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TASK 2
Requirement Gathering

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1. Introduction

In today's fast-paced world, road traffic has become a significant concern, with increasing numbers of vehicles on the roads leading to congestion, accidents, and delays. Additionally, drivers often face challenges in keeping track of road signs and being aware of real-time road conditions. This calls for innovative solutions that can provide drivers with timely and accurate information to ensure a safer and more efficient journey.

Requirement Gathering

In the world of software development, the success of a project relies heavily on a crucial yet often overlooked phase: Requirement Gathering. This initial stage acts as the foundation for the entire development life cycle, steering the course of the software and ultimately determining its success.

Requirements gathering is a crucial phase in the software development life cycle (SDLC) and project management. It involves collecting, documenting, and managing the requirements that define the features and functionalities of a system or application. The success of a project often depends on the accuracy and completeness of the gathered requirements in software.

2. Define Project Scope

Clearly defines the scope of the project by outlining its objectives, boundaries, and limitations. This step helps in establishing a common understanding of what the software is expected to achieve and what functionalities it should include.

Scope: “The primary objective of this project is to develop a mobile application that leverages the power of modern technology, including smartphones and real-time data, to address the aforementioned challenges. The application aims to deliver road sign information and road state notifications to drivers in a convenient and user-friendly manner.”

3. Identification of Stakeholders

The first step is to identify and engage with all relevant stakeholders. Stakeholders can include end-users, clients, project managers, subject matter experts, and anyone else who has a vested interest in the software project. Understanding their perspectives is essential for capturing diverse requirements.

3.1. Stakeholders:

1. Primary Users:

- **Drivers:** The primary beneficiaries of the app. They rely on it for real-time traffic updates, road sign notifications, and navigation assistance.

2. Secondary Users:

- **Passengers:** While not directly using the app, they benefit from a safer and more efficient journey due to improved driver awareness.
- **Cyclists and Pedestrians:** Can potentially use the app for route planning, especially if it integrates with cycling or walking infrastructure data.

3. Data Providers:

- **Government Agencies:** May provide official traffic data feeds, road closure information, and road sign locations.
- **Private Navigation Companies:** Can collaborate for data exchange or integration, potentially offering a more comprehensive service

4. App developers and maintainers

- **Software Developers:** Responsible for building, maintaining, and updating the app functionality.
- **User Interface/User Experience (UI/UX) Designers:** Create an intuitive and user-friendly interface that minimizes driver distraction.

4. Methods used to Gather Requirements

4.1. Interviews with stakeholders

Scheduled interviews with key stakeholders and target users to gather information about their needs, preferences, and expectations. Through open-ended questions and discussions, we aimed to uncover both explicit and implicit requirements. These interviews provided valuable insights that contributed to a more holistic understanding of the project.

4.1.1. Interviews with drivers

Interviews were conducted with drivers of varying demographics and experience levels to understand their needs, frustrations, and expectations for a road notification app.

After meeting and interviewing the drivers, the following requirements were documented.

1. **Core Functionalities:**
    - Provide alerts for upcoming road signs (stop signs, speed limits, lane changes).
    - Offer navigation functionalities with traffic-aware routing.
    - Display real-time traffic conditions (congestion, accidents, road closures).
    - Alert drivers ahead of time concerning road state and upcoming road signs.
    - A clear and unambiguous description of the road sign and road state.
2. **User Interface and Experience:**
    - Present a clear and user-friendly map interface.
    - Display traffic conditions visually (color-coded map, icons).
    - Offer voice alerts for upcoming road signs and hazards.
    - Allow customization of alert preferences (sound, vibration).
    - Enable hands-free operation for voice commands and alerts.
    - Integrate with existing navigation apps.

- Remember me functionality for fasting log in.
- Simple Login process.

3. **Personalization and Settings:**
   - Offer user profiles with customizable preferences (map view, units).
   - Allow setting preferred routes (e.g., fastest, most scenic).
   - Enable filtering of alerts based on severity (e.g., only major accidents).
   - Integrate with user accounts for saving preferences and route history.
4. **Advanced Features:**
   - Display estimated travel times based on real-time traffic conditions.
   - Offer alternative route suggestions in case of traffic congestion.
   - Integrate with weather data to warn of potential hazards (fog, rain).

4.1.2. Interviews with Data providers

Planned visit to the Delegation of transport, which serves as the primary data source for data to be used in the database of the system. After meeting and interviewing the staff at the delegation of transport. The following requirements were documented.

Due to delay to acquire a letter of authorization from the school, to carry out research at the delegation under the supervision of the school, this section of the requirement gathering phase is still pending…

4.2. Examination of an existing system

Existing road notification apps were analyzed to identify their strengths, weaknesses, and potential areas for improvement in our proposed application. Similar systems which already exist include:

- **Google Maps** is one of the top navigation apps available at the moment and is packed with lots of features, but there’s also an equally popular app called Waze.
- **Waze** is a community driven navigation app which allows its users to report any traffic-related incidents, which are then used to provide routing and real-time

traffic updates. It was originally developed in 2006 as a community project in Israel to create a free digital database of the map of Israel and was later acquired by Google in 2013.

4.2.1. Case Study 1: Google Maps

Benefits of Google maps

- Accurate and up-to-date map data
- Crowdsourced, real-time traffic data
- Provides turn-by-turn directions for driving, walking, biking, and public transit
- Provides estimated time of arrival and distance to destination.
- Web-based version
- Real-time traffic and incident updates
- Allows download of directions for offline use

Limitations of Google maps

- Limited offline functionality: Google Maps requires an internet connection to function properly, making it less reliable in areas with poor or no internet coverage.
- Privacy concerns: Google Maps collects and stores data on users' locations and search history, raising privacy concerns for some users.
- Incorrect or outdated information: Google Maps relies on user-generated data and third-party sources, which can lead to inaccuracies or outdated information.
- Dependence on Google Services: Google Maps is tightly integrated with other Google services, which can be limiting for users who don't use or prefer not to use these services.
- Battery Drain: Google Maps is a power-hungry app, which can drain battery faster on mobile devices.
- Limited accessibility features: Google Maps does not have voice guidance or other accessibility features that are available on other map apps or GPS devices.

4.2.2. Case study 2: Waze

Benefits of Waze

- Bright, colorful, easy-to-see icons
- Crowdsourced traffic conditions mean better routes
- Social connections for drivers

Limitations of Waze

- Difficult to create directions from places other than your current location
- No true offline options
- Have to download maps every time when setting a route.
- Waze's maps are cluttered despite its good usability. In congested the interface can be too overwhelming.
- Waze needs a good data connection in order to run seamlessly in real-time.

4.2.3. Solutions to the above Limitations

After examining the systems above, their advantages and limitations, this led to the following documented requirements.

1. **Enhanced Route Planning:**
   - Allow users to create and save routes from any specified location, not just their current one.
   - Integrate with points-of-interest (POI) databases to enable route planning with specific destinations in mind.
   - Offer multi-stop route planning capabilities for users with complex travel itineraries.
2. **Improved Offline Functionality:**
   - Implement a robust offline map download system that allows users to download specific regions or frequently used routes for offline navigation.
   - Store cached traffic data (historical trends, average speeds) to provide some level of traffic awareness even without a real-time connection.
   - Explore alternative routing options based on pre-downloaded map data when online connectivity is unavailable.

3. **User Interface Refinement:**
   - Prioritize a clean and intuitive map interface that is easy to read and minimizes clutter.
   - Implement zoom-dependent information display. Show detailed road signs and traffic information when zoomed in, while providing a more traffic-flow focused view when zoomed out.
   - Offer customizable map views (e.g., minimalistic, detailed) to cater to user preferences.
4. **Reduced Reliance on Real-Time Data:**
   - Utilize historical traffic data and user-generated reports (properly vetted) to provide some level of traffic awareness even with a weak or no data connection.
   - Integrate with local traffic management agencies (if possible) to access official offline traffic data for specific regions.
5. **Ensuring Information Accuracy:**
   - Implement data verification mechanisms to ensure the accuracy of user-generated reports on traffic conditions and road signs.
   - Partner with official sources (e.g., government agencies) for verified traffic data and road sign information.
   - Allow users to report inaccuracies or outdated information, with a system to review and update the data accordingly.
6. **Enhanced Accessibility Features:**
   - Integrate robust voice guidance functionalities for hands-free navigation and improved accessibility for visually impaired users.
   - Offer alternative map views with high-contrast themes and text-to-speech functionality for users with visual impairments.
   - Make the app compatible with screen reader software for a more inclusive user experience.

By implementing these solutions, our road state and road sign notification app can offer a more user-friendly, reliable, and accessible experience for drivers compared to existing navigation apps.

4.3. Brainstorming amongst project team members

Internal development teams brainstormed potential functionalities, considering user experience, technical feasibility, and market competitiveness.

After the brainstorming session amongst us the members of the development team, the following requirements were documented.

- Offer offline functionality for basic navigation and saved routes.
- Support multiple languages for international users.
- Provide clear and easy-to-understand user documentation and tutorials.
- Implement a user feedback mechanism for app improvement.
- Offer text-to-speech conversion for all voice alerts and information.
- Implement high-contrast themes for users with visual impairments.
- Ensure compatibility with screen reader software for blind or visually impaired users.
- Minimize distractions while driving (voice alerts over on-screen notifications).
- Offer a night mode for better visibility in low-light conditions.
- Ensure user data privacy and secure data transmission.
- Provide options to disable location tracking when not in use.

5. Conclusion

In conclusion, these requirements and user stories will guide the design and implementation of the Road Sign and Road State Mobile Notification Application. Further requirements may emerge as the project progresses and will be incorporated into the project plan accordingly.

6. References

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