New Forms of Employment in Europe

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Acknowledgements

CHAPTER 2

New Forms of Employment and IT: Crowdsourcing

*Jan Marco Leimeister, Shkodran Zogaj & David Durward**

§2.01 NEW FORMS OF VALUE CREATION IN THE AGE OF DIGITISATION

New communication and information technologies have changed and permanently shaped almost all fields of the provision of services. The internet in particular, as the cutting edge of technological progress, triggers and supports new developments and, to some extent, radical changes both on corporate and individual levels. Against the backdrop of these new technologies, it is also possible to make out a fundamental transformation in the nature of work. This development can be very clearly observed in the so-called digital natives, who have been born and have grown up in industrialised countries making use of digital technologies and the internet from their very early childhood. Living and working without digitisation is inconceivable for them, and new forms of work have replaced old ones in many fields.[1]

The rapid advance of digitisation also (or especially) has far-reaching implications for companies and the manner in which they coordinate and deliver their processes for the provision of services, especially in the field of knowledge-based work. The ongoing process of the expansion of networks enables this work to be distributed regardless of location and time, according to different principles of work organisation.

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1. Unterberg, U., *Crowdsourcing*, in: Michelis, D. & Schildhauer, T., *Social Media Handbuch: Theorien*, *Methoden*, *Modelle*, pp. 121-135 (Baden-Baden, 2010).

The network enables rapid and targeted access to a large pool of workers. Tasks are distributed to a large number of individuals – known as 'the crowd' – who can carry out their particular activities on their personal computers in an asynchronous and decentralised manner. This enables information, ideas and solutions to be aggregated from people all over the world with the minimum of effort and then to be integrated into the process of the provision of services. This concept is termed *crowdsourcing* in the literature and describes, generally speaking, the outsourcing of business tasks to an independent mass of people via the internet.[2] The members of a crowd act as *digital workers* or *crowd workers* and undertake collective tasks that would typically be completed by employees in a company. Crowdsourcing, as a new form of value creation, is enabling impressive outcomes. These range from fast services (e.g., translating a complex text in a few hours), via previously unknown services (e.g., cartography of planets, development of software and systems or the creation of knowledge bases such as Wikipedia) to solutions for socially relevant issues (e.g., crowdsourcing activities in the organisation and financing of social projects).

The diffusion of crowdsourcing can be seen above all in the IT industry, especially the internet, software and IT services sectors. A decisive factor in this is the constantly increasing pressure of competition, which has continuously driven software companies to seek new opportunities to design production and development processes more cost-effectively. As a consequence, recent years have seen continuous work on the industrialisation of software development in particular, with the intention of realising efficiency gains by means of increased *standardisation*, *automation* and *division of labour* in the process of the provision of services.[3] The focus here is essentially on the standardisation of software components, so that the production activities and/or processes can also be correspondingly standardised and (partially) automated. However, in order to continue to meet the individual needs of customers, a module- and component-oriented architecture for software is required at the same time. The opportunities for distributed software development have also led to practices such as the *outsourcing of value creation activities* over the internet, so that we have been able to observe relevant forms of work such as digital work and crowd work for more than ten years.

Crowdsourcing enables division of labour within software development to a greater extent than it has hitherto been possible. The crowdsourcing model, however, is not merely an innovative concept for distributing and executing business tasks, but rather an entirely *new mode of the form of work* associated with (partly radical) changes for both companies and employees.[4] For example, the company's communication and coordination processes change, while working methods, work design and working conditions all change from the individual worker's perspective. In light of the above, we need to address a number of questions: How does crowd work 'function' exactly? Which mechanisms is it based on? How does the service provision process work in

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2. Howe, J., *The Rise of Crowdsourcing*, Wired Magazine, Issue 14, pp. 1-4 (2006).
3. Bitkom, *Industrielle Softwareentwicklung - Leitfaden und Orientierungshilfe* (Berlin, 2010).
4. Leimeister, J.M. & Zogaj, S., *Neue Arbeitsorganisation durch Crowdsourcing: Eine Literaturstudie* (Düsseldorf, Hans Böckler Stiftung, 2013).

crowd work or crowdsourcing? What does crowd work mean for the crowd workers involved – i.e. for individuals performing their work in this way? What consequences does crowd work have for those involved (crowd workers, companies using crowd-sourcing)?

The present chapter aims to address these questions, based on the current state of research and knowledge. It would seem essential to tackle these kinds of questions in the light of the advances being made in the digitisation of work in all sectors. It is true that the software industry is taking on a pioneering role here – but the past shows that changes in this sector are generally indicative of relevant or subsequent developments in other sectors. Before addressing the above questions, it is first necessary to define the concepts of crowdsourcing and crowd work.

§2.02 WHAT ARE CROWDSOURCING AND CROWD?

Which flavour do you like best? Blueberry or pomegranate? Do you prefer grapefruit or blood orange? The confectionary group *Haribo* asked these questions in a 2014 campaign designed to evaluate one of the company's core products – Gold Bears. However, the company decided not to task its in-house food experts with this question but to pose it to the online community in the form of an open invitation. After a large number of volunteers had registered, 1,000 sample packets were sent out, each one containing twelve exclusive Gold Bear preproduction models. The testers then had to reduce these flavours, pre-selected by *Haribo*, to six winning varieties. The process ended with the presentation of the Gold Bears FAN Edition, which consisted of six completely new flavours that then found their way onto the shop shelves. With this initiative, the *Haribo* company succeeded in outsourcing its own product development via the internet while at the same time running a high-profile marketing campaign. This alternative to traditional methods for the completion of tasks or activities applies the possibilities of modern information and communications techniques, and is increasingly being used in many fields and sectors of the economy. This trend is usually associated with advancing technological development. For example, with the aid of a 3D printer, many different products are being manufactured with ever increasing speed and cost-effectiveness. In addition to shoes or artificial limbs, spare parts for cars have also been printed in recent years. However, the success of Local Motors in producing not just individual parts via 3D printing but printing an entire car including bodywork, substructure and the majority of the interior, is quite new. Furthermore, the Arizona-based company is not using its internal research and design department but rather dispersing the whole development process and tendering each step in the form of many separate competitions via the internet. The ideas and suggestions submitted are produced and discussed by a community already numbering more than 45,000 members from 130 countries. With an in-house staff of fewer than 100 employees, Local Motors uses the internet to gain access to a large pool of potential workers. This is how more than 200 design proposals were submitted in six weeks for the current winning concept, 'strati', for which the designer Michele Anoéein won a prize of $5,000. These examples show that a profound transformation in both the type and

organisation of work is in progress. The mechanism behind these innovative business models is based on the outsourcing of activities via the internet and is becoming increasingly popular under the term 'crowdsourcing'.

The term 'crowdsourcing' is a neologism derived from the words 'crowd' and 'outsourcing' and originated with Jeff Howe, who used it for the first time in Wired Magazine in 2006.[5] This compound word makes clear to what extent crowdsourcing is different from outsourcing. While traditional outsourcing is understood as contracting out defined tasks to a third-party company or a particular institution or actor, the outsourcing in crowdsourcing is the 'crowd', in other words an undefined mass of people.[6] Therefore, crowdsourcing describes the outsourcing of particular tasks by a company or any other institution to an undefined mass of people by means of an open invitation, usually made over the internet. In the conventional outsourcing model there is always a distinction between the role of the commissioner – known as the crowdsourcer – and that of the undefined contractors, that is, the crowd or, by way of analogy with the first term, the crowdsourcees or crowd workers. In addition, crowdsourcing initiatives are executed via a crowdsourcing platform, which can be set up internally or prepared by a crowdsourcing intermediary. A summary of the different roles is presented in Figure 2.1.

Figure 2.1   Roles and Mediation in the Crowdsourcing Model[7]
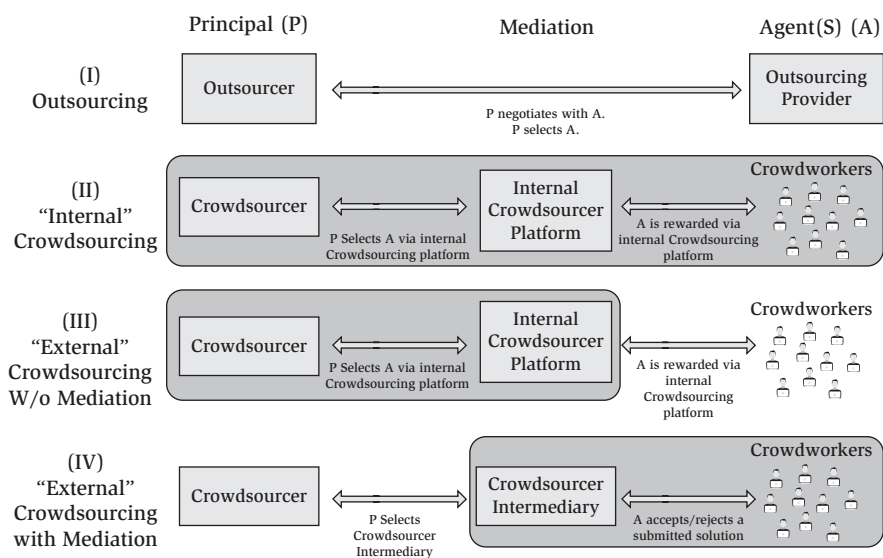
5. Howe, J., *The Rise of Crowdsourcing*, Wired Magazine, Issue 14 (2006).
6. Leimeister, J.M., *Crowdsourcing*, Zeitschrift für Controlling und Management (ZFCM), Issue 56(6), pp. 388-392 (2012).
7. Source: based on Hoßfeld, T., Hirth, M., et al., *Aktuelles Schlagwort: Crowdsourcing*, Informatik Spektrum, Issue 35(3), pp. 204-208 (2012).

A distinction must first be made between 'internal' and 'external' crowdsourcing. In the first case, the company's own staff function as the crowd. When it is implemented, each worker in the company in question can be described as a crowd worker. A platform set up within the company (intranet/internet-based platform) functions as the crowdsourcing platform. The crowd (= internal staff) uses it to create and work on contributions. By contrast, in external crowdsourcing the crowd may consist of any individuals, not necessarily associated with the company/crowdsourcer. These are mostly people external to the company – which means that theoretically any person anywhere in the world can function as a crowdsourcer if he/she has an internet connection. The crowdsourcing platform can be set up, administered and managed by the company itself. But there is also the possibility of commissioning crowdsourcing intermediaries which, in turn, build up their own (active) crowds – consisting of internet-users from all over the world – and offer crowdsourcing companies the option of outsourcing their tasks via their established crowdsourcing platform. The two above practices (external and internal crowdsourcing) are not necessarily mutually exclusive, because a company that operates internal crowdsourcing can also make use of external crowdsourcing. Crowdsourcing is by no means limited to the outsourcing of tasks in the world external to the company; it can also change internal developmental and procedural organisation. We define this new type of organisation of work as *crowd work*. *Crowd work* appears as a value creation and coordination model between market and hierarchy (see Figure 2.2), thus distinguishing itself from existing forms of work. For example, IBM has set up, within its 'Liquid' programme, an initiative that is intended to transfer 8,000 jobs into an internal crowd and enable effective internal crowdsourcing of tasks via the Liquid platform in order to give better work opportunities to employees with free capacity.

Figure 2.2   Crowd Work as a Value Creation and Coordination Model between Market and Hierarchy[8]

Hierarchy   Crowd work   Market

§2.03   CROWD WORK AS A NEW FORM OF ORGANISATION OF WORK

Against this background, crowd work can be seen as a new form of organisation of work that is already worthy of serious study. It enables companies to access a
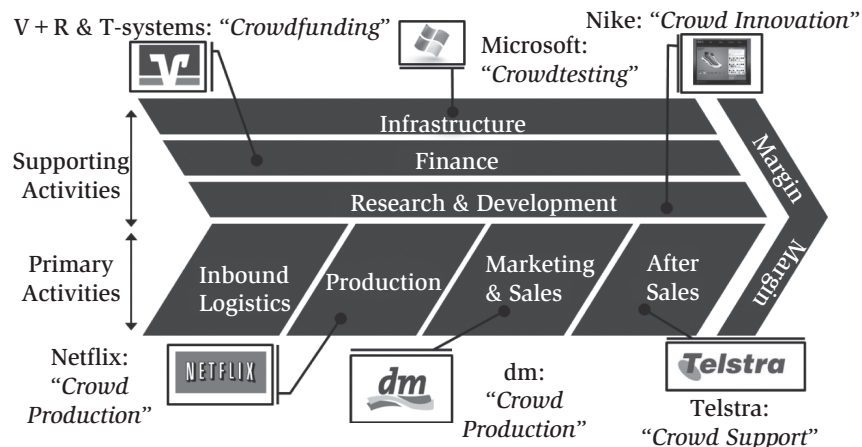
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8. Source: Author's own representation.

multitude of (crowd) workers – characterised by a variety of levels of knowledge, skills, experiences and backgrounds – for providing services. The use of crowd work can relate to different areas of value creation. The principle of crowdsourcing is already being used in almost all kinds of corporate departments in order to outsource particular tasks and activities to the crowd.

In 2010, Volkswagen launched a competition inviting ideas for generating suggestions for new and innovative infotainment systems. The community submitted almost 400 ideas, from which it was possible to develop ninety-six apps. The companies *Tchibo* and *Starbucks* also operate their own crowdsourcing platforms,[9] on which members of the community can submit and further develop ideas for innovation or development. The pharmacy chain *dm* invited the crowd to propose ideas including an advertising slogan and shower gel motto as part of the crowdsourcing campaign 'Soap Sourcing'. Cross-sectoral and support tasks – such as entering, structuring and cleaning data records – can be outsourced to the cloud via platforms such as Amazon Mechanical Turk and Microworkers. In the example of *Netflix*, a company engaged in the distribution of films, the crowd is even actively called on to create products and services. The online provider of films and streaming invited the crowd to develop an algorithm for predicting film ratings. The Australian telecommunications provider *Telstra* uses the crowd to execute its own customer support. One element of this crowd support is inviting the crowd to create 'how to' videos, which are an efficient means of responding to customer queries. Even the software giant Microsoft uses the crowd's potential, for example in testing its own software applications. In addition, there is an increasing trend for the phenomenon known as crowdfunding, which facilitates (partial) funding of projects by the crowd. *Startnext Network*, *VR-Networld* and *T-Systems* have set up a multi-client capable crowdfunding platform commissioned by Germany's network of cooperative banks (*Volks- und Raiffeisenbanken*), which is intended to help promote local projects. The sports goods manufacturer Nike offers the crowd its NikeID tool in order not only to obtain ideas and suggestions on new trends, but also to enquire into the needs of potential customers. The crowd can use it to apply their full creativity to the personalised design of products. These suggestions can then be evaluated and even ordered by the crowd itself. The list of practical examples could be further extended by other instances from diverse industries and for the most varied areas of work. However, these would essentially only confirm that crowdsourcing is now used for a highly varied range of activities within service provision processes (see Figure 2.3). This can be illustrated on the basis of Porter's value chain, according to which crowdsourcing is applied in primary value activities including 'production', 'marketing and sales' and 'after sales' as well as for secondary or supporting value activities 'research and development', 'finance' and '(corporate) infrastructure'. In this context, crowdsourcing is, for many companies, not merely a temporary alternative but has already become a longer-term alternative method of task processing which is being taken very seriously.

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9. www.tchibo-ideas.de and http://mystarbucksidea.force.com/ (accessed January 2015).

Figure 2.3 Crowdsourcing for Various Value Activities

In addition to the possible crowdsourcing applications listed along the corporate value chain, there are already many fields and industries in which particular phases of the provision of services are realised via crowd work.

§2.04 IN WHICH FIELDS IS CROWD WORK ALREADY BEING USED?

Modern information and communications systems, above all the internet, put the technological prerequisites in place for company-wide collaboration with multiple external contributors or the crowd.[10] Crowdsourcing enables companies to access a multitude of (crowd) workers – characterised by a variety of levels of knowledge, skills, experience and backgrounds – for providing services. Crowd work is now being applied in the course of a wide variety of activities within *service provision processes* (see Figure 2.4).

In this regard, the role of the crowdsourcing intermediary becomes essential. Crowdsourcing intermediaries are web platforms that serve as marketplaces in which crowdsources and crowd workers can interact. The intermediaries support the crowd-sourcing company in the targeted formulation of the tasks and the solution require-ments, so that the crowd can process the task set as effectively as possible. Crowd-sourcing intermediaries also manage the crowd as such and are responsible for almost all activities within the crowd. In this context, they can also be seen as 'brokers' who bring together knowledge seekers (crowdsourcers) and knowledge providers (crowd workers) by preparing the infrastructure necessary for crowdsourcing activities. Intermediaries are seen in the literature as having a leading role because they enable

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10. Martin, N., Lessmann, S. & Voß, S., *Crowdsourcing: Systematisierung praktischer Ausprägungen und verwandter Konzepte*, Tagungsband der Multi-Konferenz Wirtschaftsinformatik (MKWI'08, Munich, 2008).

companies to access a large pool of resources.[11] As a node in the network, intermediaries help companies to make up for their internal deficits in skills or resources by establishing a connection to appropriate partners.

Against this background, software companies, for example, now use crowdsourcing intermediaries such as TopCoder (topcoder.com) or CrowdCode (crowd-co.de) for programming software applications by crowd workers. Software testing is outsourced to crowds via platforms such as testCloud (testcloud.de), uTest (utest-.com), testHub (testhub.com) or PassBrains (passbrains.com).[12] The services provided by these intermediaries include the testing (usability tests, functional tests) of different software applications (websites, mobile apps, computer games) by experienced testers or ordinary internet users under real-life conditions. A piece of software is therefore not tested by the service provider itself, as is the case in conventional test service companies. Crowd surveys can be carried out for the upstream analysis and definition of requirements, while crowd ideation platforms can be brought in for the configuration and design of software applications. By contrast, cross-cutting and support tasks – such as entering, structuring and cleaning data records – are outsourced to the cloud via platforms such as Amazon Mechanical Turk (mturk.com) and Elance (elance.com).

Figure 2.4 Crowdwork in IT and Software Development.[13]
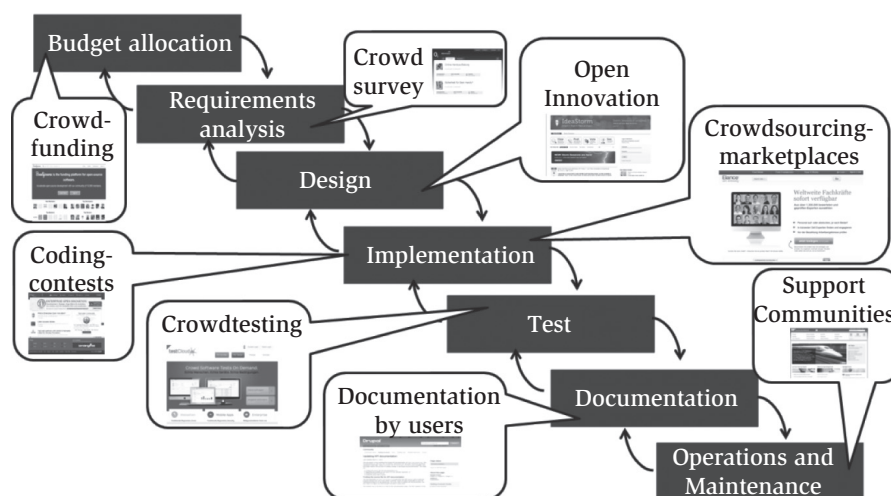
The example of the IT and software industry shows the potential areas in which crowd work can be applied along an entire service provision process. The crowd can be

11. Zogaj, S., Bretschneider, U., et al., *Managing Crowdsourced Software Testing – A Case Study Based Insight on the Challenges of a Crowdsourcing Intermediary*, Journal of Business Economics, Issue 84(3), pp. 375-405 (2014).
12. Zogaj, S., Bretschneider, U., et al., *Crowdtesting with testCloud – Managing the Challenges of a Crowdsourcing Intermediary* (2013).
13. Source: Author's own representation.

used from financing and budget allocation through implementation and up to and including operation and maintenance of a piece of software. However, the crowdsourcing intermediaries function as central hubs for project coordination and management of the individual crowdsourcing initiatives.

§2.05 HOW DOES CROWD WORK FUNCTION?

The outsourcing of companies' internal activities to the crowd is associated with various challenges in relation to the management of working and collaborative processes because it means the blurring of an enterprise's boundaries, with companies relying not only on their internal staff but also on the external crowd for almost every activity. To this extent, the question also arises of what a company's core services are and which activities can be qualitatively better, faster or more cost-efficiently executed by the crowd. In this regard, there must also be clarification of 'how' tasks can be outsourced to the crowd or a more general enquiry into 'how' implementation can take place. In this context, it is initially the challenges in relation to the management of *crowdsourcing processes* and the *management and control of work activities* that arise.[14] The working conditions and work arrangements are also of particular importance within crowd work – that is, the *forms of work in the crowd*, the established *incentive structures* and correspondingly the *remuneration of crowd workers*.

[A] Management of the Crowdsourcing Process

Companies operating crowdsourcing must initially face the challenge of deciding which internal service provision activities should (or can) be outsourced to the crowd. Theory and practice demonstrate that almost any value creation activity can be affected by crowdsourcing. In order for internal work packages to be successfully completed by crowd workers, they must be specified, described in detail and mostly divided into small (work) units (work/task decomposition). The expertise necessary for executing the partial tasks is proportionally low, so that many individuals, even if not highly qualified for a particular (larger) task, can collaborate in processing tasks. This procedure is comparable with the *principles of Taylorism*. It is a goal of these principles to increase work productivity by standardising and dividing up complex work processes into smaller individual activities (and thus also by greater division of labour). These smaller and frequently occurring individual activities can then be processed in a more effective and efficient manner by workers (who are less qualified and can learn easier and faster) benefiting from learning, network and size effects, thus increasing the productivity and speed of the overall service provision system. In parallel to the industrialisation of production processes, a majority of the effort in task processing is taken up by work planning, management and coordination. Crowdsourcing or process

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14. Jain, R., *Investigation of Governance Mechanisms for Crowdsourcing Initiatives* (AMCIS 2010 Proceedings, 2010); Geiger, D., Seedorf, S., et al., *Managing the Crowd: Towards a Taxonomy of Crowdsourcing Processes* (Proceedings of the Seventeenth Americas Conference on Information Systems, Detroit, Michigan, 2011).

managers with responsibility for the allocation of the divided tasks, and who manage and control work processes in a crowdsourcing framework, have other tasks to master than 'traditional' project or process managers.

A central challenge in crowd work is planning, implementing, managing and controlling the crowdsourcing process with all related activities. It is, therefore, necessary to discuss in detail all activities and potential courses of action that are connected to the individual phases. Ideally, the crowdsourcing process can be divided into five phases (see Figure 2.5): While the first phase is essentially about dividing up the work packages into partial tasks and determining the solution or task requirements, the second phase involves selecting crowd workers (all or only a sub-group of the crowd) to complete each task in the third phase, and determining how they are to do it. In the fourth phase, the submitted solutions or contributions (to an overall solution) are evaluated and collated so that the crowd workers can then be remunerated on that basis.

Figure 2.5   Phases and Actions in the Crowdsourcing Process[15]

Phase 1: Task Specification	Phase 2: Selection of Crowdsourcees	Phase 3: Execution of Tasks	Phase 4: Aggregation and Selection of Solutions	Phase 5: Remunerations
• Granularity: Decomposition of tasks • Specify tasks in detail • Definition of solution requirements • Determine form of work	• Unrestricted call ("everybody" can participate) • Preselection of contributors based on competencies and/or personal traits	• Task processing: Develop and submit ideas/concepts/ solutions • Depending on the type of work: Tournament-base vs. Collaboration-based	• Collect submissions and select appropriate solutions • Integrative: Combine solutions • Selective: Selection of (only) the most appropriate solutions	• Accepted tasks are rewarded • Integrative: Remunerations of all submitted solutions • Selective: Remuneration of only best solution(s)

[B]   Management and Monitoring of Crowd Activities

The targeted management and monitoring of crowd activities (known as 'crowd governance') is regarded as one of the essential challenges when carrying out crowd-sourcing. The reason for this is that an 'unmonitored' crowd cannot achieve agreed goals. For example, it could happen that crowd workers cannot complete certain tasks within a specified time and the crowdsourcing intermediary then fails to deliver the solutions to its customer (crowdsourcer). Management and monitoring in crowdsourcing includes all actions and procedures necessary for the effective management of the crowd. 'Smaller' crowdsourcing projects (e.g., simple brainstorming by the crowd) may require less monitoring effort, while comprehensive control and management mechanisms must be implemented for more complex crowdsourcing projects. However, research in this field lacks studies explicitly into management and monitoring mechanisms. Table 2.1 summarises the essential management and control mechanisms in crowdsourcing.

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15. Source: Author's own representation.

Table 2.1   Management and Control Mechanisms in Crowdsourcing[16]

Task Design
Design of appropriate structures to support the task processing effectively. This particularly concerns the specification of the tasks and the breaking down of tasks into subtasks and the corresponding aggregation of the partial solutions into an overall solution.
Feedback Mechanism
Establishment of measures by which the crowdworker can get feedback from the crowdsourcer or from the crowdsourcing intermediary. The feedback can refer to the actual work or work performance, on individual tasks or to general issues in the context of the crowdsourcing platform.
Incentive Structures
Establishment of structures and measures that address the motives of the crowdworkers and motivate them accordingly to be active on the crowdsourcing platform. The incentive structures are aligned with the needs and thus both extrinsic and intrinsic motives are relevant.
Management Solutions & Quality Assurance
Establishment of mechanisms by which the quality of submitted solutions can be evaluated. The evaluation of the solutions on previously defined solution requirements, is a common approach, however, varies from crowdsourcing initiative to crowdsourcing initiative. In addition to this procedure, three other approaches are presented in the literature: (1) Evaluation of the solutions submitted by other crowdworkers (e.g., based on 5-Star ratings); (2) Mixing of actual tasks and test tasks, thereby controlling whether the crowdworker actually solve the problems; (3) Iterative approaches, in which several crowdworkers perform the same task. If two (or more) crowdworker come to the same or similar solution, it may be assumed that the solution is suitable.
Member Management
Establishment of mechanisms by which the quality of the work and the crowdworkers can be ensured within crowdsourcing platforms. These include training measures and the provision of discussion forums in the community. In addition, also measures and structures that helps crowdworkers to contact with the platform operator or the crowdsource.

§2.06   WORKING IN THE CROWD: FORMS OF WORK, THEMES AND INCENTIVE STRUCTURES

In crowdsourcing, the crowdsourcer initiates the crowdsourcing process, defines and specifies the tasks to be processed, decides on the incentive structures and makes use of the solutions, while the crowd workers select and process the prepared tasks. The

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16. Source: Author's own representation based on Jain, R., *Investigation of Governance Mechanisms for Crowdsourcing Initiatives* (AMCIS 2010 Proceedings, 2010); Pedersen, J., Kocsis, D., et al., *Conceptual Foundations of Crowdsourcing: A Review of IS Research*, pp. 579-588 (46th Hawaii International Conference on System Sciences, 2013).

tasks are processed by crowd workers in the third phase of an ideal-typical crowd-sourcing process. However, this raises the question of precisely how work is carried out on crowdsourcing platforms, because work processes in online environments, with their large numbers of stakeholders, are structurally different from traditional internal corporate work processes.

In relation to forms of work, a fundamental distinction can be made between two approaches: *tournament-based approach* and *collaboration-based approach*. In the first case, the crowd workers are engaged in either a time-oriented competition (the first crowd worker to successfully finish the task is remunerated or rewarded) or a results-oriented one (only the crowd worker(s) with the best solution are rewarded). In this context, the crowd workers work *independently* of each other and generate corresponding solutions individually. In the collaboration-based approach, by con-trast, multiple crowd workers work together on a single solution to a particular task. One crowd worker submits a contribution and other crowd workers who want to cooperate have the opportunity to amend and also expand the submitted contribution via the platform. This generally happens by means of comment functions which the crowd workers can use to discuss the solution with each other. The output is then a jointly achieved solution (see Figure 2.6).

Figure 2.6   Forms of Work in Crowdsourcing[17]
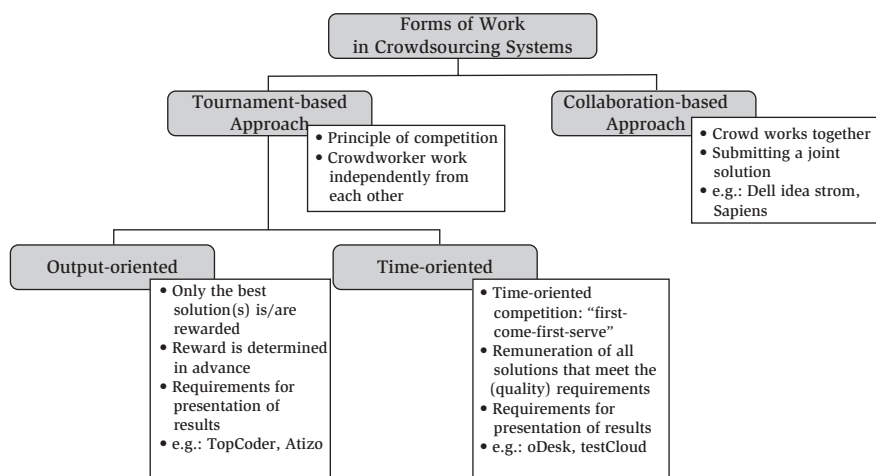
In contrast to the competitive form of work, in which crowd workers work independently of each other, the collaboration-based approach focuses on cooperation between the individual crowd workers. This collaborative concept within crowd work can be seen, for example, in software development. There are already many crowd-sourcing intermediaries that offer development or testing activities via the crowd. In

17. Leimeister, J.M. & Zogaj, S., *Neue Arbeitsorganisation durch Crowdsourcing: Eine Literaturstudie* (Düsseldorf, Hans Böckler Stiftung, 2013).

this respect, the crowd is called on to develop individual parts of a particular project – for example a software application – or the whole product, or to carry out testing activities. However, efficient work arrangements are necessary in order to generate a specific collaborative process in these sometimes highly complex work processes.

Work design in German-speaking countries has a strong basis in scholarly research and is aimed at achieving a particular organisation of work as its outcome. The organisation of work describes the scope and the conditions in which people work in direct or indirect collaboration with others in pursuit of a specific goal.[18] The underlying principles of the collaboration are traditionally rooted within companies' own methods of organisation of work. However, in a time of increasing digitisation of work, these fundamental mechanisms of collaboration can now also be found outside the corporate environment. As a consequence, work design along crowd work lines, as a new form of digital work, is taking on an essential role. In particular, the division of labour must be planned, implemented, managed and monitored with the aim of achieving an efficient and effective crowd collaboration. This crowd collaboration can, on the one hand, be supported by a set task or work design. This aims at increasing productivity, which is intended to be achieved by the effective division of labour into smaller tasks. The standardisation of procedural stages between human and machine is subject to particular focus here. These human-machine systems are often the result of prolonged trial-and-error refinements. Nevertheless, in order to exploit the potential of the crowd, there must be new, powerful solutions that support the design and implementation of human-based computation systems. The examples of *CrowdLang* and *CrowdOS* are already demonstrating that a programming language or tool can integrate abstractions such as group decision-making processes and ensure the supply of human resources and a robust infrastructure.[19]

On the other hand, a systematic approach to the development and implementation of collaborative processes – known as *collaboration engineering* – can improve collaboration between people. Collaboration processes are designed in such a way that practitioners or end-users can implement them in order to complete high-quality, recurring tasks.[20] The collaboration engineer therefore develops and documents a collaborative process that can easily and successfully be delivered to an end-user.[21] Although this approach originates from the observation of collaboration within individual companies, the concepts, methods and tools of collaboration engineering could in future also contribute to effective and efficient collaboration in the crowd. Because

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18. Leimeister, J.M., *Collaboration Engineering: IT-gestützte Zusammenarbeitsprozesse systematisch entwickeln und durchführen* (Springer-Verlag, 2014).
19. Minder, P. & Bernstein, A., *Crowdlang: A Programming Language for the Systematic Exploration of Human Computation Systems*, in *Social Informatics* (Proceedings of the 4th International Conference, SocInfo 2012), pp. 124-137 (Springer, 2012).
20. Kolfschoten, G.L., Briggs, R.O., et al., *Definitions in Collaboration Engineering*, Proceedings of the 39 Hawaii International Conference on System sciences (Delft University of Technology, University of Arizona, 2006).
21. Leimeister, J.M., *Collaboration Engineering: IT-gestützte Zusammenarbeitsprozesse systematisch entwickeln und durchführen* (Springer-Verlag, 2014).

the use of modern technology is not in itself enough to guarantee successful collaboration, the value of a technology only becomes clear after it has been applied in a skilful and targeted way.[22]

In crowd work, the collaboration processes should therefore be arranged on the basis of fundamental templates that enhance the IT-supported collaboration between crowd workers and ultimately contribute to increasing the performance of the crowd. Moreover, the heterogeneity of the crowd results in the end in the challenge of achieving a shared understanding. The different crowd workers have different levels of knowledge, experience and skills. This can inhibit collaboration. Recent research results from Bittner and Leimeister[23] are already showing that heterogeneous groups can be systematically supported in the formation of a shared understanding by means of the use of collaboration engineering. This is achieved in particular by the integration of different perspectives from multiple stakeholders within the heterogeneous groups. Consequently, transitions to crowd work also produce opportunities, before the task-processing actually begins, to minimise uncertainties and design the actual IT-supported collaboration process more effectively through targeted creation of a shared understanding. Furthermore, task design can be significantly improved in crowdsourcing initiatives. Badly conceived crowdsourcing tasks often lead to a situation in which no effective co-operation between the crowdsourcer and the crowd, and between crowd workers, takes place. This is why Kittur et al.[24] suggested the transformation from independently-acting to cooperating crowd workers by means of an expansion of traditional Computer Supported Cooperative Work (CSCW) to distributed teamwork. In this context, suitable collaboration methods and target-oriented tools can be applied using collaboration engineering, in order to extend existing structures of co-operation to the specifics of crowd work.

In comparison with 'traditional' work processes in which work tasks are generally specified and delegated or assigned by superiors, in crowdsourcing the crowd workers *themselves decide* which and also how many of the tasks listed on a crowdsourcing platform to accept and complete. The question now arises of what precisely motivates crowd workers to take part in crowdsourcing initiatives.

Different studies demonstrate that *intrinsic motives* such as *social exchange*, the *opportunity to expand individual skills* and *pleasure in (crowd) work* play an essential role. Premium-based and *monetary remuneration (extrinsic motives)* nevertheless represents the primary incentive factor for crowd workers. Moreover, a high level of self-determination is represented positively in the selection and type of activity as a crowd worker. There is a corresponding range of different remuneration/payment models. The premiums or fees vary greatly, depending on the form of works and the

22. Kolfschoten, G.L., Briggs, R.O., et al., *A Conceptual Foundation of the Thinklet Concept for Collaboration Engineering*, International Journal of Human-Computer Studies, Issue 64(7), pp. 611-621 (2006).

23. Bittner, E.A.C. & Leimeister, J. M., *Creating Shared Understanding in Heterogeneous Work Groups: Why It Matters and How to Achieve It*, Journal of Management Information Systems, Issue 31(1), pp. 111-144 (2014).

24. Kittur, A., Nickerson, J.V., et al., *The Future of Crowd Work*, Proceedings of the 2013 conference on Computer supported cooperative work (ACM, 2013).

type of tasks. While crowd workers are rewarded with just a few euro cents for some tasks, there are also several crowdsourcing initiatives in which prize money of up to EUR 100,000 or dollars are paid out. Some remuneration forms and their features are presented in table 2.2.

Table 2.2   Examples of Remuneration of Crowd Workers[25]

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 organises competitions for companies, in which to search for solutions in a particular area, e.g., 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 Workers receive for their participation in the tender so-called Liquid Points. This documents 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.

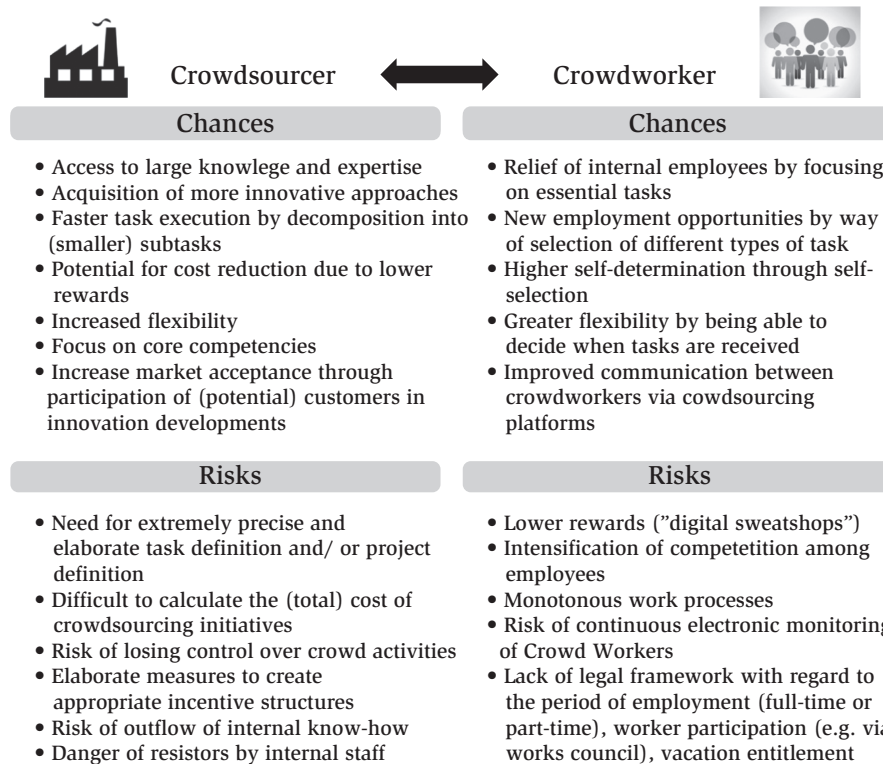## §2.07   WHAT OPPORTUNITIES AND RISKS DOES CROWD WORK CONCEAL?

In recent years, crowdsourcing has become for many companies a serious alternative option for task processing. Not only software developers but also companies from other fields (e.g., IBM, BMW, Audi, McDonald's, Otto, Henkel, Tchibo, Sennheiser, etc.) are

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25. Source: Author's own representation.

showing a tendency to outsource diverse tasks to crowds – from innovation (e.g., ideas generation) to marketing (e.g., designing logos, advertising slogans) and general support tasks (e.g., execution of calculations).[26] Numerous researchers identify great potential for companies in the opening up of internal business processes to the crowd. Some refer, in this context, to the enormous knowledge potential of the crowd,[27] while others speak of 'reaching a new evolutionary level in terms of (business) value creation'[28] through use of the potential of the crowd. On the other hand, there are also various opportunities and chances that, in 'traditional' forms of work, can only be realised to a limited extent.

In contrast to this, in many reports the risks associated with crowd work, both for crowd workers (internal crowdsourcing) and companies, have been critically discussed. For example, some papers draw our attention to the emergence of 'digital sweatshops', because the remuneration of crowd workers can sometimes be very low and is, moreover, insecure.[29] For companies there is – above all – the danger that internal knowledge leaves the company via crowdsourcing or that difficulties emerge in relation to the control of the work processes. The essential opportunities and risks, both for companies operating crowdsourcing programmes and for crowd workers are presented in Figure 2.7.

26. Leimeister, J.M., *Crowdsourcing*, Zeitschrift für Controlling und Management (ZFCM), Issue 56(6), pp. 388-392 (2012); Leimeister, J.M. & Zogaj, S., *Neue Arbeitsorganisation durch Crowdsourcing: Eine Literaturstudie* (Düsseldorf, Hans Böckler Stiftung, 2013).
27. Howe, J., *Crowdsourcing: Why the Power of the Crowd Is Driving the Future of Business* (New York, 2008).
28. Hammon, L. & Hippner, H., *Crowdsourcing*, Wirtschaftsinformatik, Issue 54(3), pp. 165-168 (2012).
29. Zittrain, J., *The Internet Creates a New Kind of Sweatshop*, http://www.newsweek.com/internet -creates-new-kind-sweatshop-75751, 2009 (accessed January 2015).

Figure 2.7 Opportunities and Risks for Crowdsourcers and Crowd Workers[30]

Crowdsourcer	Crowdworker
Chances	**Chances**
• Access to large knowlege and expertise • Acquisition of more innovative approaches • Faster task execution by decomposition into (smaller) subtasks • Potential for cost reduction due to lower rewards • Increased flexibility • Focus on core competencies • Increase market acceptance through participation of (potential) customers in innovation developments	• Relief of internal employees by focusing on essential tasks • New employment opportunities by way of selection of different types of task • Higher self-determination through self-selection • Greater flexibility by being able to decide when tasks are received • Improved communication between crowdworkers via cowdsourcing platforms
Risks	**Risks**
• Need for extremely precise and elaborate task definition and/ or project definition • Difficult to calculate the (total) cost of crowdsourcing initiatives • Risk of losing control over crowd activities • Elaborate measures to create appropriate incentive structures • Risk of outflow of internal know-how • Danger of resistors by internal staff	• Lower rewards ("digital sweatshops") • Intensification of competetition among employees • Monotonous work processes • Risk of continuous electronic monitoring of Crowd Workers • Lack of legal framework with regard to the period of employment (full-time or part-time), worker participation (e.g. via works council), vacation entitlement

The above explanation shows that a number of advantages as well as diverse disadvantages at different levels have been attributed to the crowdsourcing concept. Nevertheless, these are mostly more in the way of suppositions than well-founded insights. The real risks and potentials arising from the implementation of crowdsourcing, the operating principles on which it is based and the implications for people, organisations and markets resulting from it under any given parameters, cannot be reliably determined or predicted based on the latest available scientific knowledge. For this reason, scholars should put on the research agenda the issue of crowd work as a new form of digital work, along with the effects associated with it on individual, organisational and structural levels. On the other hand, business practice will have to address questions emerging in relation to crowd work, in order to be able to continue to apply this work model effectively and sustainably in different sectors in the future.

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30. Source: Author's own representation.

§2.08   CROWDSOURCING AS THE ORGANISATION OF WORK OF THE FUTURE?: NEW PATHS AND CHALLENGES IN IMPLEMENTING CROWD WORK

Everyday life is increasingly shaped by digital technologies. It will therefore be essential for all actors involved to face the changes associated with them. Especially if increasing digitisation changes the market environment and new business sectors emerge. In this context, crowd work represents a new form of digital work leading to long-term changes in the organisation of work. This chapter has shown how basic processes, roles and mechanisms are being re-shaped by the outsourcing of activities to an undefined mass of people. In the crowd work concept, the workforce is more available and can be accessed at any time. This fact enables companies to deploy the necessary human resources completely flexibly depending to the needs. What does this mean for the corporate strategy of the future and how will it change the perception of work for the individual crowd worker? Furthermore, can a fundamental transformation in the traditional employer-employee relationship be observed as a consequence of crowd work? What is the relationship between crowdsourcers, intermediaries and the individual crowd worker? On what levels do they interact? What interdependencies can be identified and how do they affect individuals? In addition, we are observing a transformation in the nature of the tasks themselves that are outsourced to the crowd. In particular, work in the crowd changes the perceived meaningfulness of the individual tasks and task-related factors. In comparison to traditional work, crowd workers may experience a new type of pleasure or social interaction in their activities.

Against this backdrop, the crowdsourcing phenomenon is leading to technological, organisational, legal and social challenges even as it enables innovative business models and services. In this regard, a new business model known as the *crowd-enabled lean start-up* is emerging, in which crowd work functions as a central instrument of the enterprise. Traditionally in entrepreneurship research, 'lean start-up' describes an approach in which all processes in a newly-established company are kept as minimised as possible.[31] In the services sector, these lean start-ups consist of very small, agile teams. They are generally one- or two-person firms that rely on existing third-party infrastructure for their own operations. In crowd work, such infrastructures would be, for example, the platforms of the crowdsourcing intermediaries described above. Lean start-ups that make use of the crowdsourcing principle and especially the established infrastructures of crowdsourcing intermediaries are therefore termed *crowd-enabled lean start-ups*. This new form of start-up offers services to crowdsourcers – that is, the customers in a crowdsourcing initiative – and supports them throughout the course of the project. They take on, for instance, administrative tasks such as the identification, selection, coordination and payment of the crowd workers.

The increasing diffusion of such services, however, is not only leading to occasional, short-term changes in companies and sectors. It is rather the case that organisational and working structures can be changed fundamentally over the medium

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31. Ries, E., *Lean Startup: Schnell, risikolos und erfolgreich Unternehmen gründen* (Munich, Redline-Verlag, 2012).

and long term. It is, in particular, companies that intend to use crowdsourcing that are faced with the challenge of effectively implementing crowd work. To do so, it is essential to integrate the crowd's outputs into existing internal processes in a successful manner. Moreover, for both external and internal crowdsourcing, quality management and the impacts of crowd work on the companies' staff teams are important aspects for a successful application of this new form of the organisation of work. The example of crowd-enabled lean start-ups shows the extent to which new business models can emerge from crowdsourcing and describe structural changes for the stakeholders involved. What effects will this have on the future of work? How do individual crowd workers experience their activities? To what extent can regulation be introduced in order to promote fair and good crowd work?

It has been possible in this chapter to give an insight into the basic mechanisms of crowdsourcing and the resulting challenges at different levels. In conclusion, it remains to note that internal and external crowdsourcing offers opportunities as well as risks both for employees – that is, crowd workers – and for companies that use crowdsourcing. It is also important not to overlook crowdsourcing intermediaries, which play the essential role in external crowdsourcing because they, on the one hand, interact with the crowdsourcing company and, on the other hand, also acquire and manage a large workforce – the crowd. Generally, it should also be observed that there is still far too little knowledge about the interdependencies, effects and design possibilities. This can be seen as an invitation to the academic research and business communities as well as policy-makers to put crowd work on their agendas. The goal is to take advantage of existing opportunities while at the same time minimising potential risks. It is necessary to ensure the introduction of basic rules to ensure 'good' work within the crowd. Establishing these will in turn require a solid knowledge of the various variants, principles and functionalities. In the field of collaboration-based crowd work, collaboration engineering has been presented as a possible approach for using existing expertise in relation to IT-supported collaboration for enhancing collaboration in the crowd. Collaboration engineering's mechanisms and templates, which have already been implemented in microcosm in groups within companies, could also increase efficiency within a large, heterogeneous crowd outside a company. This example shows that we must ask ourselves these questions, because crowdsourcing will gain more and more significance at different levels in a time of increasing digitisation of work.