Design for the Future—Essay

Retail Banking and Financial Service Under System Analysis

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Abstract
Financial planning services and banking experience are complicated systematic social-technological design challenges more than only discussing numbers, money, investment, and benefit. Thus, the purpose of the research is to apply modified System-Theoretic Process Analysis (STPA) to study retail banking and financial service through the lens of service systems to empower us to have more holistic views to consider other critical aspects of services and systems. Following a Capital One Café model as our case study, we identified ten key controllers/stakeholders and their values and goals in the retail banking system and then translated the outcomes into losses and system-level hazards and constraints, which helped us generate high-level, detailed hierarchical control structures to enable us to analyze the topic from the perspectives of customers, banking service provider, and retail. Under STPA systematic approach of analyzing the retail banking experience and financial services, we conclude three learnings from service designer's perspectives: 1) establish meaningful bonding's between retail and financial services, 2) create service roles to deliver a better and more immersive user experience, and 3) translate service touchpoints to data points to improve service quality. In addition, STPA is one type of systemic analysis approach that can help service designers and design leaders develop solid system thinking, model complex system concepts, and reframe problems to better solve large complex socioeconomic challenges.

Keywords
Financial Service, Service Design, System, STPA, System-Theoretic Process Analysis

Resumen
Los servicios de planificación financiera y la experiencia bancaria son desafíos

sistemáticos de diseño social y tecnológico complicados, son más que solo discutir números, dinero, inversiones y beneficios. Por lo tanto, el propósito de la investigación es aplicar el análisis de procesos teóricos de sistemas modificado (STPA) para estudiar la banca minorista y los servicios financieros a través de la lente de los sistemas de servicios, para empoderarnos a tener puntos de vista más holísticos para considerar otros aspectos críticos de los servicios y sistemas. Siguiendo un modelo de Capital One Café como nuestro estudio de caso, identificamos diez controladores/partes interesadas clave y sus valores y metas en el sistema de banca minorista, y entonces traducimos los resultados en pérdidas y peligros a nivel del sistema y restricciones, lo cual nos ayudó a generar estructuras de control jerárquicas detalladas y de alto nivel que nos permitieron analizar el tema desde la perspectiva de los clientes, el proveedor de servicios bancarios y el comercio minorista. Bajo el enfoque sistemático de STPA de analizar la experiencia de la banca minorista y los servicios financieros, concluimos tres aprendizajes desde la perspectiva del diseñador de servicios: 1) establecer vínculos significativos entre los servicios minoristas y financieros, 2) crear roles de servicio para brindar una experiencia de usuario mejor y más inmersiva, y 3) traducir los puntos de contacto del servicio en puntos de datos para mejorar la calidad del servicio. Asímismo, el (STPA), es un tipo de enfoque que puede auxiliar a los diseñadores de servicios y a los líderes de diseño a desarrollar un sólido pensamiento sistémico, modelar sistemas conceptuales complejos y reformular problemas para resolver mejor los enormes y complejos desafíos socioeconómicos.

Palabras clave
Servicio financiero, Diseño de servicio, STPA, Análisis de Procesos Teóricos del Sistema

1. Introduction

Have you ever thought about future banking experience and financial services (Mitchell et al., 2017)? What do the banking services and financial system look like through emerging technologies (e.g., AR, VR, and Internet of Things) and service design (Penin, 2017)? What are the future financial products and business models and how do they affect the space design driven by service innovation (Lee, 2022b; Lee, 2022c)?

Financial planning services and banking experience are large and complicated design challenges relevant to everyone. It is more than only discussing numbers, money, investment, and benefit. We also need to consider emotional attachment, how to improve people's quality of life, our family members or caregivers, maybe our parents' or grandparents' mobility, and health conditions. It's truly a complicated critical social issue connected to our daily lives.

In this article, we analyzed a new type of retail banking experience from the perspective of users, banking services, and retail services by applying a modified STPA, System-Theoretic Process Analysis (N. Leveson & Thomas, 2018; N. G. Leveson, 2017), to help us, as designers, understand how to create better human-centered retail banking experience and financial services in the future.

In addition, through the case study, we want to emphasize the concept, process, and implication of system thinking applied in the field of service design to decompose and analyze the relationship between people, emerging technologies, and society in the era of digital transformation and organizational change. STPA can be considered a

combination of system thinking and design process to help designers, engineers, and researchers pursue meaningful and impactful solutions and scalable creative processes. In the experimental research, we use Capital One Café (Capital One, 2018; Kapcia & Boutz-Connell, 2017; Vogelzang, 2017) as a case study and define it as a system to follow the four steps: 1) define the purpose of the analysis, 2) model the control structure, 3) identify unsafe control actions, and 4) identify loss scenarios (Figure 1). We combined steps 3 and 4 as a discussion and conclusion in the study.

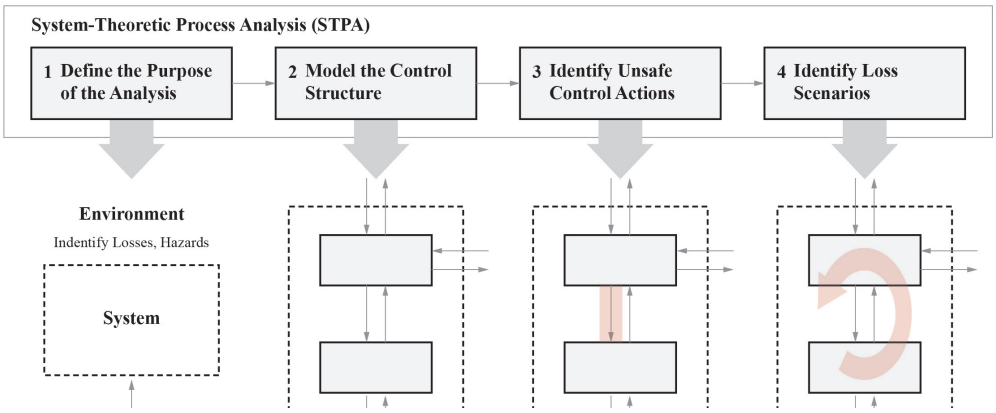

Figure 1. Overview of the basic STPA Method (modified the diagram from STPA Handbook)

Compared with traditional banking services (e.g., customers go to the bank and communicate with the bank tellers), people use digital banking more frequently through their personal devices, e.g., phones, Apps, and websites to finish their tasks online. However, there is a new type of hybrid banking experience combined with retail services, e.g., coffee shops, to offer retail banking experiences and services. We are interested in analyzing its business model and systems through the lens of service design to help us, as designers, envision better service innovations and strategies.

Different kinds of banking formats come with various scenarios and different service touchpoints: 1) people at the bank communicating with a bank teller in person, 2) people using online banking working with chatbots, 3) people using self-serve machines, e.g., ATMs independently and freely, or 4) people using a hybrid format to finish their tasks in more efficient ways. This suggests that there are different levels of safety issues (N. G. Leveson, 2017), types of experience design, and service models that we need to consider to improve the current banking and financial systems (Spencer, 2012).

In the article, our analysis emphasized the banking/financial service provider (e.g., money coach, financial advisor) as the main system to study. The retail service providers and people (e.g., customers) are also critical components to be considered in the system. The intention of the study is to view the retail banking experience and financial service through the lens of a system approach.

2. Define Purpose of the Analysis

The first step of applying STPA is to understand the purpose of the analysis and research by 1) identifying the stakeholders, 2) defining the stakeholders' values and goals, and 3) translating the stakeholders' values and goals into losses. Figure 2 shows the standard STPA flow of defining the analysis purpose (N. Leveson & Thomas, 2018).

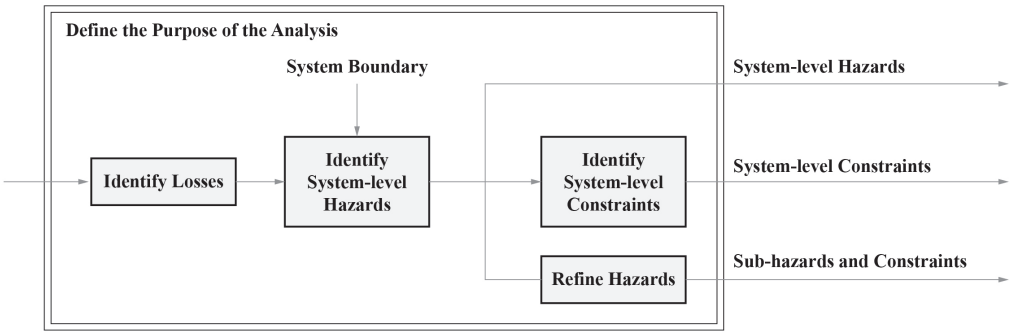

Figure 2. Overview of defining the analysis purpose (modified the diagram from STPA Handbook)

2.1. Identify the Stakeholders

In this study, we first identified seven key stakeholders to help us understand the retail banking system better and also have an impact on our control structure diagram.

- **People** (potential/target customers)
- **Coffee lovers** (people come to stores for coffee)
- **Money coach** (bank service providers)
- **Financial advisor** (bank service providers)
- **Bank operation** (back of house of bank service)
- **In-store ATM** (or other in-store machines that can provide banking services)
- **Coffee service provider** (retail service provider)

2.2. Define the Stakeholders' Values and Goals

Besides identifying the key seven stakeholders, we also listed the values and goals of each key stakeholder to clarify their roles and responsibilities separately.

- **People** (potential/target customers)
  - They want to know and learn banking and financial services.
  - They want to know the banking brand (e.g., Capital One).
- **Coffee lovers** (people come to stores for coffee)
  - They want to purchase and enjoy coffee or snacks.
  - They want to work and spend time in the coffee shop.
- **Money coach** (bank service providers)
  - They want to provide financial knowledge and services to potential/target customers.
  - They want to make connections with local communities.
- **Financial advisor** (bank service providers)
  - They want to provide more in-depth and tailor-made financial services to customers recommended by money coaches.
  - They want to deepen the connections to develop long-term relationships with the target customers.
- **Bank operation** (back of house of bank service)
  - They maintain the operation side of the banking services.
  - They provide connections with other bank branches and headquarters.
  - They provide educational programs to train the financial experts (e.g., money coach, financial advisor).
  - They collaborate with the coffee brand (e.g., Peets Coffee).

- **In-store ATM** (or other in-store machines that can provide banking services)
  - They provide 24/7 banking service to people in the store.
  - They provide digital banking services.
- **Coffee service provider** (retail service provider)
  - They provide coffee and snacks.
  - They want to collaborate with the bank.

2.3. Translate the Stakeholders' Values and Goals into Losses

The definition of losses is broadly defined, including a loss of money, of people's life, of items or properties, of mission, or even polluted spaces. In STPA Handbook, Leveson and Thomas proposed their definition of loss can be a loss involving something of value to stakeholders or any other loss that is unacceptable to the stakeholders.

Based on to Section 2.2., we need to translate each stakeholder's value and goals collectively and summarize the losses at a system level to help us analyze the retail banking system.

- L-1: Loss of money/finances (from the bank's and/or the customer's perspective)
- L-2: Loss of data/financial privacy (e.g., sensitive information)
- L-3: Loss of mission (e.g., money transferring, account opening, account closing)
- L-4: Loss of customer satisfaction (e.g., trust, user experiences)
- L-5: Loss of investment opportunities (e.g., the moment of timing to invest)

3. Identifying System-level Hazards

We first define the terms 1) system and 2) hazards to help us understand the concept of system-level hazards. From STPA Handbook, Leveson and Thomas mentioned that a system is a set of components that act together as a whole to achieve some common goal, objective, or end. A system may contain subsystems and may also be part of a larger system.

They defined the term hazards as a system state or set of conditions that, together with a particular set of worst-case environmental conditions, will lead to a loss. However, prior to identifying system-level hazards, we need to study the relationship between a system, the system boundary, the inputs and outputs of the system, and the environment (Figure 3).

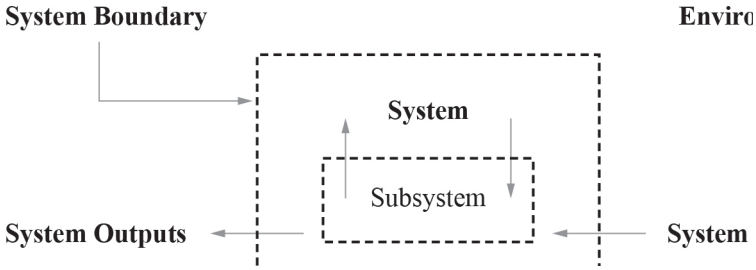

Figure 3. The relationship between a system, system boundary, and the environment (modified the diagram from STPA Handbook)

3.1. Identify the System, System Boundary, System Inputs, and System Outputs

To successfully decompose system-level hazards, we need to identify the 1) system,

2) system boundary, 3) system inputs, and 4) system outputs. The intention is to help us set up the right scope of the retail banking system before starting to analyze each component in the system (Figure 3). We summarized them in Table 1.

System	Financial/banking system services
System Boundary	We want to study banking services in the context of retail experience. In the study, we focus on how to manage financial/banking systems combined with coffee services (retail). When people experience and use the new type of hybrid (bank and retail) service, what are the critical risks, service system, business model, and other financial safety concerns that banks, customers, and retailers that need to be considered?
Systeme Inputs	• Banking service innovation (e.g., introduce new role money coach to customers) • Retail business model (e.g., curate retail experience and offering with the banking services)
System Outputs	• Tailor-made financial planning for customers • Effective investment for customers • New lifestyle promotion • Accessible banding experience

Table 1. System, system boundary, system inputs and outputs

3.2. Define the System-level Hazards

We summarize the system-level hazards that connect to system losses (section 2.3).

- H-1: Bank does not represent a reliable brand to build trust with customers [L-1, L-2, L-3, L-4, L-5]
- H-2: Bank does not cultivate a safe and comfortable environment [L-1, L-2, L-4]
- H-3: Bank is unable to protect customers' private data and sensitive information [L-2]
- H-4: Bank does not provide financial knowledge and training programs to customers and their staff [L-1, L-4]
- H-5: Bank does not complete the money transfer mission [L-1, L-3, L-4, L-5]

3.3. Define System-level Constraints

System-level constraints are the opposite way to think of system-level hazards, which can help us review the retail banking system in a more comprehensive perspective to establish a system boundary to avoid potential system-level hazards. To conclude from the STPA Handbook (N. Leveson & Thomas, 2018), a system-level constraint specifies system conditions or behaviors that need to be satisfied to prevent hazards and ultimately prevent losses.

- SC-1: Bank must represent a reliable brand to build trust with customers [H-1, H-2]
- SC-2: Bank must cultivate a safe and comfortable environment [H-1, H-2, H-3]
- SC-3: Bank must protect customers' private data and sensitive information [H-3]
- SC-4: Bank must provide financial knowledge and training programs to customers and their staff [H-3, H-4]
- SC-5: Bank must complete the money transfer mission [H-1, H-2, H-4, H-5]

3.4. Refine the System-level Hazards

In this section, we use H-4 as an example to discuss and derive its sub-hazards by asking: what do we need to control to prevent this hazard? To propose and transfer

financial knowledge and training programs to customers and staff, we will need to consider the following three steps: 1) financial education planning, 2) financial service implementation, and 3) financial program iteration. The following sub-hazards can be derived for H-4:

- H-4: Bank does not provide financial knowledge and training program to customers and their staff [L-1, L-4]

1. Financial education planning

H-4.1: Clarify who are the target groups and their financial backgrounds.
H-4.2: Identify the needs and pain points of the target groups.
H-4.3: Design the curriculum based on the information from H-4.1 and H-4.2.

2. Financial service implementation

H-4.4: Identify the feasible implementation stages.
H-4.5: Effectively execute the plan and training program through key service touch points (e.g., physical service touchpoints and digital service touchpoints).

3. Financial program iteration

H-4.6: Make the customer feedback system transparent and efficient.
H-4.7: Validate each feedback received from the customers.
H-4.8: Regularly evaluate the performance of financial experts.

4. Model the Control Structure of Retail Banking Services

In Section 2.1, we defined the seven stakeholders and viewed them as the foundational controllers in the system. To authentically represent a hierarchical control structure (Figure 8) for new retail banking service, we need to add three extra control elements in Table 2. In addition, we categorized the whole system into five subsystems: 1) economic environment, 2) user, 3) bank service provider, 4) bank and retail team, and 5) physical banking/financial process.

4.1. Identify Controllers in Control Structure

In this section, we visualize the features of each controller in the retail banking system. The seven controllers are originally from key stakeholders that we identified in Section 2.1. Meanwhile, to complete the retail banking system, we add the extra three controllers: 1) organization leadership, 2) government policy, and 3) in-store ATM.

In the study, we defined 5 subsystems and 10 controllers to discuss the banking/financial safety system under STPA. Figures 4 to 7 show the refining process and Figure 8 represents the following elements below:

Subsystem 1: Economic Environment

- **Government policy** (financial-related regulations)

Subsystem 2: User

- **Bank customers** (potential target users)
- **Coffee lovers** (people come to stores for coffee)

Subsystem 3: Bank Service Provider

- **Money coach**
- **Bank teller**
- **Financial advisor**

Subsystem 4: Bank and Retail Team

- Organization leadership (banking and retail)
- Coffee service provider (retail service provider)

Subsystem 5: Physical Banking/Financial Process

- Bank operation (back of house, operation side of bank service)
- In-store ATM (or other in-store machines that can provide banking services)

4.2. Assign Control Actions and Feedback

In Figure 8, we integrate the content of ten controllers from Table 2 to illustrate the relationship (e.g., control actions and feedback) between each connection to help us analyze the retail banking system.

Controllers	Control Actions	Feedback
Subsystem 1: Economic Environment		
Government policy (financial-related regulations)	Impact on the interest and operation of the banks and influence people's financial decision-making and planning (e.g., income, tax).	At the country level, people or organization can express their voice by suggesting to modify the relevant laws or through voting in the elections.
Subsystem 2: User		
Bank customers (potential target users)	Decide their financial planning and package and can give suggestions to reflect their retail banking experience.	Receive suggestions from financial experts (e.g., money coach, financial advisors) or digital banking services (e.g., ATM).
Coffee lovers (people come to stores for coffee)	Order coffee or snacks from the retail bank and give suggestions to reflect their retail banking experience.	Receive orders from coffee service provider.
Subsystem 3: Bank Service Provider		
Money coach	Inform customers' needs to bank tellers or financial advisors.	Understand customers' needs and provide financial services and assign them to suitable bank tellers or financial advisors.
Bank teller	Work/control with the bank system (e.g., operations) according to customers' request.	Request from the bank system (e.g., operations) based on the customers' information.
Financial advisor	Work/control with the bank system (e.g., operations, ATM) according to customers' request.	Request from the bank system (e.g., operations, ATM) based on the customers' information.
Subsystem 4: Bank and Retail Team		
Organization leadership (banking and retail)	Inform and discuss the retail bank strategy with the team reflecting government policies and customers' feedback.	Receive feedback from bank service providers and coffee service provider.
Coffee service provider (retail service provider)	Influence part of bank operation and finance through running the retail business combined with banking.	Give the items (e.g., coffee or snack) that customer orders.

Table 2. Hierarchical control structure elements

Subsystem 5: Physical Banking/Financial Process		
Bank operation (back of house, operation side of bank service)	Request from the bank service provider or ATM to achieve the needs and goals from the customers, organization leadership, and the government policies.	Report the status of the request/task and finish the task.
In-store ATM (or other in-store machines that can provide banking services)	Request from the bank service provider, customers or bank operation to achieve their goals through digital banking services.	Report the status of the request/task and finish the task.

5. Visualize Controllers in Control Structure

We first modeled the control structure by identifying controllers with assigned controlled actions and feedback. Thus it greatly helps us to visualize each controller's position and relationship sequencing from high authority to low authority. In this section, we demonstrate the process of visualizing the different hierarchical control structures from high-level sketches (Figures 4, 5, and 6) to more detailed diagrams (Figures 7 and 8).

5.1. High Level Hierarchical Control Structure

In Figure 4, we started by considering the controllers from high authority to low authority in the context of the banking/financial system and summarized four macro stages: 1) policy and economic environment, 2) humans, 3) banking/financial services, and 4) physical touchpoints.

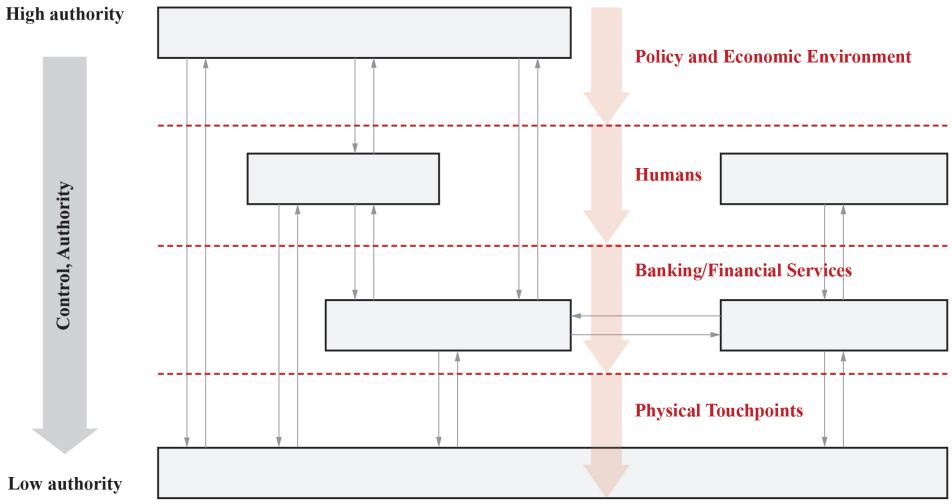

Figure 4. A high level hierarchical control structure for new retail banking service (step 1)

Based on the four macro stages: 1) policy and economic environment, 2) humans, 3) banking/financial services, and 4) physical touchpoints, we added six controllers in Figure 5: 1) government policy, 2) bank customers, 3) coffee lovers, 4) bank service provider, 5) coffee service provider, and 6) bank operations to finish a high-level hierarchical control structure for new retail banking service.

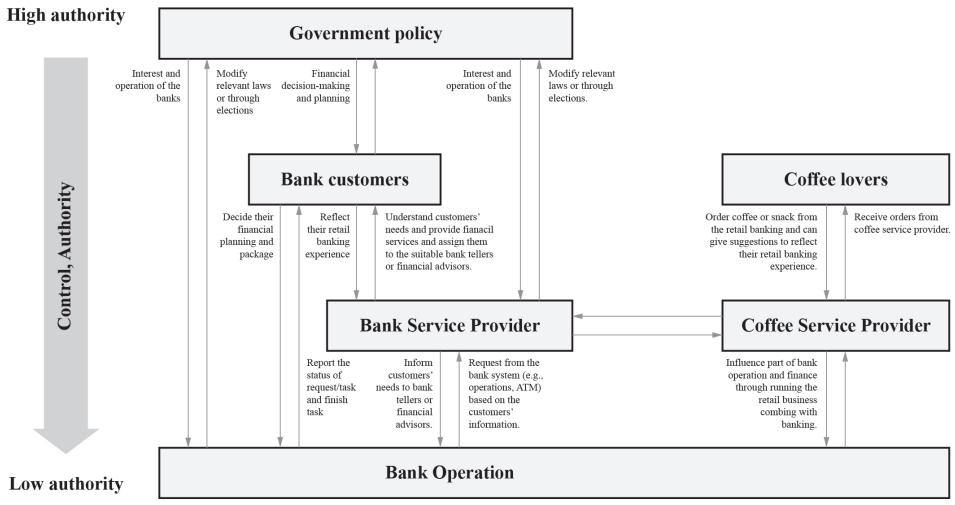

Figure 5. A high level hierarchical control structure for new retail banking service (step 2)

In Figure 6, we combined four macro stages (Figure 4) with six controllers (Figure 5) to present our first draft of the control structure for the new retail banking service, which can indicate the flow of financial services, the relationship with power, and the hierarchical structure of organizations.

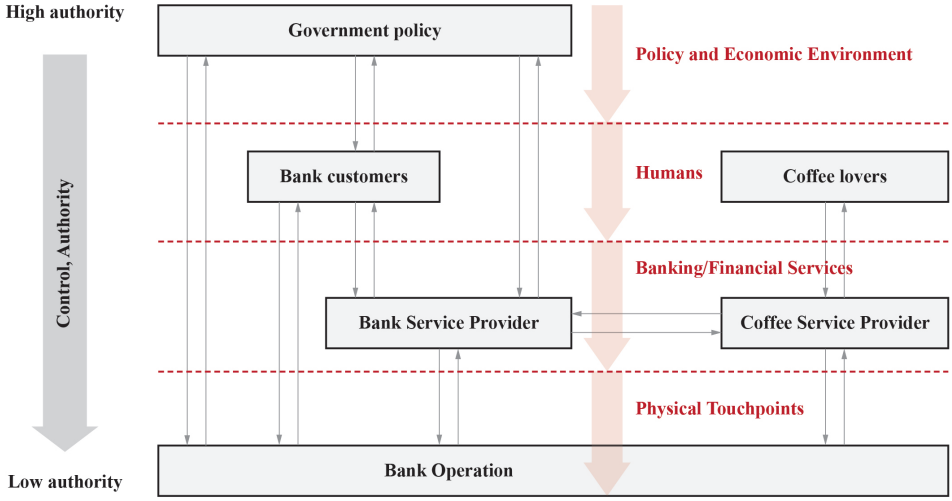

Figure 6. A high level hierarchical control structure for new retail banking service (step 3)

5.2. Detailed Hierarchical Control Structure

Based on Figure 6, we defined the bank service provider as one subsystem by adding three controllers: 1) money coach, 2) bank teller, and 3) financial advisor. Meanwhile, we added organizational leadership covering banking services and retail services in the control structure to refine the organizational structure, and we considered in-store ATM as another critical physical touchpoint of our new retail banking system (Figure 7).

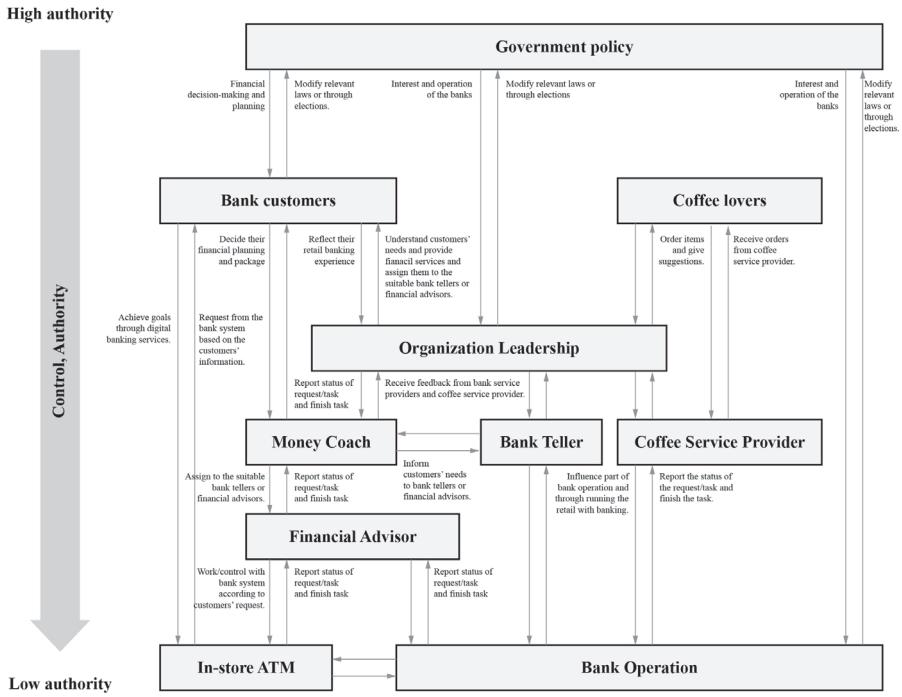

Figure 7. A detailed hierarchical control structure for new retail banking service

5.3. Refined Control Structure with Subsystem Controllers

In Figure 8, we refined the control structure of Figure 7 by adding subsystem controllers: 1) economic environment, 2) users, 3) bank and retail team, 4) bank service provider, and 5) physical banking/financial process, which can help us easily identify the retail banking control structure from a bird's-eye view. The full version of the control actions and feedback of each controller are documented in Table 2.

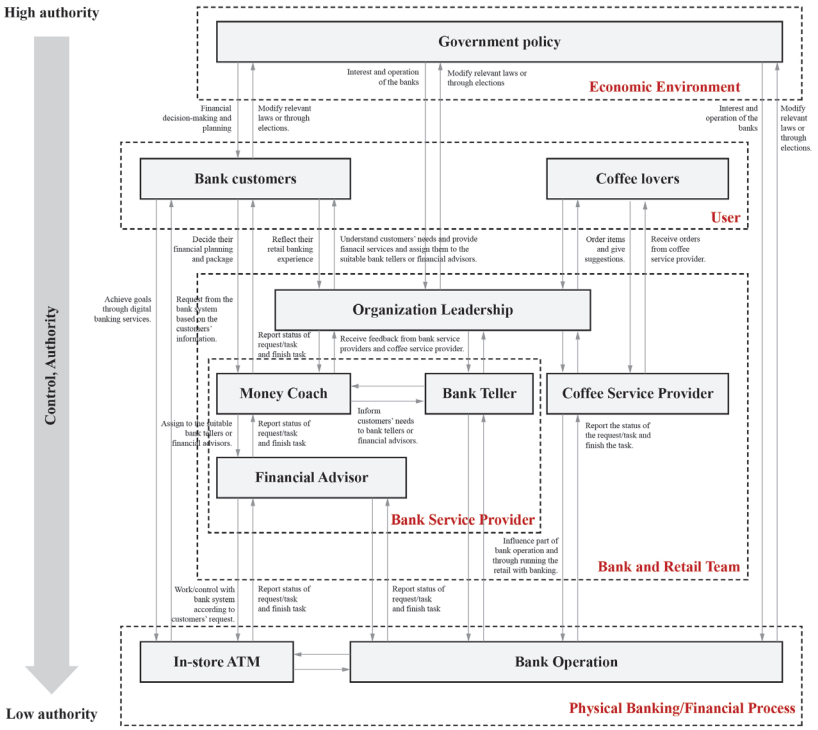

Figure 8. Refined hierarchical control structure with subsystem controllers

6. Discussion and Conclusion

Under systematic approach, STPA, to analyze the retail banking experience and financial services, we distill three key learnings from service designer's perspectives: 1) establish meaningful bandings between retail and financial services, 2) create service roles to deliver a better and more immersive user experience, and 3) translate service touchpoints to data points to improve service quality to summarize our research and provide useful insights for further studies.

6.1. Establish meaningful bonding's between retail and financial services.

In Figure 8, we can reconsider the bonding and effectiveness between bank service providers and retail service providers. The STPA diagram didn't show the strong connection between the two services, which reminds us how and why the retail experience and financial services matter to people. When people grab a coffee at Capital One Café, do they need financial services? Or might they only need to find a space to read and enjoy the space? What's the value proposition of retail banking?

One of the purposes of Capital One Café is to design the space as a community hub to gravitate neighborhoods and people to use the space for social events. It is a great design intention, but we can also consider people's perceptions, especially their first impressions of the coffee shop name. For example, when they hear the coffee shop under the name of a bank, this may also make people think about if their behavior or interaction in the store will tie to the banking services and interest, even though the coffee service is provided by Peets Coffee.

To make meaningful connections and collaboration within retail banking systems, we need to be more empathetic towards not only the service recipients (e.g., bank customers), but also service providers (e.g., money coaches, financial advisors) in terms of their behavior, interaction with different stakeholders and self-serve kiosks, and discussion. Only when successfully identifying what their essential needs in the new retail banking journey will we reflect on how to redesign the financial service models and strategies.

6.2. Create service roles to deliver a better and more immersive user experience.

How can we create an accessible retail experience and financial service? Capital One Café is one of the service solutions by introducing a "money coach" role as a brand and service ambassador and bridge between a financial advisor and a bank teller. This creates another service layer to help new customers have their personal coach to understand the bank services and their financial status. According to the conversation with the money coach and their needs, the money coach can assign them to suitable financial advisors or bank tellers to discuss further.

We can assume that a money coach serves as the first service touchpoint when people who are interested in financial services enter the retail bank space. Therefore, the money coach plays a critical service role to set up the right expectation and communication channels for potential customers.

Besides having a money coach, we can consider what other service design toolkits and methodologies can bring a more immersive user experience, cultivate innovative culture, and empower financial service providers.

6.3. Translate service touchpoints to data points to improve service quality.

Unsurprisingly, service design has penetrated our daily lives across industries from financial services, to education, and medical industry to entertainment. Applying

service design properly, not only creates extra value for the existing products but also makes people live more convenient and comfortable lives.

The next step is how we, as designers, deliver high-quality services physically and digitally to users and with users. Since we have many different Apps or web-based platforms to use digital banking services, how do we improve the banking experience to enhance the efficiency and effectiveness of the digital tools and the key touchpoints to empower users and their financial advisors to have more transparent conversations, and suggest more human-centered solutions to address their needs?

We care about users' desirability and banking service providers' working experience. Therefore we need to think about how to translate most service touchpoints across both journeys of service recipients and providers to meaningful and traceable data points (Lee, 2022a), which can better improve the service quality in a relatively scientific way.

Acknowledgement

Thank you for the great support and encouragement from Nancy G. Leveson, Professor of Aeronautics and Astronautics at MIT for allowing me to experiment with different systemic challenges by applying STPA analysis to discuss not only system safety and system engineering, but also the transformation of the design of business, service, and experience. Especially thanks to Justin Wei Siang Poh. I couldn't have finished the research without his mentorship and encouragement. I am very lucky to book his weekly office hour to help me figure out this non-easy research topic. I also want to express my greatest appreciation to Susan Spilecki for their professional editing of the content and all the constructive suggestions on the language and the flow of the study.

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