Challenges in Intelligent Applications development

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Introduction

Intelligent Application if defined technically is a strategy that uses hyper-personalized mobile app experiences and services and knowledge-extraction processes to increases the user experience (Jessica Ekholm, 2017).

In simple words, the applications that not only know how to support or enable key decisions but also continually learn from the user interactions to become even more relevant and valuable to those users, are known as Intelligent apps.

Such applications are smart enough to differentiate between relevant and irrelevant information with the help of AI algorithms. Moreover, these apps have the capability to ease the complex task into the as simple task as a single touch.

Examples of Intelligent Applications. To demonstrate how the intelligent applications work, some applications are mentioned below (Jessica Ekholm, 2017):

Prevention of food poisoning: One in every six Americans suffers from food poisoning each year. Researchers have developed an app called *nEmesis* to identify restaurants that may be responsible for some cases of food poisoning. It uses deep-learning algorithms to read tweets, picking up on those about food poisoning to identify the restaurants that may be responsible.

Next-generation search: *Google's RankBrain algorithm* updates will enable its search engine to learn to update itself with little to no human interference, resulting in a self-modifying intelligent app with endless improvement cycles. Likewise, *Wikipedia's AI assistant, Objective Revision Evaluation Service*, seeks to automatically identify inaccurate edits to articles and also assigns quality scores.

Research Significance

The demand for the intelligent app is increasing significantly. According to Gartner's hype cycle of personal technologies, intelligent applications are placed on the peak. And hence it is required to study the development process and apply that study practically to increase the product usability.

Academic research:

The Intelligent applications involve more than one Information Technology, this blend of various technology like artificial intelligence, machine learning, mobile application development and user experience gives a new academic field for study. Among these, technologies like mobile application development and user experience are well developed while AI and machine learning are still in progress. Although, it's been a culture for a long time in IT to mingle several technologies to enhance available technology, here we are integrating AI in mobile application development to improve the user experience. Hence the proposed study can contribute to the academics to give a path to implement such technologies. Also, a continuous study in the same field will going to help in further enhancement of the user experience.

Practical significance:

We are moving from mobile first world to AI first world and hence it is important to update our self with AI especially when you are developing mobile applications. This study can have contributed to the organizations who are developing mobile applications, as it suggests the solutions to the challenges such organizations are facing. After this study organization can have knowledge about how to integrate two It technologies to improve the third technology. The study proposed to get into the depth of challenges organization can or may face in future once they

decide to develop the mobile applications with artificial intelligence. Also, some part of the study covers the future market of the IA which can help in deciding investment in IA related business.

Research Question

The purpose of the study is to find out solutions to the following research questions:

- What are the challenges organizations are facing while switching from usual mobile applications to intelligent applications?
- How are organizations adopting these changes?
- What is the potential of this new mobile application market in worldwide?

Brief Literature Review

Since intelligent application technology is a new trend in IT there are fewer papers directly related to the field and hence most of the information is taken from the articles available online, blogs and some field experts. As this technology is a combination of several pre-existing technologies in IT some papers were referred to study how these technologies work individually. To learn about the artificial intelligence which specifically uses learning technique, Active preference learning for personalized calendar scheduling assistance (Gervasio et.al., 2005), which discuss a learning system called PLIANT, it learns user preference from the feedback that naturally occurs during the interactive scheduling. This work helped in understanding the methodology and basic learning technique, algorithm involved in such application.

The elements of user experience (Garret, J. J., 2011 p.18-31) helped in gaining knowledge about the subtle parts of user experience which need to keep in mind while developing the application. Also, a survey study by Law, et.al., in 2009 gave insight about how the UX review changes with time and practitioners view on such subjective topic.

To study how information and signals in devices specifically in mobiles are processed (Yu & Deng, 2010) were referred. Their work deep learning and its applications to signal and information processing taught the necessary requirements to process information.

Mobile application development is an old yet evergreen field, from the time since mobiles especially smartphones were invented a continuous work is in progress to enhance the mobile technology. Though development of mobile application requires the basic knowledge of programming, to understand how to integrate machine learning algorithms with mobile application development strategy several works were referred. The agile approach towards mobile application development was studied through (Abrahamsson, et.al., 2004). To further investigate the existing challenges of mobile application development (Konig-Ries, 2009) was referred. The investigation also discusses the use of AI to overcome these challenges.

To study the market potential of this emerging technology in the worldwide, Allied market report (2017) is referred. It was found that market depends on more than one factor. Store type, location or region, and developing organization are some main factors.

At last, to study the building strategy, and the future of this technology several articles like (Schmarzo, 2017 & Chalfen 2015) were referred.

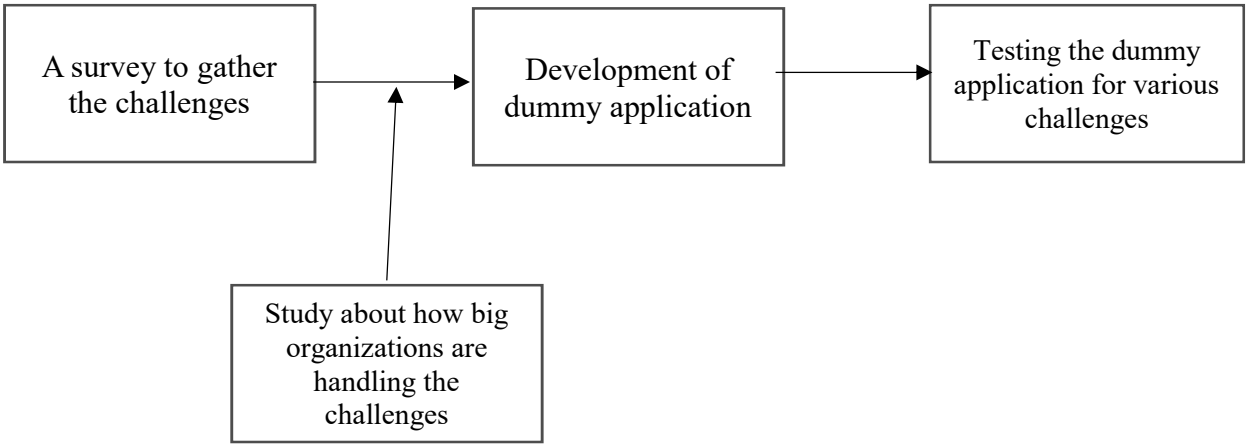
Being emerging technology topics to the integration of this technology and another future possibility of enhancing the same technology interviews available in the form of videos or blog were also referred.

Theoretical Basis and a Tentative research model:

The best strategy to learn and solve some problem is by working on it by yourself. The study proposed to answer the research question by handling the challenges in development by developing a similar application as a model or dummy. This test application will be a java based

application developed using the android studio. The purpose of this application is to test all the challenges and problem, hence its designs will be moldable such that after solving one challenge it can be engaged in a different module of problem. To gather the challenges industry is facing we will perform an online survey among the freelancers and organizations working on mobile application development. To solve the problems, a study needs to be conducted separately which finds out how big organizations are handling this challenge.

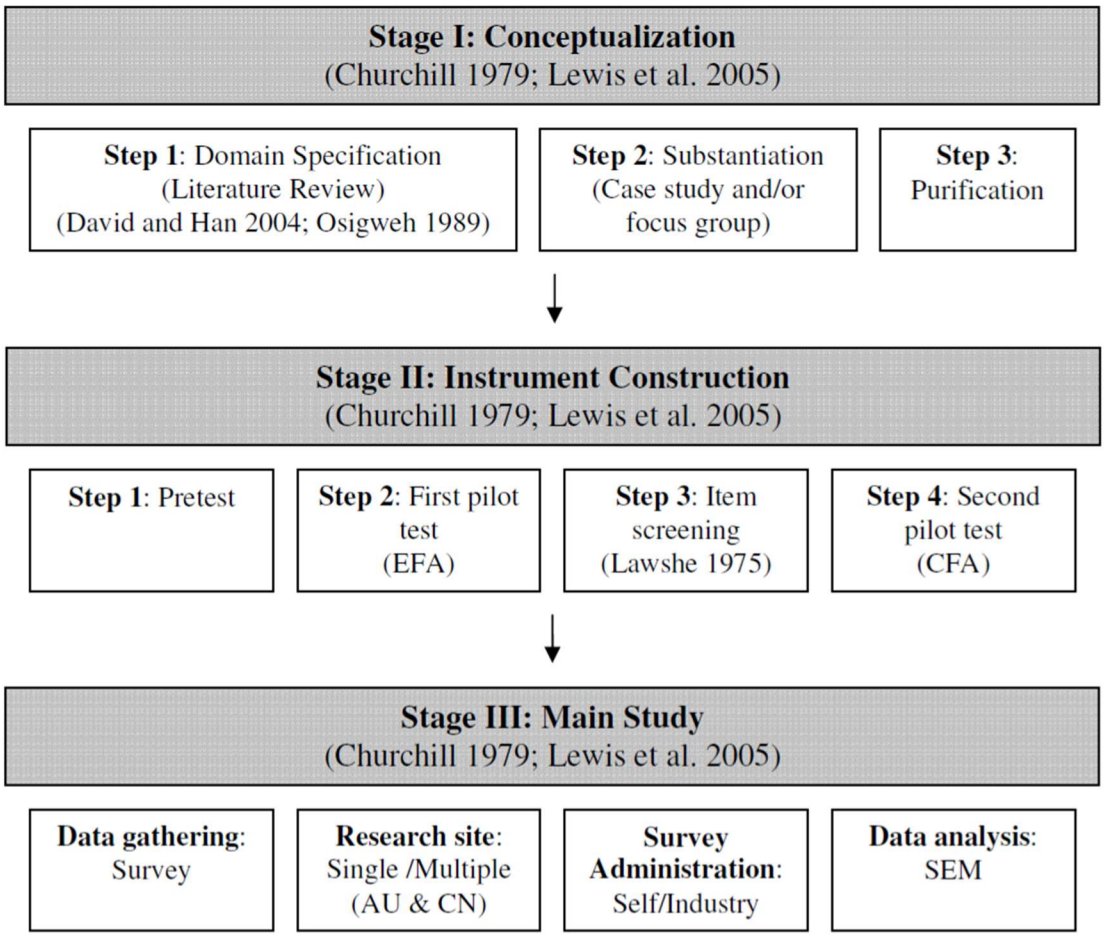
Below is a tentative research model that will be followed to complete the study:



Research Design:

The proposed study seeks to obtain desirable research outcomes by adopting a mixed method approach that employs both quantitative and qualitative research methodologies. Overall, there are three main stages in the proposed study each producing different yet connected outcomes. The first stage involves the conceptualization of challenges in IA development using which a dummy IA can be developed in the second stage, while the third stage consists of the empirical and quantitative testing of the developed dummy application to investigate and find the solution to the challenges appears in the new integration of AI learning techniques with basic mobile app development.

The first two stages largely follow the construct development approach suggested by Churchill (1979), who made extensive references to Nunnally's (1978) study of psychometric theory, and the one suggested by Lewis et al. (2005), whose work was built on Churchill (1979), that was specially designed for use in information systems studies. However, the proposed study has made minor changes to these approaches to fit its specific research context. This is mainly because the Intelligent application development does not have a concise conceptualization. As a result, extra steps need to be taken to ensure that the conceptualization of Intelligent application development is valid, reliable, and rigorous, which in turn guarantees domain and content validity (Bohrnstedt 1970; Churchill 1979).



Research Result-To Date

Development of Intelligent applications. Intelligent apps are developed in Agile Fashion with modern PaaS and DevOps. These apps are embedded with the algorithms which are capable of providing analytical insights whenever the situation to make a decision arises. The development is taken with considering the fact that applications are for everyone and needs to be updated for constant relevance. The platform for delivering these applications can be Web, Mobile, IoT Systems etc. whichever suits best.

Challenges in developing Intelligent applications. Mobile app development company must leverage innovative data, data intelligence systems that are endowed with machine learning and predictive learning to build apps in order to sustain in the AI first world. The apps should have a continuous learning approach to progressively become intelligent. (Helios, 2017). The development of Intelligent application requires integrating a simple application with artificial intelligence learning techniques. Various organizations working towards the development of Intelligent Apps need to have knowledge about AI. The challenges organizations are facing to develop the Intelligent applications are training data, using new strategies, technology-driven processes, and skilled developers. All these challenges are discussed in detail below:

Training data is at the heart of building distinctive narrow-AI-Based products. Startups need to find sources of structured data that can help them build the best possible models. Since mobile applications are more focused on User Interface it should be designed along with AI algorithms. Machine learning theory states that with unlimited data, we could expect all algorithms to produce similar-quality results. So, startups will only resist commoditization if they have access to a unique data set and extend their early lead by continuously learning how to improve their algorithms based on end-user interactions. The most famous example is Google's

use of clickstream data as a private source of training data to improve search-ranking results. However, the company may well have found its way. First, the team created a platform it can reuse for many different text-based AI applications, whereas it had started with a toolset. Second, it has found a high-value focus in automating text conversations. Importantly, the algorithm is based (amongst other data quarries) on analyses of huge repositories of real call-center transcripts. This may now yield a replicable product that can be the foundation of a large business.

Having data is not enough, we should have accurate metadata to be extracted from the dataset. I find that the best AI-driven startups are focused on increasing both the throughput and the refinement and accuracy of their algorithms. That takes iteration and time — and a lot of data — to get right. (Chalfen, 2015)

Adopting new strategies. Even once the right algorithms are chosen, a good data set identified and a process to improve and scale Machine Learning is hardened, startups are often just at the starting line. Some challenges require innovation on multiple fronts. Even for narrowly focused startups, engineering challenges are rarely one-dimensional. IT operations-focused startup Moogsoft is a good example. Phil Tee, the founder, and CEO of Moog is a fifth-time founder, and as the founding CTO of Micromuse was responsible for the dominant incumbent in network management. His goal was to work out how to process millions of different event data points so that IT operations could be evaluated across the full stack. The team also needed to have the understanding of enterprise use cases so that the software was effective in reducing time to resolve and troubleshoot tickets, and in delivering transparency to the affected organizations. This combination is not trivial.

Market potential. The global intelligent apps market is segmented on the basis of store type and geography. Based on store type, the market is classified as Apple App Store, Google Play, and others. Based on region, the market is analyzed across North America, Europe, Asia-Pacific, and LAMEA.

The global Intelligent apps market is dominated by key players such as Google Inc., Microsoft Corporation, Opera Software, Cognizant, Hewlett Packard Enterprise, Development LP, SAP SE, China Mobile Limited, Samsung Electronics Co. Ltd., Apple Inc., and others.

Conclusion

The proposed research studies and solve the challenges in IA development collected by organizations working with it by developing a dummy application that is tested for each challenge and also discusses the potential market of IA to understand the need of such rapid study in this emerging field.

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Appendix-1

Table 1

Services and IoT Applications and Analytics Will capture some 60% of IoT Spending

Technology Layer	Market Size (€billions)	CAGR, 2015-2020 (%)	Value
Services	10-60	~40%	IoT users need customization
IoT Applications	10-60	~40%	App and S/W development precedes hardware rollout
IoT Analytics	3-20	~40%	Analytics support app and drive insights
Identity and Security	3-20	~40%	Financial and technical challenges will limit initial spending
IoT Backbone	3-15	~30%	Platforms will initially be given away and will lag behind point solutions
Communications	10-25	~29%	Commoditization and scale effects will lead to price erosion; existing network infrastructure will likely be reused

Source: IDC; Gartner; ABI Research; BCG Internet of Things buyer survey; expert interviews;

BCG analysts

Appendix-2

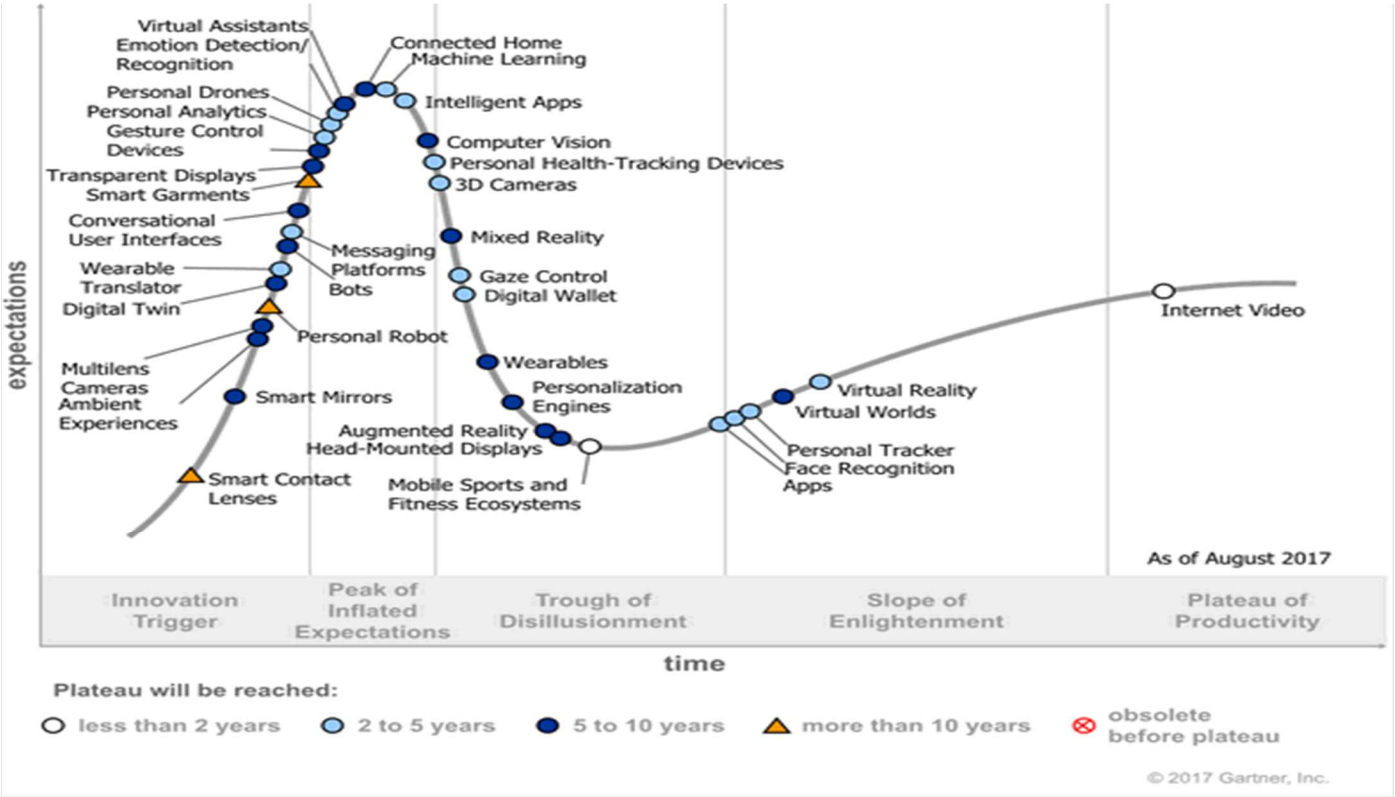

Figure: Hypecycle for personal technology 2017.

In priority matrix for Personal Technologies 2017 Intelligent apps was adopted in mainstream within 2 to 5 years and term was considered as transformational