Form, which uses a centrally coordinated, vertically integrated structure to manage and supervise employees in their highly specialized jobs.
However, in the case of knowledge work, this traditional solution to social dilemmas does not work for three reasons.

First, to exploit knowledge of joint team production efficiently, the team members should to a high degree have different knowledge areas. Compare a team of workers lifting cargo into a truck with a team of fashion designers. Workers lifting cargo must not have different knowledge. In contrast, fashion designers need to integrate different knowledge about e.g. production processes, the garment, CAD software and marketing. In knowledge working teams who exploit their existing knowledge, it is not efficient if all team members know everything the others know. If the team leader knows everything her subordinates know, then synergies in exploiting knowledge will not be reached. Gains from specialization can only be reaped when cross learning is minimized and is replaced by knowledge of how to coordinate cross-functional knowledge. However, division of labor in knowledge work not only increases information asymmetries but also decreases the possibilities to monitor team members. The team-leader can monitor only to a limited extent whether her subordinates have chosen the most productive activities or whether they freeride. Although she could benchmark the team’s output if the outputs are measurable, she cannot attribute the joint result to singular team-members. Even co-workers in a cross functional team of knowledge workers can control each other only to a certain degree, since they have different knowledge areas. As a result, if workers in a knowledge working team want to freeride, they are in a good position to avoid monitoring by their superiors and co-workers.

Second, if joint knowledge-producing teams do not only exploit existing knowledge, but explore new knowledge, then knowledge transfer is crucial. Under these conditions, another problem arises. Contributions to firm specific joint knowledge are contributions to a firm specific common good, which each firm member can use, even if he has not contributed to it. For a rational and self-interested team-member there are two reasons to freeride instead of
contributing his knowledge. Firstly, he could lose his competitive edge. Secondly, he enables his supervisor to monitor him more effectively. As a result, selfish knowledge workers in teams are not only in a good position to freeride, but they also have an incentive to hide their expertise vis-à-vis their superiors and colleagues.

Third, knowledge workers have much more bargaining power vis-à-vis managers than manual workers. They cannot be easily replaced. Consider the example of the team of workers lifting cargo into a truck. These workers can be trained quickly. In contrast, knowledge workers are a critical resource to the firm, because their abilities must contain firm specific knowledge to gain a sustainable competitive advantage. A knowledge worker may invest mainly in his general knowledge and underinvest in his firm specific knowledge without the employer being able to control this underinvestment sufficiently.

TRANSACTIONAL SOLUTIONS TO SOCIAL DILEMMAS

With knowledge work monitoring does not work to overcome social dilemmas as long as people act as rational egoists. This is due to information asymmetries between supervisors, workers and co-workers. Are there any alternative transactional solutions which provide incentives to self interested team-members not to freeride? Conventional wisdom suggests two solutions, both based on pay for performance for observable outputs.

A first suggestion consists in the modularization of knowledge. The modules could be developed relatively independently by specialists and still be composed to a whole in an M-form structure. Modularization reduces the need for knowledge transfer between specialists. Inside the module, specialists can work without having to acquire the knowledge of specialists working in other modules. A module can be organized like a profit center. Its output can be evaluated and linked to other modules via transfer prices. This solution works as long as the
product architecture is stable and the interfaces between the modules are clear-cut. As soon as this is not the case, transfer of specialist knowledge between the modules is necessary and the social dilemma arises again.

Second, “selective incentives” are suggested to provide an incentive to transfer knowledge, e.g. when contributions to an electronic database are rewarded which then can be used by all firm members. A “selective incentive” is a bonus given to individuals as an inducement to contribute to a common good. However, such a bonus might work too well. Knowledge work contains some easy to measure components (e.g. pages of written text) and some hard to measure components (e.g. the importance of a text). Since pay-for-performance systems have to concentrate on few clear-cut criteria, they direct employees’ attention towards these criteria. As a consequence, rational employees will focus on the easily measurable components of the task and leave aside the components that are not so easy to measure, but are often of higher importance. Such a goal displacement - often called multiple-task-effect - sometimes has dramatic unintended consequences on firm specific common goods. The example of Sears car repair shops show this with firm reputation. Mechanics working for this company were paid according to the profits earned on repairs requested by customers. With this incentive in mind, the mechanics talked customers - with some success - into commissioning unnecessary repairs. When these acts of dishonesty were exposed, the Californian authorities threatened to close down all Sears car repair shops in the state.

To summarize, transactional solutions may mitigate some problems of joint knowledge work. But the more complex and dispersed among employees knowledge is, the more likely these solutions are to fail.

TRANSFORMATIONAL SOLUTIONS TO SOCIAL DILEMMAS
We have demonstrated that knowledge work within and between teams cannot be monitored and sanctioned by supervisors in the same way as it is the case with manual work. Therefore, with selfish employees, social dilemmas unfortunately go hand in hand with the production of synergies and common goods that are supposed to increase with teamwork.

Fortunately, “in most organizations, employees contribute much more to goal achievement than the minimum that could be extracted from them by supervisory enforcement...” as Herbert A. Simon has stated. To make use of this insight, we have to extend the theoretical background of the traditional view. According to the man model of “homo oeconomicus”, the traditional view assumes that people (a) have stable preferences and (b) that these preferences are selfish. In contrast, according to the man model of “homo psychologicus” which has been adopted by psychological economics, we take into account that (a) preferences can be transformed since they are plastic and (b) preferences are not only selfish ones. In contrast to the “homo oeconomicus” the “homo psychologicus” is not only based on assumptions, but on empirical research. On the basis of these insights, one might ask, under which conditions preferences of individuals can be shaped in a way that social dilemmas are avoided and contributions to common goods are fostered. This makes it clear that motivation is a main factor in knowledge teamwork. To study which transformational solutions could work, two types of motivation are to be distinguished: extrinsic and intrinsic motivation.

Extrinsic motivation serves to satisfy indirect or instrumental needs, for example, money or reputation. As such, money is almost always the means to an end – for example, paying for a vacation, or buying a car – and not an end in itself. In this instance, a job is simply a tool with which to satisfy one’s needs with the salary one earns. Transactional solutions focus mainly on extrinsic motivation. Intrinsic motivation works through immediate need satisfaction. An activity is valued for its own sake and is undertaken without any reward except the activity itself. There are two kinds of intrinsic motivation: enjoyment based motivation and prosocial
motivation. *Enjoyment-based intrinsic motivation* refers to a satisfying flow of activity. Examples are skiing, playing a game, or solving an interesting puzzle. In each case, pleasure is derived from the activity itself and not by the compensation. *Prosocial intrinsic motivation* takes the wellbeing of others into account without expecting a reward. The welfare of the community enters into the preferences of the individuals. A wealth of empirical evidence demonstrates that many people, in fact, are prepared to contribute to the common good of their company and community. They feel better if they have observed group norms like ethical standards, professional codes of practice, or norms of fairness.

HOW TO TRANSFORM MOTIVATION

If employees are motivated intrinsically to collaborate, then shirking is not a preferable action, because the activity causes a benefit instead of a cost. The social dilemma disappears. Transactional solutions are no longer the only way to create synergies. Instead, solutions to transform motivations in a way that foster voluntary cooperation come into consideration. Transformational solutions focus on two directions: First, they aim to protect existing intrinsic motivation. Second, they intend to enlarge intrinsic motivation.

*Crowding-Out of Intrinsic Motivation*

Research by the psychologists Deci, Ryan and their associates show that under certain conditions, external interventions can reduce intrinsic motivation for an activity. A first condition for crowding-out to occur is that the individuals concerned have intrinsic motivation in the first place, which can then be undermined. Second, the crowding-out of intrinsic motivation occurs if people perceive an external intervention as reducing their self-determination when doing an intrinsically interesting activity. In this case, people feel that
they are not the origins of their behavior. Their attention shifts from the activity itself to the external circumstances. The content of the activity loses its importance.

The crowding-out effect has been observed for some forms of hierarchical control and reward systems. It has proved relevant for both types of intrinsic motivation, that is, for enjoyment-based intrinsic motivation, as well as for pro-social motivation. In addition, it has also been observed that prosocial intrinsic motivation is crowded out if people realize that other team members are shirking.

**Crowding-out by Hierarchical Control.** Hierarchical control, that is, the process of standard setting, monitoring and evaluation undermines intrinsic motivation if employees perceive control predominantly as a signal of distrust and as autonomy thwarting, and if they perceive control as selfish. The downside of a distrust-signaling hierarchical control system is vividly illustrated by Gittell’s research on American Airlines. The then-CEO Robert Crandall insisted that delays come to his attention and get assigned to individuals and departments. “Crandall wants to see the corpse” a field manager told. American Airlines control system was characterized by sanctioning “the culprit”. The result was a culture of fear and infighting. Individuals and units tried to pin the blame for problems on others instead of learning from their failures.

**Crowding-out by Reward Systems.** Rewards are shown to also have an undermining effect on intrinsic motivation if they are perceived as controlling. A number of meta-analyses show that expected, tangible and salient performance-contingent rewards undermine individuals' intrinsic interest in an activity and their pro-social care for others. The effects of pay-for-performance on intrinsic motivation are well illustrated in a famous field experiment by Gneezy and Rustichini, that analyzes the behavior of school children voluntarily collecting money for cancer research. The children reduced their efforts by about 36 percent when they were promised a bonus of one percent of the money collected. Their pro-social commitment
for the good cause was changed into a transactional money-for-deed attitude, while the one percent bonus was far too low to compensate for the loss of intrinsic motivation.

**Crowding-out by Freeriding of Others.** If free-riding can take place without the possibility to sanction it, pro-social motivation to cooperate in teams is undermined in the long run. In other words, nobody is willing to be the "sucker" recurrently. If other team members are constantly shirking, the willingness to cooperate drops for everybody in the team. This effect has been studied by psychological economics in laboratory experiments. In so-called public good games that mimic social dilemmas, a high number of participants contribute voluntarily in the first round to the common pool. When the participants realize that others are shirking, they reduce their contribution, until after several rounds, it is close to zero.

**Crowding-In of Intrinsic Motivation**

Under certain conditions, external interventions have a positive impact on intrinsic motivation if they are a) targeted to create an intrinsically rewarding job environment, b) support employees' feelings of competence by supporting forms of hierarchical control and rewards, c) support employees' perception of esteem and relatedness by fair processes, d) signal social norms and e) enable self-governance in teams to discipline freeriders.

**Crowding-In by Job Design by Emphasizing Autonomy and Feedback.** Intrinsic motivation can be enhanced through job design along several dimensions. The two most important dimensions are autonomy and task feedback. Autonomy, that is the degree to which the job provides decision latitude, enhances employees' self-determination and thereby strengthens intrinsic interest and pride in the job. Task feedback, that is the degree to which the job provides clear information about performance levels, heightens feelings of competence and empowers employees' in their tasks. Three additional dimensions were found
to strengthen intrinsic motivation through raising perceived meaningfulness of the job. These are variety (the degree to which a job requires the use of a number of different skills and talents); identity (the degree to which the job requires completion of a “whole” piece of work, or doing a task from beginning to end with a visible outcome) and significance (the degree to which the job offers opportunities to protect and promote the well-being of beneficiaries).

**Crowding-In by Hierarchical Control.** Whereas hierarchical control often undermines intrinsic motivation, there are two conditions under which the contrary is true. First, empirical research demonstrates that hierarchical control is perceived as supportive if feedback is given in a constructive and timely way, and if caring guidance prevails. Second, hierarchical control that is executed for the sake of the community rather than for selfish interest is perceived to be legitimated. Field research shows that such benevolent, non-selfish monitoring leads to perceptions of organizational support and to higher pro-social motivation. Laboratory research demonstrates that people are more willing to contribute to a public good if a leader makes personal sacrifices.

**Crowding-In by Reward Systems.** Some forms of reward systems also crowd-in intrinsic motivation. This is the case if these incentives support employee’s feelings of competence and esteem. Monetary incentives, for example, signal benevolence and caring attitude if they are presented as "no strings attached". A Norwegian study in a knowledge-intensive industry found that that a generous fixed wage has strong and positive effect on work performance through its boosting influence on intrinsic motivation and affective commitment. Such wages signal that the firm believes in employees' goodwill and efforts without the need of constant evaluation and control. Awards and non-monetary incentives also signal support and esteem for employees' voluntary special efforts. Awards thus play an important role in sectors where such voluntary efforts and intrinsic motivation are crucial, in academia, for example, in the arts, and in military and public services.
Crowding-In by Fair Processes. To boost intrinsic motivation governance mechanisms need to be designed and executed in a fair way. The characteristics of governance mechanisms that lead to perceived procedural fairness can be summarized as participation, neutrality, and being treated with dignity and respect. Participation gives employees voice to choose between alternatives. Even more important is the participation in devising the rules of cooperation. Neutrality refers to the extent to which employees feel that the company or their superiors make unbiased decision. A precondition is the belief that individuals who set and sanction the rules do not allow personal advantages to enter into their decision-making. Finally, governance mechanisms should be executed in a way that signals dignity and respect to employees. Note that all three characteristics of procedural fairness (participation, neutrality and being treated with dignity and respect) are essentially unrelated to outcomes. Therefore, procedural fairness is crucial for situations that may lead to unfortunate results for the employees, e.g. in resolving conflicts or making decisions concerning promotions.

Crowding-In by Setting Pro-Social Standards. People seem to be inclined to do what they are asked to do. Field research has shown that people adhere to rules and accept the decisions of authorities they believe to be legitimate, even if it is not in their own self-interest to do so. People are also highly sensitive to signals about socially appropriate behavior. Such signals are given, e.g. by framing teamwork as a contribution to a community, instead of a tournament. In experiments it was found that participants were much more willing to contribute to a common good if they were told that they take part in a "community experiment" rather than in a "Wall Street experiment".

Crowding-In by Self-Governance to Discipline Freeriders. In all kinds of communities there exist some freeriders. As mentioned, the willingness to contribute to the common good in a team declines drastically when contributors realize that others are shirking. However, when freeriders can be punished, contributions are raised to the initial level, but only when
punishment does not serve the self-interest of the punishers. As a consequence, self-governance and peer-control in teams, as opposed to control by the superiors, is crucial for two reasons. First, sanctions by superiors are, in many cases, not considered as unselfish. Second, team members often are in a better position than superiors to realize shirking of peers. Elinor Ostrom, the Nobel prize–winner in economics 2009, has empirically shown with many examples that self-governance of commons is more efficient than hierarchical control with regard to counteraction of shirking.

In sum, a context which prevents crowding-out and enables crowding-in strengthens intrinsic motivation, prosocial behavior and cooperative learning. An intrinsically motivating organizational environment reduces freeriding and thus is instrumental in helping to overcome the social dilemma of knowledge management.

Table 1 summarizes the main differences between transactional and transformational solutions to social dilemmas as they are applied to manual and knowledge work. This table shows also what is discussed in the following section, namely, what follows from these theoretical insights. Firstly, we will introduce three new organizational forms to demonstrate how to implement transformational instead of transactional solutions. Secondly, we will show that the starting point for the governance of knowledge work is no longer the division of labor, but the integration of knowledge.
ORGANIZATIONAL FORMS FOR TRANSFORMATIONAL SOLUTIONS

To raise the productivity of knowledge work, organizational designs must provide a basis for transformational solutions that foster knowledge workers’ intrinsic motivation to cooperate and share knowledge voluntarily. The starting point is no longer the strict division of labor and clear-cut responsibilities within discrete structural alternatives, like the U-form or the M-form. We have to abandon a design process that starts with organization charts i.e. grouping of people into boxes and then connecting these boxes by some lines which symbolize coordinating and monitoring relationships. Instead, with the new organization forms, the starting point of organization design is the integration of knowledge by governance mechanisms that include a comprehensive bundle of relationships, ranging from democratic self-governance and participation to hierarchical coordination. Metaphorically speaking, the new organization design starts with the lines between the boxes, determines the meaning of the lines according to the requirements of knowledge integration and then considers the content of the boxes. If design solutions are tailored in this way, the focus of analysis shifts to attaining a new understanding of organizing; namely, from the dominance of organization structures to the dominance of integrating mechanisms, and from transactional solutions to transformational solutions that foster intrinsic motivation to collaborate voluntarily.

In recent years, some new organizational forms have emerged that elucidate these ideas in an exemplary way. Although, they differ in various aspects, one common feature is evident: They emphasize collaboration and voluntary knowledge transfer across functional, divisional and even firm boundaries. Thus, happily, they provide us with ideas how transformational solution can be enabled and institutionalized in structures, processes and integrating mechanisms to govern knowledge work. We refer to three innovative organization design models that have evolved quite recently as the C-form, the F-form and the I-form. They are
exemplary organizational forms for governing knowledge work compared to traditional manual work.

The Circular Organizational Form (C-Form)

The concept of circularity was introduced in the 1980ies and advanced to an organization form by the management researcher Georges Romme. Circular design addresses organizational democracy by establishing the circularity of power: Hierarchy is preserved, but embedded in operating procedures based on consensus. Thus, the C-form is geared to transcending the origin dichotomy between two forms of control: hierarchical control and self-control. Many researchers see the two forms as inconsistent and incompatible. Therefore, it is little wonder that the circular design model did not become famous until detailed studies were conducted at the Dutch electrical company Endenburg. This company produces circuit boards and electrical control systems. To date, principles of circular design have been implemented worldwide in more than 30 firms.

The key principle of circular design is the synthesis of hierarchical and self organizing forms of control. The organization switches continuously to and fro, in a timely and efficient manner, between authoritative and participative based mechanisms. This is done by establishing four design principles:

First, decision making processes on strategy issues run according to the principle of consensus; the matter is debated in circles of organization members. Consensus is deemed to exist, if nobody raises a reasoned and overriding objective against the proposed decision.

Second, each firm member participates in at least one circle. A circle is a decision-making unit, composed of people with a common work objective. “Circle-relevant” matters are decided by a participative process in which a consensus must be reached. The circle members,
in conjunction with their leaders, are autonomously responsible for smooth running of the cooperation and performance within their circle. The circle members are more likely to cooperate and are more willing to share knowledge, for two reasons. On the one hand, participation allows interactions among knowledge workers in the firm that are frequent and long-lasting. This enlarges the feeling to belong to a community. On the other hand, the participants of the process can be easily identified and thus peer control becomes a barrier against freeriding.

Third, between two circles there are vertical connections that are formed by way of double linking. Double linking is the participation of at least two leaders in the next higher circle. One leader is appointed top down. He or she represents the traditional hierarchical principle. The other leader is elected by the members of the subordinate unit. He or she represents a democratic bottom up principle. This principle makes sure that hierarchical control is balanced by participation. A crowding-out effect by unilateral commands and unsupportive monitoring can be avoided.

When there are different interests at hand, the fourth design principle is implemented: All co-determining parties in the decision-making process clearly formulate their arguments and participate in a discourse until presumably, a stalemate occurs. If a new argument that will reach an agreement cannot be put forward within 48 hours, the matter to be agreed upon is passed to the next circle above and the debate is moderated by a representative of the higher circle. The idea behind this is to stop resistances impeding business activities. The experiences at Endenburg show that in most cases an acceptable solution for all sides is reached before the 48 hours are up, because the negotiating parties have an interest in preventing intervention by the next instance up in the hierarchy. Elaborated intranet solutions were realized to support these decision making processes, so that all representatives have free access to decision-relevant information.
The circular design model is well suited to foster intrinsic motivation of firm members. This is because the four design principles are characterized by a high degree of autonomy and participation, task feedback, fair procedures, and self governance through peer control. Firstly, the circular form allows firm members to influence decisions whose results will affect them. They regularly have the opportunity of raising their objections in various circle meetings. Secondly, the circular form gives clear information about expected performance levels and responsibilities as well as feedback on goal achievement. Thirdly, the rules of decision-making are fair. With a circular design, the rules of decision making are easily identified by every firm member, and each firm member can get involved. Finally the sucker-effect is avoided because peer control is enabled.

The Initiative-Freeing Organizational Form (F-Form)

While the C-form links democratic bottom up organization with hierarchical top down organization, the F-forms goes a step further and intends to reduce hierarchical control to a minimum. The F-form was introduced by two management researchers, Brian Carney and Isaac Getz who are inspired by the work of the psychologists Deci, Ryan, and their associates. They studied companies like W.L. Gore & Associates, one of the leading manufacturers in polymer products, and the Danish Hearing Device Manufacturer Oticon. These companies were experimenting with organizational designs which emphasize self-initiative and autonomy. The key principle of such initiative freeing forms, which are shortly called the F-form, is a design in which the firm members should have freedom and responsibility to take actions that they decide are best. Thus in many of those companies studied, employees are allowed to set their own work times, choose their own job descriptions, and create their own job descriptions. Some even have no traditional organization charts and no assigned formal
roles. The goal of the F-form organization is to create an environment where employees can motivate themselves. The F-form is characterized by three design principles.

The first design principle is to institutionalize processes of participation. Employees are regularly asked where they want to contribute and are involved in the decision processes. For example in the case of W.L. Gore & Associates leaders are not formally designated but are peer selected. In addition each employee has chosen his or her personal mentor to make sure that his or her voice is heard across projects and functions. Mentors are also chosen to support fair reward systems.

The second design principle is to provide integrating mechanisms that foster autonomy and intrinsic interest. For example at W.L. Gore & Associates employees are encouraged to experiment, collaborate and self-select into projects. This principle includes, for example, the authority to spend whatever time is required to solve a customer’s problem. This type of work design not only allows for maximal self-determination but at the same time also creates variety, identity and significance of work. Variety and identity is supported because employees are encouraged to switch between projects and functions. Significance is signaled by encouraging employees to change leadership and functional roles which provides them with a better understanding of the interdependence of team projects and thus of the contribution of their work to the company as a whole.

The third design principle is to replace traditional command and control practices by means of participation, self-governance and peer control. Employees are expected to reach an agreement on the rules of cooperation, to set social norms, and to subject them to peer-control. Work is structured in a way that what each employee does becomes visible and is contingent upon what others do. One principle of W.L. Gore & Associates is to stay small to enable these processes: whenever a unit exceeds 200 employees it is split into new units. This self-governance on the one hand has the potential to transform the originally divergent
preferences of employees into a common mutual understanding by promoting a group identity. On the other hand it helps to avoid the sucker-effect. Recurrently free-riding individuals are not likely to last long in such teams.

Though the three design principles of the F-form are not yet as clearly developed as those of the C-form it has become obvious that the F-form implements the theoretical insights of how to foster intrinsic motivation to contribute to the common good via three areas: participation, autonomy-enhancing job design and self-governance through peers.

**The Innovation Organizational Form (I-Form)**

The I-form is a collaborative community of complementor firms. The management researchers Miles, Snow, Miles, and their colleagues suggest this design model as organizational answer to the innovation era. It evolves in industries where on the one hand the knowledge base on which business opportunities rest is constantly changing and growing. On the other hand, this knowledge is distributed among firms. The I-form organization follows the strategy of persistent exploration of new market uses for continuously adapted technologies. It is based on an entrepreneurial research and development process, because ideas developed in one setting are adapted to a new use in another setting. This happens when people from different firms interact collaboratively within networks or communities. Thus, the I-form transports key principles of governing knowledge and innovation work beyond traditional firm boundaries to multi-firm networks.

The evolution of the I-form model is tracked in many pioneering communities such as Technical and Computing Graphics (TCG), a network of Australian firms which collaborate on technological and product innovation in the IT sector, as well as in web-based businesses. A very recent example is the Open Handset Alliance (OHA), a business alliance of 50 firms
founded at the end of 2007. This alliance is led by Google and includes companies like Intel, LG, Motorola, T-Mobile, Texas Instruments and many others. Google chairman and CEO Eric Schmidt said that the alliance’s vision is to advance open standards for mobile devices which will help shape a new computing environment in terms of how people access and share information in the future. The members of this community develop Android, a mobile operating system based on an open source license. Since its original release it has been updated many times and some members have contributed significant intellectual property to the Alliance. The first commercially available phone running Android went on to the market in autumn 2008.

The key assets of these exemplary networks are knowledge commons that accumulate learning and serve as an idea bank which member firms can tap. To govern these knowledge commons, three design principles are applied: a facilitator organization, general operating protocols used to guide firm behavior, as well as voluntary and collective management of the commons.

The first design principle reflects the facilitator organization which provides strategic initiatives and administrative services to the community. At the OHA, Google assumes the role of the facilitator and sets the strategic initiative by contributing its knowledge on mobile-device code writing to unveil an open software platform. Applying administrative services to governance means that some control of the collaboration procedures is delegated to the facilitator organization. Such delegated control is likely to be perceived as organizational support and not as a signal of distrust.

The second design principle is to transform supportive mission and value statements into general operating protocols. These protocols include the expectations of how individuals and the collaborating companies should behave in the community. They set standards guiding the inter-firm behavior. It is important that the protocols are visible. Thus ambiguity is reduced
and reliability is increased. In addition, protocols eliminate potential conflicts, because they are formulated for objectivity. Seen in this light, operating protocols also form the basis for transformational solutions. On the one hand, they foster fair processes because they are devised in a participative way and guarantee neutrality. On the other hand, operating protocols can be used to set pro-social standards by agreeing on a socially appropriate behavior.

The third design principle reflects self-management to govern voluntarily the knowledge commons. For example, at the OHA potential co-determinants must apply for admission to the network. All members decide together which companies are welcome to join this collaborating community of vendors, carriers and application developers. All community members are expected to reach a consensus on the rules of cooperation. Another example is that at the OHA each collaborating party has undertaken an obligation to greater openness in the mobile ecosystem. The operating system Android only works because all members agreed to advance and use these knowledge commons as the platform for the products and services they will develop. All community members are also expected to subject each other to peer control to discipline freeriders. Self-management processes are implemented in order to firstly determine the content of the operating protocols, secondly to gain compliance with these protocols, thirdly to modify them over time so as to better fit them to changing characteristics of the community setting, and fourthly to decide on sanctions for those parties who violate the protocols.

The three design principles of the I-form fit very well into the theoretical insights developed how to foster voluntary contributions to knowledge commons. Intrinsic motivation is enhanced by supportive coordination via the facilitator organization, by fair procedures, by establishing social standards via general operating protocols, and by self governance through peers. The I-form demonstrates that transformational solutions are not only applicable within
single organizations but also across multi-firm boundaries in order to enable collaborative communities.

CONCLUSION

To summarize, the new organization design models discussed, the C-form, the F-form and the I-form, have two characteristics in common that differentiate them from the traditional U-form and M-form. Both characteristics aim at fostering voluntary contribution to common goods or synergies, which are achieved through collaborative knowledge work.

First, the starting point in the design process is no longer the division of labour into clear cut tasks and responsibilities and grouping them into boxes and charts. Instead, the starting point is the design of integrating mechanisms, such as processes of participation and self governance. Note that the design principles of the three new design models do not refer to any dimensions of division of labour, such as functional or market-related tasks. Instead, the circles in the C-form or the project groups in the F-form can contain different tasks, e.g. functional, regional- or project-based tasks.

Second, the integrating mechanisms are no longer concentrated on transactional solutions to the problems of social dilemmas, such as monitoring and contingent pay. Instead, the integrating mechanisms center on transformational solutions to foster intrinsic motivation to collaborate. Thus the social dilemma is mitigated since activities to contribute to the common good are no longer a cost but a benefit. We have shown that the integration mechanisms in the C-, F-, and I-form fit very well into the theoretical insights with regard how to foster intrinsic motivation, in particular participation, autonomy-enhancing job designs, and peer control to avoid free-riding.
However, there are also differences between the three forms. They relate to the question how the coordination of activities between teams is achieved. In case of the C-form it is quite clear that hierarchical coordination is preserved, though embedded in the double linking of circles that enable at the same time authoritative and participative integration mechanisms. In the case of the I-form the facilitator organization exerts some hierarchical coordination, though in what way this coordination is executed seems to differ in the firms mentioned. In the case of the F-form it is quite unclear how coordination is achieved and whether this is done in a way that is perceived to be supporting. In general, more case study research is needed to inquire whether there is a robust repertoire of integrating mechanisms that allow coordination of activities between teams without hierarchical control undermining intrinsic motivation.

Despite these open questions we hope to have contributed to the insight, that the design principles to organize knowledge work are different from those of earlier organizational forms. We have shown that to enhance productivity of knowledge work it is not sufficient to build on monitoring and contingent pay, that is, on the assumption of “homo oeconomicus”. Rather it is necessary to focus on the question how to govern commons on the basis of “homo psychologicus”. These insights should be based on theoretical and empirical work and be integrated into a theory of "new organizational forms". A good example of how this can be done in a systematic fashion is the work of Elinor Ostrom, who has won the 2009 Nobel-prize in economics for her theoretical and empirical insights on design principles of institutions to govern tangible commons. Thus let us follow her example and gain further insights into how to govern intangible knowledge commons in the new organizational forms for the 21th global economy.
Table 1: Main differences between transactional and transformational solutions to social dilemmas with manual work and knowledge work.
SUMMARY

Our understanding of organization design is still dominated by ideas on how to manage manual work. This understanding is mainly driven by the division of labor based on clear cut responsibilities, focusing on organizational structures like the U-form and the M-form. Integrating governance mechanisms played a secondary role and were focused on transactional solutions, that is, on monitoring and monetary rewards. Today knowledge work is dominating. In this case integration of distributed cross-functional knowledge is crucial. Therefore, organization design has to start with integrating governance mechanisms while clear cut responsibilities play a secondary role. The most important integrating governance mechanisms are no longer based on transactional but on transformational solutions that focus on the willingness and intrinsic motivation of knowledge workers to collaborate. We analyze the theoretical insights on which such collaboration can be based and discuss three evolving organizational designs in order to demonstrate the implementation of these insights.
SELECTED BIBLIOGRAPHY


*Managerial Dilemmas. The Political Economy of Hierarchy* (Cambridge University Press, 1992) by G. Miller includes a comprehensive discussion of social dilemma situations in firms. A good overview on the findings of psychological economics on cooperative behavior in social dilemma situations can be found in the academic article by E. Fehr and H. Gintis, “Human Motivation and Social Cooperation: Experimental and Analytical Foundations”, *Annual Review of Sociology*, 2007, 33, 43-64.


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