REMEMBER ME

Building personal relationships between salespeople and customers.

INVESTIGATING
AUGMENTED REALITY OPPORTUNITIES
EMPOWERING RETAIL SERVICE AGENTS WITH AUGMENTED REALITY

A thesis submitted to the School of Design, Carnegie Mellon University,

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A B S T R A C T

This thesis attempts to investigate of how AR can create a beneficial impact on consumers' lives. The question of AR technology might be used to enhance the in-store shopping experience is investigated, since this has recently been challenged by the emergence and continued growth of online shopping. E-commerce has offered many retail innovations including personalizing information to individual customers. These advances have not been easy to bring to retail environments, which still make up the bulk of people's shopping. Salespeople want to engage customers on a personal level, and they want to discover a customer's interests in order to provide high quality, personalized service. They often struggle to understand a customer's taste and needs, as personal taste is hard to communicate. Augmented reality offers an opportunity to deliver individualized information about customers to salespeople in order to help them personalize service. This thesis project explores opportunities for augmented reality technology to help salespeople to better understand and create personalized relationships with customers. I researched retail salespeople's experiences to identify design opportunities. Based on the opportunities I identified, I propose an augmented reality platform with tools that can provide real-time, integrated information about customers to salespeople.

CONTENTS

INTRODUCTION

01

05 - 06

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INTRODUCTION

In contemporary society, humans are constantly connected to numerous electronics throughout the day, and interactions between humans and machines have co-evolved along with technology. One of the new emerging languages connecting humans with machines is augmented reality (AR). AR turns the environment around the user into a digital interface by displaying virtual objects against the existing world. AR blurs the line between the real and the digital world by virtually enhancing visuals, sounds and even smells. Users can have richer, more immersive experiences with AR. As human interactions with computers have started to move away from the smartphone, a significant wave of AR is approaching.

AR changes the communication barriers between humans and machines, and also makes this interaction much more immersive. Many technology companies have invested billions of dollars in this area, and this might be the next main platform used for interactions with one another. However, some observers are skeptical, and question whether AR can create an impact. The most important challenge is that it is currently unclear what AR should be used for, or how it might help.

A few years ago, Google introduced Google Glass, a headset display device that can take photos, record sounds and allow users to interact with the internet via voice commands. [1] The device uses a mediated reality to display the information on top of the existing world. However, the purpose of wearing this device when encountering other people was not generally understood, as was the problem the device was trying to solve.

In terms of the retail shopping realm, one of the greatest trends currently developing is the domination of online and globalized retail stores. Although there are great benefits to be gained from the emergence of online stores, service theory shows that employees add value, and that customers desire high-quality, personalized service.

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[1] Matt Swider "Google Glass review" Techradar February 21, 2017
http://www.techradar.com/reviews/gadgets/google-glass-1152283/review

This thesis attempts to investigate the problem of how AR can create a beneficial impact on consumers' lives. The question of AR technology might be used to enhance the in-store shopping experience is investigated, since this has recently been challenged by the emergence and continued growth of online shopping. This realm was chosen for the following reasons:

One of the potential "sweet spots" in which AR can add value is in the area of face-to-face service encounter; almost no current technology supports this kind of social interaction. Research shows that people add value when they have a good service. Research also shows that in-store retail is dying because people are moving to online. AR provides this opportunity for mixing data and action in the physical world.

AR offers a valuable chance to blend the best aspects of digital personalization and front-line employees, since AR allows the salesperson to undertake face-to-face service encounter and at the same time allows the salesperson to receive additional information through an AR display. This research aims to successfully achieve this balance of physical interaction and technology through the AR display.

Specifically, this work examines how AR can help salespeople to build a more effective and lasting relationship with in-store customers. This was achieved through fieldwork with customers and salespeople. To identify the problem space, a number of interviews were carried out with both salespeople and customers. Based on the identified problem space and key findings, a particular store was chosen for continued interviews with salespeople and to shadow them in order to develop a concrete solution.

The concept proposed here is an augmented reality system called "Remember Me", which helps salespeople to build a personalized relationship with customers. Building a personalized relationship helps salespeople to provide a high-quality service, which makes them perform better in their work. "Remember Me" allows the technology to support the salespeople, to strengthen and expand their human-to-human interaction skills when engaging with customers. The system ultimately creates an enhanced awareness for salespeople, so that they can perform more effectively, helping them to retain their jobs for much longer.

RELATED WORK

08 - 12

The goal of this section is to understand the state of the art of AR and to explore the area in which this project can make a novel contribution.

RELATED WORK

This section describes the state of the art of AR and to inform how my research can make a novel contribution. Related work falls into three areas: augmented reality, service encounter, and AR in retail.

2.1 Augmented reality

What is augmented reality? An AR system supplements the real world with virtual (computer-generated) objects that appear to coexist in the same space as the real world.[2] AR can potentially apply to all senses, including hearing, touch, and smell. Certain AR applications also require removing real objects from the perceived environment, in addition to adding virtual objects.[3] Over the years, researchers and developers find more and more areas that could benefit from augmentation. The first systems focused on military, industrial and medical application, but AR systems for commercial use and entertainment appeared soon after.

Research shows that one of the biggest potential markets for AR could prove to be in personal wearable computing. AR may serve as an advanced, immediate, and more natural UI for wearable and mobile computing in personal, daily use. For instance, AR could integrate phone and email communication with context- aware overlays, manage personal information related to specific locations or people, provide navigational guidance, and provide a unified control interface for all kinds of appliances in and around the home.[4]

AR faces technical challenges regarding for example binocular (stereo) view, high resolution, color depth, luminance, contrast, field of view, and focus depth. However, before AR becomes accepted as part of user's everyday life, just like a mobile phone and a personal digital assistant (PDA), issues regarding intuitive interfaces, costs, weight, power usage, ergonomics, and appearance must also be addressed.[5]

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2 Ronald Azuma, Yohan Baillot, Reinhold Behringer, Steven Feiner, Simon Julier, Blair MacIntyre "Recent Advances in Augmented Reality" November/December 2001
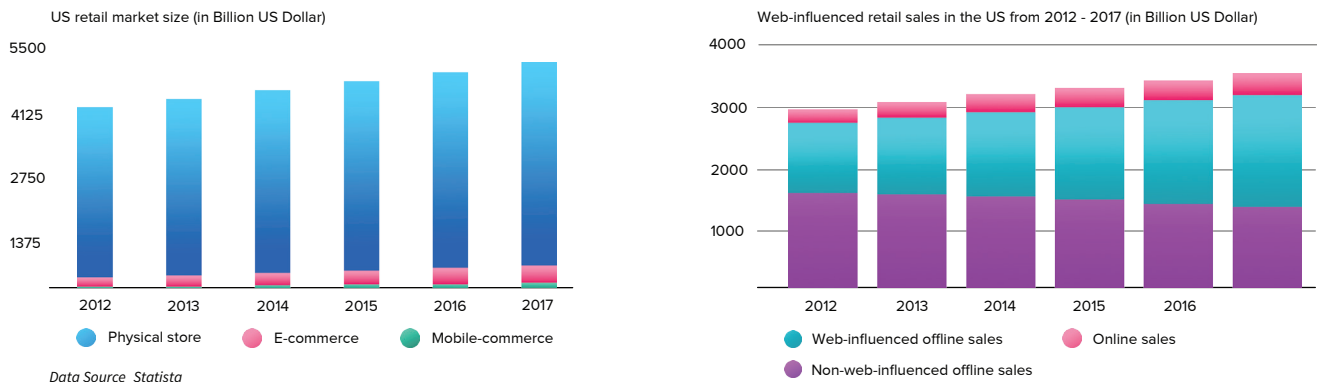
3 Ronald Azuma, Yohan Baillot, Reinhold Behringer, Steven Feiner, Simon Julier, Blair MacIntyre "Recent Advances in Augmented Reality" November/December 2001

4 D.W.F. van Krevelen "Augmented Reality: Technologies, Applications, and Limitation" April 18, 2007

5 D.W.F. van Krevelen "Augmented Reality: Technologies, Applications, and Limitation" April 18, 2007

2.2 AR in Retail

Recently, there has also been a large increase of web-influenced offline sales. The trend is for traditional retail stores to become more hybrid/digitalized stores. While most retail stores are physical, web-influenced sales are increasingly leading to hybrid (digitalized) stores. Retail stores are evolving in a direction that embraces AR.

US retail market size (in Billion US Dollar)

Physical store   E-commerce   Mobile-commerce

Data Source_Statista

Web-influenced retail sales in the US from 2012 - 2017 (in Billion US Dollar)

Web-influenced offline sales   Online sales
Non-web-influenced offline sales

"While most retail stores are physical, web-influenced sales are increasingly leading to hybrid(digitalized) stores."

Figure 2.1
Retail Market Graph

A particular trend is the way in which retail stores have started to adopt emerging technologies such as augmented reality, computer vision, machine learning, sensor fusion and many more, in order to deliver an enhanced experience to customers. For instance, Amazon Go ,[6] a store where customers don't have to stand in line, is a good example that uses major advanced technologies. Customers can simply walk into the store, pick up the item they want to buy and pay with their mobile. Other globalized stores are also adopting unique advanced features to enhance the overall experience of customers. Merging advanced technologies have had a great impact on sales and have also enhanced the experience of the customers. One of the technologies highlighted in this regard is AR, which retail stores have started to actively adopt in retail industry.

There are numerous research studies and projects currently being carried out into the use of AR in retail shopping. Research has shown that having multiple people view, discuss, and interact with 3D models simultaneously is a major potential benefit of AR. Collaborative environments allow seamless integration with existing tools and practices and enhance practice by supporting remote and collocated activities that would otherwise be impossible .[7]

6 Seth Fiegerman "Amazon opens a grocery store with no checkout line"
CNN tech December 5, 2016 http://money.cnn.com/2016/12/05/technology/amazon-go-store/

7 BILLINGHURST, M. AND KATO, H. Collaborative mixed reality. In ISMR'99: Proc. Int'l Symp. on Mixed Reality (Yokohama, Japan, Mar. 1999), Springer Verlag, pp. 261–284. 3.5

The current work analyzes the traits and benefits that prior work on AR shopping can deliver. One of the most interesting findings is that most of the studies of AR within retail shopping are focused on the customer's experience, and attempt to give the customer easy access to information and allow them to search for a specific product. However, there are no convincing research studies or products that have focused on the salesperson's perspective. Another finding was that these studies are limited to displaying certain information above particular products, for instance, showing prices, or how the clothes would look, for example. Lastly, a substantial number of AR studies were involved a remote situation, in which users can purchase products with the help of a virtual assistant.

It was important to investigate a new area which would leverage the use of AR within the retail environment, as the author's prior research identified that the use of AR in face-to-face service encounter is an under-investigated and rich design opportunity. In addition, focusing on the salesperson's experience has the potential to provide a significant opportunity for salespeople to engage with customers more effectively.

2.3 Service Encounter

Face-to-face service encounter in the retail service industry is important, since a salesperson adds value, and AR can be an efficient tool to support this. For example, the service literature has shown that one of the consequences of the recent interest in service marketing is an increased recognition of the importance of the person-to-person encounter between buyer and seller-client and provider to the overall success of the marketing effort. Many service situations, especially those termed pure services, are characterized by a high degree of person-to-person interaction. [8] Another study in the literature finds that encounters between customers and employees form a critical component of service quality. This is especially true for services characterized by a high degree of person-to-person interaction. The client comes away from this service interaction with feelings of satisfaction or frustration. [9]

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[8] Michael R. Solomon, Carol Surprenant, John A. Czepiel, & Evelyn G. Gutman " A Role Theory Perspective on Dyadic Interactions: The Service Encounter " Journal of Marketing, Vol. 49, No. 1 (Winter, 1985), pp. 99-111

[9] Jean-Louis Chandon, Pierre-Yves Leo and Jean Philippe "Service encounter dimensions – a dyadic perspective: Measuring the dimensions of service encounters as perceived by customers and personnel International Journal of Service Industry Management, Vol. 8 Iss 1 pp. 65 - 86

Service research on in-store service encounters notes that the behaviour of frontline employees can have a profound impact on a customer's experience and can have an impact on their relationship with a provider and/or brand. Researchers point to three specific interactions that seem most compelling: (i) when employees respond to a customer's expressed needs or a request, (ii) when employees provide unprompted and unexpected service, and (iii) when employees react to address a service breakdown.[10] The impact of this becomes magnified when customers feel the frontline employee goes above and beyond what the customer expects, and when they appear to exceed or violate policies in order to address the customer's needs and desires.[11] While online personalization seems to benefit from the functional utility of bringing the information customers might most want to the surface, in-store service encounters seem to benefit most from customers noticing the effort the frontline employee makes towards meeting the customer's needs.[12]

Lastly, a research has shown that service loyalty was modelled in two quantitative studies to determine the effects of potential predictors. The three evaluative judgements was compared against the effects of relational outcomes. The three evaluative judgement measure were service encounter satisfaction, perceived core service quality and value for money while rational measures comprised social comfort, social regard and friendship. It was found that service loyalty is significantly influenced by friendship and service encounter satisfaction. Based on the friendship between customers and particular service employees has a major influences on the development of loyalty.[13]

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[10] Bitner, M. J. (1990). Evaluating Service Encounters: The Effects of Physical Surroundings and Employee Responses. Journal of Marketing, 54(April), 69–82.

[11] Bitner, M. J. (1990). Evaluating Service Encounters: The Effects of Physical Surroundings and Employee Responses. Journal of Marketing, 54(April), 69–82.

[12] Andrea Fineman "Crossing the Digital-Physical Divide: Digital Personalization During Face-to-Face Service Encounters" Fifth Service Design and Innovation conference 2016

[13] Ken Butcher, Beverley Sparks, Frances O'Callaghan, (2001) "Evaluative and relational influences on service loyalty", International Journal of Service Industry Management, Vol. 12 Issue: 4, pp.310-327

Based on the aforementioned research by the author, this study will focus on the area of face-to-face service encounter in retail shopping using AR. Many service studies have emphasized the importance of person-to-person interaction; these relationships affect the customer's behavior and create an impact on the business. This work blends insights from all of these research studies. For the salespeople, using augmented reality in face-to-face service encounter would certainly add value and support the building of a personalized relationship with customers. This generates new applications for AR and adds new technology to retail; lastly, it operationalizes and enhances how employees deliver value.

EXPLORATORY RESEARCH

14 - 24

Through this exploratory research, a better understanding of the problem space and the needs of salespeople and customers within the retail environment was achieved. This understanding of the problem space allowed the research topic to be narrowed from AR to retail and eventually to face-to-face interaction.
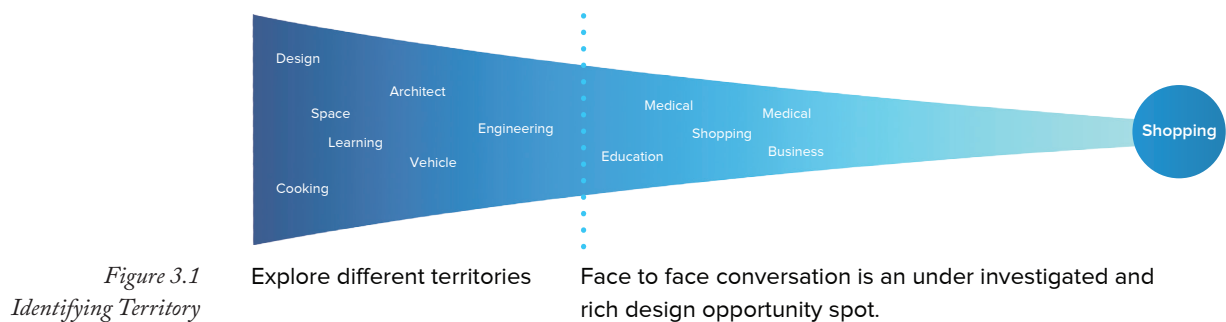
EXPLORATORY RESEARCH

Face-to-face service encounter is a crucial part of in-store and can be enhanced by AR. Currently, there are no applications of AR in most retail settings in face-to-face service encounter. The service literature shows that employees add value, especially in the field of retail, and AR shows a huge potential in enhancing face-to-face service encounter.

Given the importance of face-to-face service encounter in retail shopping, the goal of this exploratory research is to understand the opportunities for AR in enhancing face-to-face service encounter and in identifying the problem space of retail shopping. To achieve this goal, a matchmaking method was chosen in order to reveal opportunities in various areas, based on the traits of AR. Matchmaking is a method that starts with a technology and moves towards applications; this allowed an exploration of the ways in which the benefits of AR could match the needs of each industry.

Figure 3.1
Identifying Territory

Explore different territories

Face to face conversation is an under investigated and rich design opportunity spot.

Various territories were explored for this study, such as medical, education, engineering, health-related fields, and charts drawn up to show where AR could create an impact. This research showed that the face-to-face social interaction is an under-investigated, rich design opportunity in retail shopping. In terms of the trends, retail stores have started to adopt emerging technologies and it is interesting to observe how these stores are becoming more hybrid, digitalized stores. This is not only because of the emergence of the digital stores; the interesting relationship between the customers and salespeople is also an intriguing point.
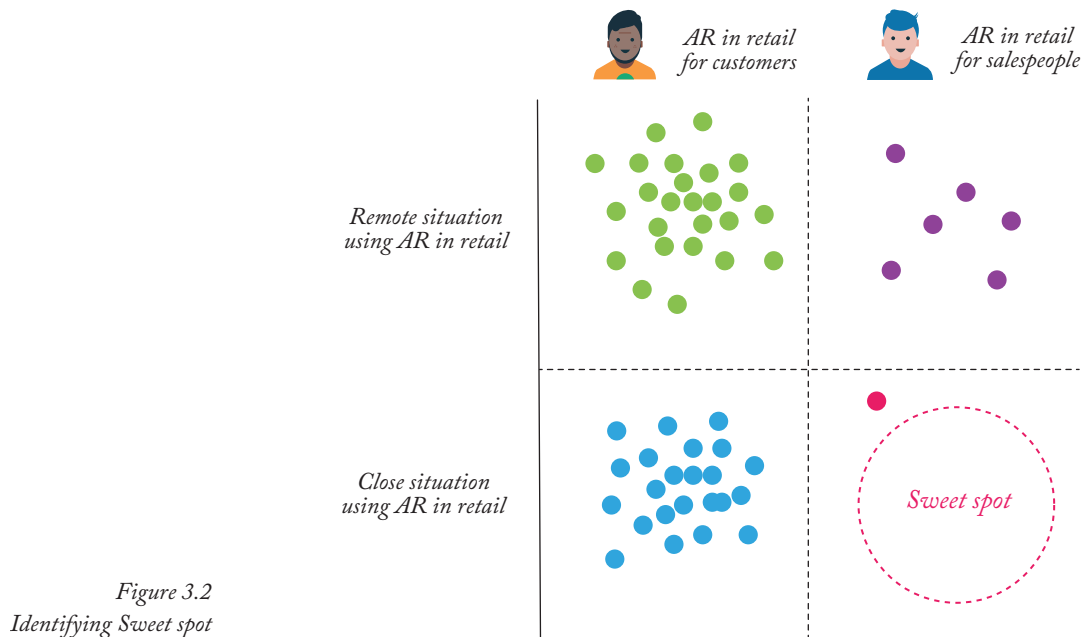
AR in retail for customers

AR in retail for salespeople

Remote situation using AR in retail

Close situation using AR in retail

Sweet spot

*Figure 3.2
Identifying Sweet spot*

Since large numbers of studies of AR have been carried out in retail stores, an affinity diagram was used to search for a field in which AR can make a novel contribution. One interesting finding was that numerous AR products have been developed and research studies carried out in remote situations; these are mainly used for displaying information superimposed on certain products, and the interactions were mainly focused on products.

Based on the affinity diagram, a "sweet spot" could be identified where face-to-face conversation takes place. Since previous projects were heavily focused on customers' perspectives and experiences, it was clear that exploring a salesperson's perspective would create meaningful value. This project explores how AR can support and help salespeople to deal with customers and work more effectively.

The matchmaking method, a process of pruning the space of possible matches among compatible requests,[14] and affinity diagram confirmed the importance of AR in face-to-face service encounters in retail stores, and the findings suggested that fieldwork with salespeople and customers should be used.

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14 Javier Gonzalez-Castillo, David Trastour, Claudio Bartolini "Description Logics for
   Matchmaking of Services"10.30. 2001

3.1 Fieldwork / Interviews

Based on the matchmaking process, it became apparent that a face-to-face conversation is an under-investigated opportunity space where AR can work. Of interest is the specific contents that salespeople are looking for and the design opportunities that can be enhanced in face-to-face conversation; thus, interviews were carried out with both salespeople and customers.

The goal of the fieldwork and interviews in this project was to identify the specific problem space in the retail store for salespeople. In order to determine the key findings, in-depth interviews were conducted with 15 sales people from various retail stores such as mobile, clothes, bikes, car dealers and grocery stores, and 13 customers from across these stores. An attempt was made to understand the different and complex situations in each different retail store. Based on these interviews, a customer journey map was created for both salespeople and customers.

3.1-1 Salespeople Interviews

Interviews were conducted with the salespeople, who were asked to recall their challenging and successful moments when dealing with customers. Salespeople were engaged from various retail stores such as clothes, home appliance, mobile, car dealer and a bike shop.

Several of the salespeople mentioned that customers expect them to remember specific information about them; however, salespeople said it is impossible to remember or store a customer's interests or basic information when dealing with hundreds of customers each day.

"Most of the customers don't remember the detailed information (e.g. customer ID, the basic settings of the product…) They expect us to know the information."
-Mobile store interview-

Salespeople want to engage customers on a personal level, and they want to discover customers' interests in order to provide a high-quality, personalized service. Salespeople often struggle to understand customers' taste and needs, since these are sometimes hard to articulate.

"Getting to know customers on a personal basis is important. We consider customer more like guests. We try to create a personal experience."
-Clothes store interview-

One of the goals of the salespeople is to identify what customers truly want. There are customers who have done a substantial amount of research and know which specific product they want to buy; however, there are also customers who do not know what they want to purchase, and want the salesperson to support them by specifying what their needs are. If the customer is not satisfied with the product, he/she is likely to return it, which is a poor outcome for both parties.

"The most challenging part is sometimes the customers don't know their style. If I suggest something that is exactly the one what the customers have mentioned, they say that it's not the one that I was looking for."
-Clothes store interview-

3.1-2 Salespeople Journey Map

Based on these interviews and on shadowing the salespeople, a journey map was created for the salespeople. The unsuccessful and successful moments were able to be identified.
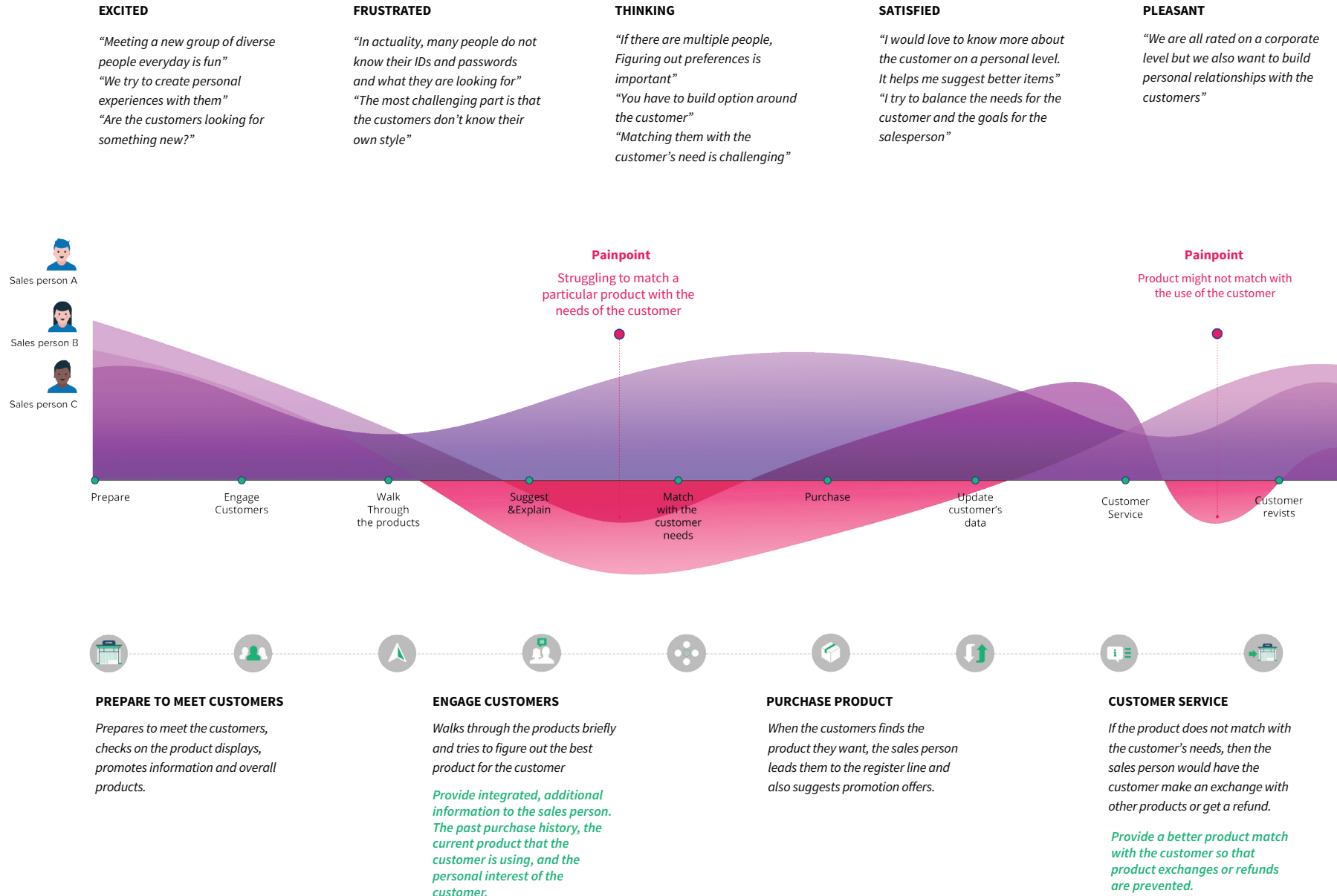
EXCITED

"Meeting a new group of diverse people everyday is fun"
"We try to create personal experiences with them"
"Are the customers looking for something new?"

FRUSTRATED

"In actuality, many people do not know their IDs and passwords and what they are looking for"
"The most challenging part is that the customers don't know their own style"

THINKING

"If there are multiple people, Figuring out preferences is important"
"You have to build option around the customer"
"Matching them with the customer's need is challenging"

SATISFIED

"I would love to know more about the customer on a personal level. It helps me suggest better items"
"I try to balance the needs for the customer and the goals for the salesperson"

PLEASANT

"We are all rated on a corporate level but we also want to build personal relationships with the customers"

Sales person A

Sales person B

Sales person C

Painpoint

Struggling to match a particular product with the needs of the customer

Painpoint

Product might not match with the use of the customer

Prepare | Engage Customers | Walk Through the products | Suggest &Explain | Match with the customer needs | Purchase | Update customer's data | Customer Service | Customer revists

PREPARE TO MEET CUSTOMERS

Prepares to meet the customers, checks on the product displays, promotes information and overall products.

ENGAGE CUSTOMERS

Walks through the products briefly and tries to figure out the best product for the customer

Provide integrated, additional information to the sales person. The past purchase history, the current product that the customer is using, and the personal interest of the customer.

PURCHASE PRODUCT

When the customers finds the product they want, the sales person leads them to the register line and also suggests promotion offers.

CUSTOMER SERVICE

If the product does not match with the customer's needs, then the sales person would have the customer make an exchange with other products or get a refund.

Provide a better product match with the customer so that product exchanges or refunds are prevented.

Figure 3.3
Salespeople Journey Map

3.1-3 Takeaways from the Salespeople Journey Map

Based on the synthesis of the salespeople journey map, the main pain points were identified as being difficulties in matching the product with the needs of the customers, as there are times when it is hard for customers to articulate their specific needs, and the salesperson then has to identify those needs. The most exciting moment for the salespeople is when they engage the customers on a personal level. This not only helps them to understand the customer's interests but also to provide a high-quality service.

3.2 Customer Interviews

A large number of customers complained about the length of the time spent waiting before they could engage with the salespeople, especially at weekends. In addition, some customers complained that they sometimes had to repeat the same answer multiple times to the salespeople.
"I was here for technical support but I had to wait for an hour to get it solved and there was a long line forming for the customer service."
-Home appliance store customer-

One of the biggest reasons for customers visiting the retail store is being unable to figure out the complex features of the product. They prefer to ask detailed questions about the product before making a decision.
"I need help with the product because I can't deal with technical complexity issues. There are so many things that you need to figure out. It's such a complex product."
-Tech store customer-
*"Once they told me how easy it was to use I just made the purchase.
There is a huge learning curve to actually use the product - that's why I like buying it in the store."*
-Mobile store customer-

3.2-1 Customer Journey Map

Based on the findings, a journey map was also created for the customers, with various behavioral modes. Some customers did not want to be bothered by the salespeople, while others actively needed help. Depending on the customer's needs, the pain points and experiences in the store varied.
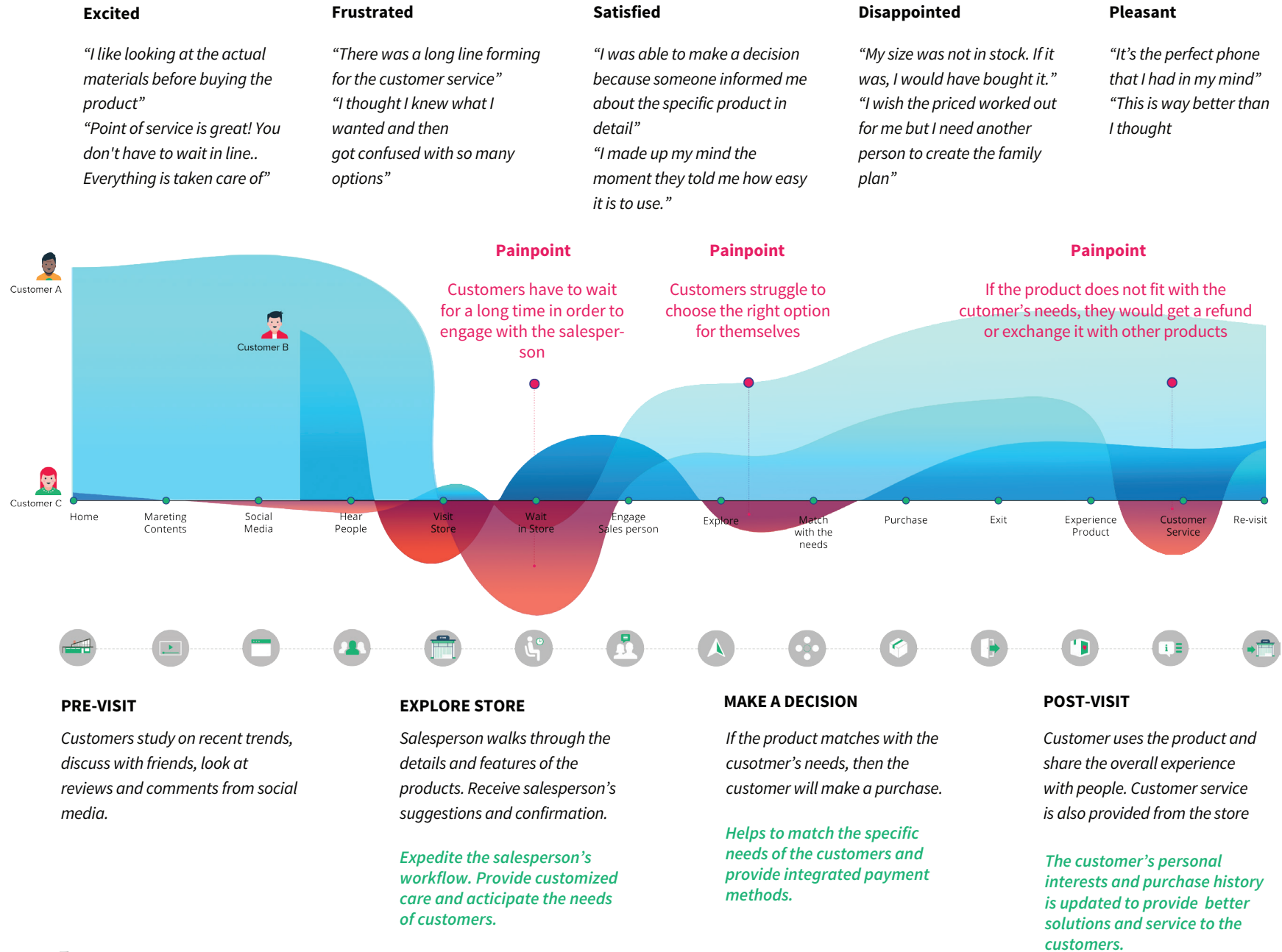
Excited

"I like looking at the actual materials before buying the product"
"Point of service is great! You don't have to wait in line.. Everything is taken care of"

Frustrated

"There was a long line forming for the customer service"
"I thought I knew what I wanted and then got confused with so many options"

Satisfied

"I was able to make a decision because someone informed me about the specific product in detail"
"I made up my mind the moment they told me how easy it is to use."

Disappointed

"My size was not in stock. If it was, I would have bought it."
"I wish the priced worked out for me but I need another person to create the family plan"

Pleasant

"It's the perfect phone that I had in my mind"
"This is way better than I thought"

Painpoint

Customers have to wait for a long time in order to engage with the salesper-son

Painpoint

Customers struggle to choose the right option for themselves

Painpoint

If the product does not fit with the cutomer's needs, they would get a refund or exchange it with other products

Customer A

Customer B

Customer C

Home · Mareting Contents · Social Media · Hear People · Visit Store · Wait in Store · Engage Sales person · Explore · Match with the needs · Purchase · Exit · Experience Product · Customer Service · Re-visit

PRE-VISIT

Customers study on recent trends, discuss with friends, look at reviews and comments from social media.

EXPLORE STORE

Salesperson walks through the details and features of the products. Receive salesperson's suggestions and confirmation.

Expedite the salesperson's workflow. Provide customized care and acticipate the needs of customers.

MAKE A DECISION

If the product matches with the cusotmer's needs, then the customer will make a purchase.

Helps to match the specific needs of the customers and provide integrated payment methods.

POST-VISIT

Customer uses the product and share the overall experience with people. Customer service is also provided from the store

The customer's personal interests and purchase history is updated to provide better solutions and service to the customers.

Figure 3.4
Customer Journey Map

3.2-2 Takeaways from the Customer Journey Map

The most significant pain point for the customers was that researching which product to buy is sometimes time-consuming; they have difficulty in making the right decision, especially for complex products. Customers appreciated being taken care of by the salespeople and being able to ask detailed questions about the product. Being able to engage and discuss a particular product with the salespeople was one of the primary reasons for customers visiting the retail store.

3.2-3 Local Store Salespeople Interview

In order to generate a novel idea, another round of in-depth interviews were carried out with local, family-run stores in Pittsburgh. In-depth interviews were conducted with nine local stores: a book store, a comic book store, a design store, an art store, a painting store and a cafe. Since these family-run local stores had more time, right number of customers, similar interests, they tend to have strong personalized relationships with customers. Since some of these stores had traded in Pittsburgh over 30 years, valuable points of inspiration could be gathered from the salespeople.

Figure 3.5
Interview Photo

Based on these interviews with local salespeople, it was possible to determine that remembering and using the customer's name creates an immediate connection. An attempt to understand their emotional state and other interests also helped salespeople to better understand how to approach the customers. In building long-term relationships, remembering the last interaction helped the salespeople to strengthen the connection.

 "I opened the store almost 30 years ago and I have a good memory, so that helps me to remember the customer's name. Calling customers by name creates an immediate connection. Using a person's name is something more than that. It just immediately allows you to bond with the customer, and customers are usually impressed by that."
-Interview from a store manager in a design store-

In the course of the research, the question arose as to why most customers still travel to the retail stores. In order to identify this motivation, another round of interviews was conducted with the customers. I conducted interviews with 15 customers who tend to visit in-stores than on-line stores and this interview was conducted in a café. Most customers appreciated the expertise and attention that a salesperson can provide.

"I like to engage with people and ask or hear from the salespeople before making decisions."
If the product is complex and has numerous features, it can be difficult to make the right decision. Salespeople can provide details to customers who are not familiar with the product.

"I do not want to do the research. I need someone to make the right decision for me."
Some customers mentioned that if there is someone who knows their personal tastes and needs, they do not have to put in effort towards researching the product. Salespeople help customers specify their vision.

"I want to feel that I'm being cared for."
Once the customer visits the store and has a good experience with the sales-people, they repeatedly return and expect to be taken care of by the brand in the same manner.

"I needed it right away."
Online stores usually take between two and 10 days to ship the product. However, at a retail store, customers can generally purchase the product immediately.

"I want to see, touch and interact with the actual product."
Seeing the product online has many limitations. Customers want to physically see and touch the product at times, especially if the product is expensive and complex.
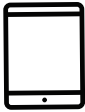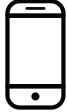
"Sometimes I feel unsafe of sharing my personal information on online."
Customers also mentioned that they would not want to share their specific information on online. However, some stated that they wanted to share their information on online store so that they could receive a more personalized and high-quality service.

3.4 Exploration of the Use of AR

It became necessary to verify whether AR was the right method for face-to-face service encounter, and to explore more specifically how AR would work in this field. In some retail stores, salespeople use a tablet to receive information and physically interact with people. However, using a tablet disconnects the salesperson from the customer, since the salesperson must look down to check specific information. In order to identify an ideal tool for supporting salespeople, a design workshop was conducted which had the specific script of a situation in retail store between a customer and a salesperson trying to buy an electronic product. I conducted a design workshop with 8 random customers in a design studio. This was tested using other comparative tools, such as an AR device, an earpiece, a tablet, a smartphone and a smart watch. With using these different devices, the interaction was tested with 10 customers and feedback received for each of the devices.

	AR device	Ear aid	Tablet	Smartphone	Smartwatch
	Helps salesperson to understand which customer to approach	*Great for internal communication*	*Good when discussing a product with a customer*	*Limited screen space to view information while having a conversation.*	*Limited screen space to view information while having a conversation.*
	Does not distract to check out information compared to other products.	*Distracting while having a conversation with a customer.*	*Distracting while having a conversation with a customer.*	*Distracting while having a conversation with a customer.*	*Distracting while having a conversation with a customer.*
	Easy and efficient to check information while having a conversation.				

The design workshop showed that the use of AR in retail stores might help salespeople to understand which customers to approach when there are many customers in a store; it also might minimizes the distraction when a salesperson wants to check out information while having a conversation, compared to other devices.

Through this exploratory research, a better understanding of the problem space and the needs of salespeople and customers within the retail environment was achieved. This understanding of the problem space allowed the research topic to be narrowed from AR to retail and eventually to face-to-face interaction. After conducting the salesperson interviews, it became clear that salespeople aim to improve customer interactions through knowledge about the customers, and that this interaction can be achieved through various tools in the AR system. From the customers' interviews, the retail expectations of customers were identified. One of these expectations involves being able to ask detailed questions about their interest and receiving comprehensive answers. Ultimately, all of this information was used in further work toward the balance of physical interaction and technology.

SYNTHESIS

26 - 28

At this stage, the focus was on how to reframe the problem and determine the most suitable direction for the ideating concepts of the study.

SYNTHESIS

A set of insights, opportunities and concerns were identified as collectively arising from the research described above. At this stage, the focus was on how to reframe the problem and determine the most suitable direction for the ideating concepts of the study. In order to come up with the findings, I made an affinity diagram, did sketching, discussed with my advisors to identify the key findings. Based on this research, the findings were analyzed and synthesized in order to identify the design opportunity space, that is, a "sweet spot" where AR can create an impact within retail shopping and make a novel contribution.

4-1. Key Findings

Most customers appreciate the expertise and attention that a salesperson can provide. Both salespeople and customers aim to build personal relationships; however, limits in terms of time and data make this difficult. To be more specific, salespeople desire a tool that can help them to quickly build long-term relationships with customers, and to understand the different categories of customers.

Salespeople desire to better understand the customer's tastes, which are difficult to articulate.
Customers know what they want, but at the same time, they do not know. Some customers cannot communicate their tastes and desires effectively; sometimes, they cannot put their desires into words. There are also cases when customers simply do not know what they want.

Salespeople struggle to understand the different modes of customers.
Salespeople categorize customers into different groups depending on the purpose of their visit, their needs, and their knowledge of the product. Based on this pattern and customer knowledge, salespeople decide which customers need more focus, especially when the store is crowded.

Salespeople desire to keep track of and reconnect with customers; however, this is difficult because they do not have the right tool to make this happen.
Salespeople want loyal customers who will return to the store over long periods of time, and want to become aware of a customer's visits and purchase history in order to better engage and understand them.

However, there is no effective, compelling tool to support this.

Salespeople struggle to access customers' information
Certain customers visit the store and are not able to remember their ID or password; it then takes time to try to access the customer's data.

4-2. Design Opportunities

Future developments in this area involve salespeople creating personal relationships with their customers. Research has shown that if the technology or product can support personal relationships between the salespeople and customers, this would not only improve the shopping experience for customers but also create a positive business impact on retail stores. Customers want high-quality personal service. The service literature shows that interpersonal bonds can only be created by people rather than by computers. Augmented reality shows great potential in helping to build personal connections between salespeople and customers. In order to deliver this high-quality service, the design should focus on building long-term relationships and a tool that helps salespeople to assess who and how to help as a priority.

If *the salesperson gets to know the customer on a personal level,*
then *the customer will return to the store instead of going somewhere else; this creates loyalty.*

If *the salesperson understands the customer's personal tastes and interests,*
then *the salesperson can suggest better products that would fit the customer's needs within a shorter amount of time.*

If *the salesperson has a detailed interaction history for the customer's*
then *the store can assign a salesperson who fits the customer's interests. This will make it easier to build a personal relationship.*

If *the salesperson has access to the customer's information,*
then *the customer may have concerns about privacy issues.*

If *the salesperson performs more effectively in their job,*
then *he/she will be able to retain the job for longer.*

4.3 Ideation

Based on the identified design opportunity space, an examination was carried out into how AR can support personalized relationships between salespeople and customers. Humans and machines have different strengths in supporting interactions. Computers are well suited to keeping detailed records of what has happened, unlike humans; humans are adept at making social connections with other people, while computers are not good at establishing relationships with people. The goal for this stage is to develop a concept that allows technology to support salespeople in strengthening and expanding their human-to-human interaction skills..

DESIGN

30 - 45

An augmented reality system, "Remember Me," is proposed here which helps salespeople to build a personalized relationship with customers. When salespeople build a personalized relationship with customers, they are able to provide high-quality service, which makes them perform more effectively in their work.

D E S I G N

In order to come up with a concrete design, in the design process, I discussed with my advisors to narrow down the concept, did sketching to explore different ideas, created storyboards and collected authentic customers' stories to make the concept more realistic. For the final design, I created hi-fidelity UIs based on the user scenarios and made a prototype using Microsoft Hololens to validate my design.

Design Process

5.1 Design: Remember Me

This thesis started with the question of how augmented reality can create beneficial value and one of the answers of how salespeople perform better and provide high-quality service to customers is an important one.
An augmented reality system, "Remember Me," is proposed here which helps salespeople to build a personalized relationship with customers. When salespeople build a personalized relationship with customers, they are able to provide high-quality service, which makes them perform more effectively in their work. "Remember Me" uses technology that helps salespeople to strengthen and expand their human-to-human interaction skills when engaging with customers. The system helps salespeople to remember customers' interaction history and anticipate their needs so that the salesperson can provide specific information or suggest a product that a customer has in mind. This builds a personalized relationship. "Remember Me" not only anticipates the goal of the customer's visit but also helps salespeople to better understand the range of needs of the customers in the store. The system ultimately creates a enhanced awareness for salespeople, so that they can better perform as salespeople, which will ultimately help them to retain their jobs for much longer.

5.2 Remember Me : Hardware

"Remember Me" allows salespeople to engage customers using an AR device. In order to do this, "Remember Me" is delivered through normal-looking glasses to make the engagement more rich and natural. Research has shown that it would take another eight to 10 more years for the hardware to be as simple as regular-looking glasses. In the next 10 years, the form factor is likely to continue to be reduced in size, and normal-looking glasses will eventually be available which can implement both virtual and augmented reality. Augmented reality gives the user the ability to see the world but also to be able to superimpose digital objects on it.[15] The concept of "Remember Me" envisions that with AR glasses, salespeople will not only be able to focus on face-to-face conversations but also view useful customer information through an AR display. However, current technology is not yet sufficiently advanced to make the form as simple as the shape of glasses.

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[15] Adi Robertson. "Mark Zuckerberg says augmented reality glasses are 'what we're trying to get to'" Verge April 12, 2016. http://www.theverge.com/2016/4/12/11415366/mark-zuckerberg-facebook-f8-virtual-augmented-reality-glasses
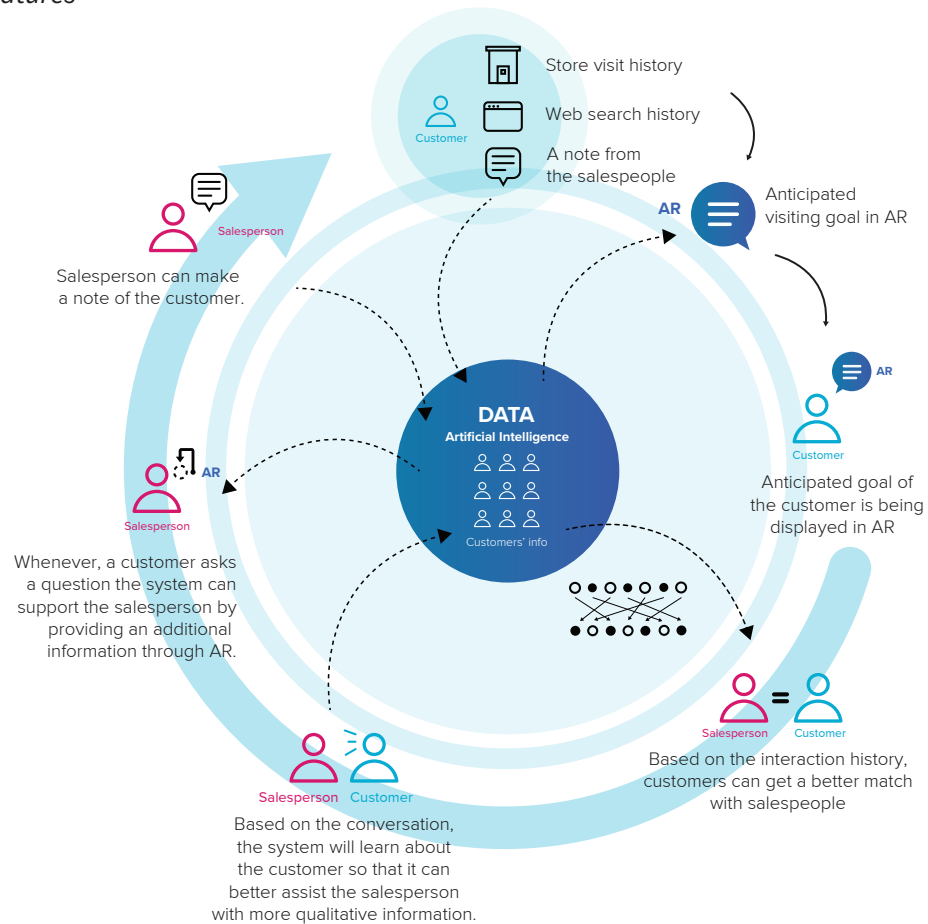
Figure 5.1
System Map

5.3-1 Inference of intention

Salespeople are able to anticipate the goal of the customer's visit based on their history. This history includes the customer's web search information, store visit history records, purchase records, and many more data points. These multiple points provide the predicted information for the goal of the customer's visit.

5.3-2 Reminding

Based on the interaction history between the salespeople and the customer, the system is able to notify the salesperson of the last interaction history.

5.3-3 Augmenting Social Performance

By positioning the specific information in the salesperson's visual field, "Remember Me" allows salespeople to able to engage more naturally with customers without looking away, and at the same time, to check out updated information about the customer as well. With this AR system, the salesperson does not have to remove their attention from the customer and can focus on the face-to-face service encounter.

5.4 Remember Me : Design Details

Remember Me supports the building and enhancement of the relationship between salespeople and customers. In order to provide a concrete solution, a specific electronic store was selected for applications of these concepts within the situation. Several of the features of how Remember Me will help salespeople to anticipate customer's information, check out past interaction history and ultimately build relationships with customers are described below.
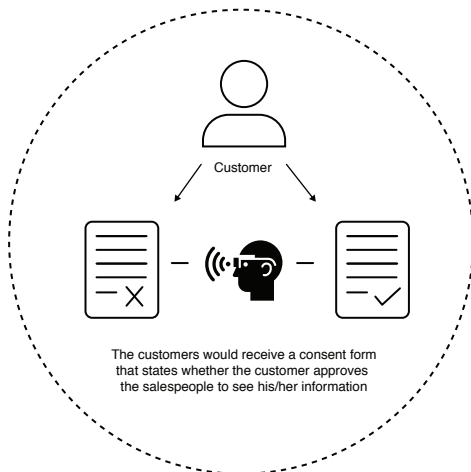

The customers would receive a consent form that states whether the customer approves the salespeople to see his/her information

Figure 5.2
Opt–In Service

5.4-1. Opt-in/-out service

During the interviews, some customers mentioned that they would not want to share their specific information with salespeople. However, some stated that they wanted to share their information so that they could receive a more personalized and high-quality service. Since the responses differed from person to person, an on-boarding stage was designed for customers, in which they can choose whether or not to experience the service.
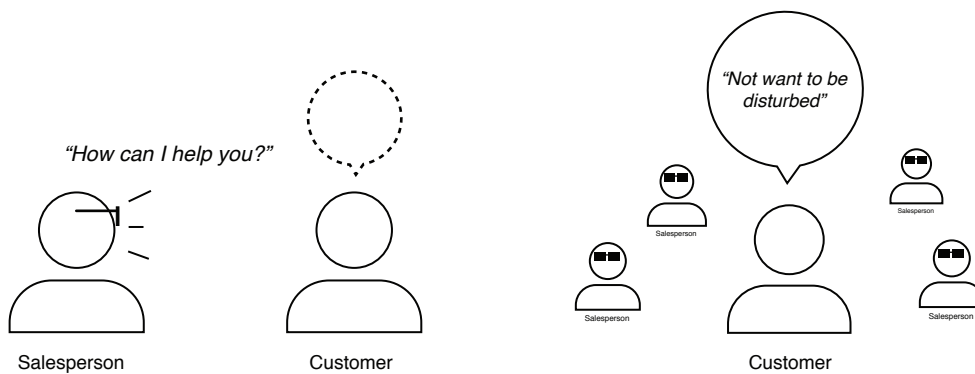
"How can I help you?"

Salesperson   Customer

"Not want to be disturbed"

Customer

Figure 5.3
Help Service

5.4-2. How can I help you?

One of the most important challenges for salespeople is to understand why customers have visited the store. In general, a salesperson will ask "How can I help you?"; depending on the answer, Remember Me shows the goal of the customer's visit above their head in AR form. In this way, salespeople will not have to repeat their question to the customer, and customers will not be bothered by the salespeople.
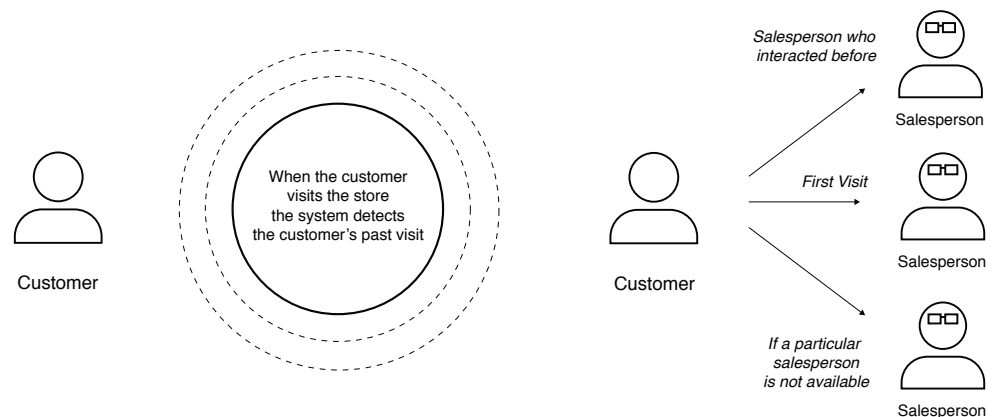

Customer

When the customer visits the store the system detects the customer's past visit

Customer

Salesperson who interacted before

Salesperson

First Visit

Salesperson

If a particular salesperson is not available

Salesperson

Figure 5.4
Salespeople Assistantace

5.4-3. If the salesperson is not able to assist

When a customer visits the store, he/she will be treated differently depending on the salesperson's situation. If the customer is a first-time visitor, he/she would be directed to a salesperson at random. If the customer has interacted with a particular salesperson before, the system will direct the customer to a salesperson who would be a good match. If the assigned salesperson is not available at that time, the customer can either choose to wait or to engage with another salesperson.
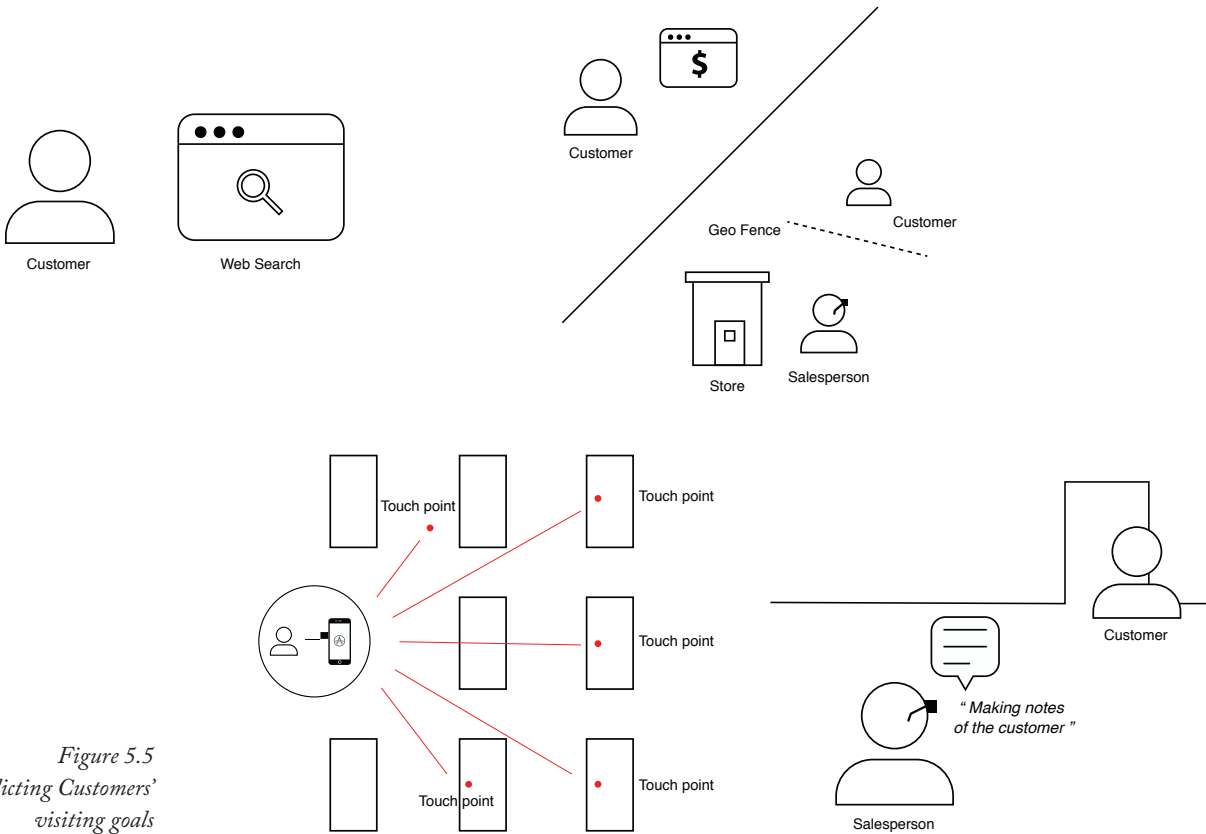
Figure 5.5
Predicting Customers'
visiting goals

5.4-4. Can we predict why the customer is here

One of the aspects of interest to salespeople is how to predict the purpose or goal of the visit. There are several touch points that allow the system to anticipate the customer's goals. For instance, in an electronic retail store, there are multiple data points that can be used in analysis.

The majority of customers visit the store website to explore the specifications and prices of products before visiting the physical retail store. Depending on the clicks and the time that the customer has spent on the website, these multiple touch points can be stored in the system and used to analyze and anticipate the products which may interest the customer.

If a customer buys a product online and tries to pick up the product the following day, the salesperson will be alerted when the customer reaches the store, using a geofence technology, and can have the product ready for the customer. If the customer is logged in with their ID on their smartphone, it is possible to track a certain range of location when the customer approaches the store.

When a customer's ID is logged in on their smartphone, the system is able to see how much time the customer spends on a particular product and the way in which he/she interacts with the product. This information will be shown to the salesperson to enable an understanding of which particular product or topic the customer may be interested in.

When a salesperson finishes a conversation with a customer, a note about the customer can be left; when the customer returns to the store, this helps the salesperson to immediately bond with the customer. The salesperson can write a note about the customer based on their conversation. This helps the salesperson to quickly re-engage and build a relationship with the customer.

Figure 5.6
Customers' Interests
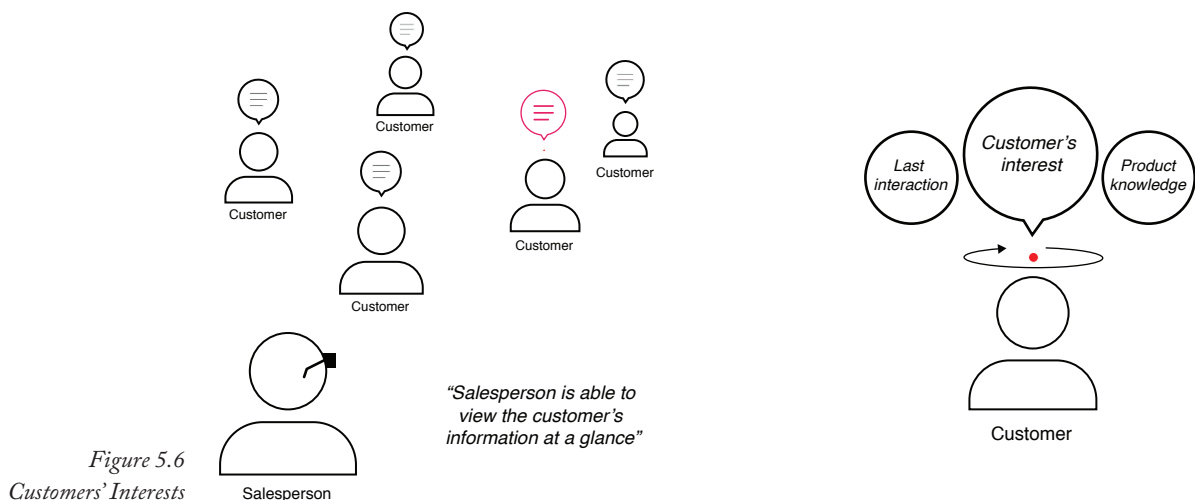
5.4-5. AR Display

When the store is crowded with customers, a salesperson can quickly view the visiting goals of customers at a glance using the AR glasses. This allows the salesperson to understand the overall situation of the store and how to start a conversation with a particular customer. When engaging the customer, the interface can quickly show the previous interaction with the customer, which products interest the customer and their level of product knowledge. This information helps the salesperson to bond with the customer and supports the building of a personalized relationship.

"Customer profile picture is based on the image of the most recent visit of the store"
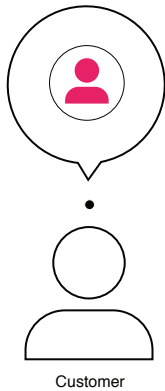
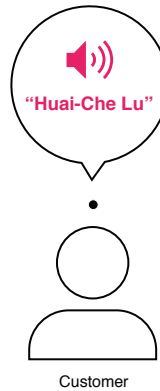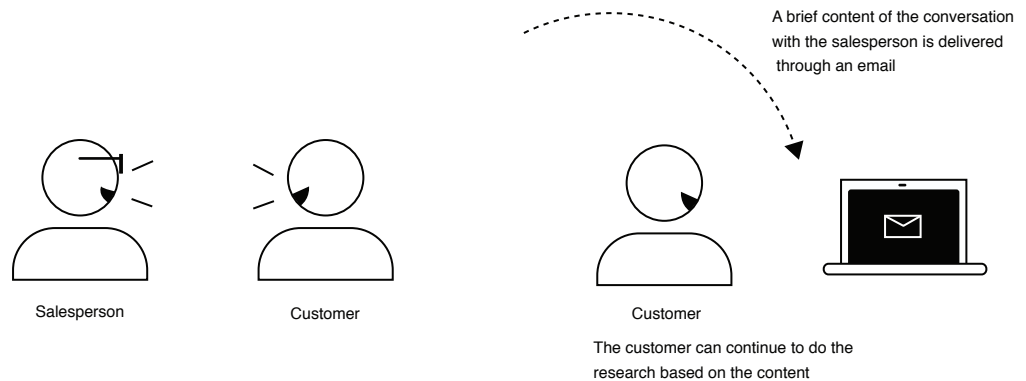"For international names or names that are hard to pronounce, the system helps the salesperson to articulate"

"Huai-Che Lu"

Customer

Customer

Figure 5.7
Customers' Interests

5.4-6. Reminder

On the AR interface, there is a profile picture of the customer, which is taken from the most recent visit to the store, and a voice feature, which pronounces the name of the customer. The picture can help the salesperson to remember the customer through an image. In addition, during the interviews, a large number of salespeople mentioned that there are times when it is difficult to pronounce international names. Being able to pronounce a name accurately is valuable when engaging customers.

A brief content of the conversation with the salesperson is delivered through an email

Figure 5.8
Connected Relationship

Salesperson

Customer

Customer

The customer can continue to do the research based on the content

5.4-7. Connected relationship

A short summary of the key points of the conversation between the salesperson and the customer is delivered via email, so that the customer is able to continue their research at home and make a purchase. This allows the customer to avoid forgetting things, to continue their research and to a build relationship with the salesperson.
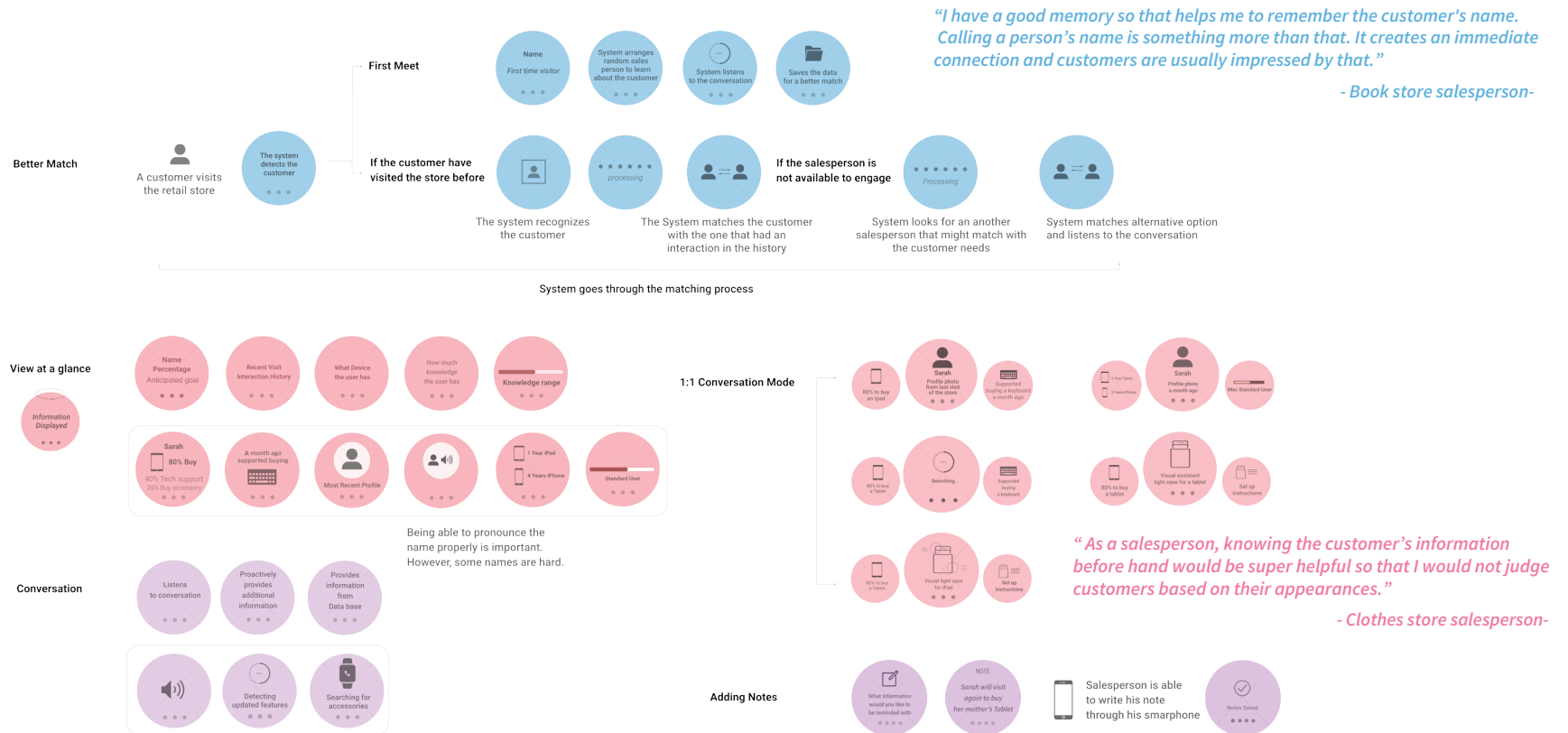
First Meet

Name
First time visitor

System arranges random sales person to learn about the customer

System listens to the conversation

Saves the data for a better match

"I have a good memory so that helps me to remember the customer's name. Calling a person's name is something more than that. It creates an immediate connection and customers are usually impressed by that."

- Book store salesperson-

Better Match

A customer visits the retail store

The system detects the customer

If the customer have visited the store before

processing

If the salesperson is not available to engage

Processing

The system recognizes the customer

The System matches the customer with the one that had an interaction in the history

System looks for an another salesperson that might match with the customer needs

System matches alternative option and listens to the conversation

System goes through the matching process

View at a glance

Name Percentage
Anticipated goal

Recent Visit Interaction History

What Device the user has

How much knowledge the user has

Knowledge range

Information Displayed

Sarah
80% Buy
40% Tech support
20% Buy accessory

A month ago supported buying

Most Recent Profile

1 Year iPad
4 Years iPhone

Standard User

Being able to pronounce the name properly is important. However, some names are hard.

1:1 Conversation Mode

80% to buy an ipad

Sarah
Profile photo from last visit of the store

Supported buying a keyboard a month ago

1 Year Tablet
2 Years iPhone

Sarah
Profile photo a month ago

Mac Standard User

80% to buy a Tablet

Searching...

Supported buying a keyboard

80% to buy a tablet

Visual light case for a tablet

Set up instructions

Conversation

Listens to conversation

Proactively provides additional information

Provides information from Data base

80% to buy a Tablet

Visual light case for iPad

Set up instructions

" As a salesperson, knowing the customer's information before hand would be super helpful so that I would not judge customers based on their appearances."

- Clothes store salesperson-

Detecting updated features

Searching for accessories

Adding Notes

What information would you like to be reminded with

NOTE
Sarah will visit again to buy her mother's Tablet

Salesperson is able to write his note through his smarphone

Notes Saved

Figure 5.9
System Wireframe

A wireframe of the overall system was created which included on-boarding, a distance view, a close-up view and a note stage. Numerous design iterations were carried out based on feedback from users, and a concrete version of the salespeople's experiences was later created using low-fidelity design.

Final Design

After the overall structure and idea of the design was established, the most appealing visuals were applied to leverage the AR system for salespeople. The goal of a high visual mock-up stage is to explore and identify the right visual form that will help salespeople to receive specific information and enable them to feel comfortable while having conversations with customers.
In order to explore the most efficient visual form, sketches, paper prototyping and user-testing were carried out. Since an electronic retail store was chosen as an example to test this design, a number of authentic customer stories were collected from the participants and applied to the design solution in the story.

5.5. User Scenarios
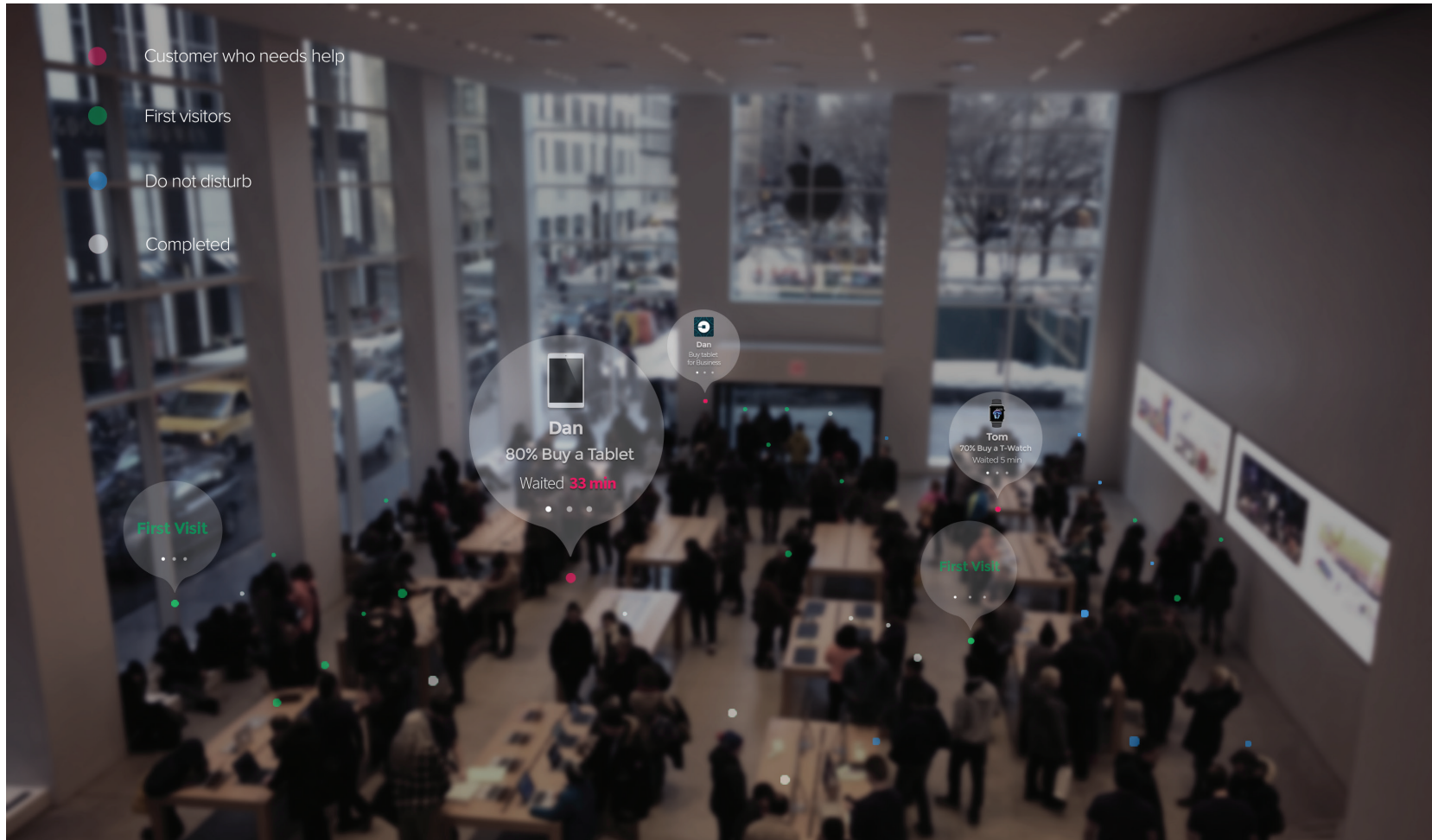
Figure 6.1
Show Customer Modes

Remember Me: AR interface - Show customer modes

It is Saturday, and a salesperson, Jack, is able to see a large number of customers in the store. There are various types of customers: customers who need help immediately, customers who do not want to be approached, and customers who have visited the store for the first time. With the AR glasses, Jack is able to identify which customer needs his help first.
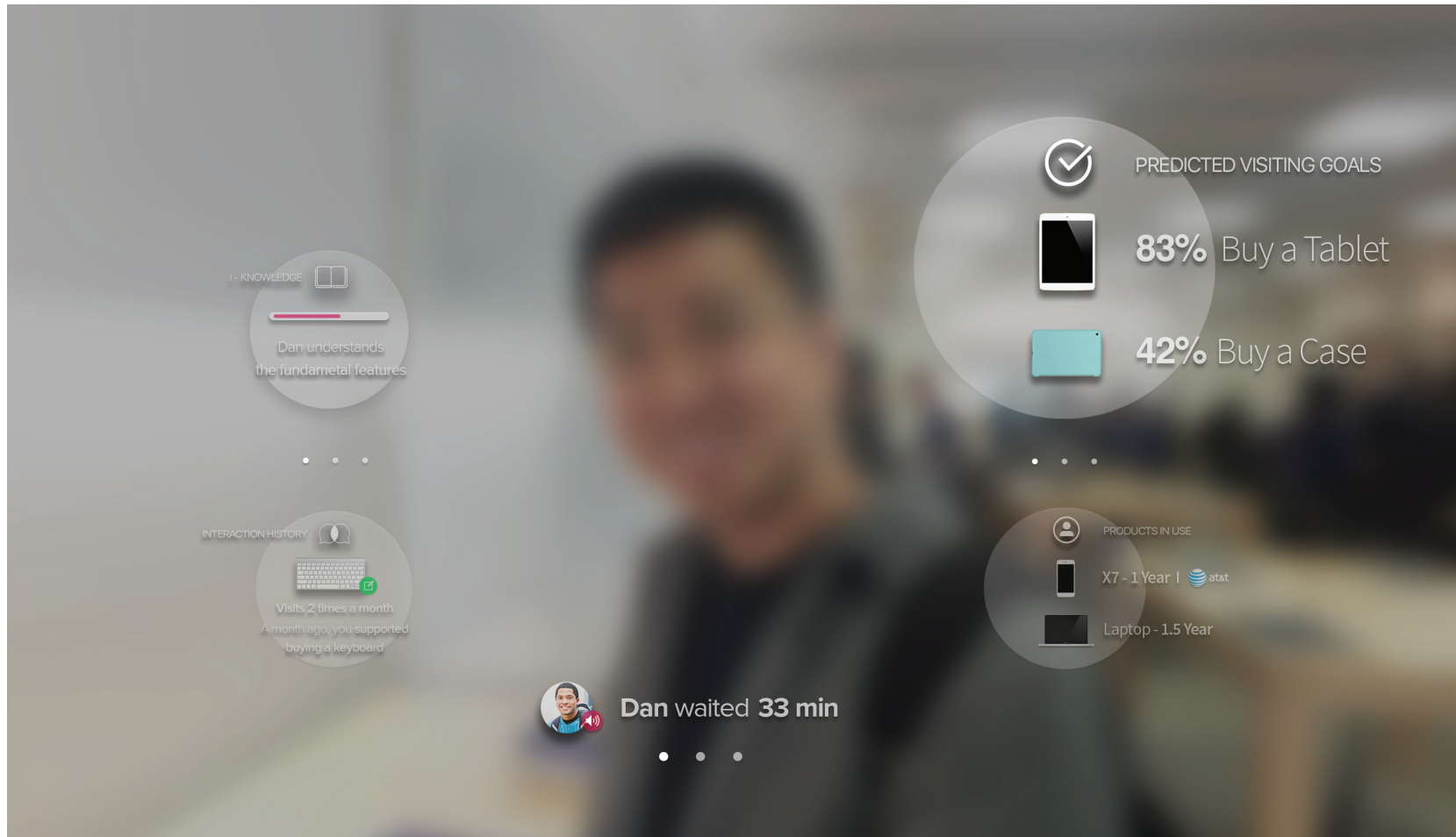
Figure 6.2
Show Customer Interests

Remember Me: AR interface - Show customer interests

As Jack approaches the customer, he looks at the AR display and finds that the customer is very interested in buying a tablet and a case, based on the analysis from the multiple touch points. Using the customer's ID, Jack can see that the customer has a smartphone which has been used for over a year and a laptop that has been used for a year and a half. Last month, Jack supported the customer in buying a keyboard from the store.
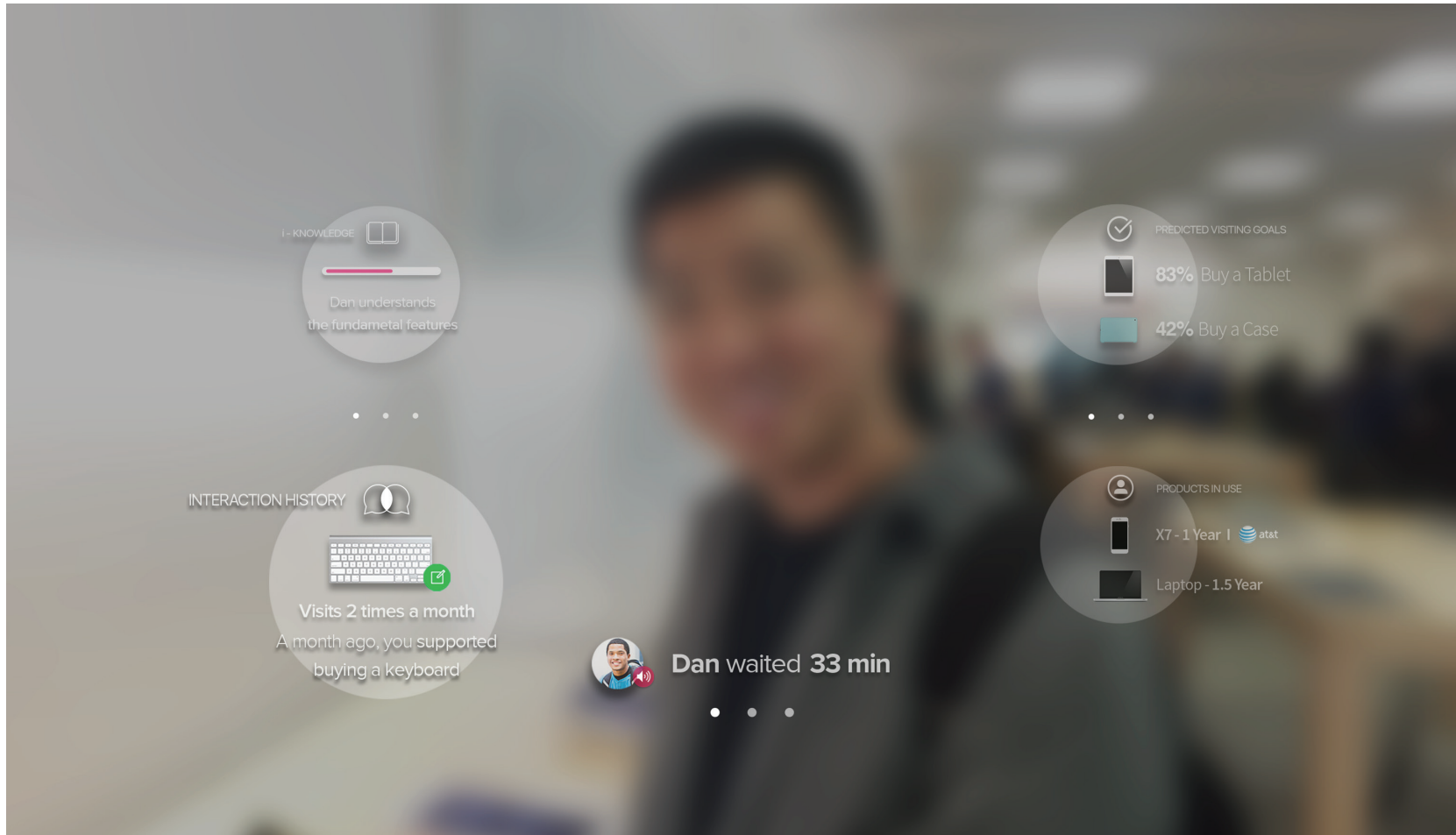
Remember Me: AR interface - Show customer note

Based on the last interaction, a note shows that the customer is quite knowledgeable about product usage. Since Dan uploads 300 pictures on average to iCloud every month, and most of the apps that Dan has downloaded from the App Store are related to taking photos, Jack can see that Dan is passionate about taking pictures. This information helps Jack to know which topics the customer might be interested in and what products to suggest.
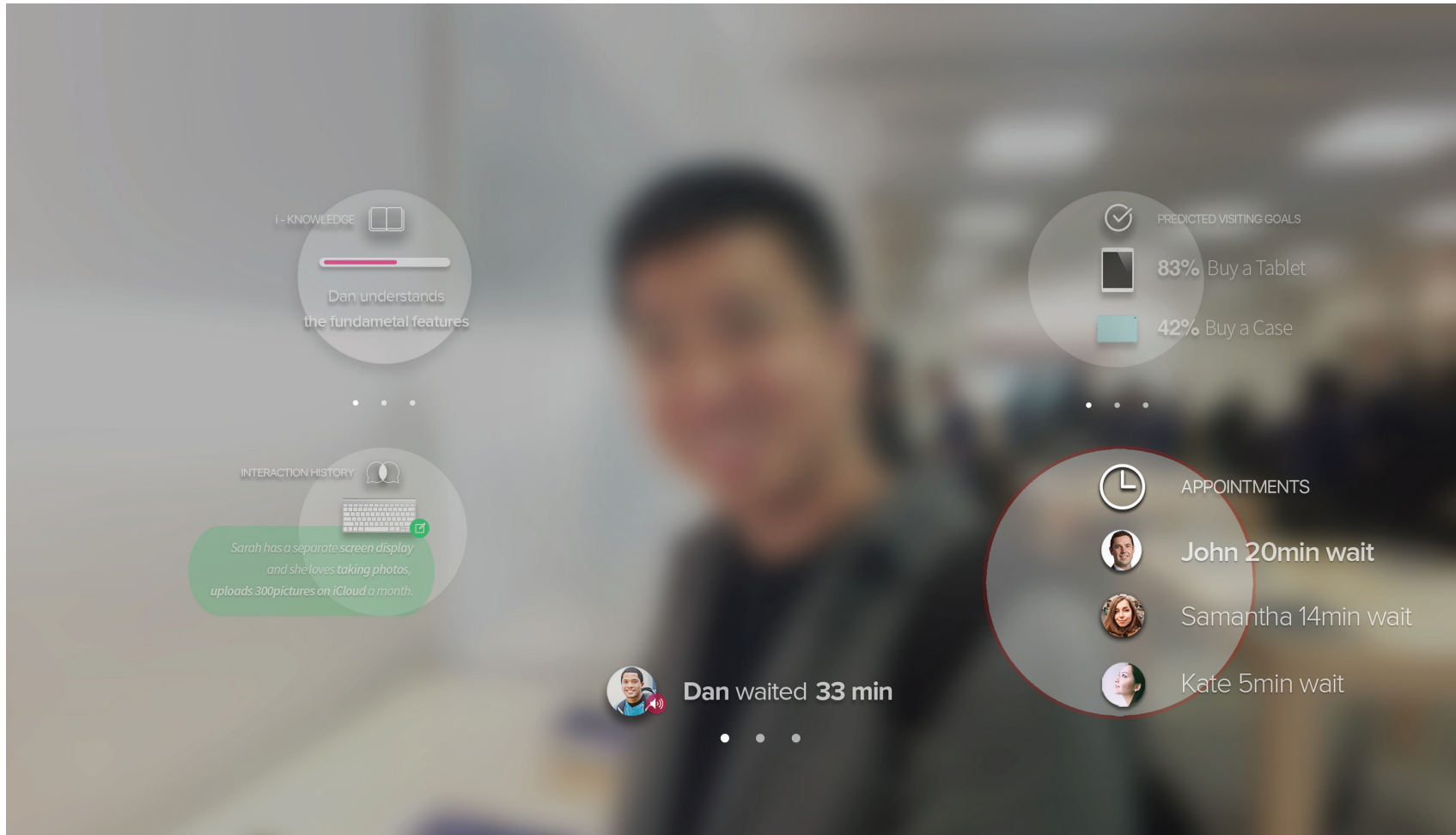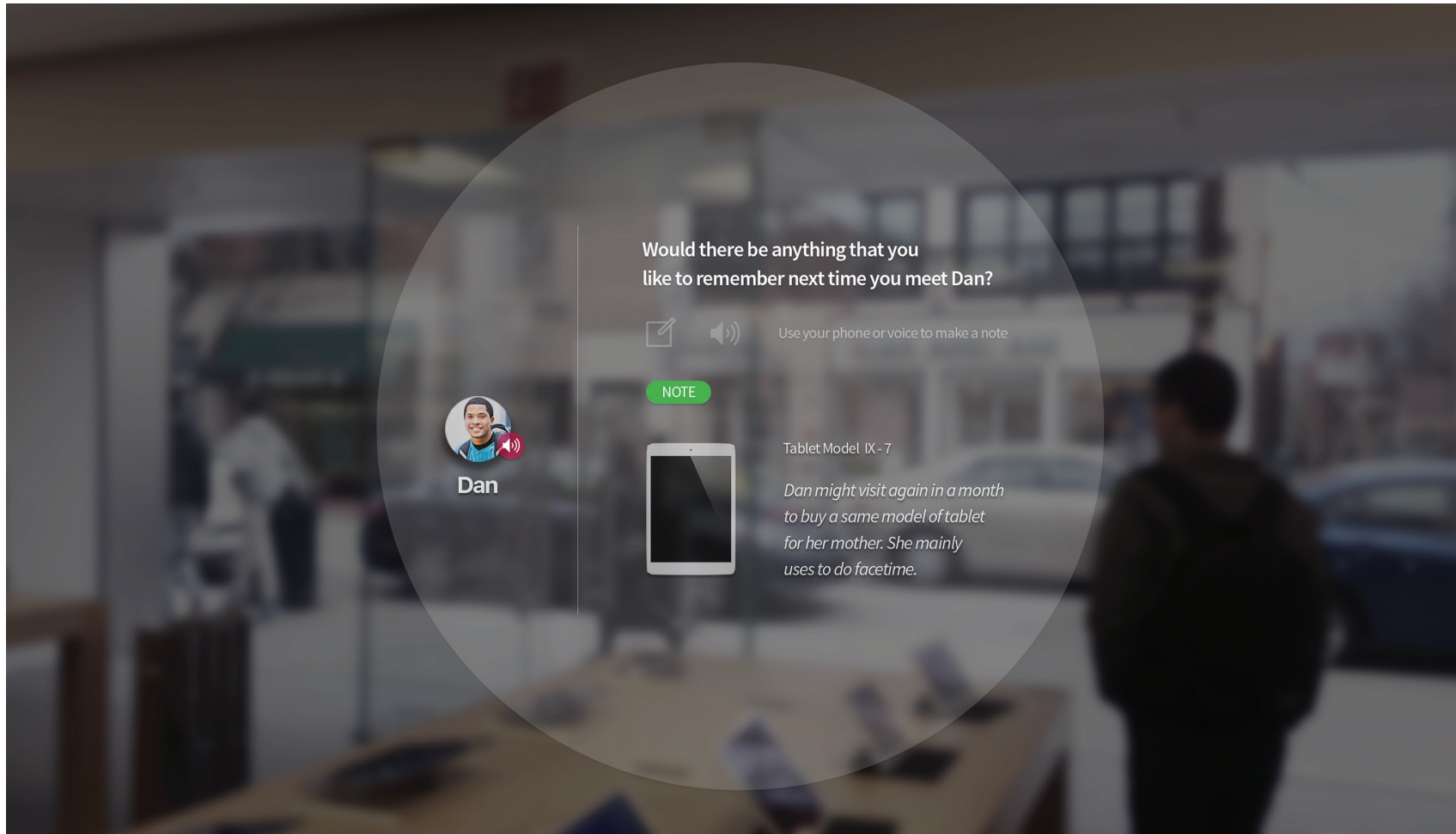
Remember Me: AR interface – Time management

While having a conversation with this customer, Jack can also check how many customers are waiting for him and how long they have waited. This information allows Jack to manage his overall time while having a conversation with each customer.

Figure 6.5
Make a Note of the Customer

Remember Me: AR interface - Make a note of the customer

After his conversation with the customer, Jack is able to write a note about the customer based on their conversation. This note will be helpful whenever the customer revisits the store.

6.5 Prototype: HoloLens Demo

After finalization of the design, it was necessary to test the design with users. An AR headset device called Microsoft HoloLens was used at this stage, which allows the users to view the AR on the existing space. The final design was applied to the HoloLens using a software program called Unity. From a distance, the salesperson will see a single bubble that states the visiting goal of a particular customer. As the salesperson approaches the customer, he/she can see more detailed information: the last interaction history, other products the customer is using, and the range of knowledge that the customer has about the product. With the HoloLens demo, design iterations were made possible based
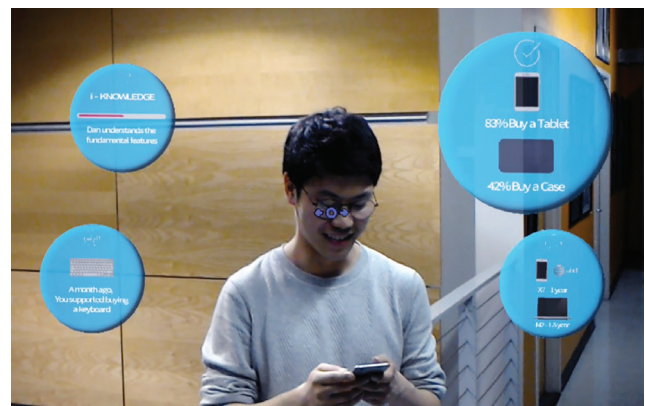

Figure 6.6
Using HoloLens

Figure 6.7
HoloLens AR Interface Design

When a salesperson engages a customer, the interface will divide into 4 different groups of UIs. One of the biggest challenges was how the salesperson would interact with the interface while having a conversation. Based on the feedback, I used a gazing feature in HoloLens to allow the salesperson to select the UI while engaging the customer.

REFLECTION

The AR system Remember Me can be applied to not only retail stores but a number of other places where a high degree of human-to-human interaction takes place.

REFLECTION

Returning to the original question for this paper, which was 'What can interaction design do with AR?', it becomes clear that AR can work in a unique way in face-to-face conversation, especially in the field of retail. With the increasing dominance of online retail, the use of AR to support people in strengthening in-store social interactions and transferring the advantages that customers experience online to the physical retail store will make the retail store experience more beneficial for customers. The use of an AR display to support salespeople creates a kind of hyper-perceptive awareness. Salespeople will not only be able to better understand the unique and at times complex needs of customers, but also build a personalized relationship with them.
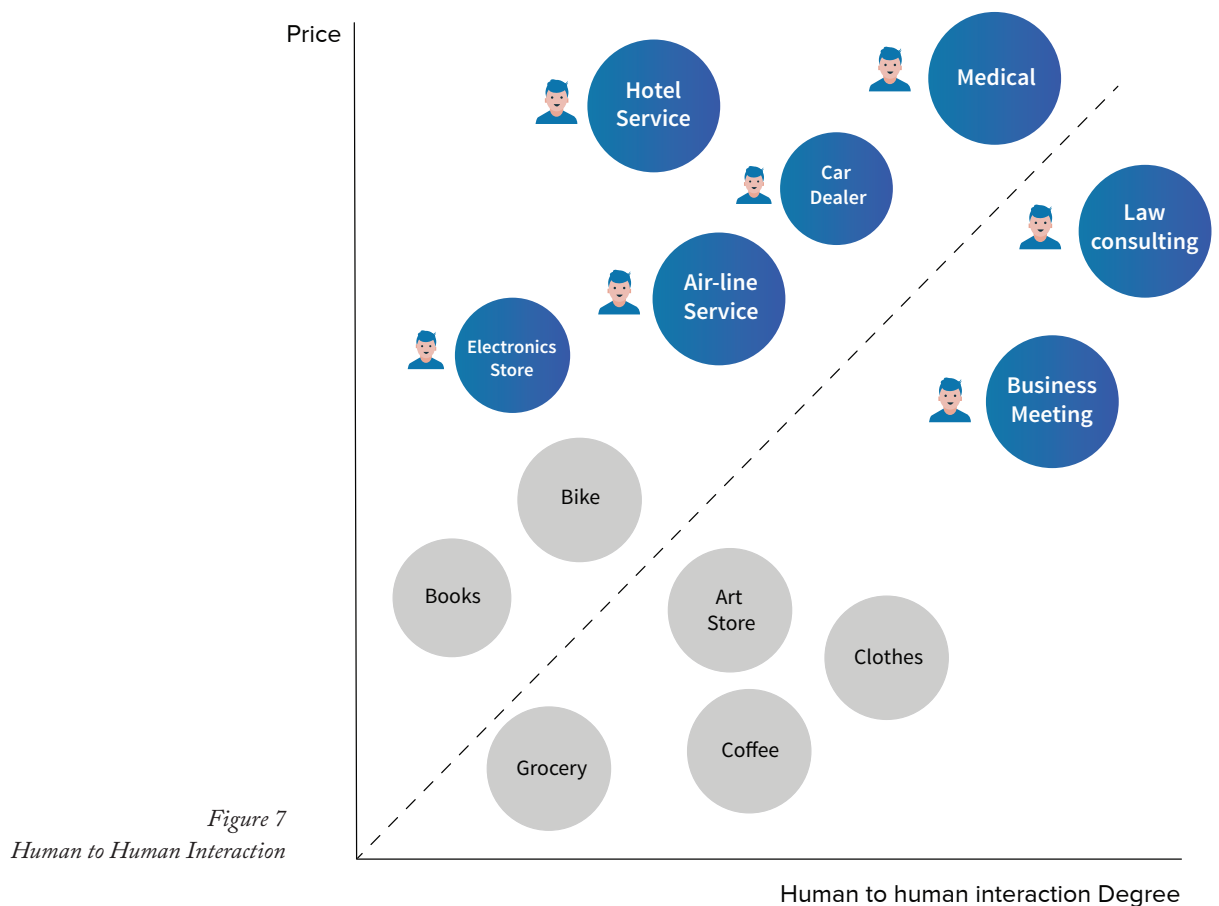

Figure 7
Human to Human Interaction

This technology can help the salespeople refine their interpersonal skills, facilitating their ability to respond competently to customer needs. This experience will eventually help salespeople to retain their jobs for much longer. Customers will also experience a higher quality of personalized service from salespeople. This service will help them to save time and easily identify which product to buy before making a purchase. Customers will experience the same benefits as online, together with the benefits of the physical store.

The AR system Remember Me can be applied to not only retail stores but a number of other places where a high degree of human-to-human interaction takes place. However, it would be hard to imagine the use of this system in low-priced product stores such as grocery shops, coffee shops and clothing stores since in general, customers do not need lengthier interactions in these stores, such as asking questions before buying products. The AR system Remember Me aims to provide a service not only in the retail realm but also in numerous other places or relationships, such as between doctors and patients, teachers and students, business meetings, hotel services and airline services; that is, situations where a high degree of interaction happens. With Remember Me, the relationship between people can be more engaging, and the salesperson using the system will provide a better service. AR can perform in a unique way in these situations, since it is able to augment information while people have face-to-face conversations. Humans and machines have different strengths in supporting interactions. Computers are suited to keeping detailed records of what has happened, unlike humans; humans are proficient at making social connections with other people, unlike computers. The AR system mutually coexists and supports these different strengths, to build human-to-human interactions.

In this exploration of the AR interface, numerous questions remain to be answered as to how people will interact within this new territory. How will people use the AR device to minimize social awkwardness in face-to-face conversations? How will people use the AR device to build trust in face-to-face interactions? How will the user manipulate the AR interface as naturally as possible when having a conversation? These are still under-investigated territories to be explored and identified.

CONCLUSION

50 - 50

This paper identifies how AR can make a novel contribution in face-to-face conversation between salespeople and customers, and how AR can support the building of personalized relationships in this situation.

CONCLUSION

This paper investigates what to do with AR and how AR can make a novel contribution in face-to-face service encounter between salespeople and customers. Prior research investigating customer service interactions has shown that employees add value when engaging customers. In the exploratory research phase, five critical design opportunities were identified as follows:

If the salesperson understands the customer's personal taste and interests, then the salesperson can suggest better products that would fit the customer's needs within a shorter amount of time.

If the salesperson has a detailed interaction history with the customer, then the store can assign a salesperson who fits with the customer's interests. This would make it easier to build a personal relationship.

If the salesperson gets to know the customer on a personal level, then the customer can build a connection with the salesperson.

If the salesperson performs better, then he/she will be able to retain their job much longer.

If the salesperson has access to the customer's information, then the customer may have concerns about privacy issues.

Based on these opportunities, an augmented reality system is proposed called Remember Me, which helps salespeople to build personalized relationships with customers. Remember Me enables salespeople to strengthen and expand their human-to-human interaction skills when engaging customers, and the system ultimately creates a superhuman awareness for salespeople so that they can enhance their performance, such as responding more effectively to individualized customer requests and needs, which eventually helps them to retain their jobs for longer. This AR system may also be applied within numerous other situations where a high degree of person-to-person interaction takes place.

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