Best UI/UX practices in the world of modern IT business applications

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Best UI/UX practices in the world of modern IT business applications

Undergraduate thesis

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Abstract

User experience design is a creation of useful and efficient digital applications that are simple and that fulfil the needs of users who are conducting any activity on those applications. User experience design has been developing through the last several decades and its importance has been growing ever since. The user experience design process has been significantly impacted by other information technology trends such as the transfer from desktop to handheld devices and it has been impacted by some socio-cultural trends like remote work. Although complex business applications do pose a challenge to technology companies in terms of optimizations for mobile devices it is a challenge they must overcome. The process of optimization is not going to be a streamlined one but a feature by feature, to ensure an easy transition and in order not to be too costly for the business application development companies.

Keywords: user experience, user interface, technology, business applications

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1. Introduction

1.1. Aim of the paper

The aim of this paper is to provide an overview of user interface (UI) and user experience (UX) design processes, how those processes evolved over time, and to take an in depth look at the future of those processes in the development of mobile versions of complex business applications. UX design is a creation of useful and efficient digital applications that are easy to use and fulfil the needs of users that are conducting any activity on those applications. UX design has been developing through the last several decades and its importance has been growing ever since. The UX design process has been significantly impacted by other information technology trends such as the transfer from desktop to handheld devices and it has been impacted by some socio-cultural trends like remote work, especially sped up by COVID-19, making the UX more significant than ever before. Due to this, many users of complex business applications have been expressing the wish to optimize those applications for mobile devices. In this paper, above-mentioned trends will be looked at and how they drove the development of the UX design processes will be analysed. A survey is conducted using an example of a complex business application with a goal to reach a conclusion on how to efficiently translate a desktop business application onto a handheld (mobile) device.

1.2. Methodology

In order to answer all the questions mentioned in the section aim of the paper the primary data is collected from scientific and professional articles, books, research papers on the topic of UX and UI process design. In addition, data is collected from a survey conducted among the business application experts from which a conclusion will be drawn on which type of business processes can be optimized for mobile devices and in which ways.

1.3. Structure of the paper

This paper is divided into five main chapters. The first chapter is the introduction of the topic of UX and user interface design and definition of those terms, as well as a brief overview of the history and the evolution of UX and UI. Furthermore, development of technology throughout time will be observed via the advancement of the business IT applications, speed of adaptation to technology developments and the transfer from desktop to handheld devices. The process of transfer from desktop applications to handheld device ones will be discussed in depth in this chapter. The fourth chapter will talk about the socio-cultural environment and how people adopted the new lifestyle of working remotely with the help of technology. Following chapter is the analysis of the conducted research on user opinions of transferring specific complex business processes to a handheld device and the results of that research. Lastly, conclusion will be brought through the vision of the future of the technology and what can we expect from UX/UI in the following years.

2. Definition of UI/UX design

2.1. UX design

UX design is the discipline of creating a useful and usable Web site or application that's easily navigated and meets the needs of the site owner and its users. UX design is the process of creation and synchronization of the elements that affect users' experience with a particular company with the intent of influencing their perceptions and behaviour. [1]

Everything that the user can hear, touch or interact with are the elements that impact the UX. Although it may not be intuitive at the first glance, when designing any digital product, the designer or the design team must also consider users' physical/tangible environment because physical items such as screens, keyboards and audio equipment can significantly impact the way users interact with their product. To be successful, the UX design must consider the business objectives of the project, needs of users and any limitations that can affect the intended usage of product features.

In the modern day business and product and service development, companies have become aware that it is not enough just to implement features and test their usability but it is necessary to design the experience in order to compete on the market. Products and services have to be enjoyable but also support fundamental human needs and values which leads to experience of the usage or consumption being a key concern while developing a product or service.

Furthermore, various definitions on UX agree that the impact of UX is affected by the users' internal state- emotions, by the context in which it is presented and the users' perception of the product, and not only usefulness and usability as the main part.

[1] Unger R., Chandler C., (2012): A Project Guide to UX Design, Second Edition.
Retrieved from: https://books.google.hr/books?hl=hr&lr=&id=dF7li-90OYQC&oi=fnd&pg=PT19&dq=ux+design&ots=PzL1Bl-BEw&sig=fZbYE9EhLVstrn2hd7Wg2mpvgyU&redir_esc=y#v=onepage&q=ux%20design&f=false

However, it has to be kept in mind that UX is measurable and manageable. In order to create a successful UX design, the designer and the design team must consider several factors and parts of UX.

1.1.1. UX design process

First step or factor in UX design should be research which includes understanding of the user's requirements.[2] This research can be conducted via surveys, user interviews and observation methods. This type of research can help to identify not only the final goals but also issues a user may encounter so that they can be anticipated and prevented. In addition, an important step in the research process is creating a journey map and use cases in order to see how the user will start and finish using the product.

Next factor of UX design, brainstorming, is closely connected with research because it focuses on the user flows or, what steps will the user take while using the product. The output should be a "rough skeleton" or the wireframe of the product that will serve as a prototype for the further digital product development.

Third factor of UX design is implementation which consists of digital prototypes and frontend and backend development. Prototypes are needed in order to see how the product will look in real life after gathering data and can give an insight on whether the user will like the product. When the prototype is approved, developers start working on the backend and the frontend of the product.

Finally, there will be a reporting process on the product. It includes usability reporting or how real users view the product, split testing of various design iterations and analytics reporting which gives additional insights on bounce rates or time spent.

[2] Stone D., Jarrett C., Woodroffe M., Minocha S., (2005.): User Interface Design and Evaluation. Retrieved from: https://books.google.hr/books?hl=en&lr=&id=VvSoyqPBPbMC&oi=fnd&pg=PR21&dq=user+interface+design&ots=d8K_RVlRUa&sig=eZf7384nLu9KUmqLU7Z-S1XmwRw&redir_esc=y#v=onepage&q=user%20interface%20design&f=true

1.1.2. Academia vs application

It is important to note that there is a gap between scientific research of UX and the practical usage of it. The latter focuses more on the usability, functionality, novelty and the product life cycle while the first one is based on theories, models and frameworks.

Stating the right questions, [3]understanding the UX and making it measurable and manageable is crucial when designing the UX and implementing it on the product. It has to be noted that UX evaluation has to be valid, reliable and repeatable in order for it to be manageable also in big companies where responses are needed fast and cost efficiently. Furthermore, it has to be applicable for various types of products but also for concept ideas, prototypes. UX design should also focus on the question is it suitable for different target groups (ages, gender, educational level).

UX is a multidisciplinary activity which means that many departments inside of the company are interested in developing it but also that a variety of users can be expected.

2.2 UI design

UI is a vital part of almost every computer system because it is that part of the generally complex backend logic that the user sees and interacts with. UI is only a part of the UX design process, but as the front image of all the process, often takes up the core part of the focus. The key to the successful development of a usable UI are the users and the analysis of how they behave in practice.

Good UI is one that is easy to use and understand but meets the needs of the final users and supports them in the completion of their tasks. This is why the development

[3] Väänänen-Vainio-Mattila K., Roto V., Hassenzahl M., (2008): Towards Practical User Experience Evaluation Methods. Retrieved from: https://www.researchgate.net/publication/239749277_Towards_Practical_User_Experience_Evaluation_Methods

of UI should be user centred[4], which means that in the centre of the development process must be understanding of the users and the tasks they wish to carry out in the certain environment. UI is a set of elements whose relationship should be observed in order to understand it as a whole. In order to understand why UI matters we have to look at human - computer interaction or HCI. It is a study of how humans interact with computer systems they use. It is a broad term that includes various disciplines such as psychology, ergonomics, engineering but also graphic design which is closely related to UI design.

Furthermore, it covers many aspects of people's everyday lives directly like personal computers or less directly such as digital cash registers. Development of the UI can be divided into three parts. First one is requirements where designers have to ensure that they know who will use the system and for what purpose. Next is the design itself that is based on conceptual design, choosing interaction devices and software components and the final integration of these components within specific design. Third part is evaluation where designers find out whether the interface works which is an intrinsic part of designing. Furthermore, developing a UI should be an iterative process that requires repeated prototyping and evaluation together with close collaboration with final users and other key stakeholders.

The importance of UI design lies in the fact that computers and various information systems are used on an everyday basis and people base their emotions and memory on the visualization. Therefore, design and development of UIs have to be subordinated to people and tasks they have to perform in order to make it as easy and user friendly as possible.

User centred [5]design is an approach to UI design and development where users are involved throughout the whole process of design and development. Taking the user centred approach designers are also analysing the environment (organizational, social

[4] Stone D., Jarrett C., Woodroffe M., Minocha S., (2005.): User Interface Design and Evaluation. Retrieved from: https://books.google.hr/books?hl=en&lr=&id=VvSoyqPBPbMC&oi=fnd&pg=PR21&dq=user+interface+design&ots=d8K_RVlRUa&sig=eZf7384nLu9KUmqLU7Z-S1XmwRw&redir_esc=y#v=onepage&q=user%20interface%20design&f=true

and psychological), which further optimizes computer systems usability. There are four essential human centred design activities. First one is understanding and specifying the context of use. Next is specifying users and organizational requirements. Both of those depend greatly on the active involvement of users. Third activity is producing design solutions and prototypes. The following activity is evaluating the design with the users against requirements and analysing their experience in order to make adjustments and improvements.

2.3. Evolution of UI/UX design in technology

The term UX was first used by a cognitive psychologist and designer Don Norman in the 1990s, but the origin can actually be tracked way back to ancient China and their philosophy on the importance of space. More than 4000 years ago, Feng Shui, the ancient Chinese philosophy that refers to the arrangement of objects in space with relation to energy was introduced. It is based on the arrangement of the surroundings in the most optimal way that is the most “user-friendly”. It refers to the framework or the layout and also to the colours and materials. UX designers use similar principles to develop simple and intuitive experience for users. In addition, ancient Greeks have made their tools and workplaces based on ergonomic principles. This means that they have taken into consideration how to optimize human well-being and system performance using the design. This could be seen in the example of Hippocrates surgeon’s workplace in a way that it has to have correct lighting, that tools have to be arranged and in a hindsight of the surgeon.

More modern mentions of UX can be seen in the early 1900s when Frederick Winslow Taylor has mentioned in his book “The principles of Scientific Management”, how to optimize the relationship between humans and their tools.[6] Couple of decades later Toyota has put the work environment in focus. This was a further deepening on the topic of UX and the importance of human input and workers interaction with the machines.

[6] Robinson K., (2016): History of UX Design. Retrieved from: https://blog.prototypr.io/5-things-you-didnt-know-about-the-history-of-ux-design-20592208a336

Furthermore, what can be said is the most precise explanation of UX design was from Henry Dreyfuss who based his philosophy on common sense and scientific approach. In his book Designing for people he said that UX designing is “When the point of contact between the product and the people becomes a point of friction, then the (designer) has failed. On the other hand, if people are made safer, more comfortable, more eager to purchase, more efficient or just plain happier by contact with the product, then the designer has succeeded.”[7]

Next more modern UX innovator was not from the engineering background but a strip illustrator Walt Disney who is often considered as one of the first UX designers in history. His mission was to create a near perfect UX by guiding his team of engineers which he called “imagineers” to know their audience, wear their shoes and communicate with colour, shape, form and texture. His vision was to use the latest technologies to improve the lives of people which is pretty similar to the today's vision of UX designers.

In the 1970s with the kick off of the personal computer engineers, programmers and psychologists started working together on the UX. Most influential developments came out of Xerox's PARC research centre. Some of those are graphical UIs and the mouse which set the future of personal computers. Another company that continued to raise the bar of personal computing was Apple, with its Macintosh that was released in 1984 and was the first mass-market PC. It featured a graphical UI with a built-in screen and mouse. Furthermore, the company took its part even in coming up with the term UX design.

In 1995 Donald Norman, a cognitive scientist, who came up with the term UX design joined the team in Apple as their UX Architect.[8] This made him the first person to have UX in his job title. Donald Norman explained what was the motivation for inventing the term UX design “I invented the term because I thought human interface and usability were too narrow: I wanted to cover all aspects of the person’s experience with a system, including industrial design, graphics, the interface, the physical interaction,

[7] Dreyfuss H., (1955): Designing for People. New York, Simon and Schuster.
[8] Spremić M., (2020): Enterprise Information Systems In Digital Economy. Zagreb, Faculty of Economics and Business

and the manual.”. The first UX designer published in 1988 The Psychology of Everyday which was later renamed to The Design of Everyday Things and which is continuing to be a UX design principle to this day.

In the modern era of technology where artificial intelligence, voice technology or virtual reality is used on an everyday basis, UX designers face new challenges constantly. UX design has to adapt and evolve continuously in order to catch up with all the novelties and trends in the world of technology. UX designers are successfully managing it and are creating their own trends of UX design. First example of those trends in 2020. would be advanced micro[9] interactions which are subtle moments or events that are centred around accomplishing a certain task. Their purpose is to engage the users and make their experience more human. Next examples of trends in UX and UI are augmented reality and virtual reality (AR & VR). Augmented reality improves UX and UI by adding digital elements to a live view often by using the camera on a smartphone. On the other hand, virtual reality puts the user completely out of the physical world implying a complete immersion experience.

Next example is useful data visualization. UX designers try to display enormous amounts of data in an interesting, useful and meaningful way in order to enable users to make decisions based on the information they see. Identity verification and authorization is another example of a trend in UX and UI design. It is a process that ensures users identity and that it matches the one that is supposed to be. Furthermore, it enables organizations by permitting only authorized users to access its private resources to keep their networks secure. Authorization can be done through various processes such as fingerprint scanning, face identification, two factor authentication apps and similar. Voice UI is based on using speech recognition technology in order for users to interact with technology using just their voice. VOI has been increasing in popularity in recent years and can be experienced in Apple's Siri, Amazon's Alexa and Google Assistant. Because of the increasing complexity of new technologies, it is very important for companies to make advanced onboarding and tutorials that would help the users of their applications to get the best experience while using it. Advanced

[9] Batchu V., (2018): Micro-interactions: why, when and how to use them to improve the user experience. Retrieved from: https://uxdesign.cc/micro-interactions-why-when-and-how-to-use-them-to-boost-the-ux-17094b3baaa0

onboarding is a virtual unboxing experience that helps users to start using the app through video tutorials, guides and examples. It is very important for the first experience with the app to be smooth and remarkable in order to gain and retain users.

Due to the pandemic and lockdowns in 2020 and 2021 organizations have made significant investments in developing collaboration applications like video conferencing and team messaging. Matching specific user needs and interests with no effort from targeted users is the goal of personalization by delivering content and functionalities accordingly. In the modern day of business, it is one of the most important and best practices to gain and retain users. The last trend that has to be mentioned is compelling storytelling which engages users and helps them remember information and build meaning.

3. Technology development

3.1. Business IT applications through time

History of technological impact on business is decades long and filled with larger and smaller milestones. The biggest interest one for this paper is the introduction of computers and later on the introduction of business applications. Introduction of computers in the workplace increased the pace of the business or in other words the speed and efficiency of conducting said business processes. Advantages of computers range from faster and more reliable methods of performing complex calculations, transactions, and communication. In addition, computers enabled businesses to store, organize and preserve files, documents and all other relevant business information in an efficient, trackable and long-lasting manner for a lower personnel and physical costs. Processing of information became faster making overall business perform better and earning higher profits consequently.

Upon the introduction and integrations of computers in everyday business procedures, information technology was the next impactful advancement to business By information technology we can consider all internet and online solutions that have been introduced, and soon became a necessity for any business conduct. It is next to impossible to pinpoint which of the services and applications have brought the biggest change however some of honourable mentions are enterprise resource planning system- large and complex solutions that offered management, tracking, governance and storing of all incoming and outgoing transactions a business can need. Large improvements have been made by document management systems that enabled the efficientization of conduct but also improved perception for administrative institutions, turning the tedious and complicated processes of document management into an automatized operation that follows all regulations, minimizing to the maximum the possibility of human error. Rising stars of the future of IT are inevitably Internet of Things technologies that, even though significantly developed on paper, are still only being slowly implemented following the smart city ideologies, oriented towards societal

well-being[10]. Another important and widely talked subject are decentralized finances brought by blockchain technology and popularized by cryptocurrency, which on the other hand improve the safety, transparency and traceability of any transaction whether physical or digital (interesting example here would be governance management where important documents such as passports, ID cards etc, can be issued directly from the government to the citizen with maximum security ensured). Information technology will surely remain an important asset for businesses because it is continuously reforming the ways in which business is done. Most of the business today can be done online even using mobile devices independently from the location.

3.2. The speed of technology development and adoption speed

The first time that the mobile devices /smartphones sales have surpassed the global personal computer sales was in 2011. In this year there were more than 100 million smartphones sold. At the first glance this may seem as nothing special. However, it really proved to be a turning point in how businesses interact with their users. Suddenly, users were not anymore static and localized individuals. They were in constant motion, global, fast paced and with decreased attention span or in other words increased attention to the content too long or not interesting enough. This was a point of change in UX design that is still ongoing- creating easy to consume attractive ways to present the content or a process.

Only 8 years later, in 2019., this number skyrocketed to around 1.7 billion of smartphones sold compared to the seemingly small number of 250 million of personal computers sold. The following year, 2020, we can see a drop in the number of mobile devices sold which can be connected to the general decrease of new investments and purchases due to the COVID.

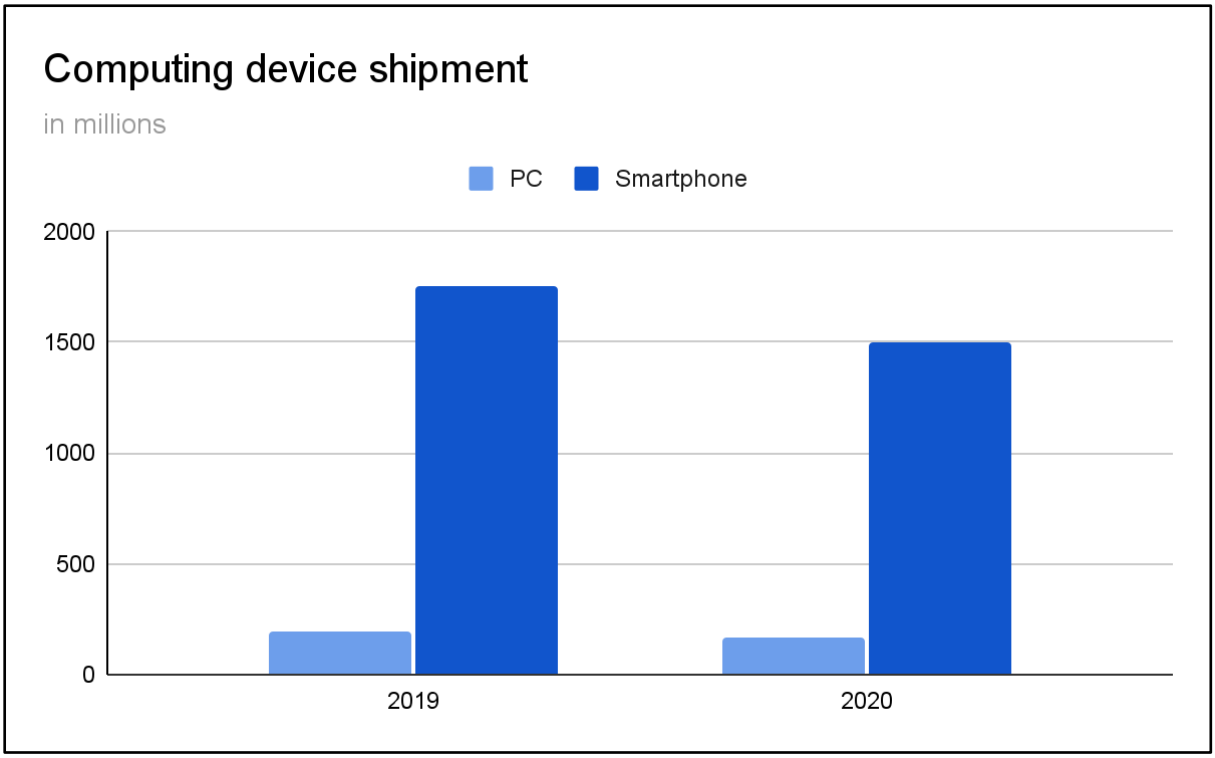
The global shipping of mobile phones was expected to reach 1.5 billion units in 2020, down from 1.75 billion units in 2019. Due to the effects of the COVID-19 pandemic, global shipments of gadgets such as personal computers, tablets, and mobile phones

[10] Spremić M., (2020): Enterprise Information Systems In Digital Economy. Zagreb, Faculty of Economics and Business

are expected to drop by 13.6% in 2020. Desktop personal computers sales and shipments are steadily declining due to the increased use of laptops and notebooks, as well as, more recently, tablet devices and smartphones. For the foreseeable future, this tendency is projected to continue. Experts maintain, however, that the classic desktop personal computer will always have a place, especially in the offices, and that this type of computer will continue to be sold but at a slower rate than in the past.

According to some reports, tablet usage among businesses will become widespread by 2020, with adoption rates expected to be close to 100%. According to the same source, employers may be hesitant to provide business tablets to their employees, preferring instead to allow staff to connect their own personal devices to the corporate network. Despite this, it is projected that shipments of basic and utility ultramobiles, such as tablets, would continue declining from their 2014 highs.[11]

Figure 1. Shipment of computing devices

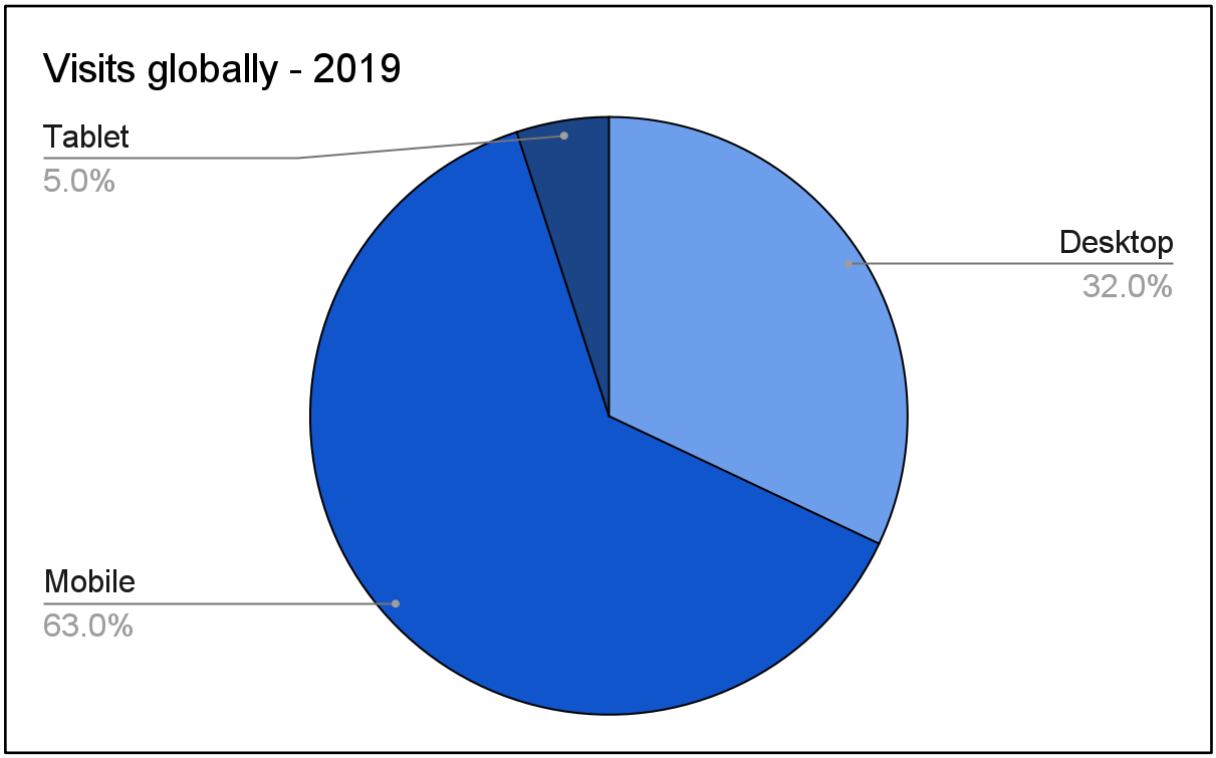


Source: https://www.statista.com/statistics/265878/global-shipments-of-pcs-tablets-ultra-mobiles-mobile-phones/

[11] Alsop T., (2020), PCs, tablets, ultra mobiles, mobile phones global shipments forecast 2013-2020. Retrieved from: https://www.statista.com/statistics/265878/global-shipments-of-pcs-tablets-ultra-mobiles-mobile-phones/

It can be seen in the pie chart that in the year 2019 all website visits globally were mostly made through mobile phones, precisely 63% of total visits. Device that is used the most next is the desktop computer taking up to 23% of the total visits to websites. Even though tablets are similar to mobile devices they have never reached its popularity which can be seen in the number of visits to websites they take up.

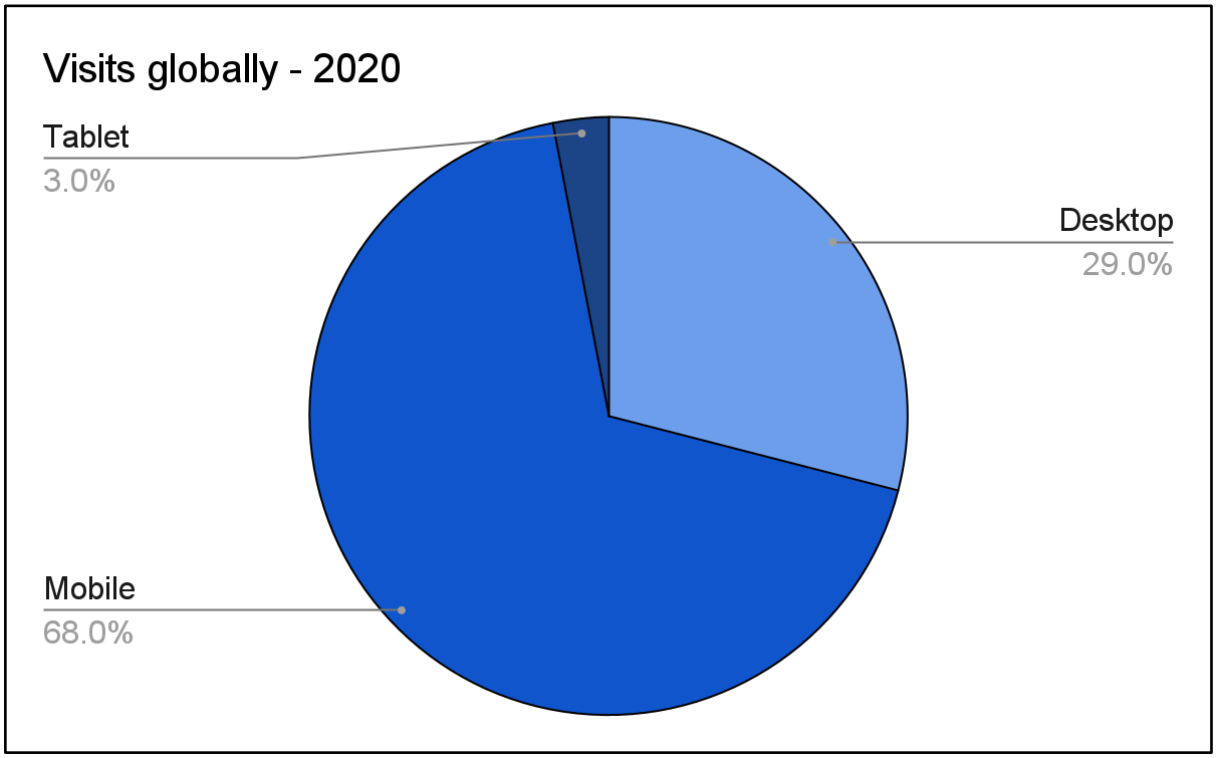
Figure 2. Global visits to web pages in 2019



Source: https://www.statista.com/statistics/1110433/distribution-worldwide-website-traffic/

On this pie chart we can see the similar disposition of the percentages of the total visits to the websites visited. Comparing the two pie charts it is also obvious that during the time of the pandemic usage of mobile devices have increased even more compared to desktop usage. This significant advantage of mobile device usage over other devices in visits to websites can be owed to the increase of attention and development spent on UI and UX. This just proves that mobile usage, if anyone still doubted it, is not a trend and even solid, hard systems like business applications are just waiting for their turn to become fully mobile friendly.

Figure 3. Global visits to web pages in 2020



Source: https://www.statista.com/statistics/277125/share-of-website-traffic-coming-from-mobile-devices/

3.3. Transfer from desktop to handheld devices

In the modern day of technology where both personal computers and smartphones are available to almost everyone a discussion on which device is more relevant and useful has risen. In the last couple of years mobile phones have become the leading source of internet traffic which means that the general time spent on the device is higher for the mobile phones. Data shows that mobile devices are responsible for more than 50% precisely 54.8% of internet traffic even though tablets are excluded from the analytics. [12]

This rapid increase can be explained through a couple of factors. Certain countries such as Kenya, Ghana and Nigeria have skipped desktop usage because of its high costs and went straight to smartphones that are much more affordable. Next reason would be the increase of popularity of social media which are mostly used on mobile

[12] Petrov C., (2021): Mobile vs. Desktop Usage Statistics for 2021. Retrieved from: https://techjury.net/blog/mobile-vs-desktop-usage/#gref

devices. Handheld devices account for approximately 80% of the time spent by users worldwide on social media. A good example of a company that has successfully turned almost all their users to mobile devices is Facebook. In 2021 98.3% of all Facebook users accessed it through a portable device. They have succeeded in this due to the amount of work the company has put towards mobile accessibility. On the other hand, we can notice that the LinkedIn traffic comes in a smaller portion from portable devices. The number is still on the side of smartphones accounting more than 60% of visits even though it is a professional network. The majority of internet traffic nowadays is mobile, and the majority of business to business enquiries are made via mobile. Consumption of social media is also primarily done on mobile devices.

Nonetheless, the desktop appears to have a future, as evidenced by the mobile vs desktop usage numbers for 2021 especially for professional needs. Another reason for an increase of usage of mobile phones is that mobile apps have a better percentage of engagement than mobile-optimized websites or browsing the web on a desktop computer. Further benefit of the mobile phones is the fact that CPC or cost per click is 24% less than desktop and the CTR or click through rate is 40% higher.

Research further shows that US adults spend approximately 4 hours per day on their smartphones. It is used for visiting websites, watching videos of various content, playing games but also work-related tasks such as sending emails, video conferences and meetings, creating educational content and similar.

In recent years, an increasing number of organizations have adopted a mobile-first strategy when deciding between mobile friendly web pages and native applications. Immediacy, simplicity, and context are three design principles for mobile devices. The most fascinating manner in which mobile devices vary from desktop ones is through context. Because they are constantly at work, in their spare time, while traveling, and so on. Context, which includes the user's location, communication history, and previous activity, may predict user news and offer relevant information at the appropriate time.

4. Socio-cultural environment

4.1. Work-life balance and work from home in corporate world

A contributing factor to changes in UX design is also a switch towards remote working, especially sped up during COVID-19 times. Companies were frightened by the impact of remote working on the efficiency and productivity of employees and the quality of executed tasks; however, the findings show that the experiment of remote work as reported by hiring managers went better than predicted[13]. Businesses are dramatically increasing their plans for future remote hiring as a result of the perceived benefits of working remotely, which will accelerate the already growing trend of more remote work. Remote work is on the rise and has progressively increased in the two decades leading up to COVID-19, but it still accounts for a small percentage of the workforce. Companies frequently avoid having remote employees or significantly reduce remote work, and the overall number of the workers that were fully remote was small in size.

In the pre-COVID Future Workforce survey, over half of employers said that none of their employees worked remotely for a substantial amount of the time. The 2.3% of hiring managers had totally remote teams, and only 13.2% of the labour force represented worked entirely remotely. These figures are in line and broadly consistent with prior projections.

[13] Ozimek A., (2020): The Future of Remote Work. Retrieved from: https://ssrn.com/abstract=3638597

Table 1. Forecasts of remote work presence

	November 2019	Five year forecasted rates		Five year growth	
		Pre - COVID	Post - COVID	Pre - COVID forecast	Post - COVID forecast
Entirely remote	13.2%	17.2%	21.8%	30%	65%
Significantly remote	10.2%	13.7%	17.7%	33%	73%
Some remote	9.5%	15.0%	18.8%	57%	98%
Not at all remote	67.1%	54.2%	41.7%	-19%	-38%

Source: Ozimek A., (2020): The Future of Remote Work. Retrieved from: https://ssrn.com/abstract=3638597

The polls queried a total of 1,500 hiring managers, including executives, vice presidents, and C-levels, so the survey demonstrates the same results coming from the individual's opinions of who has the direct control in the company. In summary, the findings show how core leaders so far have interpreted the remote work experiment and how its consequences impacted their plans.

Main findings are the following: as a result of the pandemic, remote employment has skyrocketed, with more than half of the American workforce now working from home. Second finding is that the change to remote work has gone better than planned for 56% of recruiting managers, while it has gone worse for only one in ten. Next finding was that the biggest advantages of remote work, according to 40% of respondents or more, include not having to commute, having fewer unneeded meetings, and having

fewer interruptions at work. On the other hand, it was found that the biggest disadvantage is technology concerns, which are most likely a result of the abrupt and unexpected transition and would be reduced over time. Furthermore, a third of recruiting officers reported enhanced productivity as a result of remote employment, a higher percentage than reported decreasing productivity.

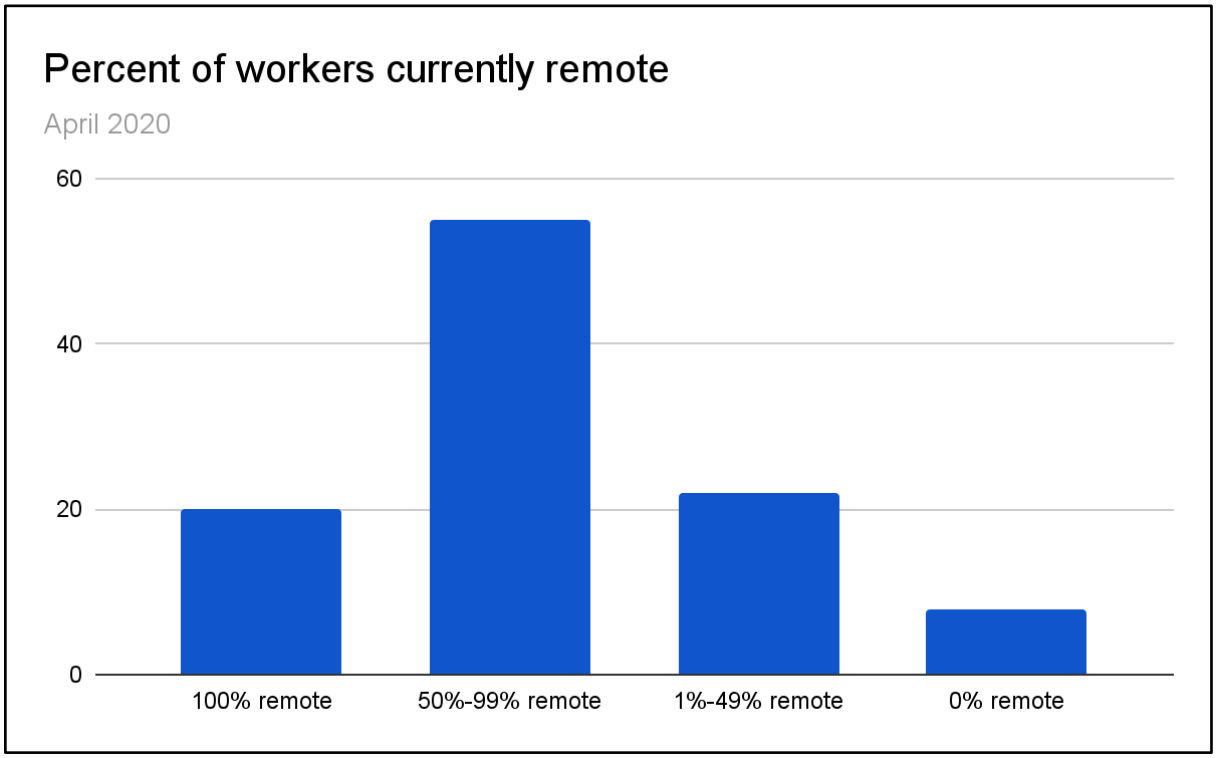
Finally, as a result of their COVID-19 experiences, 61.9% of recruiting managers expect their staff to be more remote in the future and that over the next five years, the predicted growth rate of full-time remote work will double, from 30% to 65%.

Table 2. Comparison of remote work pre and post COVID-19

	Pre - COVID	Post - COVID
No remote workers on their team	46%	6%
Fully remote team	2.2%	20%
Share of their workers remote	13.2%	56% to 74%

Source: Ozimek A., (2020): The Future of Remote Work. Retrieved from: https://ssrn.com/abstract=3638597

Figure 4. Percentage of workers currently remote



Source: Ozimek A., (2020): The Future of Remote Work. Retrieved from: https://ssrn.com/abstract=3638597

The survey reports that the most common reason for poor execution of work while working remotely was technological challenges, which 36.2% of respondents agreed with. Increased distractions at home was the second most frequent response, with 32% of respondents agreeing. Importantly, experience will lessen these two issues with continuation of remote employment. Because of the requirement to go remote quickly, many individuals and businesses are adopting new technologies they have not used previously, and many will have to explore before deciding on what works best for their business. As a result of change in the way of communication team cohesion has been reduced leading to difficulties in communication and often misunderstandings between co-workers. This caused organizations many problems such as not meeting the deadline, unsuccessful projects and generally less productivity. As technology advances, the number of people who find team cohesion, communication, and structure to be a challenge will undoubtedly decrease.

Table 3. Issues of working remotely

What has worked poorly regarding the remote work at your organization?	
Technological issues	36,2%
Increased distractions at home	32%
Reduced team cohesion	30,5%
Difficulties in communication	30,3%
Teams are less organized	23,3%
Less productivity	22,5%
Nothing has worked poorly	14,8%

Source: Ozimek A., (2020): The Future of Remote Work. Retrieved from: https://ssrn.com/abstract=3638597

To summarize, with remote work becoming more normalized, work environments will change even more to non-stationary offices where mobile communication will become increasingly prevalent. This will increase mobile first challenge UX designers are tackling to the large beast- business applications.

4.2. Globalization and digital nomads

Whereas the lifestyles of digital nomads and remote workers (telecommuters) differ (telecommuters generally balance family responsibilities, while nomads balance leisure and work – and, in rare cases, child bearing), both find it difficult to draw clear lines between work, leisure, and family life.

The study of work-family balance aims to determine the extent to which flexible work schedule rules help employees be both productive workers and caring family members Women, in particular, find it difficult to separate their work time from family obligations when they telecommute with small children at home.[14] And, with technologies that encourage constant communication, pressures to overwork can be enormous – but they benefit men more, as they are better able to distinguish work time and space from

[14] Anderson D., Kelliher C., (2020): Enforced remote working and the work-life interface during lockdown. Retrieved from: https://www.emerald.com/insight/content/doi/10.1108/GM-07-2020-0224/full/html

family responsibilities, often with partners who help reinforce this division with their own labor.

Remote professionals known as digital nomads travel to various localities on a regular basis. They employ current technology to work from coffee shops, hotels, co-working spaces, and libraries throughout the world using a WiFi-connected laptop or smartphone.

Benefits of being a digital nomad are various. First and most obvious reason would be the flexibility to live where you want, which can also be in a low cost of living area. Next benefit is ditching the often toxic environment in the office spaces. Many people love to experience new cultures, learn new skills and languages which all comes with making new acquaintances and personal or business connections. Furthermore, people are very different and their most productive times of the day may vary which is why working remotely and as a nomad is very favourable while you can set your own schedule and take time off whenever you want. Lastly, there are many options for people who work remotely, they can either work for other companies or even become an entrepreneur themselves and start their own online businesses.

Fortunately, for the people who prefer working online, there are numerous options available, and they are growing every year as organizations downsize and recruit remote workers to cut down on physical costs such as office space. Also, since the COVID-19 pandemic process of globalization has only increased and is still accelerating the transformation to working remotely.

5. Practical research on user opinions

5.1. Research objectives

Objective of the research was to verify whether there is a value in optimizing certain processes of a complex business application for the mobile device, to verify if those processes are too complex for effective use on mobile devices and, finally, whether their optimization presents financial burden or a benefit to the proprietor or developer of that complex business solution.

In order to portray UX and UI in a practical way research was made on a real-life example of a software application called Centrix2. It is an electronic office business system that facilitates and supports the complete digitalization of office business processes in compliance with the Office Operations Regulation. In simplest terms, it facilitates the management of office documentation in organizations with a large number of employees and a large amount of incoming and departing mail. Furthermore, the fundamental version of this program can be filled with many options and functionalities that a certain client may require, such as digital signing of documents, various activity reports, archiving of documentation or mail dispatch which is also the main process in the research.

Previously mentioned process of mail dispatch was the process selected for the research because of its importance for the users, for the fact that the users in order to fulfil the process need to visit various different physical locations and because of the assumption of the suitability of the process for transformation to hand held devices such as smartphones or tablets.

The research was conducted using the application called Tacit.pro which offers various possibilities of making a questionnaire/survey through a set of activities respondents have to go through. The most common usage is to capture and analyse activities and questions that caused a certain reaction of the respondent. Tacit.pro is also activating the video camera and screen recording of the respondent’s desktop. With these recordings it is able to analyse data on various levels. It uses facial recognition in order to make a timestamp of a moment where the respondent was

either happy and satisfied or confused and irritated. Furthermore, the application tracks eye movement in order to show on which part of the screen respondent has been focused the most. Screen recording part of the application also gives insight on where in the application and when the user had the most difficulties, for example in finding a button that will lead them to a next step in the process. Tacit.pro also offers the possibility of adding more sophisticated devices such as EEG, EKG and other wear on devices that enable analysis of the data on a much deeper level. Since Tacit.pro gives insight into intangible reactions as well it helped to provide much better input to the research conclusion.

The research was conducted among ten business analysis professionals that are using the application Centrix2 for purposes of educating final users and providing support when final users start using the application for their business processes. This is a good set of people because of their experience and knowledge of the processes and what problems final users usually have either in understanding the application, or where application does not meet their needs. User issues are often related to the position of the action buttons and the inconsistency of those positions on various screens in the application. Those are the tasks that can be easily resolved with the right information. Unfortunately, users often do not know how to express their wishes and feelings precisely which can grow frustrations on both sides of the developers and users leading to general dissatisfaction.

5.2. Outcome assumptions and the description of the business application process

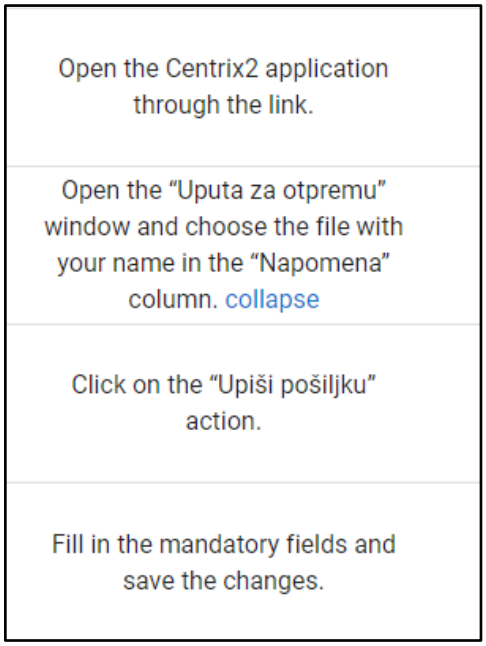
Possible assumed outcomes of the research that the process of mail dispatch is feasible to implement because it has a strong usability case for the end user working with email dispatch, it improves the efficiency of the process if optimized for mobile devices and it is financially feasible for the developer. Other possible outcomes are that the process is too complex to optimize for mobile devices, or that it is too costly to be implemented. Any of the variable combinations is also possible i.e. the case does not bring any value if optimized for the mobile devices.

This process can be divided into two main parts. First one is monitoring new mail that has to be dispatched and inserting the necessary information for the post to know where the mail is going and to whom. The second part is control of the information which includes locking of the mail and sending the information to the postal service. The outgoing mail has to be recorded in the Centrix2 application for the need of other workers to track where their documentation is and if there has been some interference. Dispatchers are often employees that visit various locations of the organization on a working day collecting their mail in order to provide it to the postal service all at once. This is why it would be of great help for them to use a simple mobile application that would allow them to instantly enter the needed information of the mail and forward it directly to the postal service together with the physical mail.

5.3. Survey structure and analysis method

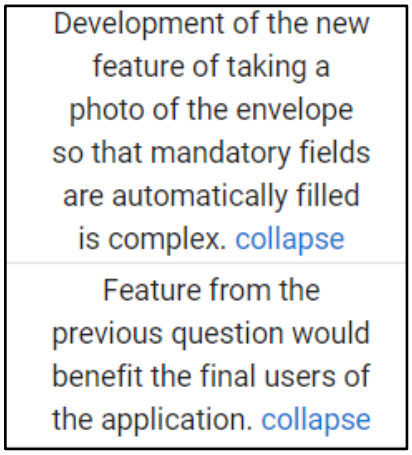
Questionnaire is made up of eleven questions and tasks regarding the process of dispatch and transferring the process to a mobile application. First set of questions is leading the respondent through the first process of dispatch and that is to fill in the mandatory data and save the changes.

Figure 5. First set of questions



Next set of questions regard the new features of the system. For example, what are respondents' opinions on the feature of making a photo of the envelope that would automatically fill in the mandatory data and how would that help final users in their work processes.

Figure 6. Second set of questions



Figures below show the possible interface of the mobile application that covers all the needs of the final users for the process of mail dispatch. Same colours and position of buttons are set so that users do not have any difficulties adapting to a new version of the application and that it reminds them of the current desktop version. There are not too many elements on the interface and all unnecessary information and actions have been removed which makes the work easier.

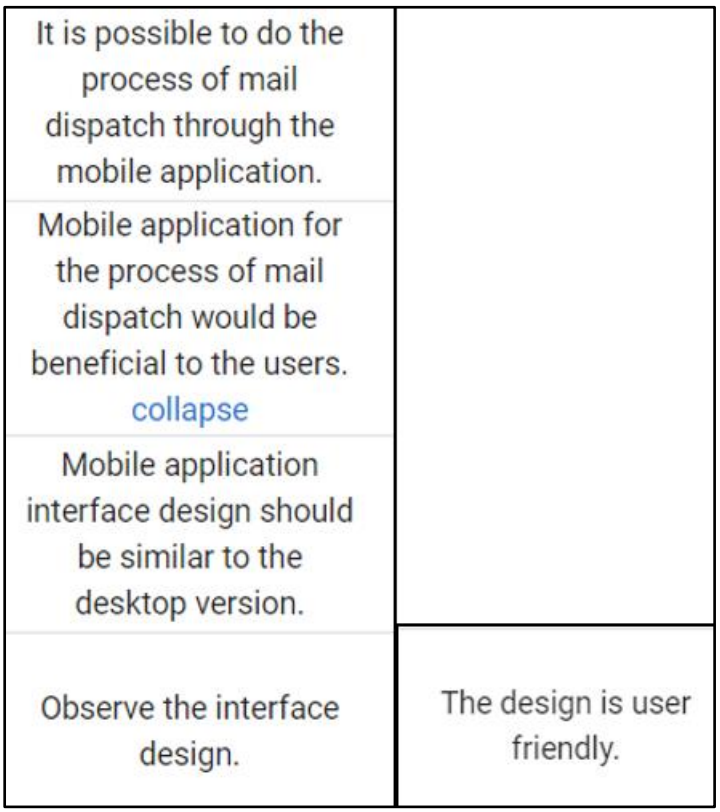
Figure 7. Mock ups of the mobile application interface

Figure 8. Mock ups of the mobile application interface

Final set of questions is providing the information on the opinion of respondents on the mobile application interface design. It is very important to make the interface user friendly so that users can immediately see the benefit they get from it. This application

has to make their work easier which is why developers have to carefully observe their work process and develop and implement their suggestions. From previous experience mock ups were created to show to and get the feedback from questionnaire respondents.

Figure 9. Third set of questions



5.4. Survey conclusion

While working with final users in certain companies it was noticed that they would benefit greatly with the possibility to access Centrix2 application through their mobile phones. Examples of features that could be used via mobile application are to look at their documents or documents in their domain, write some notions, send the notifications to their co-workers, mail dispatch, signing the documents and similar, but unfortunately some of those actions are still too complex or it is unsafe exercising them through the mobile phone. On the other hand, the process of mail dispatch seems to be suitable for transformation into a mobile application that would allow users that are

working in the mail department of the organizations and are often on the move, to easily scan when receiving and send information on the mail that is being dispatched.

The survey was conducted on 10 respondents, all experts on Centrix2 application as mentioned before. They were guided by the questionnaire in order to follow the exact steps of the business process. After they had finished the questionnaire it was possible to see their results and the data collected by the Tacit.pro application.

From their answers it can be concluded that all of the respondents disagreed that the execution of the development of the mobile application for the specific business process would be complex. Furthermore, they either agreed strongly or agreed that the application would be very beneficial for the final users.

One of the most important points of the analysis is the respondent's opinion on the observed application design. For the question on should the interface design of the mobile application be similar to the web application respondents strongly agreed because it ensured relatively simple optimization for the mobile device as well as guaranteed easier user adoption/transition.

The last question is if the observed mobile application interface design is user friendly and optimized for the user needs. Most of the respondents agreed and left certain suggestions for improvement.

Final outcome of the research is that the development of the mobile application for the process of mail dispatch should be taken into consideration by the company. The reasons for that are numerous. First reason would be that the application would be beneficial for the final user according to the survey because it would shorten the time for completion of the task and efficientize the process of mail dispatch. The second reason is that implementation of the mobile application would not be too complex because the UI and UX would be similar to the web application therefore not too costly for the company to develop. Finally, the suggestion would be to implement the mobile device optimization for this feature as soon as possible.

6. Conclusion

To conclude, UX/UI design processes have taken over digital application development and are becoming ever more important than before. Not only do those processes make the digital applications usable they also make applications enjoyable to use. Factor of enjoyability is not to be minimized in value because it is the factor that ensures that digital application is in fact going to be used, that is going to be used correctly and ultimately efficientize the business process it tackles or increase the profitability of the business depending on the type of digital application being used. During COVID-19 times UX design proved to be even more relevant than it was assumed before. With the change of environment of where the business is being conducted, in this case mostly home offices, ergonomy, simplicity and adaptability of business applications enable businesses to quickly switch from usually very equipped places of business conduct to workers homes. In addition, several other socio-economic trends such as switch of usage from desktop to mobile devices, impacted the ways the UX is thought and created, moving it to mobile first approach. Although complex business applications do pose a challenge to technology companies in terms of optimizations for mobile devices it is a challenge they must overcome. The process of optimization is not going to be a streamline one but feature by feature, in order to ensure easy transition and in order not to be too costly for the business application development companies.

7. Sources:

1. Almeida, F., Monteiro, J. A., (2017): Approaches and Principles for UX Web Experiences: A Case Study Approach, International Journal of Information Technology and Web Engineering. Retrieved from: https://www.igi-global.com/article/approaches-and-principles-for-ux-web-experiences/176908

3. Alsop T., (2020), PCs, tablets, ultra mobiles, mobile phones global shipments forecast 2013-2020. Retrieved from: https://www.statista.com/statistics/265878/global-shipments-of-pcs-tablets-ultra-mobiles-mobile-phones/

2. Anderson D., Kelliher C., (2020): Enforced remote working and the work-life interface during lockdown, Gender in Management, Vol. 35 No. 7/8, pp. 677-683. Retrieved from: https://www.emerald.com/insight/content/doi/10.1108/GM-07-2020-0224/full/html

3. Batchu V., (2018): Micro-interactions: why, when and how to use them to improve the user experience. Retrieved from: https://uxdesign.cc/micro-interactions-why-when-and-how-to-use-them-to-boost-the-ux-17094b3baaa0

4. Crawford K., Dobbe R., Dryer T., Fried G., Green B., Kaziunas E., Kak A., Mathur V., McElroy E., Nill Sánchez A., Raji D., Lisi Rankin J., Richardson R., Schultz J, Myers West S., Whittaker M., (2019): AI Now Report. New York: AI Now Institute. Retrieved from: https://ainowinstitute.org/AI_Now_2019_Report.html.

5. Dreyfuss H., (1955): Designing for People. New York, Simon and Schuster.

6. Fraser J., Plewes S., (2015): Applications of a UX Maturity Model to Influencing HF Best Practices in Technology Centric Companies, Procedia Manufacturing Volume 3, pp. 626-631. Retrieved from: https://www.sciencedirect.com/science/article/pii/S2351978915002863

7. Hartson R., Pyla P. S., (2012): The UX Book – Process and Guidelines for Ensuring a Quality User Experience. Retrieved from: https://books.google.hr/books?hl=en&lr=&id=w4I3Y64SWLoC&oi=fnd&pg=PP1&dq=UX+&ots=OlOW1NBPzC&sig=9Ovje4JJTAQbdbrLSBd12sazbmk&redir_esc=y#v=onepage&q=UX&f=true

8. Heaven D., (2020). Why faces don't always tell the truth about feelings, nature journal. Retrieved from: https://www.nature.com/articles/d41586-020-00507-5

9. Herrman T., (2006): Corporate UX: Bringing Value to the Mobile Industry, Interactions volume 13, issue 4, pp. 16-17. Retrieved from: https://doi.org/10.1145/1142169.1142183
10. Kerkow, D., Klöckner K.,Kohler K., Nass C., Niebuhr S.,Graf C., (2010): KREA-FUN: UX for Business Applications, Fraunhofer IESE. Retrieved from: https://www.iese.fraunhofer.de/de/leistungen/user-experience/leistungen-ux/krea-fun/jcr:content/contentPar/sectioncomponent2/sectionParsys/linklist_0/linklistParsys/downloadcomponent/file.res/iese-033_10.pdf
11. Mistry A., Rajan A. P., (2018): Evaluation of web applications based on UX parameters, International Journal of Electrical and Computer Engineering (IJECE) Vol. 9, No. 4. Retrieved from: https://www.academia.edu/43639249/Evaluation_of_web_applications_based_on_UX_parameters?auto=citations&from=cover_page
12. Mullins C., (2015): Responsive, mobile app, mobile first: untangling the UX design web in practical experience, SIGDOC '15: Proceedings of the 33rd Annual International Conference on the Design of Communication. Retrieved from: https://doi.org/10.1145/2775441.2775478
13. Ozimek A., (2020): The Future of Remote Work. Retrieved from: https://ssrn.com/abstract=3638597
14. Petrov C., (2021): Mobile vs. Desktop Usage Statistics for 2021. Retrieved from: https://techjury.net/blog/mobile-vs-desktop-usage/#gref
15. Robinson K., (2016): History of UX Design. Retrieved from: https://blog.prototypr.io/5-things-you-didnt-know-about-the-history-of-ux-design-20592208a336
16. Silva da Silva T., Selbach Silviera M., Maurer F., Hellmann T., (2012): User Experience Design and Agile Development: From Theory to Practice, Journal of Software Engineering and Applications Volume 5 No.10. Retrieved from: https://www.scirp.org/journal/paperinformation.aspx?paperid=23904
17. Spremić M., (2020): Enterprise Information Systems In Digital Economy. Zagreb, Faculty of Economics and Business
18. Stone D., Jarrett C., Woodroffe M., Minocha S., (2005.): User Interface Design and Evaluation. Retrieved from: https://books.google.hr/books?hl=en&lr=&id=VvSoyqPBPbMC&oi=fnd&pg=PR21&dq

=user+interface+design&ots=d8K_RVlRUa&sig=eZf7384nLu9KUmqLU7Z-S1XmwRw&redir_esc=y#v=onepage&q=user%20interface%20design&f=true
19. Unger R., Chandler C., (2012): A Project Guide to UX Design, Second Edition. Retrieved from: https://books.google.hr/books?hl=hr&lr=&id=dF7li-90OYQC&oi=fnd&pg=PT19&dq=ux+design&ots=PzL1Bl-BEw&sig=fZbYE9EhLVstrn2hd7Wg2mpvgyU&redir_esc=y#v=onepage&q=ux%20design&f=false
20. Väänänen-Vainio-Mattila K., Roto V., Hassenzahl M., (2008): Towards Practical User Experience Evaluation Methods. Retrieved from: https://www.researchgate.net/publication/239749277_Towards_Practical_User_Experience_Evaluation_Methods

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