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TE WĀHANGA PŪTAIAO

MAP PROJECT PLAN

Assignment 1

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Map Project plan(Massey 158.225 Assignment 1)

I. Project assumption

- ❏ Assume our project will be carried out in an orderly manner according to our plan, without surprises, and finally complete the project within the specified time.
- ❏ Assume our budget, resource planning, and technical expertise are sufficient to support project needs, new features and solutions can be rolled out relatively quickly.
- ❏ Assume there are alternatives for the project, the planning gap can be seamless and not get out of hand.
- ❏ Assume that our technical expertise enables application migration and cloud service setup.
- ❏ Assume that the technical tools and platforms we use will adapt well to various environments, we can ensure the stability and order of the back-end development control of the project.
- ❏ Assume that the project is mainly targeted in urban areas with a high density of mobile device users in the early stage, and there are enough test users.
- ❏ Suppose the project has intelligent route planning that provides users with the best alternative routes.
- ❏ Suppose it will have better mobile port responsiveness and performance, with optimized patches designed for mobile and tablet systems, and more mobile-friendly than Google Maps.

II. Explanation of hypothesis：

- ❏ **Complex mobile applications and cloud services:** In the process of project application, we will constantly expand the hardware environment and equipment that can be carried by the project according to specific needs, and replace or increase the server as the number of users increases.
- ❏ **Smart route planning feature:** The application can use real-time traffic road information and various factors to plan the best route and estimated arrival time.
- ❏ **Best alternative route:** The route with the shortest planning time, the shortest cost and the priority of highway.

- ❏ **Stable and continuous development environment:** We have a fixed infrastructure to address standardization and service provisioning issues.
- ❏ **Existing resources and technical expertise:** The company can develop new functions and update procedures according to the current personnel and equipment strength.
- ❏ **Urban areas with high user density:** We chose cities with a population density of 800 people per square kilometer as our test subjects.
- ❏ **Mobile port responsiveness and performance:** The application is optimized for mobile devices, making it more mobile friendly than Google Maps.

III. Request document

1 Introduction

The system request document Outlines the requirements and specifications for a mobile and tablet mapping application designed to compete with Google Maps and provide high quality mapping and navigation services to mobile device users. The system request document also identifies the stakeholders and their roles, requirements, and user descriptions.

2 Functional requirements

2.1 Map Function

- ■ Displaying real-time map and route information.
- ■ Allow Users to switch Map views
- ■ Allows users to resize the map
- ■ The application Can locate location and face direction
- ■ Show nearby restaurants, entertainment and landmark buildings
- ■ Covering global map data

2.2 Navigation Function

- ■ Real-time speed monitoring.

- The application Can display a traffic light countdown.
- Able to estimate route time.
- Offline Navigation
- The application Can display the current traffic conditions.
- The application Can update the traffic conditions in real time.
- The application Can provide the latest suggested routes in real time.
- The application Can provide a variety of navigation modes, such as walking, cycling, driving, etc.
- The application Can use voice and text cooperative navigation to remind the user of the environment and required behavior.

2.3 Search and Locate Functions

- Users can search for destinations and provide relevant nearby information.
- The results can include detailed destination information, customer ratings, and more.
- Voice search and input search can be realized
- The user can save the location and route
- The user can view the search history

2.4 Personalized service and recommendation

- Can provide personalized recommendations according to user preferences (reset layout, color, style, etc.).
- Allows users to rate historical locations.
- Users can provide real-time feedback through online customer service.
- Can integrate seamlessly with other transportation-related applications, such as ride-hailing apps.

2.5 User Settings and Options

- Allow users to customize the interface and theme
- Allow users to change languages and units of measurement
- Allow Users to adjust Notification and Privacy Settings (sharing location Information)

3 Non-functional requirements

3.1 Performance requirements

- In 95% of cases, the response time is less than 1.5 seconds.
- The application can respond to 10,000 user requests simultaneously.
- The application has a good modular architecture.

3.2 Requirements on Availability and User Experience

- Let the majority of users in a short time understand that we are a map navigation system.
- 60% of users should be able to use it in a short time under the guidance and be familiar with the operation of the system.
- Effective documentation, including user guides, manuals, and developer documentation to make the product easier to use.

3.3 Reliability requirement

- Can prompt for input requirements.
- Ability to check data format to prevent exceptions.
- Applications can better cope with unexpected events such as network faults
- Ensure that the service failure probability caused by software system failure is less than 5‰.
- The system is required to run 7x24 hours, and the annual failure time does not exceed 10 hours.

3.4 Security and Privacy Requirements

- The application shall comply with relevant national laws and regulations and privacy policies
- Access permissions can be restricted through user authentication.
- Protect data from illegal/unauthorized access and tampering.

- Provides run log management and security audit functions to track the historical usage of the system.
- Can withstand general malicious attacks from the Internet. For example, virus (including Trojan horse) attacks, password guessing attacks, hackers, etc.
- Encourage the network to transmit data.
- Encourage and store service data.

3.5 Cultural and political requirements

- No content that discriminates against the culture and politics of any country or region.

4 Reference material

- Google Maps API document.
- W3C Web Content Accessibility Guidelines (WCAG)

IV. Feasibility analysis

1 Technical feasibility

Intelligent route planning and offline mapping capabilities can be implemented by using Global Positioning System (GPS) data, map data and traffic data. Personalized service capabilities may require the use of artificial intelligence and machine learning. The company has a lot of IT expertise and experience, which shows that the technical implementation of the application is feasible.

2 Market viability

The presence of a large number of mapping applications, such as Google Maps, indicates fierce competition in the market. However, a mapping application optimized for mobile devices may attract a certain number of users, especially if the application has excellent mobile port response and performance, among other favorable points of sale.

3 Financial Viability

Designing and developing a high-quality mapping application requires considerable investment. The company has a wealth of resources and expertise, but needs to assess the costs and benefits and determine if the project is worth the investment.

4 Legal and compliance feasibility

Mapping applications may involve the use and sharing of sensitive data such as user location information. The company needs to ensure that its apps comply with relevant laws, regulations and privacy policies, and that user data is secure.

5 Time feasibility

Designing and developing a high-quality mapping application takes time and resources. The company needs to assess its existing resources and schedule to determine whether the project can be completed on time.

Taking the above factors into consideration, we believe that these hypotheses are feasible, but need more detailed analysis and planning before implementation.

V. Development program

1 Adopting Agile Development Methodology

Agile methods meet requirements mainly through iteration. At the end of each iteration cycle, a usable and deployable system can be delivered to users, who can use and experience the system and provide feedback. In subsequent iteration cycles, these opinions and other changes in requirements are implemented and integrated into the product. Each iteration cycle should be as short as possible to handle changes in requirements and user feedback in a timely manner.

1.1 Advantages

1.2 **Accurate:** The waterfall mode refers to advancing projects in chronological order. However, we will find that the final outcome of the project will conflict significantly with our expectations. For agile development, tasks are divided into many small steps, and the next step's behavior is influenced by the previous step, constantly adjusting until the task is completed.

1.3 **Quality:** Agile development has a unique approach to its own development cycle. This development method will complete the test code before writing the functional code, which provides quality assurance for the development of the entire project's functional blocks.

1.4 **Speed:** Agile development prioritizes the completion of key parts of the project and builds the skeleton of the project first. This will enable the development team to have higher development efficiency and make project development smoother.

1.5 **Investment return rate:** Agile development prioritizes the development of key functions, so it maximizes customer returns and is a cost-effective choice for customers.

1.6 **Efficient self-management:** Agile development requires team members to actively communicate tasks with each other, possess strong professional skills and self - labor management skills, which is also an improvement for team members.

2 Technological Process

2.1 Request collection and analysis

2.1.1 Team members engage in project communication with clients to understand their goals and requirements for the project, and to understand the basic functions and priorities of the project in their minds.

2.1.2 Plan a specific project task list and completion timeline for the team and internal members, continuously follow up on the progress of each member during the development process, ensure the orderly progress of project work, and achieve project management and tracking.

2.1.3 In this process, an indispensable process is to collect the needs and opinions of stakeholders such as customers and users, and involve them in the development process, making the entire development of the project more humane and flexible, which can also adapt to the changes in the current product market.

2.2 Prototype design stage

2.2.1 Firstly, plan the architecture of the project, create a basic project framework, seek stakeholders to experience it, and determine the next step of the task based on their testing results and feedback.

2.2.2 Analyze feedback and self - discovered issues, further improve and update the project, and gradually add new features.

2.2.3 A prototype is the prototype of a project, which can be said to be the initial version mainly used to seek feedback from stakeholders. It should not be too complex to operate and should not be a final version.

2.3 Iterative development

2.3.1 Update and iterate the prototype by continuously implementing functions and seeking feedback to develop the product.

2.3.2 After each iteration, there should be a period of time for the next step of design planning and development testing, which is approximately two weeks.

2.3.3 Within each iteration cycle, the task should focus on a specific and important function, and continuously optimize that function. This requires team members to communicate more frequently and effectively, as everyone's goals are the same.

2.4 Code review

2.4.1 Every once in a while, team members need to sit together for progress approval and code review to ensure that everyone's stage and resources are synchronized, and the code is synchronized in real-time, reviewing the quality and consistency of the code.

2.4.2 During the code review process, any discovered code issues should be resolved in a timely manner, and potential issues around them should be explored to improve the stability and compatibility of the code.

2.4.3 Code review will enable us to have a better understanding and summary of the current situation of the project, help us to plan the next task, and also help us to absorb previous errors, so that the project can be carried out more efficiently, which is a crucial part of the whole project development process.

2.5 Continuous delivery and deployment:

2.5.1 Agile development has unique techniques for completing versions that can be put on the market, enabling project automation and integration into the production environment.

2.5.2 Agile development will conduct comprehensive and in-depth testing before the project is put into production, so that the project has better stability and can be launched into the market.

2.5.3 Continuous delivery and deployment will allow projects to have shorter iteration cycles, partly because of their automation, and partly because of their importance. Agile development will focus on automation, making it a critical part of the project and a thorough testing and updated deployment of the project.

2.6 Feedback and iteration:

2.6.1 Test feedback is an important basis for customers and team members to update and improve the project during the completion process

2.6.2 Team members will analyze the test feedback before each iteration, which will be applied to the adjustment and planning of the project plan for the next stage.

2.6.3 During the development process of the project, team members will further develop and modify the project according to the newly designated project plan, meeting customer feedback needs, and keeping the project in line with customer ideas at all times. This will also provide good motivation for team members in some respects.

VI.PERT and Analysis

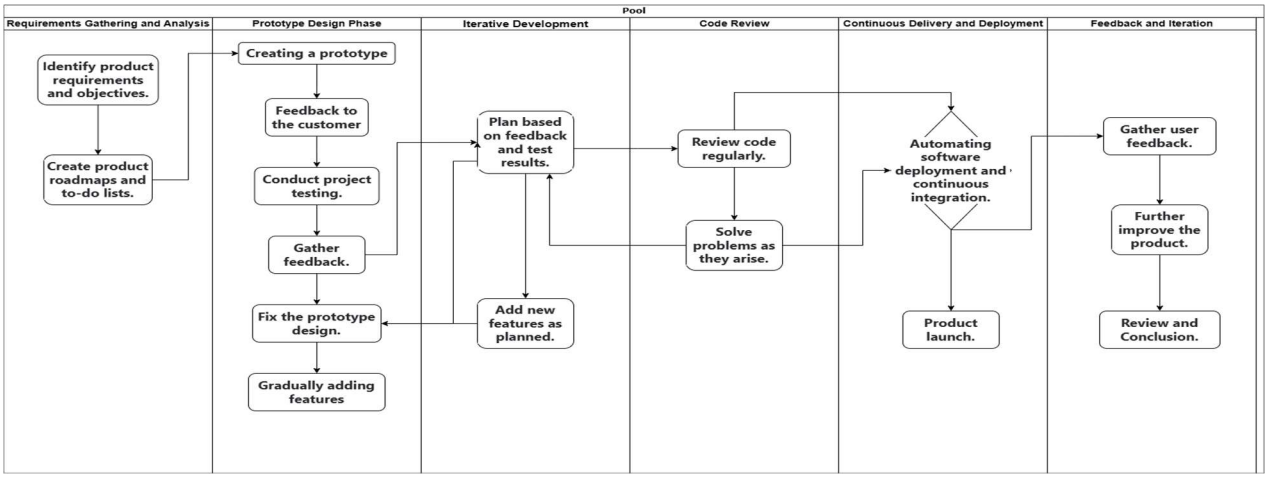


Chart analysis:

The entire chart is divided into six parts, namely **Requirements Gathering and Analysis**, **Prototype Design Phase**, **Iterative Development**, **Code Review**, **Continuous Delivery and Deployment, Feedback and Iteration**:

- The first part is the preparation stage of development, which includes planning and resource investment. After sufficient preparation, it enters the second stage.
- The second stage is the prototype development stage, which includes the planning, development, testing, and deployment stages. This stage is also a step in each iteration cycle of iterative development.
- The third stage is iterative development.
- The fourth stage is code review, including code modification and acceptance.
- The fifth stage is the deployment stage, where the project is measured.
- The sixth stage is the final summary and review stage.

VII. Team description

1 Project Manager

1.1 Number of people: 2-3

1.2 General situation:

The project manager will be responsible for overseeing the entire project, managing the team, and ensuring that the project is completed within the allocated time and budget. Be able to understand market and user needs, plan product roadmap and coordinate with development team.

1.3 Details:

- Develop and manage project timelines, budgets, and resources.
- Ensure effective communication within the team and with stakeholders.
- Identify and mitigate risks that may impact the project's success.
- Collaborate with the team to make informed decisions that align with the project goals.
- Monitor project progress and ensure that it meets quality standards.

2 UI Designer

2.1 Number of people: 2-3

2.2 General situation:

Responsible for designing the user interface, user experience, and optimizing the interface design for mobile devices.

2.3 Details:

- Conduct user research to gather insights into user needs and preferences.
- Create wireframes, prototypes and high-fidelity designs that meet design guidelines.
- Work collaboratively with other designers and developers to ensure design consistency across platforms.
- Continuously evaluate and improve the user interface based on feedback from users and stakeholders.

3 Front-end developer

3.1 Number of people: 2-3

3.2 General situation:

The web developers will be responsible for developing the web-based components of the application, such as the backend infrastructure and APIs.

3.3 Details:

- Write clean, well-documented code using HTML, CSS, and JavaScript frameworks.
- Ensure cross-browser compatibility and accessibility.
- Collaborate with back-end developers to integrate front-end components with server-side logic.
- Perform code reviews and contribute to the development of best practices within the team.

4 Backend developers

4.1 Number of people: 2-3

4.2 General situation:

Responsible for implementing server-side applications, writing backend code, and managing databases.

4.3 Details：

- Design and implement scalable and secure server-side applications using appropriate technologies.
- Develop RESTful APIs to support client applications.
- Manage databases and ensure data integrity and security.
- Implement automated testing and deployment processes.

5 Mobile developers

5.1 Number of people: 2-3

5.2 General situation:

Responsible for developing mobile applications on different platforms, such as iOS and Android platforms.

5.3 Details：

- Develop native mobile applications on iOS and Android platforms.
- Ensure cross-platform compatibility and optimal performance.
- Collaborate with UI designers to ensure a seamless user experience across platforms.
- Stay up-to-date with new mobile technologies and recommend ways to improve the product.

6 Testing personnel

6.1 Number of people: 1-2

6.2 General situation:

Responsible for testing products to ensure they meet requirements and promptly fix issues.

6.3 Details：

- Develop and execute test plans and test cases to ensure high-quality products.
- Work closely with developers to ensure that issues are promptly diagnosed and resolved.
- Participate in the design and development process to ensure the product is testable and meets user requirements.

7 Operations personnel

7.1 Number of people: 1-2

7.2 General situation:

Responsible for configuring and managing servers, networks, and cloud services to ensure that products are always available and secure.

7.3 Details：

- Configure and maintain servers, networks, and cloud services to ensure high availability and reliability.
- Monitor system performance and troubleshoot issues.
- Implement security measures to protect against unauthorized access and data breaches.
- Develop and maintain operational procedures and documentation.

8 Data Analyst

8.1 Number of people: 1-2

8.2 General situation:

Responsible for collecting, processing, and analyzing user data, providing data support and suggestions.

8.3 Details：

- Design and implement data collection and processing pipelines.
- Analyze user data to derive insights and make data-driven recommendations for product improvements.
- Collaborate with other team members to ensure that data is used effectively throughout the project lifecycle.
- Continuously evaluate and improve data collection, processing, and analysis processes.

VIII. Requirements gathering

1 Requirements Collection Purpose

- Define project goals and vision, and agree with client and team members.
- Identify product functions and features to meet user, market and business needs.

- Reducing changes and rework can reduce project risks and costs by fully collecting requirements and comparing them with project objectives.
- Establishing a communication bridge between the team and stakeholders during the requirement collection process can effectively increase the efficiency of communication and collaboration.
- Improving customer satisfaction, collecting customer needs, and completing the requirements can effectively improve customer satisfaction, which is beneficial for the long-term development of the product and also increases customer loyalty.

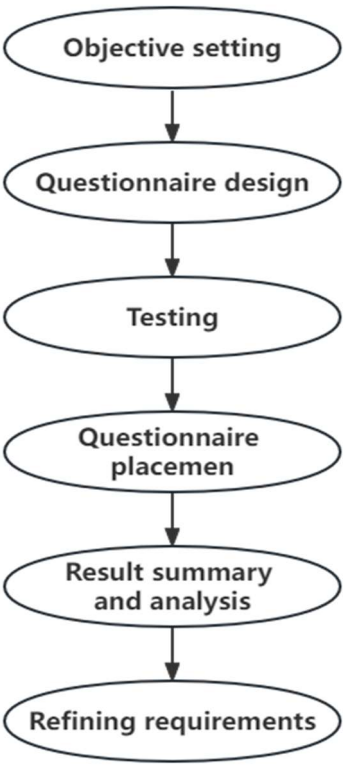
2 Requirements Collection Method

2.1 Questionnaire

The questionnaire is designed to be filled out by users. The questionnaire is recovered, user feedback is collected, and user requirements are obtained by means of quantitative data.

Function: Quantify users and user needs

Steps:



Pay attention to the problem:

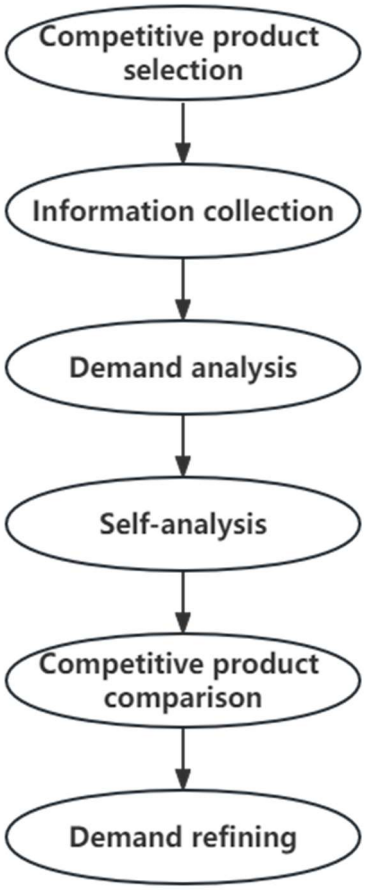
- The questionnaire must have a clear theme and purpose, and the design of questions must follow the theme.
- Do you have to use this APP? Do you have to use this app? (similar to the wrong question)
- The best way to do this is to set questions around 25.

2.2 Analysis of Competitive products

Select map applications of the same type as the track, carefully analyze the advantages and disadvantages of competing products in the market, and then learn the experience of competing products according to the actual situation of the project, analyze the requirements.

Function: Compare competing product demand, analyze own demand

Steps:



Pay attention to the problem:

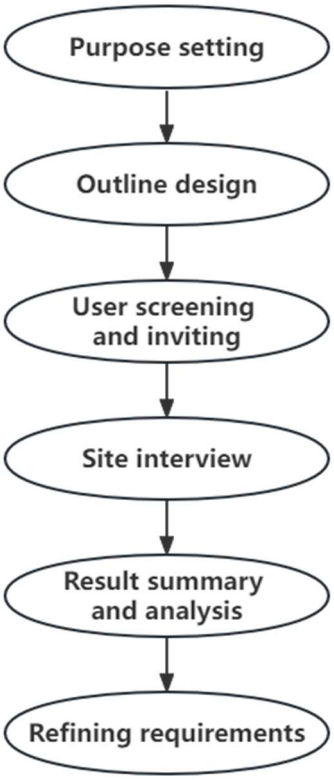
- The selection of competitive products needs to be rigorous, as far as possible to select representative competitive products with a high degree of similarity to the project.
- Laws and regulations should be observed when collecting information about competing products.
- When comparing the demand for competitive products, it should be combined with its own situation.

2.3 User Interview

Communicate directly with the users of the survey, one to one or one to many, preferably face to face.

Function: Discover users and requirements scope

Steps:



In the implementation of user interview, it is necessary to pay attention to several links:

- **Interview preparation:** Define the theme and purpose, and design an outline
- **On-site interview:** to establish a pro-company relaxed atmosphere, remember to record or make detailed records, recommended within 40 minutes

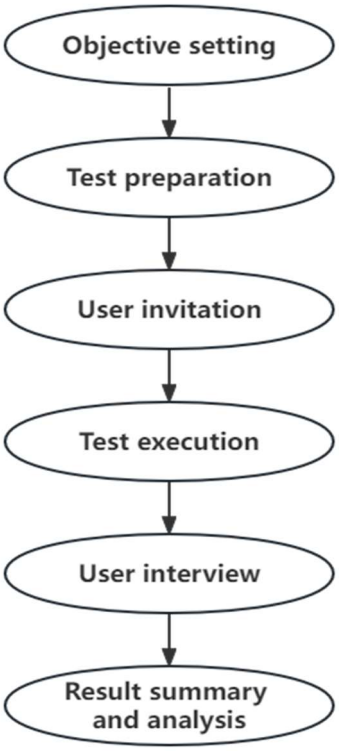
- **Demand analysis:**
  - Filtering invalid messages (off-topic and repeated replies) after screening results
  - Refining user feedback needs to avoid being misled by users' proposed "solutions"
  - Identify inconsistencies between what users say and what they do
  - Demand analysis results:
    - Users: Personal information and Internet usage Preferences
    - Problem: What problems do users encounter?
    - Behavior: What will Users do?
    - Cause: What are the causes of user problems and behaviors?

2.4 Availability Testing

Invite users to actually use the product, observe the problems encountered by users in the process of using the product, and analyze the needs of users from the actual behavior of using the product.
Methods: Qualitative research method, inviting users to use products, observing user behavior and feedback, and analyzing user needs

Function: Verify users and user requirements

Steps:



Pay attention to the problem:

- Check whether the user represents a typical user
- Operations and feedback when users encounter problems
- Post-test interviews to understand users' feelings and thoughts

IX. Documents and diagrams

1 Requirements document

The requirements document includes the non-functional requirement and functional requirements in the project, and the functional requirements include steering navigation, real-time traffic update, offline map and other functions. Non-functional requirement include specification of specified performance and quality standards, such as response time and accuracy.

2 Use Case Diagram

Use Case Diagram can be used to describe the interaction between different project participants (users, managers, etc.) and the project. Identifying a Use Case Diagram can analyze the relationship between actors and requirements, and one actor can correspond to multiple requirements.

3 Entity-relationship model

Entity-relationship model can describe and model the data part of the project. It is conducive to determining the relationship between various parts of the project.

4 System architecture diagram

This diagram is usually used to summarize the system architecture, highlighting key components and interfaces of the system. It is conducive to displaying the interaction relationships between different components in the system.

5 Class diagram

Class diagrams are used in programming, and they are the main component of object-oriented modeling. It is used for both general conceptual modeling of application system classification and detailed modeling, transforming the model into programming code.

6 Sequence diagram

Sequence diagrams is used to illustrate the interaction between different objects and components in a specific situation. Facilitate the identification of potential issues in the system.

7 R&D document

R&D documents refer to the documents used in the R&D process. The document provides a detailed record of the product's research and development objectives, development phase, research and development timeline, etc. As a reference for project execution, documents provide a textual basis for timely completion, project quality tracking, and subsequent development of the project.

In this project, we can ensure consistency and balance between various parts of the project through use cases, classes, and sequence diagrams. Reviewing each document during the development process can effectively ensure that each member of the team understands the requirements and possesses all the information needed to develop the system.

X. Stakeholder thinking

1 Software supplier

The software supplier is the main participant in this project, and they have invested a large amount of resources in this project. They have clear goals for the mobile and tablet markets, and their interests are closely related to the interests of the project.

2 Developers and IT professionals

Developers also belong to stakeholders. In the team of this project, the majority of members belong to developers, and these stakeholders will play a key role in the development of new products.

3 Users

The users of the product belong to stakeholders. Only when the product meets the needs of users can it develop smoothly.

4 Competitors

Competitors belong to stakeholders, and competitors on the same track as this product will compete for benefits. Because they can affect the market share of this product, affect the economic benefits of the product, and thus have a direct or indirect impact on the development of the product.

5 Investors

Investors belong to stakeholders. Because the output of the project will be related to their profitability.

6 Regulatory authorities

Regulatory authorities may also be stakeholders. They have an obligation to ensure that the product complies with relevant regulations and laws. If the product does not meet the specifications, it will harm their interests.

XI. Appendix

○ Software Development Kit

- ■ Android 地图 SDK | 腾讯位置服务 (qq.com)
- ■ 概述-Android 地图 SDK | 高德地图 API (amap.com)

○ Map development specification

- ■ 国家标准|GB/T 39584-2020 (samr.gov.cn)
- ■ 标准地图服务系统 (mnr.gov.cn)