User-centered Software Engineering and Micro-donations

Henryk Julian Seeger

Abstract— **The present paper aims to identify success factors for micro-donations at the point of sale. On the example of the German charity program Deutschland Rundet Auf, the key principles of user-centered software-engineering are discussed — both in the light of what is called the service economy and the research on user experience. It is argued within this paper that in order to motivate people to conduct micro-donations – which are not impactful to one's individual finances since the sums are typically less than 10 cents – the focus has to be put on the convenience aspect: the easier it is to conduct such micro-donations and the more convenient these transactions are, the more likely people should be to actually conduct them. Thus, it can be shown that the core principles of software-engineering of the 21st century – such as a focus on transparency, data integrity and safety and a positive user experience – especially apply to micro-donations.**

Keywords— **software-engineering, CSR, user experience; micro-donations**

I. INTRODUCTION

The program Deutschland Rundet Auf (DRA; translation: Germany Rounds Up) is built around the idea of micro-donations. Micro-donations are small donations of typically less than the equivalent of 10 cents. The program DAR tries to incorporate such micro-donations in the sales process at German retail stores. Customers in selected shops get the option of donating the difference between their purchase price and the next full EUR-amount to selected charities at the point-of-sale. When taken together over longer time-spans and a multitude of participating stores, these micro-donations are able to gather impactful donation sums (the program management explains that even with a willingness to donate of only 10% of all retail-transactions with an average donation sum of 5 cents, a total of 92.5 million EUR per year could be collected via these means), the single impact for the donating person stays small.

This is an important point, as authors such as Kirchgässner [1] point out: While major decisions about financial transactions are taken on a much more factually-based level, minor transactions are usually conducted without comparing the costs and benefits of the transaction. Thus, micro-donations are usually not decided based on whether the donated sum would be impactful or hurtful to one's own donations, but rather, on personal emotions and convenience. Convenience is one of the megatrends of our time [2]. The term comes from service marketing and originally describes the time and effort a consumer spends on buying or using services [3]. The tendency of people to have convenience is by no means limited to trade.

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Also, in the prosocial sector, the concept shows its great influence. Therefore, the present paper discusses the principle of convenience in the light of software engineering and how it can influence customers' willingness to conduct micro-donations at the point of sale.

II. THE PRINCIPLE OF USER-CENTRED SOFTWARE ENGINEERING

A. The experience economy

Pine and Gilmore [4] describe the current stage of the economy as an experience economy. While earlier stages were shaped by various aspects, such as product quality, convenience, or a focus on service (i. e. outsourcing of the baking of a birthday cake instead of making it oneself), the current stage puts a focus on events and the experience it generates. This is also pointed out in more recent research by Spence, Puccinelli, Grewal, and Roggeveen [5]. As the competition in many areas – for example, retail – has intensified and products of different competitors are not always distinguishable in terms of quality, the experience generated by the purchase or the use of the products has become a more crucial aspect.

While the debate about experience and its impact on consumer behavior seems strong, others point out that no full definition of what experience means in this context exists [6]. Sundbo and Sørensen, [6] however, define experience as a mental phenomenon that is not about the functionality of the product or service experienced: "An experience cannot be stored in the same way that a good can and it does not necessarily solve any problems. An experience is something that happens in peoples' minds and is determined by external stimuli and elaborated via the mental awareness that people have from earlier experiences, mental needs (such as self-realization, un-stressing, avoiding everyday life through escapism) and personal strategies" [6]. Therefore, the authors deduce the following working definition of what an experience constitutes: "Experience, in the context of the experience economy, could be defined as the mental impact felt and remembered by an individual caused by the personal perception of external stimuli." [6]. They further point out that a positive experience does not necessarily have to be one that is characterized by joy, fun or entertainment; rather, the experience has to fit the expectations and the scope of the event in which it is felt. In a similar vein, it is said that experiences should involve convenience or – at least – lack inconvenience. Services that are perceived to be more convenient – such as the introduction chapter of this paper already points out – are perceived to be more positive than others. Thus, convenience leads to higher customer satisfaction and consequently, to a

higher probability of customers buying or using a service another time in the future [7].

B. The Basics of Software engineering

Software engineering is described to be as crucial for running the modern world – all modern industries depend on software solutions [8], which range in complexity from simple solutions to single problems up to complex, worldwide operating information systems. Therefore, the method of software engineering is not only one of high importance but also one for which no uniform rules exist [8]. Rather, Sommerville [8] argues, different problems require specific approaches to solving them: "Developing an organizational information system is completely different from developing a controller for a scientific instrument. Neither of these systems has much in common with a graphics-intensive computer game. All of these applications need software engineering; they do not all need the same software engineering techniques." [8].

Thus, the first step of successful software engineering projects has to be finding out the requirements of the project, based on which the right tools, methods and approaches can be chosen [9]. Further, Sommerville [8] points out that software engineering mostly focuses on software projects not done by individuals but professionally in teams; thus, it has strong connections to project management. As software is engineered for professional purposes, the factor of documentation starts to play an important role as well: software engineering, as Sommerville [8] explains, is more than just the pure act of programming, as some might assume, but also includes the documentation of the process, thus allowing for collaboration.

Other challenges facing software engineers include increasing diversity, a higher demand for reduced delivery or production times and software that is safe and takes data integrity in stronger consideration [10]. As data becomes more and more crucial in many parts of everyday life and business as well, its integrity becomes a rising topic as well [10], especially when it comes to critical data such as health data [11] or financial data [12]. In such cases, the safety of such data becomes one of the most crucial challenges of software engineering.

C. User-centered design

Experiences are becoming – as chapter 2.1 of this article has already pointed out – an increasingly important part of the economy; that is the case not only in software engineering, but in most other human interactions of the business world, the experience quality of it gains importance. User experience, the application of this principle to the software world, Garrett [13] explains that in product creation, the first focus is usually put on the function, on what it does — as the author calls it. While this functionality is at the core of software engineering, the user experience aspect sometimes gets overlooked. This, however, indicates a most likely failing software project, as the experience factor nowadays typically makes the difference between a project that succeeds or fails.

User experience therefore includes different aspects – one of the most central ones being the ease of use, as Davis [14] points out. Apart from the perceived usefulness of a product, the ease of use is considered to be one of the top predictors to the question as to whether a product will or will not be a success. This goes along with research on convenience, where authors such as Lux [2] point out that products have to be convenient to use transparently in order to be successful. User experience, however, is more than convenience and includes aspects such as transparency [15]. Transparency gives the user cues about what the software does, what information is stored in which way and shared with whom, and what the outcomes of the actions will be, all of which is said to increase trust. Trust in the software, again, is said to positively influence user experience and thus strengthens the chances that users are willing to work with software.

Concluding, however, Garrett [13] points out that for user-centered design, just as for software-engineering in general, the actual use-cases have to be taken into strong consideration. While user experience in itself also contains aspects such as the joy of use, simplicity or aesthetic considerations, their importance strongly correlates to the user-case: pointing back to the aforementioned comparison of an information system versus a computer game, it becomes clear that the optimal user experience also varies based on the purpose of the software.

III. THE CASE OF GERMANY ROUNDS UP – MICRO DONATIONS

The previous chapters were able to show that user experience is becoming a more and more crucial factor in deciding whether a project will be a success or a failure. Davis, [14] for example, points out that the ease of use – which is arguably one part of a positive user experience – is one of the core predictors of how well a software solution will be accepted by its customers and clients. Solutions have to be convenient, as Lux [2] points out. Especially for decisions that can be described as minor and not very impactful to the individual, Kirchgässner [1] argues, the importance of convenience cannot be underestimated.

As micro-donations typically only have a very low financial impact on the donator and also do not give a direct reward either, one of the core predictors of whether people make use of them, therefore, should be how convenient they are to use. If conducting such a micro-donation causes the individual additional costs – be it in the form of time (which is considered to be part of convenience [2]) or additional considerations – chances will decline that the donation will be actually conducted. Apart from the ease of use, [14] transparency seems to play a crucial role here [15]. This can especially be argued in the light of financial transactions, which require a higher level of trust in data integrity and safety.

In general, the results presented within this work show that in order to foster the conduction of micro-donations, the service has to be easy to use — and thus, be convenient. As authors such as Lux [2] or Berry, Seiders and Grewal [3] point out, convenience is one of the major aspects in service quality and thus a major predictor of customer satisfaction. The more

convenient a service is, the higher the chances that it will be used. Thus, it can be shown that the principles of user-centered design and a focus on user experience in software engineering go in strong alignment with each other: In an experience economy, companies cannot allow themselves to provide anything but the best possible service quality in order to succeed. This seems especially true for a system such as micro-donations: The key goal of these micro-donations that are conducted by means of rounding up must be an easy-to-use and convenient system.

This becomes true not only for the individual customers who are supposed to donate but also to companies or retailers who implement these systems: The point of sale is considered to be of highest importance for retailers, thus, a system that gets implemented there has to be convenient and avoid any additional hassle for the customers.

REFERENCES

[1] Kirchgässner, G. "Towards a theory of low-cost decisions." *European Journal of Political Economy*, vol 8, issue 2, pp. 305–320, 1992. https://doi.org/10.1016/0176-2680(92)90028-F

[2] Lux, W. Innovationen im Handel: Verpassen wir die Megatrends der Zukunft? Berlin, Heidelberg: Springer Berlin Heidelberg, 2012. https://doi.org/10.1007/978-3-642-28121-1

[3] Berry, L. L., Seiders, K., & Grewal, D. "Understanding service convenience." *Journal of marketing*, vol *66, issue* 3, pp. 1-17, 2002. https://doi.org/10.1509/jmkg.66.3.1.18505

[4] Pine, B. J., & Gilmore, J. H. "Welcome to the experience economy." *Harvard Business Review*, vol *76*, pp 97–105, 1998.

[5] Spence, C., Puccinelli, N. M., Grewal, D., & Roggeveen, A. L. "Store atmospherics: A multisensory perspective." *Psychology & Marketing*, vol. *31, issue* 7, pp. 472–488, 2014. https://doi.org/10.1002/mar.20709

[6] Sundbo, J., & Sørensen, F. "Introduction to the experience economy." In *Handbook on the experience economy*. Edward Elgar Publishing, 2013. https://doi.org/10.4337/9781781004227

[7] Kaura, V., Durga Prasad, C. S., & Sharma, S. "Service quality, service convenience, price and fairness, customer loyalty, and the mediating role of customer satisfaction." *International Journal of Bank Marketing*, vol. 33, issue 4, 404-422, 2015. https://doi.org/10.1108/IJBM-04-2014-0048

[8] Sommerville, I. *Software engineering*. Addison-Wesley/Pearson, 2011.

[9] Pohl, K. "Requirements engineering: fundamentals, principles, and techniques". Springer Publishing Company, Incorporated, 2010

[10] Kumar, R. S., & Saxena, A. "Data integrity proofs in cloud storage." In *2011 Third International Conference on Communication Systems and Networks (COMSNETS 2011)* (pp. 1-4). IEEE, January, 2011.

[11] Patil, H. K., & Seshadri, R. "Big data security and privacy issues in healthcare." In *2014 IEEE international congress on big data* (pp. 762-765). IEEE, June, 2014.

[12] Bogdanov, D., Talviste, R., & Willemson, J. "Deploying secure multi-party computation for financial data analysis." In *International Conference on Financial Cryptography and Data Security* (pp. 57-64). Springer, Berlin, Heidelberg, February, 2012. https://doi.org/10.1007/978-3-642-32946-3_5

[13] Garrett, J. J. "The elements of user experience: user-centered design for the web and beyond." Pearson Education, 2010.

[14] Davis, F. D. "A technology acceptance model for empirically testing new end-user information systems: Theory and results" (Doctoral dissertation, Massachusetts Institute of Technology), 1985.

[15] Yang, X. J., Unhelkar, V. V., Li, K., & Shah, J. A. "Evaluating effects of user experience and system transparency on trust in automation." In *2017 12th ACM/IEEE International Conference on Human-Robot Interaction (HRI* (pp. 408-416). IEEE, March, 2017. https://doi.org/10.1145/2909824.3020230