

Model of Scrum Team Reaching an Effective Level

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The article proposes to consider the possibility of predicting of reaching a stable level of “speed” for the implementation of project requirements by project teams when implementing projects using such an approach that is well-known throughout the world and gaining popularity in the post-Soviet space as Scrum. It is proposed to consider such a characteristic of an effective project implementation team as self-organization from the point of view of group dynamics and the need for purposeful management of minimizing the time to achieve maximum productivity.

Keywords: Scrum, productivity, project life cycle, self-organization, group dynamics, team effectiveness, Belbin role model.

Introductory part. The last decade in the field of project management, the so-called “flexible” management methods, in particular in software development, are becoming increasingly popular; this concerns such a framework as Scrum [1]. Moreover, this approach has been increasingly applied in other areas of activity. At the same time, of course, both customers and project executives still continue to concern about the attainability of the expected results both in time and in terms of the costs that must be incurred to create the product and put it into operation.

Problem statement. When implementing projects with fixed technologies and content, it is enough to simply predict the content of the work, respectively, select qualified work executives and rely on the most predictable estimates of the duration and resource intensity of project tasks. Unfortunately, in systems with dynamically changing requirements it is far from always possible to easily and simply evaluate such parameters, although there are also methods for this [2]. There is a concept of “speed” of the work performed by the team and recommendations for its measurement, including a very original technique [3]. Nevertheless, there is also a dependence of the project team ability to work with maximum productivity on how well coordinated the work of all project participants is, in particular how successfully it is possible to distribute and redistribute the roles of participants in such “self-organizing” teams. For better understanding of some of the elements of group dynamics, it may be worthwhile to give some basic principles of team forming to beginner specialists in project management.

Main part. The subject of work related to group dynamics, in particular, the discussion of the most famous models of B. Tuckman [4] and D. Levy [5] appeared a long time ago and continues to develop actively. Noteworthy is the “mix” of the Tuckman group dynamics model in relation to the project timeline proposed by V. Hugenrad, and in his model the sprint is the unit of time scale [6]. Perhaps, for the first time, these two approaches are combined in it, as shown in Fig. 1. Time in sprints is on the X axis, the level of the project team work efficiency is on the Y axis.

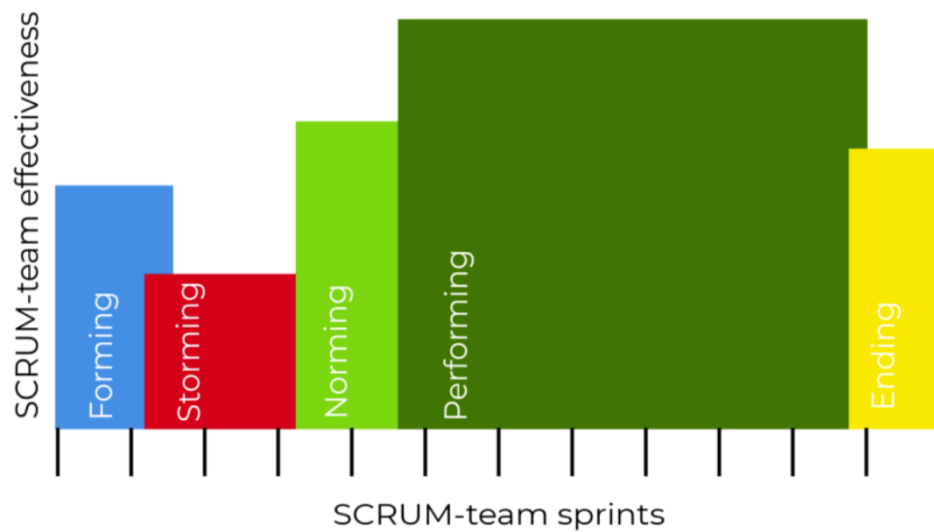


Fig. 1. Graph of the Scrum project team development (according to [6])

In some works of the author devoted to role models of project teams [7, 8], an attempt was also made to mathematically substantiate such relationships throughout the project life cycle [9].

Methodology. One of the "silver bullets", which is referred to as a universal recipe for the success of the project team (again, based on, first of all, the definition of the development team in Scrum), is self-organization. But, as rightly noted in the already mentioned work [2]: "It is obvious that in order to master Scrum, it takes time. There are new roles and activities in it. And, especially hard, it requires the adoption of new values. We have to give our developers the opportunity to organize themselves to do the work. It is easy to convene Scrum rallies and call each other new Scrum roles. But in fact, it's very difficult to really make Scrum." What can we say about those situations when there is a need to implement projects where "just Scrum" is already insufficient? One can hardly expect a quick and painless "self-organization" from the project team, if, of course, it is no longer an established team. At a minimum, at the initial stage of team building, you need to understand the main roles and their interaction. For Scrum, these are the roles of the product owner and the scrum master. As the main tools for researching the project life cycle, the effectiveness (and speed) of the work of project teams, we will consider the following set:

- a) Model of B. Tuckman [4]
- b) Model of R. Belbin's roles in an effective team [10]
- c) Scrum roles [1]

You can expand the list of models used, but for the general picture of the above, it is enough, in particular, the author also uses the Belbin role model [5], as well as the Drexler-Sibbet model [11] of the team reaching the maximum performance level.

We use the PAEI model to demonstrate the basic idea of I. Adizes that it is impossible to be equally well (and ideally excellent) to be developed (and maintain this level constantly) in all four (PAEI) areas / role styles / preferences .

We need B. Tackman's model to understand the importance of controlling the dynamics of the team reaching the most productive mode (ideally, of course, also effective). In the logic of such an approach as Scrum, this can be associated with achieving and maintaining a high "speed" of the team's work as the ability to "digest" a certain total indicator of the "complexity" of the selected sprint backlog content during the sprint.

Roles Scrum we need in order to do a "mapping" with the corresponding "roles" in the PAEI model of I. Adizes.

Results. It should be noted, as was already shown in [6], that the necessity of taking roles by the project team members is also due to the fact that without this it is hardly worth hoping to establish a further effective communication process. In particular, in [7] it is proposed, on the basis of the Markov model of communications constructed by the authors, to consider the following transition process diagram between the "subroles" of the project participants in the logic of R. Belbin's model (Fig. 2). As you can see in the transition process diagram, at least five "steps" are needed in the constructed discrete model based on the transition probability matrix for an optimized role interaction process, so as to ensure the most efficient project implementation (p_{10}). The transition process diagram presented in Fig. 2 between the following components of role communication in the project team after stabilization

(five modeling steps) shows the following distribution: p_1 – resource investigator, p_2 – plant, p_3 – coordinator, p_4 – team worker, p_5 – shaper, p_6 – specialist, p_7 – implementer, p_8 – complete finisher, p_9 – monitor evaluator, p_{10} – actually, the project – with all its properties and changing requirements.

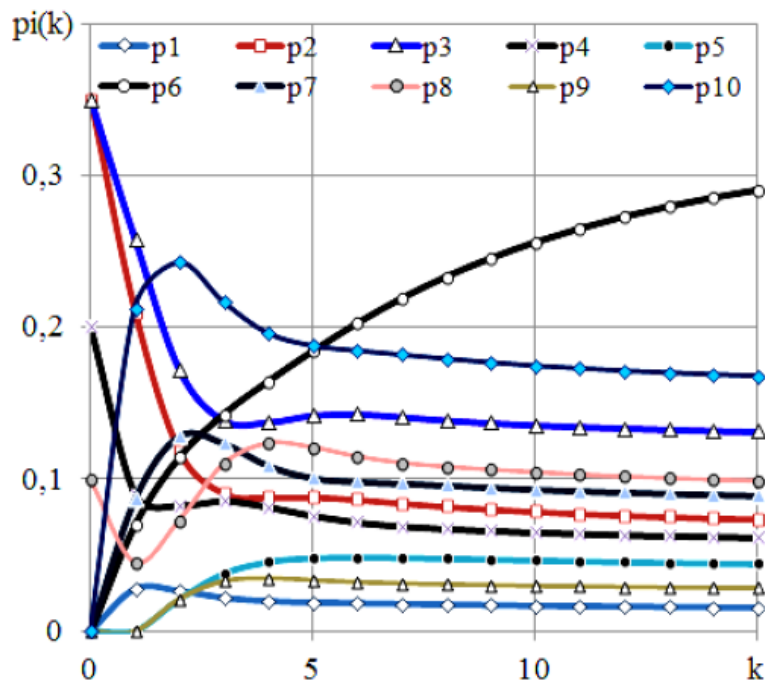


Fig. 2. Transition processes in the project team communication system (according to [7])

In the diagram, in descending order, after the 5th step (each of the “steps” in this case can be interpreted as a “sprint”, similar to the model logic given in [9]), the following hierarchy of project communications is built: p_6 – specialist > p_{10} – project > p_3 – coordinator > p_8 – complete finisher > p_7 – implementer > p_2 – plant > p_4 – team worker > p_5 – shaper > p_9 – monitor evaluator > p_1 – resource investigator.

Discussion. Of course, the presented results of the study are rather descriptive, but, on the other hand, it allows us to formulate a number of hypotheses that will be interesting to verify, including using quantitative analysis methods, namely:

a) analysis of other role models, such as the already mentioned Drexler-Sibbet model and the construction of corresponding mathematical models for them (based on Markov systems) with the analysis of transients, should lead to similar results (the number of “steps” - “sprints” should not be significant differ);

b) if hypothesis is true a) it is possible to carry out mapping work (analysis of the equivalence of roles and their combinations from one role model to another);

c) to conduct a serious quantitative study, in particular, based on the analysis of “combustion diagrams” of tasks in projects implemented by various teams of performers with a view to the output of such teams at planned maximum performance and predictability (“velocity”). The main idea is that the first 5-6 sprints should not be expected from the teams to unconditionally match the “plan” and the “fact”, regardless of the qualifications of the team members (an exception may be for teams coming to a new project entirely after successful implementation of the previous - definition, already in the required state of maximum efficiency).

On the other hand, the results obtained can also be considered as an occasion for a possible correction of the hypothesis expressed by M. Belbin [10] about the need for a balance between the carriers of various role-playing patterns in the team in order to achieve the maximum level of team work overall. At least in the practice of one of the authors of this article, there is a steady upward trend in the imbalance in the distribution of roles in truly successful and effective teams when analyzing the results of testing of their participants. Initially, such an imbalance was found in the dynamics of changing role relationships in the environment of a permanent organization, within the framework of which projects were initiated with sufficient frequency, the participants of which were the same people, and it was possible to observe such a pool of human resources for several years. Research in this direction continues now [13].

When using the Belbin test in working with teams and creating “team profiles”, the hypothesis of an “unaccounted team member” arose for the first time when a successfully functioning organization was tested that

implements various projects related to the development and release of new products consisting of various combinations of employees in project teams, where the most obvious imbalance was found in an unexpected place - directly in the team of top managers of this enterprise (for the first time - data for 2009). In the described case [12], one of the modifications (9-role model) of the standard Belbin test was used, which at that time usually contained eight roles. Significantly different from all the roles of the "Controller" and "Analytics" in the overall standings. An analysis of this situation showed that part of the team-wide functionality was nevertheless given by the most "vivid representatives" of various roles, but, nevertheless, no "bright Controllers" and "bright Analysts" were found.

This particular company in question had, as it turned out, an automated enterprise management system that was sufficiently developed for its time, which can be attributed to the class of ERP systems not only by the name of the software package, but also by the functionality actually used. It was these results that first became the basis for the hypothesis of the existence of an "invisible team member" - the enterprise information system. Moreover, for such a participant "on his behalf" a test was also passed, which showed even somewhat unexpected results: for example, for the "information system" there were non-zero values for the roles "Innovator" and "Mediator".

Conclusion. Definitely, further research in this direction will be of both scientific and practical interest, on the other hand, the data and conclusions obtained even in this way allow making a general conclusion that it is necessary to take into account the logic and pace of transformation of the project "participants" to the project "team", for which it makes sense, at least, to create conditions for the speedy passage in the team, first of all, of the processes associated with the formation of the project team without expecting that the newly formed team will be able to achieve high productivity from the first days / sprints of the project team. Perhaps, to reduce the time the project team reaches the maximum level of productivity, the first 5-10 sprints should work in weekly sprints mode (in the logic of the Markov model constructed by the authors, one "discrete step" is equal to one "sprint", as some kind of communication cycle from adoption decisions on the content of the sprint before conducting a retrospective on its completion), where the main task will be primarily to create a team.

References

1. The Scrum Guide™. The Definitive Guide to Scrum: The Rules of the Game [Electronic resource] // Available at: <https://www.scrumguides.org/docs/scrumguide/v2017/2017-Scrum-Guide-US.pdf> – Accessed: 10.11.2019.
2. Cohn M. Agile estimating and planning. – Pearson Education, 2005.
3. Sutherland J., Sutherland J. J. Scrum: the art of doing twice the work in half the time. – Currency, 2014.
4. Tuckman B.W. Developmental sequence in small groups // Psychological bulletin. – 1965. – T. 63. – № 6. – P. 384.
5. Levi D. Group dynamics for teams. – Sage Publications, 2015.
6. Wim Hoogenraad Team formation of SCRUM teams, that is sometimes disappointing [Electronic resource] // Available at: <https://ru.itpedia.nl/2019/04/29/teamvorming-van-scrum-teams-dat-valt-soms-tegen/> Мрачный Скрам – Accessed: 10.11.2019.
7. Kolesnikov O. et al. Development of the model of interaction among the project, team of project and project environment in project system // Eastern-European journal of enterprise technologies. – 2016. – №. 5 (9). – P. 20-26.
8. Lukianov D. et al. Development of the markov model of a project as a system of role communications in a team // Eastern-European journal of enterprise technologies. – 2017. – №. 3 (3). – P. 21-28.
9. Pitera V. et al. Development of the Markovian model for the life cycle of a project's benefits // Eastern-European journal of enterprise technologies. – 2018. – №. 5 (4). – P. 30-39.
10. Belbin R.M. Team roles at work. – Routledge, 2012.
11. Drexler A. B., Sibbet D., Forrester R. H. The team performance model // Team building: Blueprints for productivity and satisfaction. – 1988. – P. 45-61.
12. Lukianov D.V. Transformation of team roles in projects in the digital age / D. V. Lukianov, V. A. Sidorov // Materials of the XV International Conference "Project Management in the Development of Society". Kyiv, KNUBA, 2018 - T.1 - P.130-133
13. Sherstyuk O. et al. The research on role differentiation as a method of forming the project team // Eastern-European journal of enterprise technologies. – 2016. – №. 2 (3). – P. 63-68.