One of the greatest challenges for organizations and management is the rapidly rising importance of knowledge work for wealth creation in the global economy. In the United States, an estimated 30 percent of the workforce can be classified as knowledge workers, and this type of work is the fastest-growing segment of the workforce in all industrialized countries. However, what management theorist Peter Drucker identified as the biggest challenge of the 21st century has still not been adequately tackled. Drucker said that 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. Thus, designing organizations for the 21st century is about raising the productivity of knowledge work as dramatically as in the case with manual work over the last century.

We suggest that such organizational design primarily needs to address the motivational requirements of knowledge work. Knowledge production is heavily dependent on voluntary contributions and the sharing of knowledge. Therefore, monitoring and sanctioning do little to create or leverage knowledge. Instead, governance mechanisms are needed that further intrinsic motivation and voluntary cooperation. In addition, organizational design for knowledge work has to foster integration of distributed and cross-functional knowledge. Therefore, a strict division of labor, found in organization structures such as the U-form (unitary), M-form (multidivisional), or matrix, should no longer be the starting point for designing jobs and organizations. Instead, integration of knowledge is crucial, and managers need to be aware of, and able to operate, newer organizational designs such as the C-form (circular), F-form (freedom), and I-form (innovation). These emerging forms are characterized by the dominance of integrating mechanisms instead of the dominance of structure. At the same time, they enable intrinsic motivation and foster community-based collaboration.

In the first section, we will show that knowledge work has different motivational requirements than manual work. This is why traditional command-and-control management is not effective for knowledge work. In the second section, we discuss why pay for performance – which we call a “transactional” solution – is also not able to sufficiently motivate workers to generate and share knowledge. In the third section, we turn to the question of how organizations can foster knowledge workers’ intrinsic motivation to collaborate voluntarily. We call this the “transformational” solution. Finally, we apply our theoretical insights to three innovative organizational designs, the C-, F-, and I-form, to demonstrate how transformational solutions can be implemented and institutionalized.

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 today’s firms that rely heavily on team-based organization designs.

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 W. Taylor preached in his book *The Principles of Scientific Management*. 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 enables 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 main reasons.

First, to exploit existing knowledge of team production efficiently, the team members should have different knowledge areas. Compare a team of workers lifting cargo into a truck with a team of fashion designers. Workers lifting cargo need not have different knowledge. In contrast, fashion designers need to integrate different knowledge areas such as production processes, fabrics and other materials, computerized design software, and marketing. Knowledge work teams aren’t 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 knowledge diversity, but by the same token also increases information asymmetry between supervisors and subordinates and thus 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 free ride. Although he could benchmark the team’s output if the outputs are measurable, he cannot attribute the joint result to particular 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 free ride, 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 also explore new knowledge, then knowledge transfer and integration are 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 reasons to free ride instead of contributing his knowledge: He could lose his competitive edge by sharing his knowledge, and 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 free ride, 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 relative to management 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 under-invest in his firm-specific knowledge without the supervisor being able to control this under-investment sufficiently.

**THE FRAGILITY OF TRANSACTIONAL SOLUTIONS TO SOCIAL DILEMMAS**

With knowledge work, transactional solutions to social dilemmas, such as monitoring by supervisors and financial rewards, may work to some extent—particularly if workers act rationally in an economic sense and if they act only in their self-interest. For example, are there any transactional solutions to the social dilemma of free-riding among team members?

One suggestion involves the modularization of knowledge. Work modules can be developed such that they are independently performed by specialists and then combined to form a whole. 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, however, transfer of specialist knowledge between the modules is necessary and the social dilemma arises again.
Another suggestion is to use selective incentives to motivate workers to transfer their knowledge where appropriate (e.g., contributions to an electronic database are rewarded which then can be used by all firm members). One 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) as well as some hard-to-measure components (e.g., the importance of a text). Since pay-for-performance systems have to concentrate on a few clear-cut criteria, they direct employees’ attention towards those 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 – called the multiple task effect – sometimes has dramatic unintended consequences on firm-specific common goods. The example of Sears, Roebuck & Co.’s auto repair shops illustrates this phenomenon, with very negative effects on the company’s reputation. Sears mechanics were paid according to the profits earned on repairs requested by customers. With this incentive in mind, the mechanics talked customers, with considerable success, into commissioning unnecessary repairs. When these acts of dishonesty were exposed, authorities in the state of California threatened to close down all Sears auto repair shops in the state.

In short, transactional solutions may mitigate some problems of joint knowledge work. But the more that integration of complex, dispersed knowledge is needed, the more likely those transactional solutions are to fail. Even more important, transactional solutions are not powerful motivators to individuals who wish to collaborate with one another on knowledge work and who are not prone to free-riding and other social dilemmas.

TRANSFORMATIONAL SOLUTIONS TO SOCIAL DILEMMAS

We have suggested that knowledge work within and between teams cannot be monitored and sanctioned by supervisors in the same way as manual work. Therefore, the sharing and integration of knowledge to produce synergies requires voluntary community-based collaboration to overcome social dilemmas. Fortunately, according to Nobel Prize-winning economist and psychologist Herbert A. Simon, “In most organizations, employees contribute much more to goal achievement than the minimum that could be extracted from them by supervisory enforcement.” To make use of Simon’s observation, one must depart from the traditional view of human nature. According to the traditional view, referred to as Economic Man, people have stable preferences, they act in their self-interest, and they respond primarily to economic incentives. In contrast, the newer view of Psychological Man states that preferences can be transformed since they are plastic, and that they are not necessarily selfish and economically motivated. The Psychological Man model, which has greater empirical support, allows transformational solutions to social dilemmas to come into consideration. Here one asks, under what conditions can individual preferences be shaped in ways that social dilemmas are avoided and contributions to the common good are fostered? In order to determine which transformational solutions could work, two types of motivation need to be distinguished: extrinsic and intrinsic motivation.

Extrinsic motivation serves to satisfy instrumental needs, for example, needs for survival, safety, and health. To satisfy these needs, money almost always serves as the means to an end – buying food, purchasing a house, paying for a vacation – 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, on the other hand, is based on the satisfaction an individual derives from involvement in an activity – working, playing sports, volunteering, and so on. 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 pro-social 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 from financial compensation. Pro-social intrinsic motivation takes the well-being of others into account without expecting a reward. The welfare of the community enters into the preferences of the individuals. A growing body of empirical evidence indicates that many people are prepared to contribute to the common good of their organization and the larger community of which they feel a part. They feel better if they observe group norms like ethical standards, professional codes of practice, norms of fairness and equity, and socially valuable work.

FROM TRANSACTIONAL TO TRANSFORMATIONAL MOTIVATION

If employees are motivated intrinsically to collaborate, then shirking is not a preferable action, because the activity of collaboration is itself a benefit. The social dilemma disappears. Transactional solutions are no longer the only way to create synergies. Instead, solutions to transform motivation in a way that fosters voluntary cooperation come into play. Transformational solutions, to be truly effective, must protect
Crowding-out of Intrinsic Motivation

Research by psychologists Edward L. Deci, Richard M. Ryan, and their colleagues 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 that is being 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 determining 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 hierarchcial control and reward systems. It has proved relevant for both types of intrinsic motivation, enjoyment-based and pro-social. In addition, it has also been observed that pro-social intrinsic motivation is crowded out if people realize that other team members are shirking.

Crowding-out by hierarchical control. Hierarchical control, 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-signalizing hierarchical control system is vividly illustrated by research on American Airlines. The then-CEO Robert Crandall insisted that flight delays come to his attention and get assigned to individuals and departments. “Crandall wants to see the corpse,” a field manager said. American Airlines’ control system was characterized by sanctioning “culprits.” 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 have an undermining effect on intrinsic motivation if they are perceived as controlling. A number of meta-analyses of various empirical studies 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 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 the free-riding of others. If free-riding can take place without the possibility of sanctioning it, pro-social motivation to cooperate in teams is undermined in the long run. In other words, nobody is willing to be the “sucker” repeatedly. If other team members are constantly shirking, the willingness to cooperate drops for everybody on the team. This effect has been studied by behavioral economists 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 free-riders.

Crowding-in by emphasizing autonomy and feedback in job design. Intrinsic motivation can be enhanced through job design along several dimensions. The two most important dimensions are autonomy and task feedback. Autonomy, the degree to which the job provides decision latitude, enhances employees’ self-determination and thereby strengthens interest and pride in the job. Task feedback, 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 have been found to strengthen intrinsic motivation through raising perceived meaningfulness of the job: 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 those incentives support employees’ feelings of competence and esteem. Monetary incentives, for example, signal benevolence and caring attitude if they are presented with no strings attached. A Norwegian study in a knowledge-intensive industry found that a generous fixed wage has strong and positive effects on work performance through its boosting influence on intrinsic motivation and affective commitment. Such a wage signals 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, for example, in academia, the arts, and in military and public service.

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 decisions. A precondition is the belief that individuals who set and sanction the rules do not allow personal advantages to enter into their decision making. Last, governance mechanisms should be executed in a way that signal 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 are 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, for example, 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 were taking part in a “community” experiment rather than in a “Wall Street” experiment.

Crowding-in by using self-governance to discipline free-riders. In all kinds of communities there exist some free-riders. As mentioned, the willingness to contribute to the common good in a team declines drastically when contributors realize that others are shirking. However, when free-riders 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 superiors, is crucial. First, sanctions by superiors are, in many cases, not considered as unselfish. Also, team members often are in a better position than superiors to realize when peers are shirking. Elinor Ostrom, the Nobel Prize winner in economics in 2009, has shown empirically with many examples that self-governance of commons is more efficient than hierarchical control with regard to counteracting shirking.

In summary, a context that prevents crowding-out and enables crowding-in strengthens intrinsic motivation, pro-social behavior, and cooperative learning. An intrinsically motivating organizational environment reduces free-riding and thus is instrumental in helping to overcome the social dilemmas 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. We will next introduce three new organizational forms to demonstrate how to implement transformational solutions. In doing so, we will show that the starting point for the governance of knowledge work is no longer the division of labor but rather 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, M-form, or the matrix. We have to abandon a design process that starts with drawing an organization chart and then determining coordination and control relationships. Instead, with the new organizational forms, the starting point of design is the integration of knowledge by governance mechanisms that range from democratic self-governance and participation to
hierarchical coordination. Metaphorically speaking, the new organization design starts with the lines between the boxes of the organization chart, 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 respects, one common feature is evident: They emphasize collaboration and voluntary knowledge transfer across functional, divisional, and increasingly, firm boundaries. Thus, they provide us with ideas about how transformational solutions can be implemented and institutionalized in structures, processes, and integrating mechanisms to govern knowledge work. We refer to three innovative organization design models that have appeared recently in the organizations literature: the C-form, F-form, and I-form. These are exemplary organizational forms for governing knowledge work compared to traditional manual work.

The Circular Form (C-Form)

The concept of circularity was introduced in the 1980s and advanced to an organizational form by 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 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 feasible until detailed studies were conducted at the Dutch electrical company Endenburg, a producer of 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 mechanisms. This is done by following four design principles:

1. 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.

2. 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 the smooth running of cooperation and performance within their circle. The circle members are more likely to cooperate and are more willing to share knowledge, because participation allows interactions among knowledge workers in the firm that are frequent and long-lasting, thus enlarging the feeling of belonging to a community, and because circle members are easily identified and thus peer control becomes a barrier to free-riding.

3. 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 tradi-

<table>
<thead>
<tr>
<th>Solutions to Social Dilemmas</th>
<th>Transactional</th>
<th>Transformational</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main area of application</td>
<td>Manual work</td>
<td>Knowledge work</td>
</tr>
<tr>
<td>Model of human nature</td>
<td>Economic man</td>
<td>Psychological man</td>
</tr>
<tr>
<td>Main governance mechanisms</td>
<td>Monitoring</td>
<td>Job design that fosters</td>
</tr>
<tr>
<td></td>
<td>Contingent pay</td>
<td>- Autonomy</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Supportive feedback</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Fair processes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Social relatedness</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Self-governance</td>
</tr>
<tr>
<td>Starting point for organization design</td>
<td>Division of labor</td>
<td>Integration of knowledge</td>
</tr>
<tr>
<td>Exemplary organizational forms</td>
<td>U-form</td>
<td>C-form</td>
</tr>
<tr>
<td></td>
<td>M-form</td>
<td>F-form</td>
</tr>
<tr>
<td></td>
<td>Matrix</td>
<td>I-form</td>
</tr>
</tbody>
</table>
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. 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. The circular form also gives information about expected performance levels and responsibilities as well as feedback on goal achievement. Moreover, the rules of decision-making are fair. With a circular design, the rules of decision-making are easily identifiable by every firm member, and every firm member can get involved. Lastly, the sucker-effect is avoided because peer control is enabled.

**The Initiative-freeing Form (F-Form)**

While the C-form links democratic bottom-up organization with hierarchical top-down organization, the F-form 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 have been inspired by the work of Deci, Ryan, and their associates on self-determination theory. 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 that emphasize self-initiative and autonomy. The key principle of such *initiative freeing forms*, which can be 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, create their own job descriptions, and spend a considerable portion of their time working on research projects of their own choosing. Some of these firms even have no traditional organization charts and no assigned formal roles. The overall goal of the F-form organization is to create an environment where employees can motivate themselves.

The F-form organization is characterized by three design principles. The first principle is to institutionalize processes of participation. Employees are regularly asked where they want to contribute and are involved in decision processes. For example, in the case of W.L. Gore, 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 Gore, employees are encouraged to experiment, collaborate, and self-select into projects. This principle includes the authority to spend whatever time is required to solve a customer's problem. This type of work design not only allows for maximum self-determination but at the same time also creates variety, identity, and significance of work. Variety and identity are 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 with practices of participation, self-governance, and peer control. Employees are expected to reach an agreement on the rules of cooperation, to set norms, and to subject themselves 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 in size in order to allow its governance processes to work. Whenever a unit exceeds 200 employees, it is split into new units. Such 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, and free-riders 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 is obvious that the F-form supports intrinsic motivation to contribute to the common good, largely through participation, autonomy-enhancing job design, and self-governance through peer control.

The Innovation Form (I-form)

The I-form is a collaborative community of complementary firms. Management researchers Raymond E. Miles, Charles C. Snow, and their colleagues suggest this design model as the organizational answer to the “innovation era” that characterizes the global economy. It evolves in industries where the knowledge base on which business opportunities rest is constantly changing and growing, and this knowledge is widely distributed among firms. The I-form organization follows the strategy of persistent exploration of new market uses for constantly changing technologies. It is based on an entrepreneurial research and development process, because ideas developed in one setting may be 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 work beyond traditional firm boundaries to multi-firm networks and collaborative communities of firms.

The evolution of the I-form model can be traced in many pioneering communities such as Technical and Computing Graphics (TCG), a network of small Australian firms which collaborate on technological and product innovation in the IT sector as well as in web-based businesses. A more 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 such as Intel Corp., LG Group, Motorola Inc., T-Mobile, Texas Instruments Inc., and many others. Google chairman and CEO Eric Schmidt says 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 developed 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 OHA. The first commercially available phone running Android went on the market in 2008.

The key assets of these exemplary I-form organizations are knowledge commons that accumulate learning and serve as an idea bank that member firms can tap. To govern these knowledge commons, three design principles are applied: a facilitator organization, general operating protocols used to guide member firm behavior, and voluntary and collective management of the commons. The facilitator organization 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. Protocols include the expectations of how individuals and the collaborating companies should behave in the community. They set norms guiding inter-firm behavior. It is important that the protocols are visible, thereby reducing ambiguity and increasing reliability. In addition, protocols eliminate potential conflicts because they are formulated to be supportive of the collaborative process. 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 socially appropriate behaviors.

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 in advance and use the 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 any free-riders. Self-management processes are implemented in order to (a) determine the content of the operating protocols, (b) gain compliance with these protocols, (c) modify them over time so as to better fit them to the changing characteristics of the community setting, and (d) decide on sanctions for those parties who violate the protocols.

The three design principles of the I-form fit very well into our concept of transformational solutions. 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 networks and collaborative communities of firms.

CONCLUSIONS

Newer organizational designs such as the C-form, F-form, and I-form have two features in common that differentiate them from traditional organizational designs. Both features seek to foster voluntary contribution to common goods or synergies that 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 labor 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, including functional, regional, and project-based tasks. Second, the integrating mechanisms of these newer forms do not involve 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, social dilemmas are 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 transformational solutions to foster intrinsic motivation, particularly participation, autonomy-enhancing job designs, and peer control to avoid free-riding.

However, there are also differences between the three forms. These differences relate to the question of 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 it is embedded in the double linking of circles that enable concurrent authoritative and participative integration mechanisms. In the case of the I-form, the facilitator organization exerts some hierarchical coordination, though it is minimal and supportive. In the case of the F-form, more case studies are needed to determine how coordination is achieved and whether this is done in a way that is perceived to be supportive. In general, we need more research to find out 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 persuaded managers that the design principles to organize knowledge work are different from those used to organize traditional manual work. We have shown that to enhance productivity of knowledge work it is not appropriate to think of human nature as represented by Economic Man. Rather, it is necessary to focus on how to govern knowledge commons on the basis of Psychological Man. Inventing and developing new organizational forms that foster the intrinsic motivation to collaborate is an exciting and beneficial endeavour in the 21st-century global economy.
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Jetta Frost, Ph.D., is a full professor of organization management and theory, University of Hamburg, Germany. Her current research interests are organizational and knowledge governance in multidivisional firms and research-based organizations, and organizational solutions for the management of value creation (University of Hamburg, Lehrstuhl
Margit Osterloh, Ph.D., is a full professor of business administration at the University of Zurich. She is member of the German Science Council (Wissenschaftsrat) and was a member of the board of directors of three Swiss and German companies. Her research interests focus on organization design, knowledge management, corporate governance, research governance, open source software production, and gender issues (IOU, University of Zurich, Universitätsstrasse 84, 8006 Zürich, Switzerland. Tel.: +41 44 634 2840; e-mail: Osterloh@iou.uzh.ch).

Antoinette Weibel, Ph.D., is a full professor of management and Dean of Undergraduate Studies in Management at the University of Liechtenstein. Her current research interests include motivation management, trust in organizations, and well-being (Institute for Entrepreneurship, University of Liechtenstein, Fabrikweg 1, 9490 Vaduz, Liechtenstein. Tel.: +423 265 1155; e-mail: Antoinette.weibel@hochschule.li).