universität wien

MASTERARBEIT / MASTER'S THESIS

Titel der Masterarbeit / Title of the Master's Thesis

„Experiments on Smart Team Architectures“

verfasst von / submitted by

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angestrebter akademischer Grad / in partial fulfilment of the requirements for the degree of

Master of Science (MSc)

Wien, 2020 / Vienna 2020

Studienkennzahl lt. Studienblatt / degree programme code as it appears on the student record sheet:	UA 066 915
Studienrichtung lt. Studienblatt / degree programme as it appears on the student record sheet:	Masterstudium Betriebswirtschaft
Betreut von / Supervisor:	Univ.-Prof. Dipl.-Chem. Dr. Markus Georg Reitzig, MBR

Abstract

Over the past few decades, organizations and hierarchical setups changed. Authority and decision-making power moved from the top levels of hierarchies to the lower levels. Therefore, new forms of flat collaborations like self-managing teams emerged. This thesis takes a critical look at the effects of hierarchies on team decision-making and coordination as well as team motivation. The review finds that autonomy and control over the work environment given to the employee ameliorate motivation and performance of the very. Further, the development of the seven-step Smart Team Architecture approach, based on the fundaments of organizational design, is explained.

An experiment was conducted to test whether this specific structuring approach improves the outcomes of teamwork in terms of efficiency gains. Results depict that the team's performance can be fostered, to some extent, by applying the Smart Team Architecture approach.

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1. Introduction

All possible forms of organizations are encountered in every aspect of daily life by everyone (Puranam, Alexy, & Reitzig, 2014). This also accounts for hierarchies (Anderson & Brown, 2010). Nevertheless, in the past decades, an observable change of classical forms of organizations, as well as classical forms of hierarchies, occurred (Puranam, Alexy, & Reitzig, 2014; Kolbjornsrud, 2017). Nowadays, organizations rely more and more on peer-to-peer work without the need for hierarchical intervention (Highsmith, 2004).

It is an intensively discussed topic of whether hierarchies and the execution of traditional managerial authority have a positive or negative effect on organizations, such as companies, and its employees. On the one hand, hierarchies are said to reduce a subordinate's motivation and effort as well as hamper the will to communicate. Consequently, the overall performance is reduced (Mitchell & Silver, 1990; Kish-Gephart, Detert, Trevino, & Edmondson, 2009; Klapper & Reitzig, 2018).

On the other hand, clear structures and roles, which are known to exist in hierarchical setups, provide high transparency and clear roles, therefore, reducing the potential for conflict (Greer & van Kleef, 2010).

Typically, hierarchies give authority to individuals, who then have, among others, the power over people. In flatter hierarchical setups, this kind of authority is almost non-existent. Therefore, lateral authority, which is a task related authority, emerged. This kind of authority is rather task-based and only gives the power to decide over task-specific aspects. Experts and people generally gain authority by putting a lot of effort into their projects in terms of technical contributions or knowledge sharing (Dahlander & O'Mahony, 2001). In a study, Puranam and Lee (2015) found out, that decisions, regarding organization design, made by experts as opposed to beginners, tend to differ in quality. Experts prove to effectively have resource to experiences of the past which results in solutions of a better fit in terms of reorganization problems (Lee & Puranam, 2015).

A further change in terms of how organizations design their work environment appeared with the emergence of self-organizing teams. In the 1990s, already more than 70% of firms had installed self-

managing teams (Lazear & Shaw, 2007). These teams are equipped with the authority and decision-making power to manage their work independently. Nevertheless, with autonomy comes responsibility. Self-managing teams, therefore, are fully responsible for the output produced. (O'Connell, Doverspike, & Cober, 2002; Highsmith, 2004; Molleman, 2000).

To explain such organizational changes at the base, Puranam, Alexy, and Reitzig (2014) consider organizing as a problem-solving process. Therefore, they depict that every organization has to find a solution to the four fundamental problems of organizing, which were derived from the two universal problems of organizing – division of labor and integration of effort (Puranam, Alexy, & Reitzig, 2014). Based on these insights as well as the insights of Puranam and Lee (2015), the seven-step smart team architecture directory was developed (Puranam, Alexy, & Reitzig, 2019).

The smart team architecture directory combines aspects of self-management, like autonomy and decision-making power, with the relevant benefits of hierarchies such as transparency and clear roles. Therefore, this thesis aims to identify if and how such team structures can be fostered without relying on hierarchies. The underlying research question reads as follows:

"What are the effects of smart team architecture directory application on flat collaboration and how can it be fostered?"

To answer this question and test the hypothesis stated in chapter five, an experiment was conducted. To answer the explorative part the execution of the experiment was monitored.

The structure of the underlying thesis is as follows: It will start with the literature review regarding effects of hierarchies as well as the concept of lateral authority followed by a look on the topic of self-managing teams. To finish the literature review, organizations, organization design, and the seven-step Smart Team Architecture approach get examined.

Finally, the undertaken experiment is presented, followed by the results as well as the demographics of the participants.

2. Literature Review

This part of the thesis deals with hierarchies and its effects on team decision-making and coordination, and motivation. The second part gives an insight into the concept of lateral authority, followed by a closer look at self-managing teams. Finally, this chapter examines organizations and organization design, as well as the seven-step approach, derived from these insights.

2.1. Hierarchies

Generally, a hierarchy is a rank order of different people with one or more levels. Depending on the rank one individual holds in a hierarchy, the amount of power and authority changes. A hierarchy can take many different forms, and individuals can attain a higher rank out of various reasons. Often individuals get placed in higher positions of leadership due to specific characteristics like selfishness, bias, overconfidence, narcissism, dominance but not necessarily competence (Anderson & Brown, 2010). According to Weber (1972), there exist three reasons why subordinates acknowledge decisions and commands of a supervisor without thinking about what the supervisor entitles to act in this way. First, they trust the legal system that authorized the superordinate. Second, they do so because of long traditions to which they are used to, and third, they are enthusiastic and inspired by the charisma and heroic image as well as the status of their supervisors (Weber, 1972). Therefore, if a superordinate is in power, he has the ability to issue certain commands in conjunction with the subordinate's range of tasks (Simon, 1951). This kind of authority is rather vertical and is known as managerial authority generally observed in traditional hierarchical setups. Holders of the managerial authority typically solve the problems of dividing labor and integrating effort centrally. Furthermore, they manage conflicts and thus, can sanction or incentivize their subordinates (Klapper & Reitzig, 2018). Beyond that, there also exists horizontal authority. This type of authority gives the power to make decisions based on tasks rather than people (Dahlander & O'Mahony, 2001).

2.2. Effects of Hierarchy on Teams

The execution of traditional managerial authority in terms of a steep hierarchy or to invoke a flat hierarchy is a controversial topic. The effects of a steep hierarchy can be considered from different perspectives. This thesis highlights the effects of hierarchies on the following aspects of group work – team decision-making and coordination, and team motivation.

2.2.1. Effects of Hierarchy on Team Decision-Making and Coordination

Team decision-making is thought to be favorable for more complex tasks. While working on tasks where a larger amount of different points of view is beneficial, a flatter environment is said to be a better fit (Anderson & Brown, 2010). This also applies to tasks requiring creativity. In this case, merging group member's innovative ideas and creativity leads to improved output (De Dreu & West, 2001). If a task is characterized as being repetitive and ordinary, the existence of a steeper hierarchy is beneficial (Cantimur, Rink, & van der Vegt, 2012; Carzo Jr. & Yanouzas, 1969).

When applying hierarchy to decision making often also, the opinions and perspective of the team members are demanded however, the opinion of a superordinate is weighted more. This does not necessarily have to be true to the fact that superordinates are being truly better. Just the idea that higher-ranked employees should be better gives more weight and importance to their opinions, skills, and perspectives (Anderson & Kilduff, 2009). Also, team decisions are more precise when the team is composed of individuals with different opinions, judgments, skills, and personal tendencies. It seems problematic when a higher ranked employee is in charge of team composition since individuals tend to be attracted by similar personalities. Therefore, superiors will choose new team members based on how similar they are to themselves. Consequently, teams will be more homogenous, and diversity will be reduced, which in turn will lead to unfavorable and disadvantageous decisions (e.g. Schneider, 1987).

Perceptions of the superior's ability to make better decisions lead to a reduction of effort of employees in lower layers of the hierarchy and the conviction that their superordinate has to make more contributions (Bass & Bass, 2008). If, in this case, the higher-ranked team member was not elevated based on technical competence, among other things like specific social skills, this will have a negative impact on group performance (Bass & Bass, 2008).

In terms of cooperation, a flatter hierarchy ameliorates how individuals behave with one another. Steeper forms of hierarchies are known to create a higher level of competition between the team members because every team member wants to get a higher rank. This may be the case if each group member gets his own goal, and evaluation happens on the level of the single members and not on the level of the group as a whole. In this regard, performance measured on team level decreased (Mitchell & Silver, 1990). Additionally, when the group members are interdependent in their tasks, the circumstance of individual performance evaluation might lead to sabotaging as well as missing communication between and support among team members (Milgrom & Roberts, 1992). Thus, if tasks are interdependent, meaning that group members need to work coordinated, flatter hierarchies fit better. In this case, more layers of authority hamper efficiency and decrease performance (Lawrence & Lorsch, 1967). Nevertheless, a steeper hierarchy, under certain circumstances, is also said to provoke less conflict with regards to status as it provides clear roles, and every team member exactly knows his role (Greer & van Kleef, 2010).

Transparency is essential in flat collaborations. It is the base which, combined with shared objectives, values, regulations, and incentive structures, can mitigate the free-riding of its members by building trust, reciprocity, and certain perceptions of fairness (Lerner & Tirole, 2002; Ostrom, 2000). Transparency is an underlying requirement for reciprocal monitoring as a means of shared governance as well as it facilitates information flows among the team members. It is assumed that team members hence have all the information required to self-assign tasks best to fit their skills (Kolbjornsrud, 2017). Aside from the skill fit, the satisfaction of their personal needs, when deciding on which task to execute, plays a crucial role. Personal needs in this context may be the desire to be creative and to have fun or because of a personal interest in a specific topic (Shah, 2006).

2.2.2. Effects of Hierarchy on Team Motivation

Being a member of a team, where some layers of authority are above oneself, influences self-perception. With people occupying roles at the lower levels of a hierarchical setup, where they have almost no control, decision-making power, and autonomy, a reduction of self-confidence and performance can be observed. Further, people lower in the hierarchy tend to think they are less competent and able. This

feeling of being less effective also leads to a loss of motivation (Korman, 1971; Van Vugt, 2006). In addition, motivation may also be downsized by decisions being made centralized, which is not supported by the lower-ranked team members. A lack of trust in the superior and his competences and abilities, thus, leads to a reduction of effort in their tasks (Van den Steen, 2006).

To avoid, or at least try to avoid, motivational losses, management dispenses, first and foremost, monetary rewards. There are some reasons why this is not an optimal solution. First, if the employee's intrinsic motivation is the main reason for his contributions, extrinsic rewards in the form of monetary rewards may suppress the intrinsic motivation and therefore have a negative effect on the employee's motivation (Gubler, Larkin, & Pierce, 2016; Frey & Jegen, 2001). Second, the company may not be solvent enough to provide adequate monetary rewards for the employees and thus fail to motivate the very (Klapper & Reitzig, 2018). Third, it can also lead to a reduction of efforts if individuals believe that their rewards should be measured based on their own amount of contributions and effort and not on a team level (Adams, 1965). If, after comparison to the contributions and rewards of others, they feel treated unequally this can lead to a reduction of motivation and consequently to a decline in efforts or to a change of perceptions about their own effort and rewards or, in the worst case, to even leaving the organization (Pfeffer & Langton, 1993; Downes & Choi, 2014; Carrell & Dittrich, 1978). Nevertheless, if rewards are transparent and fair, a low skilled team member would accept a higher-skilled team member to receive higher rewards based on the fact that the higher-skilled person contributes more to the overall outcome (Trevor, Reilly, & Gerhart, 2012). Under certain circumstances, rewards based on team performance in comparison to the performance of a single team member, however, can have a positive effect on team functioning. In this context, the degree of task interdependence, culture, and values of the team members, as well as the degree of acceptance towards team-based rewards, play a crucial role (Wageman, 1995).

Further, individuals who hold roles with no authority tend to participate less in discussions and team decision-making (Locke & Anderson, 2015). With more layers of authority, the risk of miscommunication rises. This may be easily explained with an example: An idea arises in the lowest level of a hierarchy. The employee who formed the concept has to talk to his superordinate. This

superordinate then again has to talk to his superordinate. This goes on until the idea has reached a level of hierarchy where a decision can be made. Then the decision has to be communicated all the way down to the employee who may or may not carry out the task or realize the idea. At each level of the hierarchy, the person who gets the information builds his own image of the idea and interprets the idea according to his personal beliefs. In other words, the original information gets warped and adulterated with every layer in the hierarchy (Inman, Reichl, & Baron, 1993). Not only does the information by itself gets distorted but employees tend to rather not share information upwards in a hierarchy. In regards to this, it does not matter whether the information is a newly emerged idea or the expression of concerns about a decision or any other relevant issue (Kish-Gephart, Detert, Trevino, & Edmondson, 2009). On the one hand, employees fear assessment and possible negative feedback and consequences of their activities. If they fear consequences and rating of the ideas passed on upwards the hierarchy, employees reduce the number of ideas passed on. On the other hand, the number of suggestions is being cut when lacking control over their own environment (Reitzig & Maciejovsky, 2015). In the absence of control over his environment, an employee will not tell his opinion. Centralized decision-making is one suggestion for an organization design aspect, which can make an employee feel a lack of control. This condition may lead to dissatisfaction, loss of motivation, reduction of effort and it is even associated with psychological as well as physiological illness (Morrison & Milliken , 2000; Glass & Singer, 1972; Seligman, 1975; Pennebaker, Burnam, Scheffer, & Harper, 1977). Studies often corroborated this. Tannenbaum et al. as well as later scholars observed that, no matter how many layers of authority are above an employee, the employee was more motivated and was involved with more effort in his work when he felt more in control over his work environment and was included into the decision-making process (Tannenbaum, Kavcic, Rosner, Vianello, & Wieser, 1974; Leavitt, 2005). Information elaboration is a central concern when talking about team effectiveness in team decision making and design tasks (Homan, et al., 2008).

But not only does less information gets spread upwards, when information is shared upwards by employees, the superiors tend to be too confident in their own opinion that it is less likely that the new information will be considered (Brinol, Petty, Valle, Rucker, & Becerra, 2007).

Notwithstanding, vertical authority lines with regards to routine tasks are said to facilitate the transfer of needed knowledge, orders, and instructions from the management to the executing people (Adler, 2001).

2.3. Lateral Authority

In the 1920ies, Mary Parker Follett already wrote about how authority should not be dependent on one's status in regard to hierarchy. According to her, authority should be settled at the level of tasks where expert knowledge is concentrated instead of linked to the rank in a hierarchy (Metcalf & Urwick, 2003). Also, other scholars like Miles and Snow (1986), Powell (1990), and Daft and Lewin (1993) mention that collaborative labor outcomes depend more on flat and horizontal hierarchy than on steep and vertical modes of hierarchy in terms of project work. For project work, which is rather a horizontal form of organizing, organizational boundaries are often expended by collaborations of individuals belonging to different organizations. In this case, there is a need for horizontal authority in order to coordinate the collaboration. In particular, this can be observed in information as well as knowledge-intensive sectors and is also relevant in matrix organizations where functional and divisional managers coexist (Dahlander & O'Mahony, 2001; Adler, 2001; Galbraith, 1977). This type of task-based authority is called lateral authority. Lateral authority, therefore, is the right to make decisions about project-related tasks but not about sanctioning any other project member or person. Expertise plays a crucial role in terms of who gets the right to make task-related decisions or, put differently, who gets lateral authority. Dahlander and O'Mahony examined this question in their paper "Progressing to the Center: Coordinating Project Work" (2011). They investigated user behavior of an open source software project. These projects are known to be operating without managerial authority as well as to be managed collectively by all the participating users. The likelihood of gaining lateral authority in this environment rises with the amount of technical contributions, i.e., code, a user contributes. Further, an individual who takes part in technical discussions and therefore is willing to share his knowledge also gains lateral authority more likely. The third reason to gain lateral authority is to participate in coordination work (Dahlander & O'Mahony, 2001).

Having only the power over tasks rather than other employees will also avoid the possibility of treating others in a rude and uncivil way. A study by Pearson and Porath (1999) shows that impolite and disrespectful behavior is more likely to be practiced by people with higher ranks in an organization compared to the others (Pearson & Porath, 1999). Further, superordinates tend to irritate and pick on others more often and more rudely (Keltner, Capps, Kring, Young, & Heerey, 2001). Working in a horizontal setup, conflicts are initially resolved in a peer-to-peer manner within the setup and without relying on a superior (Forte, Larco, & Bruckman, 2009). In situations where debates and conflicts cannot be resolved by the peers, and self-coordination fails, lateral authority is exercised (Dahlander & O'Mahony, 2001).

In the light of this thesis, it is worth mentioning that Lee and Puranam (2015) investigated whether there exist differences of experts and novices in the process of designing, as well as redesigning, an organization. They found out that in re-organization problems, experts tend to be less prone to fall into the trap of partition focus, which is the disproportionate effort on division of labor tasks - task division and task allocation - as compared to solutions for the integration of effort. Further, experts are more likely to use analogies of past experiences as well as to invest more time in the visual representation of the problem to come to a solution for the current problem. This implies that solutions of experts are supposed to be better adjusted than the solutions of novices. Lee and Puranam (2015) come to the conclusion that a difference between experts and novices concerning organizational re-design exists. However, they found no evidence of a difference in the approaches of beginners and experts in matters of first-time organization design (Lee & Puranam, 2015).

2.4. Self-Organizing Teams

Since the formation of the first self-organizing teams, the numbers of self-managing teams in organizations rose quickly. In the late 1990s, already more than 70% of firms had self-directed teams installed (Lazear & Shaw, 2007). As a consequence, the organizational setup of software companies, in particular, changed a lot. Nowadays, software development is typically organized in an agile way, meaning that the teams self-organize their work and workload based on skills and needs as well as engage in team decision-making. Prominent examples of today’s widely used agile and self-managing

methods are Scrum, eXtreme Programming (XP), or Dynamic Software Development Method (DSDM) (Highsmith, 2004).

A self-managing or self-organizing team is a group of people with a set of diverse skills and expertise, that share the autonomy as well as the liability to take care of a project's planning, managing and also the interdependent execution of tasks to reach a common goal (de Jong, de Ruyter, & Lemmink, 2004; Guzzo & Dickson, 1996). Self-management, thus, is the autonomous decision making within the team with regards to the aspired output as well as with regards to how the approach to realize these outputs is managed and organized (Molleman, 2000). Members of these self-managed work teams, therefore, are taking responsibility for the quality of their work and product and, at the same time, share management functions (O'Connell, Doverspike, & Cober, 2002). Morgan (1998) indicates that a self-organizing team has a certain degree of autonomy, is willing to work cross-functionally, and is also willing to improve itself continuously. Further, he mentioned that self-organization needs its space to evolve. The management shall only provide a "minimal critical specification" of what is expected, and the group itself gets as much autonomy as needed to organize task execution. He also states that the possibility to work in a self-managed team is dependent on the task and process variety, meaning that self-managed teams make a better fit with new, non-routine tasks (Morgan, 1998). Self-managing groups tend to perform better when tasks have specific characteristics. If tasks contain a high degree of uncertainty (Cordery, et al., 2010), novelty (Haas, 2010), interdependence (Wageman, 2001), new technology, innovativeness (Patanakul, Chen, & Lynn, 2012) and only a low degree of routineness (Rousseau & Aube, 2010), a self-managing team performs more efficient. Additionally, performance is also said to be better when the tasks have increased levels of identity as well as significance, variety, and autonomy (Cohen & Ledford, 1994). Also, the composition of the team in terms of skill variety is important as well as the ability and willingness to learn from the other team members in order to be able to have free resources to create innovations (Morgan, 1998).

In the context of the rise of technology implementation in organizational forms, organizations have to be confident of self-managed virtual teams to reach the organizational goals. Virtual teams, due to the circumstance of geographical or organizational dispersion, collaborate virtually using information

technology also to reach a particular goal (Maznevski & Chudoba, 2000). Put differently, a virtual team, according to Lipmack and Stamps (1997), is *"a group of people who interact through interdependent tasks guided by common purpose"*, which works *"across space, time, and organizational boundaries with links strengthened by webs of communication technologies"* (Lipmack & Stamps, 1997).

Wageman (2001), based on Hackman's conceptual framework of work-team effectiveness, summarizes research on structural and contextual features which promote team effectiveness:

1. A real team: A team has to be clearly defined with boundaries and defined, preferably longtime members, to ensure the collective behavior of the members. The team combination is the most important of these four conditions (Hackman, 1987).
2. A clear goal: The purpose or objective of the team has to be clearly defined (Cohen & Ledford, 1994).
3. A supporting team structure: The structure of the team has to be of appropriate size. Only members who are necessary to complete the tasks should contribute (e.g. Hackman & Vidmar, 1970). Team members should have heterogeneous skills and tasks should be interdependent (Campion, Medsker, & Higgs, 1993; Wageman, 1995). Also, tasks should be challenging (Saavedra, Earley, & Van Dyne, 1993), and there should be communicated strategy norms to enable and support the team's organizing and planning (Hackman, Brousseau, & Weiss, 1976).
4. A supportive organization: A supportive organization provides an appropriate reward system (Cohen & Ledford, 1994), an information system providing necessary information for task planning and completion as well as a system to provide extra knowledge or the possibility to access technical support in case of lack of knowledge (Hackman, 1987).

Further, she proved that these collective conditions regarding the design of a team have a positive effect on the effectiveness of a self-managing team. In this context, most effects are due to clear goals, task interdependence, and group rewards (Wageman, 2001). Clear and cooperative goals, therefore, lead to better team performance, better decision-making, and more confidence of the team members (Alper, Tjosvold, & Law, 1998). In addition, goal orientations are also said to guide behavior and emotions (Vandewalle & Cummings, 1997). Also, one superior team goal fosters the team spirit and minimizes

the risk of the creation of contractive subgroups within the team (Rico, Sanchez-Manzanares, Antino, & Lau, 2012). Apart from the importance of a clear goal, rules, clear guidelines, and instructions to action, such as specific protocols or tools, are said to be crucial for self-managing teams. These tools or protocols provide directives to facilitate the self-managing teams to be efficient in identifying necessary colleagues and resources, collective problem-solving, knowledge sharing as well as distributing rewards (Benkler, 2002; Heckscher & Adler, 2006; Fjeldstad, Snow, Miles, & Lettl, 2012).

Another completely independent and special form of self-management in teams depicts open source software development (OSSD). There, no organizational boundaries in the form of a traditional company are given. Theoretically, everybody can join these development teams. In OSSD, there is one initiator of a project who states his problem or goal. The rest is undefined. There are no financial rewards offered. Participation is completely voluntary and intrinsically motivated. Nevertheless, famous examples like Linux OS or Apache prove the efficiency of self-managing teams (von Hippel & von Krogh, 2003; Shah, 2006).

2.5. Organizations

Organizations are everywhere. All different kinds of associations, schools, clubs, companies, hospitals, states, communities, teams, etc. are organizations. So, what defines an organization? In the past, a lot of theorizing about the system of organizations was made, and all of the various suggestions offer some similarities which Puranam, Alexy and Reitzig summarized in their Paper "What's "New" About New Forms of Organizing?" (2014). An organization, therefore, is a

"1) multi-agent system with 2) identifiable boundaries and 3) system-level goals (purpose) towards which 4) the constituent agent's efforts are expected to make a contribution" (Puranam, Alexy, & Reitzig, 2014). (For comparison see e.g., Burton & Obel, 1984; March & Simon, 1958; Scott, 2003)

In other and oversimplified words, an organization consists of at least two individuals who are members of a confined system, with existing rules for entry and exit, who chase a certain goal, and the actions of the members help towards reaching this goal. The overall organization's goals and the single agent's goal must not be the same, but the single agent's effort has to contribute to reaching the organization's goal (Puranam, Alexy, & Reitzig, 2014). A large organization, like a big company, therefore can be a

composition of many smaller organizations, like divisions, where divisions, in turn, can again be composed of smaller organizations like departments or teams and so forth (Puranam, 2018; Puranam, Alexy, & Reitzig, 2014).

2.5.1. Organization Design

Since the first underlying theories about organizational design were published, a lot has changed, and the existing theories only explain current forms of organizing to a small share (Puranam, Alexy, & Reitzig, 2014).

2.5.2. The Universal Problems of Organizing

To be effective as an organization, two problems were identified which have to be faced and somehow solved. On the one hand, there has to be a division of what has to be done to reach the overall organization's goal. This is called the division of labor. On the other hand, the service provision, in terms of agents putting effort into generating output with completing the tasks to reach the organization's goal, has to be compensated. Scholars call this integration of effort. These two problems, division of labor and integration of effort, are known as the universal problems of organizing (Mintzberg, 1979; Burton & Obel, 1984; March & Simon, 1958; Lawrence & Lorsch, 1967).

2.5.2.1. Division of Labor

The existence of a condition where organizational goals are mapped to tasks and subtasks, which are again distributed among individual agents, is called division of labor (von Hippel, 1990). This mapping may be designed or not (Puranam, 2018). Von Hippel, in his in 1990 published working paper with the title "Task Partitioning: An Innovation Process Variable", describes that an innovation project, what size it may have, is divided into tasks and subtasks, which then are distributed among agents, individuals or even suppliers. Put simply, the division of labor is about the questions "What tasks have to be done?" and "Who does which tasks?" (von Hippel, 1990). Specialized roles and responsibilities constitute two possible solutions to these questions (Puranam, When will we stop studying innovations in organizing, and start creating them?, 2017). The most famous example of specialization is Adam Smith's Pin Factory example in his work "The Wealth of Nations". There he states that the output of pins can be raised when one agent does not execute all the needed tasks to produce one pin, but every single step is

assigned to just one agent, and it takes every agent involved to create one pin. The agents, therefore, get used to and trained in executing their tasks so that the overall efficiency increases (Smith, 1776). The division of labor and its two underlying questions have to be answered carefully considering the motivation of the employee. According to Hackman and Oldham (1976), a job has to have three characteristics: skill variety, task identity, task significance to enhance the employee's motivation. Skill variety is a mix of tasks that need different skills to be executed. Task identity relates to the integrity of the tasks meaning that in the end, the employee has a recognizable finished product, and task significance refers to the meaning of the task in a way that the final product has a significant impact on the work or life of another individual. Besides that, Hackman and Oldham further mention that there also needs to be a certain amount of job autonomy and feedback regarding the work done to enhance a worker's motivation (Hackman & Oldham, 1976).

Puranam, Alexy, and Reitzig (2014) further split the division of labor into two sub-problems. The division of labor, therefore, contains task division and task allocation (Puranam, Alexy, & Reitzig, 2014).

2.5.2.2. Integration of Effort

The integration of effort is necessary for the agents to be able and willing to complete the tasks assigned to them. To make sure an agent knows everything he needs to know to be able to execute his assigned tasks and is motivated to work on these tasks, to get closer to reaching the organization's goal, are the main issues of integration of effort. These are called cooperation and coordination problems (Lawrence & Lorsch, 1967; Gulati, Lawrence, & Puranam, 2005). The cooperation problem refers to the circumstance where an agent needs the motivation to cooperate with another agent. This motivation might be of monetary nature but must not necessarily be of monetary nature. Therefore, examples to help coordinate action and realize collaboration might be extrinsic or intrinsic motivators like rewards, incentives, and sanctions. The coordination problem relates to the situation of incomplete information about task interdependences of the performing agent to other agents (March & Simon, 1958; Gulati, Lawrence, & Puranam, 2005). If the agent's expectations, as well as intended actions, are shared among each other, complications while planning the next tasks can be reduced (Malmgren, 1961). Puranam,

Alexy, and Reitzig (2014), further divide the integration of effort into two subproblems. They call these two conditions reward distribution and information provision (Puranam, Alexy, & Reitzig, 2014).

2.5.3. Four Fundamental Problems of Organizing

With regards to the growing recognition that, in the past decades, organizations drastically changed and previous theories about organizational design no longer fit the present-day forms of organizing, Puranam, Alexy, and Reitzig have addressed this topic. They further divide the two, already mentioned, universal problems of organizing, division of labor, and integration of effort, into four fundamental problems of organizing, arguing that every organization has to find a solution to each of these four problems to be effective. A new form of organizing exists if at least one of the four problems is solved in a novel way compared to a competitor. To give a prominent example: Wikipedia managed to outperform Encyclopedia Britannica by solving a part of the four fundamental problems in a different way. The Encyclopedia Britannica is an organization with heavily centralized decision power that reminds of a traditional business firm. A salaried team of experts works on a daily basis to gather information, check for authenticity and truth, and finally present the information. These tasks get assigned to them by their superordinate editorial team, which centrally makes the final decision about a publication. In contrast, Wikipedia is an open platform where everybody can get registered and contribute to a topic of interest. Contributions and efforts are not monetarily compensated. Wikipedia, thus, operates completely decentralized (Puranam, Alexy, & Reitzig, 2014).

2.5.3.1. Task Division

Task division or task partitioning, as von Hippel (1990) called it, is a procedure where an organization's goal or a specific project is disaggregated into several tasks and tentatively subtasks. If all the related tasks and subtasks were added together, the sum of all tasks would account for the entire project, assuming that the overall goal or project is well understood and known. This is accompanied by the knowledge of each task's inputs and outputs, which in turn gives the possibility to map the tasks with regards to the sequence of handling (von Hippel, 1990).

2.5.3.2. Task Allocation

Task Allocation represents the second part of the division of labor and answers the question of "Who does what?". In other words, the tasks defined by means of task division getting assigned to agents. The assignment of tasks to agents may be assigned by hierarchically superiors or via self-selection of the involved agents (Simon, 1951; Shah, 2006). Beyond that, the mapping of the tasks to agents may be influenced by the nature of the task itself. A specific recurring task could be of a more preferable outcome, if the same agent would perform the task perpetually because of learning effects, e.g., specialization (Smith, 1776). Also, other economic determining factors can affect the decision about task allocation. One example may be to minimize task, and hence, agent interdependencies (Hackman & Oldham, 1976; Simon, 1973).

2.5.3.3. The Provision of Rewards

This fundamental problem deals with the mapping of rewards to the agents in return for completing, respectively, executing tasks allocated to them, and making sure the agent will keep on performing tasks that were assigned to him. Simon (1951), mentions that employees are "persons who contract to exchange their services for a wage" (Simon, 1951). This refers to the above-mentioned cooperation problem (Lawrence & Lorsch, 1967).

2.5.3.4. The Provision of Information

To execute defined tasks that were allocated to the agent, he should not only get a trade-off, he should also know what to do and when to do. In other words, the agent needs to know whether and, if yes, where there exist any interdependencies to other tasks or agents. The better the executing agent is informed about the task environment, the better the coordination of the agents and the more favorable the outcome (Puranam, Alexy, & Reitzig, 2014; Lawrence & Lorsch, 1967; Gulati, Lawrence, & Puranam, 2005).

2.5.4. Smart Team Architecture - Seven-Step Approach

Based on the insights of Puranam, Alexy, and Reitzig (2014) as well as Lee and Puranam (2015), the following seven-step approach was derived to foster collaboration within smart team architectures. The seven steps are:

Step 1: Define objectives

In the first step, the final objectives should be defined. If relevant, deadlines can be implicated in this case. Further, the objectives shall be broken down into a set of tasks, including the task sequence in which they must be performed to achieve the goal. To accomplish this step, process diagrams, value chains, classical timelines, and the like can be used.

Step 2: Who does what (& by when)

This step is about creating roles and distributing the tasks identified in step 1 across the roles. The goal of this step is to have a set of roles that are not yet assigned to team members and do not yet represent a specific person. It is expected to have an ideal type of roles defined.

Step 3: Who talks to whom

In the third step, it should be specified which other roles each role holder needs to inform, ask for permission, and where interdependencies with tasks of other role holders are.

Step 4: Who gets what

It gets declared what each role holder gets in terms of rewards when each role holder will be rewarded, and what kind of rewards each role holder gets.

Step 5: Managing exceptions

At this step, a solution for managing disputes and arguments has to be found. The escalation process, as well as its outcome, has to be documented.

Step 6: Admit team members

This step is about assigning team members to the roles. The team members either self-select into the defined roles or are assigned to take a particular role. This may have an impact on the skill-task match as well as task completion.

Step 7: Review together and initiate

In the last step, all the decisions made in the previous six steps are reviewed, analyzed, and refined if necessary.

(Puranam, Alexy, & Reitzig, 2019)

3. Experimental Setup

In this section of the thesis, first, the model, the underlying hypothesis, and the used methodology will be described. Then, the applied treatment, the exercise itself, as well as the scoring system, will be further illustrated.

3.1. Model and Hypothesis

With regards to the insights of the paper "What's new about new forms of organizing?" by Puranam, Alexy, and Reitzig (2014) and Puranam and Lee's (2015) paper about organizational design decisions made by experts vs. novices, the above mentioned seven-step approach was created. Further, considering the effects of hierarchy on decision-making and coordination, and motivation, the concept of lateral hierarchy as well as how critical clear goals and guidelines for self-managing teams and communities are to be able to solve problems collectively, share knowledge and distribute rewards, the following hypothesis is assumed:

Hypothesis 1: Groups that apply the Smart Team Architecture approach prior to task completion, perform better, than teams without the Smart Team Architecture approach application.

Therefore, the independent variable is represented by the Smart Team Architecture approach, and consequently, the resulting team performance is the dependent variable.

Beyond that, part of this thesis is to observe the experimental groups while completion to answer the second part of the research question that is "How can a flat collaboration be fostered?". Additionally, the applicability of the directory is monitored. The goal was to find out whether the instructions are easy to understand and whether the scope of each step is realizable. Also, it was observed which problems arise, at which step they occur and whether there is a need for additional information or explanation. It was also of interest what step consumes most of the time and what step was the easiest to handle by the teams.

3.2. Methodology

To test the working hypothesis, an experiment was conducted. The teams, both treatment and control groups, had to complete a furnishing exercise. The treatment groups had to complete the Smart Team Architecture approach to structure their execution before working on the core task. To answer the explorative component of this thesis, each of the treatment groups was led through the structuring process and monitored during conduct.

3.2.1. Overview

To answer the research question of this thesis, the seven steps derived by Puranam, Alexy, and Reitzig (2019) were reduced and simplified to a five-step approach to match the circumstances of the nature of the chosen experiment. Goal setting and information provision appeared to be obsolete in a task in which all of the participants are working on the same predetermined exercise with a given objective at the same place and time. The five steps are as followed:

Step 1: Task definition

Step 2: Sequence of tasks

Step 3: Role definition

Step 4: Reward distribution

Step 5: Role allocation

The participants were asked to participate in a one-hour experiment where the major exercise was to plan and furnish an office for ten people. Yet, the treatment group first had to complete the directive with the five previously mentioned steps to structure the subsequent proceeding of the exercise. After working through these five steps, the treatment group had to complete the furnishing task as they had defined and structured it beforehand. In order to meet the time goal of one hour, the completion of the furnishing exercise had to be completed in the remaining time.

In contrast to that, the control group's only task was to furnish and plan the office. The time frame for completion for the control groups also amounted to be 60 minutes. The experiments were conducted in German.

3.2.2. Treatment

Each of the treatment group members got a set consisting of five pages where the first two make up the description of the furnishing exercise, and the other three pages built the form for the five structuring steps. The groups were guided through the whole structuring process by the moderator. See Appendix for a complete handout.

Step 1- Task division

In the first step, the participants were asked to name all tasks required to complete the furnishing exercise. The goal of this step was to break the project down into single tasks that cannot be further divided into more and smaller tasks in a meaningful way.

Step 2 – Task sequence

During the second step, the team had to define the sequence of the tasks described in step 1. How the groups organized their tasks, speaking of the method used, e.g., process flow diagram etc., was left to them. The goal was to identify tasks that can be performed simultaneously to reduce idle time of group members as well as to identify interdependencies between tasks.

Step 3 – Role definition

In the third step, roles had to be defined. The goal of this step was to distribute the identified tasks of step 1 across the roles. All tasks had to be allocated to at least one role, but one role can consist of a couple of tasks. One role can hold tasks of a similar nature or tasks with dependence so that one task has to be finished before starting to work on the next task.

Step 4 – Reward distribution

This step was about distributing rewards. A fictional reward of 100% had to be distributed on all roles. There was no further explanation, and it was not defined what kind of reward this is. Participants had to find a solution that distributed 100% of the rewards while the shares did not have to be equal. They could, for example, make their decision based on the number of tasks per role or an estimate of difficulty or effort of the tasks.

Step 5 – Role assignment

In the last step, before working on the furnishing exercise, the team members had to be admitted to the roles defined in step 3. Based on the role the team members were admitted to, they started working on the predefined tasks for this specific role.

Eventually, each team had to have one solution for every step. A decision could only be made with the consent of at least 51% of the group. Consequently, in the case of teams of four, at least three team members had to agree to make a decision.

These steps only applied to treatment groups.

The control groups only got the two-pages for the furnishing exercise and did not receive any further treatment.

3.2.3. Furnishing Exercise

The exercise consists of a combination of different tasks demanded for completion. On the one hand, there was a list of furnishings and electric devices that had to be looked up on the internet. Also, some additional features regarding some products and the overall objective were demanded. The required products were:

- A high-performance office-printer with at least a scan and copy feature
- A coffee machine
- Two wardrobe stands
- A refrigerator
- A microwave
- Ten desks with a minimum dimension of 160 cm x 80 cm
- Ten roller containers
- Ten office chairs
- Two filing cabinets
- A conference table with six chairs

Besides, the team was asked to find the following products:

- Ten footrests
- A fire distinguisher
- A first-aid kit
- Plants
- Paintings or posters
- An umbrella stand
- Ten paper bins
- A small coffee table with four chairs

To find the products, they had to use the internet and fill in the product name, the name of the online shop, the link, and the price in a list handed out to them. For the list, see Appendix.

The teams got bonus points for choosing office desks, which are adjustable height and office chairs, which are ergonomically designed. Further bonus points were given when the interior matched in style and color.

On the other hand, the groups got the outlines of the office space where they had to place and draw all of the furnishing, electric devices, decorations, and other necessary products in the office space. Find office space outlines in the appendix.

Furthermore, there were some additional requirements which had to be met. A kitchen, as well as a conference room, had to be positioned and drawn into the floor plan. These two rooms had to be separated by walls from the employee's work station. Additionally, every employee needed to have at least two square meters of free floor area at his workstation. Furthermore, the desks had to be positioned in a way that no employee had to sit to a window with his back. Also, the workstation of an employee was only allowed to be 23 steps away from the printer with one step accounting for 60 cm. These requirements, to some extent, were derived from provisions of the Austrian Health and Safety at Work Act.

Lastly, each team had a fictitious budget of € 10.000,00 to complete the furnishing exercise.

After completion of the exercise or expiration of time, each participant had to fill out a short questionnaire to gather some demographic information. All of the participants were asked to disclose age, gender, and profession. Additionally, if they were in a control group, they had to answer the question of whether their team had structured and organized the exercise prior to completion and, if yes, how. Additionally, participants were asked if they would consider a specific approach regarding the structuring of an exercise reasonable. As a participant of a treatment group, they were asked for feedback regarding the structuring approach. See Appendix for demographic questionnaires.

3.2.4. Participants

In total, 120 volunteers participated successfully in the experiment and were gathered into 15 treatment groups and 15 control groups. Consequently, each group consisted of four individuals. All participants were asked to perform the same task except for the difference in the precedent structuring form. The treatment groups got a package of five pages consisting of the two-page description of the furnishing exercise and three sheets to complete the five steps. The control group's procedure documentation was made up of the two-page description of the furnishing exercise only. Both treatment and control groups, obtained the outlines of the office space as well as a list to fill in their chosen products.

Moreover, each team was equipped with at least one private laptop and the own smartphones. Beyond that, the participants were provided with all of the equipment, e.g., measuring tools, pencils, erasers, etc., to conduct the experiment. The volunteers received no financial incentives. However, snacks and drinks were provided for the duration of the experiment. Most of the participants were friends and acquaintances. The results of five groups were excluded due to failure and were not considered in the analysis.

3.2.5. Scoring System

A scoring system was invented to make sure the performance of the control and treatment groups can be measured objectively. For each item found, correctly entered in the list, and positioned on the office space outlines, the team got a point. This applied to all the products and features demanded. Besides that, if a team bought more than one plant or more than one painting, they would get two points for the corresponding category. If the team only had one plant or painting, they would get one point. In detail,

the teams had the possibility to gather 10 points for the necessary products and 13 for the additional items and features. The overall amount of possible points, therefore, was 23. Furthermore, also the price of the chosen products was taken into account for the statistical analysis.

4. Results

This part of the thesis describes the results of the study conducted. First, the findings of the explorative study will be presented, followed by the results of the statistical analysis. To finish this chapter, an insight into the demographics of the participants will be given.

4.1. Explorative Study

Whilst completion, the treatment groups have been observed. The goal was to find out whether the structure of the approach turns out to be helpful, easy to understand, as well as easy to handle, and allover reasonable. Raison d'être was to see at what step problems arose, and whether there was a need for more explanation.

Step 1 – Task division

To complete this step, a lot more information, in comparison to the other steps, was required. The first groups did just get a short description of what was expected from them at this step. The outcome was not what was initially expected from them to do at this step. They solely divided the task into room planning, budget, looking for products, and placing products. Thus, after observing that this was too little information to understand the scope of this step, the participants were provided with an additional example. The example was: "Imagine you want to book a trip to Spain online. You want to go by airplane, live in a hotel, be transferred to the accommodation and have a rental car to get around and do some sightseeing or visit any kind of event or attraction. In order to book the whole trip you may first have to fix a date for the trip with all fellow travelers, look for flights, look for an accommodation, decide on a flight, decide on accommodation, book a flight, book an accommodation, look for possibilities of transfer, decide on a transfer, book a transfer, look for car rental, rent a car, look for events,... These tasks may be further divided into subtasks or lead to other tasks, for example, to take out travel insurance."

This communicated a clear image of what the participants were expected to do. All of the groups who got the additional example came up with more finely granular solutions to this step. Generally, the solutions were of great variety. For example, two groups even defined tasks to decide on the interior style of the office. Furthermore, the step regarding information provision was taken out of the directive.

Nevertheless, three teams defined tasks for coordination talks. The goal of this coordination talk task was to get updated and, if necessary, ask for support in making a decision. The majority of the teams defined the following analogously summarized tasks:

- Divide room/draw walls for kitchen and meeting room
- Place desks
- Place chairs
- Place footrests
- Place roller containers
- Place printer
- Check for additional requirements ($2m^2$ free floor space, no window in the back, steps to the printer)
- Place kitchenette
- Place decorations (add-on products)
- Look for fridge, add to list
- Look for height-adjustable desks, add to list
- Look for ergonomic chairs, add to list
- Look for footrests, add to list
- Look for wardrobe stands, add to list
- Look for decorations, add to list
- Monitor Budget

Some of the teams, though, came up with a hybrid solution of the two above mentioned. The solution, for example, looked like: research for furniture, research for electronic devices, research for add-on products, plan the kitchen and meeting room, place furniture, place electronic devices, place add-on products, check the budget and add details of chosen products to the list. The clear definition of what is furniture, what is an electronic device, and what is an add-on product was discussed beforehand as well as which of the add-on products are the most important ones and which are the least important. Some groups nevertheless did not individually consider each product of the add-on category or also called

decorations, in their task division. There was just the task called decorations. The groups did not plan this in detail since they first thought that they would maybe not have enough time to execute the tasks regarding decorations after finishing the more critical tasks concerning the furniture and electric devices.

Task definition always took most of the time, whereas reward distribution was the step finished the fastest.

In contrast to that, control groups in most of the cases just split up the team in two sub-teams where one was drawing and placing the products, and the other was looking for products online and filling out the product list. It was observed that most of the teams worked in a completely chaotic setup since most of the time, they just started working on the tasks without further discussing how to proceed as a team. Especially the two team members looking for the products online consequently had a lot of redundancy by not further dividing their tasks and at least defining who looks up which products. They often looked for the same products, which resulted in a waste of time and a situation characterized by stress and confusion.

Step 2 – Task sequence

Most groups decided on starting the exercise with the most significant tasks, respectively, with the tasks where there was a need for coordination and communication. Characteristically, this was the task of drawing the walls for the kitchen and the meeting room. Participants responsible for this step always checked with the rest of the team to make sure every team member is consent with the decision of where the rooms will be. In the meantime, the research for the products started as well and was executed simultaneously to the division of the room. The division of the room into three rooms was followed by the placement of the desks. Since there were the most constraints given regarding the desks and as they need most of the space, the arrangement of this very desks in the office was the second task executed by the majority of the teams. Though, two groups started with placing the desks before drawing the walls for the kitchen and conference room. The task concerning the desks was often followed by the positioning of the printer because there was another specification about where the printer may be placed. In almost every case, the last task was to place the decorations like the plants and the paintings. This was due to the fact that most of the teams decided on starting to look for more space-consuming products

like desks, chairs, printer, etc. and finished with the least important and smallest products. The movement of these tasks, of positioning the small products to the end, was being made to make sure that these products really were inserted in the product list. Hence, they wanted to avoid having products drawn on the outlines of the office without owning them.

The majority of the groups checked continuously for the budget by calculating the sum after a product was added to the list. Hence, the tasks of searching for items, adding items to the list, and monitoring the budget were executed in a parallel manner. Some groups decided to calculate the sum only after they added the more expensive products like the desks, chairs, printer, refrigerator, or meeting table with chairs. When most of the important products were added, they checked how much budget is left for the less essential products like paintings, plants, and paper bins.

There was a constant exchange of information between the participants while working on different tasks. Nevertheless, some of the teams defined communication and coordination tasks, which they scheduled at specific points in time and also accordingly completed.

To solve this step of the directive, most groups used value chains. Some teams used standard timelines, whereas four groups just decided to number the tasks consecutively.

Control groups started to work on the task right away without organizing their approach or dividing the tasks. Consequently, there was no specific task sequence. The next tasks were always selected by chance after finishing the current task. This procedure, in combination with neglecting to divide tasks properly, caused the troubles of executing the same tasks twice, resulting in a lack of time to complete the exercise.

Step 3 - Role definition

Defining roles apart from the present team members was a step where some extra explanation had to be provided. To differentiate themselves as persons from the roles which had to be defined turned out to be an obstacle for some groups. Five groups completely failed to create roles other than their individuals. They created a set of tasks based on their interests and skills and so immediately created roles based on their personalities and matched their skills to the roles. Even with intervention, these teams still did not manage to define roles differently than their members. They also named the roles

after themselves. The goal, however, was to create independent roles and admit team members to these roles in the last step, which they wholly misunderstood. Hence, they came up with an unfitting solution for the experiment. Two other groups came up with an imperfect solution. They ended up with a mixed solution to this step where the tasks and roles were defined independently, but they skipped step four and assigned the tasks right away to their team members. This was a violation of the underlying order of the steps of the approach.

Basically, roles were defined in a way that either chronological tasks for similar products were bundled up to represent one role or that similar tasks were combined. An example of this is that one role was called “Furniture Officer”. All the tasks regarding research, decision-making, and adding these products to the product list were assigned to this role. In this case, all the linked tasks were summed up to one task-package. But there would also be the definition of just looking for the products. Interrelated to this role, there was often one role that entered all the products into the list while other roles looked for the products. The process of this combination looked like this: The researchers just handed over the laptop or mobile phone, where the final product was shown with all the necessary data to write this product into the list. This product was then added to the list while the researcher took another laptop or phone and started looking for the next product.

Typically, there was one role called “room planning”. No group did not define this role. The tasks of this role consisted of placing the kitchen and the meeting room and drawing the rest of the furniture, electrical devices, and accessories onto the plan. This role often included the tasks of deciding where to put the products. Nevertheless, some groups created a second room planning role, which tasks were about deciding where the single products are placed in order to make sure all of the additional requirements regarding occupational safety were met. In this case, the other room planning role’s task was to draw onto the office outlines.

Three groups defined a supervisor role. The tasks admitted to that role were to keep an eye on the budget, make sure all of the requirements are met, all of the products are added to the list and drawn into the office outlines. This supervisor role also held the task to make sure the interior matches in style and color.

There was one group that summed up the tasks with regards to the different rooms in the first place. Still, they also created one room planning and drawing role. After finishing the first role set up, they recognized that the effort of the roles was very unequally divided. The meeting room just included a meeting table with six chairs, whereas the office involved a lot more tasks. They came up with a new solution and shifted some of the additional products to the meeting room role as well as to the kitchen role. The final solution looked like the following:

- Room Planning: Plan room (place kitchen and meeting room), draw all the furniture, electric devices, and decorations on the floorplan
- Kitchen: look for the fridge, microwave, coffee machine, small table with four chairs, fire extinguisher, first aid kit; add all the chosen products to the list
- Office: look for height adjustable desks, ergonomic chairs, file cabinets, printer, roller containers; add all the selected products to the list
- Meeting Room: conference table with six chairs, wardrobe stands, footrests, rest of decorations; add all the chosen products to the list

All of the teams defined four roles. Perhaps, this was due to the fact that the teams always consisted of four people.

Some people did not name the roles but gave them just numbers. Nevertheless, the underlying bundles of tasks were created in a favorable way.

Step 4 - Reward distribution

There were no noticeable problems or special observations at this step. None of the teams had issues working out the reward distribution. Some groups needed an extra example of what 100% of reward is since there was no real, absolute amount of a specific kind of reward offered, just 100% of a fictive reward. Except for one team, that provided more to the interior agent, who was responsible for all of the positionings on the office outlines and a matching interior style, all of the remaining teams allocated rewards in equal shares.

Step 5 – Role assignment

There was no observable difference whether the team members self-selected themselves into the roles or if they were assigned to the roles. This was probably due to the fact that for this furnishing exercise, there was no need for special skills and abilities to handle the tasks associated with this exercise. The single tasks were too trivial for it to have an impact on the skill-task match. In addition to that, the participants were all very excited to take part in this experiment, which could be the reason why there was no noticeable effect on motivation if they got assigned to a role or self-selected into a role. The assignment into roles happened to be that there was one person who assigned the roles. Team members did not disagree in this case. The team members did not always know each other well.

To make sure problems arising at step three will not adulterate the results of the study, the mode of execution was rearranged, and the results of the five groups who failed were excluded. For this reason, five additional experiments were conducted to replace the omitted results and have an even number of observations of treatment and control groups**.** After observing that some of the teams had a hard time understanding to differentiate roles from team members at step 3, the mode of working with one group at a particular time was changed to working with at least two collaterally working teams. This concrete visualization of other possible team members working on that project helped the execution. The now used treatment worked as follows: The teams got the same explanation and started working on the five-step approach simultaneously. Steps 1 to 4 were executed in the original way. After completion of step 4, the forms of the two teams were switched. Now the teams admitted the members to the predefined roles of the other team. Ultimately, they had to work on the exercise according to the structure defined initially by the other team. The simultaneously working teams were placed in a way where no possibility was given to see or hear what the other teams defined, talked, respectively, how the other teams structured their exercise.

After the exchange of the directories, the teams read through the definitions. There were no obvious problems at understanding the structuring of the other teams, and they immediately were able to start working on step five and assigning people to the roles.

4.2. Results of Statistical Testing

The working hypothesis, as previously mentioned, is "Groups, that apply the Smart Team Architecture approach prior to task completion, perform better, than teams without Smart Team Architecture approach application." To test this hypothesis, a t-test, as well as a simple linear regression, were conducted. Each of these tests was executed in terms of price difference as well as in terms of total points collected by the team.

4.2.1. T-Test for Price Difference

Figure 1 shows the SPSS Group Statistics output of the performed t-test. Each group is represented with an N of 15. The mean value of the price difference of the treatment groups is € 1356,32. For the control group, the mean of the difference lies at € 990,17. The price difference is the sum of the differences between each product's optimal price and the price of each product of each group.

Group Statistics

	Group	N	Mean	Std. Deviation	Std. Error Mean
Price Difference	treatment group	15	1356,324	1515,9766	391,4235
	control group	15	990,173	1628,8594	420,5697

Figure 1 - Price Difference T-Test Group Statistics

In Figure 2, the output for the Independent Samples Test is displayed. The Levene Test for Equality of the Variances shows a value of 0,500, which means that the variances are equal. The significance value of the T-Test for equality of means is at 0,529. This value, even considered one-tailed, is bigger than the alpha of 0,05, meaning that H0 cannot be rejected and that there is no significant effect.

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Price Difference	Equal variances assumed	,466	,500	,637	28	,529	366,1513	574,5356	-810,7315	1543,0342
	Equal variances not assumed			,637	27,857	,529	366,1513	574,5356	-811,0042	1543,3068

Figure 2 - Price Difference T-Test Independent Samples Test

4.2.2. Simple Linear Regression for Price Difference

Figure 3 shows that the R square is only 0,014, which means that only 1,4% of the model can be explained with the independent variable.

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,120[a]	,014	-,021	1573,4306

a. Predictors: (Constant), Group

b. Dependent Variable: Price Difference

Figure 3 - Price Difference Model Summary

Below, Figure 4 shows the corresponding ANOVA Table. This tells whether the null hypothesis can be rejected or not. To reject the H0, the value of significance in the last column has to be below 0,05. The value in this statistical analysis is 0,529, depicting that H0 cannot be rejected. In other words, it has no impact on the price difference if a group is a treatment group or a control group.

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1005500,992	1	1005500,992	,406	,529[b]
	Residual	69319149,29	28	2475683,903		
	Total	70324650,28	29			

a. Dependent Variable: Price Difference

b. Predictors: (Constant), Group

Figure 4 - Price Difference ANOVA Table

Figure 5 again shows that in terms of price difference, there is no significant result. The value of t in the second line would state that there is an effect of the group if the corresponding value is different than zero. In this case, the value of t is 0,637, meaning that there is no real effect. Also, the significance level again is larger than 0,05. These two values in combination predicate that there is no significant effect of

the five-step approach application on the price difference. A one-tailed contemplation would not make a difference in this outcome.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	990,173	406,258		2,437	,021
	Group	366,151	574,536	,120	,637	,529

a. Dependent Variable: Price Difference

Figure 5 - Price Difference Coefficients

4.2.3. T-Test for Total Points

In Figure 6 the Group Statistics of the T-Test for total points collected can be seen. Again, with a total N of 30. The mean of the points collected for the treatment groups is 22,07, and for the control groups, it is 20,00.

Group Statistics

	Group	N	Mean	Std. Deviation	Std. Error Mean
Total Points	treatment group	15	22,07	1,100	,284
	control group	15	20,00	2,646	,683

Figure 6 - Total Points T-Test Group Statistics

Figure 7 states the results of the Independent Samples Test. Variances are not equal in this case because the significance value of the Levene's Test for Equality of variances has a value of 0,005 which does not allow to reject the H0 of the Levene Test. In this case, the second line of the output has to be considered for interpretation. The significance value of 0,012 has to be divided by two to be one-tailed. The one-tailed value is used because the tested hypothesis assumes a particular outcome. The significance value now is 0,006. The null hypothesis can be rejected, meaning that there is an effect of groups on total points collected.

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Total Points	Equal variances assumed	9,482	,005	2,794	28	,009	2,067	,740	,551	3,582
	Equal variances not assumed			2,794	18,698	,012	2,067	,740	,517	3,617

Figure 7 - Total Points T-Test Independent Samples Test

4.2.4. Simple Linear Regression for Total Points

Figure 8 states the ratio of the statistical model that can be described through group membership. The r square value describes this implied circumstance. In this context, 21,8% of the underlying model can be explained.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,467[a]	,218	,190	2,026

a. Predictors: (Constant), Group

Figure 8 - Total Points Model Summary

Furthermore, Figure 9 represents the associated ANOVA output. The null hypothesis can be rejected as the significance level is 0,009. The group membership, therefore, affects the total points collected.

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	32,033	1	32,033	7,804	,009[b]
	Residual	114,933	28	4,105		
	Total	146,967	29			

a. Dependent Variable: Total Points

b. Predictors: (Constant), Group

Figure 9 - Total Points ANOVA Table

The coefficients table (Figure 10) also indicates a significant result. The value t states 2,794, which is a value different than zero, meaning that an effect exists. Considering the significance value of 0,009, it indicates that the existing effect is significant.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	20,000	,523		38,232	,000
	Group	2,067	,740	,467	2,794	,009

a. Dependent Variable: Total Points

Figure 10 - Total Points Coefficients

4.3. Demographics

This section illustrates the demographic data of all of the participants. It gives a closer insight into the three categories gender, age, and profession.

4.3.1. Gender

Of all the participants, 67 were male, and 53 were female, resulting in a ratio of 55,83 % of men and 44,17% of women for all of the participants (Figure 11).

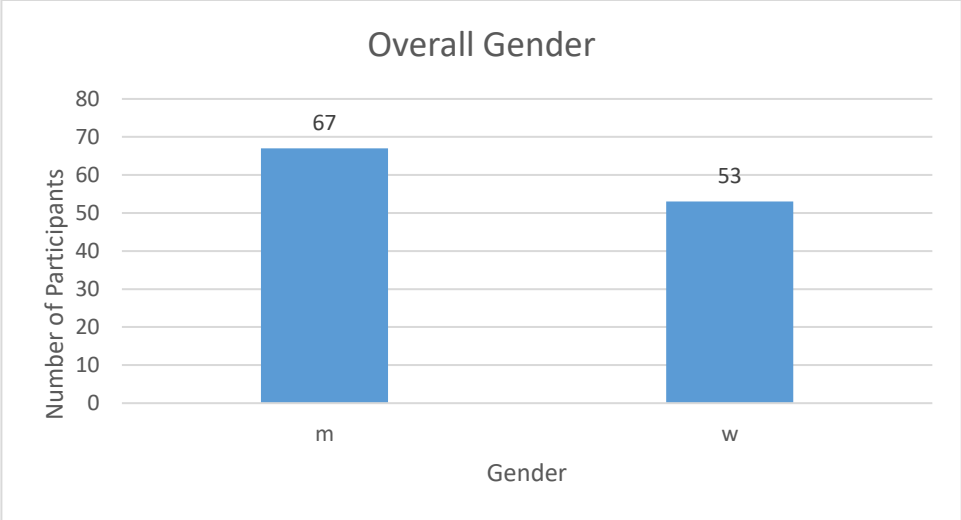


Figure 11 - Overall Gender

The distribution of genders in Treatment Groups can be seen in Figure 12. In total, 33 male participants and 27 female participants took part in the experiment.

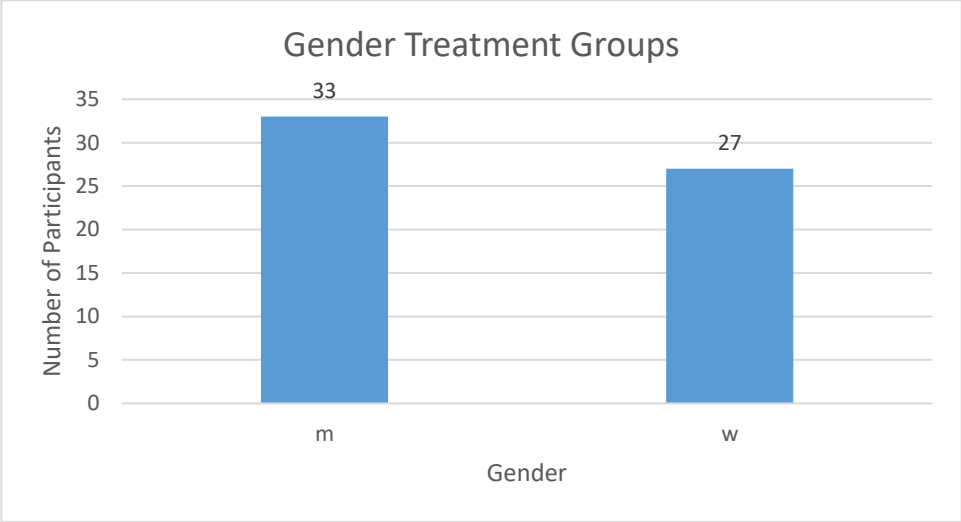


Figure 12 - Gender Distribution Treatment Groups

Figure 13 shows a 56,67% male participation and 43,33% female participation regarding the control groups. In absolute numbers, these are 34 male and 26 female participants who were taking part in the conducted experiment.

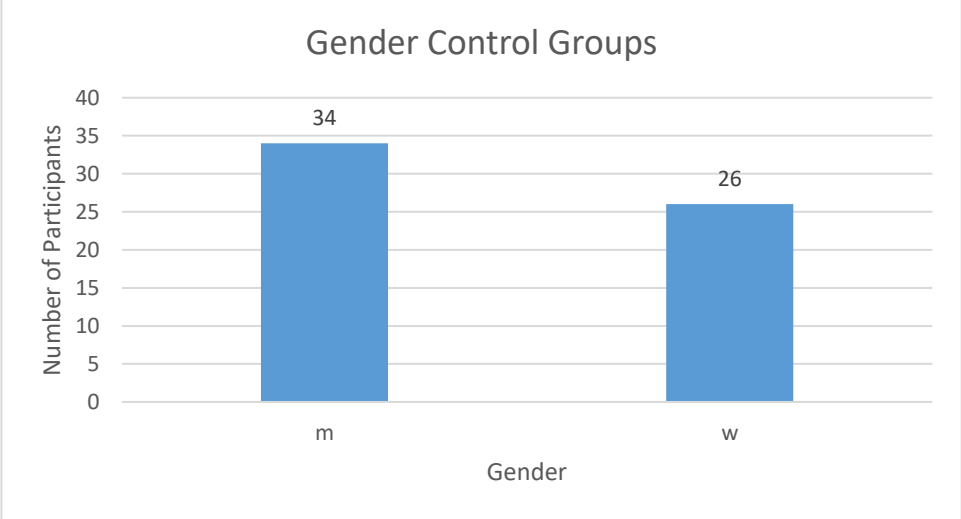


Figure 13 - Gender Distribution Control Groups

4.3.2. Age

Figure 14 shows the age distribution of all of the 120 participants. It can be seen that most of the participants were between 21 and 30 years old. 75 participants fall into this section of age. These are 62,5% of all the participants. The second-biggest category is from 31 to 40 years. This category contains 24 participants. There is one participant who was only 17 years old. This subject is the only one in the

section “under 21”. The last two ranges, from 41 to 50 and from 51 to 60, count 10 participants each. The oldest person participating was 59 years old.

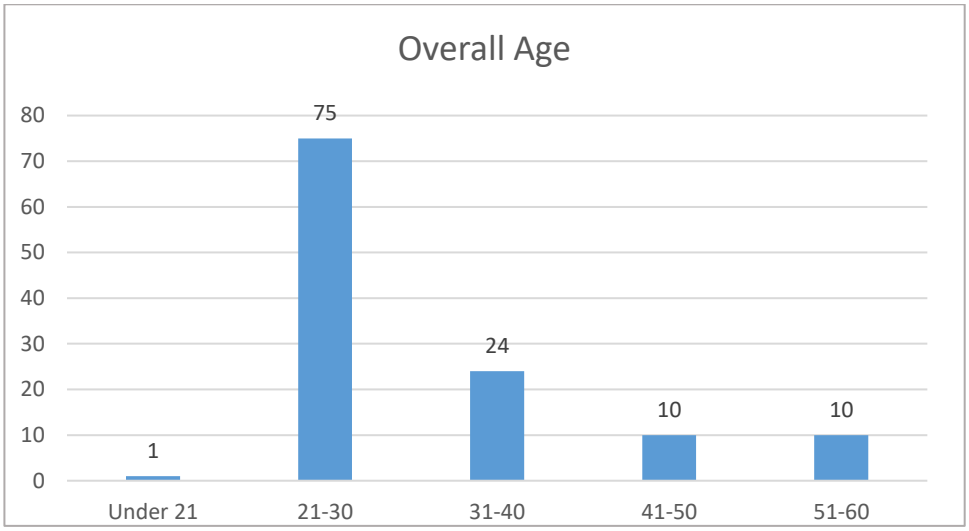


Figure 14 - Overall Age

The treatment groups’ age distribution can be seen below in Figure 15. The biggest section is, as well as for the overall distribution, the section of 21 to 30 years old participants. Ten subjects were 31 to 40 years old. In addition to that, there were five participants aged between 41 to 50, and one participant was over 51 and under 60 years old.

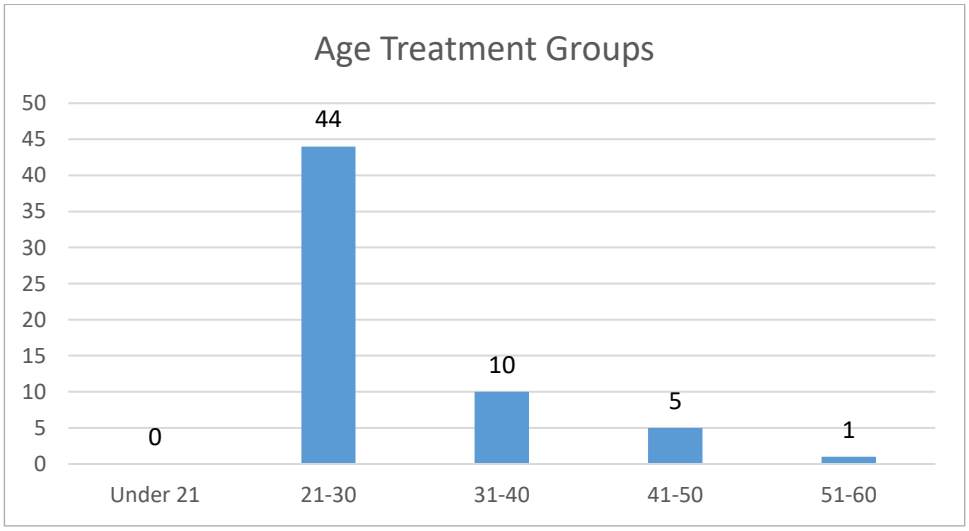


Figure 15 - Age Distribution Treatment Groups

Figure 16 depicts the distribution of the participants' age in the control groups. Likewise, the biggest proportion make up participants from 21 to 30 years old. There were 31 subjects in this age range. The second biggest group were the 31 to 40 years old, with 14 people, followed by nine participants being

between 51 and 60 years old. In the control groups, five people belong to the group of 41 to 50 years old participants, and the 17-year-old participant was also part of the control groups.

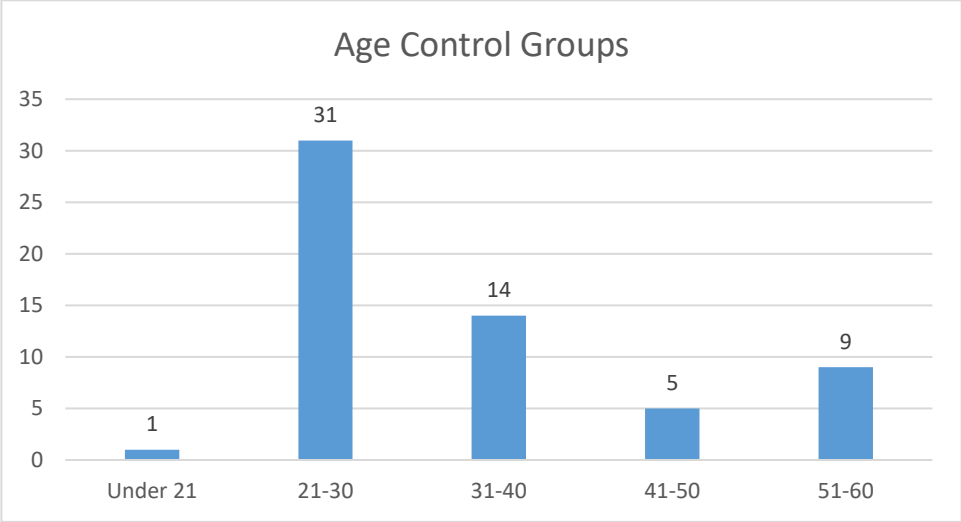


Figure 16 - Age Distribution Control Groups

4.3.3. Profession

The overall distribution of the profession of the participants is being displayed in Figure 17. Most of the participants, 89, were employed. The second-biggest category of participants make up students followed by twelve self-employed, and two already retired people. There was one participant who chose "other". This subject is currently being a housewife.

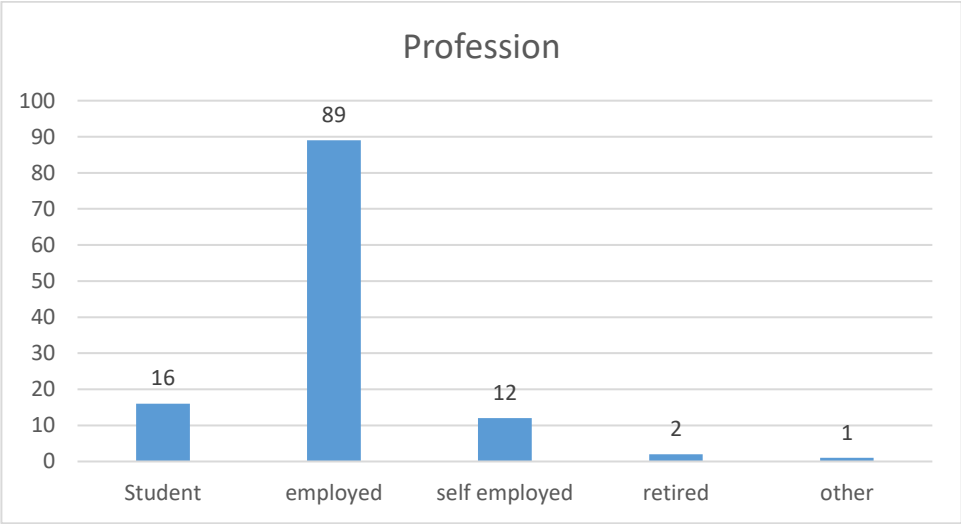


Figure 17 - Overall Profession

Figure 18 illustrates the division of participants part of the treatment groups regarding their current professional status. 43 subjects were employed by the time the experiment took place. Another 12 were

students, and 5 participants were self-employed at this time. None of the participants of the treatment groups was either retired or “other”.

Figure 18 - Profession Distribution Treatment Groups

Figure 19 shows the distribution of the profession in the control groups. Similarly, to the treatment groups and the overall distribution, the biggest section of participants was employed. Regarding the control groups, this section accounts for 46 people, followed by seven self-employed subjects. There were also four students taking part in the experiment's control groups. Further, two retired people and one housewife, who chose the category “other”, were participants of the control groups.

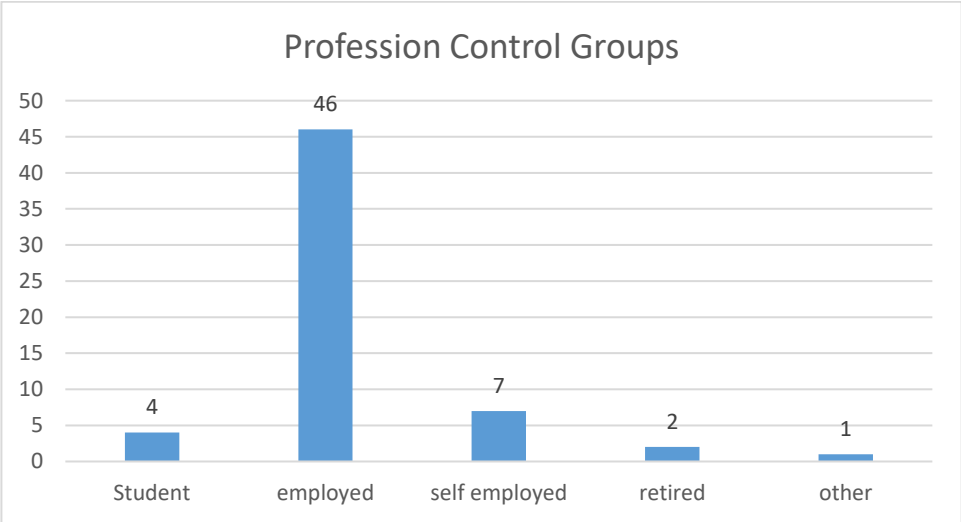


Figure 19 - Profession Distribution Control Groups

4.4. Feedback of the Demographic Questionnaire

The Feedback on the demographic questionnaires of the treatment as well as control groups is given in the following part of the thesis.

4.4.1. Treatment Groups

All of the treatment groups had the same opinion when being asked how they liked the structure and if they think an approach like this makes sense. They were all unanimously confident that an approach to structure a project is preferable in terms of a gain in efficiency and productivity. There was one group arguing that they don't understand and would not support distributing rewards before finishing the project because time and effort are hard to estimate beforehand and that the precise amount of effort needed to solve a task can never be known in advance. Additionally, most of the participants mentioned that they liked working on the furnishing task and had fun during completion. Some participants who were colleagues at work even called it an excellent team-building session.

4.4.2. Control Groups

The feedback given by the control groups was mostly mentioning that they had fun working on this exercise and that they liked the kind of activity too. In addition, everyone mentioned that they should have structured and planned more before starting to work on the task. This is in accord with the answer to the question of whether they think that a specific given approach to structure a project would be helpful. Every participant answered yes when being asked this question.

5. Conclusion

The results of the conducted experiment show that the application of the smart team architecture approach makes the team perform more efficiently in terms of total points collected. The outcomes concerning a difference in price show no significant difference.

The teams that applied the simplified and adapted seven-step approach based on the insights of Puranam, Alexy, and Reitzig (2014), as well as Lee and Puranam (2015), performed better than the teams of the control groups when looking at total points collected. The treatment groups spent 15 out of 60 minutes to organize and structure the task prior to execution, which led to a favorable outcome. In contrast to that, the control groups also had a total of 60 minutes, with no further instructions on how to approach the execution. Control groups immediately started working on the task. Most of the time, they did not invest time in structuring the course of action. This led to misunderstandings between the team members while conduction, which resulted in redundant execution of already finished tasks or the performance of the same task simultaneously by two team members.

Problems regarding the applied smart team architecture approach appeared in the first and third step. The division of the overall exercise in single tasks was problematic for the first couple of teams. After adding the “book a vacation” example, no further groups had problems working on this step.

For the completion of the second step, the majority of the teams used simple value chains or timelines to sequence the execution of the tasks. At this step, no further information was needed.

The third step, which was about role creation, was mostly solved by summing up either chronological tasks or similar tasks. Roughly speaking, typically, there were two roles regarding the room planning and two roles to be in charge of the furniture, electronics, and the other products required. These roles differed in sub-tasks in terms of product type, size of the product, monitor the budget, or to draw and write the list. In some teams, there was even a single budget officer or an interior designer to ensure the chosen products match in color and style. This step needed most of the further explanation and additional information. Five groups completely failed to create roles apart from their personalities. As a consequence, another five groups, with a rearranged mode of execution, were conducted. In this case, at least two groups performed simultaneously. They executed steps 1 to 4 and then switched their forms.

They then had to assign to the roles created by the other team and also complete the furniture exercise according to the structure of the other team.

The fourth step, regarding the reward distribution, was rather unproblematic as well. Some teams needed a further explanation of what the fictional reward is. Once told, they understood and had no further complications.

Step 5 did not depict a problem as well. The team members either self-selected in their roles according to personal interest or skill, or they just got assigned to the roles. There was no observable difference in motivation or performance. The five additional groups, which were conducted because of the failure of some groups, in this step, had to assign to the roles created by other teams. This did not turn out to be problematic.

The control groups did not consider any of these aspects except for the division of the tasks. They just roughly divided their team in two, where the one half planned the room, and the other half was responsible for the products. It was witnessed that this led to misunderstandings and misconceptions about the responsibilities of each team member, which induced inefficiencies in the overall performance. The definition of clear roles did prove to avoid this.

The statistical analysis seems to support the assumption that the application of the smart team architecture directory can foster a team's performance without relying on hierarchy to provide a certain structure.

This thesis depicts the first experimental investigation of the effectiveness of the Smart Team Architecture approach. There still needs to be further investigation. To conduct a likewise experiment with a bigger sample size would improve the validity and significance of the results. Further, it is assumed that, at least to some extent, effects on the participant's motivation were falsified due to the simple nature of the exercise.

6. References

Adams, J. (1965). Inequity in Social Exchange. *Advances in Experimental Social Psychology, 2*, pp. 267-299.

Adler, P. S. (2001). Market, Hierarchy, and Trust: The Knowledge Economy and the Future of Capitalism. *Organization Science, 12*(2), pp. 215-234.

Alper, S., Tjosvold, D., & Law, K. (1998). Interdependence and Controversy in Group Decision Making: Antecedents to Effective Self-Managing Teams. *Organizational Behavior and Human Decision Processes, 74*(1), pp. 33-52.

Anderson, C., & Brown, C. E. (2010). The functions and dysfunctions of hierarchy. *Research in Organizational Behaviour, 30*, pp. 55-89.

Anderson, C., & Kilduff, G. J. (2009). Why do dominant personalities attain influence in face-to-face groups? The competence-signaling effects of trait dominance. *Journal of Personality and Social Psychology, 96*, pp. 491-503.

Bass, B. M., & Bass, R. (2008). *The Bass Handbook of Leadership: Theory, Research, and Managerial Applications.* New York : Free Press.

Benkler, Y. (2002). Coase's Penguin, or, Linux and The Nature of the Firm. *The Yale Law Journal, 112*(3), pp. 369-446.

Brinol, P., Petty, R., Valle, C., Rucker, D., & Becerra, A. (2007). The Effectsof Message Recipients' Power Before and After Persuasion: A Self-Validation Analysis. *Journal of Personality and Social Psychology, 93*(6), pp. 1040-1053.

Burton, R. M., & Obel, B. (1984). *Designing efficient Organizations: Modelling Experimentation.* Amsterdam: Elsevier Science Ltd.

Campion, M., Medsker, G., & Higgs, C. (1993). Relations between Work Group Characteristics and Effectiveness: Implications for designing effective Work Groups. *Personnel Psychology, 46*(4), pp. 823-847.

Cantimur, Y., Rink, F., & van der Vegt, G. (2012). When Status Hierarchies Enhance Group Performance: The Moderating Role of Task Simplicity. *Academy of Management Annual Meeting Proceedings*(1).

Carrell, M., & Dittrich, J. (1978). Equity Theory: The Recent Literature, Methodological Considerations, and New Directions. *The Academy of Management Review, 3*(2), pp. 202-210.

Carzo Jr. , R., & Yanouzas, J. N. (1969). Effects of flat and tall organization structure. *Administrative Science Quarterly, 14*(2), pp. 178-191.

Cohen, S. G., & Ledford, G. E. (1994). The Effectiveness of Self-Managing Teams: A Quasi-Experiment. *Human Relations, 47*(1), pp. 13-43.

Cordery, J., Morrison, D., Wright, B., Wall, T., Grant, A., Fried, Y., . . . Frese, M. (2010). The impact of autonomy and task uncertainty on team performance: A longitudinal field study. *Journal of Organizational Behaviour, 31*(2-3), pp. 240-258.

Dahlander, L., & O'Mahony, S. (2001). Progressing to the Center: Coordinating Project Work. *Organization Science, 22*(4), pp. 961-979.

De Dreu, C. K., & West, M. A. (2001). Minority dissent and team innovation: The importance of participation in decision making. *Journal of Applied Psychology, 88*(6), pp. 1191-1201.

de Jong, A., de Ruyter, K., & Lemmink, J. (2004). Antecedents and Consequences of the Service Climate in Boundary-Spanning Self-Managing Service Teams. *Journal of Marketing, 68*(2), pp. 18-35.

Downes, P., & Choi, D. (2014). Employee reactions to pay dispersion: A typology of existing research. *Human Resource Management Review, 24*(1), pp. 53-66.

Fjeldstad, Ø., Snow, C., Miles, R., & Lettl, C. (2012). The Architecture of Collaboration. *Stragtegic Management Journal, 33*, pp. 734-750.

Forte, A., Larco, V., & Bruckman, A. (2009). Decentralization in Wikipedia Governance. *Journal of Management Information Systems, 26*(1), pp. 49-72.

Frey, B., & Jegen, R. (2001). Motivation Crowding Theory. *Journal of Economic Surveys, 15*(5), pp. 589-611.

Galbraith, J. (1977). *Organization Design.* Reading, MA: Addison-Wesley.

Glass, D., & Singer, J. (1972). *Urban Stress.* New York: Academic Press.

Greer, L., & van Kleef, G. (2010). Equality versus differentiation: The effects of power dispersion on group interaction. *Journal of Applied Psychology, 95*(6), pp. 1032-1044.

Gubler, T., Larkin, I., & Pierce, L. (2016). Motivational Spillovers from Awards: Crowding out in a Multitasking Environment. *Organization Science, 27*(2), pp. 286-303.

Gulati, R., Lawrence, P. R., & Puranam, P. (2005). Adaption in Vertical Relationships: Beyond Incentive Conflict. *Strategic Management Journal, 26*(5), pp. 415-440.

Guzzo, R., & Dickson, M. (1996). Teams in Organizations: Recent Research on Performance and Effectiveness. *Annual Review of Psychology, 47*(Social Science Premium Collection), pp. 307-338.

Haas, M. (2010). The double-edged swords of autonomy and external knowledge: analyzing team effectiveness in a multinational organization (Case Study). *Academy of Management Journal, 53*(5), pp. 989-1008.

Hackman, J. (1987). The design of work teams. In J. Lorsch, *Handbook of Organizational Behavior* (pp. 315-342). Engelwood Cliffs, NJ: Prentice-Hall .

Hackman, J., & Oldham, G. (1976). Motivation through the Design of Work: Test of a Theory. *Organizational Behavior and Human Performance, 16*, pp. 250-279.

Hackman, J., & Vidmar, N. (1970). Effects of Size and Task Type on Group Performance and Member Reactions. *Sociometry, 33*(1), pp. 37-54.

Hackman, J., Brousseau, K., & Weiss, J. (1976). The interaction of task design and group performance strategies in determining group effectiveness. *Organizational Behavior and Human Performance, 16*(2), pp. 350-365.

Heckscher, C., & Adler, P. (2006). *The firm as a collaborative community: reconstructuring trust in the knowledge economy.* Qxford, NY: Oxford University Press.

Highsmith, J. (2004). *Agile Project Management: Creating Innovative Products.* Addison-Weasly.

Homan, A., Hollenbeck, J., Humphrey, S., can Knippenberg, D., Ilgen , D., & van Kleef, G. (2008). Facing differences with an open mind: Openness to experience, salience of intra-group differences, and performance of diverse work groups. *Academy of Management Journal, 51*(6), pp. 1204-1222.

Inman, M., Reichl, A. J., & Baron, R. S. (1993). Do we tell less than we know or hear less than we are told? Exploring the Teller-Listener Extremity Effect . *Journal of Experimental Social Psychology , 29*(6), pp. 528-550.

Keltner, D., Capps, L., Kring, A. M., Young, R. C., & Heerey, E. A. (2001). Just Teasing: A Conceptual Analysis and Empirical Review. *Psychological Bulletin, 127*(2), pp. 229-248.

Kish-Gephart, J., Detert, J., Trevino, L., & Edmondson, A. (2009). Silenced by fear: The nature, sources, and consequences of fear at work. *Research in Organizational Behavior, 29*, pp. 163-193.

Klapper, H., & Reitzig, M. (2018). On the effects of authority on peer motivation: Learning from Wikipedia. *Strat Mgmt J., 39*, pp. 2178-2203.

Kolbjornsrud, V. (2017). Agency problems and the governance mechanisms in collaborative communities. *Strategic Organization, 15*(2), pp. 141-173.

Korman, A. K. (1971). Organizational achievement, aggression, and creativity: Some suggestions toward an integrated theory. *Organizational Behavior and Human Performance, 6*, pp. 593-613.

Lawrence, P. R., & Lorsch, J. W. (1967). *Organization and environment: managing differentiation and integration.* Boston: Harvard Univ.

Lazear, E., & Shaw, K. (2007). Personnel Economics: The Economist's View of Human Resources. *The Journal of Economic Perspective, 21*(4), pp. 91-114.

Leavitt, H. (2005). *Top down: why hierarchies are here to stay and how to manage them more efficiently.* Boston, MA: Harvard Business School Press.

Lee, E., & Puranam, P. (2015). The Nature of Expertise in Organization Design: Evidence From an Expert - Novice Comparison. *Cognition and Strategy (Advances in Strategic Management), 32*, pp. 181-209.

Lerner, J., & Tirole, J. (2002). Some Simple Economics of Open Source. *Journal of Industrial Economics, 50*(2), pp. 197-234.

Lipmack, J., & Stamps, J. (1997). *Virtual Teams - Reaching Across Space, Time and, Organizations with Technology.* John Wiley & Sons, Inc.

Locke, C. C., & Anderson, C. (2015). The downside of looking like a leader: power, nonverbal confidence, and participative decision-making. *Journal of Experimental Social Psychology, 58*, pp. 42-47.

Malmgren, H. B. (1961). Information, Expectations and the Theory of the Firm. *The Quartely Journal of Economics, 75*(3), pp. 399-421.

March, J. G., & Simon, H. A. (1958). *Organizations.* New York: Wiley.

Maznevski, M., & Chudoba, K. (2000). Bridging Space Over Time: Global Virtual Team Dynamics and Effectiveness. *Organization Science, 11*(5), pp. 473-492.

Metcalf, H., & Urwick, L. (2003). *Dynamic Administration: The Collected Papers of Mary Parker Follett.* London: Routeledge.

Milgrom , P., & Roberts, J. (1992). *Economics, Organization & Management* . New York: Prentice Hall International.

Mintzberg, H. (1979). *The structuring of Organizations: A Synthesis of the Research* . Englewood Cliffs, N.J.: Prentice-Hall.

Mitchell, T., & Silver, W. (1990). Individual and Group Goals When Workers Are Interdependent: Effects on Task Strategies and Performance. *Journal of Applied Psychology, 75*(2), pp. 185-193.

Molleman, E. (2000). Modalities of self-managing teams: The "must", "may", "can" and "will" of local decision making. *International Journal of Operations & Production Management, 20*(8), pp. 889-910.

Morgan, G. (1998). *Images of Organization: The Executive Edition.* Thousand Oaks: Berrett-Koehler Publishers, Inc. and Sage Publcations, Inc.

Morrison, E. W., & Milliken , F. (2000). Organizational silence: A barrier to change and development in a pluralistic world. *The Academy of Management Review, 25*(4), pp. 706-725.

O'Connell, M., Doverspike, D., & Cober, A. (2002). Leadership and Semiautonomous Work Team Performance: A field Study. *Group and Organization Management , 27*(1), pp. 50-65.

Ostrom, E. (2000). Collective Action and the Evolution of Social Norms. *Journal of Economic Perspectives, 14*(3), pp. 137-158.

Patanakul, P., Chen, J., & Lynn, G. (2012). Autonomous Teams and New Product Development. *Journal Of Product Innovation Management, 29*(5), pp. 734-750.

Pearson, C. M., & Porath, C. L. (1999). Workplace incivility: The target's eye view.

Pennebaker, J., Burnam, M., Scheffer, M., & Harper, D. (1977). Lack of Control as a determinant of perceived physical symptoms. *Journal of Personality and Social Psychology, 35*(5), pp. 167-174.

Pfeffer, J., & Langton, N. (1993). The effect of wage dispersion on satisfaction, productivity, and working collaboratively: Evidence from college and university faculty. *Administrative Science Quartely, 38*(3), pp. 382-407.

Puranam, P. (2017). When will we stop studying innovations in organizing, and start creating them? *Innovation: Organization & Management, 19*(1), pp. 5-10.

Puranam, P. (2018). *The Microstructure of Organizations.* New York: Oxford University Press.

Puranam, P., Alexy, O., & Reitzig, M. (2014). What's "New" About New Forms of Organizing? *The Academy of Management Review, 39*(2), pp. 162-180.

Puranam, P., Alexy, O., & Reitzig, M. (2019). Smart Team Architecture (STA).

Reitzig, M., & Maciejovsky, B. (2015). Corporate Hierarchy and Vertical Information Flows inside the Firm - A Behavioral View. *Strategic Management Journal, 36*, pp. 1979-1999.

Rico, R., Sanchez-Manzanares, M., Antino, M., & Lau, D. (2012). Bridging Team Faultlines by Combining Task Role Assignment and Goal Structure Strategies. *Journal of Applied Psychology, 97*(2), pp. 407-420.

Rousseau, V., & Aube, C. (2010). Team Self-Managing Behaviors and Team Effectiveness: The Moderating Effect of Task Routineness. *Group & Organization Management, 35*(6), pp. 751-781.

Saavedra, R., Earley, P., & Van Dyne, L. (1993). Complex Interdependence in Task-Performing Groups. *Journal of Applied Psychology, 78*(1), pp. 61-72.

Schneider, B. (1987). The People make the Place. *Personell Psychology, 40*, pp. 437-454.

Scott, R. (2003). *Organizations: rational, natural, and open systems (5th ed.).* Upper Saddle River, NJ: Prentice Hall.

Seligman, M. (1975). *Helplessness: On Depression, Development, and Death.* San Francisco: WH Freeman .

Shah, S. (2006). Motivation, Governance, and the Viability of Hybrid Forms in Open Source Software Development. *Management Science, 52*(7), pp. 1000-1014.

Simon, H. A. (1951). A Formal Theory of the Employment Relationship. *Econometrica, 19*(3), pp. 293-305.

Simon, H. A. (1973). Applying Information Technology to Organization Design. *Public Administration Review, 33*(3), pp. 268-278.

Smith, A. (1776). *An Inquiry into the nature and causes of the wealth of nations.* London, UK.

Tannenbaum, A., Kavcic, B., Rosner, M., Vianello, M., & Wieser, G. (1974). *Hierarchy in Organizations.* San Francisico: Jossey-Bass.

Trevor, C., Reilly, G., & Gerhart, B. (2012). Reconsidering Pay Dispersion's Effect on the Performance of Interdependent Work: Reconciling Sorting and Pay Inequality. *The Academy of Management Journal, 55*(3), pp. 585-610.

Van den Steen, E. (2006). The Limits of Authority: Motivation versus Coordination. *MIT Sloan Research Paper No. 4626-06*.

Van Vugt, M. (2006). Evolutionary Origins of Leadership and Followership. *Personality and Social Psychology Review, 10*, pp. 354-371.

Vandewalle, D., & Cummings, L. (1997). A Test of the Influence of Goal Orientation on the Feedback-Seeking Process. *Journal of Applied Psychology, 82*(3), pp. 390-400.

von Hippel, E. (1990). Task Partitioning. *Research Policy, 19*(5), pp. 407-418.

von Hippel, E., & von Krogh, G. (2003). Open Source Software and the "Private-Collective" Innovation Model: Issues for Organization Science. *Organization Science, 14*(2), pp. 209-223.

Wageman, R. (1995). Interdependence and Group Effectiveness. *Administrative Science Quarterly, 40*(1), pp. 145-180.

Wageman, R. (2001). How Leaders Foster Self-Managing Team Effectiveness: Design Choices Versus Hands-on Coaching. *Organization Science, 12*(5), pp. 559-577.

Weber, M. (1972). *Wirtschaft und Gesellschaft: Grundriß d. Verstehenden Soziologie / 5. rev. Auflage, Studienausgabe.* Tübingen, Germany: J.C.B Mohr (Paul Siebeck).

7. Table of Figures

8. Appendix

In the following the documents handed out to the participants is shown.

8.1. Furnishing Exercise, Five-Step Approach and Questionnaire for Treatment Groups

Smart Team Tool

Das Ziel dieses Experimentes ist es, die u.a. Aufgabe zu lösen. In einem ersten Schritt lesen Sie bitte die Aufgabe durch und gehen im Anschluss daran die Schritte 1 bis 5 mit Ihrem Team unter der Führung des Moderators durch und sammeln Sie Ihre Ergebnisse in den vorgesehenen Tabellen. Abschließend führen Sie bitte die Aufgabe, wie beschrieben, durch!

Aufgabe

Ihre Aufgabe besteht darin, einen Büroraum für 10 Personen mit allen notwendigen Gegenständen einzurichten. Diese beinhalten:

- Einen leistungsstarken Büro-Drucker, der mindestens eine Scan- und Kopierfunktion besitzt
- Eine Kaffeemaschine
- Zwei Garderobenständer
- Einen Kühlschrank
- Mikrowelle
- Zehn Schreibtische mit 160cm x 80cm Mindestmaß
- Pro Schreibtisch einen Rollcontainer
- Zehn Bürosessel
- Zwei Aktenschränke (Höhe: mindestens 150cm, maximal 200cm)
- Ein Besprechungstisch mit sechs Sesseln

Eine Küche und ein Besprechungsraum sollen durch Wände (diese sind vom Budget ausgenommen) vom Arbeitsplatz der Mitarbeiter/Mitarbeiterinnen getrennt werden. Dabei sollen Sie beachten, dass jeder Mitarbeiter/jede Mitarbeiterin 2 Quadratmeter freie Bodenfläche beim Arbeitsplatz haben muss. Außerdem ist eine Küchenzeile (Maße: 150cm x 80cm) bereits vorhanden und sinnvoll zu platzieren. WC sowie Waschbecken sind ebenfalls bereits im Büroraum vorhanden. Diese sind nicht zu platzieren. Die Schreibtische der Mitarbeiter/Mitarbeiterinnen sind außerdem so zu platzieren,

dass die Mitarbeiter/Mitarbeiterinnen nicht direkt (in erster Reihe) mit dem Rücken zum Fenster sitzen. Die Schrittlänge zum Drucker soll maximal 23 Schritte betragen (Beachten Sie hierbei, dass ein Schritt etwa 60cm beträgt).

Bitte beachten Sie, dass es darüber hinaus Extrapunkte für die folgenden Kriterien gibt, sofern diese erfüllt werden:

- Höhenverstellbare Tische
- Ergonomische Sessel
- Fußstützen (pro Mitarbeiter eine)
- Feuerlöscher (1x)
- Erste-Hilfe-Kasten (1x)
- Pflanzen
- Bilder
- Schirmständer
- Mistkübel (pro Mitarbeiter einen)
- Kaffeehausmöbel für Küche (Tisch + 4 Stühle)
- „Ein roter Faden“ im Innendesign

Für diese Aufgabe nutzen Sie bitte das Internet, um die entsprechenden Gegenstände herauszusuchen. Außerdem müssen Sie die gefundenen Objekte auch im beiliegenden Plan einzeichnen. Bitte geben Sie ebenfalls die genaue Bezeichnung des Artikels, den Preis des Artikels, den Namen des Online-Shops bzw. Möbelhaus sowie die Adresse der Website an.

Für Ihre Aufgabe steht Ihnen ein fiktives Budget von 10.000€ und 45 Minuten Zeit zur Verfügung. Viel Erfolg!

Smart Team Tool

Schritt 1 – Einzelne Aufgaben definieren

Welche Aufgaben fallen an? Was muss alles erledigt werden? Brechen Sie das Projekt in möglichst kleine einzelne Aufgaben. Schreiben Sie Ihre Tasks in die vorgesehene Tabelle auf Ihrem persönlichen Smart Team Tool Formular.

Aufgaben definieren

Schritt 2 – Reihenfolge der Aufgaben

In welcher Reihenfolge sollen die Tasks erledigt werden? Welche Tasks können parallel erledigt werden und wo gibt es Abhängigkeiten? Zeichnen Sie hierzu ein Prozessdiagramm oder arbeiten Sie mit einer Zeitlinie, Value Chain, etc.

Reihenfolge der Aufgaben

Schritt 3 – einzelne Rollen definieren

Definieren Sie Rollen auf welche Sie die zuvor bestimmten Aufgaben aufteilen. Wer macht was? Tragen Sie dies wieder in Ihr Formular ein.

Einzelne Rollen definieren

Aufgabe	Rolle

Schritt 4 – Verteilung der Belohnung

Definieren Sie wie viel jede Rolle für ihre Performance bekommt.

Verteilung der Belohnung

Rolle	Prozentueller Anteil der Belohnung

Schritt 5 – Personen den Rollen zuteilen

Teilen Sie Ihre Teammitglieder auf die zuvor bestimmten Rollen auf. Erfassen Sie dies wiederum auf Ihrem Formular.

Personen den Rollen zuteilen

Teammitglied	Rolle

Vielen Dank für Ihre Teilnahme!

Angaben zu Ihrer Person und Kritik/Lob:

1. Geschlecht	☐ weiblich ☐ männlich
2. Alter	
3. Berufsstand	☐ Schüler/Student ☐ Angestellter/Arbeiter ☐ selbstständig ☐ Pensionist ☐ Sonstige:_____
4. Kritik, Lob und Verbesserungsvorschläge betreffend das Projektmanagement-Tool:	

Vielen Dank für Ihre Teilnahme!!

8.2. Furnishing Exercise and Questionnaire for Control Groups

Hallo!

Bitte lösen Sie die unten angeführte Aufgabe im Team und tragen Sie ihre Ergebnisse auf den beigelegten Blättern ein.

Vielen Dank für Ihre Teilnahme!

Aufgabe

Ihre Aufgabe besteht darin, einen Büroraum für 10 Personen mit allen notwendigen Gegenständen einzurichten. Diese beinhalten:

- Einen leistungsstarken Büro-Drucker, der mindestens eine Scan- und Kopierfunktion besitzt
- Eine Kaffeemaschine
- Zwei Garderobenständer
- Einen Kühlschrank
- Mikrowelle
- Zehn Schreibtische mit 160cm x 80cm Mindestmaß
- Pro Schreibtisch einen Rollcontainer
- Zehn Bürosessel
- Zwei Aktenschränke (Höhe: mindestens 150cm, maximal 200cm)
- Ein Besprechungstisch mit sechs Sesseln

Eine Küche und ein Besprechungsraum sollen durch Wände (diese sind vom Budget ausgenommen) vom Arbeitsplatz der Mitarbeiter/Mitarbeiterinnen getrennt werden. Dabei sollen Sie beachten, dass jeder Mitarbeiter/jede Mitarbeiterin 2 Quadratmeter freie Bodenfläche beim Arbeitsplatz haben muss. Außerdem ist eine Küchenzeile (Maße: 150cm x 80cm) bereits vorhanden und sinnvoll zu platzieren. WC sowie Waschbecken sind ebenfalls bereits im Büroraum vorhanden. Diese sind nicht zu platzieren. Die Schreibtische der Mitarbeiter/Mitarbeiterinnen sind außerdem so zu platzieren, dass die Mitarbeiter/Mitarbeiterinnen nicht direkt (in erster Reihe) mit dem Rücken zum Fenster sitzen. Die Schrittlänge zum Drucker soll maximal 23 Schritte betragen (Beachten Sie hierbei, dass ein Schritt etwa 60cm beträgt).

Bitte beachten Sie, dass es darüber hinaus Extrapunkte für die folgenden Kriterien gibt, sofern diese erfüllt werden:

- Höhenverstellbare Tische
- Ergonomische Sessel
- Fußstützen (pro Mitarbeiter eine)
- Feuerlöscher (1x)
- Erste-Hilfe-Kasten (1x)
- Pflanzen
- Bilder
- Schirmständer
- Mistkübel (pro Mitarbeiter einen)
- Kaffeehausmöbel für Küche (Tisch + 4 Stühle)
- „Ein roter Faden“ im Innendesign

Für diese Aufgabe nutzen Sie bitte das Internet, um die entsprechenden Gegenstände herauszusuchen. Außerdem müssen Sie die gefundenen Objekte auch im beiliegenden Plan einzeichnen. Bitte geben Sie ebenfalls die genaue Bezeichnung des Artikels, den Preis des Artikels, den Namen des Online-Shops bzw. Möbelhaus sowie die Adresse der Website an.

Für Ihre Aufgabe steht Ihnen ein fiktives Budget von 10.000€ und 60 Minuten Zeit zur Verfügung. Viel Erfolg!

Abschließender Fragebogen:

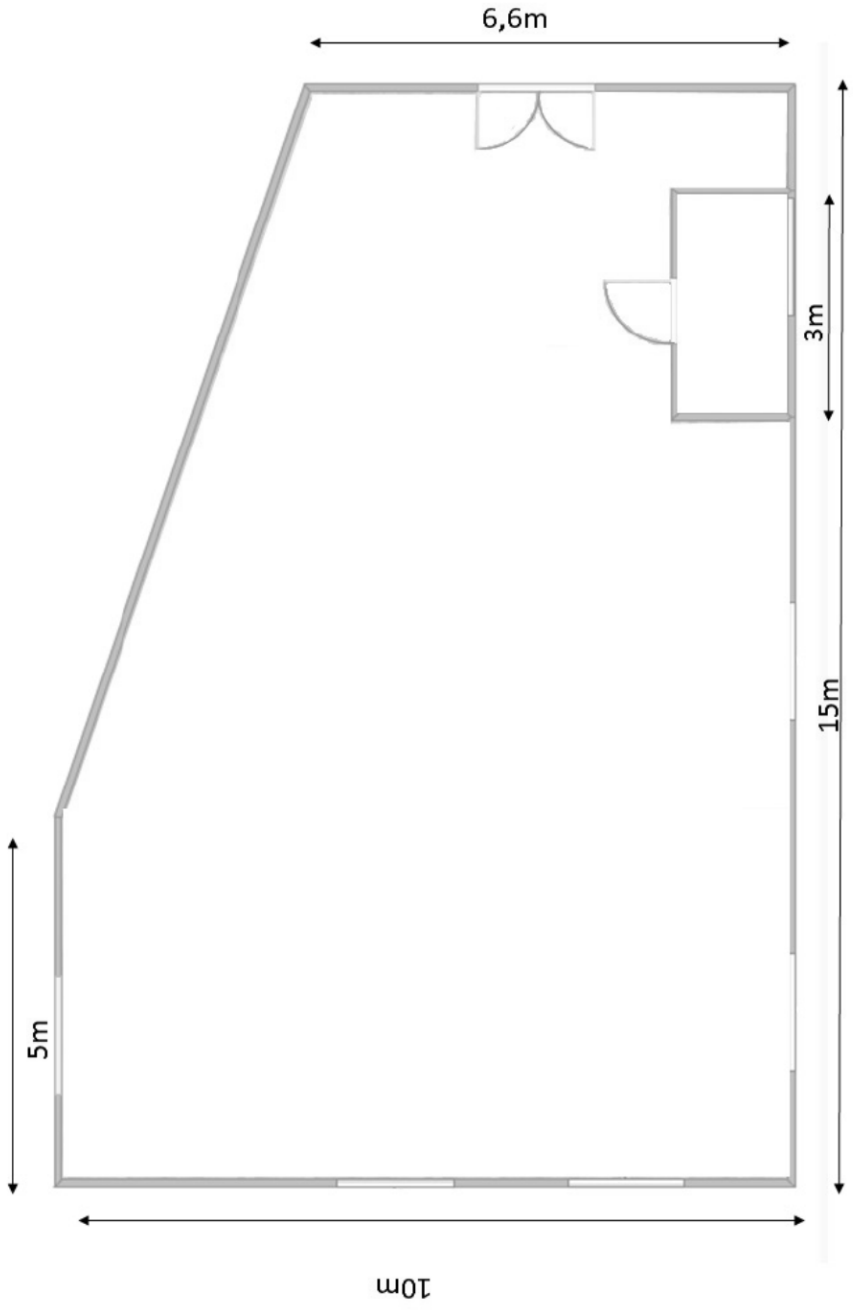
5. Geschlecht	☐ weiblich ☐ männlich
6. Alter	
7. Berufsstand	☐ Schüler/Student ☐ Angestellter/Arbeiter ☐ selbstständig ☐ Pensionist ☐ Sonstige: _____
8. Haben Sie die Aufgabe vorab strukturiert und Aufgaben verteilt?	☐ Ja ☐ Nein Wenn ja, wie haben Sie die Aufgaben strukturiert/verteilt?
9. Denken Sie eine strukturierte Herangehensweise (z.B. ein Leitfaden zur Organisation einer Aufgabe) wäre sinnvoll?	☐ Ja ☐ Nein

Vielen Dank für Ihre Teilnahme!!

8.3. Product List for Treatment and Control Groups

Produkt	Genaue Bezeichnung	Online Shop	Internetadresse/Link	Preis

8.4. Floor Plan for Treatment and Control Groups



The participants received a hard copy of the floorplan with the scale of 1:100.

8.5. Abstract

In den vergangenen Jahrzehnten haben sich Organisationen und hierarchische Strukturen verändert. Autorität und die Befugnis Entscheidungen zu treffen verlagerten sich von den oberen Hierarchieebenen auf die unteren Ebenen. Es entstanden neue Formen der nicht-hierarchischen Zusammenarbeit, wie beispielsweise, selbst-organisierende Teams.

Diese Arbeit beschäftigt sich mit den Effekten von Hierarchien auf Teamarbeit betreffend den Aspekten der gemeinschaftlichen Entscheidungsfindung und Koordination sowie Team Motivation. Es wurde festgestellt, dass die Eigenverantwortung und Kontrolle über das eigene Arbeitsumfeld, welche dem Mitarbeiter übertragen wird, die Motivation und Leistung ebendieser verbessern.

Darüber hinaus wird die Entwicklung des “Smart Team Architecture”-Ansatzes, bestehend aus sieben Schritten, basierend auf den Fundamenten des Organisationsdesigns, erklärt. Es wurde ein Experiment durchgeführt, um zu überprüfen, ob die Anwendung dieses spezifischen Strukturierungsansatzes die Ergebnisse der Teamarbeit, in Bezug auf Effizienzsteigerungen, verbessert. Die Ergebnisse zeigen, dass die Performance der Teams unter Anwendung des “Smart Team Architecture”-Ansatzes durchaus gefördert werden kann.