

Software CROWD-Sourcing

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Abstract—Software crowdsourcing emerged from the crowdsourcing concept and inherited most of features from it. However, it adapted its nature according to the requirements of software engineering techniques and technologies. Therefore, it is important to understand the detailed elucidation of software crowdsourcing. This paper introduces the connotation of CROWD (Community, Remoteness, Open-call, Web, Diversity) in crowdsourcing and in particular software crowdsourcing. It expounds the meaning and importance of these five CROWD components of software crowdsourcing and their contribution in making it successful.



Fig. 1. Connotation of CROWD in Software Crowdsourcing

I. INTRODUCTION

The modern crowdsourcing term was reinvented by Jeff Howe and Mark Robinson in 2006 [1]. Crowdsourcing is an approach of outsourcing tasks to a large and undefined crowd through an open-call [1]. Software Crowdsourcing (SC) emerged from this crowdsourcing concept and inherited most of features from it. However, it adapted its nature according to the requirements of software engineering techniques and technologies to perform various software engineering tasks such as requirement analysis, design, coding, and testing [2]. SC comprises many vital components that make it powerful and successful. The first and foremost component is the virtual Community that supports and participates in all types of software development activities [3]. SC completely relies upon the Web, with all its activities carried out through the Web, which is the life support system [4]. As it is a web-based process, it can utilise the global community with no geographical boundaries and should be managed Remotely [5]. The most important component of SC is an Open-call that allows everyone in the community to participate beyond organisational

boundaries [1]. Another crucial component of SC is Diversity, which makes it entirely different from traditional software development [1], [6], [7]. Traditional software development relies upon the expertise of personnel employed on the basis of their skills and academics. However, it is not guaranteed that they are fit for purpose and can carry out their assigned tasks [2]. SC opens the door for anyone who meets the minimum requirements and can participate in competitive development tasks [2]. The aforementioned five main components constitute the CROWD of SC and define it as “an *Open-call for Diverse and Remote Community to participate and collaborate in the various software development activities on the Web*” [8, p.381]. Therefore, this paper further expounds the meaning and importance of these five CROWD components of SC and their contribution in making it successful.

II. CROWD (COMMUNITY, REMOTENESS, OPEN-CALL, WEB, DIVERSITY)-SOURCING

A. CROWD - Community

“Nobody is, obviously, as clever as everybody [i.e., community]” [9]. A community is a self-organized nexus of people with a common program and interest [10]. A virtual community comprises of members in an online environment, commonly the Web/Internet. The key component of SC is the virtual community (mostly software community) who explicitly participate in the system and ready to perform some tasks that are assigned to them by the system (or play an active role and query for tasks, depending on the employed crowdsourcing model) [3]. The benefit of the community is that it promotes a positive culture, a universal feeling of involvement and belonging to achieve the goal. The community can be characterised and classified based on the size of the group, strengths of ties, physical or virtual type, and temporal constraints [3]. Thus, in SC, the software development team is being augmented by the creative software community [9].

B. CROWD - Remoteness

“Never forget, the solution to a problem isn’t within the same room as you” [6]. SC is mostly used for brainstorming and innovation, which are not 9-5 office jobs, and brilliant ideas are created 24/7 [11]. Therefore, in SC, outcomes are more important than location. Most successful models of SC assume that all the SC tasks are performed remotely by a geographically dispersed pool of labour using the Internet/Web [5]. SC guru, co-founder and CEO of uTest, Doron Reuveni found that enabling multiple winners to perform remote work on a recurring basis are a better fit for building high-growth, sustainable crowdsourcing businesses. Reuveni states allowing remote working eliminates geographic restrictions, thus opening up the community to anyone with Internet access [12]. Onsite SC mostly serves the limited purpose of the business.

C. CROWD - Open-call

In a world of widely distributed knowledge, where the boundaries between a company and its environment have become blurred, companies cannot afford to rely entirely on their own research and ideas to maintain a competitive advantage. Jeff Howe described an open-call as one of the most vital prerequisites for crowdsourcing [1]. Open call simply means an open invitation for everyone in the general public, and not only to a pre-selected few participants. It provides the opportunity for everyone to join the crowd in order to participate in a crowdsourcing activity [7]. Consequently, companies benefit from gathering a number of bright ideas, innovations, and products rather than relying on just handful employees and their creativity [13]. In SC, most open-call formats are in the form of a competition, and each software development task is organised as an open contest. Every registered member satisfying the legal requirements can register for contests and submit their solutions. At the end of the competition, a few top winners receive prize money as a reward [2].

D. CROWD - Web

In the past, crowdsourcing was a laborious and prolonged approach, impeded by communication challenges. With the advent of the Internet and Web, crowdsourcing was reinvigorated by “web-savvy” organizations that were designed to take advantage of the Web [4]. Now, crowdsourcing could easily reach out to a global pool of resources, skills, and creativity, readily available at almost any time of the day at the click of a button [14]. This contributed to the idea that the term was coined recently, despite its long history. Soon after the Web revolution, Web offered another benefit, social media for SC technique. Social media such as Facebook and Twitter have been harnessing and transforming SC by involving the community more vigorously. Now, social media has become an essential and live section to SC as it allows organizations to reach a wider audience faster, with less expense and more efficiently than ever before [4]. Another benefit of online and web-based SC is that it has changed the working approach of governments and businesses by bringing more transparency. They started an investigation of the role that citizens and customers individuals or larger crowds alike - could play in improving innovation potential and public image [14].

E. CROWD - Diversity

“The person who you think would be best qualified to perform a job isn’t always the best person to do it” [15]. The best example is the invention of the *marine chronometer* by John Harrison, a carpenter, which would have not been possible by the great astronomers at that time [6]. The great idea can come from the completely unknown and unskilled person in that area; thus, crowdsourcing is all about diversity [1], [6]. The CEO of Idibon, Rob Munro carried out a number of surveys on diversity in crowdsourcing and found the people who participate in online crowdsourcing platforms possess a diversity of skills that are far beyond the internal capacity of any one company [16]. Thus, one of the biggest change that crowdsourcing is having on business is in diversity. The diversity is not limited to only skills but it subsumes spatial diversity, expertise diversity, gender diversity, age diversity, language diversity and ethnic diversity [6], [7]. One of the best

examples of diversity in crowdsourcing is the language diversity. Rob Munro conducted a survey on additional languages of English-speaking crowdsourced workers and found that crowd workers spoke more than 5,000 languages. It is almost impossible for any business to offer services in all languages by employing translators internally. The biggest benefit of the language diversity for the software industry is that more software and services are made available in less widely spoken languages, allowing the speakers to better connect with the world on their own terms [16].

III. CONCLUSION

This paper has expounded the five main CROWD (Community, Remoteness, Open-call, Web, Diversity) components of crowdsourcing and in particular software crowdsourcing. It has explained how and why these vital components constitute crowdsourcing and make it successful.

REFERENCES

- [1] J. Howe, “The Rise of Crowdsourcing,” *Wired Magazine*, vol. 14, no. 6, pp. 1–4, 2006.
- [2] K. Mao, L. Capra, M. Harman, and Y. Jia, “A survey of the use of crowdsourcing in software engineering,” *Research Note*, vol. 15, no. 1, pp. 1–36, 2015.
- [3] A. Smirnov, A. Ponomarev, and N. Shilov, “Hybrid crowd-based decision support in business processes: the approach and reference model,” *Procedia Technology*, vol. 16, pp. 376–384, 2014.
- [4] M. Marchionda. (2015) Crowdsourcing spreading like wildfire with social media. [Online]. Available: <http://www.prescientdigital.com/articles/web-2.0/crowdsourcing-spreading-like-wildfire-with-social-media>
- [5] S.-A. Barnes, A. Green, and M. Hoyos, “Crowdsourcing and work: individual factors and circumstances influencing employability,” *New Technology, Work and Employment*, vol. 30, no. 1, pp. 16–31, 2015.
- [6] E.-J. Pfauth. (2008) Jeff Howe: Crowdsourcing is all about diversity. [Online]. Available: <http://thenextweb.com/2008/05/23/jeff-howe-crowdsourcing-is-about-diversity/#gref>
- [7] M. Hosseini, K. Phalp, J. Taylor, and R. Ali, “The four pillars of crowdsourcing: A reference model,” in *Research Challenges in Information Science (RCIS), 2014 IEEE Eighth International Conference on*. IEEE, 2014, pp. 1–12.
- [8] N. Naik, “Crowdsourcing, Open-sourcing, Outsourcing and Insourcing Software Development: A Comparative Analysis,” in *10th IEEE Symposium on Service-Oriented System Engineering (IEEE SOSE)*. IEEE, 2016, pp. 380–385.
- [9] L. Dzamic. (2013) Crowdsourcing can’t beat power of the individual genius. [Online]. Available: <http://www.theguardian.com/media-network/media-network-blog/2013/jul/10/crowdsourcing-creativity-individual-genius-advertising>
- [10] Businessdictionary.com. (2015) Community. [Online]. Available: <http://www.businessdictionary.com/definition/community.html>
- [11] Crowdsource.com. (2013) Working remotely: No-go for yahoos marissa mayer. [Online]. Available: <http://www.crowdsource.com/blog/2013/02/working-remotely-no-go-for-yahoos-marissa-mayer/>
- [12] D. Reuveni, “Setting up a crowdsourcing effort? read this first.” *Harvard Business Review*, 2013. [Online]. Available: <https://hbr.org/2013/08/setting-up-a-crowdsourcing-eff/>
- [13] R. Fernandez. (2013) Crowdsourcing vs. collaboration: Which yields superior results? [Online]. Available: <https://opensource.com/business/10/6/crowdsourcing-vs-collaboration-which-yields-superior-results>
- [14] E. Simperl, “How to use crowdsourcing effectively: Guidelines and examples,” *Liber Quarterly*, vol. 25, no. 1, 2015.
- [15] BrightSightGroup. (2008) Jeff Howe - Crowdsourcing. Youtube. [Online]. Available: <https://www.youtube.com/watch?v=F0-UtNg3ots>
- [16] R. Munro. (2013) Crowdsourcing and worker diversity. [Online]. Available: <http://idibon.com/crowdsourcing-and-worker-diversity/>