Appflation – A Phenomenon to be considered for Future Digital Services

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Abstract: In recent years, the society has experienced a remarkable change that induced shifts in behavior of people and companies. This effect is reinforced by the evolution of current and the emergence of new technologies such as Smartphones. In this paper it is aimed to contribute to the establishment of a research area for both academic and industrial researchers on what will be described in the following as *appflation*. First a brief evaluation of the effects of mobile devices and application services on the ongoing digital transformation and the customer/company relationship is provided. Second a definition of *appflation* is given and the origin and impact of this phenomenon is analyzed by considering the customer and the company side. This analysis is supported by a survey amongst Smartphone users, generally confirming that amongst a vast number of installed apps only a very small number actually is used. Additionally, this survey was used to briefly analyze the usage behavior of the participants in relation to the so called primary IT trends. Finally, in order to encourage researchers to advance the field future areas of interest are identified and drivers that will affect *the appflation* phenomenon in the future are outlined.

Keywords: Hier stehen Stichworten, die das Thema des Beitrags am besten beschreiben. Die Formatierung ist äquivalent zu der des Abstracts, nur ist vor dem Absatz ein Abstand von 6pt statt 30pt.

1 Review of literature

1.1 The Digital transformation through the use of mobile devices

What defines mobile devices? It is the smartphone, the tablet, the wearables and all the devices that in the last years are influencing our daily life. In fact they are omnipresent in every aspect of life and if we consider the definition of the digital business transformation that the IMD gives: "An organizational change through the use of digital technologies to materially improve performance" [MW14] it can be surely considered that mobile devices are enabling this transformation. From the recent analysis of ABI Research (cf. fig. 1) it can be observed that mobile devices like Smartphones are of an increasing importance in the market. How can a small object influence the society so much? Briefly, this is enabled

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through the widespread affordability and the increasing power and functionality of those devices.
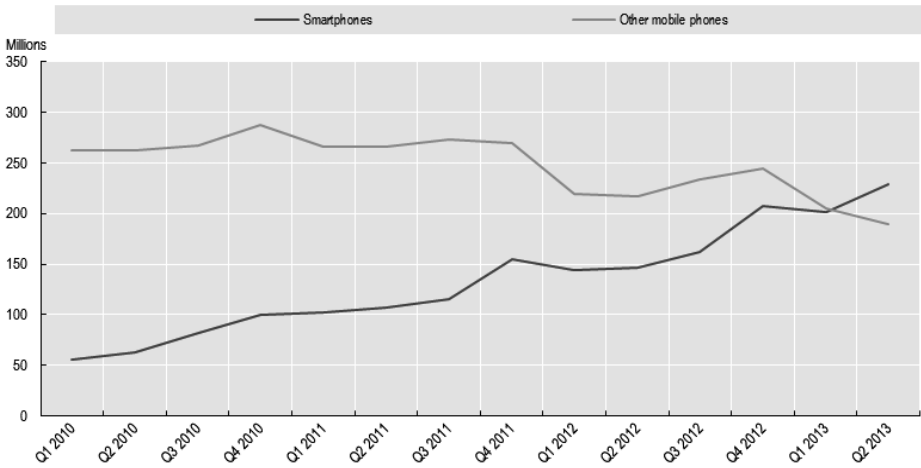

Fig. 1: Smartphones progression based on the 14 largest mobile producers, July 2014 [ABI15]

The dissemination of smartphones, tablets and other mobile devices is accompanied by the heavily growing number of offered software applications (in short "apps") [6]. As can be seen from the diagram of figure 2, the total number of mobile applications available across the top-five app platforms in the world surpassed the 3 million-app milestone in 2014, further highlighting the rapid growth of the smartphone and tablet software market. As of July 2014, there were 3,170,000 applications available across Google Play, Apple App Store, windows Phone Store, Amazon Appstore and Blackberry World.

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[6] The short form of application: "app" gained in popularity and was even in 2010 chosen as word of the year by the American Dialect society (American Dialect Society (2011), "App" 2010 Word of the Year, as voted by American Dialect Society) [Am15].
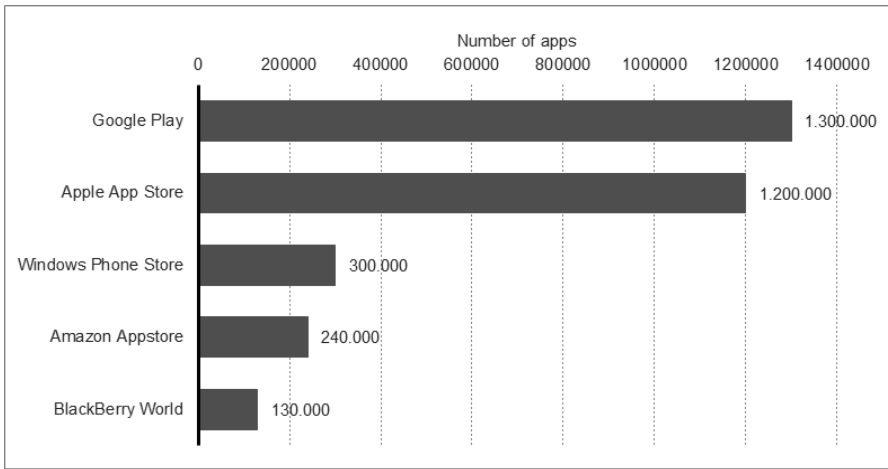
Fig. 2: Number of apps available worldwide in leading app stores as of July 2014[St15]

This development and dissemination of mobile devises and in particular of Smartphones is a key part of the digital transformation. But what are the most important implications that the Smartphone driven digital world is bringing for an automotive company and more specifically, how does it influence customer experience?

In automotive companies all is about transportation. In such setting a key value to increase user experience is to provide means to get from A to B as quick as possible, less expensive and with the most of comfort. To achieve these goals and to improve mobility respectively, presently the use of a multitude of different applications is necessary. But the question for the single user is, how to still keep track with all these apps?

1.2   Turning point for the customer/company relationship

Society is moving from an industrial world with a productive economy hierarchy and formalism to a digital economy where the customers play a very important role. Customers are getting increasingly powerful through access to information anytime and everywhere. This phenomenon brings along that the focus of today's business rather has to lay on the customer and its interests, than on mere product quality. In other words: it is all about customer experience now [BZ03] [OI01]. Such perspective change influences the interaction between users and companies drastically [SSS00]. Today, in all areas of society and in the daily life a ubiquity of ICT (information and communication technology) is experienced that puts the user in the center of futures investigations [Be12]. The customer is driving the change and in turn the digital world is playing an increasing role in its life [MW13].

A multiplier for this effect was the introduction of the Apple App Store in 2008, the first successful platform-based service market place, which brought along a new era of mobile service delivery. This allowed for an autonomous searching, comparing and purchasing of mobile services and so for a rapid increase of functionality of the user devices [Cr10] [JB13].

2   Appflation

2.1   Definition

Namjae Cho defined that "the new smart phone is an offspring of digital convergence of network, media, and electronic equipment. Smart phone, being an enabler of telecommunications network and open internet network access, help business people use diverse modes of date, information, images, and video on a unified mobile application platform" [Na13].

As observed by *Aarts and Dijksterhuis*, the decision, which specific apps to download and install on such device is driven by the social environment [AD00] of the respective customer then. People tend to download broadly successful apps or such apps which specifically are popular in their immediate environment. But is the single customer aware of all the installed apps at all times and does he/she really use them in consequence?

Where in non-digital times the customer easily lost overview e.g. due to a multitude of loyalty cards and systems, today in the digital era, a similar phenomenon is experienced with apps. As the famous slogan of Apple "there is an app for that" [Ap15] shows, mobile applications exist for everything. And the number of those apps is steadily increasing. If the inflation of apps continues this way, how can an effective usage of the services provided by these apps being safeguarded? Or in other words: How to manage this inflation? Might app technology even be considered as a burden for the customer experience?

The analysis of such inflation of mobile applications will be in the center of this research, with the overall phenomenon being named *Appflation* (App + inflation → Appflation). Let's analyze this phenomenon from the two relevant perspectives first – from the customer perspective on the one hand, and the company's perspective on the other:

2.2   The customer side

On the customer side – as shown in a Gartner statistic – it can be observed that the app sector is experiencing a real boom. Already in the last year the 100 Billion apps download mark was reached and Gartner assumes that this phenomenon is just at its beginning, with possibly 200 Billion apps downloaded in 2016 then:
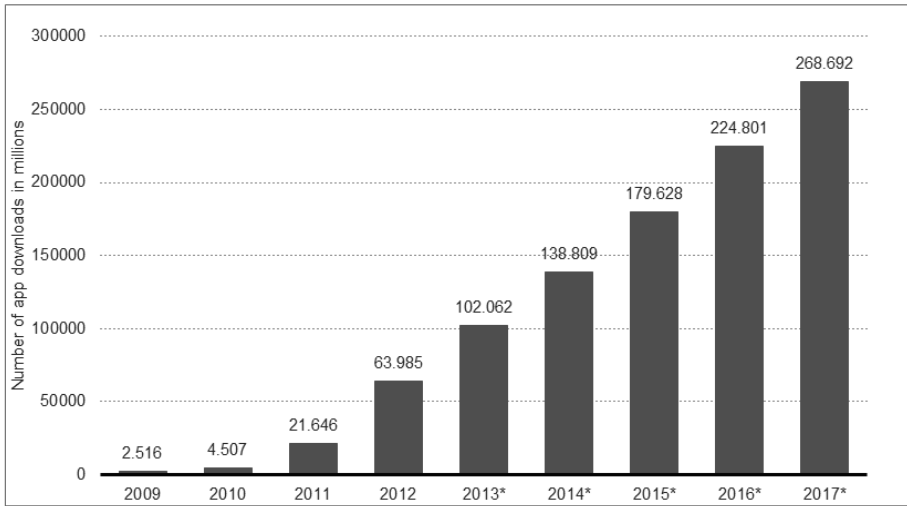
Fig. 3: Forecast number of mobile app downloads 2009-2017, 09.2013 [Ga15]

2.3   The company side

The abundance of apps available online on different app platforms indicates that companies generally tend to provide apps (simply spoken) for everything, to try to be closer to their customers. Typically, globally acting companies offer dozens or hundreds of different apps for their customers and employees.

From a general business perspective, such an approach is understandable, given that apps are considered as an ideal touch point with customers and that they can bring new business models (e.g. when speaking of mobility services like the Daimler moovel app [Th12]). With such incentives for app development, typically even the single departments of a company set up their own applications, preventing a company-wide, uniform app development, which might reduce the amount of apps of a company.

3   Survey

However, as initially asked, does the company and more important the customer need so many apps? Or could this proliferation of apps rather lead to confusion? Or speaking from a customer experience point of view, how to navigate through the tides of existing apps in the different apps stores?

The following survey might provide ideas how customers generally deal with this appflation.

3.1   Survey design

A quantitative study using a questionnaire was conducted in March 2015 in order to answer the research questions. The questionnaire was composed of 19 questions (containing open and closed questions) and was posted and shared via mailing list and social media. The structure of the survey can be founded in the annexes. It is based on the general framework of apps use during the day, for better understanding the phenomenon of appflation.

Most of the participants were younger than 45 years (93,7%; N=118). The largest group was between 25 and 34 years old (75,4%; N=95), followed by individuals between 35 and 44 years (9,5%; N=12).
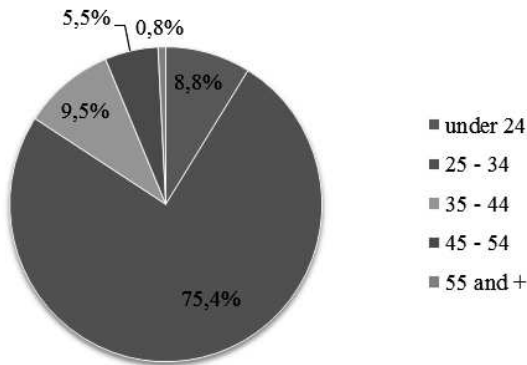

Fig. 4: Repartition of the survey participants

Amongst the participants were employees (55,2%; N=70), students (22,4%, N=28) and others (mostly PhD students) (12%, N=15), the remaining respondents were managers (8%, N=10), entrepreneurs (1,6%, N=2) and retirees (0,8%, N=1). Respondents' mobile devices affiliation was identified by categories of devices. 98,4% use a smartphone as mobile device and only 3,2% use wearables (e.g. smartwatch, smart glass).

3.2   Results and interpretation of the Survey

Under-Utilization of Apps

A key result of the study was to observe that in all cases the differences between the numbers of apps the respective participant had on its mobile device and the number it used

daily was immense. With an average of 60 to 100 apps installed, effectively only 5 to 10 were used daily. This shows that a vast number of installed apps remain unused.

This becomes even more obvious, given the rather long times of app usage per day. It was observed that the majority of the participants were connected to their mobile devices via apps at least 1 to 3 hours per day (74%, N=92):
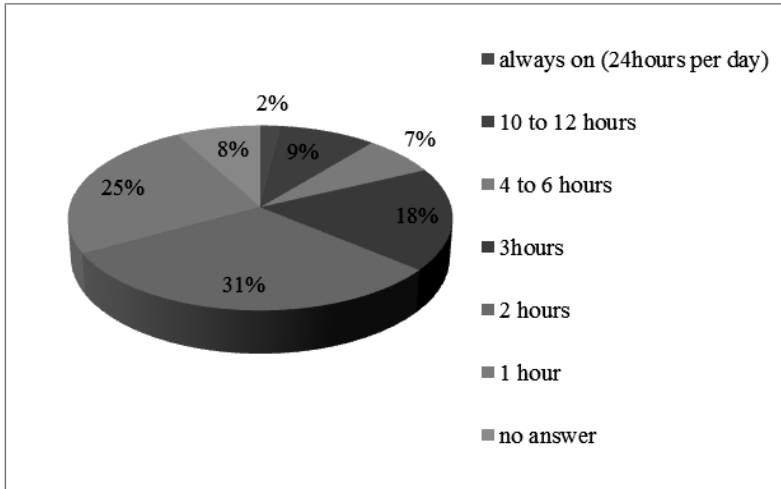

Fig. 5: Repartition of time of apps using per day by the participants of the survey

How habitual the use of a very limited number of apps is for the participants, can be seen from the further observation that for every category of apps user (whether a casual or intense user, as categorized in the following Fig. 5) the use is not done in one part of the day morning or evening but was scattered of the day. Independent of the different wishes and needs over the day the participants did not change their app behavior and remained with the common 5 to 10 daily apps – like an automatism.

Results in relation the primary IT trends

However, for better understanding the user experience in the area of app using in relation to the primary IT trends, it was additionally decided to ask the participants on how specifically they use their apps. To do that it was considered that a customer day is divided into six parts: wake up time, morning, lunch break, afternoon, evening and night time. This approach enabled to build a customer day map, which was put in relation to trends (called Primary IT Trends) which Daimler IT Innovations teams identified in cooperation with the Fraunhofer Institute then[7].

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[7] They are in the number of six: internet of things, naturalization of user experience, information-centric thinking,

For this part the focus was laid on the three most important groups of the survey partici-pants, representing 83 % of the participants. The first group is the one with people using mobiles apps 1 to 2 hours per day (56%, N=70), the second is the group with people who are using their apps 3 hours per day (18%, N=22) and the third one are those participants who are using their apps between 10 to 12 hours per day (9%, N=11).
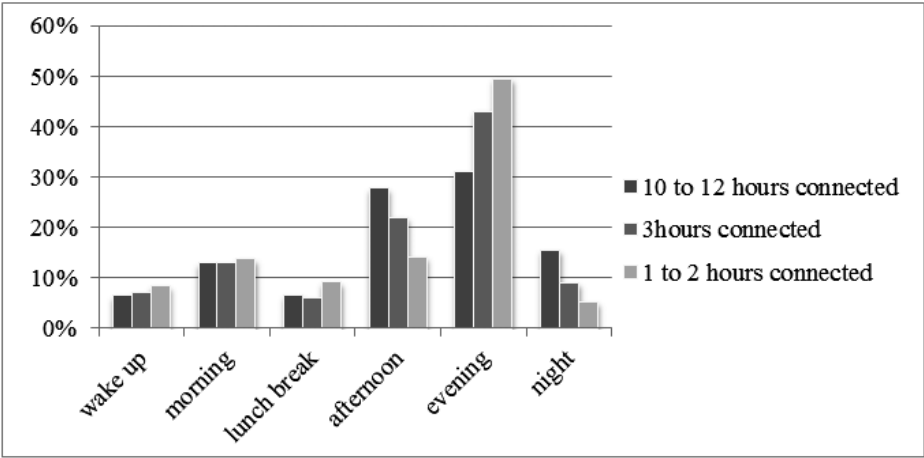

Fig. 6: Customer day map

This customer map shows how the participants generally use their app all over the day, in relation to the specific usage (1 to 2 hours, etc.). As can be seen in the customer day map, the bigger group of the panel (the one of people using apps on their mobile devices 2 hours during the day) with nearly 56 % of the participants is composed mostly with people in the age class 25 to 34 years (76%). This class of age is also mostly represented in the two other groups: the one with people using apps 3 hours per day and the one with people using apps 10 to 12 hours per day.

Apart from that global usage of apps during the day, a second dimension was considered now: the one of which categories of apps are mostly used during the day and their spread over the different parts of the day.

Given that the panel was composed of a majority of people from the class of age 25 to 34

digital economy, smart machines and cyber physical twins. Primary IT trends are fundamentally comparable to so-called general megatrends (e.g. aging societies, urbanization of the planet, etc). However we examined these with a slightly reduced time horizon of approx. 5–10 years and with dedicated IT focus. From our experience, in IT it's not possible to make serious predictions much further in time than this timeframe.

years old, it was not surprising that when the different categories of apps used in the different part of the day by the different panel groups (cf. figure 8) were observed, mainly the same categories were found in the same part of the day:

	Group 1 to 2 hours apps use per day (56% of the panel)	Group 3 hours apps use per day (18% of the panel)	Group 10 to 12 hours apps per day (9% of the panel)
Wake up	Alarm clock, weather, social network, news work time tracker, messaging	News, weather, messaging, email, social network, alarm	Email, instant messaging, weather, social network, gaming, news, alarm, music
Morning	News, messaging, finance, activity tracker	Email, social network, gaming	Email, social network, gaming
Lunch break	Email, social network, commuting	Gaming, email, social network	Social network, news, email, messaging, picture (Instagram, etc.)
Afternoon	Email, music, driving apps, news, sport, messaging, banking, shopping, e-learning	Email, music, driving	Email, news, messaging, social network, gaming, music, e-books, shopping
Evening	Social network, messaging, alarm	Social, music, video, calendar, messaging	Email, news, messaging, finance, sport, shopping, finance
Night	Health	Health	Not specified

Fig. 7: Categories of apps used in the different parts of the day

A third dimension was to link this behavior with the "primary IT trends" then. So let's go more in the macro level and consider the relation of consumer behaviors with the "primary IT trends".

What distinguishes a "primary IT trend" from the well-known IT hypes? A "primary IT trend" is a change that does not spread through society in one fell swoop, but rather subliminally. People somehow just get used to the new trend. The continuous change gets rarely noticed; it simply becomes a normal part of life. But at the same time, such a trend is also a change that comes with such energy that it cannot be prevented by anyone (no government, no company and no other community). It is something that brings enormous changes to society and business in the medium and long term. And it is something that can sometimes make small, recently formed companies into new world market leaders, consigning other, traditional companies to their downfall if they have missed the boat.

So let's have a closer look to these trends. They are in the number of six: internet of things, naturalization of user experience, information-centric thinking, digital economy, smart machines and cyber physical twins. But which ones have an impact on the appflation phenomenon?

Considering the customer day map and the categories of apps used in the different part of the day, we can observe that three trends are very important here: the digital economy the cyber physical twins and the naturalization of user experience.

Digital economy has to do with business going digital. This is not new; we already had the first wave in the form of the e-business hype in the early 2000s. However, since the apparition of smartphone and apps we see an acceleration of this trend. The boom of apps sector brings new business possibilities and contributes always more to the economy. For example if we consider the study from the European Commission [Eu14] we can observe that in 2013 the European app economy brings a revenue of 17, 5 billion Euro and it is rising to 63 billion euros by 2018 if referring to the results of this study to pure digital service products that are implemented as a pure digital value chain and services mashups without any physical assets involved at all.

Additionally to this, apps are a part of the changing world that is more known as the acronym cyber world. In this virtual world more and more entities (persons, legal bodies, locations, things, etc.) which exist in the real physical world, also have some kind of digital counterpart in something which is called cyber space nowadays. Sometimes even more than one cyber counterpart exists. The most important aspect is that both representations are so closely connected together that any state change in one representation is somehow synchronized to the other representation. Any external action to one representation will induce some kind of reflection on the other side. Hence the resulting notion of "twins". Accepting the cyber world representation as an inseparable part of entities has a big impact on the rules that have to be applied to this cyber representation (e.g. data ownership and information protection). This is totally linked with the trend cyber physical twins and match completely with the apps phenomenon.

Finally, the primary IT trend "naturalization of user experience" plays an important supporting role in this area. It does this two-fold: First, the most popular apps are those that come with an attractive user interface, can be used without a long lasting learning curve and offer also additional interaction modes like e.g. speech control, advanced swiping features and simple use of the built-in Smartphone cameras. Second, the instant, seamless and context-aware user experience pattern of those apps helps a lot to foster frequent usage of them all over the day in modern life. It's like business models being instantly exposed to the customer's finger tips and in the future even to their eyes, ears and body movements. But again, care must be taken with the sheer number of even such attractive interaction modes.

3.3   Limitations

Due to the exploratory nature of our research, this study has some limitations. For example, while in this paper it is referred to the inflation of apps, it must be recognized that the considerations are limited to the consumer view. It might be valuable to make a comparable survey from a company oriented view to validate the company side. It could be considered in future studies related to the topic.

Also, the survey is not representative for all app users, as it includes a large group of people under 34 years old. In addition, only very general information on the demographic characteristics of the participants was at hand, which limits the ability to relate app users' information seeking behavior to demographic characteristics.

4   Conclusion and Perspective

The study shows that approaching from both sides – companies and consumers – the phenomenon of appflation can be observed, with a potential loss of usability and a negative impact on the consumer experience going along therewith. Appflation is not only making the experience more complex for the user community. Companies also have to deal with the phenomenon to more effectively approach bigger numbers of customers, making more concerted digital app strategies necessary. What remains open is what role Enterprise Architecture could play in this organizational change. Some of well-known EAM (Enterprise Architecture Management) artifact cloud helpful, par ex. Life-cycle model, the service and domain model, the process-apps-technology-cloud model as well a repository.

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