universidade de aveiro

REDE DE TRANSPORTE DE DOENTES

João Vieira, 50458, 33,(3)%
Lara Matos, 95228, 33,(3)%
Vítor Santos, 107186, 33,(3)%

Interação Humano Computador
Ano letivo 2022/23

TABLE OF CONTENTS

01 THE PROBLEM

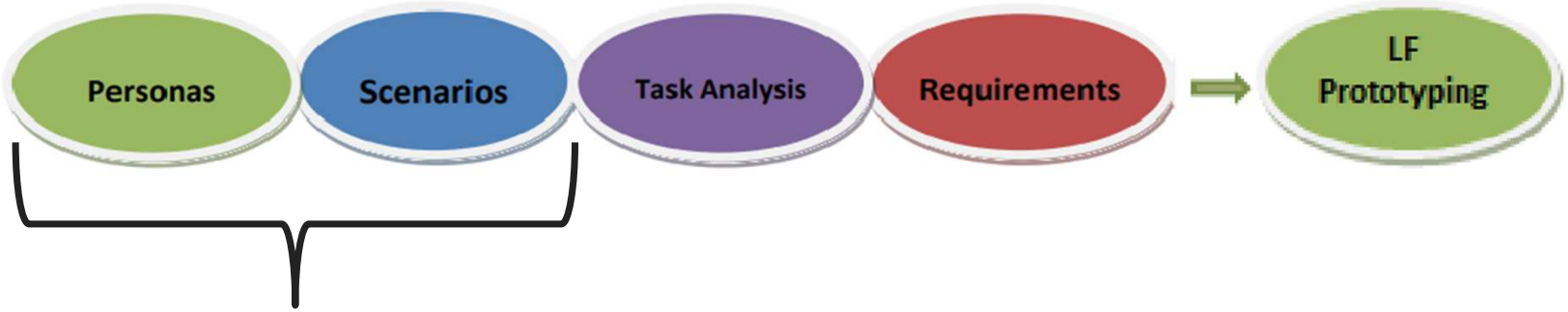
- Non-urgent patient transportation
- Current methods are :
  - outdated, archaic and vague;
  - **costly**.
- Competitor System (SGTD) has **several design flaws**

01 REDE DE TRANSPORTE DE DOENTES

- Assist non-urgent **patient transportation**
- Human Centered Design
- Accessibility
- Efficiency

02 REQUIREMENTS METHODOLOGY

- Goal-directed & activity-based



- User research, informally interviewing:
  - Proxy users
  - Actual target users
- Other user research (documentation)

02 PERSONAS

Paulo Rodrigues Silva – Volunteer Firefighter

- Age: 30 y
- Schooling: Master's Degree
- Tech Literacy: High
- Occupation/Job: 1st Class Fireman
- Experience: 5 y in Non-urgent Patients Transportation

- Motivation: Wants a more efficient system to manage Non-urgent Patients Transportation

- Approved by interviewed end-users and proxy users

02 PERSONAS

Honório Bonifácio Rodrigues Serrano – Patient

- Age: **84 y**
- Schooling: **4th grade** basic education
- Tech Literacy: **Illiterate**
- Occupation: Retired – Miller (formerly)
- Experience: 70 y as a **Miller** and **Farmer**

- **Motivation:** Would like a way to be **more independent** in transportation using a **simple and intuitive** system.

02 PERSONAS

Maria Luísa Serrano – Informal Caretaker

- Age: 63 y
- Schooling: **Bachelor's Degree**
- Technological Literacy: **Average**
- Occupation/Job: **History Teacher** (Basic School)
- Experience: **35 y** as a Teacher

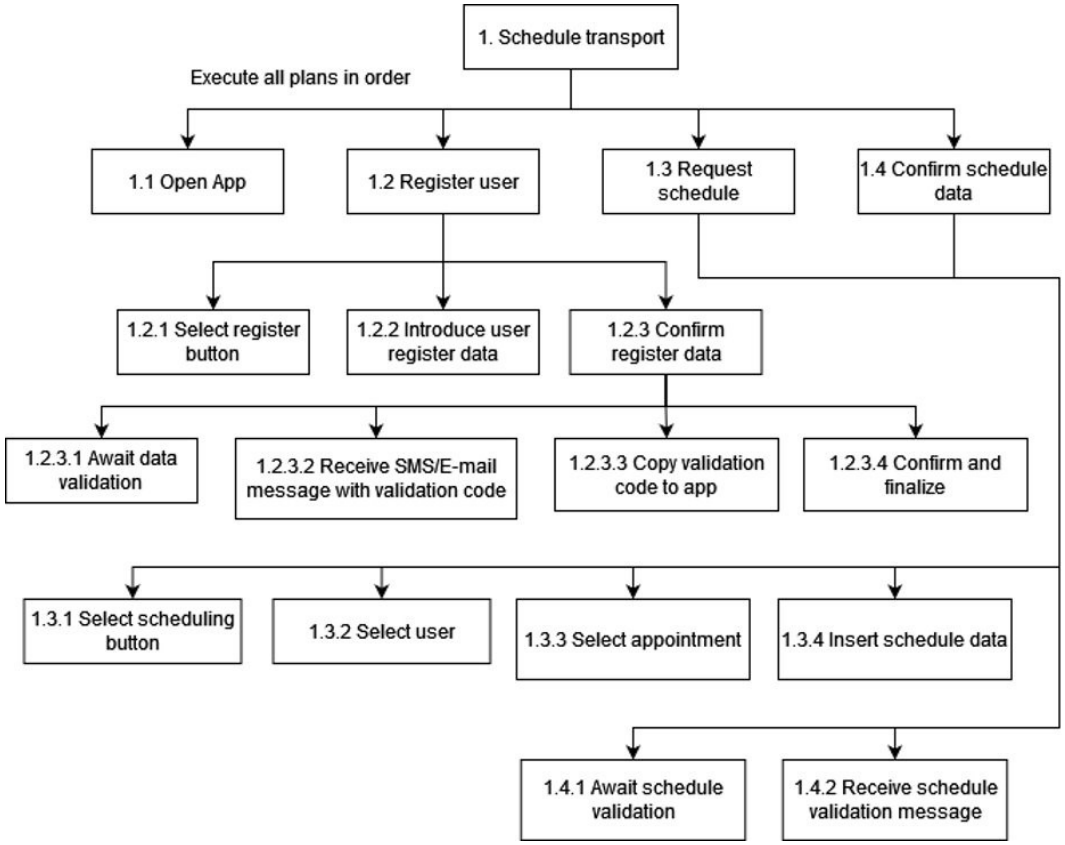
- **Motivation:** wishes she could have the **means to arrange and manage** transportation for her father's treatment sessions **without affecting** her job.

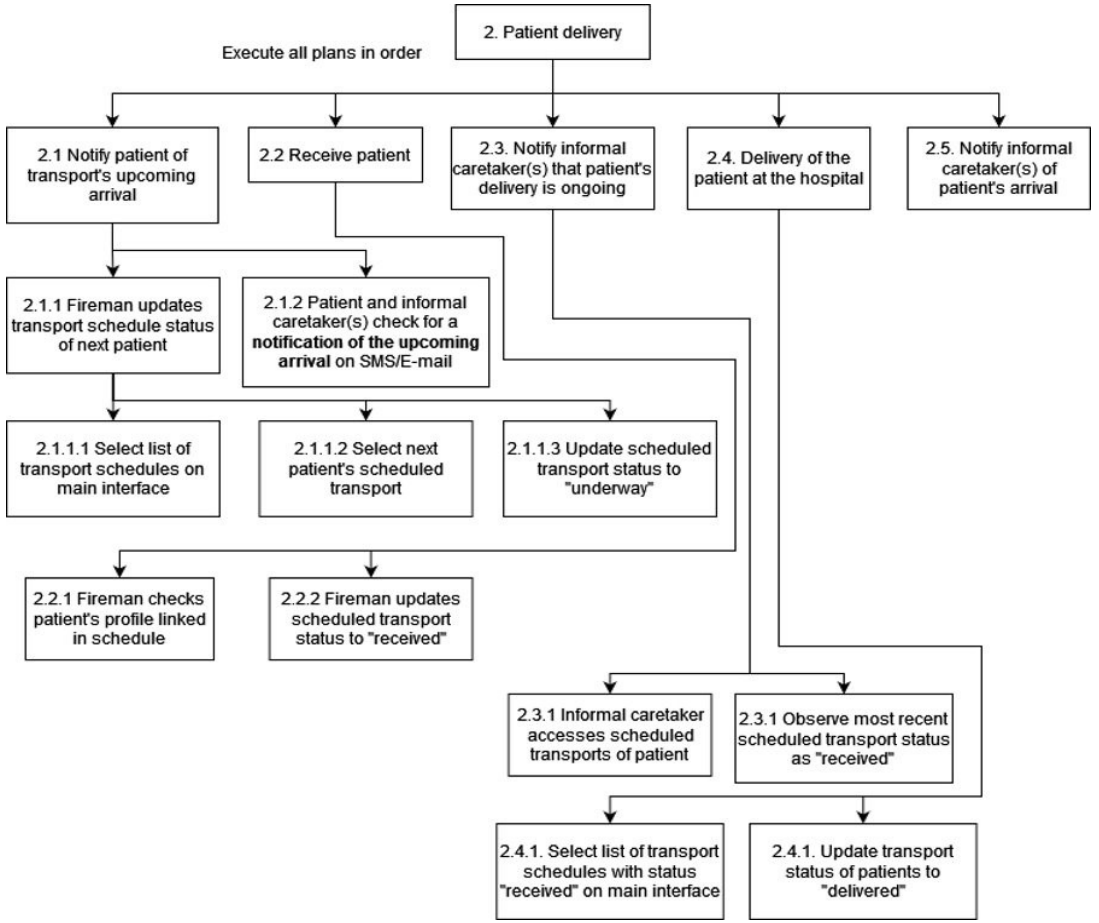
02 SCENARIOS

- Scenario 1 – Scheduling transport – Mrs. Maria, Mr. Honório
  - Mr. Honório's daughter (Mrs. Maria) **doesn't have the necessary conditions to transport her father** to the hospital. So, Mrs. Maria Luísa will open the RTD app to **schedule a transport** with the local fire department. Mrs. Maria Luísa registers Mr. Honório's data and **do the scheduling** that will be confirmed by the responsible for non-emergency patients' transportation.

- Scenario 2 – Patient delivery – Mrs. Maria, Mr. Honório, Mr. Paulo
  - The next patient **firefighter Paulo** will pick up is **Mr. Honório**. When he gets the patient's data, he knows that Mr. Honório **needs transportation with wheelchairs**. The patient and his daughter are **informed via SMS** that Mr. Honório is the next person to recall and Mrs. Maria Luísa **doesn't need to miss work**. After a few minutes, **Mr. Honório is picked up** by the firefighter Paulo and after 30 minutes, the non-urgent ambulance arrives at the hospital. **Paulo updates the transport's status** and Mrs. Maria Luísa receives a notification that **his father arrived at the hospital safely**.

02 TASKS


1. Schedule transport
Execute all plans in order
1.1 Open App
1.2 Register user
1.3 Request schedule
1.4 Confirm schedule data
1.2.1 Select register button
1.2.2 Introduce user register data
1.2.3 Confirm register data
1.2.3.1 Await data validation
1.2.3.2 Receive SMS/E-mail message with validation code
1.2.3.3 Copy validation code to app
1.2.3.4 Confirm and finalize
1.3.1 Select scheduling button
1.3.2 Select user
1.3.3 Select appointment
1.3.4 Insert schedule data
1.4.1 Await schedule validation
1.4.2 Receive schedule validation message


2. Patient delivery
Execute all plans in order
2.1 Notify patient of transport's upcoming arrival
2.2 Receive patient
2.3. Notify informal caretaker(s) that patient's delivery is ongoing
2.4. Delivery of the patient at the hospital
2.5. Notify informal caretaker(s) of patient's arrival
2.1.1 Fireman updates transport schedule status of next patient
2.1.2 Patient and informal caretaker(s) check for a notification of the upcoming arrival on SMS/E-mail
2.1.1.1 Select list of transport schedules on main interface
2.1.1.2 Select next patient's scheduled transport
2.1.1.3 Update scheduled transport status to "underway"
2.2.1 Fireman checks patient's profile linked in schedule
2.2.2 Fireman updates scheduled transport status to "received"
2.3.1 Informal caretaker accesses scheduled transports of patient
2.3.1 Observe most recent scheduled transport status as "received"
2.4.1. Select list of transport schedules with status "received" on main interface
2.4.1. Update transport status of patients to "delivered"

02 REQUIREMENTS

- Non-functional 

  - ❑ Modular & Extensible
  - ❑ Easy to maintain and manage
  - ❑ Robust
  - ❑ Effective & Efficient
  - ❑ Applicable to most mobile systems
  - ❑ Accessible even in remote rural areas
  - ❑ Highly intuitive

- Functional 

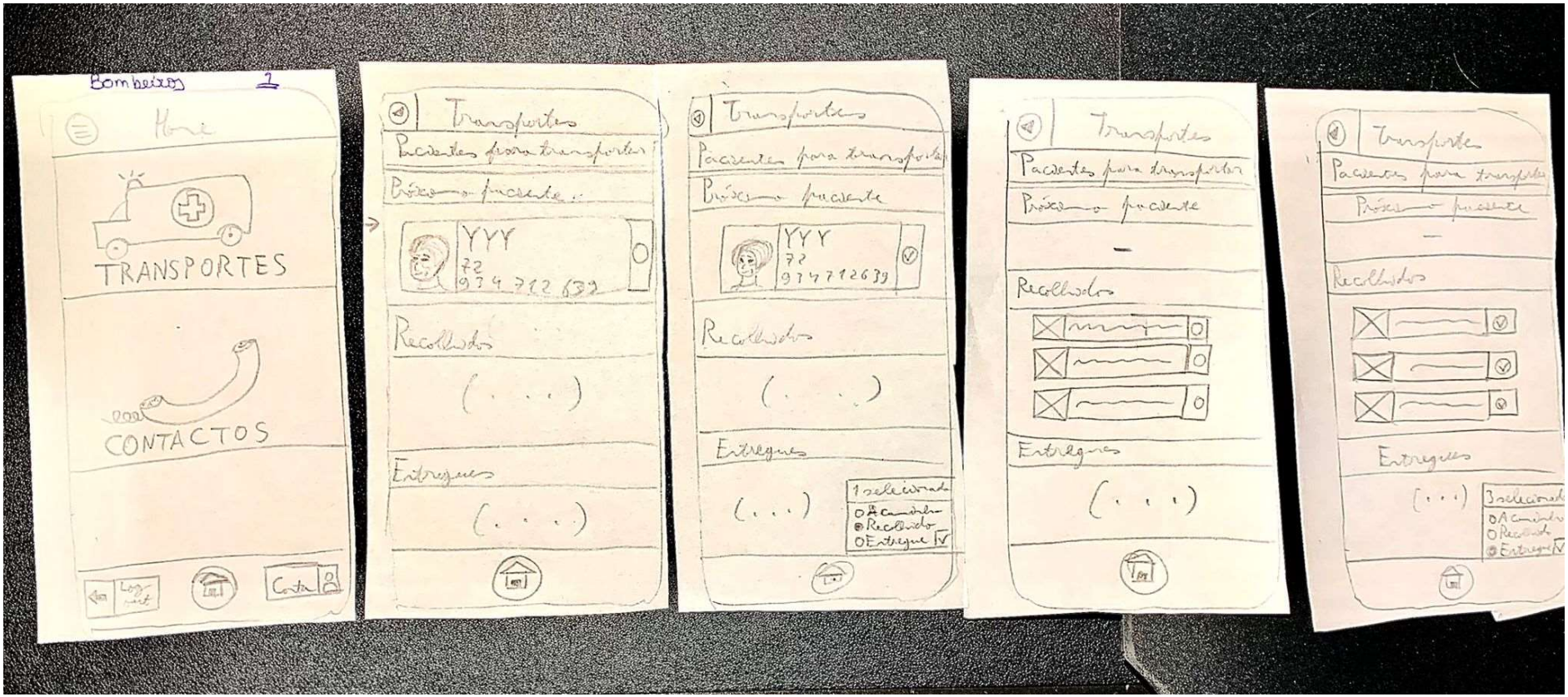
  - ❑ Allow transport scheduling
  - ❑ Display waiting time (queue)
  - ❑ Display patient medical history
  - ❑ Allow some user info update (address, mobility, transportation requirements)
  - ❑ Interconnected systems for patients & informal caregiver

---

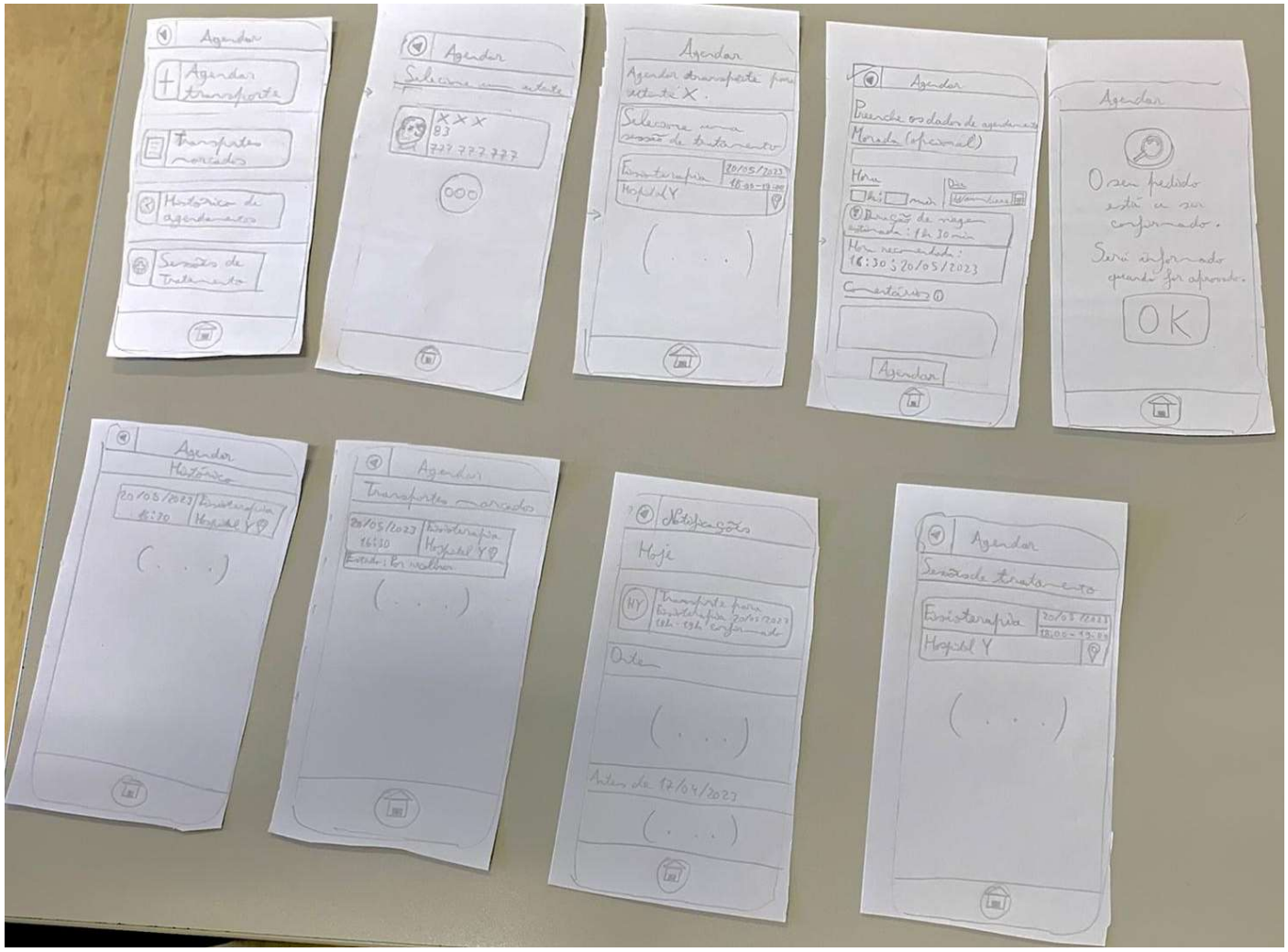
- INITIALLY PLANNED but DISCARDED
  (not in Scenarios)
  - ❑ Video Calls
  - ❑ Literacy adaptable
  - ❑ GPS Tracking system
  - ❑ Family doctor contact
  - ❑ Interactive narrated FAQ

03 PAPER PROTOTYPE

- Based on prev. **Requirement Analysis** and **Nielsen's 10 usability heuristics**.



03 PAPER PROTOTYPE



04 ISSUES & DECISIONS

- Paper prototype 

  - ❑ Unclear word semantics
  - ❑ Lack of color
  - ❑ Visually indistinct, yet functionally very distinct UI elements
  - ❑ Some illegible words
  - ❑ Elderly very uninterested

- Functional prototype 

Development in **Flutter (easy platform independence)**
Firebase integration suggested but pushed aside for production app development.

  - ❑ Initially highly static
  - ❑ Some holes in functionality

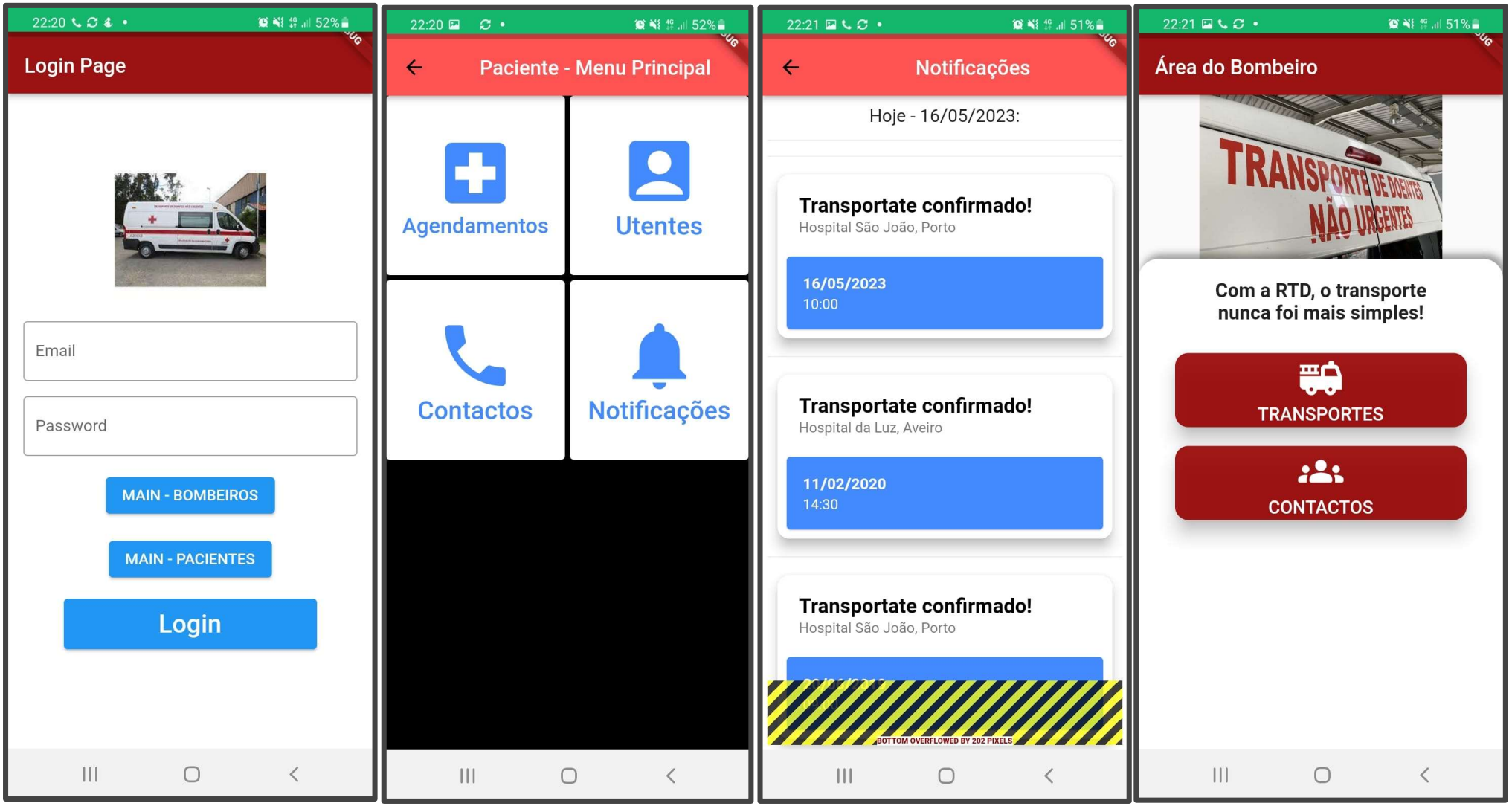
- Opted for 2 main UI groups

Firefighter – functionally very distinct from patient/informal caretaker.

Patient/Informal Caretaker – tasks performed by both roles are very similar.

  - ❑ Latter group biased toward patient accessibility

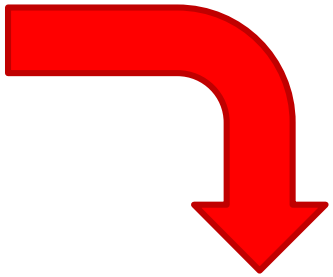
07 PROTOTYPE



05 Usability Tests

FIREFIGHTER

	1	2	3	4	5	6	7
Do login	5/Yes	5/Yes	5/Yes	5/Yes	5/Yes	5/Yes	5/No
Consult the list of people to collect	5/Yes	5/Yes	5/Yes	5/Yes	5/Yes	3/No	5/No
You have now made a collection, check the person who collected it	4/Yes	5/No	5/No	5/Yes	5/Yes	5/Yes	5/No
Delivered all patients to the hospital unit, "check" all patients on the list	5/No	5/Yes	5/Yes	5/Yes	5/Yes	5/Yes	5/Yes



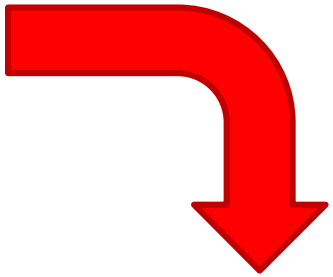
	1	2	3	4	5	6	7
Do login	5/Yes	5/No	5/Yes	5/Yes	5/Yes	5/Yes	5/Yes
Consult the list of people to collect	5/No	5/Yes	5/Yes	5/Yes	4/No	5/Yes	5/Yes
You have now made a collection, check the person who collected it	5/No	5/No	5/Yes	5/Yes	5/Yes	5/Yes	5/Yes
Delivered all patients to the hospital unit, "check" all patients on the list	5/Yes	5/Yes	5/Yes	4/Yes	5/Yes	5/Yes	5/Yes

Legend:
Difficulty scale: 1-Not easy-> 5-Very easy
Completed the task with autonomy: Yes/No

05 Usability Tests

INFORMAL CAREGIVER / PATIENT

	1	2	3	4	5	6	7
Register in the app	5/Yes	5/Yes	5/Yes	5/Yes	5/Yes	5/Yes	5/Yes
Do login	5/Yes	5/Yes	5/yes	5/Yes	5/Yes	5/Yes	5/Yes
Make an appointment	4/Yes	4/No	5/No	5/No	5/Yes	4/Yes	5/No
Consult the appointments already made	5/No	5/Yes	4/Yes	5/Yes	5/Yes	4/Yes	4/No



	1	2	3	4	5	6	7
Register in the app	5/Yes	5/Yes	5/Yes	5/Yes	5/Yes	5/Yes	5/Yes
Do login	5/Yes	5/Yes	5/yes	5/Yes	5/Yes	5/Yes	5/Yes
Make an appointment	5/Yes	5/No	5/No	5/Yes	5/Yes	5/Yes	5/Yes
Consult the appointments already made	5/No	5/Yes	5/Yes	5/Yes	5/Yes	5/Yes	5/Yes

Legend:
Difficulty scale: 1-Not easy-> 5-Very easy
Completed the task with autonomy: Yes/No

05 Post-Tasks Questionnaire

Number	Sentences
1	I found the prototype aesthetically appealing
2	I found the prototype aesthetically complex
3	I found the program easy to use
4	I think this program will create conflicts with the authorities
5	If I were an informal caregiver, I would use this application
6	I think this mechanism is unnecessary for the transport of non-urgent patients
7	If I were an elderly person in need of transport, I would use this application
8	I think I would need support to use this application
9	I feel confident using the program
10	I think the program tools are not adequate

05 SUS Evaluation

	User 1	User 2	User 3	User 4	User 5	User 6	User 7
1	4	2	5	5	4	5	5
2	2	2	2	1	3	1	2
3	5	5	5	5	5	5	5
4	1	1	1	1	2	1	1
5	5	4	1	5	5	5	5
6	2	1	3	1	1	1	1
7	5	5	5	5	5	5	4
8	1	1	2	1	2	1	1
9	5	5	4	5	5	5	5
10	1	1	1	1	2	1	1

Let R(n) be the answer to Question n:

$$SUS = \left(\sum_{n=1}^{5} R(n)-1 + 5- R(n*2) \right) * 2.5$$

ODD	24	21	20	25	24	25	24
PAIR	7	6	9	5	10	5	6
X	19	16	15	20	19	20	19
Y	18	19	16	20	15	20	19
INDIVIDUAL SUS SCORE	92,5	87,5	77,5	100	85	100	95

TOTAL SUS SCORE	91,05

05 HEURISTIC EVALUATION

- Issues found (median) 

  – aided by HCI colleagues **Diogo Marto 108546**, **Tiago Pereira 108298** from practical class **P5**

  - ❑ Little help and documentation resources – **Severity: 2 – Help and documentation**
  - ❑ Patient information cards lack a photograph – **Severity: 2 – Recognition rather than recall**
  - ❑ Font size not adjustable – **Severity: 2 – Visibility, Control**

- Mostly positive evaluation

06 FINAL APPLICATION

Short-term objectives

- ✓ Adaptable for **illiterate** people
- ✓ **Intuitive** for the **elderly**
- ✓ Applicable to most **Android** systems

Long-term goals

- ✓ **Intuitive** to **all age** groups
- ✓ **Effective** and **efficient** across the country
- ✓ **Robust** & **easy** to manage
- ✓ Highly **modular** & **extensible**

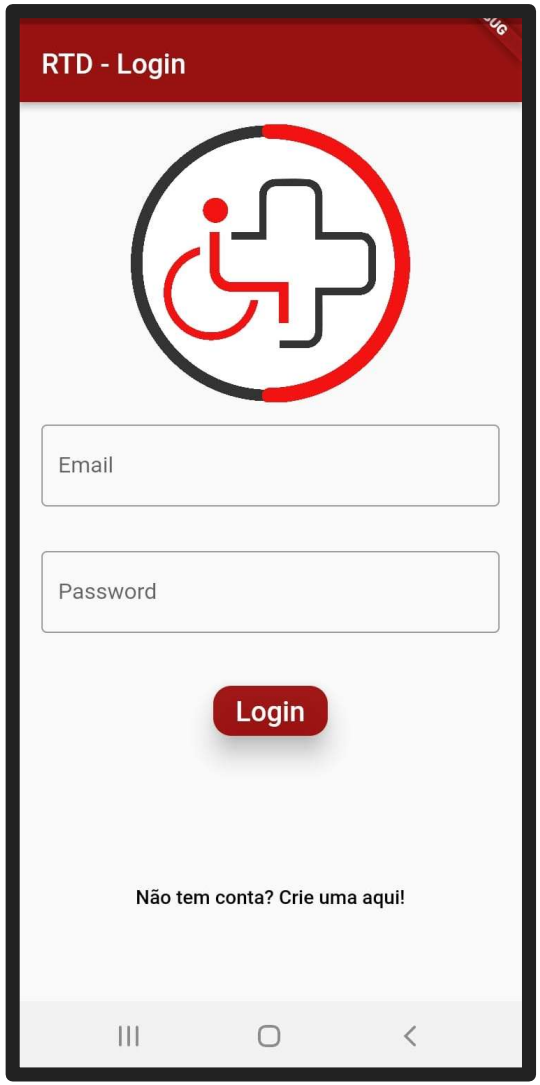
Frontend development using **Flutter:**

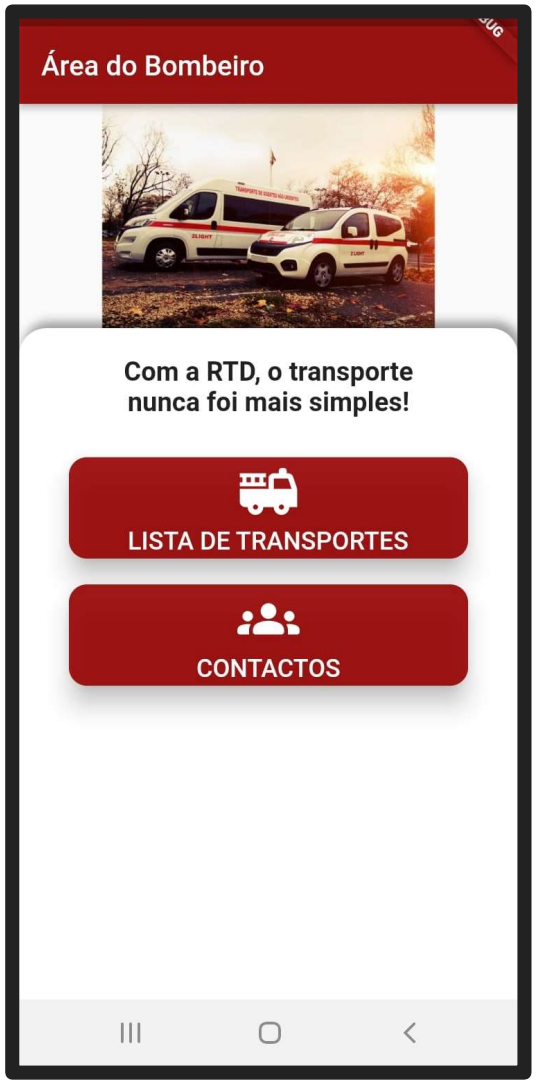
- **Extensible, modular, platform-independent**

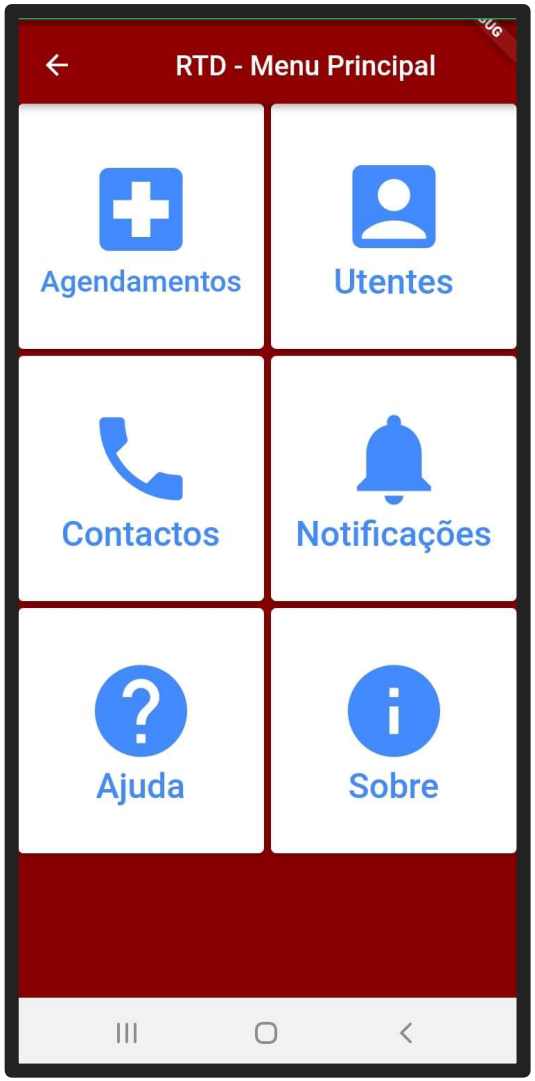
Backend development using **Firebase:**

- **Rich family of integrations** (ex.: Android Studio, Google Cloud, Google Play)
- **App analytics monitor** (enrich future **empirical usability evaluations**)

07 REFINEMENT








TRANSPORTE DE DOENTES NÃO URGENTES
BOMBEIROS
CONCELHO
ESPINHO
DEMO

08 CONCLUSIONS & FUTURE WORK

- Applicability
  - Informal caregiver's & people with reduced mobility may find this app useful.
  - Today's elderly population do not understand how to use the app.
  - However, future generations will.

- App will improve
  - Firefighter's coordination.
  - Patient's independence.
  - Informal caregiver's freedom.
  - Overall quality of life in Portugal

- Future Work
  - More research is needed for (tech) illiterate people.
  - Develop tools for people with disabilities (ex.: blind)
  - Development of a GPS tracker may be useful
  - Connect to a real SQL Data Base or Firebase

REFERENCES

Presentation Assets:

- Presentation template by Slidesgo
- Icons by Flaticon
- Infographics by Freepik
- Images created by Freepik

Development Resources:

- Android Studio IDE
- Flutter framework
- Flutter templates
- Flutter projects

HCD Research:

- HCI course slides & respective references

OUR GITHUB

https://github.com/laramatos22/ihc_project

Jira Software

https://rtd-ihc2023-ua.atlassian.net/jira/software/projects/RTD/boards/1