

# Transforming Work Organization with Internal Crowds: a Process Theory

*Completed Research Paper*

**Michael Greineder**  
University of St. Gallen  
michael.greineder@unisg.ch

**Ivo Blohm**  
University of St. Gallen  
ivo.blohm@unisg.ch

## Abstract

*Internal crowdsourcing showed a substantial increase of use in recent years, since it describes a promising alternative to traditional orchestration of employees in today's digital era. However, literature falls short in explaining the transformation process that is enacted by such approaches of platform-based work organization. We apply a process ontology on internal crowdsourcing as platform-based mode of work organization, following two organizations employing internal crowdsourcing in a case study approach for over four years. On a macro level, our theory describes the transformation process enacted by internal crowdsourcing as three-phased process. On the micro-level, we illustrate that this transformation process is driven by specific design choices on single elements. In so doing, our process theory contributes to a better understanding of internal crowdsourcing as means for transformation work organization and to STS theory by showing that the emergence and constitution of STS is mainly driven by processes on a micro-level.*

**Keywords:** internal crowdsourcing, process theory, decentralized work, socio-technical system

## Introduction

Internal crowdsourcing showed a substantial increase of use in recent years (Durward et al. 2016; Palacios et al. 2016), since it describes a promising alternative to traditional orchestration of employees in today's digital era with a change in technology, increasing job automation and new forms of employment. For instance, Bosch launched an internal crowdsourcing platform inviting its employees to join the crowd in order to create a logistics dictionary. Through internal crowdsourcing, the company could integrate employees from all over the globe that reflected the whole supply chain. As a result, Bosch was able to globally synchronize these definitions for the first time in its history (Zuchowski et al. 2016). However, building up and orchestrating such a huge crowd reflects a major transformation for any organization that does not happen automatically. The case of the Allianz Group UK illustrates the dilemma. The company introduced an internal crowdsourcing platform for idea generation in order to drive innovation. While the initial setup of the platform was comparably easy, it took the organization almost eight years to entirely integrate the work performed on this platform into its business operations due to magnitude of change that was required (Benbya and Leidner 2018).

Existing research (Malhotra et al. 2017; Nurmi and Hinds 2016; Simula and Ahola 2014; Stieger et al. 2012) has focused on the examination of internal crowdsourcing as a complex socio-technical work system (Lyytinen and Newman 2008). These studies have made great strides in understanding the potentials of internal crowdsourcing (Ågerfalk and Fitzgerald 2008), different application domains (Malhotra et al. 2017) as well as the design of the individual components that are needed to build such systems (Vukovic 2009). While the socio-technical systems (STS) perspective was useful for an initial conceptualization of internal crowdsourcing, STS theory reflects a system theory that generally describe a phenomenon as a system that comprises of

interacting subsystems and other more fine-granular components (Burton-Jones et al. 2017). Consequently, this perspective is inherently static in nature. However, this research falls short in explaining the transformation process that is enacted on organizations by such approaches of platform-based work organization (Afuah and Tucci 2012).

In this paper, we re-conceptualize internal crowdsourcing as an innovative form of platform-enacted work organization (Zuchowski et al. 2016). In extension of this argument, internal crowdsourcing implies a structural and significant change in an organization's established socio-technical work system (Lyytinen and Newman 2008; Patnayakuni and Ruppel 2010; Zuchowski et al. 2016). Following the well-established, but inherently static notion of STS theory, existing research has neither sufficiently addressed the changes in work organization that are enacted by internal crowdsourcing, nor the corresponding transformation process itself. However, in order to reap the benefits of this new platform-based approach to work organisation, we require a profound understanding of the transformation process' underlying mechanisms and dynamics (Leicht et al. 2017; Zhao and Zhu 2014; Zuchowski et al. 2016) as well as their surrounding organisational and ecological context (Langley and Truax 1994; Pettigrew 1990). Particularly, it is pivotal to not only identify specific events, decisions and activities that drive internal crowdsourcing within organisations, but also how they drive the reorganisation of work and the reconfiguration of the underlying socio-technical work systems. Therefore, our research is guided by the question of how internal crowdsourcing transforms work organisation and reconfigures socio-technical work systems over time.

This paper develops a process theory that explains the transformation process when organizations strive towards internal crowdsourcing as a new mode of work organization. In so doing, we overcome existing research that considers internal crowdsourcing as a static STS (Zuchowski et al. 2016). We broaden this current understanding by applying a process ontology on internal crowdsourcing as platform-based mode of work organization. Taking a dynamic perspective on how internal crowdsourcing transforms work organization over time, we follow two organizations employing internal crowdsourcing in a case study approach for over four years. On a macro level, our theory describes the transformation process enacted by internal crowdsourcing as three-phased process that predicts the structural formulation, generation and transfer of knowledge creation as well as the organizational re-definition. On the micro-level, we illustrate that this transformation process is driven by specific design choices on single elements of the established socio-technical systems that alter the dynamics of how work is organized in these organizations. In so doing, our process theory contributes to a better understanding of internal crowdsourcing as means for transformation work organization, and also to STS theory by showing that the emergence and constitution of STS is mainly driven by processes on a micro-level.

This paper is structured as follows: In section 2, we elaborate and present the the theoretical background of STS theory in combination with internal crowdsourcing and the work organization mechanism are presented. In section 3, we outline our methodology that is followed by the presentation of our results in section 4. Finally, theoretical and practical implications are discussed in section 5 as well as areas for future research are presented in conjecture with this work's limitation in section 6.

## **Theoretical Background**

### ***Internal Crowdsourcing***

The idea of crowdsourcing is that a crowdsourcer, e.g., a company, proposes to an undefined group of contributors or crowd workers (individuals, formal or informal teams, other companies) the voluntary undertaking of a task presented in an open call (Blohm et al. 2013). Crowdsourcing provides several benefits such as broader access to specialized skills (Prpić et al. 2015), more flexible and faster hiring processes (Kuek et al. 2015), shorter product development cycles (Simula and Ahola 2014) or lower costs (Schenk and Guittard 2011). A crowdsourcer can apply crowdsourcing externally or inside its organizational boundaries. Early crowdsourcing initiatives started within the external setting, where contributors participate in some sort of digital freelancing. Today, companies increasingly use their own employees as an internal crowd of contributors in order to leverage collective intelligence or to orchestrate their employees more efficiently (Zuchowski et al. 2016).

## **A Socio Technical Systems Theory Perspective on Internal Crowdsourcing**

While early research focused on the potentials of internal crowdsourcing as problem-solving approach (Bjelland and Wood 2008) and proof-of-concept applications (Ågerfalk et al. 2009; Gaspoz n.d.; Jette et al. 2015), current research has conceptualized internal crowdsourcing as a complex socio-technical system (Geiger and Schader 2014; Knop et al. 2017). Following the underlying premise of STS theory (Lyytinen and Newman 2008), internal crowdsourcing systems are not only information systems that allow orchestrating a large crowd of employees for executing work. They are also embedded into a social system of participating individuals and the overall organization that influence functionality and usage of the underlying information system (Baxter and Sommerville 2011). Today, STS theory is frequently applied for analyzing digital work systems (e.g., Mumford 2006; Sykes et al. 2014) and generally such systems consist of four components within the STS (Bostrom and Heinen 1977; Lyytinen and Newman 2008): actors, structure (represent the social system) task, technology (represent the technical system).

Following this conceptualization, internal crowdsourcing represents a collaborative or competitive group-activity of human individuals (Zhu et al. 2014). Actors include an organization's employees and its main stakeholders who may influence the internal crowdsourcing system (in the following all employees, stakeholders or groups refer to the type of actor(s) in the STS). In existing research on actors of internal crowdsourcing systems, the focus has been on aligning the aims of the organization and the participating employees (Simula and Ahola 2014) as well as the characteristics of participating employees. Research found that these individuals need to be diverse (Simula and Ahola 2014), proactive (Zhu et al. 2014) and self-organized (Stieger et al. 2012). Further, internal crowdsourcing systems are determined by a certain structure that may consist of subsystems such as communication, authority, and workflow. Structure includes a normative dimension, i.e., values, norms and general role expectations, as well as a behavioral dimension, i.e., patterns of communication, exercising authority or incentive mechanisms that reflect a major research topic in internal crowdsourcing (Hind and Van Alstyne 2010). In the task domain, task decomposition and work delimitation is a key challenge in internal crowdsourcing (Zuchowski et al. 2016). Prior studies have focused on classification (Jette et al. 2015; Lopez et al. 2010), or the decomposition, and allocation of tasks (Lopez et al. 2010; Simula and Ahola 2014) in such a way that the task can be solved in isolation, but integrated later into a complex environment. Task formulation should therefore be unambiguous and precise (Bailey and Horvitz n.d.), within a fixed time frame for completion (Vukovic and Naik 2011), and be placed in relation to see where the task fits into the 'big picture' (Simula and Vuori 2012; Vukovic and Naik 2011; Zuchowski et al. 2016).

Internal crowdsourcing is a technology-enabled phenomenon as digital crowdsourcing platforms determine the exchange and the interaction of these individuals. Research has investigated different types of such platforms that may range from generic social media tools (Stocker et al. 2012) to specialized IT solutions (Rohrbeck et al. 2015). The design of platforms has also been a dominant research topic (Bailey and Horvitz n.d.). Using such platforms, actors broadcast a series of tasks to the internal crowd for execution. These tasks are quite specific such that internal crowdsourcing systems are frequently bound to a specific purpose, i.e., developing innovation ideas (Malhotra et al. 2017) or testing software (Leicht et al. 2017).

Previous studies have made great strides in internal crowdsourcing research, but are affected by a static view. The research often considers only proof-of-concept applications rather than to go beyond this point. The interaction between the changes in the socio-technical system elements is neglected in research so far.

### ***Mechanism of Work Organization***

Literature on organizational behavior, considers work organization as the fundamental question of how organizations divide labor and integrate effort (Parker et al. 2017; Puranam et al. 2014). Extending this perspective, STS theory suggests that work organization is deeply rooted in the design of socio-technical systems and that changes in work organization are causing re-configurations in the underlying socio-technical work systems (e.g., Mumford (2006); Sykes et al. (2014)). Consequently, changes in work organization, or more precisely changes in the way organizations divide labor and integrate effort, are reflected in the transition and transformation of socio-technical work systems (Puranam et al. 2014; Trist 1981).

Following this line of reasoning, the design of socio-technical work systems affects an organization's structures, operations, and culture (Foss and Klein 2014; Schneider et al. 2013) in order to assign tasks and responsibilities to employees and integrate the obtained results. Thus, on a more operational level, transforming work organization can be regarded as changing the mechanisms of division and allocation of tasks to employees as well as the required mechanisms of coordination and collaboration.

We follow this conceptualization of work organization and consider these four mechanisms as potential means for altering socio-technical work systems of organizations using internal crowdsourcing. We describe and define these mechanisms in Table 1 (Parker et al. 2017; Puranam et al. 2014).

<b>Mechanism</b>	<b>Definition</b>
Division of work	Includes task division, with the problem of translating the objectives of the work organization into tasks and subtasks.
Allocation of Work	The mapping of tasks, obtained through task division, to individual employees or complete work systems.
Collaboration effort	The effort for mapping a set of implicit or explicit mechanisms to employees to ensure their motivation to perform the assigned work tasks.
Coordination effort	The effort to provide employees with the information they need to perform the given tasks and coordinate their activities with others

## Methodology

Since internal crowdsourcing is a novel phenomenon and generally little is known about how platform-based work manifests itself in organizations and influences the social-technical work system over time, we have chosen an abductive, multiple case study design. This has allowed us to gain rich, field-based insights into key person interactions, work organisation mechanisms and the resulting transformation processes (Yin 2013). Case study methods have been used in a number of transformation studies (e.g. (Jay 2013; Kaplan and Orlikowski 2013; Mirabeau and Maguire 2014) and are considered suitable analyse contemporary series of events over which researchers have little or no control (Yin 2013) and to generate multiple observations on complex transformational processes (Eisenhardt and Graebner 2007; Langley 1999).

### *Research Setting and Sampling*

In choosing appropriate case studies, we have been guided by previous studies that argue that software testing is a suitable environment for research on internal crowdsourcing (Leicht et al. 2017; Troll et al. 2018). Crowdsourced software testing is a specific application of crowdsourcing in which a large crowd of individuals tests software, i.e., an organization's employees in the context of internal crowdsourcing. Since software testing is highly standardized and a common software development activity, it is highly comparable across different organizations. Thus, crowdsourced software testing is well-suited for multiple case studies on how internal crowdsourcing transforms work organization.

For this study, we accompanied two companies, SwissBank and SwissInsure (disguised names), over the period of four years such that we were able to follow the entire transformation process enacted by internal crowdsourcing. In both companies, data collection spanned the period from the introduction of internal crowdsourcing until this approach has become a standard business operation. In so doing, we could collect data in longitudinal fashion on the entire transformation process and thus avoid retrospective bias. Furthermore, for lateral replication both companies are very well suited for this purpose, since the implementation was motivated by different reasons (Yin 2013). When introducing a new banking software, SwissBank pursued a wide-ranging application with the mandatory integration of a large number of employees. At SwissInsure, on the other hand, internal crowdsourcing rather followed a grass-roots approach and manifested itself over time by an increasing voluntary participation of employees over time. In both cases, internal crowdsourcing was introduced because traditional software testing procedures had reached their capacity limits and did

not ensure sufficient software quality. In other words, both companies pursued the same goals with internal crowdsourcing, in a mandated top-down approach and in an emerging bottom-up approach. This setting allowed us to examine internal crowdsourcing from two different perspectives, following the aim of a more robust theoretical replication of the observations (Eisenhardt 1989; Yin 2013).

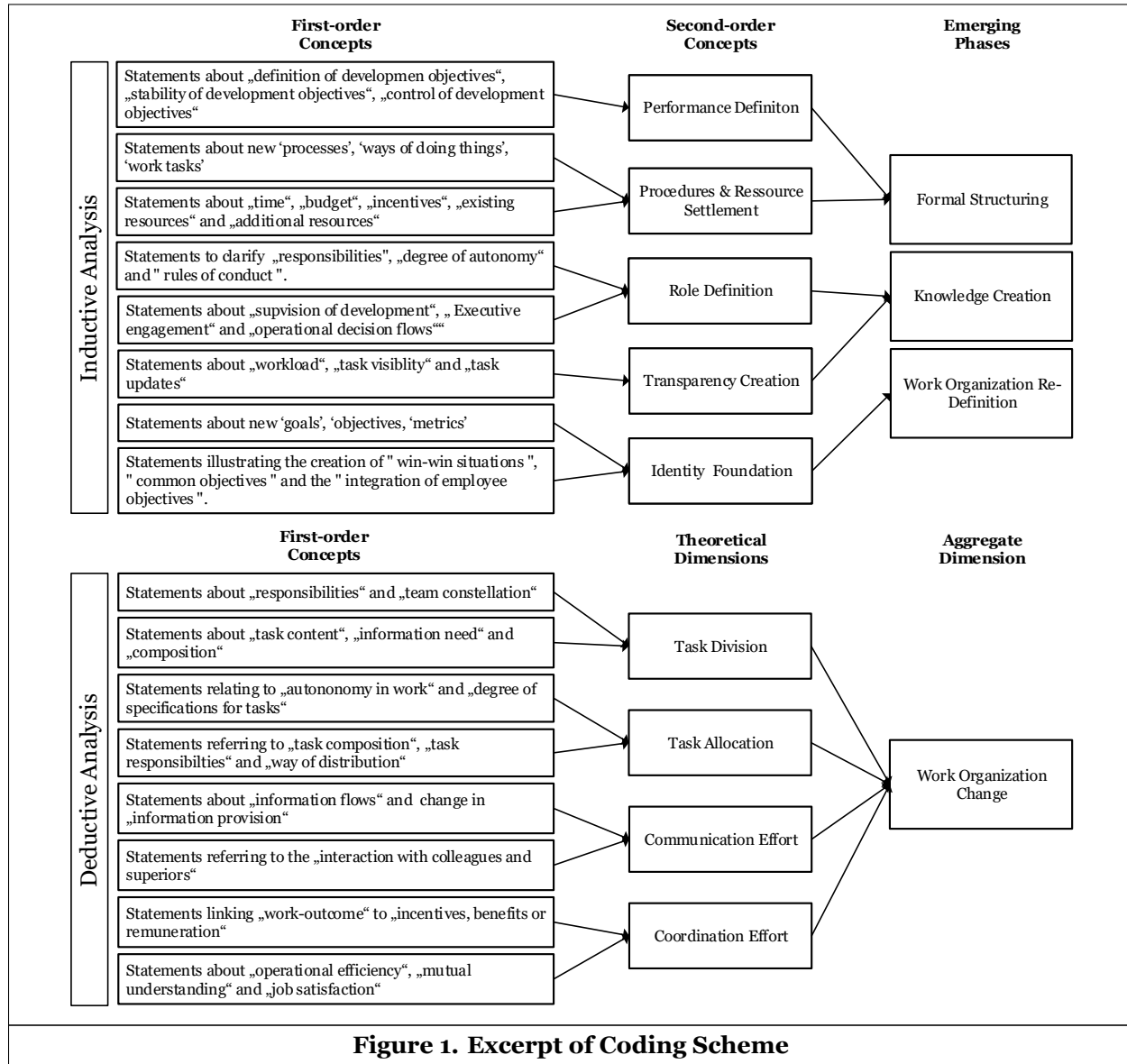
### **Data Collection**

Two main sources of data were used: First, we conducted interviews with all stakeholders of the internal crowdsourcing projects on a longitudinal basis, and second, we collected pertinent documents (such as meeting protocols, project reports, intranet articles and related comments). The interviewees included organizational executives and other stakeholders playing an important role for internal crowdsourcing (e.g., project managers, software testing managers, crowd workers, and other project participants). We conducted 41 semi-structured interviews in four waves over 4 years (see Table 2). Interviews lasted between 30 and 90 minutes and were either conducted via telephone and Skype calls or face to-face meetings. The interviews were transcribed, coded and analyzed by using the analysis software Nvivo 12. In addition, documents were consulted in order to triangulate interview data including strategic planning documents, company presentations, newspaper articles, web articles, guidelines and correspondence.

<b>Wave (Year)</b>	<b>Total Number of Interviews</b>	<b>Type of Informants at SwissBank</b>	<b>Type of Informants at SwissInsure</b>	<b>Average length (in minutes)</b>
1 (2016)	10	1 CIO, 1 PMO, 2 Crowdworker, 4 Software Test Managers	1 PMO, 1 Software Test Manager	30
2 (2017)	9	1 Executive, 3 PMO's, 3 Crowdworker	1 PMO, 1 Crowdworker	28
3 (2018)	12	1 Project Participant, 2 Software Test Managers, 3 PMOs 4 Crowdworkers	1 Project Participant, 1 Software Test Managers	47
4 (2019)	10	3 Executives, 2 Project Participants	1 CIO, 4 Project Participant	35
(CIO = chief information officer, PMO = Project Management Officer)				

For the initial phase of developing the interview protocol, we followed Kvale and designed an open-ended interview guideline in order to ensure that our semi-structured interview approach (Myers and Newman 2007) elicited relevant information that allows for tracking the evolution of internal crowdsourcing until the specific time of the interview as accurately as possible. In order to begin our understanding of the longitudinal process of organizing work with internal crowdsourcing, we conducted an initial analysis after the first wave of surveys to identify the most important decisions, activities and events in the development of internal crowdsourcing in both companies. This first analysis led to some adjustment (e.g. who was responsible and on whom did this have an impact) of the focus of data collection for the second, third and fourth wave - a fairly normal process in inductive research (Eisenhardt and Graebner 2007). Interview schedules for the following phases were more closely adapted to different project stages and the transition points between them. The purpose was to generate a large amount of process data and trace developments in the two focal organization to the last data collection point. Thus, we were iteratively able to refine, link and validate the information obtained in earlier data collection waves and to follow the unfolding processes more precisely. To achieve this, the following phases of interviewing continued between February 2016 and November 2019. Once all the data had been collected, a detailed descriptive chronology of the case was prepared and submitted to the interviewees for verification.

## Data Analysis



To systematically extract the transformation process enacted by internal crowdsourcing and analyze how the organization of work changes the mechanisms of dividing and allocating tasks as well as coordination and collaboration, we coded the interviews. Codes “are labels that assign symbolic meaning to the descriptive or inferential information compiled during a study” (Miles et al. 2014, pp. 71). They can be used to retrieve and categorize chunks of information in interview transcripts to cluster segments that relate to a particular construct or theme (Miles et al. 2014). In our case, the codes serve to structure the verbalizations of the transformational work organization process from the interviews. We use these codes to derive distinct transition points from one phase to another, analyze the different arrangements of work organization within the phases, and how the four mechanisms of work organization dynamically change over time. In doing so, we followed a data analysis and coding approach proposed by Gioia et al. 2013, Hyde (2000) and Miles and Huberman 1994, which is well established in related literature on work organization and process research (e.g. Vuori et al. 2016, Schilpzand et al. 2015, Strike et al. 2016). We conducted the analysis in two waves.

First, we inductively analyzed the data to derive different events, decisions and activities, which occurred during the introduction of internal crowdsourcing in an explorative fashion. We applied a multi-staged coding scheme with first-order codes, second-order concepts, and aggregated dimensions (see Figure 1). First-order codes represent informant-centric terms that emerge during the interviews. For these codes, we adhered to words that were used by the interviewees to describe the decisions, activities and events leading the transformation of work organisation. Alongside we analysed in the same fashion the collected documents to cross-validate statements and find additional aspect, which are relevant to the changes made during the transformation journey. Based on similarities and differences in the generated codes from interviews and documents, it is possible to derive second-order concepts that represent germane themes and categories described during the interviews (Gioia et al. 2013). Finally, it is possible to aggregate these second-order concepts to aggregated dimensions (see Figure 1). In order to derive the time-related process phases from the data, we followed the temporal bracketing strategy proposed by Langley 1999. It represents a standard approach for analyzing process data and is especially well-suited for an “open-ended inductive approach that most researchers use in process research” (Langley et al. 2013, p. 693). At its core, temporal bracketing refers to the decomposition of data and the explicit investigation of successive, adjacent periods and contextual changes in order to obtain a temporal classification of how actions in one period lead to changes in context that affect actions in subsequent periods (Langley 1999). Based on these codes (aggregated phases), we reconstructed the transformation process enacted by internal crowdsourcing and its sub-phases. These processes can then be grouped based on the number of transitions between phases and similarities in their alignment to describe the processes as “evolving internal crowdsourcing system”(Langley 1999). Figure 2 shows a visual representation of the overarching process of both cases based on the aggregated results of the inductive coding.

Second, building on the initial inductive analysis, started a phase of deductive reasoning (Hyde 2000; Miles et al. 1994). In doing so, we coded the interview again on events, decisions, activities to create a list of first-order codes, which serve as the basis to assign the codes into distinct categories of the respective work organization mechanism (see Table 1). In order to be able to trace the exact course of the influences on these mechanisms we used the same temporal bracketing approach proposed by Langley 1999 to match the different work mechanism changes and the respective decisions, activities and events to the corresponding transformational phases.

To increase confidence in the analysis, two researchers were involved in the coding process. We followed Saldaña(2015), who notes that coding “can and should be a collaborative effort” (p. 27) to develop more objective perspective on the codes and their interpretation. For this purpose, literature suggests an iterative process of “constant comparison”(Corbin and Strauss 1990). In line with Saldaña(2015) and Harry et al.(2005), we did not attempt to develop a numerical reliability rating, but to reach a consensus on the appropriate usage of the set of codes. We developed potential concepts and dismissed, changed or retained them based on comparisons across the interviews to achieve a coherent synthesis. We discussed preliminary results and variations and gave our raw data to independent students for analysis (Lehrig et al. 2017, cf.) We adapted the concepts whenever suitable or necessary and doubled checked with the collected documents and informants. In this way, we embarked on “a process of testing the codes for clarity and reliability” (Harry et al. 2005, p. 6). We repeated the process until we reached consensus with regard to the aggregated phases of work organization in internal crowdsourcing and the relevant changes in the mechanisms for dividing and allocating tasks as well as coordination and collaboration effort at these phases.

## **Results**

Drawing on the findings from our analysis, we first present the overarching process of internal crowdsourcing and second the changes in work organization in the respective phases.

### ***Initial Case Situations before introducing Internal Crowdsourcing***

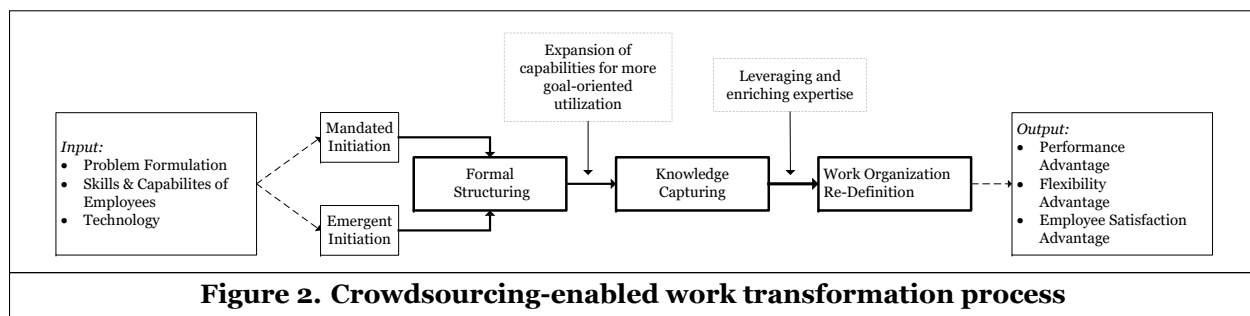
**SwissBank**, a Swiss-based bank with more than 9,000 employees, started the project to introduce a new business software in 2014. The new software, as proposed by the bank, would enable SwissBank to increase productivity and significantly reduce operating costs for administration, maintenance and training. After a

two-year development period, the bank was faced with the challenge of complying with the testing requirements of the supervisory authorities on the one hand, and creating suitable personnel structures to be able to carry out these tests successfully on the other. To support the project, it was decided to involve staff in the testing process.

**SwissInsure**, a Swiss insurance company with more than 3,000 employees was also in a change of the internal IT. In many areas the software had to be adapted and renewed to meet the requirements of the customers and the sales department. The difficulty for SwissInsur in this digitalization phase was the software testing, which did not occur in regular cycles with the same work intensity. Therefore, an alternative solution was searched for to handle temporary peaks in the workload without increasing the number of employees and without triggering additional major structural and technology changes.

### **Internal Crowdsourcing Transformation Phases**

The presented process model (Figure 2) consists of three different macro-phases, within these phases targeted activities and decisions are made which decisively shape this phase. Between the individual phases, corresponding triggering decisions are made which reflect the findings of the previous phase and determine the subsequent phase substantially.



**Formal Structuring:** Although the start of the introduction of internal crowdsourcing was very different at both SwissBank and SwissInsure, with different problem settings, use of technology and employee skills, but their actions of introducing it within the organisation showed remarkable overlaps during the formalization process.

In both settings the general technology infrastructure were left untouched and no big investment were made. This was for two reasons, first at SwissBank all employees had to be rapidly included in the internal crowdsourcing project, and second the roll-out of new technology settings would have jeopardized the timeline. Also, at SwissInsure it was initially not clear how many employees were participating in the project and if an investment would be beneficial. The existing technology was redesigned to facilitate decentralized testing through internal employees. We experience from the interview data the importance of decision-makers actively conveying their vision in the initial phase in order to reduce resistance and to motivate employees to actively support the crowdsourcing system. In both cases the initiation was made because of a constant lack of employees with relevant experience in the usage of the end-product of the software within a fixed time frame to reach the respective goals. An in-depth due diligence process was used to create roles (e.g. crowd-manager), and to identify tasks to be carried out by internal crowdsourcing. Our results indicate the relative importance of putting together a team to lead the coordination and communication between the different stakeholders involving the aspects of incentives, procedures and performance standards. Both organizations developed compensation instruments for participation in internal crowdsourcing (e.g. granting leave from regular duties, crediting overtime, and benefits in kind). Also, the corresponding processes were identified, changed and specified on how the results from the employees testing results should be integrated in the project. The creation of responsibilities of processes were communicated and codified in target dates in the IC platform, and in performance standards. Interviewees referred to these milestones, target dates, and performance standards as "mechanisms that allowed to track the performance of the outcome and employee performance".



After the successful piloting (at SwissBank), and increased interest of employees (SwissInsure), it was decided to expand the internal crowdsourcing in order to generate an extend the already experienced performance benefit. The CIO of SwissBank referred to this as: *"We have seen that we can derive great benefit from the internal crowdsourcing system here, we did not originally expect this - we will see if we will have the same success in other areas"*.

*Observation 1: The initiation of internal crowdsourcing follows a formal structuring of the social system (actors and structure) along the dimensions of technology, time, incentives, procedures and the formalisation of monitoring of work output.*

**Knowledge Capturing:** After the decision was made to integrate more employees and projects into internal crowdsourcing, we identified the internalization and routinization of the formulated processes and structures through culture of collaboration, in which employees jointly plan each step of the working process. Since, knowledge and capabilities have the propensity to be accumulated or adjusted over time (Majchrzak et al. 2012), the internal crowdsourcing system improve incrementally with knowledge and experience accumulating at all participating actors. In this phase, employees get more involved with performing work via crowdsourcing platform. We experienced that employees used additional opportunities for socialization by sharing experiences of working in a decentralized platform oriented way. For instance, both organizations initiated virtual round-table and meet-ups.

Beyond these informal settings of socialization, both case organizations started to generate extensive "crowdsourcing guidelines" with all necessary information, clear structural and procedural support, description of restructured workflows, as well as the identification of new strategies and opportunities for internal crowdsourcing. Interviewees referred to the importance of this stage a way of "concept creation", where for different settings implicit knowledge of the involved stakeholders was externalized and shared.

Crowd-Managers played a critical role in this process phase by aggregating the generated information into a shared understanding of how work is executed and synthesised these information into a new concept of a more extended use of internal crowdsourcing. However, mutual understanding of the new usage of internal crowdsourcing is not sufficient if not shared across the entire organization. At SwissBank and the high number of involved employees crowd-manager were experienced a positive resonance to use internal crowdsourcing in more complex structures in software-testing as well as engaging in software development. Also, at SwissInsure executives stated: "We have to make sure that we quickly scale this up and bring this into the entire organization - it is a real enrichment for everyone." An internal competence centre was set up at SwissBank to concentrate all crowdsourcing-related knowledge and to scale up this new approach within the organisation. Similarly, SwissInsure, which originally considered internal crowdsourcing as an "add-on" in software-testing, also established an autonomous unit within the organisation to handle complete projects. This development was also confirmed by the new perspective of the employees "We have actually always seen internal crowdsourcing as an add-on in the software testing toolbox - that was a wrong perception as it now turns out". The overall experience in both cases resulted in the decision to extend the knowledge gained from internal crowdsourcing projects to more complex, structured work in order to take advantage of the use and flexibility of the new form of internal crowdsourcing throughout the organisation.

*Observation 2: Employees engage in social interaction via the crowdsourcing platform to share experience, work techniques and knowledge of technologies, which is consolidated by the constant exchange, thus knowledge is recombined and institutionalized in the organization as a whole to new explicit knowledge of technical system components*

**Work Organization Re-Definition:** The process in the knowledge creation phase promoted a consensus around a common logic of action. The knowledge creation phase has shown that more complex projects can be handled via internal crowdsourcing, in which employees can independently sign up for suitable projects. Both settings had an eminently positive effect on the quality and productivity in the respective projects. Employees reported in interviews about a positive enrichment and extension to their normal work activities in the company. For both companies a new organizational logic was created, which establish only

formal structures and organizes crowd workers or teams without specify and defining all processes and actions. This new organizational logic is able to rapidly assemble and restructure its employees by organizing and initiating a community of potential employee for rapidly form ad-hoc teams to process complex task within the organizational needs. Our results indicate an increased engagement and commitment in the project by enabling teams and individuals in such an organizational logic. "We never thought we'd change this much in the first place. We were able to completely reorient and redefine the work activities in many areas. It is really fun". was a statement of a crowd manager at SwissInsure marking the impact on the process in the organization and the overall employee satisfaction.

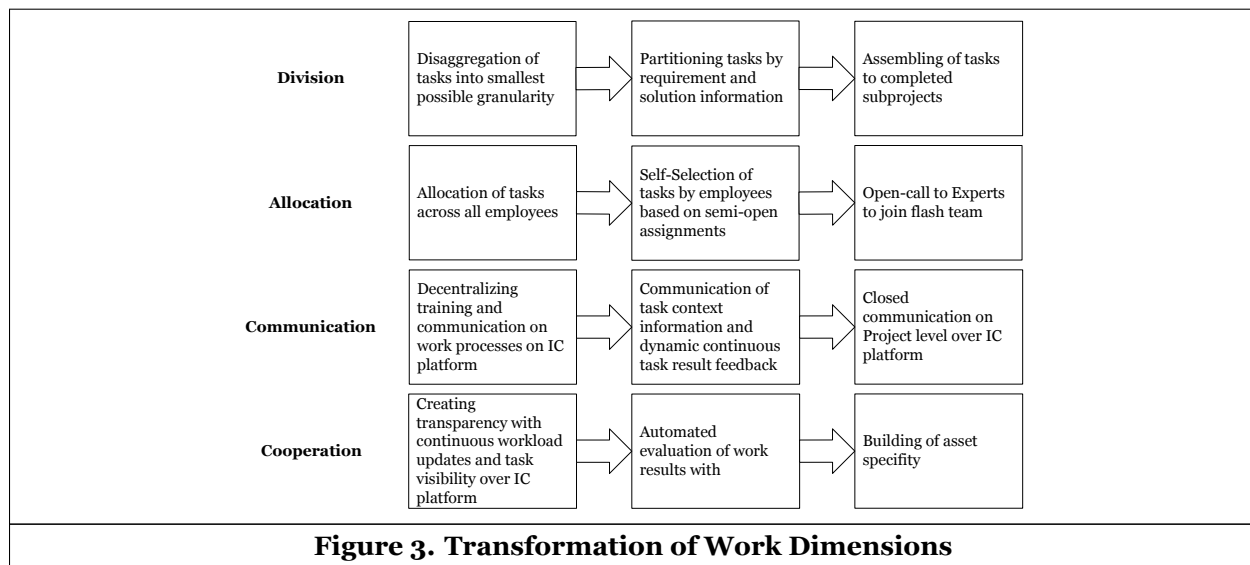
Thus, within this phase we observed the combination of the advantages generated in previous phases. The combination of the recombination of the social system (formal structuring) and the technical system (knowledge capturing) led to a complete new definition of the social-technical system.

*Observation 3: The definition of internal crowdsourcing within an organisation is based on the common understanding of usable skills which are created by bundling expert knowledge in ad-hoc teams.*

**Outcome:** Over the three phases, as with both companies, improvements in performance, flexibility and employee satisfaction were observed. In the formal structuring phase, the changes made created a basis for the efficient and effective completion of software testing tasks. In the knowledge creation phase experiences could be used to dissolve the static task context. With the institutionalization of new explicit knowledge in independent units for enable the completion of complex task. resulted in an increased flexibility of the usage of internal crowdsourcing. This institutionalisation of independent internal crowdsourcing units increased flexibility and built the basis for the new organisational definition. It enables employees to select tasks themselves and thereby increases the commitment and satisfaction of the employees.

### **Transformative Perspective on Work Organization**

By examining the transformation of the two internal crowdsourcing settings through the lens of work organization, we observed how different stakeholder shaped the definition of work organization on a micro process level in their parts of the organization (see the different phases in Figure 3).



**Work Division Change:** In the first phase of internal crowdsourcing we identified, that both firms followed in terms of task division the approach (Parker et al. 2017) to create subtasks with the least possible interdependence. The result should be as "modular" as possible such that each task could in principle performed by any employee. However, this undermined the motivation of the employees to further engage in

the system. Interviewees referred to the assigned task as "exhausting and monotonous". Within the knowledge creation phase, employees got more engaged in the process and the task division changed to mutual exclusive tasks around the skills and capabilities of the employees. Task got divided by (1) requirement information, which included the business logic from the user's point of view, and (2) the solution information which included the technical logic from the point of view of the technical requirements, usefulness and feasibility of the software. These changes had the effect that two task groups were created based on the respective knowledge levels. The advantage of this division is the involvement of employees based on their available competencies, skills and knowledge. In the third phase this division ultimately made it possible to combine the tasks to be performed via the crowdsourcing platform into complex sub-projects. These sub-projects were in turn handled by the respective experts who had the necessary knowledge level.

*Observation 4: The task division changed from simple equal tasks to complex sub-project tasks creation, which made possible by the division of tasks on the basis of requirement and solution knowledge.*

**Work Allocation Change:** The distribution of tasks was initially equally allocation because tasks had a similar logic and were not differentiated regarding the required skills to solve them. This had the consequence that the quality of the results varied significantly with the respective tasks and employee competencies. In order to solve the problem of result quality and to be able to better allocate tasks to employees, profiles with the respective areas of competence were created in the IC platform for all employees. These profiles could be supplemented by employees with personal interests as well as existing competencies. On this basis, employees were suggested tasks to apply for and complete. The distribution of tasks has thus changed from a fixed allocation of tasks by the employees themselves. With the creation of employee profiles in the IC platform. The profile data enabled employees to select tasks themselves, invite other colleagues to bring in their competence into the ad-hoc team for complete the project or sub-project.

*Observation 5: The allocation of work tasks changes from a equally allocation to a self-selection of work tasks by autonomous working groups or individuals.*

**Communication Change:** Throughout the three different phases, we observed changes in the communication with the goal to foster internal crowdsourcing as mode of work organization. With the start of internal crowdsourcing, both companies faced the challenge of communicating the necessary skills for platform-based work to enable their employees to engage efficiently with this new working environment. In both cases, it was not possible to use regular learning environments. Because the employees were working at different locations, and no time restrictions could be imposed on voluntary participation. For this purpose, an asynchronously learning environment over web-based trainings (WBTs) was initiated. This decentralised training was introduced together with an affiliated knowledge repository which served as a digital reference book. The insights that can be generated from crowd workers' feedback loops are an important source of information whose usage can be optimized to identify opportunities for future process improvements (Hoornaert et al. 2017). We observed them during the implementation of the knowledge repository and FAQs, for which feedback was generated from previously evaluated tasks and from frequently occurring problems in dealing with the new working environment and tasks.. The communication shifted completely to the crowdsourcing platform, where the crowd workers receive task-related information and feedback as well as evaluations of work orders. The organizations therefore integrated the employees to improve the working procedures and at the same time providing feedback for triggering a learning cycle between employees and internal crowdsourcing system (Palacios et al. 2016). With the introduction of the crowdsourcing platform, communication changed from peer-to-peer communication to community communication, in which all participants of a sub-project are always communicated with. This had the relative advantage that all participants were informed and at the same time the collaborative work was strengthened.

*Observation 6: Communication changes from an allocation of information and knowledge to an interactive exchange of knowledge across several levels*

**Coordination Change:** The coordination of work is effected by three major factors (1) degree of interdependence of tasks (2) degree of differentiation of tasks and (3) degree of interest or goal conflict between individuals (Victor 1990). As in our cases the degree of interdependence and differentiation between and of task was handled over the IC Platform and appropriately tackled by an efficient task division, the conflict of interest among individuals was found extremely difficult to handle or as one test manager of SwissBank described it: "Each head of department in the individual coordination meetings had the feeling that his/her employees contribute the most or bear the greatest workload." Therefore the effort for coordination in our cases is inherently linked to transparency. We have found that by creating a continuous transparency of workloads both in individual areas and among employees in both settings, cooperation is ensured and coordination efforts are reduced. In order to create the greatest possible transparency, it is necessary to evaluate the quality and quantity of work performance objectively and efficiently. This is not only about evaluating the output but also about carrying out secondary tasks such as finding errors, identifying duplicates and providing targeted feedback. We have found the greatest possible success in settings where these tasks are automated. Apart from these measures, the greatest benefit was seen in the support of asset specificity with regard to the coordination effort of tasks. Interviewees in both companies pointed out that the benefits created when people worked together over several projects greatly reduced the coordination effort. This effect could be observed among employees within sub-projects as well as across project levels.

*Observation 7: Improving Transparency increases the interaction and cooperation in the internal crowdsourcing system by creating asset specificity - the value generated over time when people work together.*

## Discussion

In this paper, we have developed a process theory which characterizes the transformation of work organization enacted by internal crowdsourcing as three-stepped process at the macro-level. Across these macro-level process phases, we elaborate on micro-level mechanisms, that is, allocation and division of work as well as coordination and communication, and their corresponding dynamics through which they facilitate the overarching transformation process.

Our process theory is deterministic in the sense that both organizations undergo highly comparable phases of formal structuring, knowledge creation and work organization re-definition to establish internal crowdsourcing systems of high performance. Between these phases, the organization have been confronted with similar decisions in order to progress in the transformation process. Over the course of time and the three phases we examined work organization mechanisms in detail to show how specific events, activities and decisions significantly influenced the macro processes of the introduction of internal crowdsourcing, due to this process we have been able to observe the constitution of a new STS.

### *Theoretical Implications*

Our work makes two important contributions to the research fields of internal crowdsourcing and socio-technical systems.

First, research in crowdsourcing and related platform-based work systems has made great strides in the last decade (Bailey and Horvitz n.d.; Leicht et al. 2017; Lopez et al. 2010; Malhotra et al. 2017). While, existing internal crowdsourcing research has focused on the development of isolated mechanisms of crowdsourcing systems and their potential benefits and shortcomings (Hind and Van Alstyne 2010; Malhotra et al. 2017; Zuchowski et al. 2016). We complement this research by a process theory that explains how these mechanisms interact in an longitudinal an end-to-end fashion. Our process theory goes beyond existing research on internal crowdsourcing that usually investigates prototypical proof-of-concept implementations and that was constantly calling for researching more institutionalized settings of applying internal crowdsourcing in the long run (Jette et al. 2015; Lopez et al. 2010; Prpić et al. 2015; Simula and Ahola 2014). Our research shows how internal crowdsourcing transforms the organization of work and thus goes beyond our understanding of internal crowdsourcing as problem-solving approach (Deng and Joshi 2016; Malhotra et al. 2017). Our process theory shows critical incidents and process phases that change the perception of such novel modes

of work organization. Further, our work extends existing research (Deng and Joshi 2016; Zuchowski et al. 2016) in regards to the understanding and management of internal crowdsourcing by showing how internal crowdsourcing unfolds over time and how different events, decisions and activities influence the division of work and integration effort on various hierarchical levels.

Second, through our unique longitudinal empirical account, we highlight the mechanism through which transformations in work organization are facilitated and how these mechanisms shape the the overarching phases (Knop et al. 2017; Kouamé and Langley 2018). For instance, in the phases of formal structuring and knowledge capturing, decisions were significantly influenced by the different, sometimes rather intuitive organizational activities at the micro-level of the work organization mechanisms (e.g. provision on continuous feedback influenced the decision to leverage expertise of the system). In this regard, a decisive point was the division of work on the basis of the required knowledge about structures which was only recognized afterwards as a key element of organizational realignment. This applies equally to the transparency of work statuses introduced on the crowdsourcing platform, which subsequently led to an increased willingness to socialize and share knowledge between employees and, as a result, to organizational learning. Through our approach and the insights we have gained, we show that micro-processes influence the macro-outcome (in our case the configuration of the respective explicit activities in the individual phases) and co-evolve with them over time. With the insight that micro-processes have a considerable influence on the individual phases and thus on the constitution and modification of the STS, we can show that socio-technical systems are not designed successfully but rather arise due to their complexity and the constant co-evolution between individual factors. We thus contribute to existing STS research (Alter 2013; Baxter and Sommerville 2011; Trist 1981) by providing a new perspective on the emergence of STS over time, but also address the field of crowdsourcing research by highlighting important factors for a successful introduction of internal crowdsourcing (Zuchowski et al. 2016).

### ***Practical Implications***

Our research results will help companies to successful manage the transformational process from traditional work organization towards platform-based form of work organization like internal crowdsourcing. The outlined research has the following implications for practitioners. On the one hand, our presented process study can be used in companies to better predict possible developmental steps and thus be helpful for the implementation of a new work organization.

Practitioner can use our findings as a transformation guideline of internal crowdsourcing to detect potential threads, opportunities and constraints along the way, and can take over the different phases and importance of corresponding work organization mechanism to ensure a successful implementation of internal crowdsourcing for organizing work. The concept of the presented "Hybrid- Flash Organization" as an independent work organization in the corporate environment can be used by companies to perform critical and complex work tasks in-house, to involve employees in the development of new products, services or critical company projects or to train and educate employees. In addition, the findings on division of labor and work integration from the process study are helpful for companies with regard to the successful execution of internal crowdsourcing. The findings are also helpful for companies that new organizational capabilities, the better acquisition and utilization of employee knowledge and expertise can be gained through the introduction of internal crowdsourcing. Therefore, through the developed process theory organizations can manage the implementation of internal crowdsourcing more effectively and efficiently. In addition, our cases show the high relevance of new work organization for both sustaining and creating a culture of innovation as well as the development of agile capabilities in a changing organizational environment.

### **Conclusion, Limitation and Future Research**

This paper presented the introduction of internal crowdsourcing was investigated in two case setting. We identified in qualitative longitudinal case studies three different phases emerged by using internal crowdsourcing. While the formal structuring followed the dimension of technology, time, incentives, procedures and the formalisation of monitoring of workoutput to reassemble the social system, the following phase of knowledge creation experiences are shared and new explicit organizational knowledge is developed. The

nascent organizational structure is restructured and transferred to build what we experienced as a ad-hoc team organization. An organization, which facilitates the advantages of ad-hoc teams by rapidly organizing crowdworker into an organization, and by reversing the disadvantage of asset specificity into an advantage by using existing crowd skilled employees (Valentine et al. n.d.). We therefore extended our internal crowdsourcing framework to create a holistic and indulgent understanding of internal crowdsourcing processes, for which several authors have been calling (Alter 2013; Baxter and Sommerville 2011; Trist 1981) (Fayard et al. 2016; Knop et al. 2017; Zuchowski et al. 2016).

Although our case study provides first evidence for the new organization of work with internal crowdsourcing, our results needs to be replicated in additional case studies and/or quantitative research. Moreover, our approach could be of limited generalizability. However, we have not tried to achieve the greatest possible generalizability, but rather to enable the transferability of our findings. Our approach is therefore characterised by a richness of detail and the greatest possible degree of precision in order to make the micro-macro-instantiation visible. The detailed explanations may also appear context-bound and not very transferable. However, the value of this study lies not in the specific links revealed, but in the understanding of the means and mechanisms by which they come about (Kouamé and Langley 2018), even though they will certainly manifest themselves differently in different situations. While the emerging process theory rather focuses on the organizational level and describes how organizations may master the transformation processes, a prospective area for future research may aim to gain a deeper understanding of the perception of this transformation process by employees. Especially, the co-evolutionary impact from crowdworker on the development of new work modes could be examined. Based on our prior work, additional quantitative data from affected employees could be collected in a series of surveys to shed lights in new prospective areas.

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