ElectroCap Mid-Program Pitch Deck

Visualize- Bridging Vision Gaps in University Spaces

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TÉCNICO LISBOA

Visualize Team

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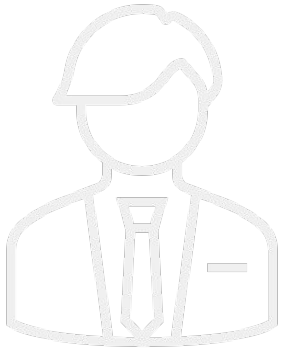
Scientific Advisor

Scientific Co-advisor

Coordinator



Mentor (waiting for response from APEC)

Problem definition

The goal is to develop an indoor navigation app tailored to the needs of visually impaired students, enabling them to navigate the university environment confidently and independently, thereby reducing the risk of dropping out of studies due to accessibility challenges.

Our restrictions in this moment are: the cost of the solution, ensuring precise location using an open source, integrating the indoor navigation system with our web app.

Solution beneficiaries

Visually impaired people: Visually impaired users are an important target group for your app. They depend on the accessibility of the app to navigate the campus independently and safely.

Teachers: As users of the application, teachers are directly impacted by its effectiveness and usability. They are interested in efficient navigation to get to classrooms and other relevant areas on campus.

Students: Like teachers, students are direct users of the application and benefit from simplified and fast navigation around campus. They are keen to get to classes and other places of interest efficiently.

Instituto Superior Técnico: Técnico may have an interest in promoting accessibility and efficiency on campus. It can also provide support, resources or partnerships for the development and implementation of the application.

Technological solution

Since we will not be able to incorporate Situm's indoor navigation system, we are currently exploring three different open source options, explored in the next slides.

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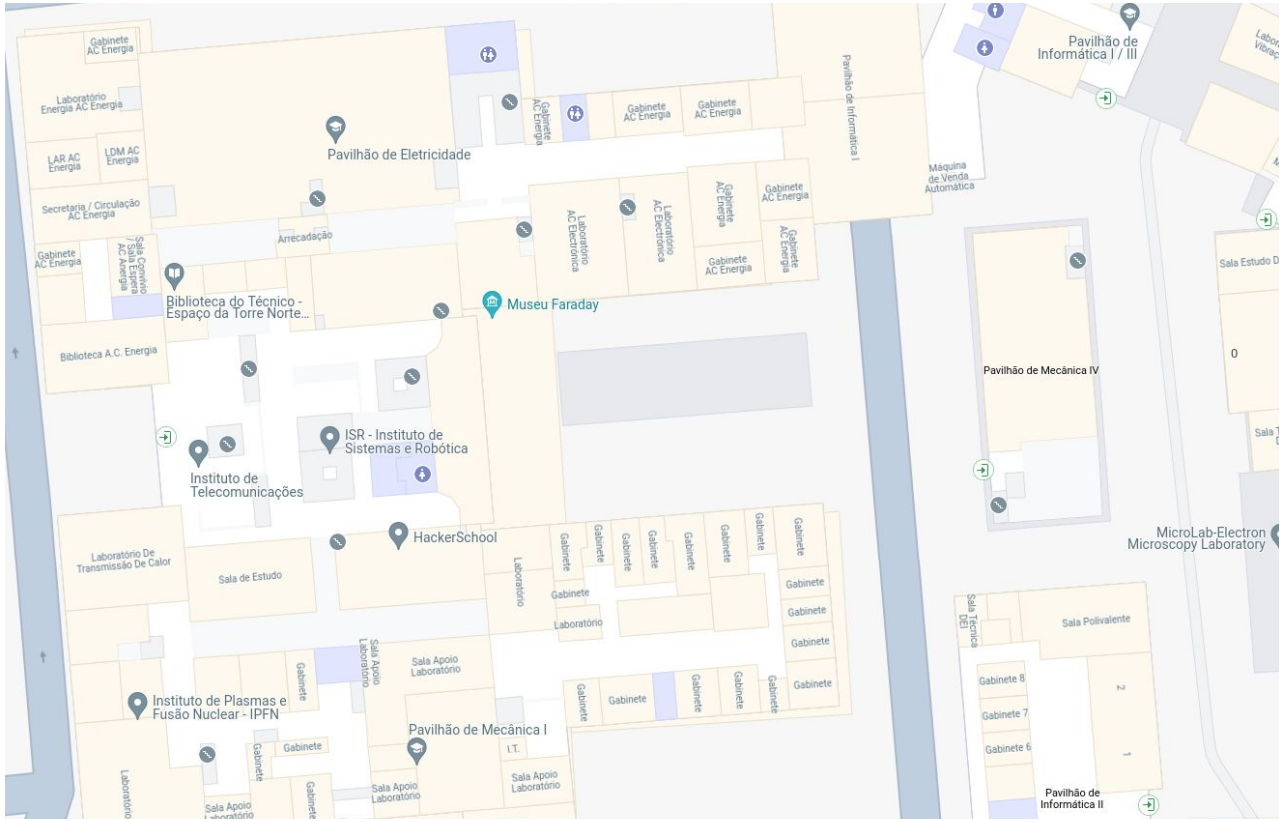
Google Maps



Comparison and results

	Osiris	Anyplace	Navigine	Google Maps
Latest Update	2017	2021	2024	2015 (indoor map)
Location	Uses Wifi, unspecified about Beacons	Hybrid WiFi + IMU Navigation; WiFi Heatmaps; Crowdsourced WiFi Fingerprint Management	Supports both Beacons and Wifi (Wifi is only for Android users)	Integrates through gps signals with the triangulation of wifi signals (the last only on android phones)
Integration in Flutter App	Custom integration	Has an API/SDK, which can potentially be used in Flutter	Has SDK integration for Flutter	Easy integration with Flutter through specific packages
Pros	(Open source), Customizable	(Open source), Customizable	Comprehensive documentation, supports various technologies	The indoor map is already created. Easily integrated in our app. Comprehensive documentation
Cons	Update frequency and community support unclear	Lack of recent updates, limited support	Commercial software, cost involved. Requires the use of beacons	The map is not exactly up to date. Location only works well for android. The directions are not always precise.
Results	Need of creating our own server	Unable to function with their servers. Need of creating our own server	It depends on the use of beacons, as it does not have a great WIFI detection capacity (IOS and Android). Most services requires financing.	Still in testing…

Competitors and previous work

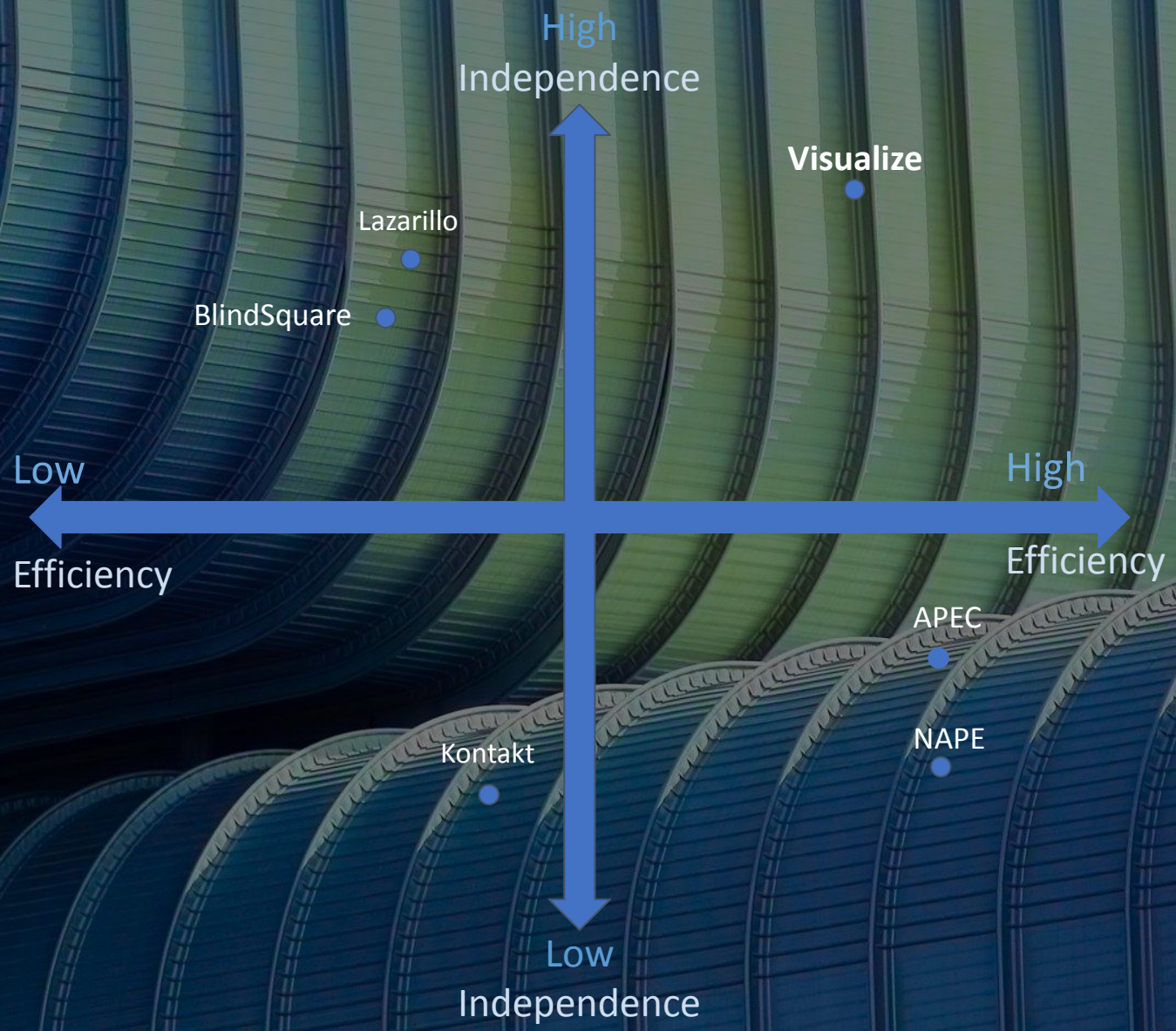
Competitors	Applications that blind individuals use to orient themselves in spaces, such as: Lazarillo, BlindSquare, Kontakt, etc.
Previous work	Support from the nucleus of student support (NAPE) and associations like APEC that give assistance to guide blind students to classrooms.

Differentiation

Current assistive apps for the visually impaired are not tailored to educational institutions (IST), often lacking efficiency and speed. Our webapp will be strategically designed for IST,. Unlike Kontakt which requires extensive hardware, our webapp will diminish both user independence and efficiency.

Solutions like NAPE or APEC, while efficient in guiding to specific classrooms, removes user autonomy.

Our inclusive app will also be designed for sighted individuals, enhancing navigation for all within the educational environment.



Solution requirements

With the solution chosen we hope to firmly build our guided, in campus, orientation module. This solution has meet the following requirements:

Functionality: Accurately guide users inside our campuses buildings with voice directions (main priority).

Performance: Quick to process users movements. Highly responsive to other users requests.

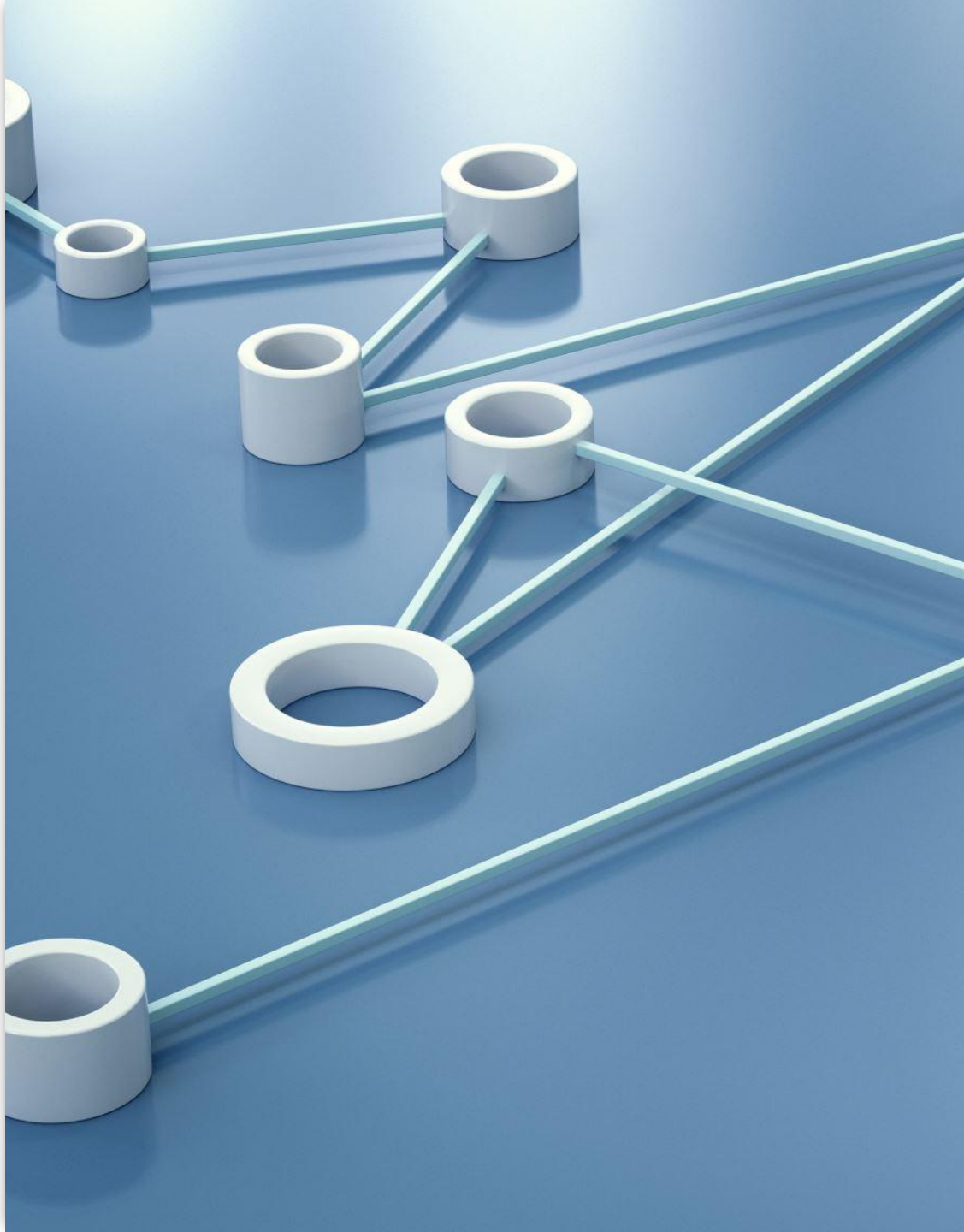
Usability: Easy to use for non visual users. Accessibility is key to the success of this solution.

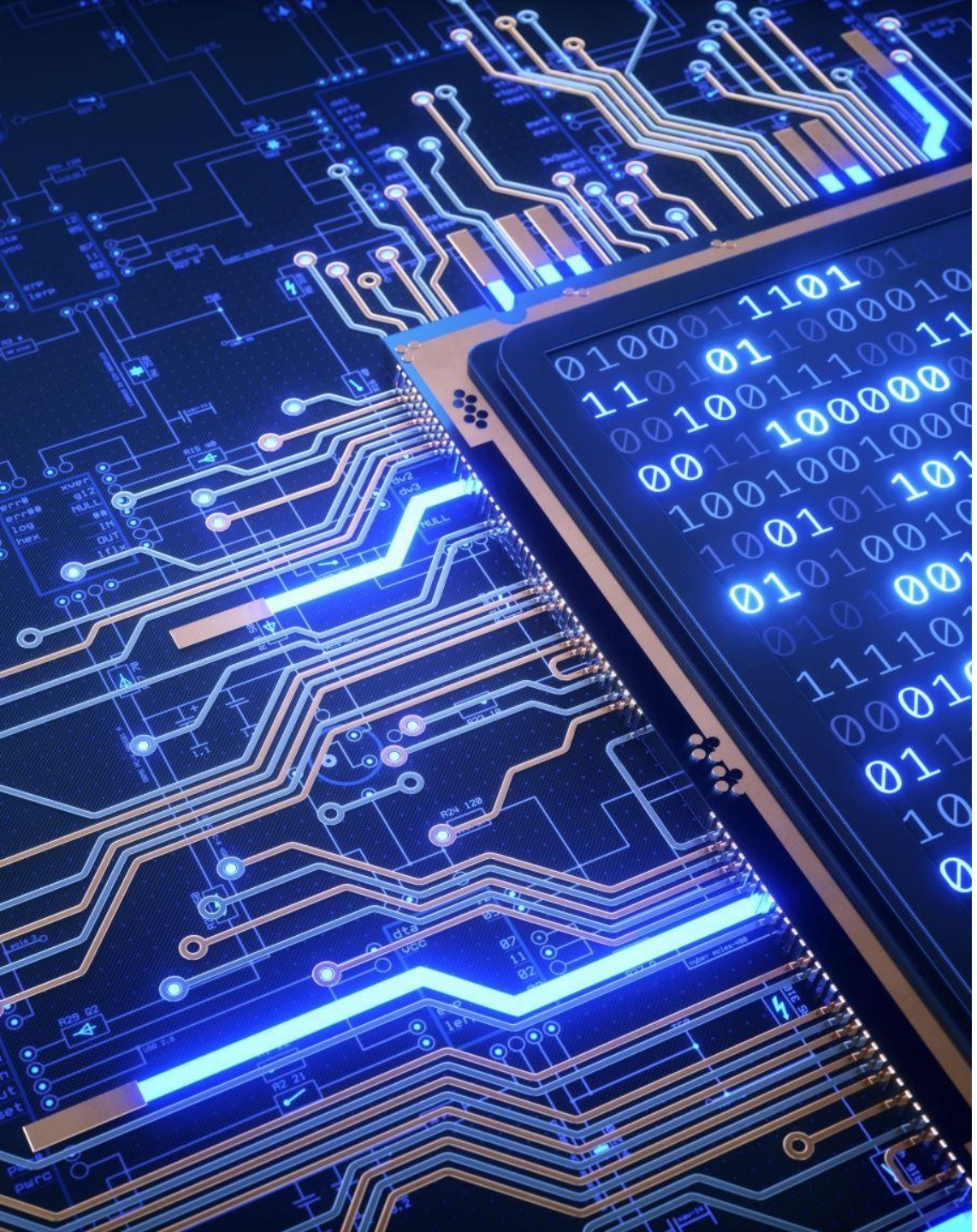
Reliability: Accuracy is one of the most required features of this solution, without it we risk the irrelevance of our work. Therefore it has to be consistent when it comes to the users location and his guidance through the campus

Security : Make sure that the user's data acquired is not used for anything else other than our app.

Compatibility: Every mobile phone.

Scalability: Easily deployable in every of our campus buildings.





Technical challenges

- Ensuring that visually impaired users can **receive audio directions without compromising their ability to hear important environmental sounds**.
- Navigating dynamic indoor environments **where obstacles can frequently change, such as temporary constructions or crowded areas.**
- **Ensuring the privacy and security of users, particularly when tracking and storing location data**.
- Achieving **high precision in indoor navigation to ensure safety and confidence for visually impaired users**, especially in crowded or complex environments like university campi.
- Ensuring **the app does not drain the device's battery quickly**.

Partners

APEC, the Association for Support to Blind Education, plays a crucial role in helping us understand the reality in which blind individuals live, thereby assisting us in identifying priorities. By working closely with blind individuals and understanding their experiences, challenges, and needs, APEC provides valuable insights that guide us in developing effective strategies and solutions to support the blind community.

1888 APEC
ASSOCIAÇÃO PROMOTORA DO ENSINO DOS CEGOS

Testing and validation metrics

Accuracy of Navigation Instructions: Measure the accuracy of the app's navigation instructions compared to the actual physical paths within the campus. This can be assessed using techniques like GPS accuracy testing and comparing the app's directions to ground truth measurements.

User Feedback and Satisfaction: Conduct user testing sessions with blind individuals to gather feedback on the app's usability, ease of navigation, and overall satisfaction with the user experience.

Accessibility Compliance: Ensure that the app complies with accessibility standards such as WCAG (Web Content Accessibility Guidelines) to guarantee it is usable by individuals with various disabilities, including blind users who rely on screen readers and other assistive technologies.

Testing and validation metrics

Reliability and Stability: Assess the app's stability and reliability by monitoring for crashes, freezes, or other technical issues during usage. Metrics such as mean time between failures (MTBF) and mean time to repair (MTTR) can be useful here.

Coverage and Completeness of Navigation Data: Evaluate the extent to which the app covers all important indoor locations within the university campus, including buildings, entrances, exits, classrooms, restrooms, and other facilities crucial for navigation.

Battery Consumption: Measure the app's impact on device battery life to ensure it remains usable for extended periods without draining the user's device excessively.

Route Optimization: Assess the app's ability to provide optimized routes considering factors such as distance, obstacles, stairs, elevators, and other accessibility features relevant to blind users.

Division of labor (1)

Mafalda Brito	Marta Catalão	Tomás Esteves
Navigation software	**Navigation software**	**Navigation software**
Test different open sources to decide what is the best option (Navigine, AnyPlace, Google Maps)	Test different open sources to decide what is the best option (Navigine, AnyPlace, Google Maps)	Test different open sources to decide what is the best option (Navigine, AnyPlace, Google Maps)
Once decided on the best option, test it and integrate it into your web-app	Once decided on the best option, test it and integrate it into your web-app	Once decided on the best option, test it and integrate it into your web-app
Video/poster	Video/poster	Video/poster

Division of labor (2)

Diana Coelho	Maria Neves	Mariana Ramos
WebApp Development	**WebApp Development**	**WebApp Development**
Navbar	Search bottom	Login and data security
Main Page	Main Page	Main Page
Vídeo/ Poster	Vídeo/ Poster	Video/Poster
App tests	App tests	App tests

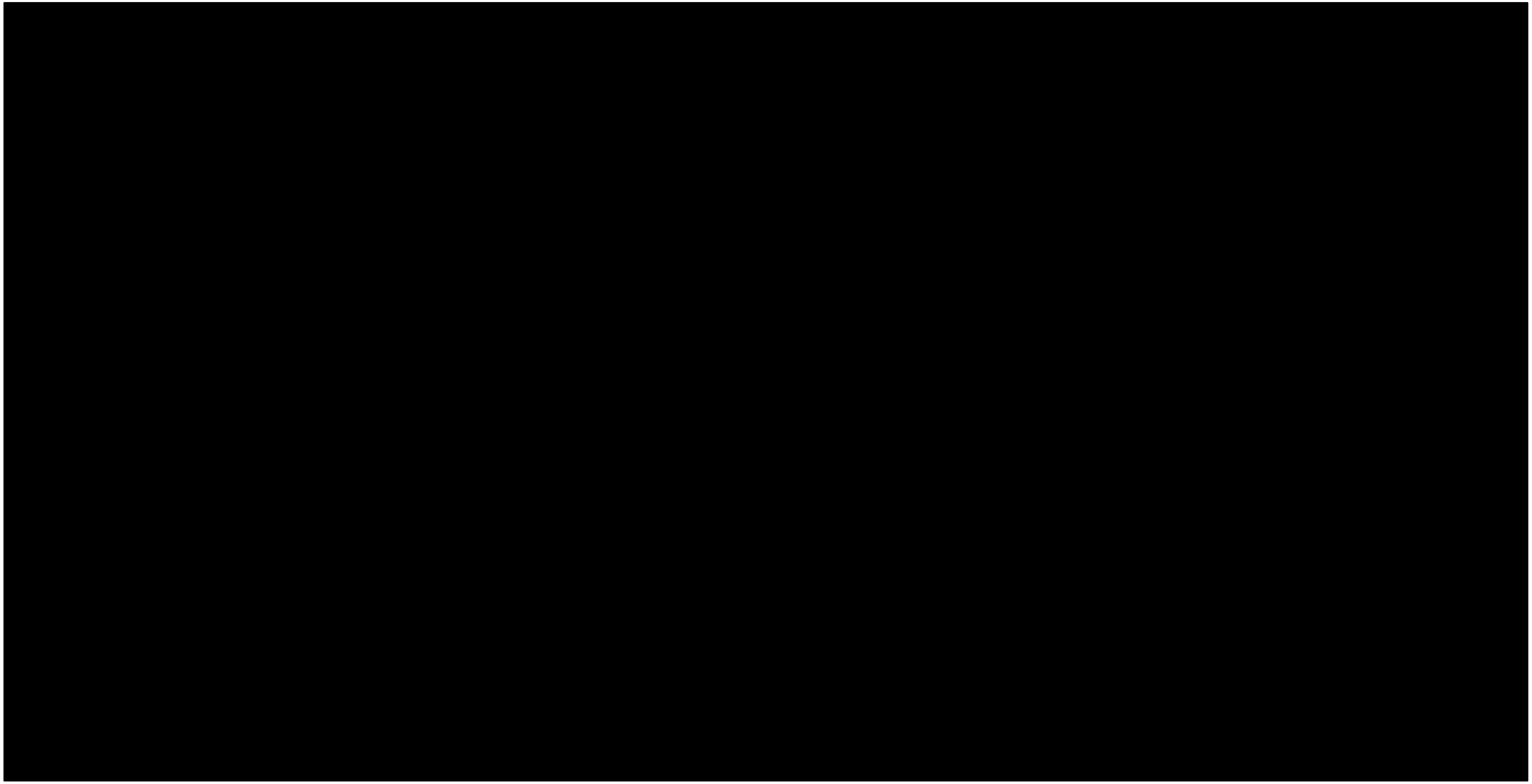
Mid-program status

- **Website** has been successfully launched and is being updated weekly to reflect the latest advancements and activities within the project;
- **Webapp development**: we are currently developing the Flutter-based design, ensuring a seamless and intuitive interface that will enhance the navigational experience for all users.
- **Location algorithm research**: we're currently evaluating various open-source options to integrate the most effective and precise positioning solutions that aligns with our project.

Achieved results

- We launched our **website**! Check it out: https://pic-visualize-tomasgesteves-9a2c6c6209ed433189c5c458214944da393.gitlab.io/;
- On monday, 18th of March, we had **a meeting with APEC**. We concluded that our app must have all icons labeled for voice-over functionalities to enable comprehensive audio navigation for both iOS and Android users;
- Research on Open-Sources;
- Partnership **(APEC);**
- Start **designing and implementing our web app.**

Current Status of our Webapp



Challenges faced by the team

- Find a good alternative for an indoor location system that can be implemented in so few months and fits the solutions requirements.
- Since we want the app to be adapted for blind people, we've had some difficulty realising what's really important to them and what's not. To overcome this problem, our mentor, an APEC member, is going to help us.
- Balancing coursework with other commitments specially other course projects and evaluations.

Deviations from original schedule

Complexity of the problem:

- Challenge: **Underestimated the complexities involved** in developing an intuitive and user-friendly application adapted to people with visual impairments.
- Actions taken: **Engaged with APEC** to gain insights into the real-world **needs and preferences** of the visually impaired community.
- Going forward: Schedule **regular consultations** with APEC to **ensure the app's design and functionality** align with user needs.

Deviations from original schedule

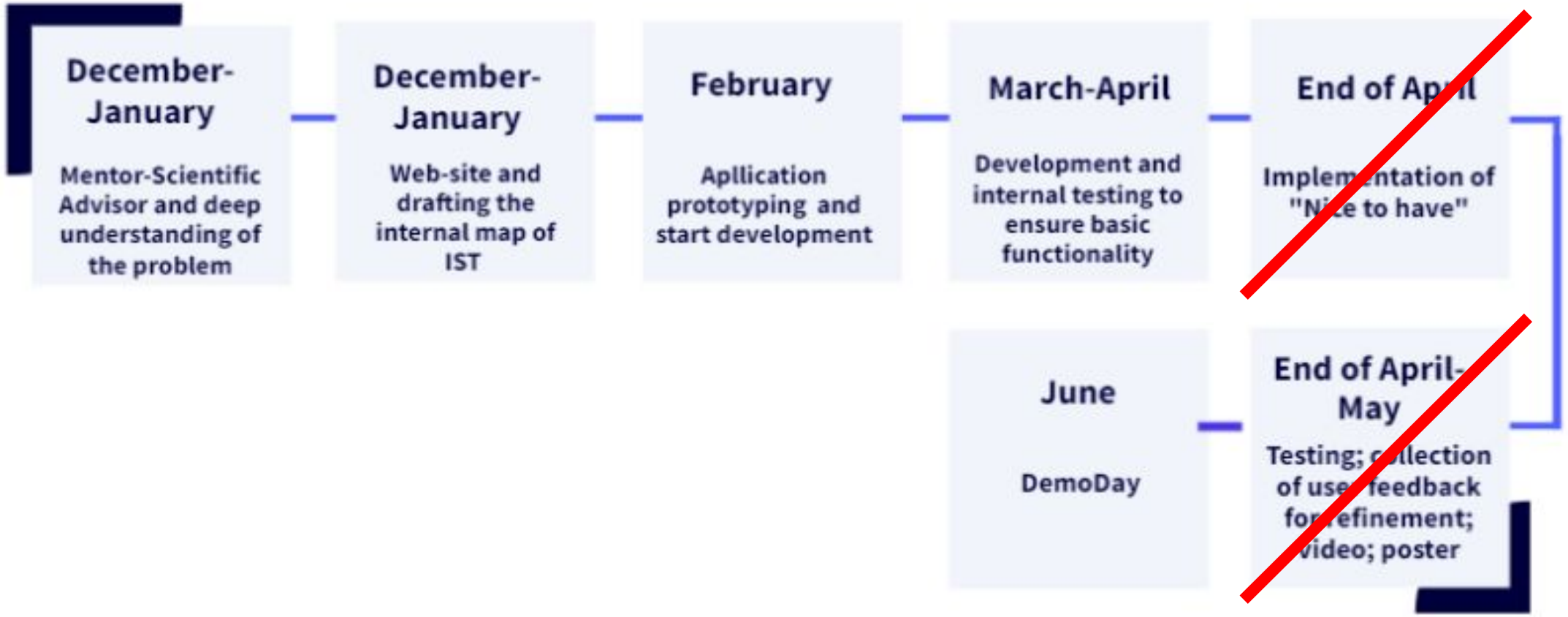
Integrating the navigation system :

- Challenge: Faced difficulties in **obtaining robust indoor location and navigation software** that met these main requirements: **easy to implement anywhere** (no hardware needed); **accessible to visually impaired people** (accurate location, voice guided directions and compatibility with every mobile device);

- Actions taken: **Evaluation of the feasibility of the solutions found**. The main thing found was that for **apple devices** only applications **based on apple maps** can have a more **accurate location**.

- Going forward: **Accepting the downfalls of the best solution** and make it as good as possible.

Deviations from original schedule



Contribution of each team member (1)

Mariana Ramos	Marta Catalão	Tomás Esteves
Developed the website	**Design of the webapp**	**Developed the website**
Update the website	Update the website	Update the website
Contacted and visited APEC	Visited APEC	Search for open sources alternatives
Started to implement the webapp in the website	Started to implement the webapp in the website	Sent an email to some open sources
Search for open sources	Tested the different open sources	Tested the different open sources

Contribution of each team member (2)

Mafalda Brito	Maria Neves	Diana Coelho
Contacted Situm	**Design of the webapp**	**Design of the webapp**
Update the website	Update the website	Update the website
Search for open sources alternatives	Visited APEC	Visited APEC
Sent an email to some open sources	Started to implement the webapp in the website	Started to implement the webapp in the website
Tested the different open-source	Helped to implement the website	Tested the different open-source

Correct Timeline

January-February

Deep understanding of the problem; Start to develop the website

February

Lauch of the website;
Technological research for the webapp;
Contact with Situm

March

Visit to APEC;
Design and start to develop the webapp;
Search of open sorces for location algorithm

April

Development of the webapp;
Integration with the location algorithm

May

Internal testing;
Implementation of "Nice to have"

End of May

Testing; collection of user feedback for refinement; video; poster

June

DemoDay