Onboarding Models for Software Projects: An Ad-hoc Literature Review

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Abstract. *New hires usually should learn about the working process, organization structure, and company corporate culture and to be acquaintance with a very new environment. It requires company to organize throughout a well-planned onboarding process, but many companies are not aware of onboarding models and how to support onboard process to become more efficient. We aimed to characterize the main methods through an ad-hoc literature review. We provide practitioners and researchers with the rationale to identify onboarding models and characteristic of the main methods relate to onboarding Software Engineering.*

1. Introduction

Onboarding is a process of supporting newcomers to adjust either social, cultural, performance aspects in their new jobs in the way that this is supposed to be quickly and smoothly [Bauer 2010][Cable *et al* 2013][Meyer and Bartels 2017][Britto *et al* 2017]. Companies that engage to an onboarding planning, a step-by-step program for newcomers, to support them on learning what their role are, what the organization norms and how they are to behave, are more onboarding effective than those organizations that do not. Adopting onboarding strategy plays an important role in whole onboarding process [Bauer 2010]. However, many companies are not even aware of these existing models or cannot distinguish them. This paper aimed to identify and describe methods proposed on literature and to map main characteristic and context applied. We identified 7 existing models representing steps for an outsider to become an insider, through a socialization process, and provided a summary of existing onboarding models and main characteristic to research and field application.

2. Background

Onboarding has been a recurring subject of research in software engineering. Meyer and Bartels (2017), for example, showed that the use of a planning and structured onboarding model enhances rates of perceived utility, organizational commitment, perceived organizational support and job satisfaction. Britto *et al* (2017) reviewed onboard models in literature, and identified, in the context of geographically distributed development, that

the most common strategy adopted is coaching and mentoring, although it is only semi-formalized. Still in the context of Global Software Development (GSD), Moe *et al* (2020) observed that even if one organization applied the same practices and strategies for onboarding of all new employees, the results are affected by several factors such as the domain and complexity of the teams, the type of team, and availability of teammates.

Sharma and Stol (2020), based on survey data, argued that a successful onboarding is associated to higher levels of job satisfaction and workplace relationship quality. Their data also show that providing support is the single most important factor predicting onboarding success, while trainings programs do not seem to be enough. Cable *et al* (2013) conducted an experiment at the Wipro company and also evidenced that planned and structured onboarding process raised to positive results with employees being much less likely to quit jobs in the first six months, customer evaluation to be significantly more positive, beneficial effects on employees' attitudes and behavior, and increased work engagement and job satisfaction. Steinmacher's series of studies [2014, 2018, 2019] analyzed the context of Open Source Projects (OSS) and detected barriers for effective onboardings as well as ways to overcome them, and proposed the FLOSScoach tool, a tool for supporting newcomers, to make them feel oriented and more comfortable with the process. Fagerholm *et al* [2013, 2014], in turn, mapped characteristics of OSS projects that affect the onboarding process and observed that mentored developers have three times more activities (commits, pull requests, interactions) in projects than non-mentored developers.

3. Onboarding Models

Based on these previous studies, conducted in the software engineering field, we synthesized referential models to guide onboarding planning initiatives. In the context of more traditional co-localized development, we noticed that models were imported from business literature. However, when it comes to mode advanced ways of software development (such as GSD or OSS), specific models have been proposed, as can be seen in the list below:

- *The Traditional process*: according to Cable *et al* (2013) a traditional approach is organized around transferring culture to new employees. Newcomers undertake team training where, in the first days, they learn about the company and receive human resources information; after, they are expected to exhibit competency in the English language. Next phase, it is training in customer service with supervision to, finally, take this position. At this point, employees would have a clear understanding of norms and behaviors valued by the company.
- The *Onion Model*: proposed by Nakakoji *et al* (2002) to express developer steps to overcome from a passive user to a core member in an OSS project. It is based on roles that OSS community members play in the community, and the structure of the community defined by the collaborative relationship among those different roles.
- The *Developer Joining Model*: proposed by Steinmacher *et al* (2014), represents stages, as the developer assumes progressive roles: outsider, newcomer, contributor, member. Also, it maps forces that influences the progress from one stage to the following: motivation, attractiveness, retention. Besides, they mapped hindering factors that can be critical to the joining process becoming obstacles to newcomers and contributors to contribute.

- *The personal identity socialization model*: Cable et al (2013) proposed the personal identity model which involves encouraging newcomers to express their unique perspectives and strengths on the job from the very beginning. Group members emphasize their personal identity and bring to the job their signature strengths and unique perspectives.

- *Onboarding Characterization Framework*: van Maanen and Schein (1979) developed a theoretical framework based on six dimensions as tactics for socialization used in a wide variety of organizations. According to them, onboarding models can be characterized as: (1) collective vs. individual; (2) formal vs. informal; (3) sequential vs. random; (4) fixed vs. variable; (5) serial vs. disjunctive; and (6) investiture vs. Divestiture. Further research has shown that different tactics will lead to distinct results [Britto *et al* 2017].

- *Onboarding Types:* Jones (1986), based on van Maanen and Schein's model, proposed that all those dimensions can be reduced to two, namely: (1) *Institutionalized*: formed by collection of collective, formal, sequential, fixed, serial and investiture dimensions, which occurs when these tactics are applied in structured onboarding strategies by organizations together with a formal group orientation and mentoring [Britto *et al* 2017]; and (2) *Individualized*: formed by collection of individuals, informal, random, variable, disjunctive, and divestiture, which occurs when newcomers receive organization norms, values and expectations at the beginning of the onboarding, and they start the role activities to assimilate role responsibilities on-the-job.

- *Multilevel onboarding model:* Bauer (2010) identified four levels to accommodate the organization's legal, performance, cultural, and relational dimensions (4C's): (1) *Compliance*: refers to ensuring newcomers receive basic legal and policy-related rules and regulations and represents the basic level that most organizations apply to the onboard programs; (2) *Clarification*: refers to ensuring that newcomers receive and understand information about its role and all related expectations; (3) *Culture*: provides newcomers with organization norms, including both formal and informal; and (4) *Connection*: refers to building effective interpersonal relationships and information networks. According to Bauer, the level of onboarding practices can be described as: *Level 1*: is a passive non-systematic onboarding; *Level 2* is a more formal onboarding; and *Level 3* is a proactive onboarding, which takes place when the organization formally addresses all 4C's.

4. Comparing models

Steinmacher's work considered, as key point for their model, the **stages** that an outsider progress while engaging in an **OSS projects**, and **forces** who would push the newcomer away or pull them in. The onion onboarding model is well accepted by the literature in this field of research (OSS projects). Nakakoji *et al* (2002) highlighted the **role played** by the insider, and community structure; the more outer or inner in the layers of the community, the more basic or core role the pretender plays in the role community. Cable *et al* (2013) brought the traditional and personal identification socialization. The first, traditional, is considered as an onboarding that focus on informing to newcomers about organization policy mainly; it emphasized **organizational identity**. From the second, personal identity, newcomers are motivated to authentically express their strengths in the new activity; organizations shape onboarding processes around individual identity. It denotes the central point for his proposed model is **personal identity**.

Thereby, socializations proposed by Cable *et al* (2013) seems to match in certain levels on what Bauer leverage as Level 1, passive onboarding, where focus is Compliance. Organization engages newcomers to transfer organization policies, rules, norms etc.; and Level 3, proactive onboarding, where all four building blocks applied, and onboarding is systematically organized with strategic human resource management approach; thus Connection, dimension related to social network integration in concerned [Bauer 2010]. Bauer concentrated her model around mainly the called **functions**. From our investigation, functions are areas to be handled during onboarding programs; the more implemented function in the onboarding processes, the more Cs are in place: the more success is the newcomers onboarding. These functions could be used in the research as measure of level of how many Cs are integrated to the onboarding program, as we could outcome from the investigation [Meyer and Bartels 2017][Britto *et al* 2017][Moe *et al* 2020]. Bauer model was built upon Jones' model; on the other hand, Britto *et al* (2017) comment Jones' model was built upon Maanen and Shein's model. In fact, Maanen and Shein's model are intended to influence **role concept** and **role learning**; organize their proposed dimensions is an onboarding tactics which organizations can employ when socializing new recruits into the organization or at various boundary passages; a combination of tactics which one might hypothesize as being most likely to produce each of the specific organizational responses [Van Maanen and Schein 1979]. Jones' model differs from Maanen and Shein's model as the author hypothesized and evidenced two possible combinations of **tactics** which turned to **Institutionalized** and **Individualized dimensions** [Jones 1986].

3. Considerations and future work

Onboarding process are important step that a newcomer needs to move through. Models are meant to improve this process and make it smoother. Several studies used models to improve onboarding process. We aimed to identify and to characterize methods proposed on literature and extract main features and context applied. We identified 7 existing onboarding models that map detailed tactics, dimensions, processes, tools, procedures, practices, techniques, methods, and technologies to shape onboarding programs around. Specific investigations about when events to take place or how they happen have been done in specific studies. Other models have deeper focus on human and social aspects. However, there are no models concerned to when a newcomer feels as integrated to the organization, to the group, to the team.

Thereby, our findings suggest that these onboarding model study can support either research or organizations to better plan, strategize their work around or to shape up with one of models in other to improve process for benefiting new hire, and organization. For future work, we are planning to investigate follow question: when, what onboarding stage, phase, a newcomer feels as integrated to the organization, to the group, to the team?

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