EE4213 Human-Computer Interaction

Group Project: Mobile App Design for Positive Impact to the Society

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Introduction

Overview

The iAM Smart system is a digital services platform of the Hong Kong government that enables users to use online services on their personal devices. This app aims to provide a one-stop digital platform for Hong Kong residents to access various government and commercial services online, such as renewing car licenses, paying taxes, and utility bills. This platform provides major functions such as authentication of government online services, personalized announcements, and notifications on government news or urgent matters.

The main functionalities iAM Smart provides are authentication, “e-ME” Form Filling, personalized notifications, and digital signing. It offers simple login to various government and commercial online services with a single digital identity by scanning a QR code. This feature allows users to authenticate themselves through their personal mobile phones with biometrics enabled, providing a secure and convenient way to access online services without repeatedly logging into different services with the same account identity. Eliminating the need for users to remember multiple account names and passwords.

With a digital identity and authentication feature, the app is able to simplify processes by automatically filling in personal details on electronic forms and handling statutory documents and procedures. "e-ME" form filling eliminates the repetitive task of filling in personal details and uploading address proofs. Users can conveniently auto-populate forms with their saved information, saving time and effort. This streamlines processes and reduces the likelihood of errors, enhancing user efficiency and convenience. Besides those features, this app also provides users with access to practical, real-time daily-life information, including real-time weather, traffic conditions, government information, and validated incident information.

While this system follows the international standard for information security meeting the international standard, the application for this system had room to improve the user experience (UX). In this project, we identified and analyzed the issues the points that deteriorate the UX and suggested a new design to compare how old and new systems have differences in the tasks to execute in the system.

Objective of the project

One pivotal enhancement we aim to implement in the existing "IAM Smart" mobile app is the ability to provide users with timely notifications for relevant information. Currently, the app offers a wealth of valuable information; however, it lacks the capability to notify users outside the confines of the app. Our proposed function seeks to bridge this gap by allowing users to select specific information categories for which they wish to receive notifications. This empowers users with the flexibility to customize their notification preferences based on their individual needs and priorities.

By implementing this function, "IAM Smart" will significantly enhance its utility by extending its reach beyond the confines of the app itself. Users will be able to stay informed and up-to-date even when not actively using the app, ensuring they never miss critical updates or time-sensitive information. This feature improves the overall user experience and provides a convenient and efficient way for users to access essential information without constantly monitoring the app. "IAM Smart" becomes a proactive tool that keeps users informed and empowers them to make informed decisions promptly.

Furthermore, the function takes into account the varying levels of urgency that different information categories may possess. For instance, users can set different notification intervals based on the urgency level or opt to receive real-time notifications for emergency incidents. This approach ensures that users can stay connected to important updates promptly and effectively, enabling them to respond appropriately in critical situations.

Requirements

Functional Requirements

Functional requirements for the "iAM Smart" Mobile App include:

1. User registration and authentication:

Users need to register accounts in order to store personal information. The app allows users to register their accounts and provides secure authentication methods such as login credentials and biometric authentication. Accounts are automatically logged out when the app is closed or manually logged out by the user.

2. Profile and personal details management:

The app enables users to manage their profile and personal details. The app validates data input for specific formats, ensuring data completeness and consistency. Users can edit, view, and delete all personal details that are stored on the app, such as contact details and address information. The profile is linked to their account, ensuring that personal information remains persistent throughout the account's lifecycle.

3. Government service integration:

Users are able to search and discover a comprehensive list of government-provided online services. Users can directly access these online services through the app. The app allows users to apply their stored personal information to government online services and "E-form filling." Single sign-in is supported so that users access multiple government services without needing to enter login credentials repeatedly.

4. Personalized Notifications:

Users have the ability to select their preferred notification categories. Users can set notification intervals, choose the type of information they wish to receive (government services or real-time daily information) and specify the level of urgency for notifications. Users can update their notification preferences. The app delivers push notifications, email, and in-app messages to users based on the preference setting. Preferred information is prioritized and displayed on the front page banner.

5. Public data display:

The app provides practical information from various sources, including public facilities, traffic updates, weather conditions, environmental data, and government-verified incident

reports. Users can preview or click to view detailed information. Access to this information does not require a user login.

6. User support and help:

The app offers in-app user support and help features, including FAQs, tutorials, and online assistance Q&A. A user guide automatically displays when users first use the app.

7. Customized setting:

Users are allowed to customize the font size and language according to their preferences.

8. Regulations and disclosures:

The app provides access to the terms of use, privacy policy statement, and personal information collection statement within the app.

Non-functional requirements

Non-functional requirements for the "iAM Smart" Mobile App include:

1. Data:

All the public assessable data must be up-to-date, accurate, and verified. The personal information input data should be text-based with a specific format depending on the data type.

2. Environmental:

The app should be compatible with a wide range of mobile devices, operating systems, and screen sizes. Biometric mobile device preferred. The physical environment should have sufficient lighting and network bandwidth. The user in-app support is always on standby.

3. User:

The majority of users must be Hong Kong residents holding Hong Kong Identity Cards and aged 18 or above. Users have various technical backgrounds, but regularly access government online services could be the frequent users. Users may have physical disabilities.

4. Security:

The app and system adopt government standard security on both the front and back end.

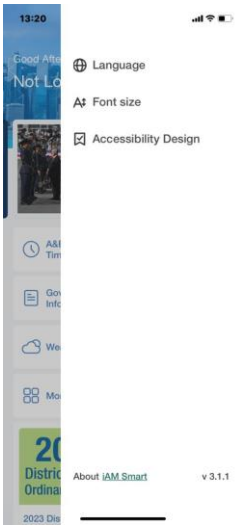
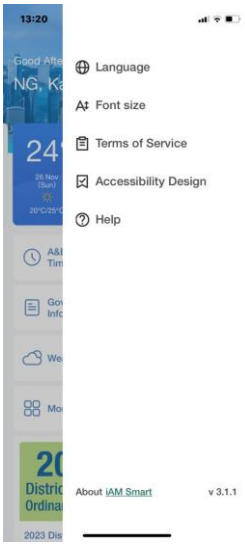
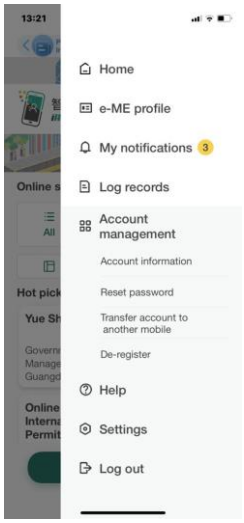
5. Usability:

The app needs to be simple enough with sufficient user guides so that novices can use the app immediately. The task sequence is memorable to frequent users. The app is able to inform users when encountering any user error, while users are able to acknowledge any waiting process.

Usability issues

Inconsistent and unclear sidebar menu

Three different versions of the sidebar depend on the user's login status and the user's interaction are provided by the current design, as shown in the following diagrams:

State 1: Before login	State 2: After login	State 3: After clicking the online service page
		

Inconsistent sidebar menus are observed across various screens, causing confusion and hindering users' ability to navigate efficiently. Specifically, the placement of language, font size, terms of service, and accessibility design within the "Settings" tab after accessing the "Online Service" page (ver3 sidebar) creates an unexpected and non-intuitive navigation flow.

Additionally, instead of being directed to the initial page they encounter when opening the app, selecting the "Home" tab leads users directly to the "Online Service" page. This deviation from the expected behavior can confuse users and disrupt their navigation flow within the app.

Besides, the sidebar includes uncommon options such as "Reset Password," "Transfer Account to Another Mobile," and "De-register". These options are infrequently used and occupy space within the sidebar.

Furthermore, the sidebar in the "Popular Information" section (ver2 sidebar) does not include a visible logout button, making it challenging for users to find the logout functionality. The necessary elements are not displayed or visible to users. Consequently, users must navigate back to the "Online Service" section to access the logout button, disrupting their browsing experience and an unnecessary step in managing their account.

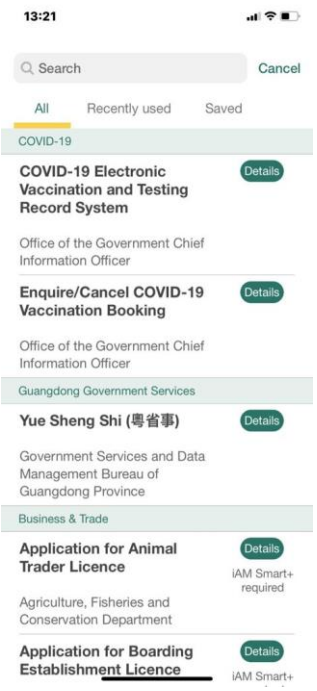
Inconsistent sidebar menus, unexpected navigation flows, and the absence of essential features such as a visible logout button create barriers that hinder users' ability to navigate the app smoothly and complete tasks efficiently. These issues can result in a suboptimal user experience, leading to dissatisfaction and potential abandonment of the app.

App content lacks organization and grouping

e-ME profile	Account information
	

The e-ME profile and account information are segregated into two distinct screen layouts. This division creates an inconvenience for users because, despite the personal information being relevant for E-form filling functionality, they are required to navigate through two separate screens to access and modify their personal information. Users may find accessing and updating their personal information frustrating and time-consuming. This results in a less seamless and efficient workflow for users.

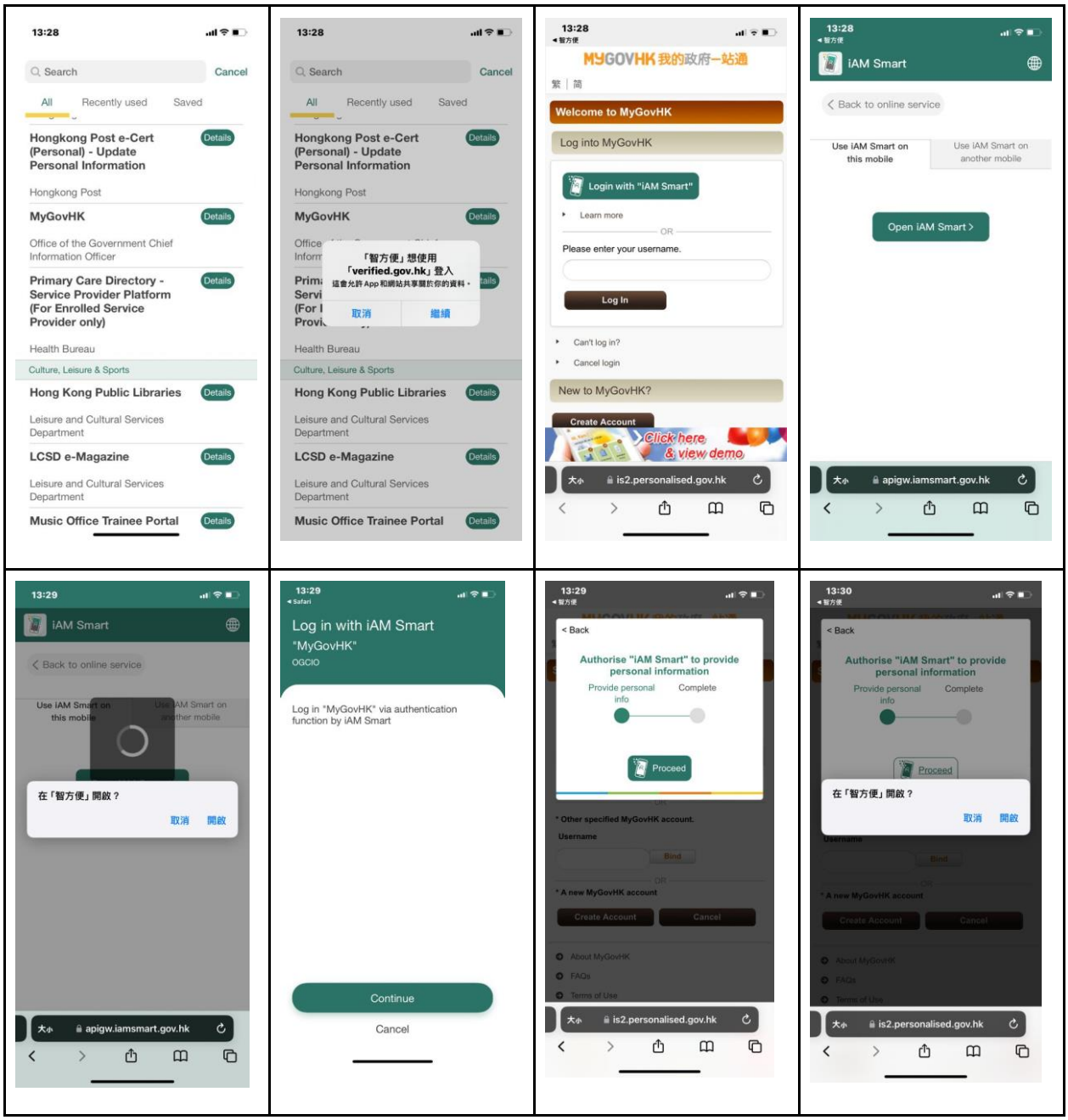
All online services tab



The government online services options are presented in a manner that necessitates excessive scrolling. This extensive scrolling creates a challenge for users as finding the specific online service they need becomes time-consuming and cumbersome. The lack of a clear information hierarchy further complicates the search process, making it harder for users to navigate and locate the desired online service easily.

Excessive App-to-Browser Switching

When users attempt to access government online services or perform e-ME form filling within the app, the workflow is hindered by frequent and automatic switching between the app and a web browser. users are repeatedly prompted with pop-ups asking for permission to switch between the app and browser, further adding to the inconvenience. This switching behavior interrupts the user's flow and disrupts the overall experience.


13:28
Search
Cancel
All
Recently used
Saved
Hongkong Post e-Cert (Personal) - Update Personal Information
Details
Hongkong Post
MyGovHK
Details
Office of the Government Chief Information Officer
Primary Care Directory - Service Provider Platform (For Enrolled Service Provider only)
Details
Health Bureau
Culture, Leisure & Sports
Hong Kong Public Libraries
Details
Leisure and Cultural Services Department
LCSD e-Magazine
Details
Leisure and Cultural Services Department
Music Office Trainee Portal
Details
「智方便」想使用「verified.gov.hk」登入
這會允許 App 和網站共享關於你的資料。
取消
繼續
MYGOVHK 我的政府一站通
繁 | 简
Welcome to MyGovHK
Log into MyGovHK
Login with "iAM Smart"
Learn more
OR
Please enter your username.
Log In
Can't log in?
Cancel login
New to MyGovHK?
Create Account
Click here & view demo
is2.personalised.gov.hk
iAM Smart
Back to online service
Use iAM Smart on this mobile
Use iAM Smart on another mobile
Open iAM Smart
apigw.iamsmart.gov.hk
13:29
在「智方便」開啟？
取消
開啟
Log in with iAM Smart
"MyGovHK"
OGCIO
Log in "MyGovHK" via authentication function by iAM Smart
Continue
Cancel
< Back
Authorise "iAM Smart" to provide personal information
Provide personal info
Complete
Proceed
* Other specified MyGovHK account.
Username
Bind
* A new MyGovHK account
Create Account
Cancel
About MyGovHK
FAQs
Terms of Use
13:30

User Analysis

User Group 1

Persona:

Emily Chan is a 35-year-old working professional living in Hong Kong. She works as a project manager in a technology firm. Emily is tech-savvy and embraces digital solutions to simplify her life.

Demographics:

Name: Emily Chan

Gender: female

Age: 35

Lives: Wong Tai Sin

Education: Bachelor's degree in Computer Science

Occupation: Project manager in a technology firm

Family: lives with her spouse

Behaviors and goals:

- Plan everything before action.
- Need to drive and attend face-to-face conferences with her clients.
- Regularly access government services like taxation and financial services, data protection, and privacy regulation services
- Regular exercise habits
- Frequently use a smartphone to reply to clients and manage her team.

Pain points

- Struggle to choose between Tate's Cairn and Lion Rock Tunnel.
- Difficulty staying informed about industry updates outside of working hours
- Repeatedly fill and check the e-form to government service.
- Cannot customize the information type for push notifications from other apps.

User Group 2

Persona:

John Chan is a 65-year-old worker living in Hong Kong. He works as a Decoration Painter. He is weak in tech and tries to stick with old methods.

Demographics:

Name: John Chan

Gender: male

Age: 65

Lives: Tsuen Wan

Education: Primary School

Occupation: Decoration Painter

Family: Lives alone

Attitudes: Stubborn, Disobey

Behaviors:

- Not familiar with technology.
- Unstable working place.
- Playing Chess in a park on a day off.
- Prefer to do things on own self
- Hate others who order him

Quotes: “I know what I am doing.”

Goal: Keep the life level.

Pain points:

- Difficulties with finding the setting
- Unable to read works words in small font size

User Group 3

Persona:

Hei Leung is an 18-year-old student in Hong Kong. He is an outgoing and energetic person. He always uses booking websites for the use of fee-charging sports facilities and goes hiking every weekend.

Demographics:

Name: Hei Leung

Gender: male

Age: 18

Lives: Yuen Long

Education: Bachelor's degree in Global Business

Occupation: student / part-time tutor

Family: Lives with aging parents

Attitudes: outgoing, energetic

Behaviors:

- Annually apply government’s financial assistance scheme
- Assisting primary school students with homework in their homes or public library
- Regularly use a smartphone to reply to clients.
- Love outdoor exercise, such as hiking and surfing

Goal: Bring no burden to his family.

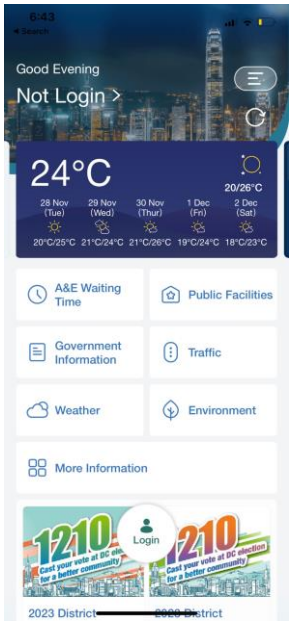
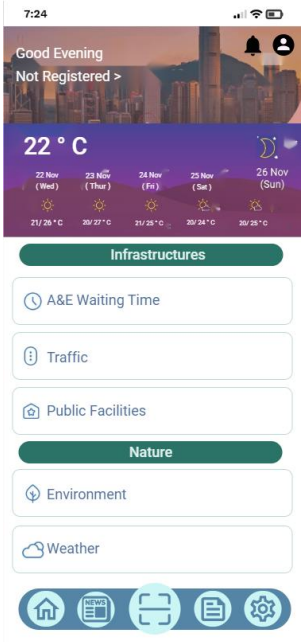
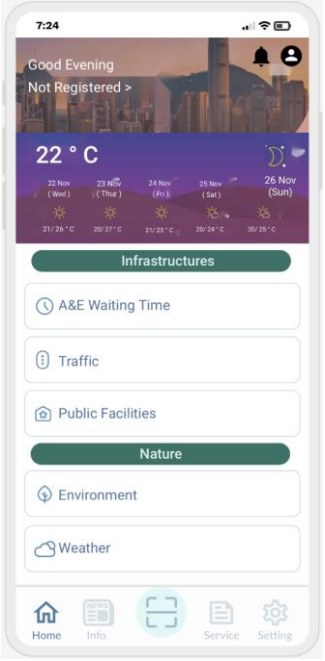
Pain points:

- Always forget the deadline for student grant application
- Can not catch the bus due to weather information delay

Design Description

1. Navigation bar

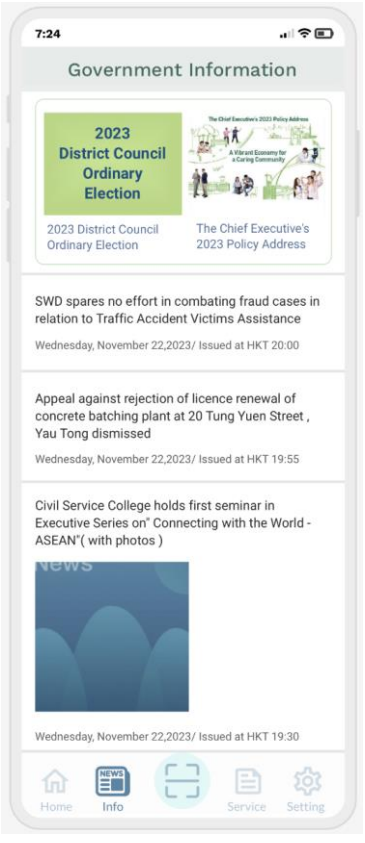
First, we added the bottom navigation bar to the app. They are “Home,” “Government Information,” “QR code scanner,” “Online Service,” and “Setting.” The new “Home” page contains most of the functions that the original home page contains except government information and more information. We want to keep the consistency of the Home menu. So, we categorize them as Infrastructures and Nature. The home page contains real-time data that the users may want to check.

Home Page (Original)	Home Page (Ver.1)	Home Page (Final Ver.)
		

There are potential improvements that we can consider for the navigation bar. The three versions are the icon representation problems, the users cannot directly understand what the information the icon tends to. In reference to the other apps, there is a fourth version to show the user with words to represent the icon. The reasons to remove the background row bar are that the color does not match the color type of the apps, and it makes the page a bit of a burden. The final version of the navigation bar is highlighting which page the user is in.

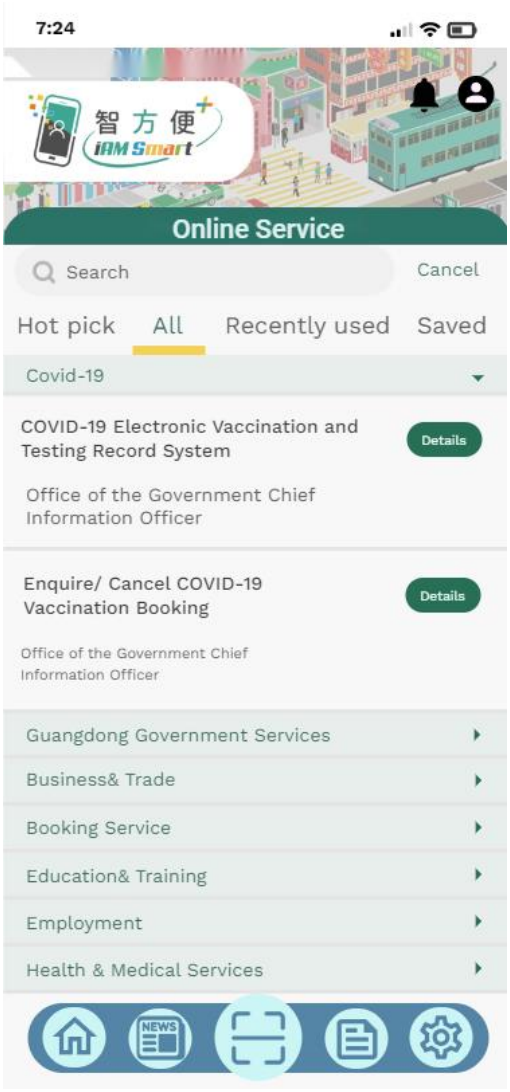
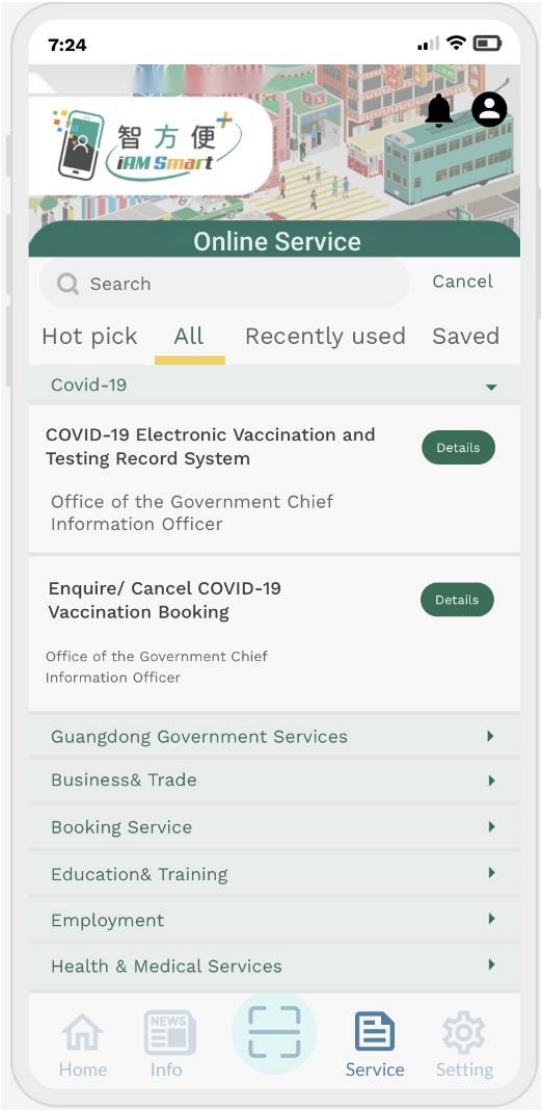
The different versions of the bottom navigation bar

2. Categorizing pages in the Same Contextual Group

Government Information Page Ver. 1	Government Information Page Final Version
	

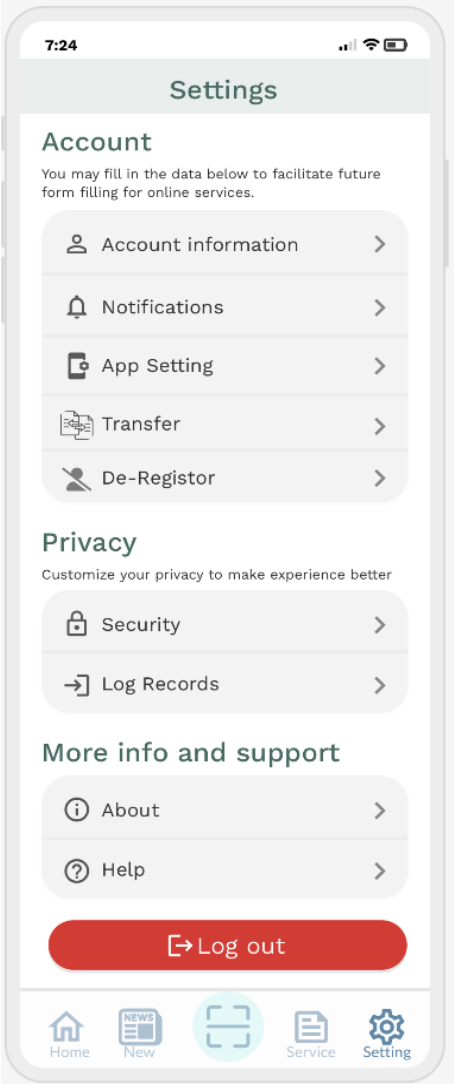
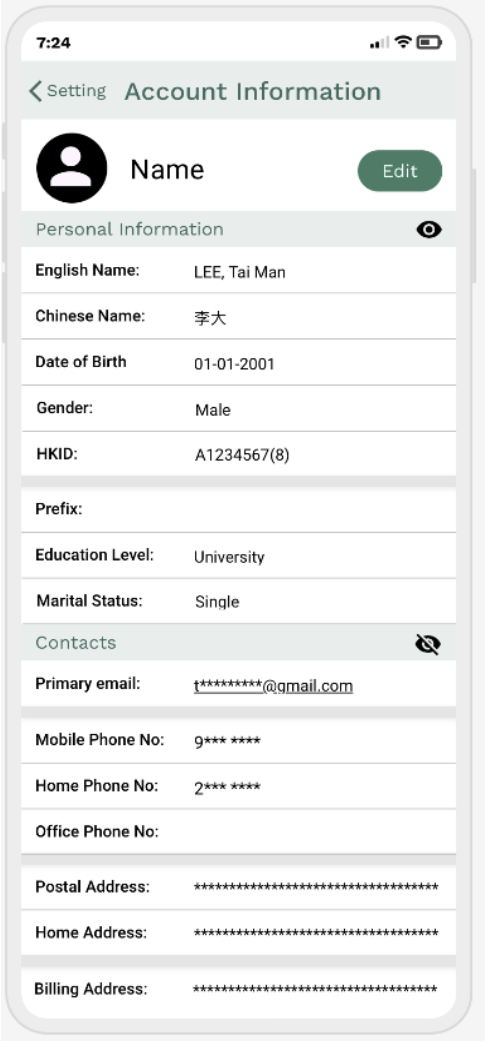
We separated the government information into a new page, the “Government Information” page. This page allows users to see the most recent information about the government.

3. Improvement of Online Service Page

Online Service Page Ver. 1	Online Service Page Final Version
	

The original circular bottom at the button is separated from the “Online Service” page. On this page, one of the significant changes is we got rid of the home page of the online service since it is useless except for the hot pick. In order to keep the hot pick, we added a new tag, “hot pick,” in the online service. Another change we made is to implement a dropdown menu in the “All” tag of the online service. It can help reduce the time scrolling down to the bottom of the list.

4. Improvement of Setting and Account Information page

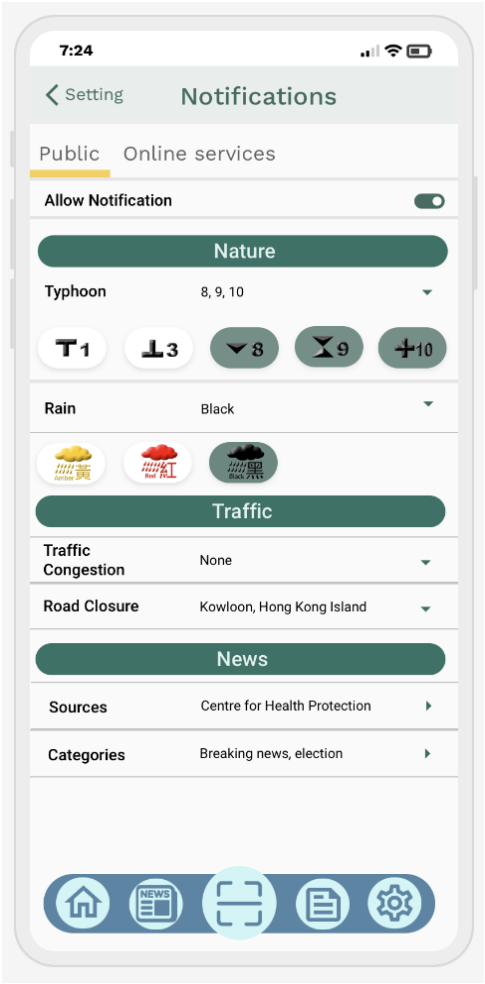
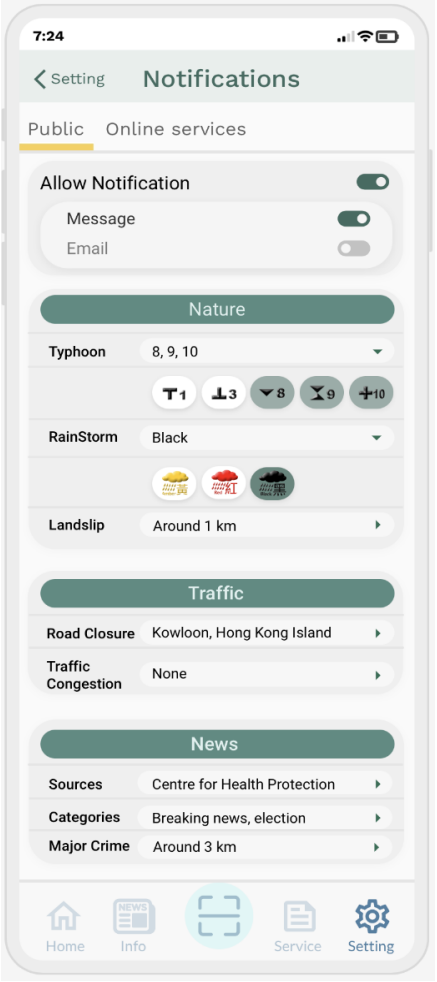
Setting Page	Account Information
	

The last button of the navigation bar is “Setting.” On this page, users can make some basic settings of the app. Users can change the “Account Information” and “Notifications” in the settings. In account Information, we grouped the original function of the account information. Users can view their personal information here. The “Contact” allows them to input their personal information for registration.

5. Change the location of QR code scanner

For the original QR code scanner function, as we prefer many users to use this function to log in to the government service, we put it in the middle of the navigation bar. And enhance it by using a more prominent icon. We prefer users to use this function in fewer steps.

6. New 'Notification' functionality

Notification Page Ver. 1	Notification Page Final Version
	

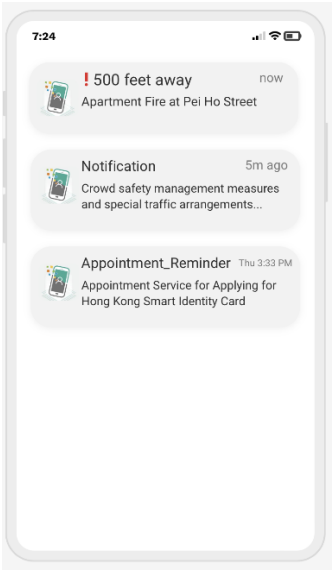
We also added the new function "Notification". This function allows users to set what notification they want to receive from the app. Users can receive a notification outside the app if they enable the function. They can set specific conditions to get noticed. For example, Typhoon

signals, storms, Traffic congestion, etc. It allows users to get the primary data that they are interested in.

Notification Example

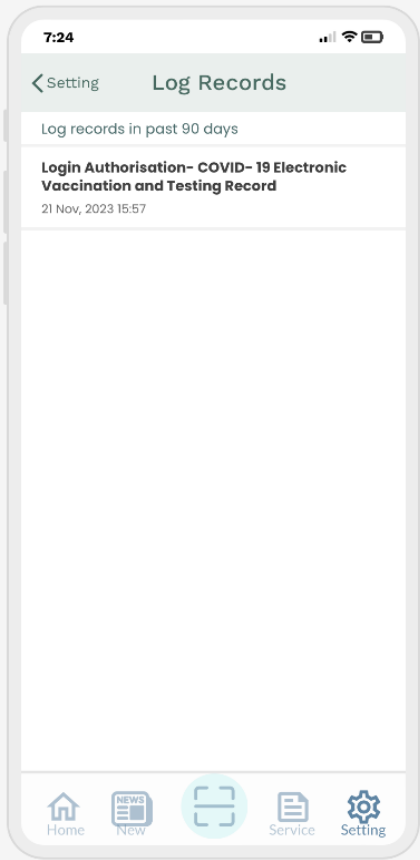
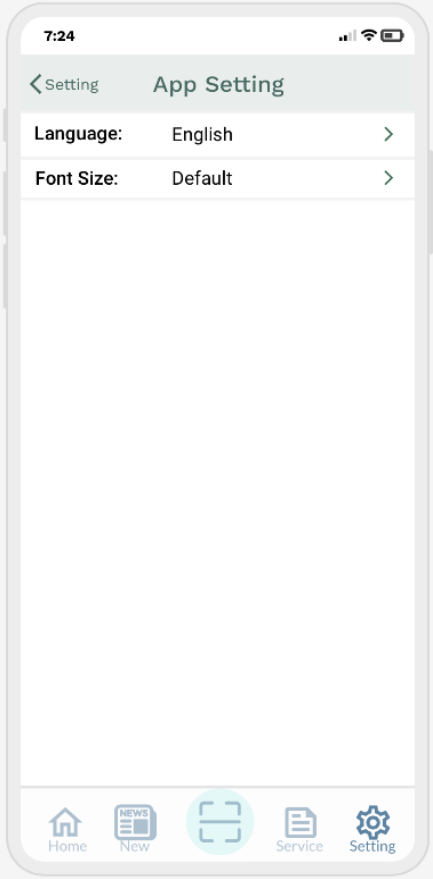
The notification should notify users about important updates, emergency alerts, reminders/deadlines, and personalized alerts. For example, severe weather warnings, public safety alerts, location, distance, and warning icons. The information boxes should provide a clear and concise description of the notification. Moreover, the warning icon provides visual feedback so the users do not need to spend much time to figure out there is some danger around them.

Notification Examples



7. Organizing the setting page

It also included several other functions on the setting page. App Setting allows users to set basic settings such as language and font size. A log record allows users to check the login and out of a record. Also, the original functions like Transfer, De-register, and other functions. Finally, the logout button allows users to log out of their accounts.

Log Record	App Setting
	

Representative Task Identification

Task 1

1. Authentication:

Representative Task: Logging in to various government and commercial online services using a single digital identity by scanning the QR code.

Task 2

2. "e-ME" Form Filling:

Representative Task: Using personalized data stored to use auto form filling, which allows them to input their personal information for registration of different applications

Task 3

3. Personalized Notifications:

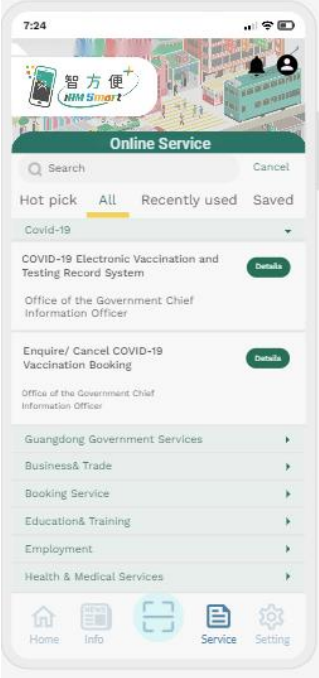
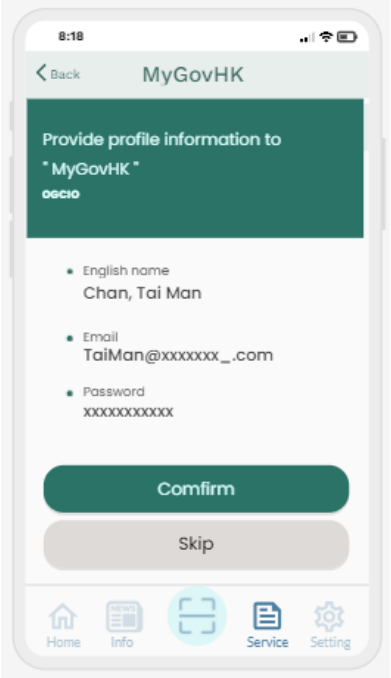
Representative Task: Checking personalized notifications received from various government online services.

Hierarchical Task Analysis

Hierarchical Task Analysis (HTA) is a method used in user interface design to understand and represent the hierarchical structure of tasks performed by users in a system or interface for human-computer interaction (HCI). This HTA breaks down complex tasks into a series of sub-tasks, providing a detailed analysis of how users interact with a system to accomplish their goals. The main goal of HTA is to identify the specific steps or actions that users need to perform within a task physically by observing their actions. It helps designers gain insights into user behavior, cognitive processes, and the overall flow of tasks. Therefore, this method is used to evaluate and improve the usability and efficiency of systems by identifying potential issues and opportunities for optimization.

1. Authentication, Search, and Access Online Services:

Representative Task: Searching and logging in to various government and commercial online services using a single digital identity:

Search and access a specific online service	Allow the online service using login information	Successfully login online service
		

- 1. User opens the iAM Smart app on their device
  - 1.1. Click the iAM Smart app icon
- 2. Enter online service screen
  - 2.1. Click the online service icon
- 3. Search the service
  - 3.1. Toggle the list with the service type labeled
  - 3.2. Find the exact service
- 4. Access the service
  - 4.1. Click to access the service
  - 4.2. Biometric login to the app (automatically activated)
  - 4.3. Grant permission to allow service using personal information.

Users must have registered an account on the iAM Smart app before attempting this task. The representative task is identified as one of the frequent tasks performed by users. Throughout the

task, there is not much user input required. The time needed to complete the task depends on the user's speed in finding the exact service they want. On average, the task can be completed within 2 minutes.

2. Update personal information for "e-ME" Form Filling:

Representative Task: Editing account and personal information for “e-ME” form filling in the iAM Smart App

- 1. User opens the iAM Smart app on their device
    - 1.1. Click the iAM Smart app icon
- 2. Enter Account setting screen
    - 2.1. Click the right-corner account icon
    - 2.2. Biometric login to the app (automatically activated)
- 3. Edit account information
    - 3.1 Click the account information tab
    - 3.2 Click edit button
    - 3.3 Fill or change information
        - 3.3.1 Select the information label wanted to edit
        - 3.3.2 Input the information or select the options
        - 3.3.3 If the user wants to undo the edited field, click reset
    - 3.4 click submit button

The frequency of this task may vary depending on the user's need to update their account information. The task requires user input to navigate through the app, select the desired information to edit, make changes, and submit the updated information. The time needed to complete the task depends on the number of fields to be edited and the complexity of the changes. Generally, this task can be completed within 5 minutes.

3. Personalized Notifications:

Representative Task: customize the notification pushed by iAM Smart

- 1. User opens the iAM Smart app on their device
    - 1.1. Click the iAM Smart app icon
- 2. Enter notification setting screen
    - 2.1. Click the right-corner bell icon
- 3. Edit the notification preference
    - 3.1. Toggle the notification switch
    - 3.2. Set notification condition
        - 3.2.1 Toggle the condition label
        - 3.2.2 Select the condition options

The frequency of this task may vary depending on the user's need to adjust their notification preferences. The task requires user input to navigate through the app, toggle the notification switch, select the desired condition label, and choose the appropriate options for the condition. The time needed to complete the task depends on the number of notification preferences to be edited and the complexity of the changes. Typically, this task can be completed within 3 minutes.

Evaluation

Cognitive walkthroughs are a usability evaluation technique in user experience (UX) design for human-computer interaction (HCI). The goal of a cognitive walkthrough is to assess the usability and user-friendliness of a system or interface by simulating the thought process and decision-making of potential users as they interact with the system. This simulation includes steps walking through the product for each task. The reason why this technique is applied to evaluate this design is that this method focuses on evaluating designs for ease of learning. This concept of ease of learning signifies the learning curve for users to fully utilize the product for their needs.

The cognitive walkthrough is applied to previously introduced tasks: Authentication, "e-ME" Form Filling, and Personalized Notifications. These tasks share the same action sequence for the old and new designs.

- 1. A user opens the iAM Smart app on their device
    - 1.1. the app displays the main page and has a circular button at the bottom to register the system.
    - 1.2. the app displays the main page that has a circular button at the bottom to go to the 'Online Service' page.

Then, the user performs actions to proceed with the specific tasks sequentially. For the following actions, we may ask the following set of questions:

- Q1. Will the correct action be sufficiently evident to the user?
- Q2. Will the user notice that the correct action is available?
- Q3. Will the user associate and interpret the response from the action correctly?

For the first representative task - Authentication, Search, and Access Online Services - we may answer the questions for both old and new designs. In the old design, the whole section related to the online section is nested; a user is required to click the online service after

completing the registration. Considering the first page and online service in the old design have the same level of logical category since the old design didn't explicitly group the function at the contextual level, users are highly likely to have difficulties finding how to perform the task they desire. On the other hand, although the new design requires an extra step for a user to change to the online service view, this task is done by accessing the icon at the navigation bar, which explicitly displays the group. Therefore, a user can notice the action that they were looking for available. Also, in the new design, when a user touches the icon of the navigation bar, the selected section is highlighted with a darker (more significant) color, which provides the visual feedback that supports the user to interpret the context in which they interact with the system.

These questions can asked similarly for the second representative task, 'Update personal information for "e-ME" Form Filling.' As discussed in the 'Inconsistent and unclear sidebar menu' under the usability issue, the action was only accessible after several hidden steps. It requires users to first redirect to the online service page and touch the sidebar at the top right corner. The sidebar is an interface component commonly used for the complexity of the current page. Provided that the sidebar hides a component from the page, this action, which should be located on a page that the user can easily identify, is not well-designed. We benchmarked the setting page, focusing on the learning experience aspect of the setting. This setting can be accessed via the navigation bar, which can easily identified by the user. This enables users to recognize the correct action by reducing the steps to access and changing visual components; therefore, users can easily associate and expect the outcome of the action.

The third representative task, 'Personalized Notifications.' is a new functionality added to the redesign of this application. Similar to the previous representative task, this action can also be found under the settings page on the navigation bar at the bottom of the screen.

Discussions and Conclusion

Regarding the usability issue with the iAM Smart system, the main problem identified is the inconsistent and unclear sidebar menu. The system has three different versions of the sidebar depending on the user's login status and interaction, causing confusion and hindering users' ability to navigate efficiently. Additionally, the app content lacks organization and grouping, and there are too many redirections, which can be frustrating for users.

These issues make it difficult for users to use the system effectively and efficiently, leading to a poor user experience. Based on the cognitive walkthroughs for the old design as an extension of the identification of user issues, we were able to identify that the one more step that makes users redirect to the online service page, which contains the applications of the main functions users, would like to perform to facilitate their accesses to the governmental application/registration tasks.

Although the current iAM Smart system has several usability issues and room for improvement, this system has the potential to be a useful digital service platform. The proposed design solutions aim to improve the user-friendliness and effectiveness of the system. Also, further testing and evaluation are necessary to ensure the success of the proposed design solutions, continuous improvement and user feedback, which takes long-term inspection of the iAM Smart system, would also be crucial for the success of the system.

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