

LEVEL OF SIMILARITY OF TEAM MANAGEMENT. RESULTS OF A LONG TERM, NON-PARTICIPATING OBSERVATION OF MANAGERS IN A GIVEN PROJECT WITH THE USE OF THE SYSTEM OF ORGANIZATIONAL TERMS

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Abstract: The objective of the paper is to estimate a level of similarity in team management in a given project. This objective concerns two dimensions of managerial actions: types of management techniques used by managers and their sequence in a period. In management studies, there is profound research on management styles, management skills, and management roles. Although that these concepts were introduced in management science many years ago, they are still not enough to estimate the similarity of team management. To solve the problem of ambiguity of these terms more efficient methodology of managerial work was introduced by the author of the paper. This methodology is called the system of organizational terms and it lets conduct the non-participating observations of team managers and their members by the online management tools which record the human actions. The system of organization terms and online management tools (implemented in transistorshead.com) were used in the research of 5 teams of students who were given the same project to conduct for one month. They were told to use online management tools (transistorshead.com) to work out the results of the project. Their work was recorded by online management tools in content and time domains, however, in this paper, a level of team management similarity is considered in the field of the time domain. The main conclusion from the research is that there are no similarities in team management made by managers despite the same conditions of the task and similar characteristics of participants.

Keywords: Team management similarity, Management styles, Managerial roles, Managerial styles, System of organizational terms

1 Introduction

Due to their ability to respond more effectively to the dynamic and complex environments faced by organizations today, team management has become more and more relevant in the past decades (Mathieu *et al.* 2008). This has enabled modern organizations to take advantages of integrating all related activities by the means of teamwork (Shakshuki *et al.* 2003).

On the one hand, managers do not have the luxury of standing back or outside of a situation in which they act. They have to take action in the context of the situation. Managerial actions lead to the consequences which managers are not able to foresee. Conversely, they need to be able to identify, articulate and respond to the unexpected contingencies (Segal, 2011). On another hand, after the first age of robotics in mechanical processes and manufacturing rapid development of computer science and the Internet gives opportunities to automate managers' work to a large extent (McAfee and Brynjolfsson, 2016). This would be the real accomplishment of Drucker's words that in the future "computers" will not only make decisions but they will do much more (Drucker, 1967). Looking for an answer if it is possible to replace human team managers with robots, it leads to a strong need of establishing some patterns of team manager's work and a level of similarity in team management (Halliday and Stacey, 2009).

This attempt always has to come to a simple question: *what does a team manager really do?* (Sinar and Paese, 2016)

This question can be answered by a traditional research approach based on surveys or structured interviews. In general, there are three research challenges related to team management research. The first challenge is how to model team management to fully represent what really a team manager does. The second challenge is how to gather information about managerial actions in team management, and the third challenge is what kind of methods could be used to distinguish team managers and, additionally, to label their styles of leadership. Traditionally, the first challenge is addressed by the action sequence analysis which tracks the order of actions over time (Abbott, 1990). Regarding the second challenge, those actions are usually declared by managers and then collected by questionnaires (Barnes, 1980). Based on that, a team manager can be represented by a data map describing the action features of, e.g. "what", "when" and "how" (Beshears and Gino, 2015). However, this method is not robust because some managerial actions could be ignored due to poor memory and impression of team managers (Flak and Pyszka, 2013). Moreover, this representation method is not general and has low flexibility since different managers may take different types of managerial actions (Beshears and Gino, 2015). The third challenge is also not solved so effectively as it should be when team management is concerned.

That is why it seems to be a need for a new methodological approach, which would let define managerial actions, gather information about them and estimate similarities of team managers and their managerial actions more precisely.

As an answer to these challenges the theoretical foundation called the system of organizational terms was designed by the author (Flak, 2018c; Flak, 2019). It was tested in several research projects conducted by the author on similarities of managerial actions in planning projects (Flak *et al.* 2017b), management styles (Flak *et al.* 2018d) or design thinking in mono- and multilingual teams (Flak, 2018b).

Therefore this paper aims to present the results of a long term, non-participating observation of five managers in a given project in the perspective of managerial actions taken by managers. On a foundation of the recorded data characteristics of managerial actions are described and the level of similarity is estimated.

The research method in this project was a long term, non-participating observation together with online management tools as research tools (Flak, 2017c) implemented in the research platform Transistorshead.com. Managers were students of Human Relations Management at the University of Silesia in Katowice. They used online management tools in TransistorsHead.com in a given project. Their managerial actions were recorded by this research platform in response to the methodology called the system of organizational terms.

The main scientific contributions of this paper include interdisciplinary research on the brink of management science and pattern recognition of managers' behaviours which aimed at replacing human managers with robots in team management.

2 Managerial actions as a model of team management

The job of team managers inevitably becomes more and more complex, which means that they need to be able to organize not only their own time and processes but also those of team members. In this meaning, a team is defined as a social system of two or more units that are embedded in an organization, in which members perceive themselves and each other as members and collaborate on a common task (Hoegl and Parboteeah, 2007). Team memberships in the past were often mutually exclusive with members working on only one team at a time. Traditional teams are co-located and have easy access to both face-to-face and electronic communication. These teams have been formally studied for more than half a century (Kozlowski and Chao, 2018; Mathieu *et al.* 2017). Contemporary the term membership tends to overlap because members working simultaneously on more than one team. Additionally, today teams are becoming more virtual organized (Salas *et al.* 2015). Therefore, to be effective, team managers need to become more fluent with the consistent application of systems and business processes into teamwork (Jain and Anjuman, 2013).

The view of the manager's work in team management has been changed over the last hundred years. Despite the fact, at the beginning of scientific management, the picture of a manager in an organization was defined by his classical functions, such as a reflective planner, an organizer, a leader and a controller (Fayol, 1916). For more than 50 years a view of the nature of a manager has been dominated by three approaches.

Firstly, managerial work has been very often associated with managerial styles, introduced to a common view of team management by Tannenbaum and Schmidt (1958). A management style is defined as a preferred way of managing people to bind diverse operations and functions together, as well as to exercise control over employees (Pei-Li *et al.* 2016; Clear and Dickson, 2005). In another words, a management style is a recurring set of characteristics that are associated with the decisional process of the firm or individual managers (Albaum and Murphy, 1995; Tull, Albaum, 1971).

In many publications, there are mentioned several typologies of management styles. It seems to be three main classical approaches to management styles. There is the Tannenbaum-Schmidt Management Model which is oriented towards tasks (results) and people (relationships) (Tannenbaum and Schmidt, 1958). Management styles according to this model are authoritarianism, elitism, consultation, democracy. Next, there is Likert's management system proposing four different types of management style: exploitive-authoritative, benevolent authoritative, consultative, participative (Likert, 1958). However, the newer concept of management styles makes them more simple in meaning and introduces the division of two management styles: participative and authoritarian management style (Jago, 2017). Participative management style assumes that employees want to make decisions concerning their work on the foundation of the idea of participative management of McGregor's Theory X – Theory Y (Hines, 1974). Participative managers are trying to empower and reward their subordinates. They are always open to employees' participation. They also allow workers to enhance their professional skills. The participative style of management fosters experimentation and risk-taking (Cheng and Bolon, 1993). The opposite style is authoritarian management. Some describe it as a paternalistic leadership (Morris and Pavett, 1992). The authoritarian style limits employee's or manager's creativity and has a negative impact on the staff's motivation (Karakitapoglu-Aygün and Gumusluoglu, 2013).

Last but not least, the Blake and Mouton Management Grid is the most famous among practitioners. It is based on the two indicators: concern for people and concern of results. In this division, we distinguish five classes of management styles: impoverished management, authoritarian management, relationship-oriented management, balanced management, integrated management (Blake and Mouton, 1965).

Secondly, in 1964 Koontz and O'Donnell launched a discussion on the meaning of managerial skills (Koontz and O'Donnell, 1964) and in 1974 Katz (Peterson, 2004) proposed an approach in which managerial skills represented managerial work. A managerial skill was defined as an ability to work effectively as a team manager and to build cooperative effort within the team which the manager leads (Katz, 1974). The dominating typology of managerial skills divides skills into three groups: technical, interpersonal and conceptual skills. Technical skills were regarded as most important for supervisors, interpersonal skills for middle managers, and conceptual skills for executives (Kaiser *et al.* 2011). One of the latest typologies of managerial skills of managers contains such needed skills as critical thinking, problem-solving, an ability to organize data, conceptual thinking, evaluating ideas, persuasive skills, etc. (Ullah *et al.* 2014). During more than 40 years of the managerial skills study many typologies of them were created, however, the essence of managerial skill is not about getting better at what the manager previously did, but it involves learning how to organize team members to increase their productivity (Beaudry and Francois, 2010).

Thirdly, in 1980 Mintzberg concluded that the manager's work can be described in terms of 10 roles within interpersonal, informational and decisional areas which were common to the work of all types of managers. Managerial roles are defined as areas of job activities that are undertaken by a manager (Mintzberg, 1980). Mintzberg introduced to the management science a typology of managerial roles which contains such roles: a figurehead, a leader, a liaison, a monitor, a disseminator, a spokesman, an entrepreneur, a disturbance handler, a resource

allocator, a negotiator (Mintzberg, 1980). Other researchers of team management proposed other divisions of roles, such as a leader, a peer, a conflict solver, an information sender, a decision-maker, a resources allocator, an entrepreneur, a technician (Pavett and Lau, 1982) or an explorer, an organizer, a controller, an adviser (McCan and Margerison, 1989).

Management styles, managerial skills, and managerial roles have influenced scientists and practitioners so much, that most of the research on team management was focused on these phenomena. However, Whetten and Cameron (2016) say that in team management it is not the style of managing that makes a difference. Multiple leadership styles of team managers can be effective, and no one style has particular advantages over others. They claim it is the case of skills and roles of a team manager which resulted in actions taken by the team manager in accordance with particular tools and techniques. When they are put into practice, they turn into effective or ineffective team performance.

Based on that it is possible to draw a conclusion that management styles, managerial skills and managerial roles as traditional theoretical concepts are sufficient to describe a team manager's work in team management. However, these terms still do not recognize what really a team manager does (Sinar and Paese, 2016) so that it is not possible to recognize team managerial action patterns or estimate similarities of managers and their managerial actions in team management.

The answer to this question seems to be hidden in the relation between managerial roles and managerial skills. Pavett and Lau (1983) said that if a manager plays certain managerial roles, he should have some managerial skills. Playing managerial roles within their managerial skills by day-to-day activities of managers effects the managerial actions taken by team managers. Therefore, *the managerial action can be defined as a real activity, which a manager does to play a managerial role having a certain managerial skill* (Flak et al. 2017b). If it is possible to know the exact managerial actions in team management, it would be possible to estimate similarities and look for behavioural patterns in team management (Flak, 2017a). It should be also added that this knowledge should be built in three domains: (1) a time domain – which managerial actions appear one after another, (2) a content domain – what a certain managerial action means, and (3) a psychosocial domain – what is the intra- or interpersonal meaning of a certain this managerial action (Flak, 2018a).

Returning to this huge and appealing influence of the mainstream research on managerial work, based on management styles, managerial skills, and managerial roles, it is necessary to claim that this approach was criticized sooner or later (Reed, 1990; Willmott, 1997). As a result, the next research direction placed managerial work in a broader perspective by analysing the systemic, institutional and moral grounds (Dyck *et al.* 2005). Despite this, the key factor in answering the research question “what really a team manager does” is to recognize managerial actions. This is the solution to the first challenge – how to model the team management – mentioned in Section 1 of this paper. The second challenge – how to gather information about managerial actions in team management – is solved in Section 3.

3 The system of organizational terms as a methodology of the research

During the last decades a vivid discussion about several methodological problems in management science was seen in the literature and a scientific society. Such problems concern H. Koonst's „theory jungle” (1961), large subjectivity in theories (Hicks and Goronzy, 1967), „overproduction of the truth” (Darmer, 2000), chaos in definitions and scientific language (Hodge, 2003), building „islands of knowledge” instead of developing a stable model of reality (Gleiser, 2014). There is still a consideration how much knowledge about organizational reality is real and objective built on important questions: (1) is the knowledge built on the true representation of the reality (ontological issue), (2) does the knowledge contain true information about the reality (epistemological issue)? (Kilduff *et. al* 2011) Chalmeta and Wrangel (2008) pointed out that by solving these two problems it is possible to get knowledge that represents the true reality of the organization.

As team management is a phenomena subset of management science, the same methodological problems and questions respond to the team manager's work which is the

second challenge presented in Section 1. Having the perspective of the rapid process of work automation (McAfee and Brynjolfsson, 2016) and advanced pattern recognition methods (Zhang *et al.* 2017) these problems should be inevitably solved so that the theoretical foundation for team management automation would be created. Such a theoretical foundation is the system of organizational terms designed and tested in many research projects by the author.

The system of organizational terms as a theoretical foundation has two dimensions. The first one is the philosophical foundation of the system of organizational terms which is based on Wittgenstein's philosophy: his theory of facts (the only beings in the world) and "states of facts" (Brink and Rewitzky, 2002). According to this approach team management can be organised by events and things. Specifically, as shown in Figure 1, each event and thing have the label $n.m$, in which n and m represent a number and a version of a thing, respectively. *Event 1.1* causes *thing 1.1*, which in turn releases *event 2.1* that creates *thing 2.1*. *Thing 1.1* simultaneously starts *event 3.1* which creates *thing 3.1*. Then, *thing 3.1* generates a new version of the first event, i.e. *event 1.2*. In such a way, a new version of the first thing is created, which is called *thing 1.2*. So, the managerial action structure consists of, e.g. *event 1.1* and *thing 1.1*.

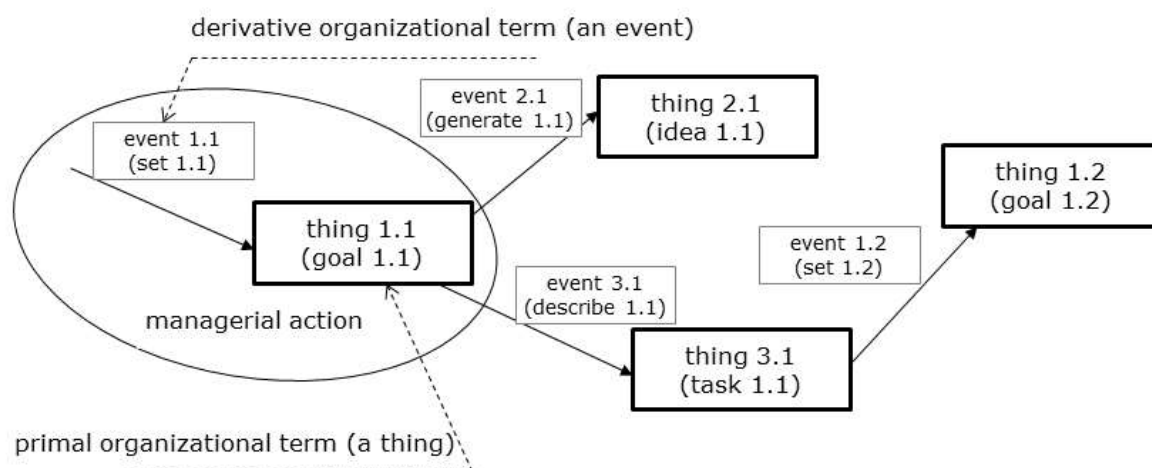


Figure 1. The fundamental structure of team management research
Source: Own elaboration

According to the logical division, organizational terms are divided into two classes: primal and derivative organizational terms. Facts, which are things (primal organizational terms) in the organizational reality, represent resources. Facts, which are events (derivative organizational terms) in the organizational reality, represent processes. By the same token, the system of organizational terms combines the resource approach and the process approach in team management research. It combines team management processes that effect in team's resources. Such an approach to the ontology of team management lets represent all such processes by standardized features vectors with data grouped in content, time and psychosocial domains (Flak *et al.* 2017b).

The second dimension of the theoretical foundation of the research concerns a method of gathering data on team management. One of the assumptions is that data should be recorded in a way, which allows representing a manager and his team members by managerial actions. The best way of recording managerial actions in team management is using online management tools, which a manager and his team members use during day-to-day work (Flak, 2018c). The online management tools recording information in time, content and human relations domains were implemented as a research platform called TransistorsHead.com, As it is shown in Figure 1, when a manager sets a goal (a managerial action represented by *Event 1.1 - set 1.1*), the research tool records features of *goal 1.1* in content, time, and human relations domains. If later (e.g. after describing a task – *describe 1.1* and *task 1.1*) this manager does the next set of the same goal, he launches the next team management process. Then

the features of this team management process are changed and represent the second version of this team management process (*set 1.2* and *goal 1.2*). The difference between features of *goal 1.2* and *goal 1.1*. let do reasoning on the team management process which happened in this period (Flak *et al.* 2017b).

The research tool at the same time is the management tool, which can be used either by managers in team management or by their team members. The research tools record the changes in managerial actions and it reminds making a movie of teamwork with frames of different managerial action features.

At present in TransistorsHead.com there are 10 different tools for different management techniques, such as: setting goals, describing tasks, generating ideas, specifying ideas, creating options, choosing options, checking motivation, solving conflicts, preparing meetings and explaining problems. The main scientific role of every management tool is recording a certain managerial action. The gathered data is divided into two parts: (1) a time domain and (2) a content domain. In the time domain (1) all button clicks are registered in the function of time. Therefore it is possible to conclude what a manager did. Figure 2 and Figure 3 show the dashboard of Transistorshead.com with the example of the managerial action called SET GOALS (the name of the goal: EBES paper). At the top where managers can choose working with tools (TOOLS default), administer members of their teams (TEAM), hide some created items (derivative organizational terms) into an archive (ARCHIVE) and read instructions on how to use the tools (TELL ME ABOUT). There are also functions like login, logout, and changing password, etc. The main menu consists of 10 different tools for team management, e.g. set goals, describe tasks, specify ideas, create options, etc.

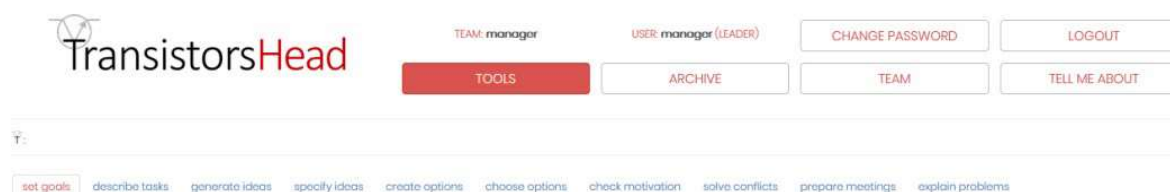


Figure 2. The dashboard of the management tools platform

Source: Own elaboration

Figure 3. Goal named „EBES paper” being edited in the „set goals” online management tool

Source: Own elaboration

The idea of managerial action research by the observation has been already used in the past. There can be found an approach to research called time-motion study (Barnes, 1980) used in production (Al-Saleh, 2011), healthcare services (Lopetegui *et al.* 2014), process of

physical workers (Magu *et al.* 2015), and at least, to some extent, in managerial work (Tengblad, 2002). This approach is also similar to one of the first research in the field of scientific management, made by F. and L. Gilbreth at the beginning of the 20th century (Karsten, 1996). They investigated human motions at work, which was the beginning of workforce automation in many industries (Spriegel and Myers, 1953). However, recording team managerial actions in such an extended scale and at this level of accuracy has yet not be done before as using the system of organizational terms.

In Section 4 there are the results of a long term, non-participating observation of managers in a given project with the use of the system of organizational terms and online management tools in Transistorshead.com focused on estimating similarities in team management.

4 Results of the research

The long term, non-participating observation of managers took part from 14th May 2019 to 4th June 2019. The managers were students of Human Relations Management at the Faculty of Psychology at the University of Silesia in Katowice. They were to conduct a given project from the idea to the final presentation which concerned organizational solution in Polish universities aimed at development in scientific achievements of academics. The students were working in teams of 4-5 persons, every team has a defined manager who led the team. All of the members of teams were using the online management tools in Transistorshead.com, a research platform available by an Internet browser (on laptops or mobiles).

The problem to solve by students: one of the main Polish universities planned to be a scientific university from 2020, however, until now most of the academics spent most of time and effort on teaching (lectures, seminars, etc.) instead of scientific work (scholarships, scientific projects, publications, etc.). The effect of their work was a public presentation of (1) a design of organizational solution (motivating academics into this change of tasks) and (2) a plan of implementation and a budget. Students were assessed by, firstly, the content of the solution (its adequacy and innovation) and, secondly, the intensity of their teamwork. This second aspect was recorded by the online management tools in TransistorsHead.com which they used in their teamwork.

During this task more than a dozen or so thousands of managerial actions were recorded which were done by all team members in eleven teams, however, in this paper, only managerial actions done by managers are taken into conclusion. To estimate a level of similarity in team management five team managers were selected. The reason is that these five managers were given the task together with the online management tools and they were free in choosing a way of actions. The rest six managers were given additional instructions describing the best sequence of managerial actions. So that only "free-minded" managers can be compared one to another in terms of their managerial similarities.

The level of similarity in team management can be described by three main areas of indicators. Firstly, in Table 1 general statistics show how many managerial actions were done by every manager, when they started and finished their teamwork and how much time it took. Secondly, the potential similarity is estimated by the comparison of managers in perspective of the number of things and their versions (see Figure 1) made by managerial actions. The detailed data were presented in Table 2 and Table 3. Thirdly, there are trajectories of team management of all managers – a type of managerial actions as a function of time – shown on Figures from 4 to 8.

Firstly, Table 1 shows how many separate managerial actions were taken by every manager, when they started and finished their work and how much time their teamwork took in this project. Although all managers had defined a period of work on this project, two of them finished much earlier and only one of them was working with his team until the very end. That is why the period of teamwork is different for each manager. What is important to understand the results of the research: there were 10 online management tools in Transistorshead.com which covered and recorded 10 different managerial actions: (1) setting goals, (2) describing tasks, (3) generating ideas, (4) specifying ideas, (5) creating options, (6) choosing options, (7)

checking motivation, (8) solving conflicts, (9) preparing meetings and (10) explaining problems. So, a total number of managerial actions contains also repeated actions (for example a certain number of setting goals).

The most intensive teamwork was done by Manager 3 who took 446 managerial actions. The most “lazy” manager was Manager 4 who took only 120 managerial actions during a longer period of teamwork (1766355 seconds) comparing to a period of teamwork (1581591 seconds) used by Manager 3.

Table 1. General statistics on managerial actions taken by managers

Manager no.	Total number of managerial actions	Date of start	Date of finish	Period of teamwork (in seconds)
Manager 1	293	14.05.2019 10:55	28.05.2019 10:20	1207523
Manager 2	328	14.05.2019 10:53	28.05.2019 21:57	1249484
Manager 3	446	14.05.2019 10:53	01.06.2019 18:13	1581591
Manager 4	120	14.05.2019 10:57	03.06.2019 21:37	1766355
Manager 5	134	14.05.2019 11:01	04.06.2019 20:53	1849956

Source: Own elaboration

Secondly, in Table 2 there are number of things (elements of managerial actions – see Figure 1) created by managers working with online managerial tools. These numbers mean that a manager started a certain managerial action (for example set goals – see Figure 1) and he saved data afterward. Other words we can say that he finished a certain managerial action. During the task, there were many cases when managers started managerial actions but they resigned from finishing them by closing a tool or an Internet browser. As we can see in Table 2 Manager 3 created 25 things (finished managerial actions effectively) whereas Manager 1 made only 6 effective managerial actions. It is difficult to point any general similarities in the perspective of numbers and types of managerial actions taken by managers. For example, only Manager 3 and Manager 5 made managerial actions called explain problems when the others did not do it. Even if we compare these two managers, a number of different managerial actions called explain problems are different.

Table 2. Number of things created in managerial actions by managers

Name of a managerial action (and the online management tool)	Name of a thing created in a managerial action (recorded by the online management tool)	Manager				
		Manager 1	Manager 2	Manager 3	Manager 4	Manager 5
set goals	setting	2	4	7	3	1
describe tasks	description	1	4	7	1	3
generate ideas	generation	2	2	4	1	0
specify ideas	specification	0	1	1	1	3
create options	creation	1	1	1	1	0
choose options	choice	0	0	3	0	3
check motivation	check-up	0	0	1	1	0
solve problems	solution	0	0	1	1	0
prepare meetings	preparation	0	0	0	0	0
explain problems	explanation	0	4	0	0	1
Total number of things		6	16	25	9	11

Source: Own elaboration

When we see numbers of things' versions created by managerial actions (see Figure 1), presented in Table 3, astonishingly it appears that the most of things' versions were created not by Manager 3 but by Manager 1. What is important, Manager 1 made only 6 different managerial actions (see in Table 2: 2 setting goals, 1 describing tasks, 2 generating ideas and 1 creating options), but he made a lot of changes in them (Table 3). Otherwise, Manager 5 created 11 things by managerial actions (Table 2) and he did only 17 changes in them (Table 3).

As it is presented in Table 3 comparing to Table 2, Manager 5 did not create other versions of a description (describe tasks) and an explanation (explain problems). The reader of this

paper should compare numbers in Table 2 and Table 3 as a matrix of a type of managerial actions and a number of a manager (e.g. set goals and Manager 1, generate ideas and Manager 3, etc.). As can be noticed after such an analysis there are no similarities between managers in case of the number of created things and their versions in taken managerial actions.

Table 3. Number of things' versions created in managerial actions by managers

Name of a managerial action (and the online management tool)	Name of a thing created in a managerial action (recorded by the online management tool)	Manager				
		Manager 1	Manager 2	Manager 3	Manager 4	Manager 5
set goals	setting	24	11	11	2	2
describe tasks	description	2	11	8	4	3
generate ideas	generation	25	17	5	6	0
specify ideas	specification	0	2	3	4	5
create options	creation	13	2	1	2	0
choose options	choice	0	0	3	0	6
check motivation	check-up	0	0	2	2	0
solve problems	solution	0	0	1	8	0
prepare meetings	preparation	0	0	0	0	0
explain problems	explanation	0	12	0	0	1
Total number of things' versions		64	55	34	28	17

Source: Own elaboration

Thirdly, managers were managing teams by online management tools that recorded their managerial actions. Owing to the fact, it is possible to present the trajectory of 10 recorded managerial actions on a timeline in histograms of team management. The trajectories of all managers are presented in Figures 4 to 8, respectively. Numbers in types of managerial actions mean: 0 – no managerial action, 1 – set goals, 2 – describe tasks, 3 – generating ideas, 4 – specifying ideas, 5 – creating options, 6 – choosing options, 7 – checking motivation, 8 – solving conflicts, 9 – preparing meetings, 10 – explaining problems.

After analysing these histograms of team management done by all managers it comes to a conclusion, that there is no similarity of managers in team management in this given project. All trajectories of team management are completely different from one another. For example, Manager 1 was changing a type of managerial action very often comparing to Manager 3 who was very stable in making one type of managerial action in a longer period. At the beginning of teamwork Manager 1 was explain problems (10), whereas Manager 4 took this managerial action in the late part of his teamwork.

Seemingly, a trajectory of Manager 1 is quite similar to a trajectory of Manager 3. However, this is only a visual similarity – the graphs seem to be similar. When it comes to details, all parameters of trajectories are different: a sequence, a type of managerial actions, durations of managerial actions, etc.

To sum up, these trajectories unambiguously show that there is no similarities in team management made by managers in the given project, although all manager were given the same task, the same conditions and the managers had similar knowledge and management skills.

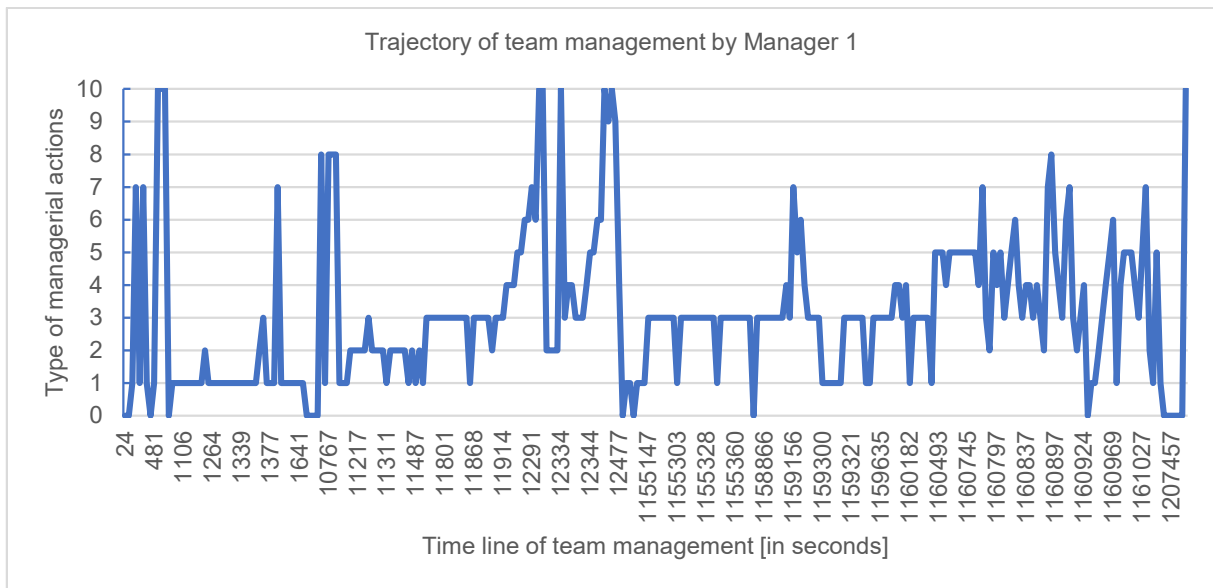


Figure 4. The trajectory of team management by Manager 1
Source: Own elaboration

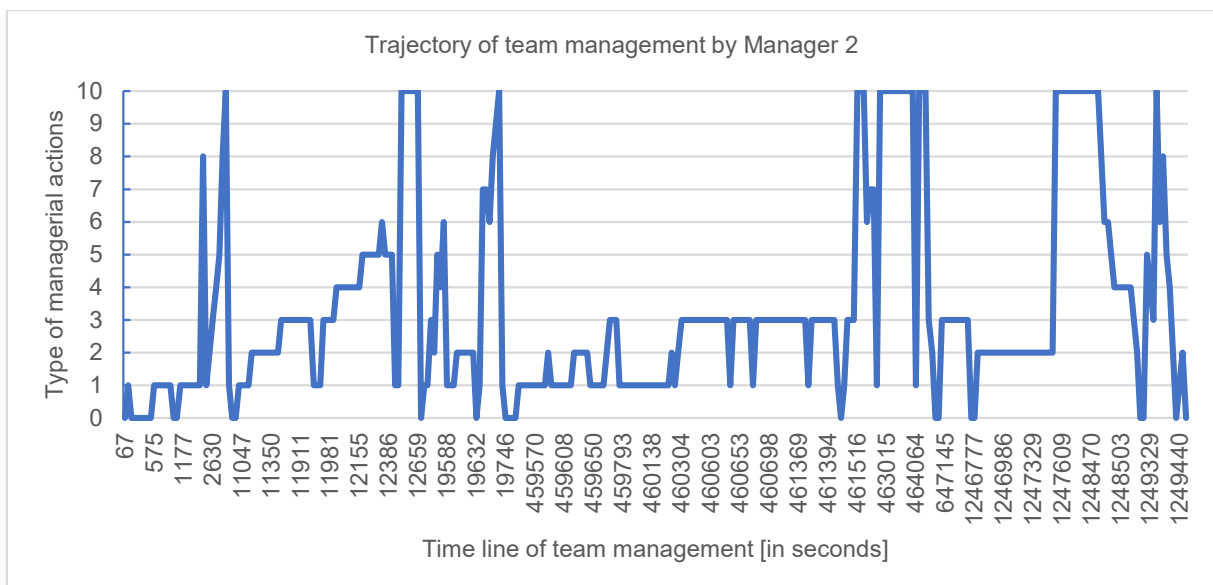


Figure 5. The trajectory of team management by Manager 2
Source: Own elaboration

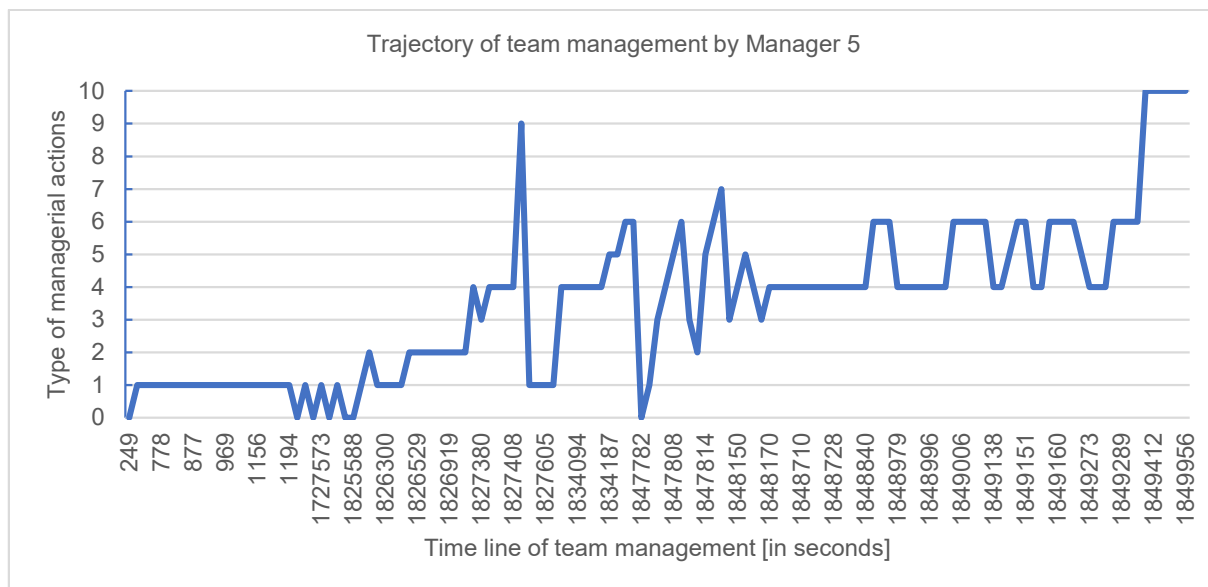


Figure 8. The trajectory of team management by Manager 5
Source: Own elaboration

5 Conclusions

In Section 2 the historical context of research on team management was presented. The most important concepts of team management were management styles, management roles, and management skills. These concepts are well-known and exploited in field research, however, these terms are not adequate to answer the simple question: *what does a team manager really do?* Answering this question is the first step towards team management automation and replacing team managers with robots in the future.

In order to determine what a team manager does the theoretical foundation called the system of organizational terms was designed. From the empirical point of view, online management tools in Transistorshead.com were used as research tools. Managers in a given project can be recorded when managing their teams by online management tools which recorded managerial actions taken by managers and their team members.

Data gathered in this long-term, nonparticipating observation let analyse team management of five managers in three areas: general statistics (Table 1), the comparison of managers in perspective of number of things and their versions made by managerial actions (Table 2 and Table 3) and trajectories of team management of all managers (Figure 4 to 8).

The conclusion is that there is no similarity in team management made by managers who took part in the observation. It is astonishing because of the simple conditions of the task and characteristics of managers. So it seems not so easy to look for patterns in team management even having an effective research methodology – the system of organizational terms and online management tools as research tools. Therefore the idea of team management automation is not so easy to implement as it seems. If it is true that all managers have their trajectories of team management, it would be extremely difficult to do effective pattern recognition in a group of managers. Then the only patterns would be only personal ones. This issue will be examined in the next research projects of the author.

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