

**People's perception of Smart Home devices in their
Homes & the factors which influence this perception**

A thesis submitted in partial fulfillment of the requirement for the degree of
Masters of Science in Telecommunications Technology

State University of New York (SUNY) Polytechnic Institute at Utica/Rome

By

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Declaration

I declare that this project is my own work and has not been submitted in any form for another degree or diploma at any university or other institute of tertiary education. Information derived from the published and unpublished work of others has been acknowledged in the text and a list of references is given.



Versha Thakur

12/02/2016

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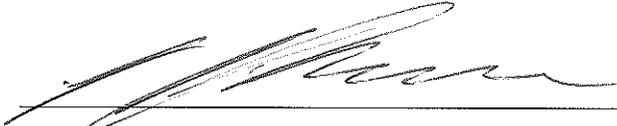
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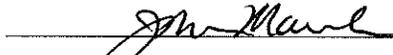
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Abstract

This thesis is to determine people's perception of Smart home devices and the factors which influence this perception. Smart Home devices are becoming more common as many companies are launching various such devices. Although many companies are pushing these devices with extensive marketing, do people feel a need for these devices in their home? This thesis tries to find the answer to this question and what factors are affecting these opinions. Focus group methodology is used for this thesis. It is commonly used to perform qualitative researches. Based on the analysis of the Focus Group discussions, it is found that most people (from the targeted population) will be interested in adopting these smart home devices. There are some concerns which will still need to be addressed by the company such as security, Privacy and some health concerns to make the consumers more comfortable in adopting these devices.

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The research that has gone into this thesis has been thoroughly enjoyable. That enjoyment is largely a result of the interaction that I have had with my supervisors.

I feel very privileged to have worked with my supervisor Dr. Larry Hash, faculty, Master of Science in Telecommunications Program who served as the thesis advisor throughout the study. I would also like to thank Dr. John Marsh and Dr. Ali Tekeoglu who supervised my research during the important phases

Thanks to the Human Subjects Review Board at SUNY Institute of technology for verifying my survey for the human subject's requirements.

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Table of contents

	<u>Page No.</u>
Declaration	ii
Abstract	iv
Acknowledgement	v
1. Introduction	8
2. Thesis Statement	12
3. Literature Review	
3.1 Smart Home on Smart Phone	13
3.2 Exploring Dimensions of Digital Game Experience using Focus Group Methodology	15
3.3 “Crossing The Chasm”- Marketing and Selling Disruptive Products To Mainstream Customers	17
3.4 Futuristic Smart Homes are not so far away – but do we want them?	19
4. Uniqueness Claim	21
5. Focus Group Methodology	24
5.1.1 Verification & Validation	29
5.1.2 Delimitations	30
5.1.3 Limitations	30
6. Analysis	32
7. Conclusion	48
8. Recommendations for Additional Research	50
References	51
Appendix	52

List of Tables

1. Focus Group Discussion Participants -1.....	34
2. Focus Group Discussion Participants List -2.....	35

1. Introduction

This thesis is an attempt to determine people's perception of smart devices in their homes and the factors, which influence this perception. One of the terms commonly used for such homes equipped with these smart devices is "Smart Homes". For the purpose of this study, Smart Home is taken to mean a home equipped with smart devices that are capable of communicating amongst each other via Internet. Usually there is one device like a smart phone or a smart watch that controls other devices but all devices can also perform different tasks without the user's interference. More ways of communicating such a voice control and gesture controls are being developed which can be used to control different devices in the home.

Smart homes promise great possibilities. One of the biggest benefits of the smart home is security and monitoring. It is possible to be away from the home still being in full control of it. A smart home can be equipped with cameras and sensors which can be accessed from anywhere with an Internet connection. This can be a great advantage for the homeowner who needs to leave the kids or pets home when they got to work. Other advantage is the ability to control all devices from one central device and also to automate different routine tasks of the day-to-day life. Some companies have recently announced home appliance such as refrigerators that can notify you when you running out of milk or eggs. Some can even suggest you recipes based on the content of the refrigerator. Once you have finalized the recipe the refrigerator can talk to the oven to put it on preheat based on the instructions in the recipe?

A person can walk to the front door of his home and have it unlocked/opened by itself. Other examples of the smart home possibilities are: the lights in the living room turn ON as soon as home

owner walks in, Air-condition/heat turns on depending on the weather and person's habits,

It adjusts the temperature during different time of the day and night, coffee maker starts brewing depending on the morning schedule of the person. Getting a notification on the smartphone when the washer/dryer is done with the cycle. All this is being promised to some extent with the current offering of the smart home devices.

On the other hand the interference of these devices into owner's personal life or the infringement in the privacy of the owner can be a topic of concern for the homeowners. Looking at the same Scenarios again we can see how a person can be uncomfortable with the fact that his lock is connected to the Internet which makes it possible to be hacked or unlocked by an unauthorized person. Many companies are implementing these smart home devices in a way that a central wearable device will control these devices. These wearable devices will be tracking all activities of the users such as steps, sleeping and eating habits, which can make some users uncomfortable.

Since all the smart homes devices will be interconnected there is possibility that failure of one device can lead to failure of many others. This can also become a big concern on the reliability of these devices. Any hacker gaining access to one of the devices may gain access to all the devices in the home. One of the other big disadvantages can be cost. Most of the homeowners already own many appliances and devices in the home it can be a very costly investment for the homeowners to upgrade all devices in the home to the smart devices. It is possible that some of the home monitoring devices might come with a subscription fee, which can be an additional cost the consumer.

Considering the advantages and disadvantages explained above it become very difficult for general

consumer to decide whether they should adopt these smart home devices or not. Positive features these smart homes offer can be very attractive but the negative concerns can scare the users away from them. It can be a difficult decision for the users to compare between comfort and privacy.

Many people are concerned about the safety and privacy. Cyber-attacks are becoming very common these days. Big companies such as Sony, Microsoft and Apple have been victim to such attacks recently. Since some of these companies are playing big role in the Smart home initiatives it becomes difficult for consumers to believe that their homes will be safe in these companies' hands. People are concerned about the amount of their data that will be accessible to these companies and hence possibly to the hackers. Also once an attacker has hacked into the home system it can be not only a risk to identity theft but a safety risk as well. Even though privacy and safety are biggest concerns some people are also concerned about smart homes making humans lazy, physically and mentally less active and even less smart. There are studies

Performed showing that if all day to day tasks are performed by smart devices and day to day decisions are not made by humans, people can become lase and even lose the ability to take those decisions.

Regard less of all the concerns that the smart homes raise the current trend seem to be in favor of the smart homes. A big home improvement chain Lowe's has conducted a survey recently (July 2014) among 2088 adults' participants in United States. The results of this survey show that the people in United States are interested in the Smart homes. 70% of the participants said that they

would like to have the ability to control their devices without getting out of the bed. Since a retail company performed this survey which owns their own smart home products it is possible the results might be shown in a positive light.

Considering the findings of the survey conducted by Lowes it can be said that the many of the consumers have positive attitude towards the smart home and are looking forward to adopting the smart features that the smart home offer but this is a very early stage. Many people are not completely aware of the negative concerns. As more of these devices are becoming available and being implemented more people will become aware of the benefits and problems, which will help them in deciding better. Since Lowes survey is conducted in regards of their own smart home product “Iris” it is more focused towards the aspects that related to their product. This thesis will try to look into an overall perspective of the consumers. It will be a more focused approach and it will be made sure that the people participating are well aware of the smart homes.

2. Thesis statement

To determine people's perception of Smart Homes & the factors which influence this perception

3. Literature Review

3.1 Smart Homes on Smart Phone

- Author - **Yu Zhong, Yue Suo, Wenchang Xu, Xinwei Guo, Yuhang Zhao, Yuanchun Shi**
- Publisher – UbiComp’11, Beijing 100084, China
- Year - 2011

Overview

This paper explains how Mobile phones can be an ideal choice for a central device to control the other smart devices in a smart home. It explains how the networking technologies and protocols have now evolved to make it possible for the smart phones to support a monitoring and controlling interface. This paper also introduces a smartphone application, which can be used to support various smart phone devices eliminating the need of having separate remote controls for separate devices. This app is called House Genie and supports a wide range of home monitoring and smart home devices. This app support advanced features such as creating scenarios, short delay alarms and Geofencing. This app not only supports a variety of devices but also makes the user experience better.

It is a challenging task to create one interface to monitor and control various different devices. Different devices have a different networking infrastructure and configuring parameters. The methodology used for this research is to focus on creating a basic interaction design to implement a controller on smart phone which can present all different devices into one interface and to make it easy to understand learn for the users so that they can easily and effectively facilitate the daily

controls. Centralized management architecture is adopted for this interface, which can be used to check the status or perform any functions on the connected devices.

Relevance to my thesis

My proposed thesis is about the smart homes. This paper is relevant to my thesis topic because it explains how one central device, a smartphone or tablet can be used to control various connected smart home devices from one interface. At present many people are interested in having the ability to control their devices with one device sitting at one place. Having one easy to use and effective interface can be a deciding factor for people to adopt the smart home devices. HouseGenie application, which is presented in this paper, can be a very good example of such universal interface.

Comments on the paper

This paper shows a very good example of how it can be made possible to control all connected devices with a smartphone. One of the biggest concerns for the consumers can be to choose which company products to buy because having all products from one company or eco system can be very helpful as all those devices can be controlled from their proprietary apps. Having devices from separate brands might lead to end up having separate remotes for separate devices. Applications like HouseGenie (presented in this paper) can solve this problem and can make it easier for the consumers to buy different products and control them all using one universal app on the smartphone or tablet.

3.2 “It is always a lot of fun!” Exploring Dimensions of Digital Game Experience using Focus Group Methodology

- Author - **Karolien Poels, Yvonne de Kort, Wijnand IJsselsteijn**
- Publisher – Eindhoven University of Technology
- Year - 2007

Overview

This paper explains a study performed to find out what exactly people feel and experience when playing digital games. There are various different games available for different genres and categories. All these games generate different feeling to the people and create a different experience for the players. According to the paper not enough studies had been done till the time of this study which can categorize the game experiences. This study is relevant to the companies or individual game developer who would like to understand people’s feeling towards games so that they can develop games according to that to reach the hearts of their gamers.

According to the study it is very difficult to describe the feelings or experiences in one word. People can have fun playing a particular game but can also feel tired if they are not able to achieve a particular goal. This study is to reach deeper into the gamer’s hearts and brains to understand what exactly they feel.

Methodology

This study was performed using focus group methodology. The focus groups were conducted among different types of gamers to capture the first hand experiences. Focus group is a common

methodology used to perform qualitative researches. Focus group provides detail opinions of the participants.

Four focus groups were conducted for this research. Members were chosen based on different age group, Game frequency and occupation status. The focus groups were organized in the following way:

- Introductory round: Moderators, assistant and members introduce themselves. Moderators introduce the topic.
- Individual task: individual response from each member was collected on his or her favorite game. Best gaming experience etc.
- Group Discussion: All the group members participate in a group discussion on the topic
- Group Task: Group members were asked to rank their best and worst gaming experiences on a common sheet

Results were drawn based on the responses. All results were structured according to the core questions that were asked during the focus groups. All the findings are summarized in tentative but comprehensive categorization

Relevance to my thesis

My proposed thesis is about smart homes. This paper is relevant to my thesis topic because the methodology used for this research is same as my thesis. I will be conducting focus groups for my research to find the people's perception about smart homes. This research is very common to my thesis the only difference is that the researchers have tried to find the people's perception about the gaming experience. The methodology used for this can be very helpful in my research. Reading

this paper and understanding the methodology used for this research I got a very good understanding on how to perform focus groups and this will be very helpful for my research.

Comments on the paper

This paper shows how useful focus group methodology can be in such complex researches. People can easily tell how they felt playing a particular game but defining their real experience

Can be very difficult. After reading this paper I have better understanding on how to collect individual opinions as well as opinions of the group. It also gave me good information on how to categorize the discussion in different rounds.

3.3 “Crossing the Chasm”- Marketing and Selling Disruptive Products to Mainstream Customers (3rd Edition)

- Author - **Geoffrey A. Moore**
- Publisher – HarperCollins
- Year - 1991

Overview

This Book explains different type of consumers and how their expectations are very different. It describes the differences in expectation of different category of consumer such as visionaries and pragmatists. This book also explains some techniques which can be used by the product makers to cross the chasm between different type of consumers and make all people adopt their products, Some of the techniques are Focused Marketing, Working with a Marketing strategy, Choosing right distribution channels, Pricing the products appropriately, Understanding the product and tuning it as per consumer’s need.

Methodology

This Book uses a methodology where the writer categorizes the consumers in five categories

1. Innovators
2. Early Adopters
3. Early Majority
4. Late Majority
5. Laggards

After categorizing the consumers the book explains what the expectation of each type of consumers are and who disruptive innovations can transition from one type to another type of consumer and be adopted by all.

Relevance to my thesis

My proposed thesis is about smart homes and people's perception about smart home devices. It is very important to understand what type of consumers have what kind of opinion about these devices. Because this thesis uses focus group methodology it is important to understand which participant belongs to which type of consumer? This paper is relevant to my thesis topic because the methodology used in this books helps in my thesis by categorizing the participant as per the Book's category and then analyzing there difference in opinion.

Comments on the paper

This paper shows how different people have different perspective about adopting any new technology. In many cases the device itself can be irrelevant because people who like to adopt any technology last (laggards) they might not even care what advantages the devices provide they might just feel it to be waste of money or they don't need anything new. it is interesting to see how

writer of this book tries to find ways to transition from innovators to laggards.

3.4 Futuristic Smart Homes are not so far away - but do we want them?

- Author - Jonathan Weinberg
- Publisher - Mirror News
- Year - 2014

Overview

This article was written by the author after he attended the consumer electronics show 2014. In the article he has described his experience with all the new smart home technologies shown or proposed at the show. He explains how amazing he found all these new devices but at the same time asks a question if we really need them. The article explains the functionalities of some of the smart home devices such as automatic doors which can open when the owner of the home approaches to it, The automatic lights which turn on when the owner enters the house and other automated devices such as washing machines refrigerators etc. performing various tasks automatically depending on certain conditions relevant in day to day life of the home owner.

These devices will be communicating with the user and among themselves to control each other and make decisions for the user. Different tech companies are going different approaches. Some companies are developing wearable devices which can control all the other devices in home whereas some are relying on the smartphones to do it.

The author explains in the article that there's a possibility that these devices will make the users

lazy. He explains his own example of how he has been using his smartphone to control his

Lounge lights all the time since he got the smart lights even though the switch is located very close to his sofa. Another important point he mentions is if all the devices are connected and controlling each other if one device fails it can lead to more or all devices in the home to fail. The article also lists out some of the new devices which are ready to be released and will be launched as consumer products this year.

Methodology

Methodology used by the author for this article is to research about the latest advancements in the smart home technology. He shares his experiences with these devices, during the CES 2014 show and with the existing smart home devices which he already owns. The author tries to give an objective point of view and lists out advantages and disadvantages both of the smart home concepts.

Relevance to my thesis

My proposed thesis is about the wearable technology and smart homes. This article is a good source of information for my thesis because it describes all the latest advancements being made in the field of technology related to smart homes and connected devices.

The author shares his experiences with these devices at CES 2014 which is a very recent

information and it is very helpful for my thesis to know about as recent advancements as possible. The author does not make any claims that the smart home concepts are good or bad for the users but he raises a question with this article which is one of the questions I am looking the answer for with my research. Which is, do we need the smart homes or not? It is good to know that more people are asking the same question.

Comments on the paper

This article gives a lot of information about what's coming and how some of the tech companies are approaching towards smart homes. It is interesting to see that the author is amazed by the number of devices being introduced at CES 2014. He finds it interesting but is also skeptical about the consequences. Being a technology enthusiast I can completely relate to the views of the author. It is interesting to see our long time sci-fi dreams coming true but it also raises concerns about the consequences of them. Reading this paper I got a lot of latest information which will be helpful for me thesis.

4. FOCUS GROUP METHODOLOGY

As the market release of many of these smart home devices and wearable devices is coming closer all the companies are promoting them and showing them on all big tech events around the world. On the other hand some people are doing researches to prove the disadvantages of these devices. Stephen S. Intille (MIT) in his research has shown that these smart devices can make the users lazy and incapable of taking their own decisions whereas the authors like Jonathan Weinberg (Mirror News) and Daniel Gross (The Daily Beast) have published articles questioning the necessity and possibility of success of these devices.

All these different opinions are creating confusion about these devices. Most of the opinions are coming from either the technology enthusiasts or tech blogs and Internet posts. General public opinion is still not known. These opinions do affect general consumer's decision but what are consumer's personal opinions is something that should still be researched.

Even though there are different experts sharing their views and writing articles about positive and negative aspects of these devices some people might have already decided if they want them or not. It will be interesting to see what people really think and how society will accept these devices.

I would like to get answers to all the questions being raised regarding these technologies with my thesis. I would like to know what people think about them and how confident are they about using these devices. Are they looking forward to them, Do they think they don't want them or they simply do not care. Do they think these devices are a gimmick, what in their opinion is the intention of the companies launching these devices? How confident are they with letting these companies come into their homes and about sharing their personal information with them. What is their opinion on the social impact of these devices and overall the main question: Do we really need them?

This thesis is unique because this topic is very new. Although companies have been releasing smaller products on this concept, the complete system for smart homes has not yet made available to the consumer. With the big companies like Apple and Samsung stepping into this market this topic has started to gain attention but because of the newness of the topic this work is still unique.

To be able to understand the perception of the people about the smart homes it is important to collect, understand and analyze their opinion in details. Different methodologies can be used to collect people's opinion.

One of the most commonly used methods is conducting a survey. Survey can be useful to collect the answers to the close-ended questions and also is more suitable for the common topics that people might already have an opinion on. Smart home is a fairly new concept and many people might still be in a decisive state about them. For example if asked "do you like the smart home concept?" people might not be ready to answer in a "Yes" or "No" right now because they might have not given it enough thought to know or they might not be aware of the devices, advantages and disadvantages.

Another common method is to conduct interviews. Interview is a good method to collect people's opinion in detail but interviews are good only if people have a lot of knowledge on the topic. Interviews are usually a one-way communication where the interviewer is not sharing any information but only asking questions, which makes it a less suitable method for collecting perception of people on the smart homes.

The third method used for collecting people's perception is focus group. Focus groups provide flexibility to the member to not only share their views and opinions but also learn from other members. Participants can help each other understand the topic and members can gain more awareness on the advantages and disadvantages on the topic by the discussions. This can help member in making them think and building the opinions about the topic.

5. Why Focus Group

Upon comparing all methods, the focus group is found to be the most suitable method for this thesis. Smart home is a new concept and very few devices are actually available in the market for the consumers at present. Many different devices are being launched and the concept is gaining popularity. Because this is still a growing technology many people might not have a lot of knowledge on the topic. Some people who are tech enthusiasts and early adopters of the technologies might know about all the products in the market but on the other hand people who are not tech savvy might not know much about it. Conducting focus groups can be helpful to take out real opinions of people. It can be helpful to have a group of people into a discussion so that they can learn new things about the topic through the discussion and can also make and share the opinion on the topic.

Focus group Methodology will include following steps:

1. Preparing Questions:

Question for the focus groups will be prepared in advanced. These questions will be open ended and intended to find out the perception of the group members. Questions will be designed in such a way that they make member think about the topic and which can trigger deeper discussions. The main intent of the questions is to stimulate the group members to share their opinions with others. Once the questions are prepared they will be sent to SUNYIT HSRB for verification to make sure the questions are correct.

Some of the examples of sample questions are listed below. These are not the final questions but only examples.

1. What according to you is a smart home?
2. Which smart home devices are you excited about and why?
3. Is there any company device or recent event in particular that has influenced you views about the smart homes?
4. What are pros and cons of having the Internet connected devices in the home?
5. How comfortable will you be knowing that your personal day to day information is being shared with the companies and might be exposed to the hackers?
6. How do you feel when told about the conveniences the smart home can bring to your life?
7. How do you feel when told the disadvantages of the smart home?
8. What changes would you like to make in the current line of Smart home products to make you feel more comfortable in adopting them?

9. Is there anything else you would like to say about why you would or would not convert your home into smart home in near future?

1. Choosing moderator and assistant for the focus groups:

I will be playing the role of the assistant for this focus group and one moderator will be chosen for the focus groups that will be responsible to introduce the topic to the group, ask questions and start the discussions. Moderator will make sure that every group member gets an opportunity to share the views by encourage any members who are not able to openly share their views due to personality problems or any other reason. Moderator will guide the discussions in the right direction and make sure it is not going off the track. Moderator will try to generate as many different opinions as possible and make sure that all the important questions are covered in the discussion.

Main tasks of the moderator are:

- Should have good knowledge on the topic of discussion
- Be attentive during the discussion
- Not only listen to the opinions and but also think how the discussion can be taken to right directions at the same time
- Should be able to think objectively
- Should be capable of summarizing or paraphrasing any comments that are either not clear or are very long. So that the comments are understood by other members.

Some responsibilities of the assistant are:

- Take the recording of the conversation
- Take notes
- Do not be interfere with the discussion and allow moderator to take control of it

3. Choosing group members

Group member will be chosen carefully. Members from different professions will be invited for the focus group. It will be made sure that the groups have mixed combinations so that they can share the views comfortably. It is important to have enough members in the group to be able to collect a good amount of information from the discussion but it is also important to not have too many people, this can cause some people to not get a chance to participate. For this study each group will have 8-10 member. More members will be invited to make sure enough members are available for the discussion even if some invited members do not show up. Initially two such groups will be created and depending on the results it will be decided if more groups are needed. Group member will be required to send a written confirmation via email that they have agreed to participate in the focus group. All members will be informed about the topic of the discussion and approximate time duration of the discussion.

2. Conducting Focus groups

All the participants will be asked to fill a consent form, which will have an agreement about the information they are willing to share. An assurance will be given to them that the information will only be used for this thesis and will only be shared with my advisor and me. Depending on how comfortable the participants are the discussion will be either in person or over the videoconference. In case of in person discussion, participants will be requested to come earlier than the actual time

so that the group has some time to settle up.

The moderator will introduce the topic to start the discussion with some open-ended questions and assistant will take notes. Although the questions are predetermined it is important to keep the Discussion free from the questions boundaries. The questions will only be used to influence the group member to share their opinions with others. Group member's answers to the questions will not be hard & fast, members will be free to change their opinions during the discussion.

Each discussion will be targeted to be within 45-90 minutes depending on the discussion. It will be made sure that discussion is limited to the time until which it is going in a productive direction.

It is important to make sure that the participant's time is not wasted. Three or four such focus groups will be conducted to produce valid results. It will be made sure that not more than needed focus groups are conducted. A good way to measure that is to reach a point when the responses start to become repetitive and not enough new or different opinions are being produced with a new group.

3. Perks for the members

To encourage people to participate in the focus group some perks will be given to them. Each member who participates in the group discussion will win an entry into a lucky draw. A few lucky draw winners will win some Smart home devices. The list of prizes will be informed to the group members before the discussion. All members will be provided with snacks and beverages before the discussion.

4. Documenting Discussions and analyzing responses

Focus group discussions will be recorded in audio or video format. All the questions asked and responses will be documented. All the important information and notes will be collected into a transcribed form. Each response will have information about the participant who shared that response. All the responses will be entered in an excel sheet. Once the excel sheet is ready the responses will be analyzed for common opinions. All the answers will be analyzed to find the common perceptions. Some categories will be defined based on the common responses. The sheet will then be organized in these categories format. The sheet will then be sorted with the Categories with the most number of responses in support of it. This process will be repeated for each group.

5. Conclusion and Results

Once the responses from all groups are organized in the synthesized format. A report will be generated which will summarize the findings. This report will be in a narrative format and will explain what most of the people believe. Results will be show what most people think vs. what few people think about the topics in the discussion. Some recommendations will be drawn based on the responses from the participant for the companies on what changes they need to make in their smart home devices so that more people can feel comfortable in adopting them.

5.1.1 Verification & Validation

Before the online survey was programmed, a paper version of the survey along with a cover letter were sent to the SUNY Polytechnic Human Resources Board (HRB) for approval. After reviewing the petition, the SUNY Polytechnic HRB provided approval to proceed with conducting the discussion. A copy of the email sent to HRB for approval is provided in the appendix. The Focus Group Methodology was programmed after this approval.

5.1.2 Limitations and Delimitations

Some limitations of this thesis are

Newness of the technology:

These technologies are so new that many people are not aware of them. Also due to lack of knowledge on the topic people might not be in a condition of taking decisions. To overcome this it will be made sure that the candidates chosen for the interview have some awareness on the topic. Extra knowledge will be shared with them before the interviews.

Differentiating between Need and Want:

It is important for the participating people to understand the difference between need and want. Need: can include things which are absolutely necessary or nearly necessary for living. Something you like or not you have to have it. Want: can be defined as something that depends on choice, you don't have to have it but if you like to have it you want it. Since most of us are living easy life

without the existence of all the smart home devices and wearable devices we might assume that all these devices are not a need but a want. But there might some handicapped or physically or mentally disabled people for who these devices are a need for better living. This question is again an open ended and different people might have different opinion about it. I would like to have a conversation with the participants to make sure they understand the difference before they answer the questions.

Some delimitations of this thesis are:

This thesis involves technologies and devices which are relevant to all members of a particular household. Which makes this research relevant to all people in a common family and it is not limited to any age or gender. This topic is also not limited to any kind of profession as these products are targeted to people in all professions. This topic is relevant to people belonging to all cast, race, religion and culture.

6. Analysis

The participants have been categorized below in five categories based on the distribution in the Book “Crossing the Chasm”. The five categories are as below:

1. **Innovators:** Innovators are the visionaries who are the very first people to adopt any new technology. They have great interest in technology and they like to innovate. They have a vision of the new technologies to be useful for them.
2. **Early Adopters:** Early adopters are very much like the innovators but they do not have technology as a central interest. They find it easy to understand the new technology and imagine the advantages it can provide. When they find any new technology matching their needs they like to adopt it but not as soon as it comes out like innovators.
3. **Early Majority:** Early majority people are similar to early adopters but they are more practical. They believe that not every new technology is successful and lasts long. A lot of it is marketing hype so they do not fall in for marketing and wait for some other people to try it out. After seeing what kind of benefits the new technology is providing to the people who have already adopted they make their decision of adopting it.
4. **Late Majority:** Late Majority people are more concerned than the Early Majority. They are not as comfortable with technology as the above three categories and they are less confident on their ability to use it. As a result they like to wait longer so the technology becomes established and they can seek support from people if they need. They like to adopt any new technology once it becomes common and is available from large companies.
5. **Laggards:** Laggards are the people who have no desire to adopt any new technology. Sometime

they do not want to spend any money on it or sometime they just don't want any new change in life. For any reason they are just not interested in it. The only time they end up getting some new technology is when the new technology has become so common that it is baked into some product that they have no choice but to upgrade. As a result they are the last ones to adopt any new technology and companies generally consider them not worth pursuing.

6.1 Focus Group discussion analysis

Description of the Focus Group:

Two Focus Groups discussion were conducted between two different groups of participants. Each focus group is described below:

Focus Group 1: -

Location: North Carolina

Date and Time: The first focus group discussion was conducted on Sept 08, 2016 at 6PM to 8PM.

Duration: The duration of the group discussion was limited to 1 hour but the actual duration was 70 minutes, as the member were interested to discuss for longer duration.

Moderator: IT Professional played the role of moderator for this focus group discussion.

Participants: The total number of participant in this group discussion was nine.

Seven participants joined in person and two participants joined over video conference using Skype/Google-Hangout. More details about the participants can be found below:

The type of consumer definition is based on the Book named “Crossing the Chasm - 3rd Edition”, written by: Geoffrey A. Moore. The participants are categorized based on their responses in the focus group discussion.

Participant	Gender	Age Group	Profession	Type of Consumer
Participant 1.1	Male	40 - 50	IT Release Manager	Early Adopter
Participant 1.2	Male	20 - 30	Customer Support Analyst	Laggards
Participant 1.3	Female	20 - 30	Student/House Maker	Laggards
Participant 1.4	Male	30 - 40	Service Delivery Manager	Late Majority
Participant 1.5	Male	20 - 30	Business Analyst	Early Majority
Participant 1.6	Male	30 - 40	CRM Consultant	Early Majority
Participant 1.7	Male	30 - 40	Sr. Software Engineer	Late Majority
Participant 1.8	Male	20 - 30	Integration Consultant	Early Adopter
Participant 1.9	Female	20 - 30	Programmer Analyst	Early Adopter

Focus Group 2: -

Location: North Carolina

Date and Time: The first focus group discussion was conducted on Sept 15, 2016 at 6PM to 8 PM.

Duration: The duration of the group discussion was limited to 1 hour but the actual duration was 75 minutes, as the member were interested to discuss for longer duration.

Moderator: Software Engineer played the role of moderator for this focus group discussion.

Participants: The total number of participant in this group discussion was seven.

Six participants joined in person and one participant joined over video conference using Skype. More details about the participants can be found below.

The type of consumer definition is based on the Book named “Crossing the Chasm - 3rd Edition”, written by: Geoffrey A. Moore. The participants are categorized based on their responses in the focus group discussion.

Participant	Gender	Age Group	Profession	Type of Consumer
Participant 2.1	Female	35 - 45	House Maker	Laggards
Participant 2.2	Female	30 - 35	Accountant	Laggards
Participant 2.3	Male	25-30	Student (PHD)	Early Adopter
Participant 2.4	Male	30-35	Software Engineer	Late Majority
Participant 2.5	Male	30-35	Business Analyst	Early Majority
Participant 2.6	Male	35-40	IT Consultant	Early Adopter
Participant 2.7	Female	25-30	House Maker	Late Majority

All the responses to all questions and discussions can be found in the transcript of this paper attached at the end. The most significant responses are discussed in this section. Of course, all the responses are in the transcripts in the Appendix.

Introduction

The moderator started the discussion by providing the introduction to the topic:

Moderator's definition of Smart home: "Purpose of today's discussion is to find people's perception about Smart homes, Smart home is not standardized term, Smart home term is generally used in regards to any home equipped with smart devices with internet of things, where the devices can talk to each other via Internet and try to make the life of home residents convenient and easy by providing smart features".

After the introduction Moderator asked the group to define Smart home in their own terms by asking the first question:

Q.1 what do you understand by the term "Smart Home"? How will you define it?

All the participants described what they understand by the term Smart home and their expectations from a home, to call it as a Smart home.

Focus Group 1:

Participant 1.5: Smart home is a home that provides comfort to the residents in smart ways, by providing easy of control to the home devices such as lighting, thermostats.

Participant 1.8: Smart home is a home that does not only provides ease of use of the devices but also manages energy in a smart way by using solar energy, rainwater harvesting and conserving energy.

Participant 1.6: Smart home is not in the future but the homes we are living in currently are also smart homes if we compare to the homes in the past. So smart home is always progressing and will be continuously evolving. The smart home should not only be comfortable but should help the residents' health wise as well.

Participant 1.2: Smart home is a home that provides ultimate security to the residents and alerts them if there is any security breach.

Participant 1: Smart home is a home in which i don't have to do anything. I don't have to move from my place. Everything can be done and controlled sitting at one place.

Focus Group 2:

Participant 2.1: Smart Home is not a standardized term but we call a home to be a smart home when it is equipped with smart devices. Any devices that are connected to the Internet, Internet of Things and devices can talk to each other & make the life of the people who are living in the home more comfortable & convenient.

Participant 2.2: Smart home is home equipped with devices which can control by themselves in conjunction with other devices. Like you are cooking something that cause a lot of smoke. A smoke detector can detect the increasing levels of smoke, exhaust fan speed increases, some sprinklers

come on, and these are different integration and the integrating steps that the system can take. Now usually we do it & take steps manually but if we have a system in place that can detect these normally & act to it.

Summary: All the participants defined the Smart home in their own way but most of them talked about a home being equipped with connected devices which can control themselves without user's initiation.

Comparative Analysis: Participants from both focus groups had their own definition of smart home but it could be observed that people from different age and profession had more focus towards some area of the smart home. First focus group talked more about internet connected devices and devices which can make the home more comfortable but the second's group talked more about the convenience and devices that can make the kitchen appliances smarter or housework easier.

After summarizing the responses from the participants, the moderator asked the second question:
Q.2 Do you currently own or plan to own Smart Home devices.

Most Participants in this group did not own a smart home device but most of them plan to own some devices in near future. Most participant were interested in buying the devices in near future

Focus Group 1:

Participant 1: He thinks that the smart home which he already owns is one of the smart home devices. He also plan to buy Amazon Echo (Voice controlled virtual assistant) but just waiting for some offer to make the price more affordable for him. He thinks getting amazon echo will be a good start for him and then he can buy more smart devices later.

Participant 1.7: he owns some Philips Hue Bulbs (Wi-Fi connected Smart bulbs). But those were gifted to him. He would like to buy more devices but cost is the biggest deciding factor for him.

Participant 1.4: he would like to own Roomba (Robot vacuum) and Smart washer dryer, because he always put cloths in the washer/dryer and forgets about them. If He can get notification when the cycle is done that will be great. He is interested in getting other devices but He does not like to be the first one to take the risk with these devices, He likes to wait for these devices to be out in the market for some time, some people to try them, get the reviews from them and then after they are fully tested He would like to buy.

Participant 1.6: He would like to buy a security system with cameras and Alarms. He is interested in AT&T provided security systems. He thinks the basic technology infrastructure has to evolve to a point that the encryption and security is strong enough to not worry about privacy.

Focus Group 2 :

Participant 2.3: He recently purchased the Amazon Echo device and also owns a smartwatch (apple watch). He thinks his smartwatch is also a smart home device because it is possible to integrate it with other smart home devices and be able to control them with the smart watch. Any home kit enabled devices which can be controlled with iPhone or iPad can also be possibly controlled with the apple watch. His main reason to buy a smart home devices is to cut cost in long run and convenience

Participant 2.6: He would like to get a smart vacuum cleaner like Roomba which can make the cleaning of the house easier

Participant 2.7: She is also interested in a voice activated assistant like amazon echo but she also wants to buy smart appliances which can make her life in the kitchen easier and safer for her kid

Summary:

Most participants showed the interest to buy the smart home devices such as Google Nest (Smart Thermostat), and Philips Hue (Smart lighting), Roomba (Robot vacuum) etc. but feel they are currently very expensive and very new to the market. They would like to wait for the prices to go down or get the reviews from early adopters to be confident to invest big amount on these expensive devices. Most of them believe that the smartphone which they own is also a smart home device as most of the smart home devices are usually integrated with the smart phones and phones can act either as a remote to control the home devices or as a device to generate alerts for the residents in case of a security breach.

Comparative Analysis:

Upon comparing the responses from the two groups it can be seen that most consumers are interested in buying the smart home devices even though they have not already bought many. The choice of who wants which kind of devices is different for different people. A student is thinking about cost cutting and convenience but a home maker is thinking about ease in the kitchen and safety of her kids.

After summarizing the responses from the participants, the moderator combined and asked the third and fourth question together:

Q.3 Are you aware of companies & platforms that provide these services?

Q.4 do you think any company or platform is providing better Smart Home devices than others?

Focus Group 1:

Question 3 and 4 were asked at the same time to this group. Some of the companies' names mentioned by the groups are:

Apple

Google

Phillips

Sony

LG - Smart Home appliances

Samsung - Smart Home appliances

Focus Group 2 :

Question 3 and 4 were asked at the same time to this group as well. Some of the companies' names mentioned by the groups are:

Apple

Amazon

Phillips

Bosch

LG

Samsung

Summary:

Some participant were aware of the companies but not many were aware about all kind of smart devices. Some participants knew about some devices but did not know which specific company makes them or the platforms they work on. Very few participant were well aware of many companies providing smart home devices and platform. Most people are only aware of the Devices which are being promoted well by the companies or are being made by big companies such as apple, LG and Samsung

Comparative Analysis:

Upon comparing the responses from the two group it can be observed that people in technical background are more aware of different platforms and smart home devices then the people in other profession. Female participants were only aware of devices which are being promoted well by the companies whereas male participants were more aware about different advancements in the field. The next question about the advantages and disadvantages of smart home was not asked specifically but most part of the whole discussion was around this question.

Q.5 what are the advantages and disadvantages of Smart Home?

Major part of the discussion was focused towards advantages and disadvantages of the smart home devices. Some of the important points discussed by the participants are

Focus Group 1:

Participant 1.5: (Disadvantage) these devices might need more energy as they will be always on, connected to the internet and performing more computing than regular non-smart devices. There Smart home devices may affect the overall energy consumption in the home and when we add that for every home this can be a huge impact on overall energy consumption around the world.

Participant 1.1: (Disadvantage) Security can be a concern when all these devices are connected to outside your home network. But if these devices are only connected to the home network and you are only living within the walls of the home with all these devices doing all the work it can be a lazier and lonelier approach.

Participant 1.4 : (Advantage) Having all these smart home devices doing all your work gives you more time to do other things now what you do with that extra time is up to you. If you spend that time sitting at home and eating you might see the negative effects such as laziness or loneliness but on the other hand if you choose to spend that extra time being more active, by working out or spending that time with friends and family you can turn it into advantage.

Participant 1.7 : (Disadvantage) These devices are very expensive and even if they provide comfort and convenience to me, I'd like to save that money and use it for something more important to me such as my child education rather than a little convenience or comfort

Participant 1.3: (Advantage) anytime there is a new technology there is always a debate but later with time we realize that it was helpful same thing applies to smart home devices. Although we may not be able to remember all the phone numbers of friends and relative we are able to make many more advancements in technology and other fields.

Participant 1.1: (Disadvantage) everyone remembers when we had to add an extra digit to the year how big of an issue it was and how it affected so many people. That was an example that the more dependent on the technology we become the bigger the effects will be when they fail. Society will have to be more careful when they are becoming more and more dependent on these devices.

Focus Group 2:

Participant 2.1: (Advantage) If these devices can make the homes not only smart but also secure and take action when the security breach happens that is a great advantage.

Participant 2.3: (Disadvantage) Current smart home devices do not offer seamless integration. If any customer buys a device in an ecosystem the companies are making them buy all other devices in the same eco system and the integration between different platforms is not seamless.

Participant 2.4: (Disadvantage) The biggest disadvantage is the fear that somebody can hack into your system and they will have the same access as you have now. That's the biggest fear.

Participant 2.6 : (Disadvantage) Safety and privacy is a concern but I think malfunctioning of these devices can also be a big problem. Such as a device like stove can be big concern for safety, for example if you are outside of your home, you are not controlling it but it suddenly turns on due to

some reason and it does not stop and it burns your house, what happens?

Participant 2.7 : (Advantage) Having smart devices such as smart appliances in the kitchen make our lives very easy and safe. We can get more time to spend with our children and family

Participant 2.3 : (Disadvantage) Converting all the devices in the home to smart home devices will create huge amount of electronic waste. So far we have not seen any plan from the manufacturers on how they will be dealing with that.

Summary:

All participants had a long debate on the advantages and disadvantages. Although all the disadvantages were raised as a concern most of the participant were interested in giving these devices a chance and adopting them

Comparative Analysis:

When discussing the advantages and disadvantages of the Smart homes, Privacy turn out to be one of biggest concern. Both the groups shared very similar opinions the biggest concerns from both groups were very similar such a security, privacy, safety etc. but there were also some unique point of views such as energy consumption and electronic waste.

Since privacy was one of the biggest concern, Moderator asked the participants to elaborate on that by asking the next question:

Q.6 Since most of the Smart Home devices will be connected to the Internet, does this raise any security concerns to you? Will you be concerned about your privacy knowing that your personal information might be collected via these Smart Home devices?

Most people believe security and privacy are two biggest concerns and biggest hurdles in the success of these devices. Some of the responses are as below

Focus Group 1:

Participant 1.1: He thinks privacy is not only a concern in case of hackers but it can also be a concern among the family members. He mentioned an example how his wife knows about his sleeping habit because of the fitness devices he uses.

Participant 1.3: He thinks a lot of devices promise better services and more convenience as a tradeoff for the privacy but he is ok to sacrifice those but compromise with the privacy

Participant 1.4: just because brands call a device a smart device that does not make it a smart device. In his opinion a washing machine sending you a notification when the cycle is complete is not very smart but he is ok with these devices as long as everything is kept within the network if something is going out to the internet then the devices will have to offer a lot better feature and more smart use cases for him to compromise or take risk

Participant 1.2: He thinks that may be currently there are more privacy concerns and less smartness into these devices but with time and more advanced technologies this will change and in future we will have less concern and more convenience like any other technologies. He gave example of

microwave that people were concerned about health risks when it was launched and now it is a household product.

Participant 1.5: Privacy is a myth even with current devices like smart phone a lot of user information is anyways collected by these companies if user can get some use of the data with these smart home devices then that is an advantage.

Focus Group 2:

Participant 2.1: It will be very useful to have security cameras in the home that can detect any breach and take action on it but if someone hacks into the camera feed then the hacker can see everything that is going on in the home. They thought is very scary.

Participant 2.2: Not everyone behaves same at home as they do outside and it is important that their private life is kept private. Any information from within the home going outside is not acceptable.

Participant 2.6: If everything remains within the private home network it is fine. As soon as it connects to the internet is the problem. If companies can figure out a way to keep all sensitive data within the network then only this can be solved.

Participant 2.5: We have phones which we know are already tracking us a lot of our information is already being saved and shared by these companies. It is about how much and what kind of data are you ok to compromise with.

Participant 2.3: Google one our phones provide smart features only if we agree to share the data. It can guess where you want to drive to at what time and provide the traffic information right before the commute but it can only do that if you share the information about where you drive to and when. It will be a similar compromise and I think most of us have already made that compromise to give up this data for better features.

Summary:

Most participant think that Security and privacy are the biggest concerns but some of them also believe the users will need to compromise with them to be able use the smart home devices. These devices can provide smart features without the personal data but can possibly provide better features if they are aware of the customer's personal needs. Most of the people are already making this compromise with their smartphones now the question will be are they ok to compromise with the information within the walls of their homes.

Comparative Analysis:

Both groups shared similar opinions but it could be observed that the level of compromise the people are willing to make varies with age and profession. Older people looked more comfortable with sharing the information in return of some convenience and comfort. Home making ladies looked more concern about privacy and were less willing to compromise on that.

7. Conclusion

This Focus group was conducted among highly educated people with advanced degrees. Since the conclusions are drawn based on the discussion among them, the conclusions apply to this demography only and may not apply to general people.

Based on the focus group discussion and analysis the conclusion can be drawn that the Smart Home devices will be adopted by the most of the people. The answer to the question that we need something or not can change with time and evolution of the technology. Today people do not think they need these devices but most of them want them. People are attracted toward the convenience and advanced features but they are little skeptical about the privacy and security. Companies will have to concentrate on making these devices more secure/safe and also they have to face the difficult challenge of convincing people that all their personal data will be kept private. If these companies could succeed in convincing people then people are already interested in getting these devices as they become more affordable and more secure. Although people showed concerns about disadvantages most people are ready to move into a smart home soon.

My Opinion

In my opinion smart home devices are going to be the next big technology evolution. During the focus group discussions although many people showed concerns about different things. One of the big concern was security. In my opinions keeping the devices secure is not only company's responsibility but also consumer's responsibility. Even in regular homes users will install door locks and will take other security measures to ensure their homes are secure. But even then there

is a possibility that someone can break in into their homes. Similarly in case of Smart homes, companies are taking steps towards making their devices secure but consumer will also have to be smart to user a smart home and take their own measures, such as installing a firewall in their home, using hard to break passwords and changing them frequently etc.

Even though participant in the focus group showed concerns when asked to answer in a Yes/No for the question whether they would like to move in a smart home today, Most of the participants answered: Yes. This shows that the concerns are not as big as the desire to live in a Smart home. But the participant in this thesis were all well-educated and professionals with income. Companies will have to work hard to market their devices to people from all demography. Companies have a good opportunity here to bring in attractive products but they also have to first face the challenges on convincing people that these devices are Affordable, Easy to install/Use, Reliable, Secure and Private. If companies can convince people on these factors then Smart home devices have a good potential of becoming the next technology big evolution and every home will have at least some smart devices in near future.

8. Recommendations for further studies

- A comparative analysis between different platforms provided by major companies
- A technical analysis on how secure the current smart home platforms are.
- A thesis on different kind of security attacks which can be performed on smart home devices and finding the vulnerabilities.

9. References

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APPENDIX

Questions:

- What do you understand by the term “Smart Home”? How will you define it?
- Do you currently own or plan to own Smart Home devices.
- Are you aware of companies & platforms that provide these services?
- Do you think any company or platform is providing better Smart Home devices than others?
- What are the advantages and disadvantages of Smart Home?
- Since most of the Smart Home devices will be connected to the Internet, does this raise any security concerns to you? Will you be concerned about your privacy knowing that your personal information might be collected via these Smart Home devices?
- What would you like to change in the Smart Home devices that are currently available to make them better suit your needs?
- Which home device would you like to make smart that's is not currently offered by any company, what functions would you like these smart devices to serve?

Letter for SUNY Poly IRB Approval

January 15, 2016

Versha Thakur
SUNY Polytechnic Institute 100 Seymour Road
Utica, NY 13502

RE: IRB Exemption for Project “to determine people’s perception of Smart Homes & the factors that influence this perception”

Dear Ms. Thakur,

The SUNY Polytechnic Institute Institutional Review Board (IRB) is pleased to inform you that after review the IRB Chair determined that your proposal listed above is a Quality Assessment project and, as such, is exempt from all requirements of 45 CFR 46, under paragraph 46.101(b)(1).

You are required to notify this IRB prior to any changes that would make the status of this study non-exempt.

If you have any questions about the contents of this notification letter, please feel free to contact me at 315-792-7151.

The Institutional Review Board of SUNY Institute of Technology subscribes to and functions within the requirements of Title 45 Code of Federal Regulations Part 46 “Protection of Human Subjects”.

Sincerely,

Marv Meissner

IRB Coordinator

COVER LETTER

STATE UNIVERSITY OF NEW YORK INSTITUTE OF TECHNOLOGY, UTICA

June 9, 2015

Dear,

I am currently pursuing my Master of Science in Telecommunications at SUNY Polytechnic Institute. For my thesis I will be using focus group methodology. My adviser is Dr. Larry Hash.

The purpose of my thesis is to determine the perception of the people about smart homes, and the factors which influence this perception. Focus group methodology will be used for this thesis. All the participants name and personal information will be kept confidential. Only the overall group results will be documented. The total duration of the group discussion will be about sixty minutes.

I would like to request the review board to please provide approval to conduct this thesis.

If you have any questions, please contact me at 315-723-4244, thakurv@sunyit.edu. You may also contact my advisor at lj_hash@sunyit.edu.

Thank you for your time and consideration.

Sincerely,

Versha Thakur
Student Researcher

CONSENT FORM

Consent to participate in a Research Study

Investigator

This study is conducted by Ms. Versha Thakur, student of Masters of Science in Telecommunications at SUNY POLYTECHNIC INSTITUTE, Utica, New York.

Purpose of the study

The purpose of this study is to determine people's perception about smart homes and the factors that affect this perception. Some people might be excited to utilize all the new smart devices available but some people might feel uncomfortable connecting their home devices to the Internet. The purpose of this study is to understand what people feel and why.

Voluntary Participation

Your participation is completely voluntary for this research discussion and you have rights to withdraw from this participation at anytime during the process. If you wish to withdraw from this participation, no information will be used and it will be deleted from all the findings.

Methods/Procedures

Focus group methodology is used for this research. Focus groups are used to get detailed responses from the participants. You do not necessarily have to know the topic in advance. You are encouraged to answer in your own words and add meaning to your answers by explaining in detail. In order to ensure accurate reporting of all the information being discussed during the participation, the audio and video will be recorded during the session.

Confidentiality

You will only be asked to share your first name but not last name and employers name at any point in this study. During the discussion, you don't need to address the other members with their last name or share their company information. Even if the circumstances comes, that other participants addresses you by your last name, it will be deleted from the final transcripts. In the final transcript all the first names will be replace with a number. The original tapes will be kept confidential. These tapes can only be reviewed by the moderator, the assistant and my faculty committeemen if they request it. Every effort will be taken to keep your information confidential. All the focus group members will be asked to keep the information to themselves.

Risks and Inconveniences

There are no anticipated physical risks to the participants during this study.

Benefits

Benefit of participating in this focus group discussion is gaining an insight into other people's perception of this technology by providing your own opinions. It will be a platform where you can discuss about your perception and your inputs can make this research real and valuable. This can help you take better decisions about which smart devices would you like to incorporate in your future homes. This study also has potential benefits to the industry, they can learn from your perception and try to make the devices which will be better accepted by you. If you wish to receive a copy of the results, it will be provided to all of you after the completion of this thesis.

Questions

In case of any questions related to this study, Please feel free to ask your questions at the time of the meeting. You can also contact me at Versha Thakur, email: Mobile:

You can also contact my advisor for this thesis Dr. Larry Hash, SUNY Polytechnic Institute, Utica, New York or you can call him on : or contact via email: lj_hash@sunyit.edu. Feel Happy to contact in case of any questions.

Authorization

You will be provided with the copy of this consent form for your records.

Printed Name of the Participant _____

Signature of the participant _____

Date _____

Printed Name of the Investigator _____

Signature of the Investigator _____

Thank You

I would like to thank you for taking out precious time from your busy schedule to participate in this discussion.

TRANSCRIPTS:

FOCUS GROUP 1:

Smart home is not a standardized system, we just use it for our home equipped with smart devices, internet of things where the devices can talk through the network to each other and somehow make lives easier for people and the living around. Some people have concerns with the security with it, privacy concern are there but I would like you guys decide on what your opinion is and share it.

The very first question that I am going to ask the group here is what do you understand by the term when I give a small description of what I feel about and what I think is a smart home or it doesn't have to be the devices that talk to the internet, it could be just a home with accessible furniture or something. What is a smart home according to you? What do you understand by the term?

Participant 1.1: A smart home, first of all a home considers something which makes me comfortable, I can be at ease and to be at ease and feel comfortable, I have to take care of certain things like temperature, lighting and you no proper furniture

MODERATOR: So you mean to say thermostats, lightings all these devices if they are smart in home, you consider it to be a smart home?

Participant 1.1: So they are essentials for the home and I will have to manually turn them on off or reduce or increase the temperature based on the weather conditions. So if a device like thermostat or something like that comes along and automates it, reads my habits just to what temperature I maintain at what time and based on external factors if it can control my house temperature,

MODERATOR: So you are trying to say that you don't have to go to the thermostat and program at, it should just do it diligently understanding your lifestyle knowing what temperature you like at what time and how the other weather is outside right?

Participant 1.1: That's correct. So this technical capability is available and it's just a matter of adopting the existing technology and it should also do two thing. One, it should make me comfortable and secondly, equally important, it should keep my energy costs lower.

MODERATOR: So energy consumption and the ease of life are two factors that you think most important when you have smart home. Anybody else wants to add something?

Participant 1.2 :Yes, when he says about the energy consumption and the smart phones, smart homes actually at a more smarter instance , they are actually getting more to go with I am just saying to move with sustainable energy where the homes itself with base from the solar energy the concept ones are coming up where they can have their own energy liberated through solar energy and rainwater could be harvested, it could be actually storing the rainwater so that instead of

externally depending on other supplies of water or electricity the sustainable energy in water could be generated at homes itself. So it's like the tube we have, we open a tap, we have water stored in a system and the smart home actually it's a capability to use that resources which we get easily and freely.

MODERATOR: So you are saying that energy is not big of a concern by the time we reach a day where homes will be smart and we might figure out some ways of having conservative energy, we might have solar energy

Participant 1.2: That's the future.

MODERATOR: So your point is that we might not have bother about energy, we should think about advancement model?

Participant 1.2: Advancement model yes.

Participant 1.3: So to your first MODERATOR, I would say I am just going, For me again it might not be a correct definition but as for me, a smart home doesn't necessarily need to be something where you know just making it easier to live, if you go may be a hundred years back when we used you know fans by hand you know like manually doing something to feel warm. So what happened after is these electricity came and you know then we have a switch where we just switch it on and it's automatic. Technically you are switching it on and the fan is working. So from that day onwards if you have seen a picture in 1950s, you know the heart I am going a bit on that style, So the heart diseases were much lesser than that they are today. So we are going into smart homes which I think is a more commercialized term than really you know which is helping us out. So a smart home should be something which should help us from, it should be comfortable but at the same time it should be you know it should be helping us may be I would health wise, you know that is the real smartness. If a home is smart, it should help us that way also.

MODERATOR: That's a great point actually, I mean I agree that if we consider from past and we are living in a smart home. Our fridge is an automatic fridge and now you are saying you will take that fridge your phone but going to the wall and clicking it, but it's a smart automated home when compared it with the past, so where do we a kind of, so at what point do we say we are in a smart home and it's a continuous process.

Participant 1.3: And I am not even taking those steps which I am taking to switch on the button right, so now I might be, I think personally that, that way my health will be deteriorating because I am in a smarter, I mean too much comfort for the real world.

MODERATOR: So you are concerned that you might become lazier because you are just going to sit on the couch and give a voice command from your phone you know control from your phone?

Participant 1.3: I am addicted to that. So is that really a “smart home”

MODERATOR: Say instead of it a smart disease.

Participant 1.3: Yes, let me tell you yes.

Participant 1.4: If we look at this, we are talking about temperature control.....ok and then some important features are ok I need to increase the air conditioner. How can all these sort of things be possible with smart home? To your point (Participant 1.3's) the easier things get the more over artificial and I deduct your idea of solar, wind mill whatever generating your own power, smart homes can be more self-contained. This is the idea of if anything is connected, people can break into your security but at the same time if you isolate yourself with your own power, with your own water with everything you need is within your own home, you wall yourself which is ...we no longer speak to one another we text. So

MODERATOR: So you are saying its more secure if we are within may be a home not connecting to the outside network or some way we are making more secure within the walls of the home to keep the security? But you agree that it is lazier approach loneliness outside?

Participant 1.4: We can seriously ...ask later if we are not careful

MODERATOR: It is actually true I mean this is from my personal experience, last week I have no time to get on Facebook and twitter (general conversation)

Participant 1.5: I think certain things are part of the evolution right, so if you go say a two hundred years back, if somebody had thought in the same way, maybe we would have cars or you know airplanes things like that. So what I think is making a house smart or anything else you know will gives you back time and it's up to you to how to utilize that, you can become lazy or you can use it in a better manner to do something more you know more innovative or something more to give back to yourself including like you are talking about missing out meeting up friends so probably if I have my ideal “smartest phone” I might had enough time to hang out with my friends more often. So that's my perspective on it.

MODERATOR: So you are just saying that the advancement can be towards that if we take the right approach from now rather than just move ahead with the technology advancement and forgetting about the social aspect of it right?

Participant 1.5: Yes, one example so some of the smart home features like ordering stuff like if You're filters are reaching the expiry, automatically ordering your filters which come to your 52

doorstep or many other things that save you time from focusing on when do you need to run to a store to buy a filter or a water filter, instead of that I may be hanging out with you a day.

MODERATOR: Makes sense, we would love to.

Participant 1.6: Support to Bobby's (Participant 1.5) point I mean the evolution what we are doing is just adding more intelligence to our devices. So my perspective is going to be that we are not actively monitoring our devices but we want minimum active monitoring and maximum control on the devices that we interact with every day. So yes that's pretty much it, I mean just adding more intelligence, making our life more comfortable and having control on the devices that we work with.

MODERATOR: Ok, So ya you are saying that it's more towards making the devices that we already own better and easier to use and not towards may be introducing more devices that can make other disadvantages that people are talking about here right?

Participant 1.6: Right

Participant 1.7 : So I guess my definition for a smart home, I think the definition is going to change. So right now we consider a smart home, fifty years down the road is going to be what we consider a standard home and it really is just having more control over the devices in your home and be able to sort of have the control from remote, being able to log into your other smart devices like your phone and things that can be logged in to control things at your home, you know tools that are making you know life minimal easier but a little more convenient by being able to open up your phone and see what is inside your refrigerator they are not the normal right now and that is what we consider them to be call these technological advances

MODERATOR: So more innovative thinking in the devices that we already know that has been there for a long time but now you talk about new ones and it does itself. Fridge that you (Mat) are talking about I think the Samsung family that take pictures every few often and then you can always look at you have enough milk or not. Those are some cool devices that are there pretty expensive right now, people want them, can't afford them, may be in the future we will and ya that's something we are always moving towards.

Participant 1.8 : I would say like of course the technology is involving and so it's good or bad so it's like it's basically a convenience for everybody it illustrates more of adding comfort to your lifestyle what you are doing today, so when the convenience come, people get used to it and like if I just give an example if you see in our generation we used to play outside and we used to have fun and now if you see all the kids, everybody is having phones in their hands so it's a technology and which is good and bad thing. So what is of course going towards more technology say everything but in other words, other way we can say that we are losing some time

So and of course not everybody is having like a smartphone, it is just still coming up. So if I have an option of course I would like to see how much the cost of it is if I really want to go for like a smart home or in other words I would like to say like I would invest in my kids' education so I would prefer the other thing like kids education and then go for my comfort and anything. So that's my perspective on that.

MODERATOR: So you are saying like any other technology there are advantages and disadvantages and one of the important factors is cost. Like to your point you are saying that it's going to go big anyways like people wanted it or not they feel that companies all these brands push their devices, they promote their devices so much that kind of become a need for the people without knowing that they really wanted or not.

Participant 1.4: People want convenience if we think back we knowwe put them in washing machine, we put them in dryer, we put them away and take all this type and condensed it so that you have more free time. If you work the same way we put our..... Sometimes some of these things get to be smart with smart home some of the things that I was reading about today seems to be.... For instance, put a toast in a toaster and have your kitchen lights blink to say your toaster is on.

MODERATOR: You will like the idea of getting your notification when your washer is on?

Participant 1.4: May be, I do like the idea especially when something is convenient as I have some... to take a look at smart options.

Participant 1.3: Yes I just want to add one you know it's like a thought. So how much dependent are we on them? If we take an example that fifteen years back I didn't have an ac in my house and it was like ok I was sleeping right, it was about 100 degrees and I used to sleep under fan. And right now if I go back on a sunny day and if there is no electricity for a day or for an hour what would I do ok? So for the same way if we have smart homes, are we getting smarter? I don't think so, means we are rather going on the other side because we had to remember this is the switch for even that may be a very easy thing but this is the switch for fan or that switch. I don't have to do anything ok, may be you need to Google or relax or whoever she is ok please do this ok and she always listens and so that's the problem. We never have you know a thought process where we have to where we have you know differences I would say or anything, we just say and it is done. So we are not sharpening our brain with that and again I think to Bobby's point that we have to make sure that you know we are having outer friends but maybe I will try to skip that if I am in the comfort of sitting inside you know on my couch and do nothing. So why will I do that? I will only do that once I realize that ok maybe it's too late sometimes. So that's my point.

MODERATOR: I agree to your point like you are saying you are giving an example of air condition, I see the example of smart phones, I used to remember phone numbers of my family, I could dial. Now I know just what number is because it's a smart phone.

Participant 1.3: I am sorry I just want to add a quick thing that we are seeing the means you know I am taking it again because this is the big problem. We see much more people diabetics today than 15-20 years back, maybe we see much more people with memory problem twenty years from now and then we realize that this was a mistake. Then you know that there must be a 'smart home' because the term is smart, it should not only be the companies driving the products, it should be some other authority making sure at the same time that people are also getting smarter. We are not losing the people for who we are doing all this.

MODERATOR: So there should be a some probably a government authority who is looking into these medical affairs of these things?

Participant 1.3: yes I know companies are going to come with all the stuff it's you know they all with stuff but no.

Participant 1.9: I actually research on paper for these exact things and how technology is quite "dominant"...But actually in a lot of times our generation is probably most of the times... Even though we have all this technology, the more we build towards it people have actually created the technology and they know more about it. But it is said there are also things that you know from..... a technology that our attention.... like the. And that we can't concentrate on things like we used to, in the way that our thinking is actually changing because of all these technologies. So is the same thing with like smart technology in smart houses and phones and even the numbers you know like telephone numbers you said, like with the actual time as Bobby was saying with the actual time that we can actually divert to other things such as like.... and actually bring it out to do other things like create more technologies and then as far as like you know like all those... studies... all the time saying it does this it does that but it always going to be debate on what are not all these technologies you know like it's a debate it's just like what will be the first to come out with top priority, you know actually you don't have to memorize the poems you know you are able to write it down. Every time as new innovation, technological innovation comes above we are just going to say this is making us dumb and then as time passes o no it helped us. So I mean it's just going to be the way whatever it is.

MODERATOR: So you are saying what we are missing is probably trivial but what we are gaining is probably more beneficial to us. We might be losing the memory for phone numbers but we are going to Mars and doing more advancements technology. Yes so it's give and take kind of?

Participant 1.9: Its half and half. Yes its give and take. I mean you are going to lose things, you are going to gain things in both ways. I mean it's just that give and take kind of technology.

Participant 1.4: But everybody remembers what you can and what mess that was. Now this was when we need to add a fifth digit to the year and we have gone along with the smart home philosophy and machines did everything and when we add the fifth digit, they just society fix it. Nobody know how to go under the code and explain the feel then add a digit and nobody did anything for themselves anymore.

MODERATOR: So you are saying the more dependent we become the bigger the loss is if there is any technical difficulty in future, it's more difficult to cope up to?

Participant 1.4: Said to be careful.

Participant 1.9: See I will suggest way back because as we keep creating these technologies, technology is just that technology and had to be created and sustained and maintained by somebody. So as much as we like them to maintain themselves, at the end of the day they have to be maintained. I mean you go into a vacuum store and ok let me get my and its all broke because no one maintained it. I mean it's a simple. But it is maintained and these technologies are built.

Like nowadays to get a job you need to have certain type of college degree and it gets smarter and smarter to just keep up the technology.

Participant 1.4:] 7000 office workers

Participant 1.1: I was very carefully listening to each one of you and noted some very good points related to life, sustainability, security and you know ease of use. I am going to comment on each of these quickly. Speaking of automation, rather it's a MODERATOR for the group, it's a complex automation is too much automation, that's to participant point, like what is the optimal level?

Where do we stop? You just said like in favor of artificial intelligence devices, amazon is doing the same for years now by using the keyboard devices and their warehouse so we have lost the battle in warehouses already right, so are we willing to let these things you know take over you know your houses where you spent more than thirty percent of the time and not counting traveling time but at least 30-40 percent of your 24 hours you spend at home. And sustainable, material usage that can be depleted as well, see there is a lot of material utilized to make these devices. It's not a minimalistic approach or an attitude and you might say it's been recycled but it's been lost even the bottles and everything that says recyclable, less than twenty percent is actually recyclable.

The remaining is dumped into the oceans or into third world countries. So that's the downside of it right and to the plus side I would like to say taking down the health aspect let's say you know, I will take the example of my parents. As much as I would like to be with them and take care of them, I would like some kind of a tracker or a wireless device that could you know. So I was talking about the plus points of smart home devices right,

So it's coupled with you know it has to be coupled with it just can't work on its own. I has to be coupled with variable devices, it has to be coupled with smart cars. Then people are talking about smart cities so that work order management if something goes wrong, there has to be some sensors alerting certain gateway some kind of a hub that collects this information and sends personnel to fix it in a timely fashion. So that's one of the plus. Yes speaking of security or legislation, it's always going to be behind, let's face it. Whatever regulation or whatever legislation that is being made so far is ancient. Technology is way ahead of the law, law making bodies. That gap is always going to increase, so we have to be prepared for that.

MODERATOR: You had a very great points. I think he kind of summarized discussion so far and I guess it's a good point to move on to more other MODERATORS. I think this was the

MODERATOR we wanted to spend more time. You guys have also covered some advantages and disadvantages which was separate MODERATOR there. So do you guys currently own or plan to own a smart home whatever is out right now, we are not talking about future but are you planning to buy something in near future that is attractive and you really want?

Participant 1.3: Can you give an example?

MODERATOR: Some of the devices are like Philips hue bulbs, the smart light bulbs that can be Amazon echo device that lets you control lot of devices with your voice, it could be a device that connects to your car and then lets you connect things in your home. There are some devices such as the Samsung refrigerator that shows picture of the fridge, washing machine that notifies you when the washer is down, vacuum cleaners that vacuum itself, you don't have to vacuum.

All these kinds of devices are there in the market and there are many more. I am just listing a few. But is there something in your mind that you really want to go in even though you think it's expensive right now and you really want it? Is there something in your mind?

Participant 1.4: I don't have smart features in the house today

MODERATOR: So although you have mentioned some of the disadvantages about it but you are still trying to lay a foundation where you can in future move into a smart home you know with better. You are not going to worry about being active so much but you want convenience.

Participant 1.4: Now see I want like you said I want to add convenience which adds to my leisure so that I can do what I want to do, I can do certain things in home and not going to worry about. I could do something else sleep in the car, able to drive me.

MODERATOR: That's very cool, smart auto driven cars I guess they are in near future but ya that's one of the things. Anybody else want to buy something?

Participant 1.8: See again how much you want to go with the smart things, what you want to buy, yes of course I have iPhone the smartphone, the Philips hue so the basic things but the other

Things if I had to really buy yes of course I have to definitely as I said before I will look for the cost, how much does it cost and depending upon that I might decide things so.

Participant 1.5: Light and robot, the vacuum cleaners automatic and robotic and something you were mentioning about water dryers with notifications that is something that I always I put stuff in the washer dryer and I never look at it for two days. I am a person who waits as a consumer, want things that come into the market like somebody mentioned here there are so many things that come into the market, you don't want to always be the first one to grab something because one will be because of the patent and stuff it will be expensive and then from a security stability perspective, you want to bath it out in the market to really understand which ones you know really needed as well as something like you are mentioning a few Samsung devices right, you want the

Samsung devices to come to the market and stay there, you don't want them to be going off like the note 7 .

MODERATOR: Seeming to see that you are interested but. You say that you want to trial and test it before you invest your money in it, you decide to buy something but you are interested in getting some of these devices.

Participant 1.5: Definitely there are many things I am interested in.

MODERATOR: Are you guys aware of some companies some advancements in this area, are you guys following deliberately sinking ok what is happening to autonomous cars? Are you guys kind of interested, you follow that?

Participant 1.3: So one thing which I can remember, I think it is in market from pretty time you know some time now, it is AT&T has a concept where you can get the camera installed and if there is any bug ready or if somebody comes, you just get that photograph on your phone that this Participant 1.8as ringed you. Right. So that is something which is useful and I did not see any drawbacks as of now. I would like you know if anybody could add something so because till now I have only seen the drawbacks so that is something which I can remember that doesn't.

MODERATOR: Yes I mean just because you asked one of the things people are concerned in that area is when you like to be able to send those pictures to your phone through the camera, they have to be connected to the network and once you are in the network, somebody can hack and see what's going on in your home. So that's one of the privacy concerns people will have a lot of these cameras. They need you to make the cameras stream public then only you can stream it through the outside the network. So if I am not at home on a vacation I want to see what's going on in my home, a lot of these cameras need you to make it public.

Participant 1.3: So I want to add something, so that maybe a bit primitive when we are discussing about smart home for it to be very quick so see as I said that someday somebody was

Saying that Google we are you know relying on Google and stuff but no one discusses about internet or electricity right. So when you are going to a smart home or you know a camera which is you know putting and so we have 128 bit, we have encryption, we have decryption. So everybody has to understand, that's what I think you know when I am driving a Toyota or a

Honda, I should not think that whether the tire will be stable or not because I have to put a trust and then I go a level up.

MODERATOR: So you are saying that the basic infrastructure the backbone is the network, electricity also?

Participant 1.3: Yes what I am saying is we have to also understand right now we are discussing something and you know there are people on Skype. So that thing is encrypted. So we should not be that much worried about, we should not always count from one when we know already the counting is till thirty. We are at thirty one, we have to rely on something which is thirty.

MODERATOR: You are saying you have to go on with some level of trust, if you doubt every step of it then you can never you know.

Participant 1.3: Yes, when I am connected from my home for something you know I travelled from my work and then I connect from my home, I know it is an external network right even when I am in Starbucks but it is a Google star bucks I can say you are getting. Then that trust has to come from somewhere right like my company is trusting that network that I can connect

MODERATOR: That's actually a good point and that leads us to the next MODERATOR that I wanted to ask. Are there any companies that you guys trust?

Participant 1.1: Is the data that's being collected by all these smart devices, is it staying on the device or is it going to some cloud or to someone else's computer for further analysis and how exposed are you basically? How willing are you to let go off your very private data I should say. You know a device at your home will probably even monitor when you wake up and when you sleep and so on

MODERATOR: So like Jim is pointing towards his fibbed that is technology right now where fibbed already knows that you are up now or you are sleeping now, there are things that we can control with it. So he can say when fibbed thinks I am up then lights are up or when we sleep the lights go off, the air conditioning go up or whatever. It's already there but again privacy right, it knows your health, it knows what time you wake up, it knows what time you sleep, it knows your location if you have GPS kind of it. So that's kind of the topic I want to spend few minutes on. Security, how comfortable you guys are with the security and privacy of these things? Will

You be concerned with your privacy knowing that your personal information might be collected by these smart home devices?

Participant 1.1: So in this age I think privacy is at most. Everybody knows I mean where are you, who are you, we don't even realize that there is a data being collected at every time I mean whenever you are on Facebook I mean the advertisements that you get are based on the searches that you are looking for some time back. How customized it is? So you may not even realize but they are I mean these companies how much can you trust these companies? In fact they are having data breaches in these companies right. So even they are not safe given I mean the recent example for Sony, their emails got hacked and this is one organization that is being named is making advances in smart homes. They cannot keep their own email servers safe right. So how much power are we going to give one organization where we live, it's our life right our family, our kids, everybody, I mean our life depends on it. So it's too much power being given to one organization that would be my concern.

MODERATOR: And that also is about the like level of trust, may be some of us have big trust on Sony but when their servers got hacked about one of the movies that had a lot of controversies their password was password. So I mean that really gets down to a person who is doing it, who is controlling that and how much can you trust?

Participant 1.3: That is something when you are speaking that is something which I was thinking. So when you see a company you know you think about company's fortune 50 or 100 companies having like 200000 employees ok, 300000 employees ok. So today I did not have a good day and my manager was like you know ok you never did anything good and my mood was not good and the evening I thought ok I will quit and what I can do before that is I can run a command Rn-Rn. Means I know I have enough savings for my future, you are getting. So whenever you are talking about giving authority to an organization, so technically there is somebody still sitting there and doing something. You cannot just remove 250000 employees and make it all computerized right, you need to have somebody sitting there, you need to have given passwords to somebody, somebody needs to know everything and trust is nothing but you know that you are willing ok that person will not do that ok. Under today's circumstances what happens tomorrow ok as I said it depends. That is the biggest beauty and that is the biggest I would say the scary part of the human nature you never know. So when you are trusting somebody, some organization, you are actually trusting that one person sitting somewhere who is having the data right, so somebody has access to it, they will not share that's what we are trusting.

Participant 1.4: Something you talked about you mentioned internet of things, the password that means that we are not just talking Sony or not just talking, we are talking 20, 30, 50 different companies that looks wide something and they all have to communicate with one another and

When smart home is not going to work, so that does make security less, does it make it more?

You don't know how many different types of devices from different organizations you lined up in your house and then it's not just Sony, it will be many things.

MODERATOR: So we all agree that security is a concern here, we don't have a solution for it, the companies have to think for it, but how much are you concerned about your privacy? Like you mentioned there going to be cameras looking at you all the time, they're going to be fitness devices to know your health data. This is going to be every information even when you do long reasoning share and collect it. I mean is any of you here thinking I am not going to do this no matter what, I am going to live with what I have.

Participant 1.3: I am sorry I am going to make it very quick. So I have seen my wife scolding me because my fibbed told her I am not sleeping till 2 am in the morning. So that was an example right and that's a very simple example.

Participant 1.9: I know that we have many things smart in our home, I mean even I have a smartphone for me, makes me little antique because I have to on location on just GPS because places you don't know how to get to next place.

Participant 1.4: Got to refine yourselves.

Participant 1.9: Yes but exactly. I don't want you to find my location and my doing anything need you to find my location and then same when you talked about organizations have been you know looking at your stuff .I mean they are monitoring yourself get being back and is making them better yes but your privacy is being invaded. And then you know some others I don't care to be over you know to be on my phone and push a button and o the lights are on and yes find a fitness switch I mean I can without these and I really don't , I mean for me privacy is a bit more important than convenience is .

MODERATOR: So you think you will not make the move unless you are 100 percent certain that

Participant 1.9: I don't know that would even there are certain edges that I was worried about. II mean it's really cool, it's a great idea. As far as technology goes I mean I say better of these we only really care about what we could do with it like our computers therefore we play game on them I mean other than that it's just.

Participant 1.4: How many people use a baby monitor? There anybody anywhere continuing to sit and see

Participant 1.9: yes that's true

Participant 1.7: I think it's you know I am not really repenting on buying any smart devices because the way we use just does not attend calls mostly. Anyone has to be an extreme for they work well. I think something especially things that are intended to home and that are required a lot like the washers and dryers that will beep at you when they are complete. Nobody would consider that to be a smart home device not this way learning your phone but just beeping over and over and something like that is acceptable but things where data stays in your home and does not go out into the network or into the internet. I think those are pretty much secure I mean a long way who ever get into that will be say broken to your home somehow. I haven't really see any issues there as far as anything go out to the internet. I think as long as whoever is going out to the internet, you don't mind if someone finds it. I think you are good but things like you know even credit card numbers to an extent if you have a credit card number and you put it on a website, all of them consider websites you know from commercial websites use credit card information it's all for something like PayPal or use that. Every time I use my credit card, I delete the information from the saved account because the account is more open, more accessible, someone could you know run something, they could find my details, they could guess my details. I could use the same details on another site that was less secure and from this site they could try my details.

MODERATOR: But banks themselves might be secure and have all the things to save you but by saving the information, you might not, the device itself might be secure but when you are integrating with other devices using these third party services, for example those services might link your data.

Participant 1.7: So based on the credits they sent, my banking information is sent. So you know if you give in your name they can easily login your home and manage things from there.

Participant 1.9: What I spoke like you should be changing your password for no less than every 30 days yourself. No one does that as far as they say in order to if you don't want your privacy to be taken I know but you specifically change every 30 days or so and there is something more not as simple as even your security MODERATORS. Now the things like what's your mom's maiden name?

MODERATOR: But that's more hassle than convenience right, we are talking about these devices,

Participant 1.9: But that's the point with, we hear alarming things like artificial intelligence because in the end of the day is not the same as human intelligence. I mean all had the same reasoning as much as you can try and repo crate it, nothing as repo created will be like the human brain that can recreate it to an extent but it is just an, they say ya I just don't leave there will be time where you can really create human reasoning.

Participant 1.1: They have come up with devices such as the IBM, Watson and Siri.

Participant 1.3: Its (Siri) IQ is always zero right. It cannot do anything more than but a Participant 1.8as fed into it.

Participant 1.7: It cannot do anything more than it already knows.

Participant 1.9: Experience.

Participant 1.3: That's correct. But they can think, they can think about something which has never being written anywhere.

Participant 1.9: Creativity.

Participant 1.3: Ya, so when you say those devices are going to heal themselves because they are going to get more information from different knowledge bases which are from the experiences of people. So at the end what happens is

Participant 1.9: So what happens when the knowledge bases are gone and no connectivity in space? They don't work.

Participant 1.7: Well you know till now there has not been actual true artificial intelligence yet, I mean they are on road, if they actually do, it's possible but currently in the existing technology, there is no true AI

Participant 1.3: So when they say you know something is self-organizing like you know a printer is there and it has a self-turner of something like that so at the end of the day what is the result? If turner level equal to less than 10 percent, fill it. So somebody has written it right, so if I forgot some character string,

MODERATOR: So he is saying computer scan can never be as humans, the decision making part of it I guess.

Participant 1.4: A computer which has fought to put in control access with below 20 percent.

MODERATOR: So it will always been an algorithm based on some rules, some adjectives that would decide right?

Participant 1.2: That is the present part of it, the future will change. We are just looking at what we are seeing today. But we could have artificial intelligence into a level where it is out of our control. That is where we need monitoring. So it's like when it goes out of the hand that's the reason as someone put in here is the maximum control. Recently we had last year a game which was actually a Chinese game I don't remember the name where a machine defeated the human. It was actually a path breaking for artificial intelligence. So it's like where a machine is over

Thinking a human being, it's not about an algorithm anymore. It's actually like algorithm is going to a new level where a machine is able to re process itself if not just the limited functionalities have been given to it. So coming back to the privacy part, it's like privacy is very important for every participant but it is like just take the example of Fitbit, so it's like the future would be you get a heart attack, a 911 call will be made, no one is at home, so think about that you have an advantage. There is a privacy concern but there is also an advantage. So we need to see that these companies work towards securing this information to the maximum extent but still provide the good things for that. It's like whether it is health, longevity of life, where the people are working for, where you will have a single human being would be treated as a, all the medication for him would be unique to him because medicine we should take in acts differently in every person. So it's like what amount of chemical or other component that has to go into your body could actually change in the future. It's the technology.

MODERATOR: So in your opinion it's more the advantages may way more than the private data that is sharing with them?

Participant 1.2: May not be today but in near future. The privacy is a concern but there are advantages we could have.

MODERATOR: So the as the security increases it will become less and less concern in future and then.

Participant 1.5: I agree with what he has just said. Again there are lot of advantages and it is really understanding what are the things that are really needed, what all things that move us in a positive direction and you know working towards that, getting that, so definitely there is a lot of positive things but again there are a lot of negative things that needs to be looked in towards. Like we were talking about trusting companies, now these companies have multiple companies working for them right. The Samsung example we took, Samsung is a trusted company that you know delivers a lot of good stuff but the they have a lot of smaller vendors who provide them small products like the battery that is provided for a phone, that is by a different company. Now how much can you trust that sub vendor who provides that?

MODERATOR: So I guess in this case its Samsung's responsibility to test all the devices they are getting from outside. I agree to your point.

Participant 1.3: I am very quick. So but don't you think the technology is way too fast to be tested sometimes. You know everybody wants to roll out their products so fast that you cannot do out testing at that mass level.

Participant 1.1: So Silicon Valley's merchant capitalists today are focusing on one thing and one thing only - "fail fast". If you are going to fail, fail fast. Let us don't force, don't waste our time.

MODERATOR: Do you guys see the device that is available currently and then go oh they could have done this to make it more, they could have given this feature to this device that would have made it something I want. Any current device that you would think is lacking some features? Anything that does not exist or at least you are not aware of it and you think that would be cool if that is smart.

Participant 1.7: So there's actually one thing. Connected to Wi-Fi you can turn it on and off from your phone, laptop and I said to him why bulb and why not just the bulb housing right? So why you know that would go into you know your power piece.

MODERATOR: So without depending on the bulb or the brand, your housing itself is smart so you can use any bulb right and that's a great thought.

Participant 1.7: Right.

Participant 1.3: So I am not sure if it really qualifies for a smart home but I would like this device to be at my home. So transportation, so I have always read that $E=Mc^2$ by Einstein. So why can we not convert all the mass we have into energy, transmit in a second or fraction of a second to our location and convert it to mass again? It may be you know people may laugh today because the same way as I said the same way 300 years back and left. So if that is possible you know that will be like super easier. But that is something which I have been looking, I would like to have.

MODERATOR: What do you guys think actually affects the opinions, the perceptions of people towards the smart home? All of you have opinions, a lot of them are similar if we see a lot of thoughts, some of the thoughts are vary but a lot of them are I see a similar thoughts here. What is that which makes these opinions? Is it the marketing? Is it the brands pushing them? Is the pure pressure that your friends have Amazon echo or something? Or it is just you see the color changing bulbs, is it a quick attraction that you have towards it and later you fell it is useless and turn it on and off?

Participant 1.3: So if somebody says I am taking a phone or talking to somebody, may be before 30 years it was cool, today it isn't. Today what is cool you know I don't do anything, I talk to somebody. So the definition of cool change is very frequently changing with the people you are surrounding, with the area you are living in, with the people you are talking to, so I think the biggest reason is the company's market based on what people want and what people want is again based on what they are looking around, what people have. So it's a circle, a vicious cycle.

Participant 1.8: I would say basically people will go with the brand, so the brand name if you say

the iPhone so the apple brand itself and of course they come up with different features to attract people and even when people ok I have this but ok this is I phone 7 is coming, I need to have it. So the brand makes a lot of difference.

MODERATOR: So you might actually not need it but apple released it, you want it.

Participant 1.8: Yes means I would not go with it but I would say people but of course the people want to have it, want to have the next level of iPhone. Brand really matters.

Participant 1.2: I think what pleasure is today is a necessity tomorrow. So it's like what you feel that ok it's make you feel cool, it becomes a necessity tomorrow once you start using the technology. So yes the technology advances you keep using it and everyone uses it. For example a car, why was it used? It is like a status symbol earlier you know, today what it is? Makes your commute so easy, someone is traveling 75 miles for work, can someone imagine that 20 years ago? So that's something which we have to.

MODERATOR: So that's a good point. A lot of times we are saying that we have everything that we need, everything is now a luxury or a pleasure. May be we don't know what all we need. We know that we need cars may be way in the past, but now it's a necessity

Participant 1.6: So I think technology which is reliable and sustainable will drive the way of life that we will live in future. So something that we can depend on, something that we can trust on, only those are the technologies that will survive.

MODERATOR: So what affects your opinions or you think people are affected by what factors to make this decision? You think its personal choice and personal belief in something?

Participant 1.6: Absolutely, so when you talk about a smart home, it doesn't have to be automating the entire, getting the latest of gadgets right. So Amazon has the small dashed buttons, it's such a small device which makes our life so easy right, just you push a button and you automatically place order for a particular product. So it doesn't have to be a major change but something that is easy to maintain even if it is a 3\$ stuff, you don't have to spend hundreds of dollars.

Participant 1.4: I think a lot of this depends on where you are in life. I can remember we did not have microwaves, we didn't have laptops, we didn't have PC's, and we didn't have all these things. Somebody said they don't like technology, but I almost guarantee you rode the elevator instead of stairs. What is to say what's going to be the difference stairs and elevator? Tomorrow we don't have, to stand, what comes next?

Participant 1.7: It's definitely marketing, most of the products I wouldn't even know about from

marketing you know I actually go out and look for lot of these things like a refrigerator where you can see what is inside, I wouldn't go looking for something like that. So I think marketing is the real driving factor

Participant 1.9: I agree with him, marketing I mean it depends on the person you are I mean as she said it's a matter of personal opinion and it's your own decision, I mean say like what makes you get a phone in the first place a cell phone or I mean everyone I know has a cell phone, I know everyone texts, so how they would text me, can contact mean? I don't have one, so that drives you too. It's like you know marketing and you know peer pressure, even if you don't know this actually affecting you, it is some way, I mean even if we find out our product from someone else you know it's like they saw it somewhere and came from somewhere like a market. So ya.

Participant 1.5: What I say for me is my current needs, what could it be and then what is in the market and how much I can trust that and that comes through reading and analysis as well as talking to others, contacts, friends, word of mouth you know, world of marketing for me

MODERATOR: Actually you are saying you are not going to rely on the commercials you see but you are going to get the real feedback from people around you if somebody is using it already. Ok that's good.

Participant 1.1: I will go back to what was just said and depends on where you are and where you want to be right. I will give an example, health insurance companies these days they are gathering all kinds of data using fib beds and what not and they are creating something called risk profiles very similar to that of the banking and financial companies that they do risk profile on credit scores and the profile people to reduce their risk, that's what is going to happen. So if I am willing to give my data to them and if I am a healthy person, I work out every day, I eat right and everything, I should see my premium going down, because an effect, if I see that happening,

I am fine with it. If I don't see that happening, and I become an unhealthy person, I eat McDonald's every day and what not, then probably I wouldn't share that data because it's not giving me back anything.

MODERATOR: So are you willing to take that chance and get an attempt, then see what the effects are?

Participant 1.1: I am willing to take the chance.

MODERATOR: Would you in near future want to have a smartphone? Yes or no?

Participant 1.2: Yes surely I would like to have.

Participant 1.6: Yes

Participant 1.4: Probably yes.

Participant 1.7: No

Participant 1.9: No

Participant 1.5: Yes

Participant 1.1: They must talk improving, so yes.

Participant 1.3: No

Participant 1.8: I would say partially because I have little bit of it but I don't want to make it how much smart you are.

FOCUS GROUP 2 -

MODERATOR: We are going to discuss the topic Smart home. Smart Home is nothing but a standardized term but we call a home to be a smart home when it is equipped with smart devices. Any devices that are connected to the Internet, Internet of Things and devices can talk to each other & make the life of the people who are living in the home more comfortable & convenient.

We would like to know if you guys think differently and if you guys have some sense about it, could be security, privacy or any other concerns, if you have or if you guys are interested in these things & what your opinions are. I have a certain questions here but we do not have to be limited to the questions. These are just conversation starters, feel free to discuss among yourselves. Feel free to give any kind of opinions where you can relate to the topics.

Ok so, all of you see a consent form in front of you, if not read it properly, then read it & sign it. If you have any concerns with any conditions in the form, you can raise the right now. Once you sign, we will expect you to participate. You guys already signed. Since we all are good we will go a short round of introduction. Just a name & may be your profession, if you work or a housewife or a house maker. We will start with the discussion. The first question I want to ask is:

Q1: What do you understand by the term “Smart Home”? How will you define it?

I have given a rough definition of what I think is Smart Home. What to you is smart home, for some people it might not be a smart devices, not be an Internet friendly devices. It could be some other things that makes a home smart for you. So, what Smart Home means to you. I will start with you.

Participant 2.4: For me Smart Home is, I have the convenience of integrating my appliances like it could be thermostat, geysers, and oven. Like I have a security footage coming out of mind from the entrance, see the forehead and talk to the person & everything is integrated. Very seamless, that I can control with the media tablet, mobile.

MODERATOR: You mean all the devices talk to each other

Participant 2.4: Yes

MODERATOR: but have to be seamless & bends into your day to day life

Participant 2.4: It should not be very complicated but it should easy to use, anyone can use & easy to understand.

MODERATOR: Easy to setup & hassle-free

Participant 2.4: Most of the appliances are easy to reach

MODERATOR: Seamless is the word that you are looking for everything has to be seamless. What the next participant think about

Participant 2.5: In a simple language, we can say it is convenient to the person, like you can reach out to anything, anytime at any possible way.

MODERATOR: OK

Participant 2.5: While entering into the home, I have the remote control to open my garage and I don't have to come out of car.

MODERATOR: You mean accessibility. Everything is accessible to you, wherever you are.

Participant 2.5: Yes

MODERATOR: You don't have to move much. Ok that makes sense.

Participant 2.6: So for me, Smart Home is a term that enables users & residents to live without any worries. For example, if your gas stove is on you should, be able to monitor. Right now, we are only focused on appliances, ease of heat & A/c. For me Smart Home, won't go beyond the concept of just comfort but to safety as well. Wellbeing of the users, even if they are away from home.

MODERATOR: Right, so you are saying, smart home should not be defined by the surroundings of the home, it can extend beyond the walls of the home & you can even use those features outside, even when you are not home. Yes, that's a good thought.

Participant 2.7: Yes, as he just mentioned, I would like to elaborate that point. Smart Home for me is just a home that is smart & that is enough. It should be so smart that if there is an appliances is turned on, it should be switched it off automatically. But at the same time, I know it's difficult. If we see the Samsung phones these days, the screen will stay on. The same way for me, I am not going into how but it should be controlled automatically.

MODERATOR: means you are saying devices themselves should have the ability to make decisions.

Participant 2.7: Decisions based on energy efficiency, on our well -being & on our health everything.

MODERATOR: Devices need to know when to do what rather than we telling.

Participant 2.7: We have those things like alarm, it knows that it has to ring at the specific time

MODERATOR: Programming it to do that means more automation based on the same concept

Participant 2.3: Basically, Smart Home is the home which is smart enough for the person living in the home, like if I am a homemaker & having a kid at my home like my kid is using that remotes & everything Ok. I want to control that my kids should not see these channels on the TV. How smartly I can handle all this with my devices. So, for e.g.: if somebody is in Doctor Profession, so the home should behave or act like ok. How smartly the home can be for a profession like doctor, what he wants for a home maker.

MODERATOR: You are saying a customized approach not just one for everything. It's not necessary that one device is not just useful or helpful for everybody. Everyone would have a different need or different approach. Home should be customized according to the needs. True.

Participant 2.1 : I will begin with some basic things we do at home. Eat, sleep & spend some time in the living room.

Talking about eating we have different types of appliances that are conventional, we have ovens we have microwaves, we have refrigerators. Smart Kitchen in my view, you can control appliances by themselves in conjunction with other devices. Like you are cooking something that cause a lot of smoke. A smoke detector can detect the increasing levels of smoke, exhaust fan speed increases, some sprinklers come on, and these are different integration and the integrating steps that the system can take. Now usually we do it & take steps manually but if we have a system in place that can detect these normally & act to it.

MODERATOR: means you want to say if something goes wrong, then the house should be able to take care itself & not just helping you when everything is good.

Participant 2.1 : Yes & you know to have a good sleep , it's required to have a good temperature 7 good to have a right amount of lighting. Some would say no lighting, so our home, device which can control lighting, depending on the time of the day, its luminosity and intensity should vary & I think that is something we have to teach the device, right

MODERATOR: I think you are saying specific needs that these device have to concentrate on the spec needs of life we spend at home.

Participant 2.5: It should change person to person

MODERATOR: Right

Participant 2.1 : You have sleep in other things, like you have smart mattresses these days. Depending on the person, the firmness of the mattress, changes & if you have some back issues, they are designed in that way & they will adapt. Like if I am sleeping, I have some settings on it, so it will recognize and adapt. So adaptability is something & key.

MODERATOR: Ok Yes that is the great point going to the specific needs & trying to fulfill those, when we want them.

Participant 2.2: For me Smart Home, where the devices or the appliances that we are using are not acting anymore dumb, where you are communicating with them, trying to switch on something, to make it function. Here it is like based on your needs, remotely you are able to access them & make use of them & program them in such a way that if you are not there.

For example: when the first time I came to know about the smart devices, when the person walks inside and the fan or the lights turn on. That was fascinating to know on. Now the things are becoming more intelligent & that was the start & today we have more & more devices getting into and making our lives more & more comfortable. It adds to it because today our lives are becoming busier & busier, we travel a lot to work outside the houses and we live in a nuclear family. Now a days with less people & to take care that we are not many people in the house, so it likes we are getting these gadgets or devices that are helping us & making our life easier. That is what I think

MODERATOR: with that at least we got the initial impression from everybody what they think about smart home & what their expectation are from home

Participant 2.4: A few days back in our community, someone broke the patio door and just came in. From that day, I'm just like, I want to get something..

MODERATOR: So you're concerned about security and you want something.

Participant 2.4: Yes I'm very much concerned about security and I just want to install something at both the doors so I know whoever is there at the door and some alarm can go off at the time when I don't want it. So safety and if it can make me feel secure, that's like a big go for me.

MODERATOR: Does somebody own any smart home device right now?

Participant 2.5: I don't own any device right now but I'd love to own a device which will keep me safe and secure.

MODERATOR: So safety of the house even when you're not at home..

Participant 2.5: When I'm away from home, I would want to see my kids.

Participant 2.6: Can you please repeat the question? I had trouble understanding it.

MODERATOR: The question I was asking everybody is do you currently own or plan to own a smart home device?

Participant 2.6: Yeah in fact I own many of them.

MODERATOR: So Participant 2.6, I asked you the question if you currently own some smart home device and you were about to answer that.

Participant 2.6: Yea so I was saying that yea, I just ordered Amazon Echo, I'm sure most of you've heard about it. I also own an Apple smartwatch which I just returned recently to get the next model. However, one thing is to say that although like Apple Watch is not classified as a smart home device but it really depends the way you decide to use that whether you can integrate it across the appliances and use it as a smart home device just like smartphones and iPads that are indeed a smart home device depending on how we use that.

MODERATOR: So if you're using a Home Kit enabled devices, then you can control using Apple Watch so it can be considered like a remote for your smart home.

Participant 2.6: Yea, true.

MODERATOR: Any specific features you're looking for in Amazon Echo?

Participant 2.6: Yea, for example, I don't want to spend too much on hardware these days like when I go to bed, I don't want to have a separate study lamp, separate table lamp, separate bed lamp, so what I'm looking for is if I can use that \$40 device to save some \$200 bucks that I used to spend on lighting my room, and it lights according to my convenience. So that's what I'm looking for in Echo.

MODERATOR: So you say you're looking to control lights and other appliances through Echo.

Participant 2.6: Yea, but these devices don't offer seamless integration across different operating systems that's why you can't use them like a completely smart thing. They're dumb devices pretending to be smart.

Participant 2.7: But yea, I'd like to add something, so as you just said that they're dumb devices pretending to be smart, that makes some sense but if we go back ten years, there were devices that were not even this smart. Or you know, as I always say when something as primitive like an alarm clock has become automatic. So at 7am, it's a machine that it knows its 7am and I've to do something. So that's how it starts. Another example is Samsung Note 7, maybe it was a technical fault but on the other side we can say they were trying to make the battery even better so that it can support more complex software. A lot of times, it happens that when a company manufactures a device, it is not exactly the result which we were thinking while making the device. But that's how innovation works and that's how it all starts.

MODERATOR: You're saying these devices are evolving.

Participant 2.7: They're ever evolving.

Participant 2.5: But you're talking from the point of view of the innovators, but if the consumer is looking at it, he'll not go into that point.

MODERATOR: That is true, just to elaborate on her point. I think she made a very good point here. There can be two kinds of people – one is innovation who are ready to take the risk with the newer devices because they're technologically interested but as a consumer like her would think why would I pay for a device that is not perfect.

Participant 2.5: Money is the main point, for like everyone. How much you make is not the point there, but how much you spend is the point.

MODERATOR: You don't want to buy something until you're 100% sure that this is perfect.

Participant 2.5: You don't keep on buying things just to experiment and stuff.

Participant 2.7: Oh yea, that makes perfect sense, that's why companies have warranties but what I'm trying to say is that a device on whole should not be considered to be 100% perfect. Obviously we're trying to stretch the limitations of the device these days too fast than a couple decades back.

So the speed of a new thing coming into market is much more than it was, maybe 50 years back. There was a time when we had a newspaper and a printing press, so now changing the information which reaches the person sitting 1000 miles away, it's a button click. If I had to send that information 500 years back, it would have taken 10 days or 20 days or maybe more. Even if the technology is increasing, the platform that supports the technology is also faster now.

There is more room for error that's what I think personally because there is lead time to anything that comes to market.

MODERATOR: I think we kind of have two thoughts here. Yea go ahead Participant 2.6.

Participant 2.6: I'd like to slightly disagree on this. Today we have Tesla testing its self-driving vehicles and when we talk about bringing everything to a smart home device I think it's just about marketing the innovations at an incremental rate, because you want to have version S, S+, etc. You want to keep your market alive. You don't want to put everything in one device and have nothing to launch the next year. So that is the thing that yes, innovation and technology are evolving but that integration that is possible given how Artificial Intelligence and machine learning have evolved, it is marketing thing that how these devices are evolving in comparison to the technologies.

MODERATOR: So you're saying technology could be evolved faster if the companies were not holding back.

Participant 2.6: Technologies have evolved beyond a point but these devices have still not caught up and the reason I see is completely because of marketing.

MODERATOR: Because they want to see a five year sales plan.

Participant 2.5: It's totally on the point of the company. Because they have to run their business.

MODERATOR: These are great points before we can get more distracted from the topic, I just want to bring us back, and because this can happen that we can talk about technology advances and move further from smart home topic.

So does anybody want to add to this question on owning or planning to own a smart home device?

Participant 2.3: I'm planning to own a device, Amazon Echo. I want my kitchen to be very smart, I want smart cookware, I want smart electric stove.

MODERATOR: So you want smart home today!

Participant 2.3: My kid is growing up so I want my kitchen to be smart and safe.

MODERATOR: So a kitchen that can take care of itself.

Q4. Do you think any company or platform is providing better Smart Home devices than others?

Participant 2.3: basically we are aware of all the advertisements.

Participant 2.4: Whatever is marketed we come to know that

Participant 2.4: everybody knows apple watch because apple is moving into smart things marketing

MODERATOR: are you guys following any devices that are better than other devices?

Participant 2.1 : sure, if you see how smart homes are build it consists of different areas kitchen, bathroom & living room etc. so on. Different companies have different products targeting different specific functions. Like we have NEST that controls temp. It makes you feel very comfortable and at the same time optimizes your utilities bill. That's something that nest is doing. Now comes to bathroom fittings, a smart soap dispensers, depending on outside temperature the, water that comes out of your tap changes, so that's the smart fittings.

MODERATOR: so these are devices, so do you think any companies is working on it

Participant 2.1 : Moan is one company that I am aware of and doing a lot of good work. They recently released a product called "smart shower ". Moan is working on bathroom aspects. If you look at kitchen, I think at that side lot of activity is going on. I have personally worked for a European home appliances company and I follow that company for all my recent updates or any new products. Bosch, Siemens are leading players in Europe and almost in every kitchen of Europe.

Participant 2.5: even Philips is emerging

Participant 2.1 : right

MODERATOR: Philips is more leading in lighting these days. There are many companies which are making lights

Participant 2.1 : It depends on functions that what you want to do. It is like all the smart devices lying on the table but it is up to us what do we want to do with it. Do we want to just text people or do we want to just call and put it aside, for that we don't want a smart phone.

Participant 2.2: he is right in saying. Many companies are working on different platforms like someone is working on kitchen appliances someone are working on bathrooms. We do not have a leader someone dominating in the market but in appliances we have Samsung and LG are leading, smart devices like thermostat we have nest leading. So it's not like single company we can outline and say this is best today. They are all into different places

MODERATOR: correct and in current scenarios what we see is the devices which are doing well are actually independent on any particular operating system, so if you mentioned Philips hue bulb, they work with everything. They work with iPhone, they work with android they work with echo, pretty much like every smart device will work with Philips hue bulbs.

MODERATOR: same thing is with ECHO, one of the reason that it is popular because it works with many things. So, I guess the leading companies are apple, Samsung or LG they are doing many things but they are restricted to their products and their ecosystems and not much open and it is one of the restriction.

Participant 2.1 : So, if you want to build a smart home, you can take the best in each area, what satisfies our needs most in terms of kitchen, safety. People have their own priorities. People have safety as their priority. Lowering the cost and on the needs you can pick and choose the products and put them together and hoping that they just work well as they do when they are by themselves. For that I think integration will be a challenge and I know borsch is doing lot of good work here.

They are developing a platform, using which they are working on API's (Application programming Interfaces), it is nothing but it's like a pay form. For example: if you put a coin, you are allowed to make a call as simple as that.

Participant 2.5: Like it goes with everything

Participant 2.1 : that's the goal. Bosh is doing great work as they are opening their devices, allowing their competitors to even ping the devices and get a response from them and use that information in making smart choices by making our home a smart home.

MODERATOR : These are great points before we get distracted from the topic i want to bring us back to the topic, Anybody else wants to add something, If someone owns a device or planning own any smart devices

Participant 2.3 I am planning to own a device like amazon echo, i want my devices in kitchen to be very smart, I want smart cookware, smart electric stove.

MODERATOR: So you want your home to be smart Today!

Participant 2.3: Yes, as my kid is growing I want my kitchen to be very smart so if she is reaching to the hot surface or anything I want her to be safe.

MODERATOR: OK, so you want the kitchen to take care of itself so you can take care of your kid.

Participant 2.3: Yes

MODERATOR: I have heard Amazon echo a couple of times that seem to be a popular product. Is anyone aware of some other devices that are doing great and you want that?

Participant 2.2: i would like to get a Roomba, which is something that would keep my house clean

MODERATOR: so you hate to vacuum?

Participant 2.2: yes i do, so it will keep my house clean that's something i would like to have

MODERATOR: Yes Roomba is good device... Since we are talking about these products, Do you think any company is advancing in this field faster or doing better than other companies in this field, There are different companies which are working on different stuff, such as Apple has Home kit, Google has something called Billow, Samsung has their own devices, LG is doing it, amazon is doing it. Are you guys aware of these companies or you are only aware of products that are being pushed hard with marketing and reaches to television with advertisements.

Q5 : Since most of the Smart Home devices will be connected to the Internet, does this raise any security concerns to you? Will you be concerned about your privacy knowing that your personal information might be collected via these Smart Home devices?

MODERATOR : Companies knows where you are where you have information and they can give you advices basically how much concerned you are about your privacy , there can be security cameras looking at you and there can be hackers who is trying to do a robbery and there can be some person from that company who is looking in your bedroom. How much comfortable are you about this possibility.

Participant 2.5: everyone should be concerned about the privacy. This is the main thing you want in your life.

MODERATOR: Home is a private place, so once you are home, so you want to be free

Participant 2.7: This is one of those things, such as privacy, which is too much specific or you know the dynamics meaning totally changes when you are talking in that context of smart home rather than any others ingle device in the universe . May be you spend 2/3rd of the time outside, so you go target, Walmart, office, DMV and at some place you need to be someone who you are not the real one. This is where homes works smart, you have different faces when you are in office or out but at home you are real. Privacy should be the biggest concern, a smart car is fine.

MODERATOR: So you mean to say you are outside and always trying to role play or show different image of yourselves means attentive but at home you are vulnerable.

Participant 2.7: You can't pretend when every time camera is looking at you. But when I am at home I am not thinking anything and becomes risky if I have cameras or sensor, which I don't know. I have heard of things that people looking at the night in their phone and stuffs and their videos were getting recorded and sometime you don't know what your phone is doing and right now it can be possible that it is being recorded. I don't know.

MODERATOR: There were cases when companies were recording through the webcam of the work laptop, what employees are doing they are working or not.

Participant 2.7 : we have phones everywhere so it's hard to believe. Initially I told Privacy is the biggest concern for smart homes specially.

Participant 2.2 : Today we had in news from FBI , always close your phones , personal laptops and put stickers on the cameras because even when switched off , someone can listen to it. So how open your devices are.

Participant 2.5 : Nowadays , we have touchscreen and we have to check that is the phone cut or not if we are talking at back .You make sure your camera is not on and it's not being recorded.

Participant 2.7 : These devices were made for outside not for home and now being transitioned to home slowly , where we are very happy that it can do this , it can sense this and that but at the same time it can get data and send to somewhere and this guy is at home or not.

Participant 2.1 : we all know about Mark Zuckerberg , he launched new feature on Facebook i.e. 360 degree photos and while doing that he had some pictures and videos streaming live from Facebook headquarters , California. His laptop has a plaster on the webcam , so he is the guy who is at forefront of the technology and making billions of dollars and he himself is not sure whether he is secure or not. He don't have the headphone jack in his laptop.

MODERATOR: So without mic, audio pen can be recorded. He obviously knows better than all of us.

Participant 2.5: For convenience & comfortableness, everything is fine but privacy comes fast and is a big concern. If you are using the technology, so you have to be careful, you can't be like that I am using this that and I am safe, I don't have to do this and that.

MODERATOR: So you say advantages are lesser of a benefits when it comes to privacy.

Participant 2.1 : You can quantify a privacy, see that is the problem.

Participant 2.5 : This reminds me of one thing that in old days we do not have the phones and the only phones landline rings and if my father don't want to talk to someone , he will always say tell them we are not home. It was easy at that time but now a days it's not like this.

Participant 2.7 : on WhatsApp , if it two blue ticks means you have read the message and you are not replying .

MODERATOR : you don't have the privacy to see a message and take some of your time to reply.

Participant 2.4 : Game called “ Pokémon” , there were incidents that people would come to know the location of the people .

MODERATOR: I think everyone in the group agrees that privacy is the biggest concern

Participant 2.4 : I don't see a solution in any way.

MODERATOR : solution is to give up

Participant 2.2 : when we are exposing the Internet to the outside world , there comes the problem. If we have our own private internet, then it's protected

Participant 2.1 : then how can it leverage the outside things and benefits

MODERATOR : you have your own device

MODERATOR: Right so some great thoughts here but i think i have mostly heard all positive things, I want to know not only advantages but also disadvantages from you guys that you think about the smart homes. Like you mentioned safety right, you want to be able to see in your home from wherever you are but are you concerned that someone else might also be able to look into your home.

Participant 2.5: Yes that is a big disadvantage

MODERATOR: You are saying that your kitchen should be able to take care of everything but what if somebody else gets control of your kitchen and then burns your gas or does something bad. So there could be some concerns like this. Some concerns can be that you are going to become lazy because of these devices, Can you think about something that can be some concerns that you might have.

Participant 2.4: i think the biggest disadvantage is just the fear that somebody can hack into your system and they will have the same access as you have now. That's the biggest fear

MODERATOR: So security!

Participant 2.4: Yes Security, Laziness i think is a personal think. I don't think we can everywhere on a bicycle just because we can get lazy by sitting in a car. We have a brain to judge and decide what is good for us. I don't think laziness is a factor but yes security is big issue. Like until and unless we have something like a. some fine a confirmation that the system is so much proved that it cannot be hacked because...may be password is encrypted or something... i don't know up to what level it will be encrypted to be that safe but until and unless i am sue about that.. I'd hesitate. I'd hesitate to make my whole home smart.

Participant 2.7: Yes i would like to add something here...as soon as we transitioned from physical to electronic world. This was the biggest fear i think so. The time when the information, photos videos started moving with electrons you actually cannot control it. I remember some time ago i was doing something and i created a text file and my friend told me to save it as exe and i don't remember complete but it used to start automatically and copy some data from my laptop to my friends laptop. A person like me who knows nothing about creating a file like that and i can fetch data from the laptop provided the right access which means that people who know stuff can do anything. So like you said the system should be proved, my point is if it is not physical, technically it's never proof. because the company which is proving it weather it is apple or Samsung or there can be any biggest company in the world, ultimately it is one person sitting their writing the code ok then they say we have added an encryption layer but it is again some person writing the encryption so if there is person who can think of these algorithms to make it secure there can be another person who can think how to break it.

MODERATOR: so you are saying there is always a key to every lock

Participant 2.7: yes there is always a key as long as we are living in an electronic world. It is like if i have a will and it is kept in a safe i know it is safe until the safe is stolen but in electronic world you don't even know what is stolen and that is the biggest fear. I fear more about not even knowing what is stolen than something being stolen and that's the biggest fear for me about smart home

Participant 2.2: We have talked about safety and privacy here but something i think is also a concern is the malfunctioning of these devices for example there is a device like stove which can be big concern for safety, for example you are outside of your home you are not controlling it but it suddenly turns on due to some reason and it does not stop and it burns your house, what happens? So it is just an example that what happens if these devices malfunction. The code which is written for them if it has some bugs in it or something that started it or something...

Participant 2.7: it can, it is a machine it doesn't have an IQ right.

MODERATOR: And a lot of times with these manual devices we go out and we are still worried that did we leave it on. But with these automated ones you would even know because you will think what did Alexa do or what did SIRI Do. Did it take my last command correctly?

Participant 2.7: very quickly i would like to add to this point. We are much far away from the primitive ages. So if today somebody tell me to live on my own without anything that i uses may be i will not survive i would say. And with these smart devices it is going to be very difficult. We cannot go and take wood to make fire out of that. So technically we are using the things in the same way if we are going to put that in the terms of smart home we are going to become dependent on these devices. Like today i would not know how to make fire from woods.

MODERATOR: So you're (Participant 2.2) concern is what happened if these devices and malfunction, and yours (Participant 2.7) is that as these devices become more smarter we might become dumber

Participant 2.7: yes and one day if there is malfunction i would not know what to do

MODERATOR: so if someday there is a malfunction you would know the alternate ways of doing things because you only know these smart devices can do it for you.

Participant 2.7: yes so may be my father and forefathers can survive in a situation where I cannot and may be there father can survive in situation where they cannot it's the same thing

Participant 2.4: You know there were time when there was no cellphones and we used to remember all the phone numbers and now it's hardly there is one or two phone number that we remember.

Participant 2.5: we are so much dependent on the devices. Like sometime while going on the car i forget my charger and battery goes down i don't remembered any numbers, how can i call someone. There you go i am not going deep in the technology but the simple things we do. and adding to the point as Participant 2.4 said, security is also a point of concern for me but laziness is also a big point because every time your brain is functioning but like i am sitting and everything is coming to me i will not even stand up because everyone like that.

MODERATOR: but you might have more time to go to the Gym because you have not spent time doing this other stuff. Just an argument

Participant 2.5: but you can be lazy

MODERATOR: yes you will have to think of another way to workout

Participant 2.7: like they say work is a necessary evil, there are certain things which i have to complete so i will do it. If i don't have to do it then may be i will go to gym or not that is another thing right. So if i have to go to school or may be my office then I will do it.

Participant 2.4 : There were times when we used to remember all cellphones numbers and now we are so dependent on them , that we hardly remember any numbers.

MODERATOR: You will have more time to spend in gym and do other works. You have to think ways to overcome your laziness too.

Participant 2.5: The smarter we become and start using devices, less manpower will be required by the organization as the technology is advancing more.

MODERATOR: Participant 2.6 do you think any disadvantages of this smart home devices?

Participant 2.6: One of the disadvantage is that "You always want for more ", whatever you say and want to spend money to get that smart devices. I ordered amazon echo yesterday and while I spent talking with her and searching for all the accessories.

Participant 2.2 : Going towards advantages : Fitbit is one of the smart devices which we use , if I see before Fitbit and today , there are more people going to gym because of Fitbit. Everyone has device and it becomes a competition that we should also have. Dependency is coming up with comfort ability to the point on phone numbers remembrance and your brain is being used in other things.

Participant 2.3 : Disadvantage : Reliability & want for more & cost. In today's time nothing comes for free, even we have to buy pen to write, so you want something you have to spend something.

MODERATOR: Microwave was opposed heavily and television saying don't use it's unhealthy.

Participant 2.6 : Era has become anthropometric , like we only think about humans and as if no other species exist. Now the volume of waste that we are generating to make our home smarter is about 48.1 million tons each year, which was the peak value of 2014 and needless to say you cannot dispose that away stock, you cannot burn this nor can you bury this. That is like a big disadvantage

Participant 2.1 : That's a great point.

MODERATOR : In order to go to the smart home , we have to change all this appliances and which will create a lot of waste, that we have to think about. We have been thinking how Smart home will affect us but how will it affect the environment and other species. It's an important point.

Participant 2.4 : Biggest advantage is for people having mobility issue . Disabled people, elderly people. They can turn on lights on their own and turn on and off thermostat by their own.

Participant 2.1 : MIT Media Lab has actually released a product which does that, if a handicap person on wheelchair can easily access things.

MODERATOR : So devices should be customized according to all the needs. Even the idea of smart devices should not be only for being smart but also towards making us healthy & also making us active. Devices should be only convenient to us but also be inspiring us to be active and inspire us to have better memory and ability to learn things. Wastage is a great point. Organization must be thinking about it and working on this.

Participant 2.1 : Apart from smart home devices & wearable devices, this Internet of Things also comes into pictures. US grade is being energized. Everything will be digital and data will be collected where the demand will be high and where the transformers will work more. It all works when it is connected to the Internet. One hackers can look out a layout of the house & the community by this too.

MODERATOR : the effects & the damage cannot be limited to one home , there might be these early adopters who can open gates for the people to understand how to hack and come and break home. How about privacy? we have talked about security ,push ads to you and give you optimized results about the devices . How much concerned are you about the privacy.

Participant 2.5 : This is the important factor and everyone should be concerned about it .

MODERATOR : Means home is the private place

Participant 2.7 : Dynamics and meaning totally changes about the privacy when it comes to smart homes. Privacy should be the biggest factor.

MODERATOR : you are attentive when you think camera is watching and at home you are you but cannot pretend all the time at home. There were times when companies were recording to see if the employees are working or not.

Participant 2.2 : There has been a news , that “ always have phones & tablet covered on the camera. There should be a sticker on the camera. Even when your phone is switched off, then also they can listen. So how are these devices working?

MODERATOR : With these devices coming out , the laws are getting stricter and people are becoming more aware and asking questions and companies are coming up with more ways to resolve this , example on iPhone your fingerprint is there but never goes to the server. There are things companies are doing to make you feel secured. At least they are putting efforts. There are ways of protecting yourself and it's always give and take, how much you want to give and have limited features and make use within the network . Let's move back to devices, what would you like to change in the Smart Home devices that are currently available to make them better suit your needs? There are many devices that are evolving, so what changes you want.

Participant 2.7 : I want a pill that I can eat that automatically senses any cancer cells, tumor cells and anything that can be tested in the hospital

MODERATOR : it's the expectation but let's talk related to smart homes .

MODERATOR : there are devices that is in your homes and emit some waves and the waves collides from your body and senses the movement of your chest and breath and tries to protect how healthy you are and if something goes wrong it can call emergency services .That can talk with other devices.

Participant 2.6 : apple watch has two sensors one to track your heart beat and measure oxygen and FCC did not gave compliance as you cannot measure oxygen and it will be additional waves to your body at every step.

MODERATOR : devices should be more eco – friendly and health friend and non- invasive.

Participant 2.4 : Washing machine should be smart enough to decide the cycles on the type of clothes.

MODERATOR ; More help towards organization of the home and the cleaning of the home .

Participant 2.1 : we are relying on the devices to take over our tasks and there will be allows some type of user interaction and we need to decide what type of interaction we want with these devices and make them customized. ‘Self-cleaning ‘ feature in oven

Participant 2.6 : Smart home devices to be very integrated and don’t want 6 other devices to operate one devices . So integration

MODERATOR : Last question to ask : What do you think, affects people’s perception of Smart Home devices?

Participant 2.1 : We talked about lot of things & devices. Word of mouth matters a lot and believing on them. In our circular friends at least he is up to date on gadgets. Will look at him on advises

Participant 2.4 : I will google and read all the reviews and not dependent on one source and try to research on it and get all the opinions and get pros & cons and then decide.

Participant 2.1 : These companies pay high to get top on the search results and the for the reviews and the stars on the amazon product line can be brought.

MODERATOR : marketing & the brand push is making our decision

Participant 2.2 : Affordability needs to be considered

Participant 2.7 : Marketing is the main thing

Participant 2.2 : Tesla model is all about the marketing what do we buy it , that how affordability

Participant 2.6 : Affordability is one of the factor due to which I bought amazon echo.

MODERATOR : YES and NO : Would you like to live in smart home today ?

Participant 2.4 : Yes already have apple watch and microwave

Almost all said yes.