New Forms of Employment And IT
- Crowdsourcing –

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New forms of value creation in the course of digitalization

New communication and information technologies have changed sustainably almost every field of performance. Especially the Internet as the spearhead of the technological progress is the trigger and companion of new developments and partially radical changes on an operational and individual level. In the course of these new technologies the type of work changed fundamentally. This development can be clearly observed on the so called Digital Natives, who grew up as a young generation in industrial countries with digital technologies and the Internet. Live and work without digitalization is not imaginable for them and new forms of work have replaced the old ones in a lot of areas (Unterberg 2010).

The ongoing digitalization has also (or especially) far-reaching implications for businesses and the manner, how they coordinate and produce the performance process, particularly in the area of knowledge-intensive work. The still growing networking enables the allocation of work, location and time-independent according to other work organization principles. A big pool of workers is accessible quickly and specifically through the network. Tasks are allocated to many individuals, the so called Crowd. The members of the crowd can complete single task asynchronously and decentralized from their own computer. Through this it is possible to aggregate information, ideas and solutions from people all over the world with little effort and integrate them in the performance process. The literature calls this concept crowdsourcing and it describes in general the outsourcing of business task to an independent mass of people via the internet. (Howe 2006). The members of the crowd operate as digital worker or crowd worker and take over tasks collectively, which are typically completed by business employees. Crowdsourcing enables as a new form of value creation impressive results. They range from very quick performances (e.g. translation of a complex text in a few hours), to so far unknown performances (e.g. cartography of planets, the development of software and systems or the creation of knowledge bases like Wikipedia), up to solutions for socially relevant questions (e.g. crowdsourcing in the area of organization and financing of social projects).

Crowdsourcing enables a distribution of tasks in the context of software development, which exceeds previous dimensions. The crowdsourcing-model is not only an innovative concept for the allocation and the realization of business tasks, but a completely new type of work organization, which walk along with (partially radical) changes on the business and employer side (Leimeister and Zogaj 2013).

So for example the communication and coordination processes change for the businesses, while basically the type of task performance and working conditions change for the single worker. Against this background the questions arise: How exactly does crowd work "works"? Which mechanisms are used? How takes the performances process place within the limits of crowd work or crowdsourcing? What means crowd work for the involved crowd worker, so for the single individuals, who perform the tasks? Which consequences does crowd work have for the involved parties (crowd worker, businesses using crowdsourcing)?

These questions should be answered in this paper, based on the current state of research and knowledge. The discussion of such questions is indispensable against the background of proceed digitalization of work in all areas. Although the software industry plays a pioneer role in this connection, the past has shown that changes in this industry are characterizing for corresponding or following developments in other industries. Before answering the scheduled questions, we define the concepts of crowdsourcing and crowd work.

What are Crowdsourcing and Crowd Work?

The term "Crowdsourcing" describes a neologism formed from the words "crowd" and "outsourcing" and reaches back to Jeff Howe, who used this term first in the Wired Magazine from 2006 (Howe 2006). This word composition clarifies how the terms crowdsourcing and outsourcing differs. The term outsourcing describes the classical outsourcing of defined tasks to a third-party business, a determined institution or an actor, while outsourcing in the case of crowdsourcing is addressed to the crowd, an undefined mass of people (Leimeister 2012). Therefore crowdsourcing describes the outsourcing of determined tasks from a business or an institution in general to an undefined mass of people through an open call via the internet. This classical crowdsourcing-model distinguishes always between the role of the principal, who is the so-called Crowdsourcer and the role of the undefined agents, thus the crowd or in analogy to the first-mentioned term the crowdsourcees or crowdworker. Beyond this the realization of crowdsourcing, initiatives takes place on a *crowdsourcing platform*, which can be operated internal or which can be provided by a *crowdsourcing intermediary*. Figure 1 summarizes the different roles.

Fig. 1. Roles and mediation in the crowdsourcing-model.
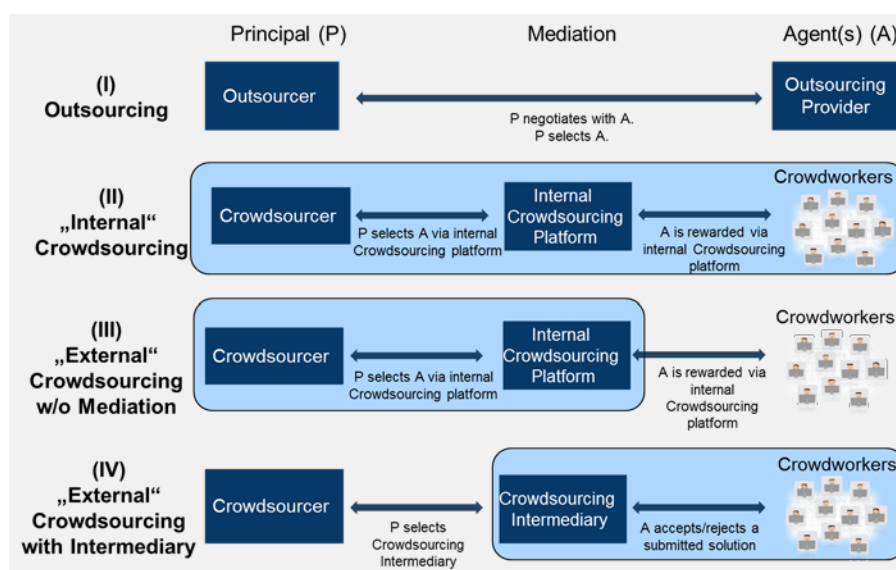
Source: (Hoßfeld, Hirth et al. 2012, S. 206).

First, it has to be distinguished between the "internal" and the "external" crowdsourcing. For the internal crowdsourcing the staff is functioning as the crowd. Therefore every employee of the company can be described as a crowdworker. An internal platform (Intranet or internet based platform) functions as crowdsourcing platform through which the crowd (= internal staff) can make contributions and process tasks. On the other hand for external crowdsourcing the crowd consists of any individuals, who have not to be associated with the company or the crowdsourcer. These are mostly external people, so theoretical every person worldwide with an internet connection can function as crowdworker. One the one hand the crowdsourcing platform can be operated, administrated and managed by the business itself or on the other hand exists the possibility to consult a crowdsourcing intermediary. These intermediaries build up an (active) crowd, which consist of internet users all over the world and offer crowdsourcing using businesses the option to outsource their tasks through the crowdsourcing platform. The two listed approaches (external and internal crowdsourcing) do not exclude each other automatically, because a business which is using internal crowdsourcing can also

use external crowdsourcing. Crowdsourcing is not at all limited to the outsourcing of tasks to the business environment; it can also change the internal company organization structure and the process organization. We describe this new type of work organization as crowd work. The crowd work appears as value chain and coordination model between market and hierarchy (cf. Figure 2) and distances itself from already existing types of work. For example the IBM "Liquid" program is an initiative, which should enable the outsourcing of 8.000 workplaces to an internal crowd. The Liquid-platform should make an effective internal crowdsourcing possible, so that employees with spare capacity have better work opportunities.

Fig 2. Crowd Work as value chain and coordination model between market and hierarchy


Source: Own diagram.

Crowd Work as new type of work organization

Against this background crowd work has to be considered as a new and already serious type of work organization. It enables businesses to refer to a variety of workers (crowdworkers), who have different knowledge, abilities, experiences and backgrounds. The use of crowd work can take place in different areas of the value creation. The crowdsourcing principle is already used in almost all corporate areas to outsource defined tasks and activities to the crowd.

The following figure shows some practical examples, which clarify that crowdsourcing is used by now for different activities within the performance process (cf. Figure 3). This can be illustrated on the base of Porter's value chain, after which crowdsourcing is used for the primary value activities "production", "marketing and sales" and "after sales", and as well for the secondary or supportive value activities "research and development" "finance" and "infrastructure". In this context crowdsourcing is not only a temporary alternative for the processing of the task, but rather a serious one for the longer term.
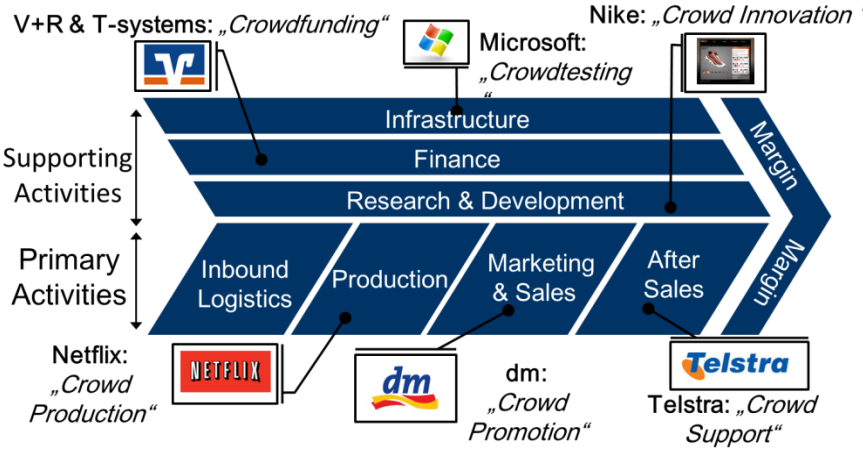
Fig. 3. Crowdsourcing for different value activities.

Next to the possible use of crowdsourcing along the value chain, areas and industries already exists, which realize defined phases of the service performance over crowd work.

In which areas is crowd work already used?

Modern information and communication systems, notably the internet, creates the technological prerequisites for a cross-business cooperation with many external contributors or the crowd (Martin, Lessmann et al. 2008). Crowdsourcing enables businesses to refer to a variety of workers (Crowdworkers), who have different knowledge, abilities, experiences and backgrounds. Crowd work is already used for different activities within the *performance process* (cf. Figure 4).

In this connection the crowdsourcing intermediary plays an essential role. Crowdsourcing intermediaries are web platforms, which are serving as market places, where crowdsourcer and crowdworker interact. The intermediaries support the crowdsourcing business to phrase target-orientated tasks and solution demands, so that the crowd can process the assigned task as effectively as possible. In addition the crowdsourcing intermediaries control the crowd as such and are responsible for the activities within the crowd. Against this background they can be described as "brokers" or mediators, who connect knowledge-seekers (crowdsourcer) and knowledge-providers (crowdworker) by offering the necessary infrastructure for the crowdsourcing activities. The literature gives an important role to the intermediaries, because they enable businesses to refer to a big pool of resources (Zogaj, Bretschneider et al. 2014). As junctions in the network intermediaries help businesses to compensate own deficits in abilities or resources by creating a connection to an appropriate partner.

Against this background for example software companies use nowadays crowdsourcing intermediaries, like TopCoder (topcoder.com) or CrowdCode (crowdco.de) for programming of software applications through crowdworkers. The test of software is outsourced to a crowd through platforms, like testCloud (testcloud.de), uTest (utest.com), testHub (testhub.com) or PassBrains (passbrains.com) (Zogaj, Bretschneider et al. 2013).

The service of these intermediaries consists of testing (Usability-tests, functional tests) of different software applications (websites, mobile apps, computer games) through experienced testers or common internet users under real conditions. Therefore the software is not tested as normally by the service provider. It is possible to carry out a crowd-survey for the upstream analysis and definition of the demands, while crowd-ideation platforms are consulted for the design and draft of a software application.

Cross-sectional and support tasks, like e.g. Data entry, data structure and cleansing of data are outsourced on the contrary through platforms like Amazon Mechanical Turk (mturk.com) and Elance (elance.com).

Fig. 4. Crowd Work in the IT and software development
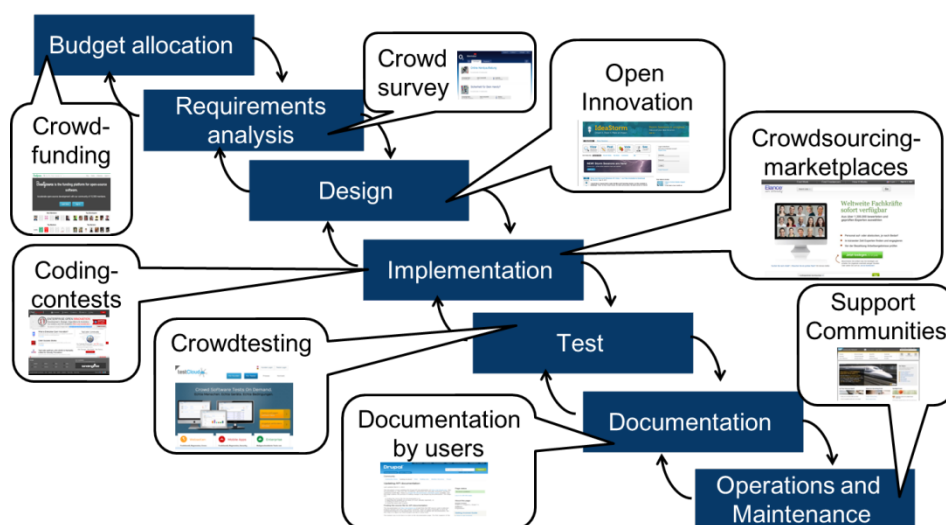
Source: Own diagram.

The example of the IT and software industry shows the potential operating ranges of crowd work along the performance process. The crowd can be used from the financing and budget allocation to the implementation and up to the operation and maintenance of software. At this the crowdsourcing intermediaries function as central control of the project coordination, as well as the management of the single crowdsourcing initiatives.

How does the crowd work functions?

Different challenges in the area of management of the cooperation process arise from the outsourcing of internal activities to the crowd, because the boundaries of the business dissolve and the business can not only use the internal stuff for the performance process, but also the external crowd for almost every activity. In this respect the question arises, what is the core service of the company and which activities can be performed quickly, cost-effectively and top-quality by the crowd. In this context the question is to clarify "how" tasks can be outsourced to the crowd or in general "how" they can be implemented. In this connection challenges in the management of crowdsourcing processes surrender (Jain 2010; Geiger, Seedorf et al. 2011). Work conditions and work design have particular importance within the crowd work – this means the forms of work in the crowd, the established incentive structure and particularly the compensation of the crowd worker.

Management of the Crowdsourcing process

Crowdsourcing using businesses face the challenge to decide which internal activity of the performance process could be outsourced to the crowd. The literature and practice clarify that almost every value activity can be used for crowdsourcing. So that internal tasks can be completed successfully by crowdworkers, these tasks have to be substantiated, described particularly and divided in little (work) units (work or task decomposition). The knowledge needed for completing the work units is correlatively low, so that many individuals, who are not highly qualified for specific (bigger) tasks can contribute to the processing of the task. This approach is comparable to the principles of taylorism. The goal is to increase the labor productivity through standardization and the decomposition of complex tasks in smaller sub tasks (and with that also through higher distribution of tasks). These smaller and common sub tasks can be completed by (possibly also low qualified or more easy and quicker learnable) workers by utilization of learning, size and composite effects, which are more effective and more efficient. This can also possibly increase the productivity and the speed of the overall performance. Analogous to the industrialization of production processes, there is less effort needed for the task completion of work planning, control and work coordination. Crowdsourcing or process manager, who undertake the disposition and control of the work processes within crowdsourcing, have to undertake different tasks than "conventional" project or process manager.

The central challenge within crowd work is to plan, implement and control the crowdsourcing process with all associated activities. This demands to closely discuss all activities or options of action, which are associated with the single phases. The crowdsourcing process is ideal-typical divided in fife phases (cf. Figure 5): The first phase is for the decomposition of the tasks and the specification of the solution or task demands. In the second phase the crowd workers (all or just a subset of the crowd) are selected, who undertake the specific tasks in the third phase. In the fourth phase the handed in solutions or contributions (to the overall performance) are compiled an evaluated, so that based on this the crowd workers can be remunerated in the fifth phase.

Fig. 5. Phases and measures of the crowdsourcing process.
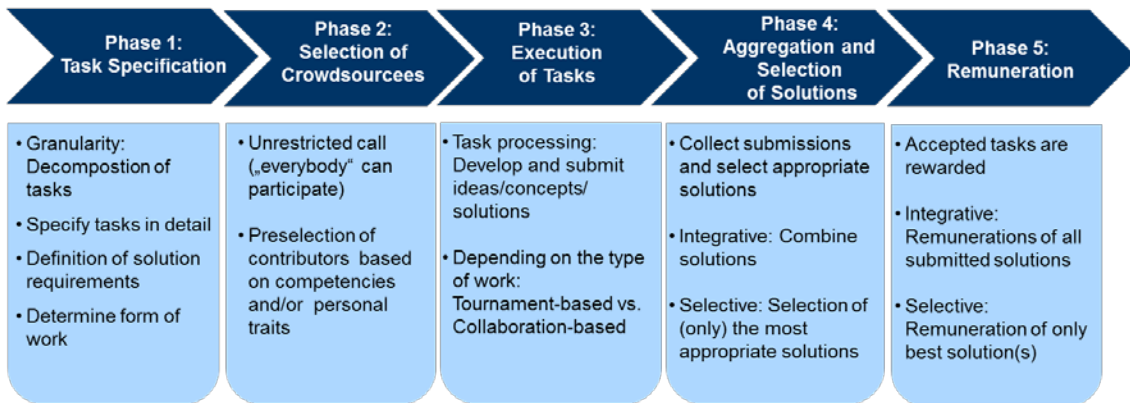
Source: Own diagram.

Working in the crowd: motives and incentive structures

During the crowdsourcing process the crowdsourcer initiates the crowdsourcing process. He defines and substantiates the tasks, determines the incentive structures and utilizes the solutions, while the crowdworker chooses and processes the assigned tasks. The processing of the tasks takes place in the third phase of an ideal-typical crowdsourcing process. But here the question arises, how exactly the work is carried out through crowdsourcing platforms, because the work process may differ structurally between online environments with many participants and classical internal work processes.

Different studies show, that intrinsic motives like social exchange, the possibility for enlarging the own abilities and the joy of (crowd) work play an essential role. But premium-based and monetary remunerations (extrinsic motives) are the main incentive factors for crowdworkers. Moreover a high autonomy is a positive factor for the choice and the type of work for crowdworkers. Respectively, in practice different remuneration and compensation models exist. The rewards or remunerations vary highly depending on the work form and the type of the tasks. While crowdworkers get few Euro cents for some tasks, there exists also crowdsourcing initiatives which have high prize money up to 100, 000 Euro or US Dollar. The following table shows some forms of remuneration with their particularities.

Tab. 1. Examples of remuneration of crowd workers.

| Platform	System	System of incentives / compensation
Amazon Mechanical Turk	Crowdsourcer sets the price	Fixed payment per task. Payment is made only if solution is accepted by crowdsourcer. The average hourly wage is approximately $ 1.25. There are few tasks that require special skills / knowledge.
Spreadshirt	Crowdworker sets the price	Crowdworker offers companies a T-shirt design for a self-determined price for sale and receives at each t-shirt sold a share of profits.
InnoCentive	Competition	InnoCentive organizes competitions for companies, in which to search for solutions in a particular area, eg. As product development or science. The remuneration is based on awards or financial compensation. The payment depends on the difficulty and can be up to $ 100,000.
IBM Liquid	Point system	Crowd Worker receive for their participation in the tender so-called "Liquid Points". This document their participation in a particular competition and will improve the community's internal reputation. On the basis of points a corporate ranking is performed. A higher rank can improve the chances of selection in other tenders.

Source: Own diagram.

What are the opportunities and risks of crowd work?

Crowdsourcing became a serious alternative to task completion for many businesses in recent years. Not only software companies, but also businesses form different areas (e.g. IBM, BMW, Audi, MC Donald's, Otto, Henkel, Tchibo, Sennheiser etc.) tend to outsource diverse tasks to the crowd – from innovation tasks (e.g. idea generation), to marketing tasks (e.g. logo design, advertising slogans), up to general support tasks (e.g. performing calculations) (Leimeister 2012; Leimeister and Zogaj 2013). Many researchers identify the opening of internal processes to the crowd as a high potential for businesses. Some refer in this connection to the enormous knowledge potential of the crowd (Howe 2008), while others speak of the "achievement of the next evolutionary stage with regard to the value creation" (Hammon and Hippner 2012) through the utilization of the potential of the crowd. On the other hand different possibilities and opportunities arise for crowdworkers, which are only possible to limited degree within the "classical" forms of work.

In contrast many reports discuss critically the risks of crowd work for both crowdworkers (internal crowdsourcing) and businesses. So some reports warn against the creation of "digital sweatshops", because the remuneration of crowd workers is partially very little and also not guaranteed (siehe z.B. Zittrain 2009). The risks for businesses are especially the release of internal knowledge through crowdsourcing or difficulties regarding the control of work processes. The following figure shows the opportunities and risks for both crowdsourcing using businesses and crowdworkers.

Fig. 6. Opportunities and risks for crowd sourcer and crowd worker.
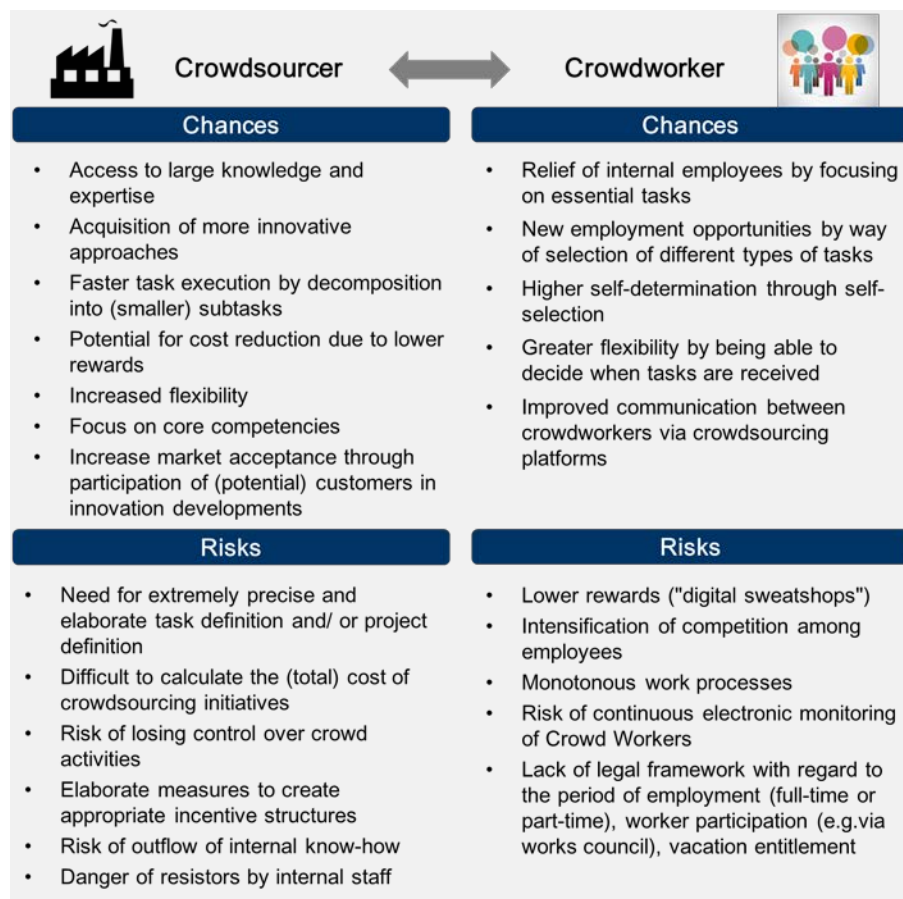
Source: Own diagram.

The previous explanations show the different advantages and disadvantages on various levels of the crowdsourcing concept. Nonetheless, these are more likely suppositions than profound knowledge. With the current insights of this topic it is not possible to answer the questions which risks does the implementation of crowdsourcing actually have, which active principles underlie here or what are the effects of people, organizations or markets. Therefore research should have the topic of crowd work

as a new type of digital work and its corresponding effects on individual, organizational and structural level on the research agenda. Moreover the economic practice has to consider the specific questions about crowd work, so that this work model can be used effectively and sustainable in the future.

Crowdsourcing as work organization of the future? – New ways and challenges of the implementation of crowd work

The everyday life is strongly shaped by digital technologies. Hence, it is essential to every participant to cope with the corresponding changes. Especially when the increasing digitalization changes the market conditions and therefore new business areas develop. In this context crowd work is a new form of digital work, which changes sustainably the organization of work. This paper has shown how fundamental processes and mechanisms have been redesigned through the outsourcing of tasks to an undefined mass of people. The crowd enables also a high availability of work forces that can be assessed at any time. This makes it possible for businesses to use the needed human resources completely flexible and according to demand. What does that mean for the future business strategy and how does it change the crowdworkers perception of work. Moreover a fundamental change of the conventional employer-employee relationship through crowd work can be observed. What is the relationship between crowdsourcer, intermediary and individual crowdworker? At which levels do they interact? Which interdependencies can be noticed and how do they affect the individual? We also observe a change of the manner of tasks itself, which are outsourced to the crowd. Especially the perceived meaningfulness of the single tasks and the task-related factors are changing through the work within the crowd. In comparison to traditional work settings, crowdworker will possibly experience a new type of fun or social exchange during their work.

Against this background the crowdsourcing phenomenon lead to technological, organizational, juridical and social challenges, although it also enables new business models and services. In this context for example, the so-called *Crowd-enabled Lean-Startups* describe a new business model, in which the crowd serves as the central key of the enterprise. Traditionally Lean-Startups describe an approach in the entrepreneurship research, in which all processes are as lean as possible (Ries 2012). These Lean-Startups consist in the service sector of very small and agile Startup-teams. Mostly it is a one or two person business, which uses existing infrastructures of third parties for the own operation. In the area of crowd work such infrastructure is the platform of the above describes crowdsourcing intermediary. Lean-Startups, which use the crowdsourcing principle and especially established infrastructure of crowdsourcing intermediaries are called *Crowd-enabled Lean-Startups*. The new form of startups offers various services to the crowdsourcers, particularly administrative tasks like identification, selection, coordination and remuneration of the crowdworker.

The expansion of such services does not lead to isolated, short-term changes of businesses and business areas. Rather organization and work structures can change fundamentally in the medium and long run. Especially the businesses that want to use crowdsourcing have to face the challenges of an effective implementation of crowd work. Here, a successful integration of the crowd's solutions into internal processes is essential. Moreover, the quality management and the effect of crowd work on the own staff are important aspects for a successful use of this new form of work organization; this applies for both internal and external crowdsourcing. The example of crowd-enabled Lean-Startups shows how new business models develop out of crowdsourcing and describes the structural changes for the participants. What are the consequences for the future work? How perceives the single crowdworker his tasks? How could rules be established for a fair and good crowd work?

The present paper provides insights in the fundamental mechanisms of crowdsourcing and the resulting challenges on different levels. Summarizing internal and external crowdsourcing has opportunities and risks for both the employee – the crowdworker – and the crowdsourcing using business. The crowdsourcing intermediaries are not negligible, which play an essential role in external crowdsourcing, because they interact one the one hand with the crowdsourcing using business and on the other hand they acquire and manage a big workforce – the crowd. After all, there is too little knowledge about interdependency, effects and design possibilities. This can be a call for the scientific

research, as well as for the economic practice and the policy to have the topic crowd work on their agendas. The goal is to use the existing opportunities and minimize the risks at the same time. Hence, the introduction of fundamental rules is needed, which ensure a "good" work in the crowd. Solid knowledge of the different ways, principles and operating modes is essential to work this out. In the area of cooperation-based crowd work was the collaboration engineering introduced as an possible approach, which use existing know-how in the context of IT-supported collaboration to improve collaboration within the crowd. The mechanisms and patterns of collaboration engineering, which are already used in groups within the business environment, could also be efficiency enhancing within a big, heterogeneous and external crowd. This example shows that we have to face these questions, because crowdsourcing is becoming increasingly important at the time of digitalization of work on different levels.

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