

12-11-2016

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Daniel Franzmann

Goethe University Frankfurt, franzmann@wiwi.uni-frankfurt.de

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## Recommended Citation

Franzmann, Daniel, "Extending the Expectation-Confirmation Theory: How do Software Updates Change Continuance Intention?" (2016). *DIGIT 2016 Proceedings*. 22.  
<http://aisel.aisnet.org/digit2016/22>

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# Extending the Expectation-Confirmation Theory: How do Software Updates Change Continuance Intention?

*Research Idea*

**Daniel Franzmann**

Goethe University Frankfurt, Frankfurt a.M., Germany  
franzmann@wiwi.uni-frankfurt.de

## **Abstract**

*Software updates have enabled developers the possibilities to fix bugs or add features after the initial software release. The phenomenon of using such updates to enhance software, is a relatively new trend that has not received much attention in the Information Systems (IS) literature. However, because software updates influence the interaction between users and developers, they are directly connected to sales and revenue. Based on a conducted literature review, this research idea consists of two parts and proposes an approach to measure and analysis the effects of software updates on users. First, a longitudinal, panel study is conducted to gain qualitative knowledge and extend the expectation-confirmation framework proposed by the existing literature. Second, a self-developed Android app will be used in an experimental setting to test and validate the research model and gain knowledge on how developers can keep users happy and increase continuance intention through functional software updates.*

**Keywords:** Software Updates, Benefits, IS Post-Adoption Theory, Expectation-Confirmation Theory

# **Extending the Expectation-Confirmation Theory: How do Software Updates Change Continuance Intention?**

*Research Idea*

## **Introduction and Problem Description**

The phenomenon of ubiquitous, interconnected IT has changed the way of software development. Software and IT devices like smartphones, wrist-worn fitness tracker and smartwatches are all connected to the Internet and receive software updates that improve usability, fix software bugs or even add new features. Even traditional hardware like cars and TVs are able and sometimes even require software updates (e.g. day-one-patch<sup>1</sup>) to function properly (Buckl et al. 2012).

While software updates affect both, software and hardware functionalities, this research idea focuses on the software side. This is due to that most of IT devices offer their users some kind of interface which they can interact with. Hardware feedback (e.g. vibration feedback) is less common and therefore not in the scope of this paper.

Over the last years, developers and publishers started to extend their efforts on exploiting software updates to release products still under major development (Microsoft 2016; Skype 2016; Valve 2016). Traditionally, software was developed until it reached gold status, sold to a fixed price and only smaller updates were provided for free (Myers et al. 2004). However, software distribution practices like early access and subscription-based business models have arisen over the last years (Sun et al. 2008; Time 2013; Xin 2006). Early access describes the practice of releasing an early version – often an alpha version or a first working prototype, for a reduced price which then increases over time and status of the development (Brackin and Ph 2012; Hill-Whittall 2015). One of the first examples of this publishing strategy is the video game Minecraft that was released as a pre-alpha in 2009 for just \$5 and reached version 1.0 with a price of \$17 in 2011 (Goldberg and Larsson 2015). Early access benefits developers through an earlier cash flow and users can save money, gain quicker access and sometimes even contribute to the development. Subscription-based business models, on the other, hand describe the idea of an endless development cycle. The users have to subscribe and pay a regular fee in order to be able to use the software. All future software updates are then rolled for free (Cusumano 2007; Hamari and Lehdonvirta 2010).

But how do users perceive feature updates and what can developers learn? To what extent do software updates influence the post-adoption process of users? Our research question is therefore: How do software updates affect users' motivation, feelings and usage behavior?

## **Literature Review – Software Updates**

The context of software updates lies in the post-adoption area. In 2011, Hong et al. were the first who studied user acceptance in the context of “how habit evolves with the frequency and magnitude of use of the upgrades to agile systems”. They state that comfort plays an important role in the IS acceptance. Further research regarding the specific topic of software updates and its effects on users' continuance intentions has been conducted by Fleischmann et al. (2015) and Amirpur et al. (2015). Through the use of experiments, they measured the influence of expected and unexpected software updates on continuance intention and used the expectation-confirmation theory as a framework (Bhattacharjee 2001; Fleischmann et al. 2016; Fleischmann, Benlian, et al. 2015).

However, the whole topic has not received much attention in the IS post-adoption community (Fleischmann et al. 2016). To our knowledge no interview based, qualitative studies have focused on the

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<sup>1</sup> A day-one-patch is a critical software update, available on the release date.

motivation behind an increased continuance intention after software updates (Fleischmann, Hess, et al. 2015). Further the conducted experiments focused solely on fictitious productivity software and did not examine the effects of software updates on entertainment software. No longitudinal studies have yet been conducted.

## Proposed Research

In order to solve the research questions proposed in the introduction a two-step approach is planned. The first part consists of a qualitative study based on longitudinal interviews, while the second part is the development of an improved research model for the new, longitudinal, experimental setting focusing on entertainment software.

Our qualitative, panel study is already ongoing. The interviews are semi-structured, focus on the findings mentioned in the literature review and target the entertainment sector as suggested (Fleischmann, Hess, et al. 2015). Participants are novices, medium-users and experts in playing Pokémon Go, an augmented reality game by Nintendo. This entertainment app was chosen because it is a good example of an innovative - using augmented reality technology - early access product that was released and is under constant development. At this point it only offers basic functionality compared to earlier versions (e.g. Pokémon for Gameboy) and the developers have stated that they will add additional features in the next software updates. A second advantage of using Pokémon Go is the recent media coverage, resulting in a large player pool and overall good perception. After the transcription process and the following analysis, interviews are planned after the release of each big functional software update that adds enhanced functionalities to the game.

With the help of the results of the qualitative analysis, we plan to improve the current research model based on the expectation-confirmation theory. One adaption that has already come up through the interviews and literature is the construct enjoyment. This construct seems superior to satisfaction in describing the hedonistic motivation behind the use and continuous intention of an entertainment app (Thong et al. 2006). Another possible extension is the incorporation of negative aspects like exhaustion (Maier et al. 2015; Ragu-Nathan et al. 2008). For our experiment, we are currently developing an Android game that will be used to validate the extended research model. The game will randomly classify participants into three experimental groups and has the ability to provide a questionnaire. Group A is used as the baseline and control group, Group B to C will receive a version of the game that lacks certain features. After the initial use all participants will answer a questionnaire that includes standard controls, but also user experience which will be used as a moderator. In  $t_2$ , Group C receives a software function update and later, in  $t_3$  both Groups B and C receive another software function update so that in the end all groups use same game version. After some more playing time, all participants fill out a second questionnaire and the experiment finishes.

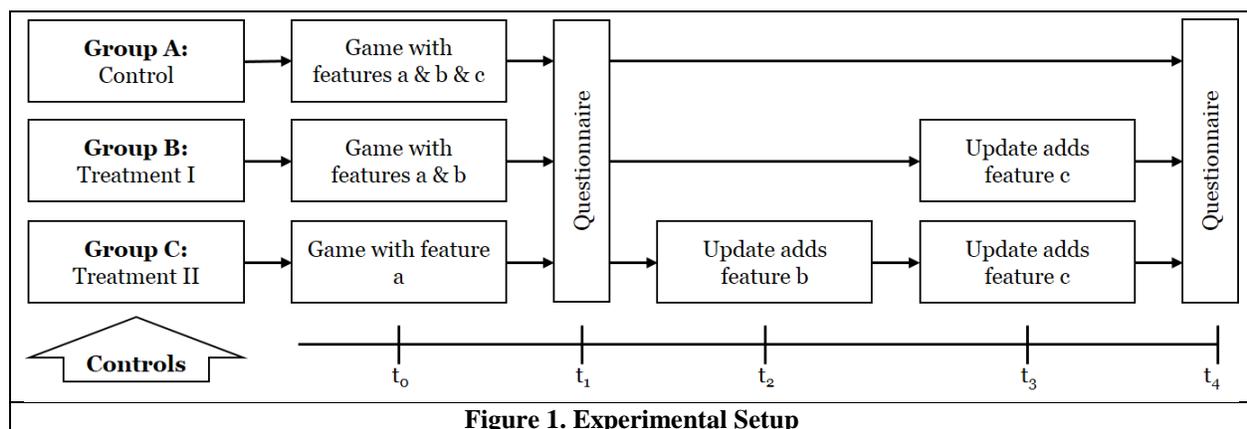


Figure 1. Experimental Setup

We will perform a multiple regression analysis in order to do a group comparison with continuous intention as the dependent variable. Further, a SEM multi-group analysis will be performed using our extended research model. We hope to use the information obtained through the study to examine, how users are affected by software updates. Software updates can be seen as a challenge but also as a beneficial

process for both users and developers. Potentially, the process could lead to a win-win-situation where developers can get earlier cash flows, improve their software constantly and users being happy about it.

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