Behind the Chatbot:
Investigate the Design Process of Commercial Conversational Experience

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Abstract

The messaging-based conversational interfaces, commonly called Chatbots, have seen massive growth lately. With the proliferation of Chatbots, there is a growing demand for a better understanding of the design practices behind conversational user experience. This thesis looked into the design process of a Chatbot-based project built on the RCS business messaging platform, and the workflow was investigated through contextual inquiry and critical incident interview techniques. The challenges experienced by practitioners from different disciplines are detailed, with a focus on their respective work tasks and practices.

Sammanfattning

ABSTRACT
The messaging-based conversational interfaces, commonly called Chatbots, have seen massive growth lately. With the proliferation of Chatbots, there is a growing demand for a better understanding of the design practices behind conversational user experience. This thesis looked into the design process of a Chatbot-based project built on the RCS business messaging platform, and the workflow was investigated through contextual inquiry and critical incident interview techniques. The challenges experienced by practitioners from different disciplines are detailed, with focuses on their respective work tasks and practices.

Author Keywords
Interaction Design; Chatbot; Conversational Interfaces; UX Design; Conversational Commerce; Design Research; Contextual Inquiry; Incident Interview.

INTRODUCTION
After being on the stage for decades, Chatbots have been pushed forward under the spotlight by tech-giants and other field players in the past three years. With emerging technologies driving behind the scenes, investment is growing in this field, along with applications available [17]. An upward surge of Chatbots appeared in 2016 which later boost the research in academia (see figure 1) and practices in the industry. More than a sudden craze, it seems that conversational interfaces are increasingly taking over the work of traditional apps, web pages, and human-human communication channels, With its inherent interaction of communication in natural language, as was predicted in the seminal report Being Human: Human-computer Interaction in the Year 2020 [11] a decade ago, the interaction with computers is now becoming more like a human-human conversation rather than instruction-based conversation.

Inspired by the natural form of human communication, conversational interfaces have been applied in more and more products, platforms and services as part of the customer experience to drive retention, user engagement, and transaction volume or to boost sales and brand loyalty. With the proliferation of conversational interfaces, there is a growing demand for more discussions about conversational UX design [9], especially when the experience worth learning from the previous practice of conversational interface design in the industry is not as much as the graphical interface design. And in academia, as Figure 1 illustrates, the number of publications addressing the keyword “Chatbot” is currently on a steady increase but the majority of those papers focus on the users rather than the designers. In view of this, it is interesting to look into the design process of chatbots and drag new insights into the UX design domain.

This thesis looked into the way design is used in a Chatbot-related project in an innovation team of a large Telecom company, with the aim of investigating how the process is managed and how practitioners from different disciplines who have different focuses on the project work together in the design process. From the investigation, a detailed description of workflow is summarized as well as the challenges and problems arose during the design process. The purpose of this study is to document the current workflows and practices to articulate current challenges and problems experienced by the team members during this design process in order to extract some key activities of conversational UX design which can set the product apart. And due to the nature of the human conversation, it is subtle to distinguish the good design and bad design of conversational interfaces, which worth more discussion. In the end, some suggestions and possibilities for improving the workflow are put in the insight section.

BACKGROUND
This section starts with a brief walkthrough of the trajectory of the conversational user interfaces, in the context of user experience design, along with its recent resurgence in the form of Chatbots. After that, related topics around Chatbots are
brought up in detailed discussion, including the real practical application of conversational interfaces, its commercial use, and the platforms where Chatbots are being integrated.

The conversation started at the beginning
When chasing the direction of a more socially-connected future, it is quite intriguing to backtrack the history and find that the trajectory of the conversational interface has come along a long way since the command-line interface (CLI). The evolution goes like a sine wave, which reaches a peak every ten years and the driving force behind every leap is a technical breakthrough and theoretical innovation [16]. The boundary between computers and humans is shifting and people hold the belief that we will be living with “increasingly clever computers” [11] in the near future. But how far has it gone? And from where does it come?

CLI, GUI, and CUI
Considered to be the original conversational interface, the command lines (CLI) tell the computer to execute the commands entered by the user and print the answer, which is very much like a conversation back and forth, with the person telling the computer what to do, the computer doing it, and coming back with a result or an additional question that required an answer to complete a task. Next is the graphical user interface (GUI), invented at Xerox PARC and popularized by Apple and Microsoft, which are now ubiquitous. Graphical user interfaces have objects resembled things people were familiar with from the real world, such as folders, buttons, windows. Those objects allow the user to converse with the computer, and the computer to converse with the user visually. Although the inputs and outputs are changing in different modalities of the interface, conversations are always there in the interaction between humans and machines.

The “Design Bits” for GUIs and Conversational Interfaces are different. For the previous one, interface components include windows, icons, menus, and pointing [4]. Design for chatbots represents a transition from the design of visual layout and interaction mechanisms to the design of conversation. In the current era of graphical user interfaces, designers benefit from substantial control of visual design and interaction mechanisms, allowing for a detailed presentation of the features and content of an interactive system. But for CUI (conversational user interface), dialogues are the design objects. What remains the same and what changes?

Conversations, Interactions, and Chatbots
User interfaces inspired by conversations, perhaps the most natural form of human communication have been around for decades [2]. However, a new generation of chatbots and virtual agents has emerged with recent advances in natural language processing and machine learning.

“All conversations are interactions but not all interactions are conversations.”
- Robert J. Moore

Conversational Interface is the computer interface that uses text or voice for human-computer interaction, which is one of many interaction modalities in the interactive systems. Tracing back to 2015, we could find that text-messaging is overtaking the social network as the most popular class of the smartphone apps [3]. It strongly indication of user’s preference for textual, messaging-based conversational agents. In Figure 1, according to the data on the number of general publications on chatbots or conversational interfaces on ACM along the years and publications addressing user-related studies [17], research on conversational interfaces is not a recent endeavor, actually, they have been present along most of the computing history, but the peak of interest in the last few years reflect the recent commercial boost. Following that, 46% of the user studies identified in this analysis are concentrated in the years 2017 and 2018. Although the topic of the chatbot has been present for decades, the design and evaluation of chatbots are still open issues now. There is a substantial technology push in chatbot development [5].

Chatbots, the so-called smart technologies like chatbots are playing an important role in our daily life activities. Also, with the development of technology, better connectivity and recent advances in Machine Learning and Natural Language Processing (NLP) are favoring the development and dissemination of chatbot, or intelligent conversation experience. Except for the well-known voice-based chatbot services like Amazon Alexa, Siri and Google Home, the textual chatbot has also been extensively explored commercially. The mainly textual chatbot has been pushed to the market successfully. Facebook Messenger, Skype, Slack together are already hosting more than a million chatbots [15]. One indication comes from a recent report on emerging technologies and marketing by Oracle, which is found that 80% of consumer brands will be using chatbots for customer interactions by 2020 [8]. To date, 36% of the brands have already implemented one. In this context, the chatbots are mostly utility-driven, designed to provide specific and limited services to the user like the pioneer bot to assist with booking flights, buy clothes, make restaurant reservations and more.

Messaging Platforms for Chatbots
In spite of the growing industry adoption and the advances in AI to make chatbots ‘smarter’ and more ‘easy-to-use’, the user interfaces of chatbots have not evolved much. They still closely resemble a messaging interface, wherein a user or a bot response results in a message bubble. Textual input still stays the main way for the interaction.

SMS
Short Message Service (SMS) was one of the few applications available on mobile devices since 1994, which supported both person-to-person and computer-to-person messaging from the beginning. Basic conversational services emerged, like checking your balance with a textual command. The usage of SMS was pushed forward with text-based games, horoscopes and other entertainment content on one end, and more serious applications like weather or stock reports on the other. Unlike other conversational applications, SMS had built-in billing, making it possible to create real businesses on top of the platform. The constraints and platform access made SMS a good starting option for experiments with mobile conversational interfaces,
bots, and smart assistants. Being textual only, SMS-based applications are not far from a command-line experience.

**OTT-based Instant Messaging**

With the rise of smartphones, we have started seeing more and more over-the-top (OTT) applications that mimic SMS’s core value proposition. Messaging applications are at the top of mobile usage charts due to a high number of notifications the user is exposed to. Since these messaging applications work over IP and not via the carrier’s signaling network there are basically no limitations on what type of content can be sent in messages. Thus, those ott-based applications can expand message types with rich media and interactive elements (such as photos, voice messages, videos, stickers, GIFs, buttons, hyperlinks, carousels and so on) to enhance interactivity. Asian messengers like WeChat and Line expanded these rich media messages in mini-applications a concept that is being westernized by Facebook with Messenger (see in Figure 2). Each message is a self-contained application that can render either text or a richer UI.

Over-the-top messaging applications are slowly opening up APIs for integrating services, pretty much mimicking the evolution on SMS. There are hundreds of bots for Telegram, Slack and Kik. As messaging apps are connecting the users directly through the internet, bypassing the mobile SMS network, it seems SMS is gradually replaced by those OTT-based instant messaging services.

**RCS Business Messaging (RBM)**

Business-to-customer SMS is the key to reverse the trend with the fact that there are still millions of businesses rely on SMS to communicate with mobile consumers. RCS Business Messaging (see in Figure 3), the evolution of messaging, is an opportunity for operators to reshape and revitalize their messaging services and play a central role in the future of IP-based messaging.

The GSMA RCS initiative brings together the mobile industry’s leading operators, vendors, and service providers to shape the RCS specification and implementation. RCS (Rich Communication Services) emerged with the aim of delivering rich messaging experience to users and enabling “Rich Business Messaging” communications between brands and consumers. RCS is a standards-based global upgrade of SMS which enables IP-based messaging with branding, rich media, interactivity and analytics. With RCS, businesses can bring branded, interactive mobile experiences, right to the default messaging app. It provides brands with the opportunity to increase their engagement with customers by making use of business messaging using chatbots and artificial intelligence (AI). RBM agents communicate with users through messages, events, and requests to achieve goals. Whether those goals are simple or complex, agents use a variety of tools (such as rich cards, media, and suggestions) to guide users through fluid conversations that satisfy user and agent needs.

From SMS to OTT-based instant messaging and RBM, there is no doubt that a much broader and unexplored potential is existing in blending conversational interfaces with rich graphical UI elements. Without the capability of blending conversational UI and rich, graphical UI, bot experiences won’t fulfill their potential.

**Conversational Commerce**

RBM served as a platform for business-to-customer messaging. Due to the nature of the conversational interface and the advantage of IP-based messaging, it is an excellent channel for conversational commerce.

Conversational commerce is an automated technology, powered by rules and sometimes artificial intelligence, that enables online shoppers and brands to interact with each other via chat and voice interfaces. Newsletters and push notifications will logically evolve into chatbots, but with added intelligence. The newsletter should progress into more personalized messages, highlighting the right products for the right person. This would improve discovery. Brands with excellent data operations can start building a new layer of notifications with chatbots serving the top of the funnel, helping propel the Awareness layer. Chatbots will work for more broad, programmatic notifications that spark interest. Pushing this idea further, chat interfaces could allow the brand to create a personalized news feed for each customer.

More and more eCommerce retailers are using chatbots to simulate the in-store experience of having a sales assistant available to help visitors at each step of their shopping experience. Customers can ask for help and get personalized recommendations; read reviews and feedback also which may be helpful and reliable for other customers. Conversational commerce also includes all conversations related to consumer
engagement and conversation chat on a website or on mobile interaction on Twitter, Facebook or Instagram involving the sharing of a link, on offer or the sending of a buy button, etc. With the growth of messaging apps, chatbots have enormous reach. As of early 2017, global monthly active users of the top 4 messaging apps surpassed users of the top 4 social networks.

Served as a platform for business-to-customer messaging, RBM is an excellent channel for conversational commerce due to the nature of the conversational interface and the advantage of IP-based messaging.

CASE OVERVIEW (RBM PROJECT IN T COMPANY)
T Company, a well-known Swedish telecom company, has been evolving rapidly to maintain its position in its traditional markets, as well as to gain a foothold in new ones. On GSMA’s initiative [10], T Company is upgrading its messaging services with RCS, aiming at enhancing its business to offer new capabilities and shares in the revenue generated by new business paradigms such as AI, chatbots. Then the RBM project is incubated in an internal innovation team, whose main mission is to build chatbots on B2C messaging as an additional interaction channel with businesses and services for T Company’s current and potential customers.

Currently, the main crew working on the RBM project includes a project manager, a machine-learning engineer, a software developer, and a UX designer. Although every team member has a different focus on the project from his/her own discipline, everyone works together at the beginning period of the RBM project to explore a feasible approach as it is a new area with little previous cases to consult. RBM is one of the projects inside the innovation team. And the way of work in the innovation team is project-driven and team members work in a matrix based on the needs of their profiles which means there are more practitioners who have been involved in the RBM project.

RBM project starts with the first chatbot that works for T Company’s own business. This chatbot (Chatbot 1) is mainly built to optimize T company’s services which were previously offered via SMS and to evaluate the feasibility and validate the hypothesis as a pilot project at the beginning. For T Company, RBM service is in the B2B market, which means that the Chatbots in RBM platforms will be sold to other companies as a solution. Thus, the second chatbot (Chatbot 2) is designed for T Company’s customer, a well-known fast-food chain, to have a conversational interface via SMS for their customers to order food. Later, more chatbots are joining the RBM project. But in my thesis, the investigation of the design process only covers the first two chatbots.

RESEARCH QUESTIONS AND OBJECTIVES
This thesis research focuses on conversational interface design of the chatbots on the platform of RCS Business Messaging. Since it is a new platform, there is a lot to explore from the design side. My research questions are:

- How does the interaction design practice shift when moving from direct manipulation to dialog flows?

I will attempt to address these questions by detailing the design process of the conversational interface on the RBM platform through contextual inquiry and critical incident interview techniques, to answer the questions from an HCI perspective.

The aim of this research is to explore the design process behind the conversational flow of the chatbot on the platform of RBM for T company. And the objectives include the description of the current workflow and practice in the development and design of the conversational interface, articulation of current challenges and problems experienced by the designers/content producers for the chatbots, suggestions, and possibilities for improving the development workflow of RBM projects.

METHODOLOGY AND RESEARCH PROCESS
The study was conducted using a mix of qualitative research methods. The stages of the study were as follows:

- Preparatory Studies: A brief preliminary research to depict a clear comprehension of this topic as well as to find proper approaches to construct the thesis research. The study results were served to inform the overall study and to aid the discussions with the interviewees in the next stage of the study.
- Interviews with each practitioner involved in the RBM project to collect specific and reliable behavioural facts about current workflow and practice.
- Contextual Inquiry: This technique was employed to get a better understanding and dig out more details about the current workflow and practices.
- Weekly Meeting Documentation: A supplementary documentation to the design process study, which summarized what has been done in the previous week, and the plans for the following week.

Preparatory Studies
At the beginning of the study brief preliminary research was conducted to explore the current practice of Chatbot design from both academic papers and the sharings published on several online platforms by practitioners who are working on Chatbots. Every design specialist has a different approach and ways of working, but there are some commonalities to the creative process [10]. The works of literature in the field of HCI design, Chatbots, Conversational Interface were collected and reviewed to depict a clear comprehension of this topic as well as to find proper approaches to construct the thesis research. Despite the academic paper reviews, practical cases and experiences shared online by the practitioners in the form of articles, comments, videos are also included in this initial research. Sources were mainly selected from more reliable online platforms such as the Nielsen Norman Group, Medium, official channels on YouTube. Keywords were clustering around Chatbots and design, such as conversational interface, interaction bots, intelligent assistant, messaging bots, etc.

This initial research served to inform the overall study and to aid the discussions with the interviewees in the next stage of the study.
Critical Incident Interview

Critical incident technique was employed to aid the interviewers to collect specific and significant behavioral facts, providing “a sound basis for making inferences as to requirements” for measures of typical performance (criteria) [9]. The critical incident technique takes advantage of people’s episodic memory to gather stories of recent events. It is especially useful for exploratory interviews: “Ask interviewees to recall specific instances in which they faced a particularly difficult case.” People do not have video recordings in their heads; instead, they reconstruct their memories from context. The more context you provide, the more reliable the results you can dig out. Also, people remember negative events more easily than positive ones, which in turn are easier to remember than neutral events. These extreme cases are often more vivid in users’ minds and will give you the details needed to come up with useful features. The trick is, beginning with specific questions that draw out stories of recent, memorable events related to the technology or object worth finding out about.

At this stage, I started from the perspective of a bystander when the first chatbot was about to land. In this research, with the aim of tracking the workflow of the design process and to find out the challenges practitioners met during their work, a series of interviews with members of the innovation team was conducted in 2019 spring. There are four interviewees involved in total as shown in the chart below, including a developer, a UX designer, a project manager, and a customer relationship manager. Except the one with the customer-relationship manager who is based in another city was conducted through Skype, all interviews were face to face in the office. All interviews were in English.

Prior to each interview, questions had been carefully prepared, all the interview starts with the question “What was your first assignment when you started working on RBM project?”. The purpose of setting this question was to help interviewees to recall the incidents as detailed as possible. Then sub-questions followed to dig out the whole story. Due to the fact that each team member has some individual tasks related to their backgrounds of discipline, information was gathered and some questions were designed accordingly for each participating interviewees. For example, there were additional questions in the interview with the product manager, to whom RBM project is assigned, to track the workflow of RBM project from the very beginning. But in general, all the questions were structured to find the answers about when, what, how. And by bundling the answers, we can find the string of their workflow, both separately and collaboratively.

Contextual Inquiry

Contextual inquiry is a semi-structured interview method to obtain information about the context of use, where users are first asked a set of standard questions and then observed and questioned while they work in their own environments[14], see in Figure 4. The contextual inquiry technique was employed to get a better understanding and dig out more details about the current workflow and practices. It was primarily used to validate the findings from the critical incident interview study, but also to capture some features and activities that might be missing in the interviews. An often-mentioned advantage of the contextual inquiry method is that the interviewee is able to show how they solve work tasks, rather than having to explain sometimes complicated relationships and practices verbally. This was deemed to be a useful method in this context due to the highly visual and situated nature of typical user experience design work, such as creating prototypes, interaction flows, etc.

For each contextual Inquiry, I spent approximately 4 hours in observing the interviewees while they were working. The contextual inquiry sessions were scheduled with the participants, it usually started in the morning at 10:00 and ended in the afternoon at 15:00, including an hour lunch break. During one of the interview sessions in my research, I sat next to the interviewee and observed them working on the split tasks of the RBM project. I was asking questions about each work task, tools used, and the reasons for choosing different design choices. The tools being used in the contextual inquiry session were mainly paper and pen, only one session (in a meeting room) was recorded. All the notes were structured by time order, step by step.

Weekly Meeting Documentation

A team meeting is conducted by the project owner every week to keep the track in the right direction. Brief observation and documentation were done during the weekly meeting as a com-
plemementary session to the interviews and contextual inquiries. Some pain points that had been discussed over the meeting were also captured. Although the amount of data from critical incident interviews and contextual inquiry is quite considerable, it is impossible to track everyone’s everyday workflow. The weekly meeting was a very suitable supplementary documentation to the design process study. First of all, the weekly meeting was scheduled with the purpose to make sure the project is in the right direction. Usually, the weekly lasts for half an hour and the meeting process had two parts:

1. A brief summary about what has been done last week, and the plans for the following weeks.

2. Discussions on progress, problems, new ideas, etc.

The pain points are the problems that were frequently put on the table during the meeting. And internal workshop happened once, which was documented as well. This section is to illustrate a holistic view of the whole workflow as well as capture the work practices that the interviews may have missed.

RESULTS
This section summarizes the findings from critical incident interviews, contextual inquiries and the group activities. In this section, firstly, the design process itself will be extracted in isolation from a higher method level. A description of the current design and practice will be illustrated. However, in real practice, the design process always intertwined with a larger product development life-cycle and happens in conjunction with product manager’s process, developing process, marketing process and sales process. In case of that, secondly, the workflow of RBM project will be consolidated into the order of time in this section, which is a linear flow started in the autumn of 2017 to July 2019. Then the challenges and problems experienced by the team members in different stages of the workflow will be detailed.

Generative Design Process and Current Practice
Extracted out of the findings from incident interviews and contextual inquiry, figure 5 illustrates the design process of conversational interface which follows the generative design process and can be concluded into four main steps: discovery, invention, design, evaluation. And in each step, there were different key activities for designing the digital product.

Discovery
The design process starts with specifying use scenario and interpret users, and they were the key activities in this step. Internal workshop and meetings helped to specify the use scenario, which was based on customer’s need (Company M). Then the team employed the persona technique to build up the user profile, user personas which served to the following design.

Invention
Building the Chatbot’s personality happened in this step, which is the most unique design activity in RBM project as well as in conversational UX design, comparing to designing other digital product. The personality of chatbot supports the whole conversation experience of interacting with a bot. To create a personality for the Chatbot, the team conducted a brainstorming session: first brainstormed a list of adjectives, narrowed them down to 4-6 key adjectives, then found a few different characters who embody these qualities, wrote a short description for a character, created an image to visually represents.

Design
With a specific use case, user profile and a identity image of the bot, it was time to crafting the conversational experience with an interaction bot based on all of the previous work. In the design step, storyboard technique was used to outline the action and capture the key elements of the use scenario. Storyboards help designers refine their ideas, generate scenarios for different approaches to a story, and communicate with the other people who are involved in creating the production [20]. Then designers started to crafting the dialog scripts based on the interaction points extracted from storyboard, the user profile, chatbot’s personality. Final step was to blend the dialog scripts with graphical interface components, using Sketch (the digital prototype software).

Evaluation
The design activities in the evaluation step are: collect information, analyze information, find resource for redesign. Techniques and tools employed in this step included a walkthrough, user test experiment, after-interview. Information analysis included qualitative data and quantitative data. List of problems, issues, implications for redesign were found for the second version.

Workflow of RBM project
The workflow of RBM project is a linear flow started in the autumn of 2017 to July 2019. But since this thesis started a year and a half later in February 2019, when the first use case (Chatbot 1) was just about to launch, the previous information about the process of RBM project was all collected from the critical incident interviews. In the following, there will be three parts to describe the workflow and current practice, which are: Starting Phase, Chatbot 1 Phase, Chatbot 2 Phase. These parts are sequentially in time order. The Starting Phase has not much to do with the design, but what happened in this phase had fundamentally influence on the direction of RBM project in an overall view. Chatbot 1 Phase and Chatbot 2 Phase, as their name suggests, it the period from when the use cases of chatbot was confirmed to when the Chatbot landed or the demo was launched.

Starting Phase
RBM project, which preliminarily started in September 2017, was initially an idea brought from Google IO 2017 by the product manager and another colleague.

“RCS has been there for years but without concrete applications. Some demos of RBM appeared in Mobile World Congress in Barcelona in February 2017. Later in that year I went to the States for google’s developer conference (Google I/O) and saw a presentation about RBM. And we thought it is the time for us to deploy our RBM service.”

- Product Manager, interviewee 4
The internal initiative of the RBM project in the studied company started in the autumn of 2017, with a team of three people. The product manager is the only one who still works on the RBM project and the one who is leading the direction, which means the product manager is the right person and a reliable interviewee to ask about what happened before. Apart from the product manager, the original team also included a designer and a part-time developer, but who both had moved on to other positions when this thesis started, so there was no chance to meet and talk with them.

According to the product manager, the RBM project started in an opposite way to the process of other projects.

“Usually, we start with a problem rather than a solution. But obviously, the RBM project reversed. So we need to think about how to apply RBM to a use case that can have its maximum values”

- Product Manager, interviewee 4

Under the background of GSMA RCS initiative bringing together the mobile industry’s leading operators, vendors and service providers to shape the RCS specification and implementation[10]. The project manager explained that “RCS momentum is accelerating, and we must have a foothold in the market.” The company had informal cooperation with google and started using Google’s product to build RBM Chatbots. Although there were several RCS API’s in the market, google was considered the most competitive, with a huge ecosystem sitting behind. And google was the aggregator who also had cooperation with other providers.

However, shortly after it was launched, the RBM project paused for nearly a year. There were two main reasons behind this. The first was because there were still a lot of negotiations and corporations to be done within the RCS ecosystem. In addition to mobile operators, the RCS ecosystem consists of multiple stakeholders, fulfilling a variety of important roles. For example, RBM is using the mobile network, which is different from those over-the-top instant messaging applications. It means that there must be a SDK integrated in the mobile phone system in order to receive RBM message. But there was only a subset of smartphones on the market that were RCS-enabled. Another reason was the limited resources inside the innovation team. There were simply no developer who could take on this project. So in the time of nearly a year, this project mainly stayed in slides, reports and mind-maps, exploring some potential use cases for both internal use and for the company’s customers. At the same time, the RCS ecosystem was growing as GSMA was putting efforts to accelerate the process.

**Chatbot 1 Phase**

The first Chatbot in the RBM project was designed for T Company’s own business. Business-to-customer SMS was widely used in T Company’s business to connecting their services and products with mobile consumers. This chatbot (Chatbot 1) is mainly built to optimize T company’s services which were previously offered via SMS.

The use case of Chatbot 1 is very straight-forward and simple. When detecting a user is running out of data, it sends a message to the number who as a reminder. In previous SMS messages, there are only contains plain text and a link in the end. When clicking the link, it will jumps to the browser and open up page for loading data. But the RBM messaging sends a rich media card containing a picture, text, and clickable button.

“Although we are still sending out those messages, I, personally, donsee much help from those links. No one would like to click that.”

- CRM Manager, Interviewee 2
The design of Chatbot started by a developer at the very beginning. The developer was told to transfer a piece of SMS message into RBM message, and make a clickable button for the payment. That was all the requirement, without any proper product document. This data-loading case was from Customer-Relationship Manage Team in another city. The Customer-Relationship Manager and developer worked together through Skype and developer went to that city once a week.

"That is easy, I thought, when I was hearing the needs. I immediately started typing the dialogue in my mind."
- Developer, Interview 1

In the “design process”, prototype were sketched by text-editor (Sublime), and it was basically textual dialog. Other media contents, a cover photo and a gif was downloaded from T company’s official website. The demo was implemented in a week, and it was used to evaluate the feasibility and validate the hypothesis at the beginning. The demo was brought up in a meeting inside the Customer-Relationship Management team, further discussion happened. Later, a workshop, internal interviews were conducted to gather suggestions and feedback about the RBM message, as the basic of design decisions. A designer joined the team, who adds a persona to the brand and reconstruct the text content based on the personality of the Chatbot (see Figure 6). In late February 2019, Chatbot 1 started sending messaging to real customers. It doubled the user click rate in 10 days.

**Chatbot 2 Phase**

The second Chatbot were put into discussion in March 2019. Chatbot 2 is designed for T company’s customer, a well-known fast-food chain, Company M, to have a conversational interface via SMS for their customers to order food. For company M, the demand of having an RBM Chatbot is to build a closer connection with their customers as well as having an additional channel for their business. This use case requires much more complex conversation and logic behind than the first one.

"Building a chatbot is totally different from building a web or app. Interactions that might be challenging to design for a traditional app can be easy here, but the reverse can be true as well."
- Designer, Interview 4

The design process started with a workshop with Company M to find their needs. Company M’s initial needs from RBM is to have an extra channel to interact with their customers, which means it would be vital to build up a personality for the Chatbot, according to the company’s culture, branding, market strategy and identity image.

The first step in the design process was to build the persona for both the Chatbot and the users. To build up a personality for the Chatbot, the team started brainstorming a list of adjectives that we want users to perceive when talking to the Chatbot. Then listed down to 4 key adjectives that describe the persona’s core personality traits, which are friendly, helpful, sincere, efficient. Next step was finding a few different characters who embody these qualities, and in the end one character that best embodies the Chatbot’s action was chosen, with a short description written by the designer.

Based on the personas, designer started to write the conversation scripts and later blended the textual conversation with graphical UI components such as cards, carousels, etc. Both paper prototypes and high-fidelity prototypes were build. Then a detailed interaction document were completed and handed to the developer. With the interaction document, developer implemented the Chatbot2.

Users tests were conducted later to test the first version of the demo. Tasks were designed in the user test for the participants and the designer observed the process when participants were managing to complete them. A short interview was conducted after each participant finished the tasks. From the observation and interviews, designers draw some feedback for iterations (see Figure 7). Until now, the Chatbot have not landed yet, but have three version of demos.

**Challenges and problems**

Designing a Messenger bot is different from designing apps for mobile or the web. Some universal UX principles apply, but the tools and expectations are very different.

1. **Prototype Tool:** Graphical sketching is no longer suitable for designing dialog flow. For a Chatbot, a great conversation script is needed using an adaptive syntax which would also make the conversation pleasant and meaningful for users.

2. **Conversation Script:** Conversations are heavily scenario-based. The dialogue under different context could be very different, which adds to the uncertainty of where it will lead to. This feature is one of the challenges in conversational experience design. The designed found it hard to anticipate and structure the whole conversation at the beginning.
3. **Failure Management**: Failures in the conversation are inevitable. How to deal with failure? How should the Chatbot reply was a problem during the interaction?

4. **User Privacy**: Due to the influence of GDPR, the topic about how much data about the users that we could use during the interaction had been discussed over and over again during the design process. What is the line between helpful and rude?

5. **AI or not?**: I found it very intriguing to hear this discussion between a developer and a designer. And it remains a question for the design of Chatbot.

**INSIGHTS**

In the insight section, there are the findings which had been summarized and some suggestions and possibilities for improving the workflow. And in the design of conversational user interface, the most unique part is writing the conversation scripts, some concerns in key design activities will be discussed later.

**Crafting dialogue Script**

Crafting a dialogue script needs to take several factors into consideration. According to a report from N/N group [6], a chatbot is a domain-specific text-based conversational interface that supports users with a limited set of tasks, which means conversational interface should have a specific use scenario and it is not suitable for all the use cases Comparing to GUI of mobile applications, the CUI starts with less information, which should be taken into consideration when transplanting a service from mobile app to messaging platform.

It is true the designer needs to have a holistic view on a higher-level of the whole conversation. But when the conversation is long, it is better to break it into sections. For example, Chatbot 2 was designed for ordering in a restaurant which the process would be long, according to the practice of design Chatbot 2, it was easier to tackle the problem by having sections breaking into “Onboarding”, “Menu”, “Order”, “Payment”. By breaking up the conversation, the flow does not mess up and looks more clear in the interaction document for developers.

And there are still high demanding of efficient tools for conversation prototype. But when there are not proper tools around, paper and pen are always the best partners. Do not hesitate to write down the dialogue the moment you have it, you might get a quick, low-fidelity sense of the “sound-and-feel” of the interaction that the designer wants to convey, which conveys the flow that the user might experience.

**Build up a personality for Chatbot**

The chatbot’s personality represents the company on a personal level, chatting with customers in a one-on-one setting. And it is the key factor for increasing user engagement as well as setting the Chatbot itself apart from the others. For Business Messaging, The personality shall be built on the brand identity of the company, which helps to set up the company’s brand image that they want users to perceive. More important, it is much easier to write the conversation scripts with a concrete persona. The Chatbot’s personality will now provide the designer with suitable ideas on the way this chatbot addresses the user: its tonality. And a good persona evokes a distinct tone and personality, and it is simple enough to keep top-of-mind when writing dialog. It should be easy to answer the question: “What would this persona say or do in this situation?”. During the conversation, users will project a persona onto the Chatbot’s action whether it is planned or not. So the designers can purposefully design the experience that they want users to perceive, instead of leaving it up to chance.

**Don’t let expectations fall high**

Then expectation falls high, which is one of the current design concerns. Technologies should be solutions rather than fairy tales. User experience design is the process of linking proper solutions to the problems we meet in real life and it has always been a crucial part of the digital product development process.

A universal rule in UX design is that: User should be aware of what happened. So do not make it confusing and be honest and transparent when explaining why something doesn’t work. Since it can happen at any time during the interaction, the Chatbot needs to have unique error handling for each turn in the conversation to get the user back on track. Most of the chatbots are intended to provide an additional channel of interaction with a business for purposes other than customer service. For example, Domino’s Pizza bot allows users to order pizza. Before being smart, it needs to be efficient. Customer-service bots were perceived as generally less helpful than human representatives, but our participants also believed that they had some advantages. The most important advantage was speed.

**DISCUSSION**

There are some limitations of this thesis research. First of all, the research was conducted from a higher method
level, without taking languages and culture backgrounds into consideration, which would also be an interesting topic for further research. Second, the investigation were based on two uses cases within a team of four, which means the Results might not be universal to all the experience. Apart from the limitations, in this section sustainability and ethic aspect of Chatbot will be discussed. Then I would like to have some brief discussion about the current stage and potential future about Chatbot.

**Sustainability and Ethic**

In 2015, world leaders agreed to 17 goals for a better world by 2030. These goals have the power to end poverty, fight inequality and stop climate change[1]. Guided by the goals, I would like to discuss sustainability and ethic aspect of Chatbot.

**A channel to spread the words**

Social influence has shown to have a big impact on people, if a chatbot can get into this social sphere it has the ability to motivate people’s behavior on a completely different level than any other form of technology. There are research results from the user interviews indicate that chatbots can affect and motivate people to consume food in a more sustainable way [18].

**User Privacy**

Privacy is another area of concern when it comes to the use of bots. The questions what data from the users that we could use during the interaction had been discussed over and over again during the design process, especially under the influence of GDPR. There were small conflicts between building a personalized Chatbot and crossing the line. “What is the line between being helpful and being rude.” Chatbot responses, and all other communications, should also include some level of empathy and sensitivity when it comes to interacting with users. Should a bot be male, female, gender neutral, or perhaps entirely genderless? Should a bot have an identifiable race, ethnicity, or nationality? There are important questions to answer before incorporating chatbots into the company’s day-to-day operations and user interactions.

**The current stage of Chatbot**

In today’s world, chatbot growth and popularity are motivated by at least three different factors. First, there is the hope to reduce customer-service costs by replacing human agents with bots. Second, the success of conversational-based systems like WeChat has put forward the idea of chatbots as an interaction channel with businesses and services, intended to supplement existing channels such as the mobile web and mobile apps. Last, the popularity of voice-based intelligent assistants such as Alexa and Google Home has pushed many businesses to emulate them at a smaller scale. The tech industry has mainly been devoting its efforts towards ‘utility-driven’ chatbots - those designed to provide specific and limited services to the user (e.g., Dominos chatbot for ordering pizzas). Facebook Messenger, Skype, Slack, Kik, Telegram, etc. together host more than a million chatbots[17], with use-cases ranging from food delivery (Domino’s) to exploratory shopping (Burberry), from connecting like-minded humans (Chatible) to flight booking support (Kayak), and from casual conversation (Pandorabots) to reading news (CNN). The primary focus of these chatbots is not to mimic human conversation but to enable tasks through the ease of conversation.

The true state of technologies has fallen far behind the technological fairy tales that the public has been led to believe [19]. The development details of the product got lost in the huge hype and the “intelligence digital products” begin to seem self-willed and almost magical, leaving our users unaware of where they come from and what their real abilities are. Intelligence digital products are not building and learning by themselves, for instance, chatbots are not jumping out of a bunch of code but require a process of design and development. They have no free will and certainly is not conscious - two assumptions people tend to make when faced with digital products using advanced or over-hyped technologies.

**Towards hybrid interfaces**

From all the current practices and studies, there is no doubt that the future of the conversational interface belongs to a hybrid interface, as Tomaz Štolfa said in his blog. Each message has the potential to become an atomic application, especially those blended messaging interface, bringing the best of the command line and GUI paradigms together. Without the capability of blending conversational UI and rich, graphical UI, bot experiences won’t fulfill their potential. Chatbots will be existing in the messaging apps for a long time. And actually in the graphical user interface, we also have the conversational experience, for example, the messaging app on your phone, but the difference is that it is real human beings talking to you behind the screen. With all this activity there has been a lot of discussion around conversational UI and how the pattern of communicating with people and computers is blending in messaging or voice interaction with simple commands, and simple, mostly textual responses, occasionally paired with a photo. Voice can be a very powerful input/output mechanism for a conversational interface with a computer. Combined with a rich graphical feedback loop it can become even more powerful. There is a much broader, unexplored potential in blending conversational interfaces with rich graphical UI elements. Without the capability of blending conversational UI and rich, graphical UI, bot experiences will not fulfill their potential.

**Design the dialog for multiple devices**

Since hardware shapes the interaction. Depending on the devices and the technology behind, the conversational experience could be voice or textual, or both. On the mobile phone or laptop, users can type or speak as an input, but on the other digital devices such as smartwatches and intelligent speakers, the user’s input is usually voice. For the conversational commerce, if a company wants to use the conversational experience to boost the customers’ engagement and participation, there is no doubt the company would like their chatbot agent exists on as more digital channels as possible. In the context of this, a design challenge arouses to call for cross-platform design as well as seeking the answer to the question how to transplant the conversational experience from one platform to another. In company T’s use cases, the conversational interface initially
designed in RBM, and later, there are new needs to build the
dialog on the intelligent speaker Google Home. So it is also
interesting to look into how to disseminate the dialog through
multiple devices.

Ever-changing conversation under different scenarios
Conversations are heavily scenario-based. The dialogue under
different contexts could be very different, which adds to the
uncertainty of where it will lead to. This feature is one of the
challenges in conversational experience design. Because the
more uncertainty the conversation has, the harder it will be
for the agent to understand the user. As a result of this fact,
for each use case and each use scenario, we do not yet have a
concrete structure to frame the dialog which is ever-changing
and full of possibilities. We do not yet have a concrete struc-
ture to frame the dialog which is ever-changing and full of
possibilities. But there must be a clue to make the design pro-
cess more clear and tidy, rather than drowning in a diversity
of conversations.

Towards unified principles of interaction
As technologies shift computing away from the desktop, it is
becoming increasingly clear that traditional means of interac-
tion need to be replaced or complemented with new forms of
input and output. Today's interaction styles are mostly graph-
ical with a bit vocal and virtual, but the graphical interface
has iterated over the years, it is quite different from how it
looks like 40 years ago. The question about how will the fu-
ture interaction styles be has been posted by researchers and
practitioners over and over again in recent years. Exploratory
but quite inspiring projects are answering this question. Such
as the Skinput by Harrison et al. [12] which appropriating
the body as an input surface, Holodesk by Hilliges et al. [13]
combines an optical see through display and Kinect camera
create the illusion that users are directly interacting with
3D graphics, and inFORM from MIT’s Tangible Media Group
which allows people to remotely manipulate objects from a
distance, physically interact with data or temporary objects.
What will be the future? Which style would replace GUIs?
None. More and more modalities of interaction are filling
the gap between physical and digital tools. Multimodal in-
terfaces can deliver natural, intuitive and efficient interaction
due to the fact that people inherently interact with the world
multi-modality, through both parallel and sequential use of
multiple perceptual modalities [7]. Language is a key feature
of interaction in the physical world. There is no doubt that
the conversation seems to be more intuitive and natural. The
evolution of the interface where human-computer interaction
occurs is never about replacing each other, but thinking about
how can these interaction styles coexist and enrich each other.
To support the interoperability and end-user appropriation,
unification is needed. The most intuitive unifying principle is
that the way we interact in the physical world can also apply
in the digital world.

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