ON THE MOTIVATION OF SOFTWARE TEAMS

This briefing reports scientific evidence from a rapid review on factors that impact software teams motivation as well as as strategies that can be applied to enhance teams' motivation.

FINDINGS

FACTORS THAT IMPACT SOFTWARE TEAMS MOTIVATION

A scientific research with 176 software engineers from 20 software companies located in Recife-PE, Brazil, identified the motivators on Table 1. Motivators are capable to increase the motivation and determine the individual behavior, while Hygiene factors are not capable to generate motivation, but if not properly treated, can cause dissatisfaction, and thus repulse some action.

Hygiene Factors	Motivator
H_1 Appropriate Physical conditions	F_1 Work with people
H_2 Appropriate technological conditions	F_2 Development practices
H_3 Competitive salary	F_3 Participation in the entire life cycle of the project
H_4 Benefits	F_4 Changing Routine
H_5 Good management	F_5 Challenging goals
H6 Equity	F_6 Problems resolution
	F_7 Experimentation
	F_8 Creativity
	F_9 Meaningful products
	F_{10} Decision making
	F_{11} Balance between personal and professional life
	F_{12} Technical development
	F_{13} Exercise broad personal skills
	F_{14} Feedback
	F_{15} Rewards and financial incentives
	F_{16} Career development
	F_{17} Empowerement
	F_{18} Identification with task
	F_{19} Autonomy
	F_{20} Working in successfull company

Table 1. Motivators Set.

STRATEGIES TO IMPROVE MOTIVATION IN SOFTWARE DEVELOPMENT TEAMS

- **Gamification:** This strategy incorporates game mechanics to make tasks more attractive. Gamification in software projects can be organized as a set of challenges that need to be fulfilled. Among the scientific studies found in this rapid review, at least five provide detailed evidence on how gamification can improve team's motivation, engagement, and performance. To illustrate, a research proposed the GOAL framework to gamify developers activities. It is composed of an ontology, a methodology guiding the process, and a support gamification engine. A case study was successfully conducted in a Spanish small/medium (25 people) software development company. Another research proposed the Scrum Hero Framework. It gamifies the planning and the management of software projects based on Scrum. Scrum was mapped as a game with rewards and levels based on RPG games. When applied in a real-world project, releases were on time in 75% of cases, increasing by 55% compared to historical data of the company.

- **War Rooms:** It is a closed room where development team stay very close to each other, with no interruptions and focused. Some scientific studies has showed this strategy can improve team's motivation and performance. For instance, a research analyzed teams 's perception of six projects that used War Rooms, and in a scale of 1-5, the development teams reported a mean 4.15 of satisfaction.

- **Project-to-Project Job Rotation:** It systematically moves employees from project to project, within an organization, as a way to reduce monotony, and exhaustion due to job simplification, and repetition. A group of researchers conducted scientific case studies in Brazilian software companies and observed that job rotation increased knowledge exchange, and motivation among the teams.

- **Motivational Programs:** This strategy is based on a scientific research with 176 software engineers from 20 software companies located in Recife-PE, Brazil. The following steps can be used to assist the definition of motivational programs for software engineers, as depicted in Figure 1:

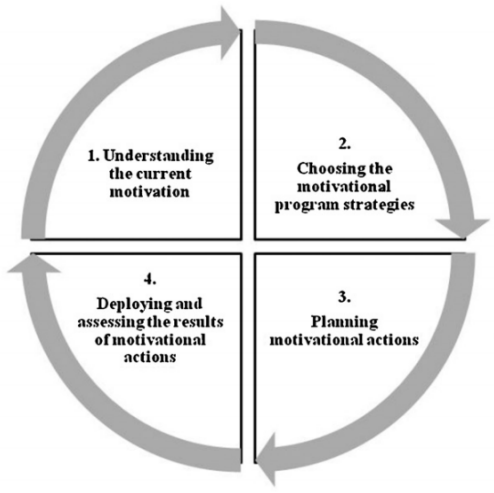

Figure 1. Steps to define a motivational program.

1. *Understanding the current motivation*: Applying a questionnaire to evaluate the value each motivator (Table 1) with the development team. From the results of the questionnaire, one can identify the motivation problems looking at the motivators with lowest values.
2. *Choosing the motivational program strategies*: First you should identify what is the type of your team among those: Tactical Team, Creative Team, Problem Resolution Team. Then, based on the questionnaire result, the motivational factors with more deficient motivators become a strategic priority for the motivational program if they are listed as important to your type of team. Table 2 shows which motivators are important for each type of team.
3. *Planning motivational actions*: after choosing the strategic motivational factors, the organizations may want to prioritize them according to the number of deficient motivators they represent and/or other organizational priorities. Figure 2 is an example of a motivational strategy. From this prioritized set of motivational factors, actions can be defined to enhance motivation.
4. *Deploying and assessing the results of motivational actions*: once defined the actions that are sought to increase motivation, they must be deployed in practice. Monitoring the results of the actions should be performed, and this would lead back to step 1 in a continuous cycle.

	Acceleration Factors	Innovation Factors	Tension Factors
(I)	F_1	F_8	F_6
(O)	F_2	F_4 F_7 F_{18}	F_{14}
(T)	F_5 F_{11}	F_{13} F_{19}	F_3
(S)	F_{15} F_{12}		F_{10} F_{16} F_{17}
(G)		F_9 F_{20}	

Table 2. Categorization of Motivators.

	Steps	Scope (O)	Scope (T)	Scope (S)
Hygiene Factors	0	H_5 H_6	H_2 H_1	H_3 H_4
Motivators	1	F_{14}	F_3	F_{17}
	2	F_2	F_{11}	F_{10}
	3	F_7	F_5	F_{16}
	4	F_{18}	F_{19}	F_{12}
	5	F_4	F_{13}	F_{15}

Figure 2. Example of Strategy for a Problem Resolution Team

What is a Rapid Review?

It is a process that searches for scientific studies about a specific topic, extracts relevant evidence and synthesizes the findings in order to support decision-making in real-world software development projects.

Who is this briefing for?

Software engineers who want to make decisions to enhance teams' motivation based on scientific evidence.

Where the findings come from?

All findings of this briefing were extracted from 35 scientific studies about software teams' motivation, identified on a rapid review.

Where can the complete scientific studies be found?

On the link at the dark bar on the bottom of this briefing.

What is NOT included in this briefing?

Findings that are not based on scientific evidence.

For more evidence briefings like this, access:

http://cin.ufpe.br/eseg/evidence-briefings

For additional information about ESEG research group:

http://cin.ufpe.br/eseg

PRIMARY STUDIES REFERENCE

http://bit.ly/2F8IrXG