DESIGN OF THE KIOSK FOR MORE EFFECTIVE UTILIZATION IN HOSPITAL QUEUES

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ABSTRACT

DESIGN OF THE KIOSK FOR MORE EFFECTIVE UTILIZATION IN HOSPITAL QUEUES

Nowadays, various queuing systems are applied in many medical institutions. These systems aim to perform consumer operations in a specific order and to prevent long waiting times. This study focusses explicitly on the queuing system that is present in the Blood Collection Unit of İzmir Tepecik Training and Research Hospital. It was stated that the touch screen kiosk called Phlerobo used in this system could not be used effectively and therefore service failures occurred.

It is aimed to examine and redesign the kiosk interface and body design in order to use this system more efficiently. This study started with literature studies that will direct the new model to comprehend the importance of the system. Then, experimental methods such as field observation and interview studies were carried out. As a result of the recommendations developed to solve the problems of the current system, design suggestions were made, and these designs were visualized. Then the designs were tested to determine the appropriate design. For this purpose, the designs were presented to the user via survey and a special web application.

Interface and body design were developed by determining the appropriate design with the data obtained from the tests. Thus, the redesigned kiosk was predicted to be used more effectively. It was determined that the design of the data obtained will be used more efficiently than the previous one.

Key words: Kiosk, Kiosk Design, Interface Design, Hospital Queues

ÖZET

HASTANE KUYRUKLARINDA DAHA ETKİN KULLANIM İÇİN KİOSK TASARIMI

Günümüzde birçok sağlık kuruluşlarında çeşitli sıra alma sistemleri kullanılmaktadır. Bu sistemler, kullanıcı işlemlerini belirli bir düzen içinde gerçekleştirmeyi ve uzun bekleme sürelerinin önüne geçmeyi hedeflemektedir. Bu çalışma spesifik olarak İzmir Tepecik Eğitim ve Araştırma Hastanesi Kan Alma Biriminde bulunan sıra alma sistemine odaklanmaktadır. Bu sistemde kullanılan dokunmatik ekranlı Phlerobo isimli kioskun etkin kullanılamadığı ve bundan dolayı da hizmet aksaklıkları meydana geldiği belirtilmiştir.

Bu sistemin daha verimli kullanılabilmesi adına kioskun arayüzü ve gövde tasarımının incelenip, yeniden tasarlanması amaçlanmıştır. Bu çalışma sistemin öneminin kavranması amacıyla, tasarıma yön verecek literatür çalışmalarıyla başlamış, devamında saha gözlemi ve röportaj çalışmaları gibi deneysel metotlar uygulanmıştır. Mevcut sistemin problemlerini çözmek için geliştirilen varsayımlar sonucunda, tasarım önerileri yapılmış ve bu tasarımlar görselleştirilmiştir. Ardından uygun tasarımın belirlenebilmesi adına tasarımlar test edilmiştir. Bu amaçla tasarımlar anket ve özel bir web uygulamasıyla kullanıcıya sunulmuştur.

Testlerin sonucunda ortaya çıkan veriler ile uygun olan tasarım belirlenerek, arayüzü ve gövde tasarımının geliştirilmiştir. Böylece yeniden tasarlanan kioskun daha etkin kullanılacağı ön görülmüştür. Elde edilen verilen düzenlenmesi yapılan bu tasarımın bir öncekine göre daha verimli kullanılacağı belirlenmiştir.

Key words: Kiosk, Kiosk Tasarımı, Arayüz Tasarımı, Hastane Kuyrukları

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CHAPTER 1

INTRODUCTION

1.1. Definition the Problem

The solutions for the needs arising from the increase in the number of people in the public service areas have been created by benefiting from technology. These solutions generally provide saving to time or economy. Healthy institutions also need these solutions and get help from the technology because, with the improvement of the health sector, technological applications have been increasingly become a need and have been become widespread. These needs are noticed in various departments, and new solutions to the problems are determined, so the solutions are started to be developed.

More specifically; The process of taking queues in hospitals is an old practice and is applying in almost all departments. There were various difficulties in the queuing system when the number of patients increased and therefore, various new problems become occurring. The problems solved under the name of 'queue management system' in many studies and the developments of the solutions continue to improve.

Various systems have been used in the medical fields with the developing technology and technology-based queuing systems which have been used for many years can be given as examples of these solutions. Solutions for factors such as an increased number of patients and prolonged waiting period reduced the existing problem but could not provide a permanent solution. Therefore, these parameters, which lead to development, have maintained the need for a new, improved method.

As a result of these improvements, the use of systems supported with artificial intelligence was one of the last steps in the development of health institutions. The queuing system using kiosk that supported with artificial intelligence is in interaction with patients, system developers, nurses, and secretaries. After the kiosks started to be used in the queuing systems, a rapid improvement of the queuing system started. It is aimed to reduce the waiting time and increase satisfaction by using this technological system.

In the kiosk history, the surveys and observations have led to the innovation of the kiosks and showed ever-growing development in the new design. Specifically, Phelerobo, a touch-screen supported with artificial intelligence, used in the queuing system of the Blood Collection Unit of the İzmir Tepecik Training and Research Hospital tries to regulate the queuing system using a particular algorithm. In the system; priority queue is present, and processes based on the obstacle status, age, and urgency of the patient. Also, the system directs the next patient to the appropriate blood collection room without any guidance.

However, some problems have occurred in the system. The primary source of these problems is the inability of the usage the kiosk effectively. Problems arising from design-based or systematic have disrupted the blood collection unit. Therefore, it is inevitable that the positive and negative aspects of the system are created with different perspectives.

This study will focus on the causes and possible solutions to these positive and negative factors of the system. To reach the targeted point in this study, the analysis of currently used kiosk was carried out, and an alternative design proposal was made per the analysis.

1.2. Objective of the Study

The primary purpose of the study is to focus on the design problems of the touch-screen kiosk that is supported with artificial intelligence and used in the Blood Collection Unit of İzmir Tepecik Training and Research Hospital by examining in two categories as users and personnel. Another purpose is to redesign the study to solve the problems based on the analysis.

The literature study aims to understand the importance of technology-based development and contribute to the design process by proper categorising the data. Besides, it is crucial to determine the direct effect of the technology used on the queuing system by performing field observation and interview studies. The purposes of the hypotheses establish after observation and interview analysis is to create a design idea that will contribute to the solution of the problems and to redesign accordingly to facilitate the harmonisation of this design used in the hospital.

1.3. Research Questions

The following identified research questions were constituted and pursued to solve the possible problems.

- What are the problems encountered in technological-based queuing systems?
- What are the design requirements for kiosk systems?
- What are the approaches of users about using the existing design?
- Which parameters lead these problems?
- How to create a design process for the new queuing system

1.4. Research Methodology

In order to determine the focus of this study, literature studies were performed. Following the literature studies, the simplicities and difficulties encountered during the use of the existing design of the touch screen kiosk system used in the Blood Collection Unit of İzmir Tepecik Training and Research Hospital were observed and examined. Then, interviews are done with personnel and users, who had more control over the positive or negative aspects of the design and needs were determined conclusively. After analysing the interviews and observations, the central theme of these problems was determined. After that, the recommendation is supported and developed by the literature studies that will guide the redesign process. The most suitable recommendations are selected, and new solutions are presented to a new design idea has been created. Finally, new design was tested by users based on the web-application and the design was suggested as the proper design according to results.

Figure 1 defines the map of methodology. The methodology of the study basically is indicated. In the literature, studying is not indicated due to it is not a significant process for the study. Observation and Interviews are showed as linked because they are examining together for data analysis. Analysis of the observations and interviews provides the case study and recommendations. Finally, the redesign study is signified binding with data analysis and case study-recommendation because the study will be completed in consideration of them.

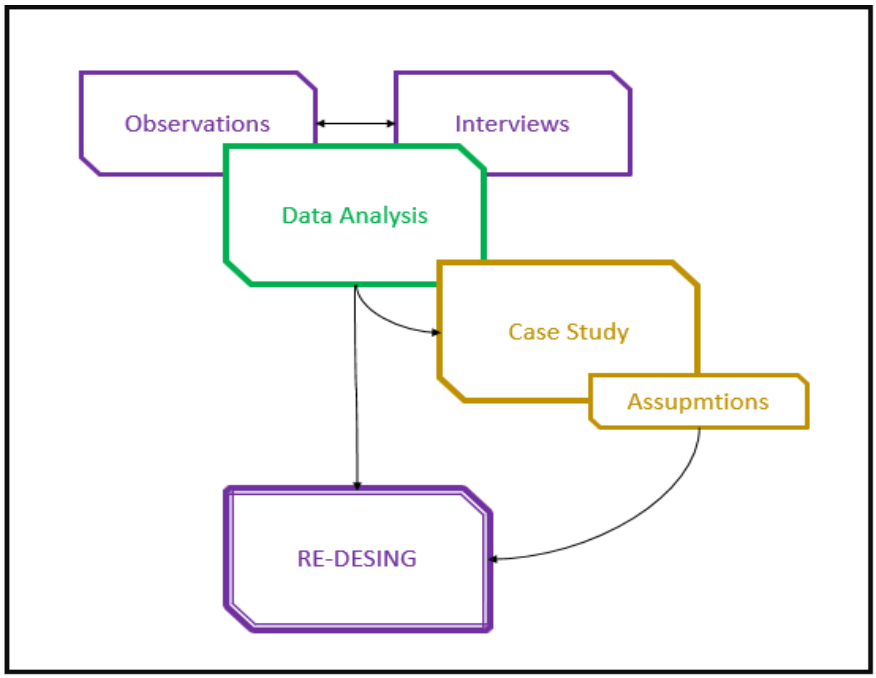

Figure 1. Map of Methodology

CHAPTER 2

LITERATURE REVIEW

2.1. Queue Management System

In order to perform any operation in an institution that provides public services, waiting for the order to be processed creates a queue. The procedure may be relevant to receiving information, payment, or service. In order to wait in this queue, the sequence number must be received so that procedures can be performed fairly. The fact that almost every individual has the same waiting time is acceptable to the person receiving the service. However, problems may occur in the queue due to a failure in the service or an increase in demand (Weisss, 2018). For many years health services have been serving in the public services, and it is necessary to register to the queue system in order to receive services.

However, as the demands on health services increased, long waiting periods increased in direct proportion. An excessive longer waiting time indicates unmet customer need and increases the inconvenience rate while waiting for a queue. With the increase in waiting time in the clinics, the decrease in the satisfaction of patients has become inevitable, and this being a global problem. Therefore, the time spent on increasing patient satisfaction becomes essential. In order to eliminate or reduce the waiting time, the process has been tried to make it less painful for the patients or create a new queuing system. In order to eliminate or reduce the waiting time, the process has been tried to make it less painful for the patients or create a new queuing system (Weisss,2018).

The emergence of the queue management system has been due to lost and inefficient times in large quantities. Queue models are essential for reducing waiting times and ensuring sequence discipline. Some of these innovations in management have been with new technologies.

In addition to the Queue Management system research, it is also possible to present this system as a patent. In 2003, the queue management system was patented. The study of this study will provide a significant gain in understanding the system. Generally, the presence of Leonard Sim's patent concerns a queue management system to manage at least one queue (Leonard Sim, 2003). Waiting in queues can be spent much time. Queuing is a frustrating and unproductive use of the person's queue time and may be ineffective for the business in question. However, for the efficient use of particular resources, significant queues are needed at least part-time.

An example can be given to the problem of managing queues. When the customer is assigned a turning number in the system which is disclosed in a queue sequence for customer service at several service points, the customer may then be informed by viewing a display, which queues to attend. This arrangement is particularly suited for queues in supermarkets where the queue time is not so long in general. However, the system will not allow the queuing person to leave the queue physically without the possibility of the person losing the place in the queue when there are many queues in remote places or for one or more queues associated with it having a considerable delay. Therefore, a queue management system is an objective of this invention, allowing people to enter a ' virtual ' queue so that the person does not have to wait near the queue (Leonard Sim, 2003).

The system includes a variety of portable modules that are organized for individuals to carry each module and includes the means of memory containing a specific identification code. The indicator means that when it is time to join the queue, it indicates to the person. For receiving signals, the signal receiver means to operate for the indicator. The transmitter can contain the transmitted identification code in an area around the individual or group of persons and docking methods to download the identification code when the mobile phone module is docked. To maintain the queue sequence, a queue manager is required. For the detection of portable modules in the vicinity of the module detector, there must be at least one module sensor by detection of transmitted identifying codes. The module detector should be arranged at the queue or on every queue to detect when the module carrier joins the queue. Second communication needed to communicate any detected verification codes between the queue manager and every module detector (Leonard Sim, 2003).

To summarize; A queue management system must have a unique portable module to replace the identification code and a docking station that downloads the code of the

module and saves the contact in a queue. Also, there should be a queue director for arrangement and protecting the queue. Also, there should be a signal transducer to instruct participating in the queue and a communication instrument to indicate the order information. Thus, the present invention can provide a queue management system allowing those who want to queue to do something else. The time required for physical queuing can be reduced dramatically to a few minutes or so. In each queue, the system maintains the user's place and tells them when they should join the queue.

Generally, applications to improve deficits in patient flow management have yielded good results and are still in the process of improvement.

2.2. Touch Screen Kiosks

A touch screen kiosk is an input device that is placed on the top of an information processing system's electronic visual display. By touching the screen with a special design, a user can supply or control an information processing system via directly. Touch-screen kiosks appear as standing and public computers. When looking at the history of the kiosk, the first used touch screen kiosk is estimated to be Healthpoint kiosks developed in Glasgow in 1989. Healthpoint's information kiosks touched on public health and lifestyle issues such as libraries, shopping and sports centres. The majority of the users here were satisfied with the system, and only a few people thought that the use of the kiosk was not easy. Towards the end of the 1990s, kiosks, which were introduced in the health-care system in Spain, were used to inform about drugs (Nicholas et al, 2001).

The NHS (National Health Service) kiosk was developed to provide access to both health information and health services. The information provided was also supported on the websites to reach easier access to them. After the information kiosks, the necessary feature in the health systems was the integration of the appointment system into these kiosks. Appointment planning had increased interest as health service demand increased (Nicholas et al, 2001).

The article of Sankarananrayanan and Wani includes the Appointment Scheduling System to control health processes efficiently. A well-designed system can help the increasing the patient satisfaction and performance of the health personnel. In order to reduce the waiting time to get a queue number, they developed the appointment system

that supported Near Field Communication (NFC) allowed the patient to touch the NFC appointment card in the appointment kiosk to make an appointment at the hospital. In this system, priority timing is assigned to appointments, which varies according to the patient's profile and age. Also, the system makes it possible for automatic patient calls to be given by the nurse concerned. In this appointment making system, it is essential to make an appointment by touching the kiosk with the mobile phone with an NFC card. Prioritising patients in electronic environment controls the waiting time of the patients and reduces the workload of nurses. However, it is not possible for patients who are depended to the nurse to use the system efficiently. Also, the system is lacking in making an automatic patient call (Sankarananrayanan, 2014).

Some of the survey respondents stated that the information given was sufficient, while others indicated that other problems were still ongoing and that they needed health professionals to solve these problems. The variables that affect the results of the survey are gender, easy to read and understand information, and easy access to information. Kiosks continue to be used in many types of research.

2.3. Human-Computer Interface Design

2.3.1. Background of the Human-Computer Interface

In general, the human-computer interface is defined as a part of an application that transmits the function of the computer application and transfers user's operations to the understandable format for the computer. The entire progress becomes through system interaction with interface and user. First, to define the human and system parts of the interaction, this chapter includes the human relationship with the graphical user interface in the human and computer interaction context.

In Figure 2.1 indicates that input data is transmitted to the computer by user in order to provide the communication with the computer and the output data is transmitted to the user.

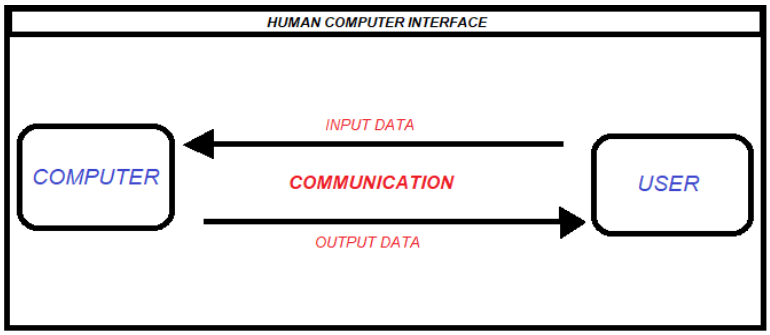

Figure 2.1. Schematic representation of the HCI

The Figure 2.1 shows the schematic representation of the human-computer interface. Computer and user interactions can be indicated by data sharing to supply communication.

Another definition made by ACM SIGCHI (Association for Computing Machinery Special Interest Group on Computer Interaction Curriculum Development Group) that is "Human-computer interaction is a discipline that deals with the design, assessment, and implementation of interactive human use computing systems and the study of significant phenomena surrounding them." (Web-1, 2003).

Human-computer interface interaction is an inter-disciplined area that covers computer science, psychological science, sociology and industrial design. The remarkable point of the design must be visual design because it has been interaction focus with computer and human. Visual design is described as the design of graphical user interfaces that are seen as graphical component integration. Visual design disciplines are graphic design, industrial design, and architecture that is communication-oriented whereas other visual disciplines, such as painting, sculpture, or photography, have a great deal in stock but are less communication-oriented. The primary concern in user interface design is the interaction with the human being specifically. In that point, the print media's main difference is seen. Although in resolution, interaction possibilities, and animation new electronic media differ significantly from print media, the knowledge gained from the print industry is applicable (Dix and Finlay, 1993).

As stated above, the disciplines of visual design are very crucial for orienting communication because of interaction between the human and the machine coming into prominence. First, it is necessary to define an exact digital product and its relationship with its user in order to analyse products that are centred and usable for human beings.

Digital products have already entered the market, and the new design methods and styles used for their design become interesting to investigate. Furthermore, these could be an application platform to discuss how the development will and should affect the industrial designer's role and profession, which could be expected soon of digital products. Since the concern is how to design things, designing things for everyday life involves much more than supporting people to more effectively accomplish specific tasks, and therefore designing usability, and practical functionality is not enough. However, it is appropriate to look into what the role of an industrial designer is in this area. First, the parts of the foundation of designing the human-graphical user interface of product interaction should be examined in order to find the keys to the successful product (Ormandjieva, 2016).

2.3.2. Graphical User Interface

"User Interface" refers to methodologies and equipment used to accommodate the interaction between machines and the people who use them. There are two primary tasks which are using for the user interface. One of them is communicating user to product information, and other is communicating product information to the user.

The graphical user interface term came into being because the first interactive computer user interfaces were not graphics; Text and keyboard orientation and usually consisting of commands. "computer-mediated" literally means facilitating communication between people or between an individual and an item (Marcus, 2002). The user interface embodies input and output, or interactive activity, both physical and communicative aspects. Thus, the graphical user interface and human-computer interface are relevant terms.

The user interface includes both computer and physical objects. This last term seems appropriate for an era in which computers themselves disappear, leaving only smart ritual objects and displays like smart home appliances, smart mobile phones and smart fridges (Marcus, 2002).

2.3.3. Interpretations of Human-Graphical User Interaction

The evolution of the graphical user interface is generally defined by hardware technology, but according to Nielsen (1993), the backbone of most computer history is the simplistic model of computer generations. Most current user interfaces are similar each other and belong to one of two common types: the traditional model that has full-screen alphanumeric terminals with a keyboard and function keys, or the more modern one that has, icons, menus, and pointing device workstations. Indeed, the majority of new user interfaces released after 1983 were remarkably similar (Nielsen, 1993). Computer dialogue styles have been transformed over the past twenty-five years through the development of hardware technology through the introduction of first minicomputers and then microprocessors. Although it conjures up pictures of the user sitting opposite a terminal interacting with a keyboard and video screen, the expression allows a much more comprehensive range of interpretations. Many products such as computers, watches, kiosks now have embedded microcontrollers that conduct dialogues of a kind.

The interface dialogues to users are usually supplemented by feedback from a display panel, and they are typically classified as simple menu selections and easily formalised using state diagram transition techniques. In an office, business and industrial environments, hospitals, banks, and educational places, there are many examples of embedded systems.

In order to save the information acquired, memory is used that contains sense memories; short-term memory and long-term memory. Cognition of HCI includes cognitive processes (think, recall, learning, decision making, problem-solving, planning...). The short-term memory only keeps the information for a short period. It is used as working memory. When the performed processes have repeated, it becomes storing the information for a more extended period (Downton, 1993).

Storage, deletion, and recovery are the three main activities in the HCI. The leading cause of deletion is decay that whether forgetting anything or access the information becomes more difficult is not completely clear. Its remarkable flexibility is the strength of long-term human remembrance. In many different ways, the same information can be combined (Dix and Finlay, 1993).

Visual ability is the most powerful sense for the comprehensiveness. The visual system of humans is designed to create an organised perception of movement, size, form, distance, relative position and texture. The visual system tries to interpret all the stimulation reaching the eyes as reflected on a flat, two-dimensional surface by a real three-dimensional scene even by stimulation.

Luminance is the light which is reflected on an object's surface and measured per square meter in candles. The visual acuity or discernment ability of the eye increases with the increase of luminance. Thus, the luminance quality is so important for human-computer interface design. Contrast, which the term suggests, describes the connection between light emitted by an object and light emitted from the object's background. Brightness is a subjective light response. There is absolutely no way to measure absolute brightness, as luminance and contrast are measured, but generally, a high brightness implies from an object. Strange effects can be experienced in areas with high to low luminosity. In the interface design, these effects must be considered (Downton, 1993).

The visual angle is the angle the object at the eye subtends. Visual acuity defines the minimal visual angle that can be resolved. For instance, an object that is L meters high and D meters from an observer in the diagram shown in Fig.x produces an angle of 4J minutes of arc to the eye as approximated below: as such angles are quite small, they are typically measured in minutes or seconds of an arc. For purposes of human-computer interaction, the visual display designer should note that the minimum visual angle of about 15 minutes of the arc should be maintained in right conditions and that it should be increased up to 21 minutes in poor viewing conditions (Downton, 1993).

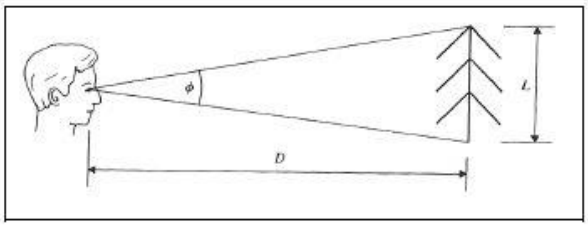

Figure 2.2. Visual Acuity. (Downton, 1993)

Figure 2.2 indicates the visual acuity that refers the clarity of the vision. According to the Downton, visual acuity depends on the visual angle (θ), height of the object (L) and distance from the object (D). Also, Figure 2.3 shows the limit of color vision.

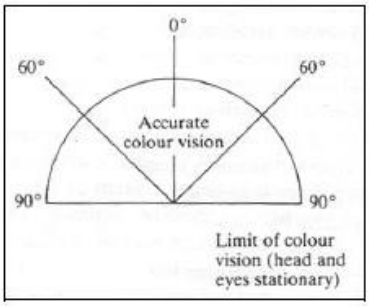

Figure 2.3. Field of view for accurate colour vision (Downton, 1993)

Hearing in any computer interaction is the most significant meaning after the vision. In the frequency gap of 20 Hz to 20 000 Hz, most people can detect sound, but with age and health, both the higher and lower frequency limits tend to worsen. The audience is sensitive in the range 1000-4000 Hz, which is roughly the top two octaves of the piano keyboard in musical terms.

Sound can also change the loudness as well as frequency changes. Defining the hearing threshold to 0 dB is followed by a whisper of 20 dB and regular converse records between 50 dB and 70 dB. If the sound is more significant than 140 dB, ear damage may occur. The ore is unfit for changes of frequency under 20 dB (i.e. under a whisper). The sensitivity to frequency and loudness depends on the level of sound they have been exposed in very recent times, as well as occasionally to the same person (Downton, 1993).

Sound is the second most important tool for a computer system to the user but can also be a cause of distraction and anger. As sound is such an invasive medium, it must be used in the design of human-computer systems sparingly and carefully.

Understanding the technology, peoples' cultures and behavioural patterns affect the way of computer use. There are literature studies of cultural influences on human-computer interaction, but researchers still feel the lack of methodology in their work.

The human-computer interface enables interaction easier between human and computer, but even this simplicity, there are many problems that exist because of the interface design, and developers and designers always try to make better designs (Dix and Finlay, 1993).

2.4. Artificial Intelligence

In this works, in the system is not mentioned that how artificial intelligence manages the queue. Only definition of the artificial intelligence (AI) is mentioned superficially.

Nowadays, Artificial Intelligence is a very controversial topic around the world. Once artificial intelligence is fully developed within electronic systems, it will provide numerous useful applications in many sectors, ranging from banking, agriculture, medical procedures to military operations, mainly by reducing human involvement in critically dangerous activities (Keskinbora, 2019).

Robots, as well as computers themselves, are the incarnation of values because they involve actions and choices, but the engineers building the systems are modelling or programming their practical applications. To ensure safety in implementing such systems, AI will need algorithmic procedures. The written AI algorithms could naturally contain errors that could lead to unforeseen economic and racial class consequences and unfair results.

In order to safeguard the rights of those involved in opposition to direct or indirect coercion, it is essential that measures be taken to monitor technological developments confirming preventive and precautionary safeguards. While ensuring that the future impact is more positive than negative is the responsibility of AI researchers, ethicists and philosophers need to be deeply involved in the development of such technologies from the outset.

Current intelligence AI algorithms that are equal to or more capable of human intelligence are programmed to be limited to one area only. For example; Computer Go is an AI programmed only to play Go. Although, human intelligence outperforms at some cognitive tasks.

Superior cognitive abilities, however, could allow AI to perform better than humans. New AI applications could open up exciting opportunities for more efficient medical care, safer industries and services, and massively boost productivity

Machine learning algorithms have proven effective in the identification and analysis of patterns in large amounts of data, regularly referred to as "Big Data". Big Data is used to develop algorithms for learning to increase their qualifications and performance to identify (Allam, 2019). In diverse areas and productions, machine learning has already been used. Computer algorithms are widely known to track and categorise the mass of data into information and services based on specific instructions and rules created by programmers.

A new queue management system has used in activities which are artificial intelligence based in İzmir Tepecik Training and Research Hospital. With this system, patients' waiting time has decreased dramatically, and many parameters could be monitored easily, such as average waiting time, personnel statistics etc.

This AI is working with machine learning techniques, which are analysing all data in the beginning and managing the queue. According to the experienced Nurse, when the system built in the beginning, the AI was not efficient to manage the queue. After two months, the waiting time started to reduce.

2.5. Semiotics

In this section, semiotics will be explained basically. It will be shown some of the most common concepts and ideas in semiotics and how they can be figured out in a design context. Some basic values and concepts such as the complex interplay between meaning and form in design theory will be analyzed.

Semiotics has provided designers with an invaluable set of tools for analyzing issues such as identity, metaphors and artefact visibility. In the late 1960s, semiotics became a popular approach to cultural studies, partly due to Roland Barthes's work (Barthes, 1964). In product semiotics, one approach mainly concerns the right way for artefacts to be designed so that they are easy to use and understand.

Figure 2.4. Semiotic idea for the signs

Semantic (meaning) words are selected to emphasize this aspect of communicati on. “Product Semantics was a theory developed by Reinhardt Butter and Klaus Krippendorf in the eighties and was influenced by contemporary continental philosophy.” (Barthes, 1964).

The Figure 2.4 indicates the common idea considered the semiotics; growing up and socialising today depends on learning a complex system of signs and codes to a large extent.

The Swiss linguist Ferdinand de Saussure is one of the founders of Semiotics which worked on the role of signs as a piece of social life. Semiotics studies not only “signs” in everyday speech such as traffic signs, symbols or pictures but everything, which "stands for" something else. This also contains our material culture such as buildings, furniture and products. For semiotic analysis, the most common object is a "text." A "text" usually refers to a message that has been recorded, so it is physically independent of its sender or receiver. It might be a book, a picture, a television, a movie or a product. A text is a group of signs (such as words, images, sounds, gestures) built and interpreted concerning the conventions of a particular communication genre and medium (Saussure,1983).

The Figure 2.5 states that the sign in semiotics is the central term. Saussure defined the sign based on the formula.

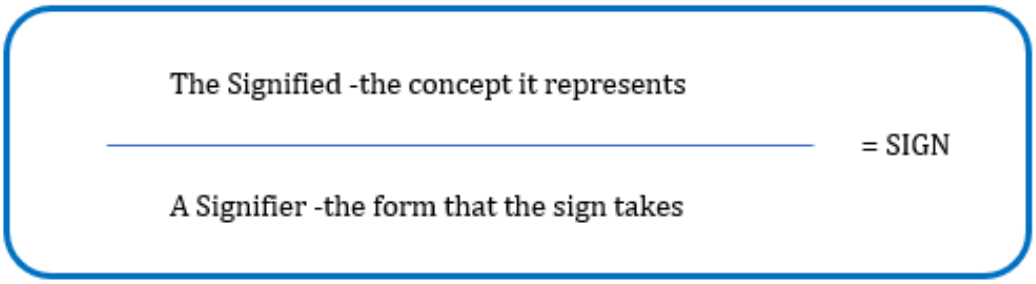

Figure 2.5. Central term of the sign (Saussure,1983)

A sign necessarily consists of a combination which includes a signifier and a signified; it cannot have a meaningless signifier/form or a meaningless signified/concept. They always go together, they are like the two sides of a medallion, and Saussure suggested a model where they are represented on each side of a line (Saussure,1983).

The word "pen" as an example, represents the meaning and the concept pen. It does not necessarily mean a real pen, but a general concept of a pen. A sign on a mall door that reads OPEN signifies that the mall is open. The Signifier is the object's physical form, the aesthetics. That is what everyone sees, touches, smells and experiences. The signified is the content that people make out of what they encounter and experience, whatever the meaning.

Figure 2.6. One of the image related to semiotics in product design

The painting of Magritte is associated mainly with semiotics that indicating at Figure 2.6. It reminds that what we see is a representation of it rather than a real pipe.

Another crucial part of the semiotics that is elementary to use metaphors in design. Metaphors are a crucial element, whether in products, graphics, film or media. A metaphor in the semiotic term is something that, in well-known terms, explains the unknown. When a new car model was introduced by Volvo, they launched an advertising campaign using powerful metaphors (Tarasti, 2016).

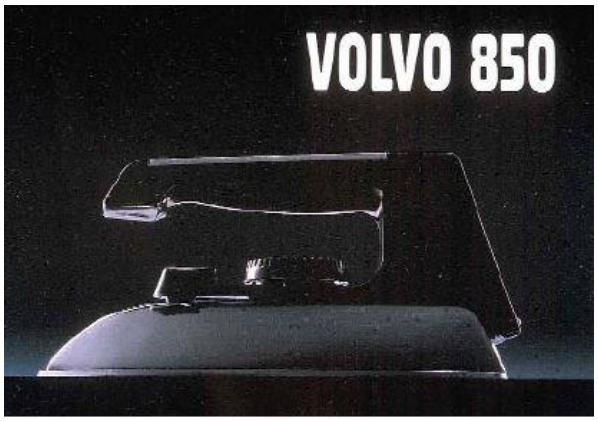

Figure 2.7. A different image related to semiotics in product design

An iron picture and the word "Volvo 850" that indicating at Figure 2.7 suggest that the car is on the road like an iron.

In general, redesign of the kiosk can be performed using the indicators of semiotics based on its deep literature information. Semiotics will play a serious role in the design because the increasing the satisfaction of individuals and the right orientation to the processes are key points for the kiosk design.

CHAPTER 3

DEFINITION OF EXISTING SYSTEM AND PROBLEM ANALYSIS

3.1. Working Principle of the Queuing System

The general working principle of the queue system is given below. This is the systematic order that should be under the normal conditions mentioned here. However, different factors may lead to a change in this system, and these should be ignored for now.

Patients who are referred to the blood collection unit by their respective doctors to give a blood sample will reach the blood collection unit after they leave the relevant outpatient clinic. The kiosk found here must take the order via the barcode which must be given to them by the doctor. The system evaluates the patient's age, chronic illness, staffing, pregnancy and other priorities. Under normal conditions, the system allows the patient is waiting time of 3-5 minutes, and at the end of this period, the patient is directed to the blood collection rooms using an automatic voice. In addition to being called by voice, the patient's name is reflected in the large screens in the waiting area. When the patient's process is active, the information of the patient occurs on the computer screen of the secretary. Then the secretary takes the required tubes and paste the relevant barcodes on the tubes and transmits them to the nurse to use. In the meantime, the called patient proceeds to the relevant blood collection room, and when it is usually in the room, the patient's blood draw is about to end. Here, we can see that the current artificial intelligence calls the next patient according to the average blood donation of the patients. Of course, various unexpected situations may occur in front of the blood collection chambers. Because of these problems, the patient has to wait, and undesirable queues occur. For example, the waiting of the previous patient, the absence of vascular access. The elaboration of these problems is discussed in Chapter 3.3.

3.2. How the Kiosk Contributes to the System?

In Tepecik Training and Research Hospital, there is an artificial intelligence-based kiosk which is used for organising queue. This system is used for optimising and managing the queue by reading the barcode, which is given by the doctor. The events related to the contribution of the Kiosk in the queuing system are given below. The kiosk contribution is mentioned generally. Problems encountered due to kiosk are not mentioned in this section.

- Patients are given a barcode by the doctor to identify their queue by the kiosk. The barcode contains the patient's personal information such as personal ID, age or gender that requires for health service
- The patient comes to the front of the kiosk meets some sentence on the screen. "To scan your barcode, CLICK" is one of them. Another sentence is "To proceed with manual entry, CLICK"
- When clicking the first button, the barcode recognition system is activated. If the barcode reader cannot scan the barcode, patients must have to click the other button to complete the process. If the patient loses the barcode, a different procedure is activated, and the responsible nurse checks the national identity number on the host computer and completes the process
- Patients who have completed the process are called to the blood collection unit after a certain period.

In here, described the general operating system of the kiosk. A detailed examination of the interface should be done. The interaction between the user and the interface directly affects the operation of the system, and these details should be examined. Details about HCL features of the kiosk are given below

- There is a language option in the upper right corner of the interface. In here, the foreign patients' kiosk usage has become prominent. The kiosk has 3 language option. These are Turkish, Arabic and English.
- Patients also can trace the process with their mobile phones through the hospital website. To trace the information, the patients must synchronize the mobile application with the kiosk. This information is available on the main screen of the kiosk.

3.3. Determination Studies for Queuing Problems of the Active Kiosk

The facilities and difficulties encountered during the use of the existing design of the touch screen kiosk system used in the Blood Collection Unit of İzmir Tepecik Training and Reseacrh Hospital were observed and examined between 10.2018 and 03.2019. In addition to the subjective observation, interviews were held with the personnel who were responsible for the same unit and who were experienced about the positive or negative aspects of the existing kiosk system. In this way, problems and needs are determined more effectively. Observations, interviews, and semi-interviews formed the data section of the study. After all the data are collected, the most striking point is to identify the different problems that occur where the problems are not only related to the kiosk but also related to the blood collection unit. Although all problems seem to be related to each other, the purpose of this study is to focus only on kiosk problems, analysis of these problems, and design solutions based on these analyses.

3.3.1. Observations Studies in the Blood Collectıon Unit

In the context of this study present new design concerning a kiosk upon the active using kiosk problems, two observational studies have been performed to collect data. Blood Collection Unit of İzmir Tepecik Training and Research Hospital is the place to occur observation of the study.

To understand the positive and negative side of the kiosk usage, an uncontrolled and unstructured observation has occurred firstly. Kothari indicates that unstructured method of observation is more appropriate for exploratory studies. While observing patients and the current system, as well as regular events, many unexpected situations had occurred too. All these are noted and analysed. Also, many significant problems have been marked. The current system has excellent benefits also. On the other hand, there are many problems detected in observations.

In general, many people cannot understand the kiosk screen easily and other information on-screen. Although the kiosk is successful in reducing the queue in blood collection unit, it creates a queue in front on it. In consideration of all observation notes

indicated in tables, some keywords have extracted for investigation problems and possible solutions. The first observation notes made at İzmir Tepecik Training and Research Hospital are given in the Table 3.1 below. The observations contained here are subjective comments.

Table 3.1. First observation notes of the kiosk using of the queuing system

1	The instructions on the screen are not easily understood
2	Especially elder people cannot use effectively
3	Waiting times are very low after scanning the barcode
4	Usually, the queue in front of the kiosk is formed, and the system needs help from someone who knows.

The second observation was carried out to support and strengthen the first observations. Therefore, attention is given to the system and kiosk was observed in more detail. The notes of the other observations are given in Table 3.2.

Table 3.2. Second observation notes of the kiosk using of the queuing system

1	Barcode scanning is not efficient; patients have difficulty in reading barcode
2	The process after the kiosk process is completed quite fast
3	The queue is usually in front of the kiosk
4	The sequence may occur in blood collection rooms for various reasons
5	Generally, the physical condition of the hospital is not suitable
6	Patients have difficulty in understanding and using the kiosk
7	No barcode number was recorded during the observations.

Thanks to the observation of the blood collection unit, some of the keywords have been selected for problem analysis. These keywords form the basis for the redesign study. The resolution process of the keywords shows in Table 3.3 is grouped under a category for problem types. Some of them are not selected because of their relevance for the study objective is low level.

Table 3.3. List of the keywords identified during observations

ease of use	suitable work area
giving priority	understanding interface
helping others	understanding signs
older people	understanding system
patient's educations	unexpected situations
personnel help	usability
personnel mistakes	wait time
regretting to use	

In addition, some of the figures that are related to blood collection unit are stated below for visualizing the area. The device shown in Figure 3.1 transfers the collected blood from the Blood Collection unit to the related laboratory for examination. The Figure 3.2 includes the the blood tests applied in the unit.

Figure 3.1. Transferring of collected blood

Figure 3.2. List of blood tests

3.3.2. Interviews with Individuals Acquainted with the Active Kiosk

After completion of the observational studies, interview studies were conducted. This work was done with the most experienced staff in the blood collection department. To catch the importance of the kiosk and queuing system problems, the expert people must be chosen. Besides, all the essential problems required for the analysis has indicated in the observational area. Thus, interviews have occurred in a blood collection room to comprehensive the system. Table 3.4 indicates the answers obtained from the interview were specified.

The questions asked in the interview were designed to make it easier to understand the positive and negative aspects of the system. Also, interviews are obtained at blood collection room shown in Figure 3.3. The questions asked in interviews are as follows;

- Is there an area where a similar system is used?
- Is this system used in other departments?
- Have you been in a department where this system is not implemented?

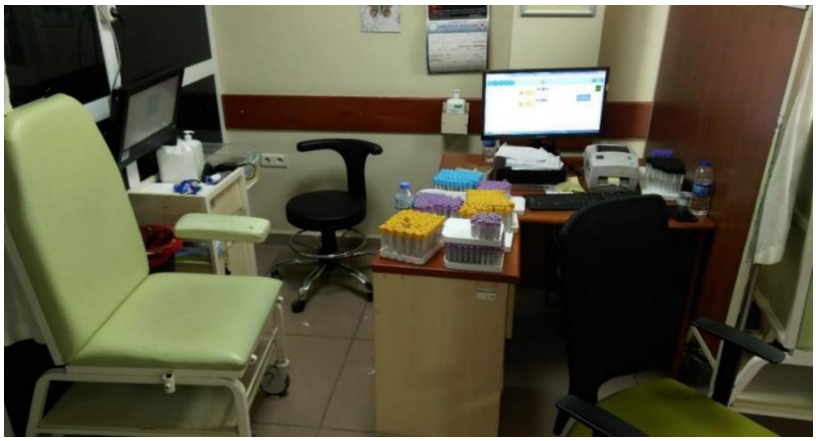

Figure 3.3. Blood collection room

Questions such as this are important to examine the differences between the existence and absence of the system and to strengthen the system analysis.

The following questions were directed to focus on and understand the problems of patients. In addition, specifying the difficulties experienced by the personnel with the system makes the harmony between the patient-personnel and the system more understandable.

- What are the general problems of patients?
- Do you think patients can use the system effectively?
- In general, what are the problems you have?

Another question was made to understand the focus of the kiosk. There are direct questions about the kiosk. Directed questions are selected to define the system and will play a direct role in the redesign.

- Do you find Phlerobo successful?
- Do you find the notifications that the device gives to the patient when the barcode is scan?
- What kind of problems do you have with foreign patients?
- What do you recommend besides these?

The answer was clarified after performing the interview. The details of the interviews are indicated in the Appendix section.

After observations and analyses, to doing an in-depth search, structured and semi-structured interviews have been achieved. The structured and semi-structured interviews have been completed with more experienced personnel.

Table 3.4. Determination of the interview's findings

1	Patients cannot use kiosk effectively
2	Patients cannot understand the on-screen instructions and warnings
3	Warning messages in Kiosk are not clear
4	Older people are having trouble while using the kiosk
5	A permanent staff needs to stand at the near of the kiosk.
6	Incompatibilities with other software used in the hospital
7	The working environment not suitable
8	Patients cannot scan barcode easily
9	Nurses cannot work efficiently because of physical limitations
10	There are many writings on screen.
11	This system is using only in blood collection unit of adults.
12	Human-based mistakes are prevented by the kiosk system.
13	Authorised staff charged the unit are not authorised in kiosk software

Table 3.5. List of the keywords obtaining interviews

changing language	printing queue number
designing kiosks with colour codes	privacy
ease of use	showing only remaining waiting time
foreign patient’s language problem	suitable blood taking areas
integration of other hospital software	understanding signs
interface design	usability
older people	usage training
personnel education	wait time
personnel help	working with ID number

As a summary of these interviews, this system has brought significant innovations to blood collection units. Many things can be monitored easily with this system, such as Patients status, personal statistics, average waiting time. Although many great features, there are many critical problems also exist. Some of them are related to personal education, physical capacities of blood collection unit, patients-based problems which are

not cover the kiosk design problems. When analysed problems and extracted the keywords, a kiosk-based problem can match easily.

Thanks to the interviews with experienced personnel, some of the keywords have been selected for problem analysis like defining in the observation keywords. The keywords are indicated in Table 3.5.

3.4. Analysis of the Findings Obtained Observations and Interviews

3.4.1. Aspects of the Findings

As a result of the observations and interviews conducted, many aspects were determined. These factors will be helpful in collecting two main headings as positive and negative. To be considered the positive side of the system, the existing system has excellent benefits.

In the blood collection unit, patients have waited less than other hospital units. Personnel does not call patients; they are called by a synthesized voice integrated into the kiosk. Here it is seen that the queuing system is working properly. Low waiting time is important for patient satisfaction. In addition, work stress is minimized by decreasing the workload of personnel. As indicated in the observation part, the waiting times are very low after scanning the barcode.

However, the negative side of the system must be stated because there are many problems seen according to observations and interviews. Besides, the negative aspects are more than the positive aspects of the system.

As indicated the Chapter 3.3, the problems are the instructions on the screen are not easily understood, and the patients do not understand them. Thus, there is forming a queue, usually in front of the kiosk. In the observational study, no barcode number was recorded and also using barcode rate is very low that stated in the interviews. Related with age is also important because elder people cannot use the kiosk effectively. Usually, the queue in front of the kiosk is formed, and the system needs help from someone who knows.

To consider the reason for the queue, Sequence may occur in blood collection rooms for various reasons such as an intravenous problem or patient fainting. Generally, the physical condition of the hospital observed as unsuitable.

3.4.2. Indicating the Major Keywords

The focussing the major keywords are indicated the Table 3.6. Interviews had a general opinion about that kiosk, and the queuing system has many advantages with search abilities than paper-based records. Also, the association of the keyword that is belonging to interviews and observations has provided the identification of the relevant keywords focusing. These keywords determined in Table 3.6 have led to the accurate new design of the kiosk to decrease the problems of the Blood Collection unit.

Table 3.6. List of the major keywords

changing language	understanding interface
designing kiosks with colour codes	understanding signs
ease of use	understanding system
integration of other hospital software	usability
older people	usage training
regretting to use	

The keywords have provided an understanding of the reasons for the inability of the patients to use the kiosk effectively. Based on them, interface design has been occurred by combining the visual recommendations, auditory recommendations and physical abilities.

CHAPTER 4

CASE STUDY FOR PROVIDING NEW KIOSK DESIGN OF THE QUEUING SYSTEM

4.1. Main Problems Analysing

People who have difficulty understanding and following the instructions on the kiosk ask for help from other people or staff around them. When the person comes to the kiosk, he has to read the barcode on his/her hand but must click on the barcode reader for that case the barcode cannot be read, the process must be completed by clicking "To proceed with a manual entry, CLICK" area on the numbers on the barcode and typing the numbers on the barcode. Another problem is tearing of the barcode, losing of the barcode or unreadable barcode numbers. In such cases, a staff member completes the procedure using the patient ID numbers. This is a time-consuming fact, and as noted in the observations, no one was registered with the barcode number, and the number of patients entering the barcode number is meagre, as indicated by the staff at the interview.

Figure 4.1. Main screen of the active kiosk

In the Figure 4.1 there is a main screen of the present kiosk. There is a welcome word has capitalized. Two click points are present and indicated with blue colour. Also, there is synchronized with kiosk the mobile application. However, there are too many instructions on the kiosk screen. Because the articles do not have a priority order, the main screen has a very complex image.

Another problem is that patients who wish to log in with a barcode they see a picture of the kiosk in the screen after touching related the button. In this picture, the place where the barcode should be scanned is indicated by a red arrow. However, as seen in the picture below, there is a picture of the kiosk on the kiosk screen, and it is not easy to see where the marked area is. At this point, patients cannot scan the barcode via the system when they do not keep the correct distance even if they find the area to be scan.

Figure 4.2. Showing the barcode scanner location

In Figure 4.2 indicates the kiosk that shows the barcode scanner location on their screen.

The Figure 4.3 shows the ordinary queue before something goes wrong. The person has difficulty in scanning the barcode, then other people have waited for the completed process.

In the Figure 4.4. The person couldn’t scan the barcode, and other people are waiting for her. The uncompleted process creates a confusion and need a qualified staff shown Figure 4.5.

Figure 4.3. An ordinary queue

Figure 4.4. One of the patients who struggled with scanning barcode

Figure 4.5. A staff comes to help patients to scan their barcodes

Another is that the screen of a scanned barcode is not understandable. Patients who completed the process they cannot understand that the process is completed or not. The display shows the patient's blood operation room for about 3 seconds. At this point, the patients may not care, understand or read the screen immediately. Therefore, the latest screenings often confuse.

Another problem is the error ‘No Sample Record, on the kiosk screen. There may be more than one reason for this error because different problems cause the same text to appear on the screen. These problems are sometimes caused by patients scanning the wrong barcode on the device or integration problems with other hospital software. Incorrect barcode status is usually when the patient scans the barcode belonging to another unit, or the doctor does not encode the barcode, or the patient falls from the system due to timeout. The problems caused by the hospital system are usually caused by the addition of a new test sample to the system.

Many of the problems described above are due to existing software and interface design. The problems of the hospital system are a smaller proportion. For this reason, it will be more effective to focus on interface design and software problems in general.

In the diagram below, the kiosk problems were determined from the general problems of the system in the blood collection unit. The specific problem focused here is that patients cannot effectively use the kiosk. The effective use of kiosk will make a significant contribution to the solution of the problem in the queuing system.

Table 4.1. The problem of the inability of patients to use kiosk effectively

The problem of cannot understanding the on-screen instructions	Barcode scanning difficulty
a- The problem of cannot reading the writings on the screen	a- Barcode cannot be scanned from the appropriate distance
b- The window that opens after clicking on the screen is not easy to understand	b- Being deformed of barcode
c- Foreign patients cannot use language options effectively.	c- Loosing of barcode
d- Because of psychological reasons, patients cannot use kiosk effectively.	

In the chart shown Table 4.1 related with the problem of the inability of patients to use kiosk effectively. The problems are categorized by two arms which are the problem of cannot understanding the on-screen instructions and barcode scanning difficulty. The main problems are defined under the two problems.

The reasons for the inability of the patients to use the kiosk effectively are shown in the diagram above. According to the main keywords stated in Chapter 3, it is understood that most of the problems mentioned are due to the interface design. The problems identified in order to identify these problems and provide possible solutions should be examined by separating them into areas of visual recommendations, auditory recommendations and physical abilities.

4.2. Recommendations for the Problems

When considering literature researches, observations and interviews, it is easy to find suitable solutions to current problems. In the Table 4.2 it can see the recommendations against the existing kiosk problems.

Table 4.2. Recommendations

GENERAL PROBLEMS	RECOMMENDATION
P1: The problem of cannot reading the writings on the screen	R1: The text on the screen is reduced. Use minimal word
P2: The window that opens after clicking on the screen is not easy to understand	R2: Semiotics supported icons are placed
P3: Foreign patients cannot use language options effectively.	R3: After scanning the barcode, the kiosk screen automatically changes to the language of the foreign person
P4: Because of psychological reasons, patients cannot use the kiosk effectively	R4: Using cold colours makes people calm
P5: Barcode cannot be scanned from the appropriate distance	R5: Proper barcode distance is determined, and design changes are made to facilitate scanning
P6: Being deformed of barcode	R6: ID number could be used to complete the process
P7: Loosing of barcode	

In the Table 4.2 recommendations have been shown for the main problems. The left parts are indicated the general problems that examined in the before sections. The right parts are indicated as a solution offered. The solution offered is related to the

recommendation. The recommendation has performed by researching the literature. In addition, capital P indicates the problem and capital R indicates recommendation.

Based on Table 4.2 the following explanation has obtained, and recommendations have clarified in detail based on their related problems.

How to Make R1 Solution Proposal for P1?

P1: There are too many texts on the screen, and it is not easily readable

R1: Decrease the texts on the screen

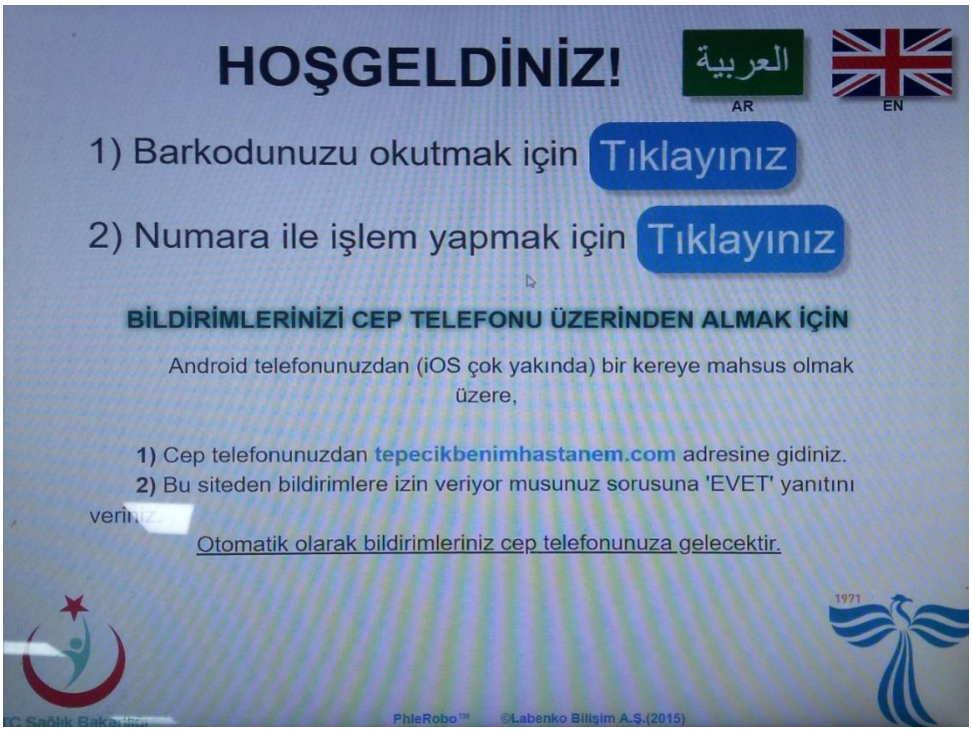

Figure 4.6. Main screen of the kiosk

As shown in Figure 4.6 there are two options for scanning the barcode. It is often difficult for patients to read the screen and decide on the appropriate option. In particular, it is difficult for older people and people with vision disorders to easily understand and apply the instructions on this screen. Considering that the second option, which is the writing barcode number option, is rarely used, taking this option under a different window, will significantly reduce the display crowds.

Figure 4.7. Removing the barcode sentence

Such a solution reduces the crowd on-screen, but it is still not enough. As seen in Figure 4.7 there is another option which for taking notifications via smartphones. Second options for barcodes is removed. This option serves to patients to give notification about them for announcement instead of watching to big screens in the waiting area. This feature seems great but actually it is not useful, because patients who are waiting in there can easily follow screens and hear announcement voices. When a patient left this area, he/she probably miss out on. In these reasons, it can also be removed these options from the main screen.

Figure 4.8. Clear image of the main screen

In Figure 4.8 second options for barcodes is removed. There is only one option left. The clearance supplies more understandable statements for the users.

How to Make R2 Solution Proposal for P2?

P2: The pop-up window after clicking the screen is hard to understand

R2: Inserting semiotics supported signs will be efficient.

Figure 4.9. Kiosk main body picture

As shown in Figure 4.9 the arrow indicates the area of the barcode scanning inside the image, but such a sign on the screen indicates the right of the screen. As Semiotics, it can say that they mislead patients because many people tried to scan the ID card or barcode on the screen during the observations. At this point, instead of showing the barcode area on the screen after the click, showing the position of the barcode reader with a broad arrow would be a more proper solution but it is still not good enough.

The Figure 4.10 shows the accurate point of the barcode scanning part. The part is very smaller when compared with the main body of the kiosk.

How to Make R3 Solution Proposal for P3?

P3: Foreign patients cannot use language options effectively

R3: After the barcode is scanned, the kiosk display automatically changes to the person's language.

Figure 4.10. Barcode scanning region indicating

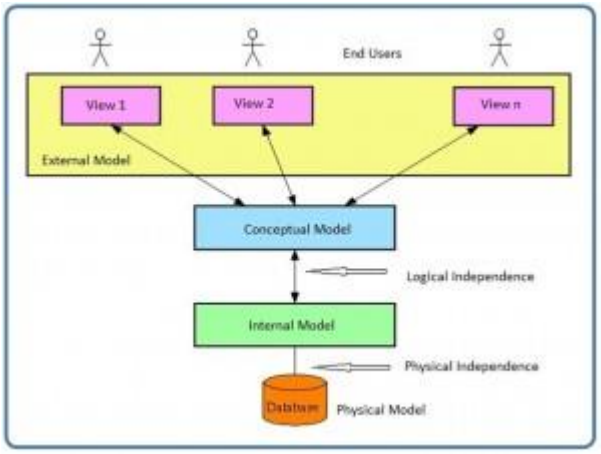

Figure 4.11. Database working principle (Source: https://opentextbc.ca/dbdesign01/data-abstraction-300x226/)

The Figure 4.11 shows how the database works based on an internal model, conceptual model and external model.

For this suggested solution, software changes must be made in the system. When the doctor encodes the barcode, the person's nationality could be added to the system, and when the kiosk scans the barcode, the language on the kiosk screen can automatically

change to the patients' native language. Language options previously added from databases can be automatically transmitted to the screen.

How to make R4 solution proposal for P4?
P4: For psychological reasons, the kiosk cannot be used effectively
R4: Patients could be calmed by using cold theme colours

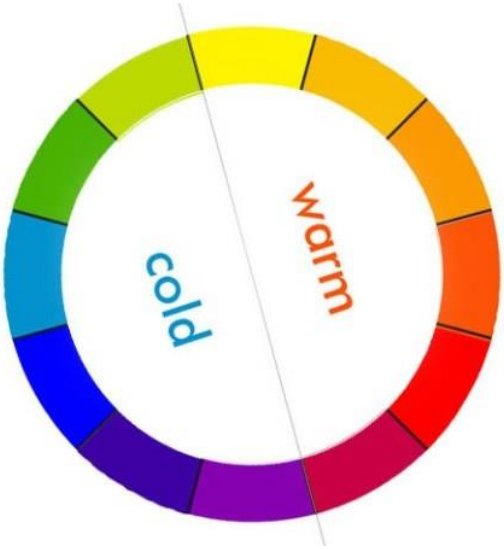

Figure 4.12. Affecting feature of colours (Source: https://hobbycakeartistetc.com/color-wheel-basics/)

The Figure 4.12 indicates the cold and warm colours. At certain times of the blood collection unit, the crowd is very much. Especially in these hours, there is a significant increase in the number of people who want to complete the queue process from the kiosk. Patients may not be able to use the device effectively because of their health problems, the stress of blood donation and the fear of interacting with a technological device. At this point, the kiosk can be redirected into a calmer mood under the subconscious of patients using cold theme colours on the screen.

How to make R5 solution proposal for P5?
P5: Barcode cannot be scanned at an appropriate distance
R5: Proper barcode distance is determined, and necessary design changes are made

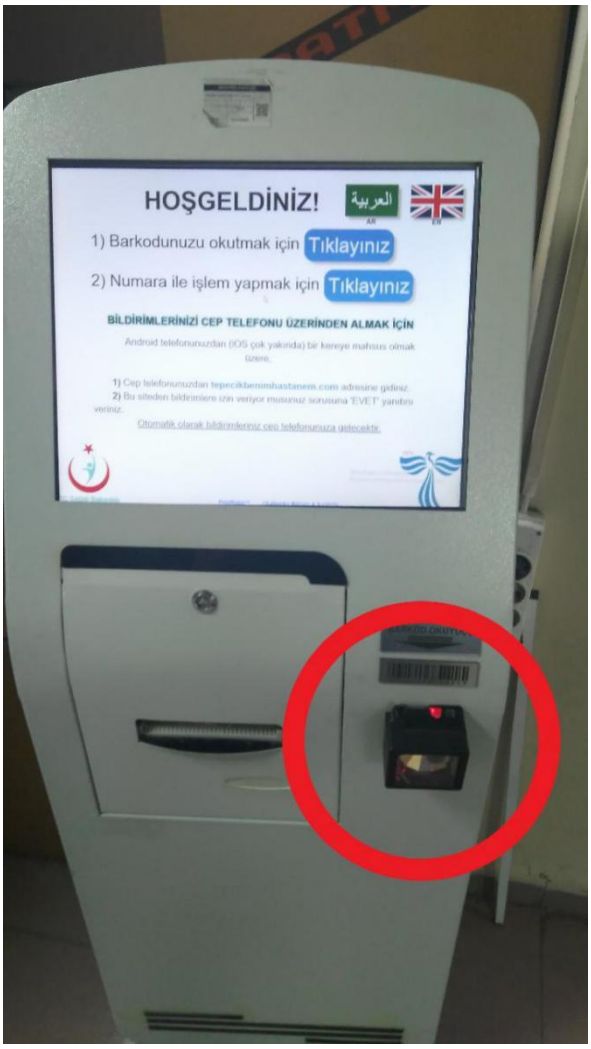

Figure 4.13. Barcode region on the kiosk

As can be seen from Figure 4.13 there is no limited distance to scan the barcode. However, the current barcodes scanning distance should be 5 cm. In this context, a simple plastic apparatus allows the barcode to be scan from a suitable distance. In this way, patients do not scan the barcode even though they want to scan very closely.

How to make R6 solution proposal for P6 and P7?

P6: Barcode could be deformed

P7: Barcode could be lost

R6: The queue process can be complete with ID number

Figure 4.14 indicates Hospital Information System in general. From time to time, patients' barcodes can be deformed in a way not to be scanned. In such cases, the code on the barcode is usually entered into the system manually. When the barcode is lost, the

patient's ID number is entered the host computer with the help of the responsible nurse. With software integration, the patient can get his / her ID number by using the kiosk.

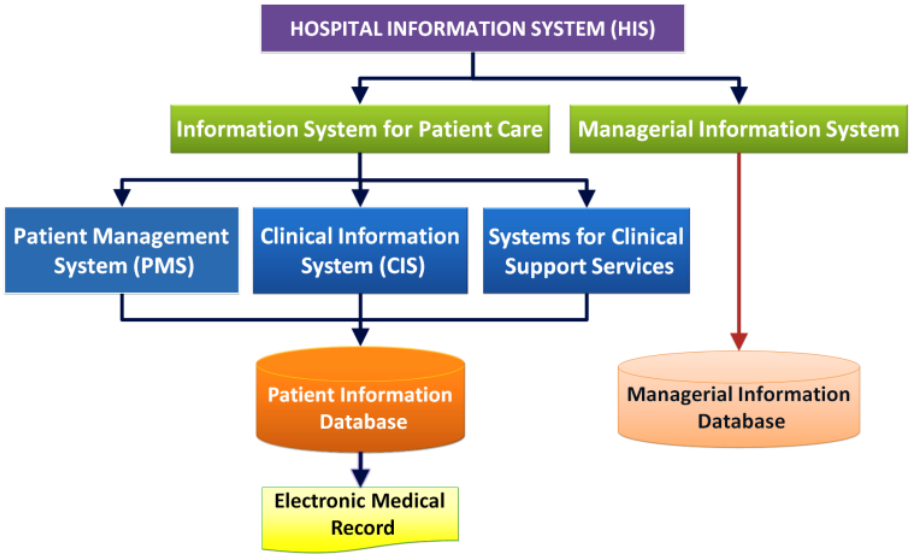

Figure 4.14. Hospital Information System (Source: https://drdollah.com/hospital-information-system-his/)

4.3. Proposal Re-Design Study

An essential part of the problems mentioned in Chapter 3 is due to the interface problems. Before focusing on all the problems, the interface design should be considered in general. It is necessary to consider these interface designs from a visual, auditory and physical perspective.

4.3.1. Visual Recommendations

The focus of visualisation is the age of the patients. It is one of the main points in the design which has a wide range of users. For this reason, the design should be created, especially considering older people so that young people can use it easily. (Design for older users, Bowe 1988: Newll and Caim, 1993). All age groups must easily perceive the screen to be used in the kiosk. In this context, the use of a high-resolution display allows

the elderly to understand the elements on the screen with less effort. (Foley et al., 1990.) Young people will also not be disturbed by the high-resolution feature of the items on the screen.

Table 4.3. Visual recommendations for design proposal

Font Size	The large font allows easy reading
Text Characteristics	Use high-quality, anti-aliasing character fonts supported by high resolution. It is also useful to use negative constructions.
Resolution	Use the screen resolution to the highest possible level
Display Terminals	Use user-adjustable, tiltable rotating screens. Use a larger screen than it is
Lightning	Provide that there is sufficient lighting in the work area
Glare	Eliminate glare problems
Colour	Colour shape combinations should be well determined. For thin lines and small shapes, the blue colour is not effective. Using colour in similar wavelengths may not be appropriate. Yellow, orange …
Colour for Text	Colour selections for the background and font are vital. For example, the blue background behind the white text can be a convenient viewing option. Black writing provides a convenient reading environment in the open background.
Brightness	Older users need a high level of brightness to distinguish colours
Object Speed	Stay away from fast-moving writing and objects
Interaction Style	Prefer visual object-based interface designs instead of text-based interface interactions.
Highly Visual Impaired Users	Make alternative interface designs for people with blindness and other high visual impairment. Software and hardware support, such as programs that read from a screen, voice recognition, can be provided.

Another thing that should be considered is the properties of objects and writings to be used on the screen. It is necessary to choose a simple format for easier understanding of objects and writings. Fast moving objects and writings should be avoided. Changes on the screen should be reflected in the user with appropriate notifications. These changes should be given the feeling that the operation is successfully completed or the next step to the user (Nielsen, 1990).

Another point is colour harmony. Using a darker background colour than the text colour and contrasting colours can solve problems caused by display glares. (Snyder, 1988). Also, anti-glare screen filters can be used. Font and other objects on the screen should be as large as can provide convenience. (Plude and Hoyer, 1985). It is more effective to reduce the intensive writings on the screen and to provide the desired message to be conveyed to the user or the action to be made to the user with visual shapes. This recommendation can be supported by research on the development of traffic signs. (Kline et al. 1990). Based on the information, the Table 4.3 has prepared to comprehensive the visual recommendation and to harmonize the re-design studies.

4.3.2. Auditory Recommendations

Visually well-supported interface design is not enough. In particular, voice prompts, and feedbacks can guide and warn users about the actions. These signs support them with visuals on the screen. For example, a successful process followed by a green confirmation image and a thin voice, a failed process followed by a warning image and a thick sound (Olsho et al., 1985).

Based on the information, the Table 4.4 was prepared to understand the importance of the auditory recommendations by adding visual recommendations for the design. The auditory recommendations include arrangement, noise, task relevance, frequencies, synthesized and speech. Each of parameter is relevant with the design process and lead the proposal of the design

Table 4.4. Auditory Recommendations for design proposal

Arrangement	Set the user environment to interact directly with the audio source
Noise	Keep the environment away from unnecessary noise
Task Relevance	Do not use non-task-related sounds
Frequencies	Keep the meaningful tones in the 800-1000Hz range.
Synthesised Speech	Avoid using as synthesized voice as possible

4.3.3. Physical Abilities

As with the existing kiosk, the redesigned device will consist of a touch screen and a minimum of input devices. Czaja (1988) also thinks that using different additional devices like keyboard and mouse will not be efficient. Especially when considering the use of older people, they should complete the process of taking the queue at the beginning of the kiosk by themselves. In this context, in addition to good interface design, kiosk length, the position of the barcode reading device, the point where the kiosk is located is also important.

The realization of physical design is more difficult than visual and auditory design because physical changes can drive design differently. For example, the location of the design, or the physical condition of the people who will use the design, affects these changes. Therefore, it is not appropriate to change the existing physical measurements without examining the physical research of the design. The design is based on the existing kiosk physical measurements. These variables may be differentiated by appropriate research for further studies.

4.4. Recommendations-New Design Analysis

Many people use their transportation cards for busses, and they can scan them in just a few seconds. Also, many people can scan goods in shopping in a few seconds. Considering that many patients try to scan the barcode without paying attention to the text of the click. Patients are used to scanning their barcode in a few seconds; in this reason, they could scan the barcodes in the hospital like they are in shopping. At this point, the question of how the use of the existing kiosk can be reduced to such simplicity pushes us to combine all recommendations. The recommendations that are taken up piece by piece to this point, when combined for a specific purpose, evolve to a different design concept than they were at the beginning.

Figure 4.15. The card scanning system in buses (Source: http://www.hurriyet.com.tr/izmirim-kartta-yeni-donem-37311090)

The Figure 4.15 shows an example of the card scanning system and refers the scanning system of the study due to its ease of use and usability. For example, in addition to changing the language with a software intervention, software interventions can also erase unnecessary windows on the screen, and the menu can be redesigned. For example, with the suggestion that the second option in the R1 proposal should be moved to a different location, with the R2 proposal the remaining sentence and the phrase is "Click" can be eliminated. The system can be designed in a way that direct barcode can be scan and passed. The complete disappearance of text and the support of semiotic icons makes

the system language-free so that the person does not have any language problems in standard barcode scanning operations. However, for advanced users, the language of the kiosk can change the nationality of the patient. For example, if a foreigner loses his / her barcode, he/she will be able to display the screen in his / her language when he/she wants to log in with an ID number. In R6, it is combined with R1 and R2.

Again, the physical design change to be made in the barcode field does not have to be limited to just simple cover design. The barcode scanning area can be seen on the right side. In this context, placing the barcode reader right in the middle of the kiosk will also make the semiotics orientation on the screen healthier. The arrow in Figure 4.19 is redesigned, and the barcode reader in the centre of the kiosk is shown comfortably. At the same time, with simple animation, the arrow on the screen will guide the patient to the bar code reading section in a slow way this point, R2 and R5 support each other to develop recommendations. One person who sees Kiosk for the first time will want to scan the barcode on the barcode reader quickly.

Figure 4.16. The proposal of the barcode scanning region.

Figure 4.16 indicates the proposal of the placement in the middle of the kiosk for the barcode scanning region.

In the current system, the text on the screen after scanning the barcode cannot be easily understood by many patients. Similarly, the goal of making the system language free brings the need to redesign the screen after scanning the barcode. At this point, when the barcode is successfully scanned, it is aimed that semiotics will be supported and a suitable visual and audible confirmation sound will create a positive return feeling for the

user. If the barcode cannot be scanned for a variety of reasons, the visual and audible feedback of the operation will also be easier for the user. The reason for not being able to get a queue with a barcode is to be displayed in the patient's language with clear sentences, not as a simple error code.

Table 4.5. Possible barcode scanning problems and possible warnings list

Reasons for Errors	Possible Warning Messages
If the doctor has not encoded the barcode;	Please contact your doctor
If a new test was added to the system	The system cannot find the specified test instance.
If the person fired from the system for being late	Your previous queue right has been cancelled
If the wrong barcode is scanned which belongs to the different unit	The wrong barcode is scanned. Please go to the relevant unit
If patients are directed by more than one section;	Please also scan the other barcode which belongs to the different section

The causes and possible warning messages in the Table 4.5 can be integrated into the system by software modifications.

4.5. Final Design of the Kiosk

The different design suggestions of the kiosk body and interface were performed based on the recommendations and literatüre studies. The body of the kiosk was designed as different shapes and colors to provide ease of use and visuality, whereas the interface of the kiosk was designed by making simplify for effective use. After complited design studies, the different design suggestions were present to the users as an online and public

survey. The survey was present to all groups regardless of age and gender. Thus, it is aimed to select the most comfortable and effective design by everyone.

4.5.1. Examination of the Design

In the light of analyses, design recommendations and the result of the survey, the existing kiosk redesign study was carried out. The designs mentioned in this section are drawn and rendered using the Fusion 360 program.

Figure 4.17. First image of redesigned kiosk

As a result of all the problem analysis and related solutions in this study, the model in Figure 4.17 has emerged. This section includes the final designs of the kiosk, which are modelled and rendered in 3D using the Fusion 360 program. Aiming to have a quite simple design, it is aimed to not be a complicated device for patients. In the body of the white colour is preferred to be made in terms of semiotics for hospital use and simplicity is to refer to representation.

Figure 4.18. Second image of the redesigned kiosk

The Figure 4.18 shows the redesigned kiosk in a different view.

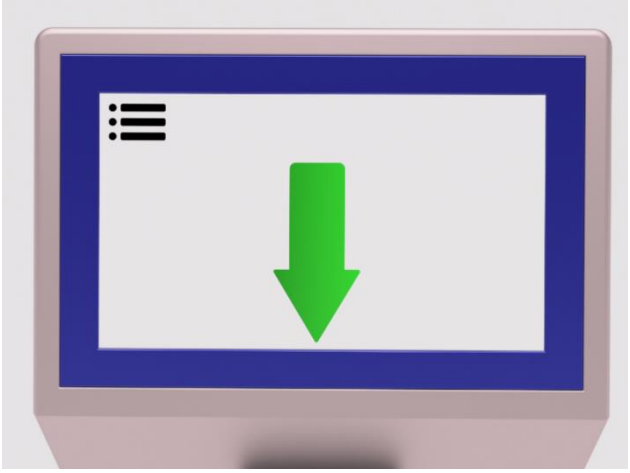

Figure 4.19. Main screen image of the redesigned kiosk

The Figure 4.19 represents redesigned kiosk's main screen. Based on Figure 4.19 in this screen, the writings are entirely removed. The patients who want to use the kiosk will notice a big blue arrow and an icon which has black lines in the upper left corner. The blue arrow on the home screen moves up and down with a slow animation, directing the people to the barcode scanning area just below. The reason why the screen frame and the arrow are blue is to give people to calm. This colour selection aims to reduce situations that may cause stress, such as a person's blood donation, the interaction with an electronic device. The icon in the top left corner represents the text and details. Patients or staff can

reach an advanced menu by clicking on the icon here if there is no standard barcode scanning or when different settings need to be reached.

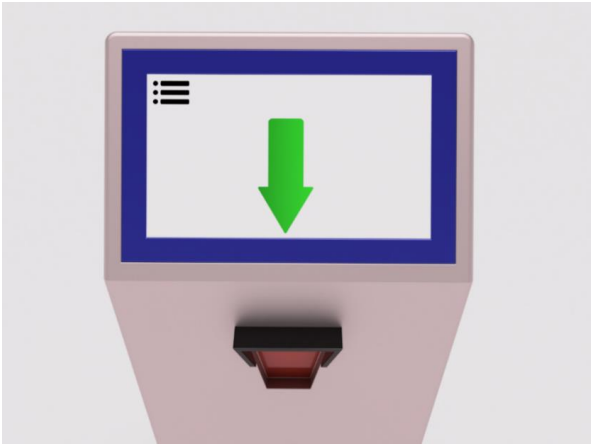

Figure 4.20. Main screen image and barcode scanning region of the redesigned kiosk

The Figure 4.20 represents the barcode scanning area just below the arrow appears more clearly. Here with a slow blue animation of the big blue arrows, patients are expected to scan the barcode quickly.

The problem is that the barcode cannot be read at the right distance in the old system, whereby it is aimed that the hand does not come too close to the barcode reader thanks to an apparatus added to the barcode reader. This allows the barcode to be read from the right distance.

Figure 4.21. Barcode scanner screen

Figure 4.22. Barcode scanner screen in a different view

The Figure 4.21 and Figure 4.22 shows the barcode scanning screen in different views. After the barcode was scanned in the old system, the writings appeared on the screen for a short time and were generally not understood by the patients. With this design change, it is aimed to understand the success of the patients' process by means of the feedback supported by semiotics and icon.

Green colour and on-screen icon are frequently used to convey meaning such as validation, continuation, transition in both daily and digital platforms. Patients are also familiar with thus signs, which are the colour, shape and sound.

Figure 4.23. Whatsapp check marks (Source: https://faq.whatsapp.com/en/android/28000015/?category=5245250)

Some of signs indicates the instructions. The Figure 4.23 shows the message check marks and the Figure 4.24 shows the traffic light. The signs indicate the confirming signs.

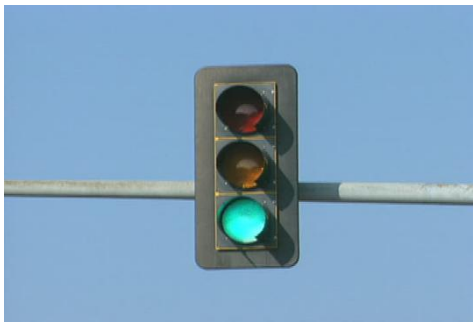

Figure 4.24. Green light of traffic light (Source: https://ak3.picdn.net/shutterstock/videos/80833/thumb/1.jpg?i10c=img.resize(height:160)

Figure 4.25. After the barcode has been scan, the error has appeared

The kiosk process cannot be successfully performed warning window is seen in Figure 4.25. As in the confirmation screen indicating Figure 4.26, Figure 4.27, Figure 4.28, Figure 4.29 and Figure 4.30 the notification made to the patients on this screen is presented by combining colour, shape and appropriate notification sound.

Figure 4.26. After the barcode has been scan, the error has appeared in a different view

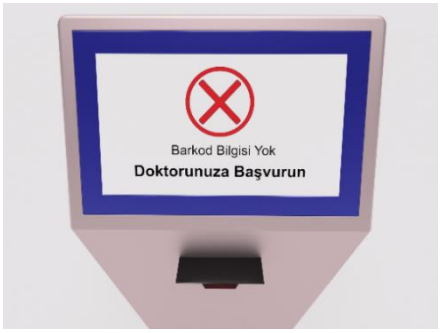

Figure 4.27. After the barcode has been scan, another error has appeared

Figure 4.28. After the barcode has been scan, another error has appeared in a different view

The kiosk can give various warnings against possible errors. The most frequently encountered windows which are used by patients have been removed from by texts as much as possible and designed as language-free. However, warning windows are not likely to do language free. It is necessary to explain in detail why the process was not successful. At the same time, a warning can be given at the person's native language with the necessary software updates.

Figure 4.29. After the barcode has been scan, the wrong department error has appeared

Figure 4.30. After the barcode has been scan, the wrong department error has appeared in a different view

Figure 4.31. Red light of traffic light (Source: https://www.wklaw.com/wp-content/uploads/2015/03/red-light.jpg)

Figure 4.32. 'No entry' sign of traffic signs (Souce: https://upload.wikimedia.org/wikipedia/commons/thumb/b/ba/UK_traffic_sign_616.svg/1024px-UK_traffic_sign_616.svg.png)

Figure 4.31 and Figure 4.32 shows the rejection signs in general. A red cross in the round and the red colour for Figure 4.32 gives patients the message which is "Stop, Wrong, Not Completed". These warnings are most commonly seen on traffic signs.

4.5.1. Test of the Design

A web-based application was conducted to test the usability of the design determined as a result of the survey data. The kiosk interface design tested in this application is. This application includes the existing kiosk interface and the interface determined by the surveys. By entering this web application, users can test both the existing interface and the recommended interface. Users participating in this test found the recommended interface more useful and understandable. They stated that the existing kiosk was more complicated and difficult and therefore they lost time. Suggested kiosk to be more understandable than the existing kiosk provides ease of use so that no loss of time.

CHAPTER 5

CONCLUSION

In this study, a new design proposal has been made for the kiosk used in a system based on artificial intelligence. Literature research, observations and interviews played an active role in reaching this point.

First, İzmir Tepecik Training and Research Hospital was visited at different times. The factors affecting the system and people were noted in each observation. In general, useful and missing parts of the system were determined. In fact, the notes taken during the observations affected the design more than executing the interview studies. Observation studies are more directly to kiosk because, in the planned and unplanned interviews of the personnel and patients, other problems in the hospital have emerged with the design of the kiosk. The planned interviews were made with the most experienced nurses, especially in the blood collection unit, to collect and analyze more data. As a result of these interviews, not only the problems of the kiosk but also the problems of the software, physical environment problems, personnel training and many other problems have emerged. All other issues were excluded from this thesis.

The data obtained from observations and interviews were reduced to keywords and literature research related to these keywords was conducted. In the literature, design proposals have been formed by reference to the sources that may be useful in kiosk design. Screen brightness, font size, semiotics signs, voice guidance, review of the work of HCI have been included in the design proposals and played an active role in the redesign process.

The design proposals were reduced to a single design idea through a survey. This allows a comparison between the existing kiosk and the redesigned kiosk. In order to achieve this, a web-based application and users were given the opportunity to compare two kiosk interfaces and the design was tested. According to the results of the test, it was proved by simulation that the design at the end of the questionnaire was preferred to the existing kiosk and would provide more effective use.

The most powerful improvements in interface design are language-independent, so they can be easily understood by everyone. In addition, the majority of the people prefer cold colors as a result of the survey, based on our research in the literature of cold colors have a confident effect on users and support more calm process. Another strength of the interface is that they can handle operations with simple tools in general, reducing the confusion in the system. In general, these improvements in the interface allow the user to complete the process as quickly as possible. The strengths in the body design are as follows. Firstly, since the barcode scanning section and the direction of the arrow are the same, it is easier for users to notice this section. Secondly, the design of the barcode scanner assumes that users can read the barcode at the appropriate distance

The design proposals, which were considered individually at the beginning, turned into a different design proposal. Design proposals have evolved. In this way, it is aimed to reduce the problems in general and to increase patient satisfaction. Although the focus of this study is on the kiosk interface, the design is thought to play a positive role in queue management. In this context, not being focused on all problems does not imply that these problems are ignored.

In the study as missing can be specified. Interview studies could not be performed professionally with patients because the interpretation of the system is generally not necessary for people who are ill. Existing serious problems lead to obstruction of the object and interpretation. Another missing point is that the body design has not been tested. Although an appropriate design was determined by the survey studies, it could not be simulated. At this point, the following can be suggested; This deficiency should be discussed in the continuation of the thesis or in a different study.

The proposed design for future studies may be tested in a pilot section. This is necessary for the application testing of both the interface and the body design.Secondly, the integration of this system in a different department in the active kiosk, or integration of this system in various hospitals, will make it easier to see both the connection and the difference between the systems. It will also contribute to the development of the design and its dissemination. Another suggestion is the work of the body design after testing. In addition to this design, all users can be used without any problems. Adjustable display or lighting can play a role. After that, a number of features required for interface design can be added in the light of pilot study data.

In general, this thesis study can be accepted as successful because the redesign of the existing kiosk interface design will save the user time and ease of use. The literature and the results from the survey and web-based application emphasize the need to improve the interface. In addition, although the proposed body design could not be tested by the users, there is also a design that they prefer visually as a result of the survey. The new design is expected to be more useful than the previous one. In addition, this thesis is a guiding work to improve the kiosk with the propositions.

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APPENDIX A

OBSERVATION NOTES

The first observation was made at 30.10.2018 in İzmir Tepecik Training and Research Hospital's Blood Collection Unit.

- Sistem sonradan gelen kişiyi öne alabiliyor.
- Barkod okutulduktan sonraki bekleme süresi en fazla 2-3 dakika oluyor.
- Sistemi öğrenen biri başkalarına yardım etme eğiliminde oluyor.
- Kioks önünde 5-6 kişilik sıra oluştuğunda yardıma bir personel geliyor.
- Kioks önünde sıra yokken, ortam sakinken ilk defa gelen 40 yaş altı hastaların sistemi anlayıp uygulaması 15 saniyenin altında oluyor.
- Kioks önünde sıra yokken, ortam sakinken ilk defa gelen 60 yaş üstü hastalar sistemi kullanmada zorluk yaşıyor, hatta bazıları sistemi öğrenmeye dahi çalışmadan yardım arıyor.
- Ekrandaki yazı ve yönlendirmeler kişileri yanıltabiliyor. Genç ya da yaşlı, elindeki barkodu ekrana yapıştıranlarınlar oluyor.
- Barkod okutulduktan sonra çıkan yazılar kişiyi yanlış yönlendirebiliyor. Mesela kişi barkodu okuttuğunda ekranda "8 Nolu masaya ilerleyin" yazısı çıktığında ismi okunmadan hemen oraya gitmek istiyor. Barkod okutulduktan sonra çıkan yazılar kişileri oyalayabiliyor. Kimi zaman da insanlar yazıyı okuyamıyor. Ekran onlara göre hızlı kapanıyor.
- Barkod okutulduktan sonra bekleme süresinin kısa olduğunu bilmeyen kişiler başka işlerini halletmek için hemen oradan ayrılabiliyor.
- Ekrandaki "Tıklayınız" yazısına basmadan barkod okutmak isteyenler de oluyor.
- Barkod'un okunma mesafesi de kişilere zorluk çıkarıyor. Ne çok yakın ne çok uzak olması gerekiyor. Bu konuda sıkıntı yaşayanlar genellikle barkodu okuma bölümüne aşırı yakın tutuyorlar.
- Kan alma birimi yerine idrar verme birimine yönelenler oldu
- Okuma yazma bilmeyen olduğunda hangi kan alma odasına gideceğini anlamakta zorluk yaşadı

- Kan alma odalarında da sıra oluşabiliyor.
- Toplanan kanlar alışveriş arabası gibi bir araçlar taşınıp ilgili test birimlerine götürülüyor.
- Normal şartlar altında bir hastanın kan verme işlemi 1 dakikanın altında tamamlanıyor. Ancak fazla sayıda test, damar yolunun bulunamaması, hastanın bayılması gibi durumlarda bu süre uzuyor.
- Sistem bir önceki hasta ayrılmadan yeni hastayı gönderiyor ancak yukarıda saydığım sebeplerle kan alma işlemi uzarsa kan alma biriminde sıra oluşuyor.
- Bir sekreter iki ya da üç hemşireyle çalışıyor.
- Bir kiosk devre dışı kalmışsa bu hastalar tarafından anlaşılmıyor ve ona barkod okutmaya çalışıyorlar.
- Kan alma esnasında hasta bayılırsa, kan alma alanlarının darlığı sebebi ile hastaya müdahale zor oluyor. Çevrede çalışan diğer personellerin de çalışmaları mümkün olmuyor.
- Sistem hastayı çağırdığında içeride müsait olan sekreterin ekranında hazırlanması gereken tüplerin listesi çıkıyor. Yazıcıdan çıkan barkodları uygun tüplere yapıştıran sekreter kan alacak hemşireye tüpleri iletiyor.
- Gözlem süresince hiçbir şekilde numara ile kayıt olan çıkmadı. Hepsi barkod okuttular.

The second observation was made at 19.03.2019 in İzmir Tepecik Training and Research Hospital's Blood Collection Unit.

- Hastalar barkodu fazla yakınlaştırıyor
- Ekrandaki yazıları anlamakta zorlanıyorlar. Barkodun okutulması için konulan yönergeler kolay anlaşılamıyor ve etkin kullanılamıyor. Özellikle arkalarında sıra varken daha çok panik yapıyorlar. Muhtemelen bu durum ekrandaki yazıları anlamayı daha da zorlaştırıyor. Barkod okutulduktan sonra çıkan yazıların okunması için uzun sure ekranda bilgilendirme mesajları kalıyor ancak hastalar barkodu okuttuktan sonra oradan uzaklaşma eğilimindeler, bu nedenle diğer bilgilendirme yazıları okunmuyor.
- Bir kişi nasıl barkod okutulduğu öğrenirse arkasında bekleyenler hemen öğrenip uygulayabiliyorlar.
- Kiosk önünde 10 kişi birikince bir görevli yardıma geliyor.

- Sistemi öğrenen biri diğerlerine yardım etme eğiliminde oluyor.
- Kan verme işleminden sonra bekleme alanında hastalar kanamayı durdurmak için de bekleme yapıyor.
- Her bir hastanın kan alma işlemi yaklaşık 50-59 saniye aralığında tamamlanıyor. Son 15 saniye kala sistem yeni hastayı gönderiyor ve hasta bir sure kan verme biriminde bekliyor. Normal şartlar altında hastadan alınan kan işlemi 1 dakikanın altında tamamlanıyor.
- Kişiler bir önceki kan alma işlemi bitmeden çağırılıyor. Bu durumun hem avantajı hem de dezavantajı oluyor. Avantajı; önceki hasta kalkana kadar yeni hasta ilgili masaya ulaşmış oluyor ve vakit kaybetmeden yeni hastaya geçilebiliyor. Dezavantajı ise, önceki hastanın işlemi çeşitli sebeplerden (damarın bulunamaması, hastanın bayılması vb) dolayı uzarsa kan alma biriminde sıra oluşuyor. Hastalar ayakta beklemek zorunda kalıyor.
- Kan vermeye çağırılan kişilere isim benzerliği olasılığına karşı anne baba isimleri soruluyor.
- Sabah saatlerinde 10:30 civarında Polikliniklerde Probel sistemi kapandı. Kan alma birimine hasta gelişi durdu. Yaklaşık 15 dakika sonra sistem geri geldi.
- Alınan kanlar toplanıp bir araba vasıtası ile analiz yapılmak üzere ilgili birimlere gönderiliyor.
- Kan alma esnasında hasta bayıldı. Müdahale için sedyenin yatırılması gerekti ancak alanın yetersiz olması nedeniyle zorluk yaşandı. Çalışan diğer hemşirelerin de çalışma düzeni geçici olarak bozuldu.
- Sistem hastayı çağırdığında içeride müsait olan sekreterin ekranında hazırlanması gereken tüplerin listesi çıkıyor. Yazıcıdan çıkan barkodları uygun tüplere yapıştıran sekreter kan alacak hemşireye tüpleri iletiyor.
- Kan alma görevlileri sekreter ile birlikte çalışıyorlar. Bir sekreter iki ya da üç hemşireye hizmet edebiliyor.
- Devre dışı kalmış kiosk hastalar tarafından kullanılmak isteniyor. Bozuk olduğu anlaşılmıyor.

APPENDIX B

INTERVIEW NOTES

The first interview was made with a secretary who helps nurses at blood collection unit in İzmir Tepecik Training and Research Hospital at 03.04.2019

Demogolojik Sorular

- Yaş, cinsiyet, eğitim durumu, meslek?
  40, Kadın, lise, veri giriş personeli-sekreter

Kıyaslama

- Phlerobo ile ilgili düşünceleriniz nedir?
  7 yıldır burada çalışıyorum, bu sistem yükümüzü baya hafifletti, en azından hastalara verdiğimiz tüplerle onlarla birebir yaşadığımız sorunlar kesildi. Şu an sadece bilgisayar, tüpler ve sonuçlar var.
- Genel olarak hastaların yaşadığı sıkıntılar nelerdir?
  Çok sıkıntı yok. Bekleme süreleri düştü.
- Genel olarak sizin yaşadığınız sıkıntılar nelerdir?
  Probeldeki gibi içerik göremiyoruz. Bir testin parametreleri fazlaysa sonuçların çıkması 15 gün bile sürüyor ama biz burada sadece immünoloji olarak görüyoruz. Hastaya 3 gün sonra sonuç çıkar diyoruz ama 10 gün sonra da çıkabilir. Bunu öngöremiyoruz.
- Phlerobo'yu başarılı buluyor musunuz?
  Eksikleri var ama başarılı buluyorum
    - Phlerobo'nun başarısız, yanlış veya eksik olduğunu düşündüğünüz noktaları var mı?
      Eksik olduğunu düşündüğüm yer: örneğin dahiliye polikliniği, biyokimyasını kodluyor, ayrıca tokluğunu da kodluyor. Hasta barkodu okuttuğunda ekranda "hasta tokluk için 2 saat sonra gelecek" yazıyor. Biyokimya daha önceden kodlandığı için sistem bunu açlık testi olarak algılıyor ve tokluk için olan testi daha sonraya alıyor. Halbuki tokluğu alınabilir ama 2 saat sonra gel diyor.

Şöyle bir eksiği daha var sistemin: Hastanın iki tane poliklinik girişi var diyelim, hem dahiliyeden gelmiş hasta hem hemotolojiden gelmiş. Barkodun birini okutuyor, ismi anons ediliyor, diğer barkodu okutmadığı zaman sistem onu görmüyor. Hasta dahiliye ile birlikte hemolotiji girişi olduğunu da söylüyor ve yeniden anons gelmesi bekleniyor ama bunun için diğer barkodu da okutması gerekiyor. Ya da iki birimden de hemogram istenebiliyor. Böyle bir durumu iptal etme şansımız da yok bu nedenle hastadan bir anda iki kere hemogram alınabiliyor.

- Olmasını istediğiniz ya da değiştirmek istediğiniz ek bir özelliği var mı?
  Testlerin içerikleri çok ayrıldı. Probel'de bir testi görülebiliyorduk ekrandan. Laboratuvarla birlikte testler ve adları da değişti. Ve biz bunları ekrandan göremiyoruz. Onun dışında sistem gayet iyi ve mantıklı çalışıyor.

- Phlerobo'dan önce burada görev alıyor muydunuz?
  - Bu sistemin olmadığı bir yerde benzer bir görevde bulundunuz mu?
    Evet, görev alıyordum.
  - Arasındaki farklardan bahsedebilir misiniz?
    Şöyle söyleyeyim, Hastalar açından değerlendirecek olursak, hastalar iki sıraya birden giriyordu. Önce bize geliyorlardı numaratöre basıp bekliyorlardı, daha sonra da kan vermek için bekliyorlardı. Bu sistemde sadece barkodu okutup bekliyorlar, isimleri anons edildiğinde geliyorlar. Bu hastalar için çok büyük kolaylık oldu.

Etkin Kulanım ve Tavsiye/Öneri

- Sizce hastalar sistemi etkin kullanabiliyor mu?
  Çok iyi kullanamıyorlar, sisteme çok yabancılar. Mesela alışık oldukları bir düzen değil. Ben 7 yıldır buradayım. Eskiden hastalar sıraya giriyorlardı ve alışmışlardı buna. Sonra numaratör sistemi geldi. Bu sefer ona alışmakta zorluk yaşadılar. Düğmeye basıyorlar numara alıyorlar bekliyorlar vs. O da bir süreçti bizim için. Şimdi bu da bir süreç aslında. Hastalar beceremiyorlar. Barkodu ekrana tutuyorlar, yazıları anlamıyorlar vs. Muhakkak orada birinin durması ve hastalara yardımcı olması gerekiyor. Hastalar bunu da istiyorlar. Kim bana yardımcı olacak diye etrafa bakıyorlar. Kim okutacak bunu, nasıl yapacağız diyorlar ya da anonsu duymuyorlar, okutup gidiyorlar. Bizim burada hastayı bekleme şansımız da yok.

İki anonstan sonra hasta gelmedi diyoruz. Hastalar da ben barkodu okutmuştum, ben duymadım, bir daha mı barkod okutacağım diyorlar. Böyle sıkıntılar da yaşıyoruz.

- Bu sistemin hastanenin geri kalanı için de uygulanmasını ister miydiniz?
  Uygulanabilir aslında. Güzel bir sistem çünkü. Gayet modern bir sistem. Geri kalanına uygulanmasına isterdim, hastalar da beğeniyor daha önce böyle bir sistem görmedik oturmamızla çağrılmamız bir oldu diyorlar. Ayrıca çalışanlar da beğeniyor.
- Bunların dışında neler önerirsiniz sistemin gelişmesine yönelik?
  Phlerobo sisteminde hasta sonuçları görülemiyor, hastalara ait bilgilere ulaşmak istediğimizde hala Probel kullanılıyoruz.
- Kan alma birimini yapı olarak, fiziksel olarak nasıl buluyorsunuz?
  Çalışma koşulu olarak hiç iyi görmüyorum. Bu durumu müdürümüze de söyledim. Sürekli gelen yöneticilere de söyledim. Benim masam rahat değil, benim çalışma alanım rahat değil. Hastalar arkamdan gelip dokunabiliyorlar. Gelen hastaları görmüyorum. Normalde çalışma pozisyonum hastalara bakacak şekilde olmalı. Hemşirelere de buradan tüpleri vermeliyim. Şu anki çalışma koşullarından memnun değilim. Çok rahatsızlık duyuyorum. Kan alma birimini seviyorum ama fiziki anlamda çalışma koşulları iyi değil.
    - Sizce kan alma biriminin bu hastanede taşınabileceği uygun bir yer var mı?
      Kan alma yıllardır burada. Taşınmadı bir yere. Sadece iyileştirme yapılabilir burada. Hastalar bayılabiliyor, bu tarz durumlarda koltukları indiremiyoruz. Alan çok dar. Belki yeniden dekor edilebilir.
- Hastaların barkod okuttuktan sonra alandan ayrılmamalarını sağlayacak bir sistem uygun olur muydu?
  Olabilirdi tabi ki, ekranlarda uyarı geçebilir. Gerçi ekranda bu tarz yazılar mevcut ama hastalar bunu görmüyor. Bir de Tepecik Eğitim ve Araştırma Hastanesi'ne her kültürden insanlar geliyor. Bazen hastalara çok zor anlatıyoruz sistemi.

    - Turnike sisteminin olmasını uygun bulur muydunuz?
      Olabilir ama hasta kısıtlanmış hissedebilir bence.
- Tek bir sorun belirtmeniz istenseydi sizce buradaki en önemli problem ne olurdu?

Hastaların “biz barkodumuzu okutmuştuk ama biz anonsu duymadık” demeleri, sekreterlerin hastayı sistemden düşürmesi ve hastaların yeniden barkod okutarak sıraya girmesi. Tabi bunda hastaların sisteme aşina olmamaları da var. Eskiden hastalar tüpleri alıyorlardı, numaratörden sıra alıyorlardı ve röntgen gibi diğer birimlere yöneliyorlardı ve geri geldiklerinde biz onları alabiliyorduk. Buna karar veren bizdik. Şimdi bunu yapamıyoruz.

- Barkod okutulduktan cihazın hastaya verdiği bildirimleri yeterli buluyor musunuz?

  Sistem yeteri kadar uyarı yapıyor. Bence yeterli

  - Barkod okutulduktan sonra ekranda onaylama işareti olmasını tercih eder miydiniz telefonlarda vs karşılaştığımız yeşil tik gibi? Yoksa yazıların yeterli olduğunu düşünüyor musunuz?

    Yeşil bir tik olabilirdi evet.

- Yabancılarla ne gibi sorunlar yaşıyorsunuz.?

Hastaya açlık tokluk testini sormada, anlatmakta zorluk yaşıyoruz. Sistem ilk kurulduğunda bize “barkod yazdırıldığında size ekstradan bir de sonuç bilgisi verilecek” denmişti ancak hala gerçekleşmedi. Bu duruma sevinmiştik. Normalde bunu manuel olarak yazamayız, hastaya da söylememiz de yeterli olmaz zira unutabilirler. En azından barkodla birlikte sonucunuz şu kadar günde çıkacaktır bilgisine yer verilse çok iyi olurdu. Bu durum yabancılarda daha da problem oluyor ama sistemi ekranlardan takip edebiliyorlar. Sistemi takip edemediklerinde de hangi masada olduğunu öğrenebilmek adına ismini bağırarak söylüyor ve kan alma biriminde dolanıyorlar.

  - Okuma yazması olmayan biri geldiğinde de benzer sıkıntıları yaşıyor musunuz?

    Biz içeride çalıştığımız için dışarıyı pek görmüyoruz ama genellikle barkodu okutacak birilerini buluyorlar.

Kapanış

- Başka eklemek istediğiniz bir şey var mı?

  Hastalar barkod okutuluyor ya da protokol ile giriş yapıyorlar ama TC No ile de giriş yapılsa daha iyi olur. Hasta barkodu düşürmüş oluyor, unutmuş oluyor ya da

barkod ve numara okunmaz halde oluyor. Bu gibi durumlarda yardımcı olmak adına Probel üzerinden hastanın TC No'su ile sisteme giriyoruz. Protokolünü çıkartıyoruz ve oradan okutuyoruz sisteme. Kimlik No ile giriş yapılabilse bu sorunlar ortandan kalkar.

Bunların dışında sistem güzel bir sistem, yavaş yavaş oturduğunu düşünüyorum. Hastalar da alışıyorlar ama biz sekreterlerin bilgilere hakim olmamız açısından ya da bazı verileri görmemiz açısından Probel kullanmamız gerekiyor.

- Probel ve Phlerobo aynı işi yapmak için mi dizayn edilmiş? Bu sistemin zamanla diğerinin yerini alması mı planlanıyor?

  Hastanede tüm birimlerde Probel kullanılıyor, sadece bizde Phlerobo var. Bu sistemle ilk tanışdığımızda hastalara bu sistemi nasıl anlatacağımızı düşündük. Probel daha farklı bir sistem. Sisteme protokol numarasını tanıttığımda hastaya ait her şeyi görebiliyorum. Probel ile her şeye hakimdik, hastayı da sağlıklı yönlendirebiliyorduk ama Phelerobo'da hakim değiliz. Yaptığımız tek şey barkod bas yapıştır, barkod bas yapıştır.

- Barkod yapıştırılırken sırası karıştırılabilir mi?

  Tüp rengine göre kolay yapılabiliyor sadece yeni gelenler zorlanabiliyor.

- Sizce personel sayısı yeterli mi?

  Fazla da değil, eksik de değil. Her masa dolu. Daha önceden 1000'den fazla hasta geliyordu. Hemşiremiz de azdı, bekleme sürelerimiz de fazlaydı. Zamanla hemşire ve sekreter sayımız arttı. Hasta sayısı da azaldı. Bizi eksiltmesinler de çoğaltmasınlar da.

The second interview was made with a manager who directs the blood collection unit in İzmir Tepecik Training and Research Hospital at 05.04.2019

Demolojik Sorular

- Yaş, cinsiyet, eğitim durumu, meslek?

  Kadın, yüksek lisans, hemşire

Kıyaslama

- Phlerobo ile ilgili düşünceleriniz nedir?

  Pratik ve şeffaf buluyorum. Geriye dönük değerlendirmeleri şeffaf buluyorum.

- Genel olarak hastaların yaşadığı sıkıntılar nelerdir?

Kisoktan hastaların buraya yönlendirilmesinde sıkıntı yaşıyoruz. Genellikle barkodu okutmak için birinin yardımına ihtiyaç duyuyorlar hatta kiosktan sorumlu birini arıyorlar.

- Genel olarak sizin yaşadığınız sıkıntılar nelerdir?
  Pherobo ile Probel'in entegrasyon sorunu var.
  Parametrelerin içeriğini göremiyoruz Sistemi kullanan sekreterin bilgisayar bilgisinin de olması gerekiyor. Kullanılan teknolojik ekipmana da halim olmak ve onların da iyi çalışıyor olması gerekiyor.

- Phlerobo'yu başarılı buluyor musunuz?
  Saydığım şeylerin dışında başarılı, ama sistemi tanıdıkça, kullandıkça sistemden beklentim yükseldi.
    - Phlerobo'nun başarısız, yanlış veya eksik olduğunu düşündüğünüz noktaları var mı?
      Hasta yönlendirmede eksik. Parametreleri göremiyoruz bu ciddi bir sorun. Hastaya da kan sonucu hakkında bilgi vereceğimiz için yarın gel, sonraki gün gel diyemiyoruz.
- Phlerobo'dan önce burada görev alıyor muydunuz?
  Hayır.
    - Bu sistemin olmadığı bir yerde benzer bir görevde bulundunuz mu? Ne gibi farklılıklar gözlemlediniz?
      Aldım, bu sistemin kimlik doğrulaması güzel, numune doğrulaması var. Hatasız kan alınabiliyor, geriye dönük datalar var. Hasta kanını kim almış, kaç dakika beklemiş, ne zaman alınmış gibi veriler mevcut. İster çalışan şikayetçi olsun ister hasta şikayetçi olsun mevcut dataları kullanarak sorunu çözmek mümkün.

Etkin Kulanım ve Tavsiye/Öneri

- Sizce hastalar sistemi etkin kullanabildiğini düşünüyor musunuz?
  Hayır, hiç kullanamıyorlar. Benim annem babam bile gelse kullanamaz. Verdiği cevap anlaşılamıyor. Eğitimli biri bile anlayamaz. Hastane prosedürünü bilen biri anlayabilir sadece. İnsanlar terimlere aşina değiller. İnsanlar numune kelimesini bile bilmiyor, onlar için kan, idrar kelimeleri daha anlaşılır. Ben numune vermeyeceğim kan vereceğim diyebiliyor hastalar.

- Bu sistemin hastanenin geri kalanı için de uygulanmasını ister miydiniz
  Evet isterdim, röntgen, poliklinikler, diğer kan alma, acil hepsinde isterdim.
- Tek bir sorun belirtmeniz istenseydi sizce buradaki en önemli problem ne olurdu?
  Hastaların barkod okutmaması, kioskun konumu belki de. Sonuçta sorun oradan başlıyor. Biz kioska da hakim değiliz, buradan (kan alama biriminin içinden) kioskta neler olduğunu göremiyoruz. Kiosk benim dışımda gelişen bir olay. Kendi kendine sıra alma yazıyor ancak kimse kendi kendine sıra alamıyor. Hasta kaçıncı sırada olduğunu bilsin isterim. Eline bir fiş verilsin. Sağda solda dönüp dolaşmasın.
- Hastaların barkod okuttuktan sonra alandan ayrılmamaları için turnike sistemi yerleştirilmesini uygun bulur musunuz?
  Hiç gerek yok, bugünkü maksimum bekleme süresi 11 dakika. 11 dakika için bir şey önermeye gerek yok bence. Bekleme salonu daha cazip olmalı diyebilirim en fazla ya da yeterince koltuk olmalı.
- Barkod okutulduktan sonra cihazın hastaya verdiği bildirimleri yeterli buluyor musunuz?
  Kesinlikle yetersiz görüyorum. Mesela sistemde "numune alma talebiniz bulunmamaktadır" yazıyor. Hasta bu noktada ne yapsın? "Hekimize başvurun" yazması lazım" ya da "kan dışı numune alımınız var " desin ya da sorununuz şu, şuraya gidin diyerek yönlendirsin. Kiosk sadece "şöyle bir sorunun var" diyor. Hasta da "ne yapayım" diyor. Mesela "Numuneniz kodlanmamış Hekiminize başvurun" gibi net bir yazı da olabilir. Ya da kan alma yok sadece röntgeni var deyip röntgene yönlendirsin direk.
- Barkod okutulduktan sonra ekranda onaylama işareti olmasını tercih eder miydiniz telefonlarda vs karşılaştığımız yeşil tik gibi?
  Hasta barkodu okuttuktan sonra çıkan yazıları okumuyor zaten. Olumlu ve olumsuz işaretler olabilir. Onaylama için büyük yeşil bir tik ve olumlu ses, Sorun olduğunda da kırmızı bir çarpı ve olumsuz ses olabilir. Mesela hasta önündeki kişilerden o sesi duymaya alışır ve kendi barkod okuttuğunda olumsuz sesle karşılaştığında bir sorun olduğunu anlar. Otobüsler okuttuğumuz kartlar gibi mesela.
- Fiziksel olarak burayı nasıl buluyorsunuz neler öneriyorsunuz?

Çok kötü buluyorum. Kan alma birimi yok zaten. Burası bir koridor. Kan alma kabinlerinin daha geniş olması lazım. Koltukların yatabiliyor olması lazım. İdrar laboratuvarının yanında idrar tuvaleti yok mesela. Her idrar laboratuvarının yanında bir tuvalet olur oysa ki

Kapanış

- Başka Eklemek istediğiniz bir şey var mı?

  Sanırım yok. Çalışanı çok zorluyor bu sistem sadece. Bu sistem bir hemşirenin olağan numune alma süresine göre hesaplanmış aslında. Mesela kalite birimleri var çoğu hastanenin ve "yoğun bakımdaki bir hemşire iki hasta bakar" diyor. Burada öyle bir standart yok. Mesela raporlarda değerlendirmeler var ama onun normali ne bilmediğimiz için en önde giden normalmiş gibi görünüyor. Yani performans değerlendirmeleri üzerine de geliştirmeler yapılabilir. Çalışanın performans değerlendirmesi.

APPENDIX C

INTERVİEW ANALYSIS

Diğer Birimler ile olan ilişki

Bu sistem Bornova'da uygulanıyor ancak çocuk kan alma birimlerinde ya da sağlık kurumlarında uygulanmıyor. Baba ve çocuk kan verme birimine geliyor. Yetişkinler için olan sistem ile çocuk kan alma birimindeki sistem farklı olması sistemin anlaşılmasını zorlaştırıyor ve karışıklık oluşmasına neden olabiliyor.

Değişiklik Önerileri

Yazılımla birlikte diğer değişiklik önerileri neler olabilir. Giriş noktasından itibaren kan verme birimine kadar olan tüm işlemler ve yönlendirmeler için. Konsept değiştirme vs. Sistem otomatik olarak dili değiştirecek mesela. Kioskun sıra vermesi isteniyor. Hastayı beklerken video ile eğitmek, renk kodlarıyla insanları yönlendirmek çözüm olabilir. Makine kişiye fiş vermeli. Hasta önünde kaç kişi olduğunu bilmeli. Bankalardaki gibi sadece rakam gösterilebilir. Kalan süre tahmini olarak hastaya söylenebilir.

*Barkod okutulunca kan alma istemi var mı yok mu belirtilsin. Röntgen, idrar gibi veriler gösterilmese de olur. Mesela ulrtasonda işi olduğu görülse direk oraya yönlendirilebilir. Protokol numarası alternatif olarak tc ile de çalışılmalı. Yanlış barkodla gelirse bunun önüne geçilebilir. Bilginin yorumlanması isteniyor. Bir Nolu iki Nolu üç Nolu kiosk yerine direk renk koduyla kiosklar yapılsa daha iyi olur. 2 Nolu kiosk demek yerine mavi kiosk demek daha doğru. Kan alma yerinde sağ ve sol el kullanımına yönelik eşyaların konumlanması. Bankalardaki gibi sadece basit bir ses ve sadece numara gösterilebilir. Ayrıca önceliklere göre farklı numara grupları da yapılabilir. 4xx 2xx 8xx gibi. Hastalar zaten bu sisteme bankalardan aşinalar.

Bakanlıklardan kalite denetimi için geldiklerinde hasta numarası isteniyor. Makineden bir numara çıkması isteniyor. Hastanede bir yerde başka bir sistem, bir yerde başka bir sistem olunca da hastanın kafası karışabiliyor. Ekranda sıradan çağrılacak hastaların isimleri yazıyor. Bu hastalar aslında çağrılmadan ilgili masaya gidip

hazırlanabilirler ancak hastalar bu konuda bilgilendirilmiyor. Ekranda hem çağrılan hem de çağrılacak kişiler benzer ara yüz tasarımıyla aktarılıyor. Dolayısı ile hangi listenin hangi kişileri gösterdiğini anlamak zor olabiliyor. Bu bağlamda renk kodlarıyla listeler ayrılabilir. Poliklinik önünde doktoru beklerken bir ekran üzerinde sistemin tanıtım animasyonun oynatılması ve bu sayede hastaların önceden bilgilendirilmesi amaçlanabilir. Kioskun daha yönlendirici olması gerekiyor. Barkodu düzgün okutmak için belirli bir mesafen gösterilmesi gerektiğini belirten yazılar koymak da çözüm olmamış. Ekranda çok okuma olmamalı. Yazıları destekleyen grafiksel öğeler olabilir.

Problemler

Kiosk Problemleri

Sistem 65 yaş üstü hastalara öncelik tanıyor ancak hastanın bundan haberi olmayabiliyor. Kalabalık gördüğü için ve ekranı da okuyamadığı için geri dönebiliyor. Kioskun yönlendirmesi daha net olmalı.

Sistem Problemleri

Sistemin verdiği cevaplar hastalar tarafından anlaşılmıyor.

“Sistemde numune alma talebiniz yoktur” cevabı çok belirsiz.

Sekreter bile yanlış barkodu yapıştırıp verebiliyor. Tc bunun önüne geçer

*Bir diğer problem tekrarlayan kan alımları var. Mesela hem dahiliyeye hem cerrahiye muayene olmuş. Arka arkaya barkodu okutsa bile sistem hem altıya hem de yediye yönlendirebiliyor. Tc ile girilirse sisteme hem dahiliye hem cerrahi işlemleri var diyerek birleştirilebilir. Hasta ikinci muayeneyi olduğunda iki kişi gibi gelmiş oluyor. Bu tarz durumlarda hastalardan “benden iki kez kan alındı” diye şikayet gelebiliyor. Mesela başka bir muayeneye gittiğinde doktorun ekranında hastaya ilişkin “bu tarihte hemoglamı var” diye uyarı verirse, doktor yeniden kan alma talebinde bulunmaz zaten.

Laboratuvarda sürekli bir şeyler güncelleniyor. Oradaki entegrasyonun kolay olması gerekiyor. Mesela doktorlar için basit olan bir şeyi hemşireler ve sekreterler çözemeyebiliyor. Uzaktan yardım almak zor oluyor.

Probel ve Phlerobo birbirini engelleyebiliyor

Hasta polikliniğe geri yönlendirilebiliyor ama neden gönderdiklerini bilmiyorlar.

Sistemde Probel gerekli bilgileri göstermiyor. Kan alma ile alakalı detaylı bilgilendirme gösterilmiyor. Bu problemin kan alma birimine gelmeden çözülebilmesi mümkün olabilir.

Laboratuvar yeni tetkiklerle çalışmaya başladığında çalışılan işlemin ne olduğu bilinemiyor. Hormon, enzim, vs. En azından bu sistemin yeni olduğu sistem üzerinde belirtilebilir.

Her şeye "numune kabulü yok" mesajı veriyor kiosk. Eksik numunesi olanla gerçekten hiçbir şey kodlanmayan ayrılamıyor. Ya da hastanın kan almada hiç işi olmayabilir.

Mesela araya takılan tokluk kan şekeri bütün düzeni bozabiliyor.

Hemşirenin kan verecek kişi için neyi işaretlediğini geçmişten görünmüyor. Hemşire diğeri mi işaretledi, sonra geleceği mi işaretledi belli değil ancak Oktay bey (admin) görebiliyor.

Tepecikte barkodlanıp Bornova'da kan veren hastalar olabiliyor bu durumda sistem kişiyi hala bekliyor olarak görüyor. Bu burumun düzeltilmesi talep edilmiş.

Bir hastanın elinde birden çok barkod olabiliyor. Bu nedenle yanlış barkodu okutabiliyorlar. Bu noktada TC No girilse daha sağlıklı olur

Sistemin dijital sertifikası olmadığı için sistemde kesintiler olabiliyormuş.

Ortam Problemleri

Kan alma biriminin bekleme ve kan alma alanlarının uygun dizayn edilmemesi gereksiz kalabalıklar oluşmasına neden olabiliyor. Kabinlerin, bekleme salonun ve kioskların konumu değiştirilebilir. Örneğin kioskalr kan alma girişindeki kapının önünde olabilir. Diğer bölümlerden gelen hastalar da orada bekleme yapabiliyorlar. Koltukları daha rahat bulabiliyorlar, hava yağmurlu ve soğuk olduğunda konumu itibari ile kan alma biriminde daha fazla insan bekleyebiliyor.

Hastane içindeki yönlendirme tabelaları uygun bir şekilde ilgili poliklinikleri göstermiyor. Bina üzerindeki yönlendirme tabelaları farklı renklerde, şekillerde. Farklı bir renk olması farklı bir şey anlatıyor gibi duruyor. Hastane içindeki diğer yönlerime ve bilgilendirme levhaları da kötü konstrat ile yapılmış. Hangi katta hangi polikliniğin olduğu kolay anlaşılmıyor.

Personel Problemleri

Sisteme uyum sağlayabilecek kişilerin bulunması gerekiyor. Ya da uyum sağlamaları sağlanması gerekiyor. Sekreterlerin Probel'e hakim olması bekleniyor. Kan verme sisteminde ekranda hastaya ait bilgilerin doğru girilmesi gerekiyor. Mesela hasta sonra gelecek, geç gelecek vs gibi seçeneklerin doğru seçilmelidir. Bir 45 saniye bekledikten sonra tekrara anons yapılıyor manuel olarak. Yine gelmezse hasta gelmedi butonuna basılıyor. Barkodu okuttuktan sonra gelmez ve sırayı kaybederse, barkod yeniden okutularak yeniden sıra alınıyor. Hemşire hasta gelmedi ya da başka bir şeyi

işaretlerse hasta sistemden kayboluyor. Bir çeşit kullanıcı hatası yüzünden hasta mağdur olabiliyor. Bu nedenle "hasta sonra gelecek" bölümü işaretlenmeli. "Diğer" işaretlendiğinde "numune talebi yok" uyarısı çıkıyor kioskta.

"Numune talebi yok" uyarısında hemşire mi yanlış kodladı, doktor mu kodlamadı, yeni bir test mi var, hasta mı yanlış geldi belli değil.

Sistemin Olumlu Yanları

Ayrıca bu sistem yanlış kişiden kan alınmasının önüne geçiyor. Performans değerlendirmesi çok vahşi. Bu durum aynı zamanda hasta haklarını da çalışan haklarını da koruyor ayrıca hasta tarafından yapılan haksız suçlamaları da ekarte edebiliyor. Çok şeffaf olması alışık olmadığımız bir durum. Sitemin hızı da kalite değerlendirmesinde önemli bir parametre. İleride poliklinikten gönderilen hastalar da daha gelmeden sistemden görülebilecek.

Çeşitli Durumlar

Bir önceki günden kalan kişiler sabah gelip erkenden sıra alıyorlar. Bu nedenle geçici bri yoğunluk oluyor. Asıl yoğunluk 9.30 dan sonra başlıyor. Teknik olarak artık sabahtan gelmek bir avantaj oluşturmuyor. Kan alma biriminde çalışan hemşireler nöbet muafiyeti olan çalışanlar oluyor. Fiziksel, psikolojik ya da kronik hastalıkları olanlar ya da evde engelli çocuğu olanlar nöbet muafiyeti oluyor. Sistemde yapılan bir güncellemede sorun yaşandığında problem tespiti yapılabiliyor sadece Phelerobo'dan beklenti, Probel sistemine ihtiyaç duymadan her işlemin gerçekleştirilebilmesi. Probel ile yapay zeka sistemi arasında bir iletişim olsa hiç sorun çıkmayacak gibi duruyor. Yapılan her güncellemede insan faktörünü minimuma indirmek amaç. Çok çeşitli sebeplerle hastalar anonsları kaçırabiliyorlar, başka bir poliklinikte sıra almış olması, tuvalete gidecek olması, telefonla konuşuyor olması vs.

Hastane Personelinin Görüş ve Önerileri

Kan alma esnasında hastalar bayılabiliyor. Korku, stres, kan tutması, aç karnına kan verilmesi gibi durumlar buna sebebiyet verebiliyor. Hasta bayıldığında dar alandan dolayı hasta yatırılamıyor. Sekreterin hastaya sırtını dönük olmaması gerekiyor. Sekretere sürekli soru soruluyor. Kabin için dizayn hem sağ hem sol koldan kan almaya uygun değil. Yeni gelen hemşireye sistem üzerinden hesap açılması gerekiyor. Sadece admin tarafından hesap açıldığı için hemşirenin işe geç başlamasına neden olabiliyor. Yeni hesap açma yetkisi de sorumlu hemşireye verilebilir. 65 yaş üstü, personel, onkoloji hastaları, engelli öncelliklidir. Deneyimsiz bir hemşirenin yazıcıdan çıkan barkodları yanlış tüplere yapıştırma ihtimali var. Bu durumun önüne geçmek için tüplere barkodları

otomatik yapıştıran bir makine kullanılabilir. Hemşireler böyle bir hata yaptığında hasta çağırılıp yeniden kan alınıyor. Özellikle kan alma kabinin yeniden tasarlanması gerekiyor. Bilgisayarın konumu, sekreterin konumu, sedyenin rahat kullanılması, her iki koldan da kolay kan alınabilmesi önemli kriterler.

APPENDIX D

SURVEY STUDY

Survey Questions

After observations, interviews and literature search all data combined to make some designs. Then these designs was shown to people via survey

Yapay Zeka Destekli Sıra Verme Kioskunun Gövde ve Arayüz Tasarımları Anketi

Bu anket İzmir Yüksek Teknoloji Enstitüsü Endüstriyel Tasarım Yüksek Lisans Tezine ait bir çalışmaya aittir. Bu anket, İzmir Tepecik Eğitim ve Araştirma Hastanesi'nin kan alma biriminde yer alan yapay zeka destekli kioskun yeniden tasarımına yardımcı olacak önerileri barındırmaktadır. Hastanede yapılan gözlemler ve görüşmeler neticesinde hastaların bu kiosku çeşitli sebeplerle etkin kullanamadıkları tespit edilmiştir. Aşağıda hem kioskun kendisine hem de arayüzüne ait çeşitli tasarım önerileri yer almaktadır.

Questıons of Survey

Cinsiyetiniz:

◯ Erkek	◯ Kadın
◯ Diğer	

Yaşınız:

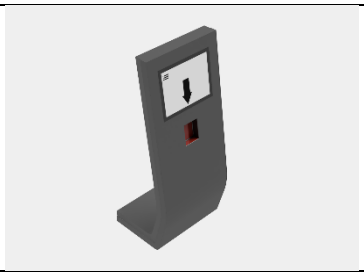
Eğitim Durumunuz:

◯ İlk ve Orta Öğretim	◯ Ön Lisans	◯ Yüksek Lisans ve Üstü
◯ Lise	◯ Lisans	◯ Diğer

Mesleğiniz:

Aşağıdaki Kiosklardan hangisinin tasarımını uygun buluyorsunuz?

◯ Model 1 Uygundur	◯ Model 3 Uygundur
	
◯ Model 2 Uygundur	◯ Model 4 Uygundur

	
◯ Tasarımları Uygun Bulmuyorum. Farklı tasarımlar olabilir.	

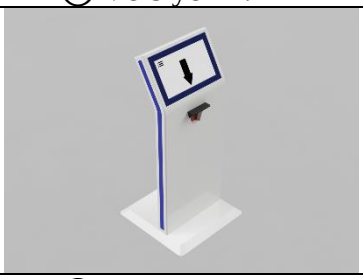
If Model 1 is selected than next question is:

Aşağıdaki versiyonlardan hangisinin uygun olduğunu düşünüyorsunuz?

◯ Versiyon 1.1	◯ Versiyon 1.2
	
◯ Versiyon 1.3	◯ Renkleri uygun bulmuyorum
	

If Model 2 is selected than next question is:

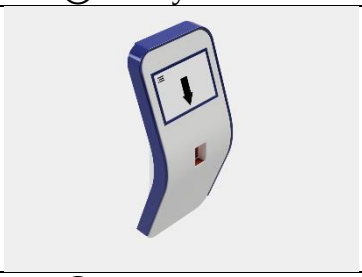
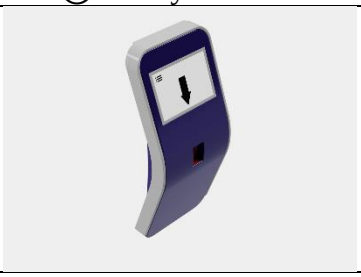
Aşağıdaki versiyonlardan hangisinin uygun olduğunu düşünüyorsunuz?

◯ Versiyon 2.1	◯ Versiyon 2.2
	
◯ Versiyon 2.3	◯ Renkleri uygun bulmuyorum

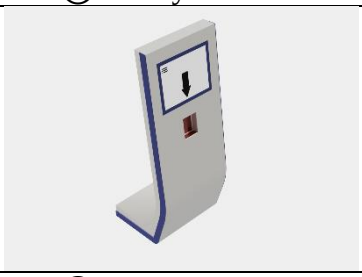
If Model 3 is selected than next question is:

Aşağıdaki versiyonlardan hangisinin uygun olduğunu düşünüyorsunuz?

◯ Versiyon 3.1	◯ Versiyon 3.2
	
◯ Versiyon 3.3	◯ Renkleri uygun bulmuyorum
	

If Model 4 is selected than next question is:

Aşağıdaki versiyonlardan hangisinin uygun olduğunu düşünüyorsunuz?

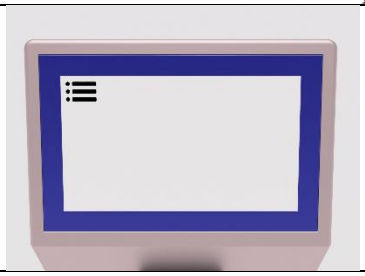
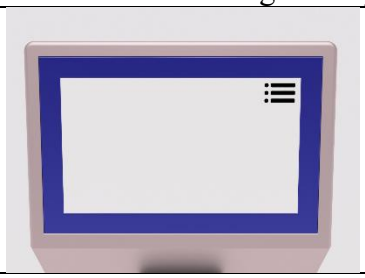
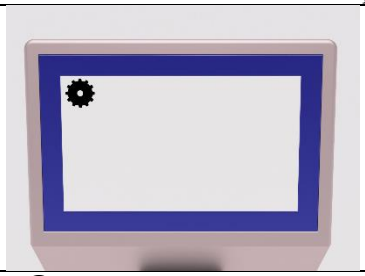
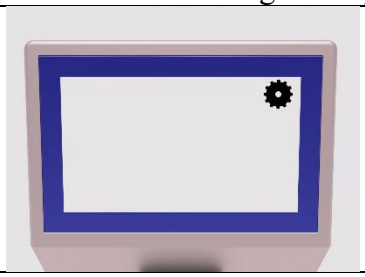
◯ Versiyon 4.1	◯ Versiyon 4.2
	
◯ Versiyon 4.3	◯ Renkleri uygun bulmuyorum
	

After body questions are finished interface questions was starded. Rest of the questions are related to interface.

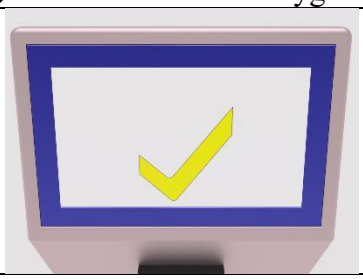
Aşağıdaki ekranda yer alan oklar hastanın elindeki barkodu okutacağı alana yönlendirmektedir. Bu yönlendirmeyi uygun buluyor musunuz? Uygun buluyorsanız hangi renkteki ok sizce idealdir?

◯ Siyah renkli ok uygundur.	◯ Mavi renkli ok uygundur
	
◯ Sarı renkli ok uygundur	◯ Yeşil renkli ok uygundur
	
◯ Yönlendirmeleri uygun bulmuyorum. Farklı bir şekil tercih edilmeli	
◯ Yönlendirmeleri uygun bulmuyorum. Farklı bir renk tercih edilmeli	
◯ Yönlendirmeleri uygun bulmuyorum. Farklı bir şekil ve renk tercih edilmeli	

Ekrandaki diğer seçenekler ana menüden kaldırılmış ve tek buton altında toplanmıştır. Detaylı seçeneklere bu buton aracılığı ile ulaşılmaktadır. Sizce bu yöntem uygun mudur? Uygun ise butonun ikonu, konumu nasıl olmalıdır?

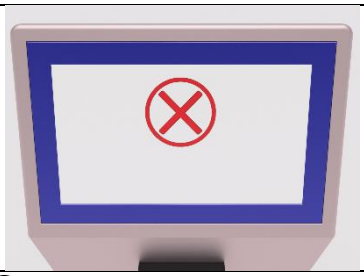
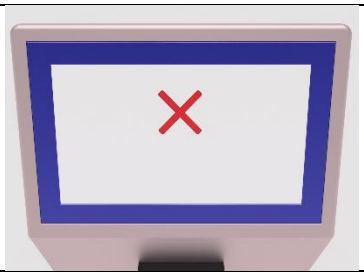
◯ 1 numaralı ikon ekranın sol üst köşesinde	◯ 1 numaralı ikon ekranın sağ üst köşesinde
	
◯ 2 numaralı ikon ekranın sol üst köşesinde	◯ 2 numaralı ikon ekranın sağ üst köşesinde
	
◯ Yönlendirmeleri uygun bulmuyorum. Farklı bir şekil tercih edilmeli	
◯ Yönlendirmeleri uygun bulmuyorum. Farklı bir renk tercih edilmeli	
◯ Yönlendirmeleri uygun bulmuyorum. Farklı bir şekil ve renk tercih edilmeli	

Aşağıda barkodun okutulup, işlemin onaylanmasının ardından çıkan ekrana ait ikon önerilerini görüyorsunuz. Bu ikonlarla hastaya, yaptığı işlemin başarıyla sonuçlandığı bilgisi aktarılmak istenmiştir. Sizce bu yönlendirmeler uygun mudur? İkonlar v1 ve v2 olarak isimlendirilmiştir.

◯ Siyah renkli v1 ikonu uygun	◯ Yeşil renkli v1 ikonu uygun
	
◯ Mavi renkli v1 ikonu uygun	◯ Sarı renkli v1 ikonu uygun
	
◯ Siyah renkli v2 ikonu uygun	◯ Yeşil renkli v2 ikonu uygun
	
◯ Mavi renkli v2 ikonu uygun	◯ Sarı renkli v2 ikonu uygun
	
◯ Yönlendirmeleri uygun bulmuyorum. Farklı bir şekil tercih edilmeli	
◯ Yönlendirmeleri uygun bulmuyorum. Farklı bir renk tercih edilmeli	
◯ Yönlendirmeleri uygun bulmuyorum. Farklı bir şekil ve renk tercih edilmeli	

Aşağıda barkodun okutulamaması durumda çıkan uyarı ekranındaki ikonları görüyorsunuz. Bu ikonlarla hastaya bir şeylerin yolunda gitmediği ve işlemin yapılamadığı bilgisi aktarılmak istenmiştir. Sizce aşağıdaki ikonlar bunun için uygun mudur? İkonlar v1 ve v2 olarak isimlendirilmiştir.

1. Seçenek	2. Seçenek

	
◯ Yönlendirmeleri uygun bulmuyorum. Farklı bir şekil tercih edilmeli	
◯ Yönlendirmeleri uygun bulmuyorum. Farklı bir renk tercih edilmeli	
◯ Yönlendirmeleri uygun bulmuyorum. Farklı bir şekil ve renk tercih edilmeli	

Survey Answers

71 Person has answered the survey questions and they led final design. All data from survey are wrote as tables below.

Answer of Gender

Cinsiyet	Yüzdelik %	Kişi Sayısı
Erkek	54,9	39
Kadın	45,1	32
Diğer	0	0

Answer of Age

Yaş	Kişi Sayısı
12	1
14	1
16	1
19	3
20	8
21	5
22	5
23	10
24	9
25	4
26	3
27	2
28	4
29	3
30	2
31	1
33	1
36	1

38	1
44	1
45	2
49	1
52	1
53	1

Answer of Education

Eğitim Durumu	Yüzdelik %	Kişi Sayısı
İlk ve Orta Öğretim	2,8	2
Lise	15,5	11
Ön Lisans	9,9	7
Lisans	64,8	46
Yüksek Lisans ve Üstü	7	5

Answers of Body Model and Color Questions

Modeller	Seçim Yüzdesi	Kişi Sayısı	Renkler	Seçim Yüzdesi	Kişi Sayısı
Model 1	41,4	29	Beyaz	41,9	13
			Mavi	25,8	8
			Sarı	25,8	8
			Uygun Değil	6,5	2
Model 2	14,3	10	Beyaz	50	5
			Mavi	10	1
			Sarı	30	3
			Uygun Değil	10	1
Model 3	17,1	12	Beyaz	41,7	5
			Mavi	58,3	7
			Sarı	0	0
			Uygun Değil	0	0
Model 4	24,3	17	Beyaz	35,3	6
			Mavi	29,4	5
			Sarı	35,3	6
			Uygun Değil	0	0
Uygun Değil	2,9	2			

Answer of Interface Question 1

Oklar	Seçim Yüzdesi	Kişi Sayısı
Yeşil	35,7	25
Mavi	21,4	15
Siyah	20	14
Sarı	12,9	9
Farklı Şekil ve Renk	4,3	3
Farklı Şekil	4,3	3
Farklı Renk	1,4	1

Answer of Interface Question 2

Seçenek İkonu	Seçim Yüzdesi	Kişi Sayısı
v1 Sol Üst	34,3	24
v1 Sağ Üst	34,3	24
v2 Sol Üst	8,6	6
v2 Sağ Üst	15,7	11
Farklı Şekil ve Renk	2,9	2
Farklı Şekil	4,3	3
Farklı Renk	0	0

Answer of Interface Question 3

Onay İkonu	Seçim Yüzdesi	Kişi Sayısı
v1 Yeşil İkon	35,7	25
v2 Yeşil İkon	27,1	19
v1 Mavi İkon	12,9	9
v2 Siyah İkon	8,6	6
v1 Siyah İkon	5,7	4
v2 Mavi İkon	4,3	3
v1 Sarı İkon	1,4	1
v2 Mavi İkon	1,4	1
Farklı Şekil ve Renk	0	0
Farklı Şekil	1,4	1
Farklı Renk	1,4	1

Answer of Interface Question 4

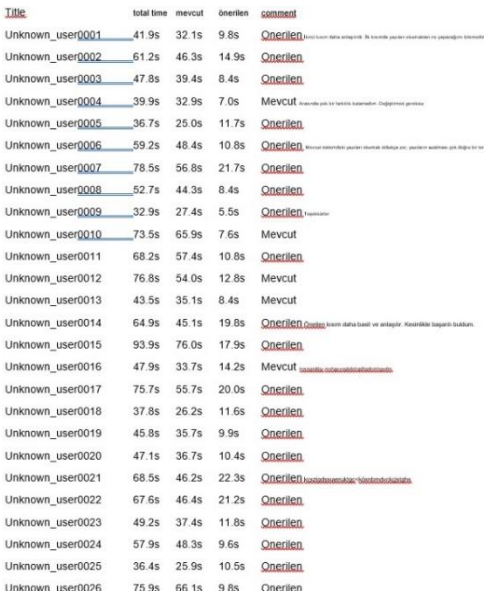
İkaz İkonu	Seçim Yüzdesi	Kişi Sayısı
1. Seçenek	71	49

2. Seçenek	23,2	16
Farklı Şekil ve Renk	1,4	1
Farklı Şekil	4,3	3
Farklı Renk	0	0

Web Applıcatıon Survey Data

Design selections from survey was tested with this web application. Then a final survey has shown to the users. These are the data from the web application survey.

Number of Participant	48 Users
Proposed Design Percentage	% 85.42 (41 users)
Active Design Percentage	% 14.58 (7 users)
Usage of Average Time of Proposed Design	12.11 second
Usage of Average Time of Active Design	43.62 second



Title	total time	mevcut	önerilen	comment
Unknown_user0001	41.9s	32.1s	9.8s	Onerilen
Unknown_user0002	61.2s	46.3s	14.9s	Onerilen
Unknown_user0003	47.8s	39.4s	8.4s	Onerilen
Unknown_user0004	39.9s	32.9s	7.0s	Mevcut
Unknown_user0005	36.7s	25.0s	11.7s	Onerilen
Unknown_user0006	59.2s	48.4s	10.8s	Onerilen
Unknown_user0007	78.5s	56.8s	21.7s	Onerilen
Unknown_user0008	52.7s	44.3s	8.4s	Onerilen
Unknown_user0009	32.9s	27.4s	5.5s	Onerilen
Unknown_user0010	73.5s	65.9s	7.6s	Mevcut
Unknown_user0011	68.2s	57.4s	10.8s	Onerilen
Unknown_user0012	76.8s	54.0s	12.8s	Mevcut
Unknown_user0013	43.5s	35.1s	8.4s	Mevcut
Unknown_user0014	64.9s	45.1s	19.8s	Onerilen
Unknown_user0015	93.9s	76.0s	17.9s	Onerilen
Unknown_user0016	47.9s	33.7s	14.2s	Mevcut
Unknown_user0017	75.7s	55.7s	20.0s	Onerilen
Unknown_user0018	37.8s	26.2s	11.6s	Onerilen
Unknown_user0019	45.8s	35.7s	9.9s	Onerilen
Unknown_user0020	47.1s	36.7s	10.4s	Onerilen
Unknown_user0021	68.5s	46.2s	22.3s	Onerilen
Unknown_user0022	67.6s	46.4s	21.2s	Onerilen
Unknown_user0023	49.2s	37.4s	11.8s	Onerilen
Unknown_user0024	57.9s	48.3s	9.6s	Onerilen
Unknown_user0025	36.4s	25.9s	10.5s	Onerilen
Unknown_user0026	75.9s	66.1s	9.8s	Onerilen