INTERNET OF THINGS

RFID technology and solutions in the health care sector

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Introduction

The assignment will introduce an essay part that focuses on the change the health care system into the fourth industrial revolution. IOT has already adapted itself to hospitals and healthcare systems, which have generated huge profits in the future through implementation processes, innovation and digitization. The technical part of the task provides an insight into NFC tags and QR codes. This will provide a basic and grounded knowledge of how information and data are processed, stored, and modified on an NFC chip and QR codes.

Over the last couple of years, Internet of Things (IOT) is one of the major technological tools that will help to solve the emergence of new and fascinated applications. The Internet of Things creates opportunities for healthcare to use the Internet of computer devices embedded in a hospital's everyday practice. IOT creates process, store and receive valuable information and data that may be beneficial to the healthcare system. IOT can be used for smart architecture for automatic monitoring and tracking of patients, staff and biomedical units within hospitals and care institutes(Catarinucci,Donno,Mainetti & et al., 2015).

IOT can create a healthcare based on different technologies specifically in RFID and NFC, which creates a better network infrastructure. IOT can also collect important data that can be used for related health care processes. Information is valuable to healthcare as it can provide support for better decision-making processes and can provide feedback to consumers(Uckelmann, Harrison, & Michahelles, 2011). The health care can through self-learning and self-improvement, make decisions that can be proposed through Artificial Intelligence, focusing on computer-aided tools with collected data acquired by sensors and records of previous patients and diagnoses(Zeng, Chen, & Fan, 2016). Through historical data there can be created effective treatments and it result a dynamic healthcare system. RFID allow you to access this information. The data can be used in future in global practice that can be implemented and standardized into health care systems worldwide. Our primary focus will be how IOT makes it possible to change and strengthen the healthcare.

The recent acquisition of IOT technology will connect the current resources in the healthcare system and provide effective solutions for secure medication administration .RFID and NFC chips, medical checkups can make the right amount of patient observations. The possibility of using IOT can create an intelligent and smart healthcare that activates technologies and methods in the form of IOT based smart devices. These important points and factors will be presented and designed in the next section. In addition, there will be a section where we focusing privacy and security with the IOT technology.

Background/Case

In these times, the Internet of Things (IOT) is on everyone's lips and it is interesting that it has reached all shades of each field. In health care IOT has gained popularity and, with its unimaginable potential, it has already begun to take over more processes, ranging from data production to patient treatment and analysis.

The project will focus primarily on how data moving between and among devices and between and among people is abundant. In order to prevent medication error, secure inpatient medication administration system is required in a hospital and healthcare system..

This essay will focus on how the IOT technology and its solutions can connect doctors and nurses with patients via a smart device without restrictions.

The case is based on a case study, where the project primarily focuses on 2 RFID-based solutions for the protection of medicine administration of treating drug injuries in the healthcare system in China. This project aims at incorporating the systems that can help nurses, doctors and hospital professionals to avoid human errors to ensure medical safety for patients in the treatment of drug damages.

Research Question

What important IOT technologies are used in the healthcare system and how does the future of these IOT technologies look?

What opportunities can RFID technology provide for healthcare costs and can make it more efficient in decision making in inpatient medication administration ?

Method

When focusing on the analysis part and going deeper into the paper, we need to focus on the methods that will be used for the purpose of this task. I have focused on doing a literature survey as this will provide a better foundation for a task and create a better academic project (Webster & Watson, 2002). I will focus on giving a detailed literature assessment and methods that show the process of collecting research articles.

Literature review: Data set Description

I have studied 22 articles from the CBS library and Google Scholar, where just the well described articles about RFID-solutions and IOT were used for the primary literature assessment. These articles have been seen as being the best-performing articles. Subsequently, you had the right tools to focus on the data set of the assignment.

Literature review: Data set limitations

The only limitation was that research articles were primarily English-language. This can be seen as a limitation, so it could be relevant if articles, case studies or studies in other languages could be beneficial to the assignment.

Literature review: Keywords and tools

To find the right articles and case studies I had to focus on the right keywords. Articles related to IOT health care were a very easy to find through CBS Libsearch and Google Scholar. Here I performed some searches through some different keywords that were adapted to the project. CBS libsearch was the right tool to find articles with different sources about the potential of IOT and RFID technology in the healthcare system.

The keywords that were used in my search can be seen in Table 1 and also how many articles of results have been found in each search (Webster & Watson, 2002).

Search Engines The tools were great for finding good articles using the following keywords and keywords. The great time was to find high quality articles within RFID technology in healthcare and health care.

Keywords	Database searched	Number of search results
RFID in the healthcare system	CBS Libsearch and Google Scholar	- 81.000
IOT Healthcare	CBS Libsearch and Google Scholar	- 32.200
IOT enabling healthcare	CBS Libsearch and Google Scholar	- 20.200
healthcare and IOT	CBS Libsearch and Google Scholar	- 32.000
smart healthcare iot	CBS Libsearch and Google Scholar	- 25.200

Analysis

In this section I will focus on analysis of the important IOT technology trends and expertise in the healthcare and system. I want to start introducing how IOT into healthcare systems and how current tools work. In order to understand RFID technology in the health sector, I will then look at what the financial opportunities with the technology is and then see how they relate to other models within IOT.

IOT enabling and the impact in the health care system

IOT is an important factor because it creates interconnections of public facilities and via computer devices that can embed objects.

Primary radio frequency identification tags (RFID) and sensors are present everywhere thanks to network-based interactions, which means that you can send and receive real-time data that creates effective decisions and activities in the healthcare sector. (Yin,Zeng,Chen & Fan, 2016)

IOT technology can provide medical rehabilitation via one stop service for patients and citizens living in remote locations.

One of the main arguments in the article is that the health service is provided with smart and convenient treatment of patients, and important rehabilitation services are sent to local hospitals, but information and information are limited in a hospital. (Yin, Zeng, Chen & Fan, 2016). It should be pointed out that instead of having a local data server has a large data processing system, where you can systematically implement an intelligent IOT-based health system that can make processes faster in local hospitals, making data and information available.

I want to look into technologies such as RFID,cloud computing and communication technologies to create accessibility in the healthcare sector and make it easier for doctors and hospitals to get effective data and information.

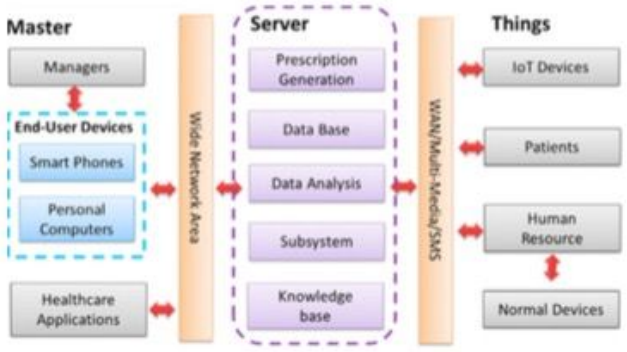


Fig. 2. System architecture of the IoT based rehabilitation [31].

Figure 1 - System architecture of the IoT based rehabilitation

Communication and location technologies

Short-distance communication

IOT has introduced very useful tools and tools to address the problem of resources for the rising healthcare patients. Communication technologies support the networking of the infrastructure in an IOT based healthcare system. This is primarily classified as short-distance technology, where communication is based on Bluetooth, RFID, Wi-Fi, Infrared Data Association (IrDA) and Zigbee (Yin, Zeng, Chen & Fan, 2016).

Table 1
Comparison of different short-distance radio communication techniques.

Type	Bluetooth	RFID(NFC)	WI-FI	IrDA	UWB	ZIGBEE
Rate	2.1Mbps	106K to 424Kbps	1Mbps to 300Mbps	14.4Kbps	53Mbps to 480Mbps	20Kbps to 250Kbps
Band	2.4GHz	13.56Mhz	2.4 G, 5GHz	850nm to 900nm	3.1GHz to 10.6GHz	868Mbps to 2.4Gbps
Distance	20–200M	20 cm	50 m	0–1 m	0–10 m	10–75 m
Network nodes	8	2	50	2	/	65,000
Security	128bit AES	TIP	SSID	IRFM	High	128bit AES
Power (mW)	1–100	<1	>1000		<1	
Cost	2–5$	<1$	25$		20$	5$

These communication technologies create better opportunities for healthcare and can minimize budgets in hospitals. The article states that RFID tags can be used to track the medical resources and acquire important information from the patient's states.(Yin, Zeng, Chen & Fan, 2016). IRDA (Infrared Data Association) is used to operate devices, but the disadvantage of this technology is that transmission speeds are low, but it is still under development, so ideally, you can create higher transmission speeds, which provide a higher data rate and secure communication.

Location technology

Placement technology is one of the new advances to track and identify the location of objects. Real-time placement systems (RTLS) create safe processing processes in health applications and help reconfigure healthcare systems based on the distribution of available resources.(Zeng, Chen & Fan, 2016). RTLS is a Global Positioning System (GPS). A satellite navigation system to locate objects that can be received by four or more satellites. It creates an advantageous resource for the health system that can use this satellite-based positioning system to shut down patients and doctors.

Smart Healthcare system

Today, many healthcare equipment and systems consist of many IT-based intelligent systems that have become commercially available (Zeng, Chen & Fan, 2016).
These smart devices have contributed to tasks such as patient monitoring, maintenance of contact with doctors and improvements in rehabilitation results. A smart healthcare system integrates with sensor technologies with IOT that allows patients to monitor patients. In addition, the system can also suggest treatment suggestions thanks to smart sensors, remote control and networking.
The system can also provide information on the patient's health and provide a complete report on health information and health conditions from a sensor. The system can provide reliability and credibility in the form of treating a patient by calculating a treatment or calculating a prescription given by the doctor (Zeng, Chen & Fan, 2016).

Cloud Computing

Cloud computing is a service that specifies quality dimensions and matrices from a database for quality models that can be used to measure and achieve mutual understanding with the physician's experience. It allows easy access to information and network access to a computing resource. Cloud service has begun to have an important impact in the IOT environment. It is crucial for the health system to have easy access to data in a timely manner (Zeng, Chen & Fan, 2016).

The article points out that via traffic data you can get an overview of which qualified doctors can treat a patient. For example, it could be a patient to have a heart surgery. With cloud computing it is quick and effective to make a decision, which hospital and doctor should operate the patient. It can suggest effective decision-making via real-time data and know the resources of the various hospitals. (Zeng, Chen & Fan, 2016)

The healthcare industry can achieve economical long-term benefits of RFID technology

The focus of this section is to look at the economic benefits and health benefits of implementing RFID technology.

Based on the study of RFID technology in the healthcare sector, we will look at the business opportunities and the negative consequences of this in terms of security and privacy.

RFID is a new technology that has quickly been implemented in healthcare and hospitals. RFID can lead to tremendous benefits in benefiting from technology in many areas like healthcare from active tracking to patient care for access control. RFID can create business benefits by creating IOT based health applications that can provide improvements in terms of improved healthcare, smart implementation, technological superiority of RFID applications and public incentives.
(Gupta,Kundu & Codanda,2015)

"The value of the RFID market rose from around 5.63 billion. USD in 2010 to almost 5.84 billion. USD in 2011. The global turnover in the RFID readers and RFID tags market alone is expected to reach 8.9 billion. Dollars by 2015. In 2011, nearly 150 million RFID brands were used in the supply chain for healthcare. Sales of RFID tags and systems were expected to reach nearly $ 1.43 billion in 2019, an increase of 51% from 2009 ".(Manzoor, A,2016)

A case study that has designed 2 lightweight RFID-based healthcare system solutions to ensure medication administration in hospitals. The study has carried out the system to hospitals so it can help professionals avoid human error and achieve system security through evidence. This case study will be focused on in the next section where the Business Canvas model will come in and look at RFID as a solution.(Yen,Lo & Wo,2012)

RFID-Based Solutions for medication administration :Business Model Canvas :

In order to focus on RFID technology as a solution in the healthcare sector, we will need the business model framework, as seen in Appendix 1. It will give us some important points such as value

proposition, the customer, financials and the infrastructure.(Uckelmann, Harrison, & Michahelles, 2011)

Value Proposition :

To have 2 RFID-based solutions for securing hospitalization for healthcare administration.
An offline solution and an online solution for safe medical administration. Offline solution is suitable for areas in Chinese hospital environments where wireless communication is not available for mobile handheld devices used by the nurse. Solutions help hospital professionals to avoid human errors to ensure medical security for the post and regular medical safety review. The proposed solutions provide great security features, such as data integrity and RFID tag anonymity. (Yen,Lo & Wo,2012)

Cost :

Using these two solutions in the Chinese healthcare and system is very beneficial. RFID tags are reasonably cheap and will be a low cost. Nurses, Doctors and Hospital Professionals, for their own RFID tags,bracelet og card. In addition, solutions have the ability to generate digital signatures. Another cost us that both carers and patients register with a trusted third party to have their own keys used to sign their digital signatures (Yen,Lo & Wo,2012). The key to an RFID tag is stored inside the tag and a copy of each tag's key is stored in the backend database and an RFID scanner is connected to a local server. Backend database and Local server are a cost to be updated on a regular basis, but RFID tags, digital signatures, keys are some investments that are considered as some tools that can be recycled.(Yen,Lo & Wo,2012)

Key Partner

The key partner is in implementing 2 RFID solutions, the hospital and including hospital employees .The board at the hospital or the doctors in the hospital may have some negative attitudes about the solution and over the changes. This may mean that the solution is not system effective or is safe enough in relation to medical administration. On the other hand, this investment can go and become very beneficial to the healthcare sector, as the proposed solutions create competitiveness and can reduce errors in terms of securing hospitalization.

Key activities

Key activities describe the important actions to be taken by the healthcare sector to create, offer and market solutions. After RFID solution the information is collected, the patient collects the prescription from the nurse's personal digital assistant (PDA). Patient information, medical information and data are maintained for both the offline and online RFID solutions. Offline solutions must always be maintained in the form of downloading patient information to the nurse or doctor's handheld device that is connected to the RFID solution.

Key Resources

The main resources are RFID tags, data, server and a backend database. Also complied with the legislation on information and data.

Customer Relationship

The solution strengthens a good relationship with patients and hospital staff. Patients in hospitals to improve their safety and minimize malfunction of doctors and nurses who can provide the right medicine for the right patients.

Customer Segments

Customer segments define the different groups of people served.

These 2 solutions are aimed at patients in hospitals and hospital professionals (nurse, doctors and employees). These actors are seen as end users of this RFID solution in the form of a new implementation of IOT technology in China's healthcare sector.

Medical errors cause health injuries for at least 1.5 million people about right and the additional cost of treating drug trafficking in hospitals amounts to 3.5 billion dollars a year.

Appropriate the right medicine administration can reduce the most medical errors.

Therefore, automatic posture with RFID technologies is proposed that helps hospital staff provide the right medicine to patients and hand over the right medical certificates

Flower Model

The flower model(Appendix 2) has eight eight different aspects.

It can be seen that the RFID technology and 2 RFID solutions in the healthcare system actually overlap some of the different overlaps shown in the model in terms of the Internet of things.

In the middle of the model there is focus on the internet and things and the 8 overlaps, which are illustrated as circles, show how the IOT devices are affected that may end in several directions. The model points out that an IOT device needs at least one or more overlaps to ensure its life and durability(Uckelmann, Harrison & Michahelles, 2011).

RFID technology itself is an IOT technology. RFID is not an application, but the advantage of RFID technology and these 2 smart solutions is communication technology with back-end database and handheld device like PDA. Nurses and doctors can access the inpatient's up-to-date records from the backend database through the communication channel established between the PDA and the database. RFID can also be related to Ubiquitous / transparent computing, as they are on devices and mobile handheld devices are enabled, connected and integrated with back-end database.

An embedded device in the form of RFID tags is included in these PDAs and handheld devices.This means that medical information from patients can be retrieved by more people and entities. This can be done by scanning the patient's RFID bracelet. Each unit dose package is attached with a cheap RFID tag

Tomas Sanchez Lopez has started a blog discussion about what the Internet of Things is not through these important factors, as shown in flower model (Appendix 2) Uckelmann, Harrison & Michahelles, 2011) . Focusing on differentiation, it's important that you don’t take every factor when talking about what the Internet of things is. The flower model frame is an important framework for seeing these different overlaps and defining the nature of the IOT devices themselves. In addition, one can also see what different technologies and services are required to be defined as an IOT device.

Holistic Model

The holistic model (appendix 3) described in the book of "Architecting the Internet of Things" by Uckelmann, Harrison & Michahelles describes how to look at key stakeholders, such as producers and consumers who exploit things of things and share benefits. A model based on consumer and enterprise incentives that will be able to contribute content and benefit from it. (Uckelmann, Harrison, & Michahelles, 2011). The model describes the iterative process on how content from consumers and producers via the internet of things can create positive benefits. Businesses, public institutions and people will be able to data for their own benefits and financial benefits for Internet of Things. (Uckelmann, Harrison, & Michahelles, 2011).

When using 2 RFID solutions for the holistic model, start by looking at the first Key Specification Content. The content is provided by the hospital itself and the health system. In addition, there are also hospital professionals (doctors and nurses) and the patients who create the content. It creates an integrity of solutions that make better decisions for patients and hospital professionals. This creates a very effective and safe process when patients need to receive hospitalization. It reduces cases of human error and creates medical security for the post. RFID solutions allow you to have a large amount of data and information that can be generated and at the same time, the solution creates great security features such as data integrity and RFID tag anonymity.

Privacy and Security : considerations when implementing RFID technology in the Healthcare system

RFID technology creates a number of benefits to the healthcare sector and enhances overall security and operational efficiency. It works without anyone's views while providing enormous possibilities (Rahman, Bhuiyan , & Ahamed. 2017). There has been focusing on RFID as a whole technology in the healthcare sector and focused on a case-related article about RFID solutions to avoid human error and to ensure medical safety for the treatment of drug injuries. The article "A privacy conservation framework for RFID based healthcare systems" points out that RFID can help create the future hospital by improving patient care and safety while optimizing workflows and reducing

operating costs (Rahman, Bhuiyan , & Ahamed. 2017) Recently, security and privacy issues have occurred in RFID based applications.

Therefore, the article points out that creating a framework that can solve privacy issues and create increased privacy in RFID-based healthcare systems.

Compared to the 2 RFID based solutions for safe medical administration, it is important to ensure patient information, drug damage and disease.

"Via PriSens-HSAC, providing increased privacy for RFID-based healthcare systems. The PriSens component provides better privacy over existing RFID authentication protocols while identifying an RFID tag in the health situation. The HSAC component limits unauthorized access to the patient's private information using the P-RBAC mechanism." (Rahman, Bhuiyan , & Ahamed. 2017).

Solution will allow privacy and provide less information if RFID applications are ever attacked by a virus. This will ultimately create more privacy for the patients. It limits unauthorized access to private information and at the PriSens-HSAC framework, RFID tag after a scan is authenticated by the PriSens Protection Protocol. It can therefore make it easier to protect RFID tags for different identifications and monitoring purposes(Rahman, Bhuiyan , & Ahamed. 2017).

Conclusion

When creating a comprehensive overview of RFID solutions and implementation in the healthcare sector, focus should be on the realization of business benefits of RFID applications and solutions to provide better healthcare.

Case studies and articles create clear incentives that IOT technologies constantly create new trends and different factors that provide safe treatment and help to make better decisions and provide more information on medical safety.

A survey showed that sales of RFID tags and systems would expect to reach an estimated sales market of almost $ 1.43 billion in 2019. Increase is due to the wide range of RFID-enabled health applications, including drug labeling on drugs.

IOT also creates other technological opportunities in the healthcare sector such as sensing technologies and cloud computing. In the hope of making these technologies more effective, they must be researched and improved in privacy and security in ensuring patient privacy and creating a framework to prevent unauthorized access to information and databases.

Regarding to the two easy RFID-based solutions for safe administration of hospitalization in China, it has been shown that the proposed systems help hospital professionals to avoid human error. Solutions have increased the effectiveness and user safety or medical safety of the post and provide audible medicine evidence that can be used in medical conflict or regular medical safety review.

Technical Part

In the technical section, there will be described how to use NFC and QR codes to interact with mobile applications.

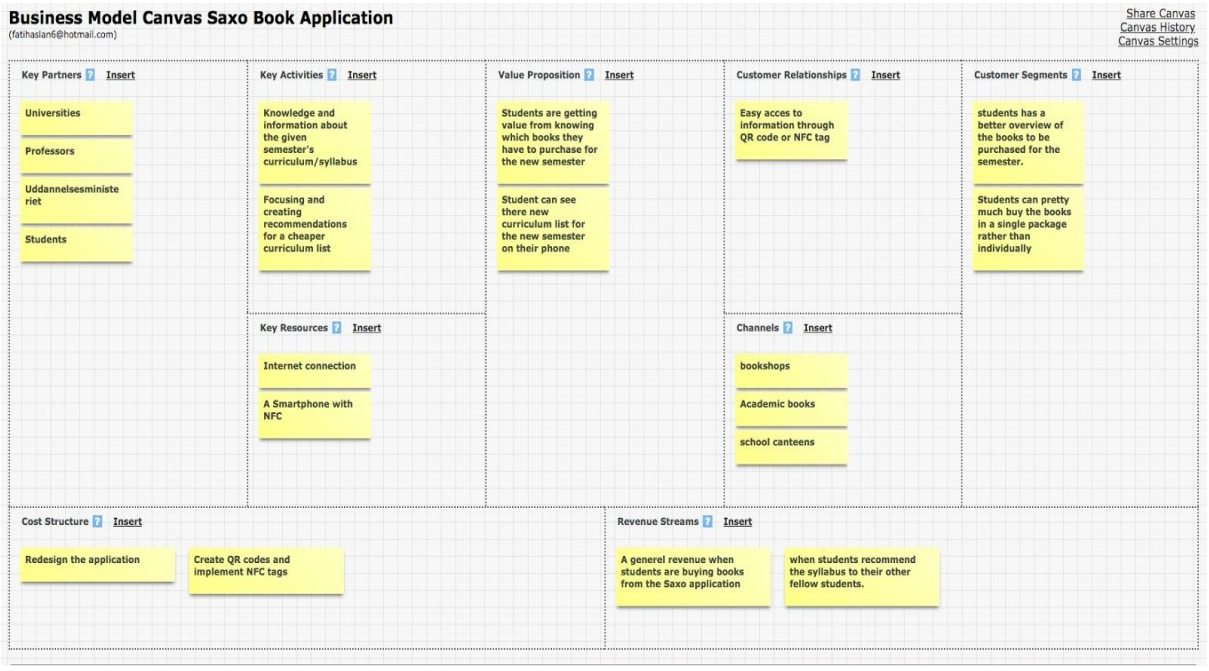
Introduction of Saxo books : implementing NFC and QR code

Saxo is Denmark's largest academic bookshop and one of the leading suppliers of books for the country's students. Saxo focuses on providing the best service to their customers while providing wide and updated selection of study books at competitive prices. My focus on Saxo is primarily because I think you should focus on creating IOT aspirations. Saxo is not yet IOT enabled and therefore could complement some important features that could benefit students at the country's university and colleges. Saxo App is Denmark's leading online bookstore and although their app has more than 10,000 downloads on the google play store, it still believes it lacks some basic features. One of the important features of the app is that it lacks a syllabus list for students.
More than 60,000 young people this year have been admitted to various higher education programs, which means that young people must buy books for study start. Back in 2014 when I started studying at CBS, I found it difficult to find the books because there was no bookstore who had compiled a syllabus for my study. A curriculum list where you could find which books to buy for what semester. I therefore propose that Saxo implement a QR scanner. QR scanner at various local bookstores in Danish universities, colleges and professions high schools, so that the new students and old students can gain access to quick and efficient access to the Saxo app curriculum lists. In this way, new students can better get the necessary information and information on which books are to be purchased for study start or the new semester. You scan the QR code and from here you will be sent directly to
saxo's syllabus list for students : https://www.saxo.com/dk/side/studieboger.
In addition, I also believe that NFC tags must be included in the various schools' canteens and bookstores, so it is possible to load saxo's curriculum list. Most of the smartphones that are being produced are include the Network Field Communication technology, so the majority of new students and old will benefit from passing through the NFC tag readers to the syllabus.

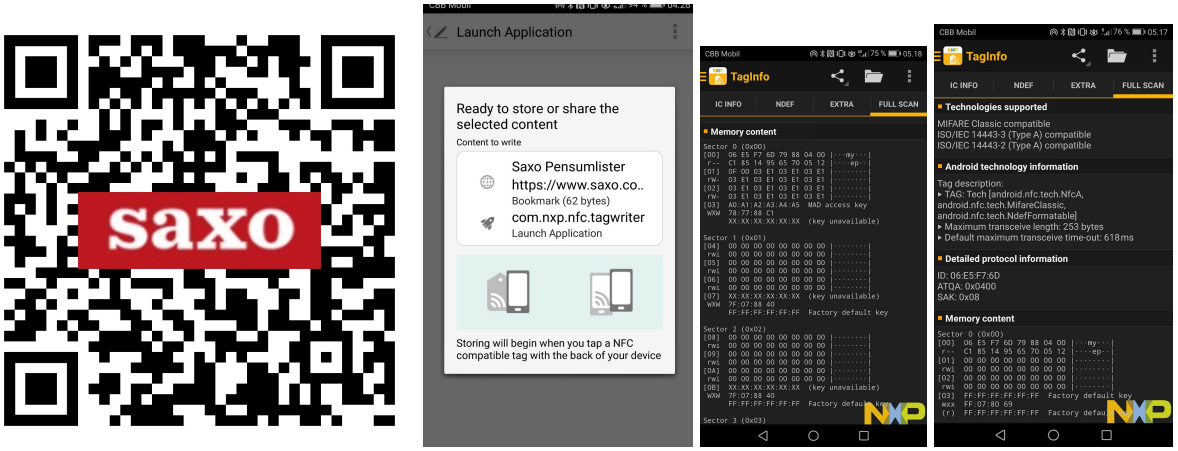
IOT architecture

When focusing on adding features based on IOT technology, look at different factors that exist in the Internet of things. I have therefore chosen to look at the most influential factors in the Saxo application.
In comparison to the flower model, it is clear that the program itself serves as an important integrated device and provides useful input to the user.
The Saxo app from the flower model fits into communication technology, since NFC and QR code get an important entry to their database. This means that via NFC and QR codes is directly linked to the syllabus and the Saxo books large database. It makes it very clear for students to find the relevant books.
The holistic model shows that you integrate NFC tag to student curriculum. Here you can generate data that creates a value add-on to Saxo that can create favors recommendations when a student tries to find similar books. This service creates content from students who create value and benefits with the help of IOT. Furthermore, students can create their own recommendations. The saxo app is integrated with facebook. This allows users to share their curriculum lists with other students. This can create potential new customers for saxo.
Compared to the future architecture model that can be seen in appendix 4, we focus on readers' components in smartphones that affected the rose architecture. Application is read both NFC tag and QR codes relative to entering Saxo's syllabus list with static data. The Saxo app can thus show which books the individual student will buy for the given semester. This will also concern the IOT capture interface.

Business Canvas Model Saxo Book application



NFC and QR



Triposo -Copenhagen Travel Guide - City map, top highlights

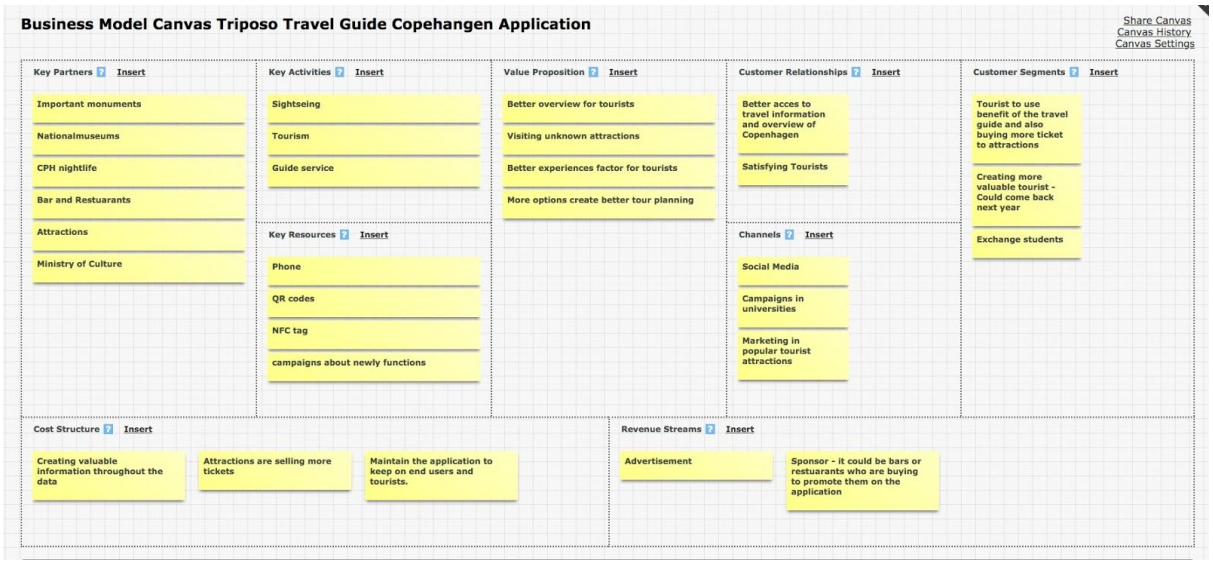
This application is a travel guide that is complete and up to date city guide for tourists. This app works offline so it is intended for tourists without network access in Denmark. The app shows the most popular and most important sights in Copenhagen. It can also show the ideal restaurant in Copenhagen while showing the nightlife for the tourists. The application is very good, but it could be much better if you could integrate and expand it to have IOT features. A tourist may have the opportunity to create a user inside the app and from here on, they can organize and favor the attractions in their own profile on the app. To make it more attractive to tourists, IOT could add features such as QR codes primarily to the sights, where there are information about sights and restaurants. Restaurants can be directly linked with QR codes to a page where you can find the given restaurants reviews. Compared to NFC, one could start implementing the NFC chip around important monuments and buildings, where tourists can read historical information from the building or monuments through an NFC tag. It can be Amalienborg where you can enter NFC tags at entrances

where people can read the tag and get direct information about the castle. With this option, tourists can enjoy some fun of writing reviews about the castle, which can be posted on the app. Other tourists could benefit from reviews that will benefit the travel guide company.

IOT architecture

In relation to the flower model, you can safely say that the Triposo app can be redesigned and innovated. The smart thing about this app is that it can both be used in offline mode, where tourists can navigate them around Copenhagen with an offline map. The app is allowed to be existing without internet. Compared to the flower model, it can be categorized as Ubiquitous Computing. The solution should be to add a QR scan function to the app and also allow to read NFC tags via the app. The application is also viewed as an embedded device and integrated with Facebook. Here you can see what attractions tourist has giving review on .
Compared to the holistic model, it is very important to mention what content is in the app.
Most of the information and information from the attractions come from the Ministry of Culture. This information is objective and based on this information, people can get a historical glance at what year or where the building or monument itself is. In addition, the Triposo app allows an end user to report the sights via Facebook.
In the future architecture model, you look at how data is generated. Compared to Triposo, data is generated statically. This means when an end user reads an NFC tag via his phone, which can get the latest updated information about the attraction. Dynamic data is collected based on traffic conditions or weather conditions, from which it is sent to cloud server and IOT Capturing application.

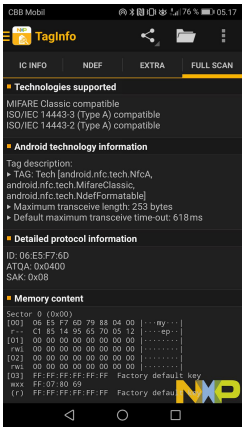
Business Model Canvas Triposo Copenhagen travel guide


Business Model Canvas Triposo Travel Guide Copehangen Application
Share Canvas
Canvas History
Canvas Settings
Key Partners Insert
Important monuments
Nationalmuseums
CPH nightlife
Bar and Restuarants
Attractions
Ministry of Culture
Key Activities Insert
Sightseing
Tourism
Guide service
Key Resources Insert
Phone
QR codes
NFC tag
campaigns about newly functions
Value Proposition Insert
Better overview for tourists
Visiting unknown attractions
Better experiences factor for tourists
More options create better tour planning
Customer Relationships Insert
Better acces to travel information and overview of Copenhagen
Satisfying Tourists
Channels Insert
Social Media
Campaigns in universities
Marketing in popular tourist attractions
Customer Segments Insert
Tourist to use benefit of the travel guide and also buying more ticket to attractions
Creating more valuable tourist - Could come back next year
Exchange students
Cost Structure Insert
Creating valuable information throughout the data
Attractions are selling more tickets
Maintain the application to keep on end users and tourists.
Revenue Streams Insert
Advertisement
Sponsor - it could be bars or restuarants who are buying to promote them on the application

NFC and QR


Amalienborg
Palace


Tap here
Amalienborg
Palace
Discover Copenhagen


TagInfo
IC INFO
NDEF
EXTRA
FULL SCAN
Technologies supported
MIFARE Classic compatible
ISO/IEC 14443-3 (Type A) compatible
ISO/IEC 14443-2 (Type A) compatible
Android technology information
Detailed protocol information
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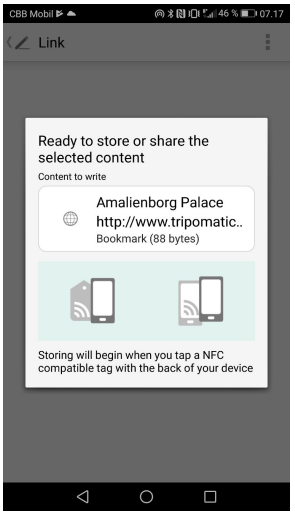
ATQA: 0x0400
SAK: 0x08
Memory content


Link
Ready to store or share the selected content
Content to write
Amalienborg Palace
http://www.tripomatic..
Bookmark (88 bytes)
Storing will begin when you tap a NFC compatible tag with the back of your device

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Appendices

Appendix 1: Business Model Framework

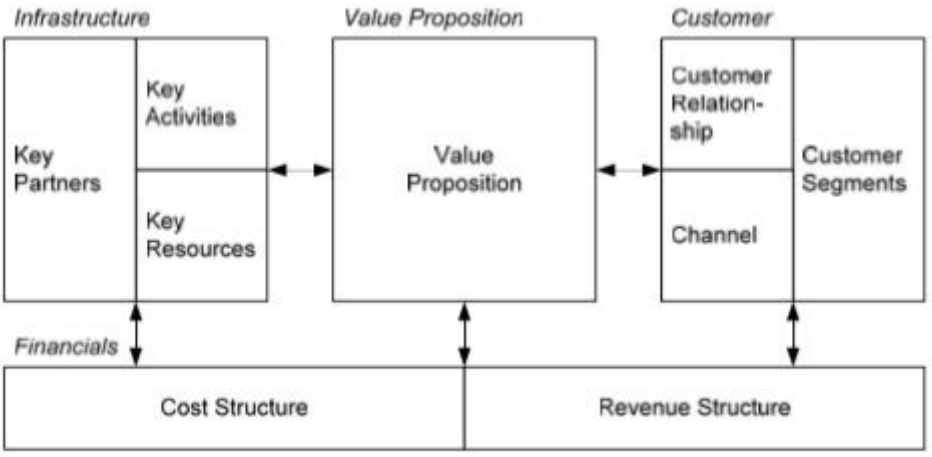
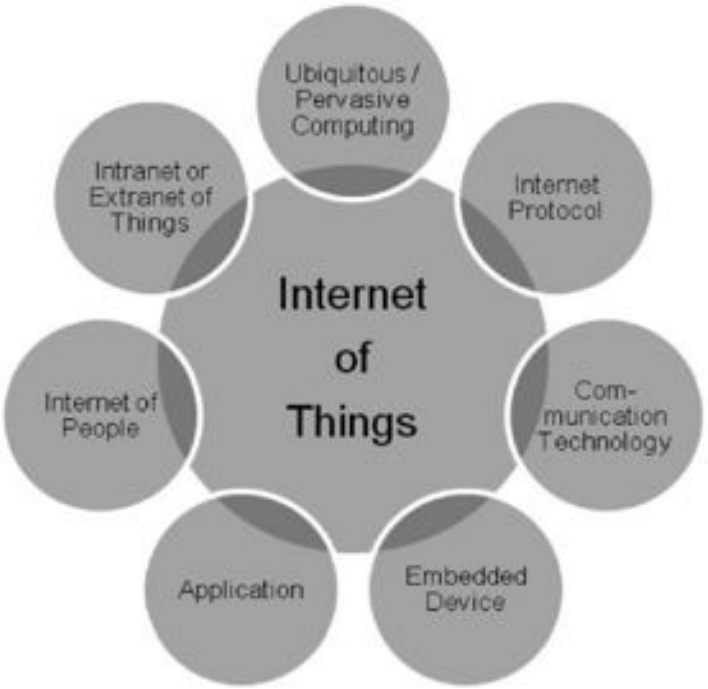
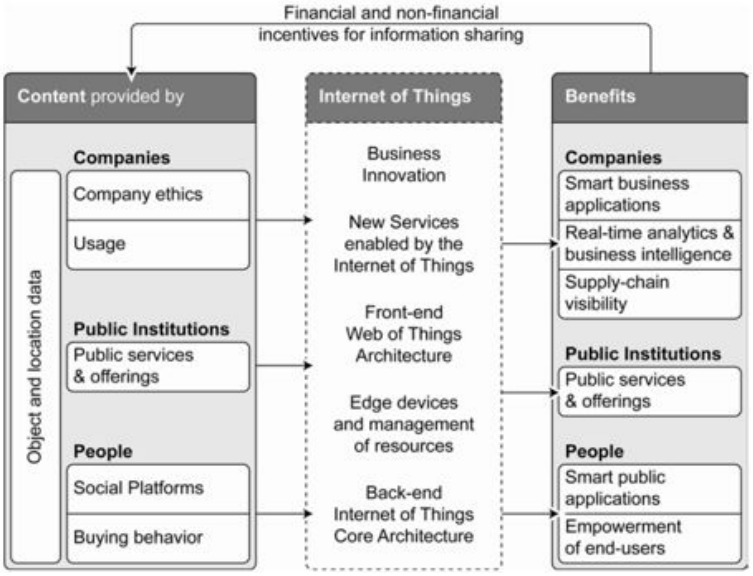


Fig. 10.1 Business Model Framework (Adapted from Osterwalder and Pigneur 2009)

Appendix 2 : Flower Model



Appendix 3 : Holistic Model



Appendix 4 : Future architecture model