



universidade  
de aveiro

# DETI MAKERLAB

Milestone 2 – requirements, related work, architecture,  
current achievements

Project Members: André Silva, Manuel Mendonça, João Martins,  
Jakub Suliga, Laura Gabryjańczyk

Supervisor: Prof. Diogo Gomes

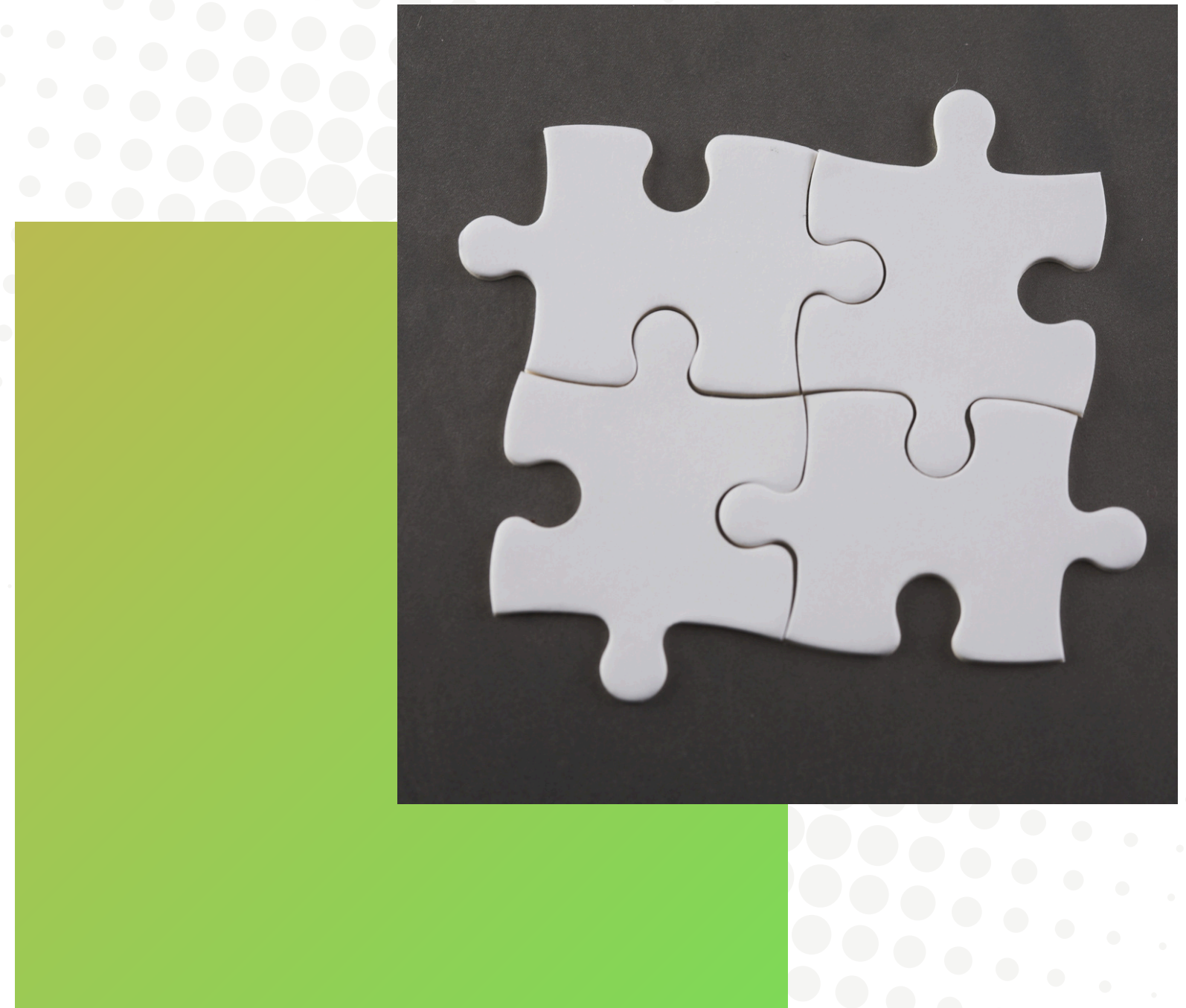


18th of March 2026



# PROBLEM RECAP

The current Maker Lab platform works, but equipment requisitions are too cumbersome and data model is too Markdown-oriented, so usage drops and equipment tracking becomes harder than it should be.





# BACKGROUND AND RELATED WORK

## CURRENT STATE

- Wiki handles projects, equipment, requisitions, documentation
- Equipment requisitions are cumbersome
- Project creation is Markdown-oriented and inconsistent

## DESIRED STATE

- Projects and groups become the entry point
- Equipment can be requested repeatedly during the project lifecycle
- Inventory is managed using Snipe-IT
- Data becomes structured and queryable

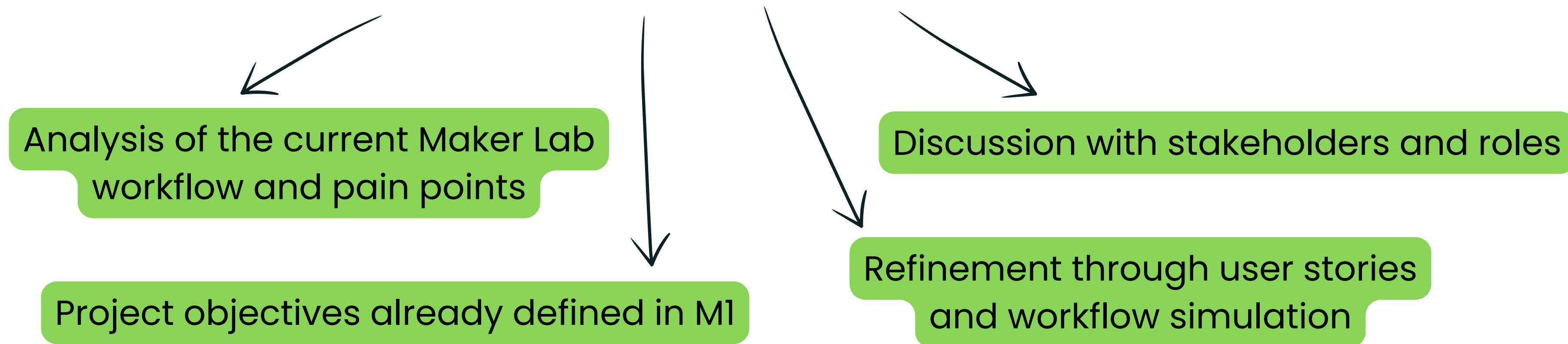
## CONSTRAINT

Preserve the current data base



# REQUIREMENTS ELICITATION

## WHERE DID THE REQUIREMENTS COME FROM?





# ACTORS



**Students**

- request equipment
- track requisition status
- return equipment



**Lab technician**

- manages inventory
- approves/rejects requisitions
- assigns and receives equipment



**Supervisor**

- reviews progress



# FUNCTIONAL REQUIREMENTS

## Access and roles

- SSO authentication with the university universal user
- distinction between students and lab technicians
- role-based permissions

## Project and group management

- assign users to projects
- associate requisitions with a project or group
- standardize project creation through forms instead of Markdown

## Requisition workflow

- request
- approval/rejection
- assignment
- return
- support multiple requisitions in the same project lifecycle
- track requisition status

## Queries and traceability

- equipment per project
- active requisitions
- overdue returns
- historical data of requisitions and assignments



# NON-FUNCTIONAL REQUIREMENTS AND ASSUMPTIONS

**Security**

**Integrity**

**Maintainability**

**Acceptable  
response time**

## **Assumptions:**

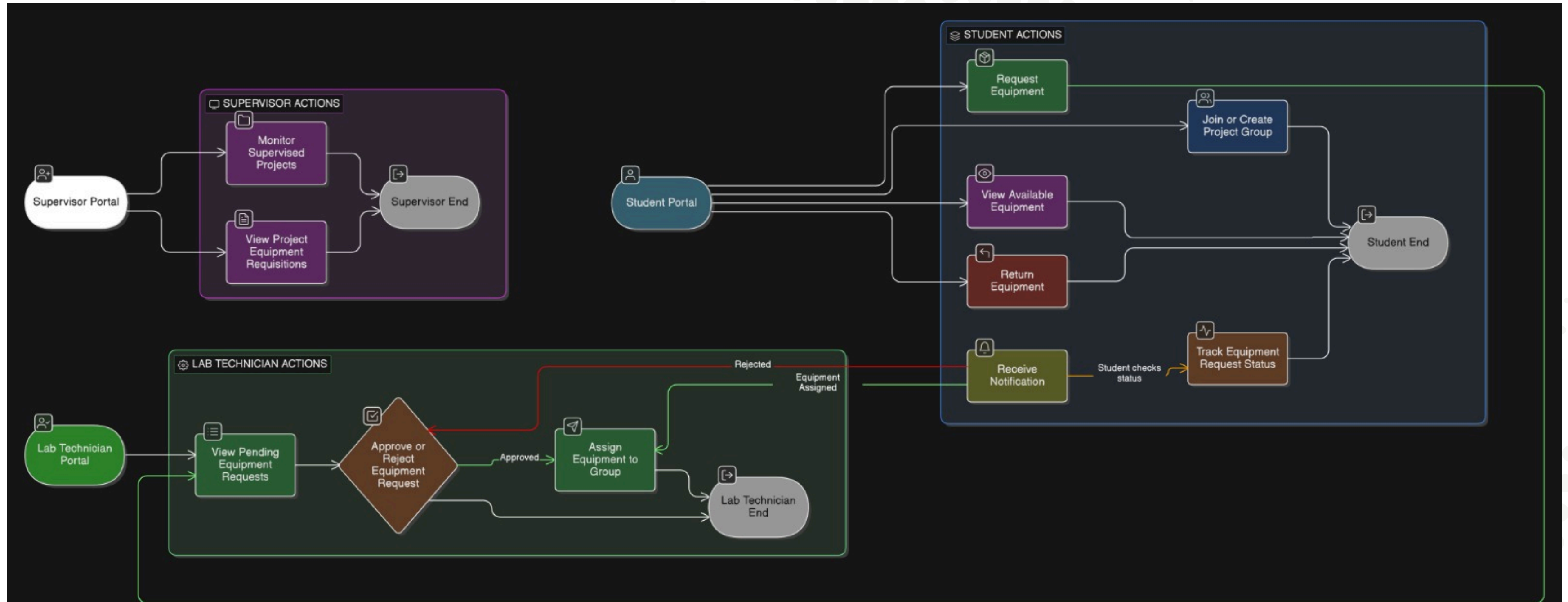
- SSO integration
- Snipe-IT as authoritative inventory
- Preservation of the existing Maker Lab base



# USE-CASE CORE REQUISITION WORKFLOW

1. authenticate
2. create or join project
3. view available equipment
4. submit requisition
5. approve/reject requisition
6. assign equipment
7. track requisition status
8. return equipment

# USE-CASE DIAGRAM



# EXAMPLES OF USER STORIES

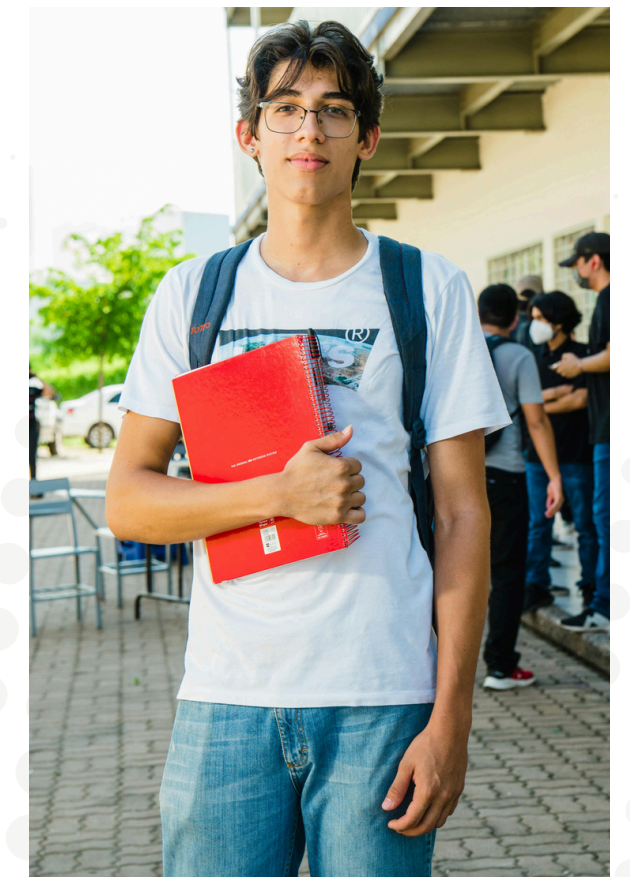


## Join a project group

Ana wants to create a project for a subject so that her group can organize the work and request equipment.

## Request equipment

João wants to request equipment for the project so that his group can build and test the prototype.



## Manage inventory

Manuel manages the lab equipment and ensures that students use the resources responsibly. He approves requests and tracks equipment usage.





DETI MakerLab

# SYSTEM ARCHITECTURE

WHO USES THE SYSTEM

web and mobile clients

WHERE REQUESTS GO

reverse proxy/application server

HOW AUTHENTICATION WORKS

university SSO

WHAT THE APP IS RESPONSIBLE FOR

projects, groups, requisitions

WHAT SNIPE-IT IS RESPONSIBLE FOR

inventory authority

WHAT DATABASE STORES

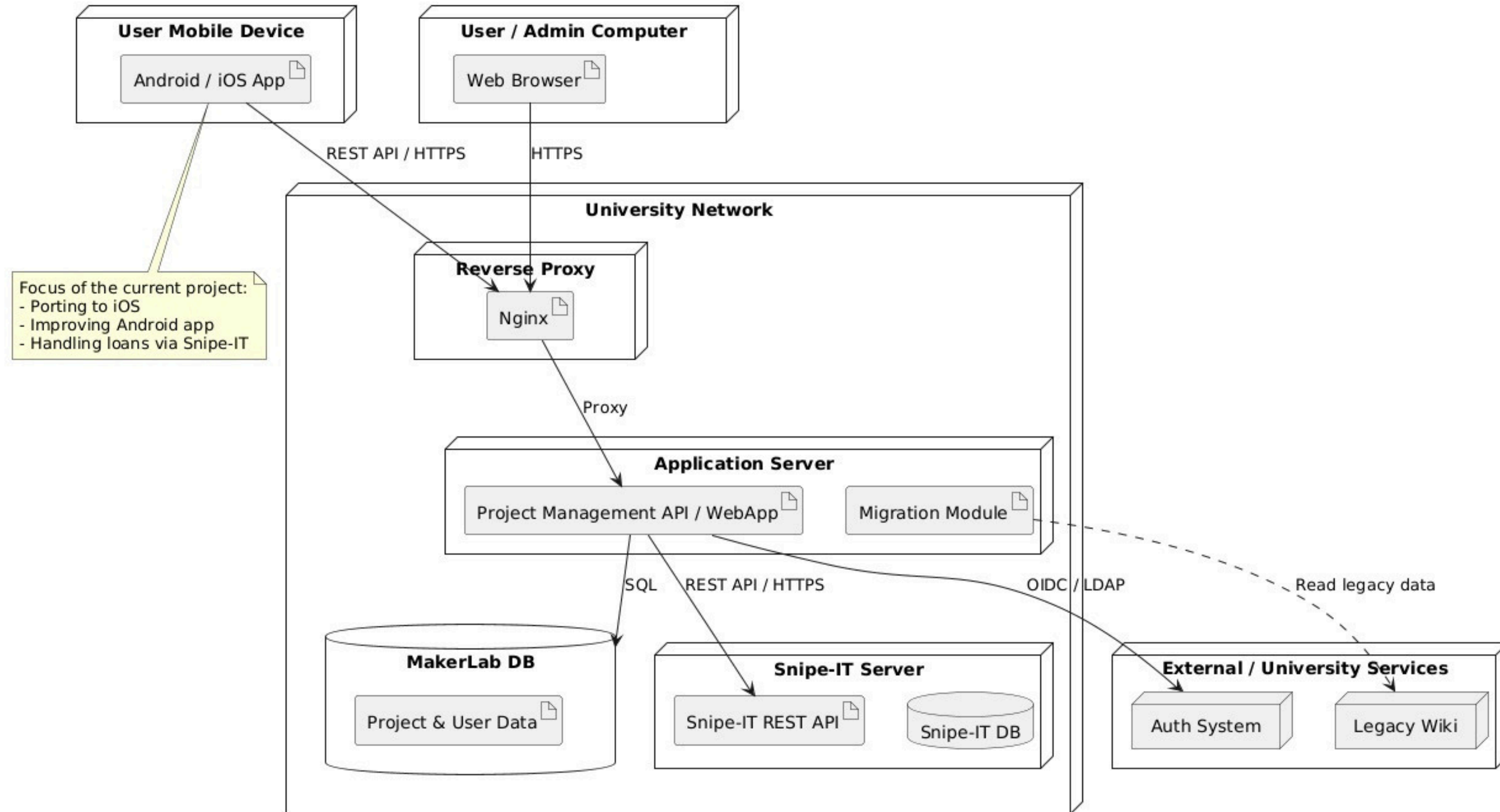
project, group, requisition, history data





# DEPLOYMENT DIAGRAM

Deployment Diagram - MakerLab Project (Updated)



Focus of the current project:  
- Porting to iOS  
- Improving Android app  
- Handling loans via Snipe-IT



# WHAT HAS ALREADY BEEN DONE

- Github repository structure created
- Project website working
- Blog created & its weekly updates
- Both functional and non-functional requirements stated
- Frontend development started
- VM created
- Snipe-IT integration started
- Mock-ups created
- User stories evaluated



# MOCK-UPS

### Equipment Details Page

DETI Maker Lab

- Dashboard
- Projects
- Equipment**
- Users
- Statistics
- Ledger
- MANAGEMENT
- Technician Portal

← Back

**Raspberry Pi 5 Cluster** checked out  
computing

<b>Details</b>	
\$ Price	399€
# Reference	QR063
📍 Location	Arm061
Condition	Good

#### Projects With This Equipment (2)

- Autonomous Rover v2 active
- CubeSat Structural Testing completed

#### 🕒 Full History (3)

- checkout **Frederico Coletta** Autonomous Rover v2 12 Mar 2026, 19:04
- return **Francisco Wang** CubeSat Structural Testing 28 Feb 2026, 14:48
- checkout **Francisco Wang** CubeSat Structural Testing 03 Feb 2026, 12:01

### Equipment Page

DETI Maker Lab

- Dashboard
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## Equipment

1904 items in inventory

🔍 search by name or supplier... All Available Checked Out Maintenance

- Prusa i3 MK3S+ 3D Printer 3D Printing 999€ available >
- Rigol DS1054Z Oscilloscope Electronics 399€ checked out >
- Epilog Zing 24 Laser Cutter Laser Cutting 12 000€ available >
- Fluke 87V Multimeter Electronics 430€ available >
- NVIDIA Jetson AGX Orin Computing 899€ checked out >
- Universal Robots UR5e Robotics 999€ maintenance >



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# MOCK-UPS

Home page side bar open

DETI Maker Lab

- Dashboard
- Projects
- Equipment
- Users
- Statistics
- Ledger

MANAGEMENT

- Technician Portal

## DETI Maker Lab

Your space for innovation

search projects, equipments, users...

39 Active Projects	1904 Available Equipment	87 Lab Members	26 Checked Out
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### Recent Projects

 <b>Autonomous Rover v2</b> Building a self-navigating rover for the campus competition 3 members 5 equipment	 <b>Smart Greenhouse Monitor</b> IoT-based environmental monitoring system for the... 2 members 3 equipment	 <b>Prosthetic Hand Project</b> 3D-printed prosthetic hand with EMG sensor control 5 members 7 equipment	 <b>Solar-Powered Station</b> Building an autonomous outdoor weather station 2 members 11 equipment
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View all

Ledger Page

DETI Maker Lab

- Dashboard
- Projects
- Equipment
- Users
- Statistics
- Ledger

MANAGEMENT

- Technician Portal

## Ledger

Immutable record of all equipment transactions

search by equipment, user or project...

checkout	<b>Rigol DS1054Z Oscilloscope</b> Francisco Coletta -> Smart Greenhouse Monitor	Mar 12, 2026 14:55
return	<b>Creality Ender-3 V3</b> Francisco Wang -> Prosthetic Hand Project	Feb 28, 2026 12:32
checkout	<b>Creality Ender-3 V3</b> Francisco Wang -> Prosthetic Hand Project	Jan 12, 2026 15:34
maintenance start	<b>Universal Robots UR5e</b>	Dec 29, 2025 17:55



# MOCK-UPS

### My Projects Page

DETI Maker Lab

Dashboard | **Projects** | Equipment | Users | Statistics | Ledger

MANAGEMENT | Technician Portal

## My Projects

Projects you have submitted

search by name, course or tag... [All] [Active] [Completed] + New Project

#### Solar-Powered Weather Station

Awaiting Approval

Building an autonomous outdoor weather station powered by solar panels, using ESP32 and LoRa for wireless data transmission to a central dashboard.

PECI Group 2

EQUIPMENT REQUESTS

- Fluke 87V Multimeter [Pending]
- Siglent SDG2042X Signal Generator [Pending]
- Dremel 4300 Rotary Tool [Pending]

#### Autonomous Rover v2

active

Building a self-navigating rover for the campus competition using SLAM and LIDAR

PECI Group 2

EQUIPMENT REQUESTS

- NVIDIA Jetson AGX Orin [Return by 17 May 26]
- Raspberry Pi 5 Cluster [Return by 17 May 26]
- Universal Robots UR5e [Pending]

#### CubeSat Structural Testing

completed

Vibration and thermal testing for the university's CubeSat mission payload

PECI Group 2

EQUIPMENT REQUESTS

- Siglent SDG2042X Signal Generator [Returned]

### New Project Page

DETI Maker Lab

Dashboard | Projects | Equipment | Users | Statistics | Ledger

MANAGEMENT | Technician Portal

## New Project

Register a new project and request resources

Back

#### Project Information

Project Name \*  
e.g. DETI Maker Lab

Course Academic Year Group Number  
e.g. PEGI e.g. 3 e.g. 15

Description  
Describe the project goals, methods and expected outcomes...

Start Date End Date  
dd/mm/yyyy dd/mm/yyyy

#### Tags

IoT Robotics AI/ML PCB Design  
3D Printing Automation Software

Add custom tag... Add

#### Documentation & Links

Wiki / Main Link  
https://wiki.lab.example.com/...

Additional Links  
Paste a URL

#### Supervisor

Search for supervisor...

#### Team Members

Search and add members...

- A André Silva [Contributor] [x]
- J Jakub Suliga [Contributor] [x]
- J João Martins [Contributor] [x]
- L Laura Gabryjańczyk [Contributor] [x]
- M Manuel Mendonça [Contributor] [x]

#### Equipment Requests

Filter available equipment...

- Fluke 87V Multimeter [Qty] [x]

Cancel Submit Request



DETI MakerLab

# MOCK-UPS

Notification Accepted Project or Equipment

DETI Maker Lab

### My Projects

Projects you have submitted

search by name, course or tag...

**Solar-Powered Weather Station** Awaiting Approval

Building an autonomous outdoor weather station powered by solar panels, using ESP32 and LoRa for wire...

PECI Group 2

EQUIPMENT REQUESTS

Fluke 87V Multimeter Pending Siglent SDG2042X Signal Generator Pending

Dremel 4300 Rotary Tool Pending

**Autonomous Rover v2** active Request Equipment

Building a self-navigating rover for the campus competition using SLAM and LIDAR

PECI Group 2

EQUIPMENT REQUESTS

NVIDIA Jetson AGX Orin Return by 17 May 26 Raspberry Pi 5 Cluster Return by 17 May 26

Universal Robots UR5e Pending

**CubeSat Structural Testing** completed

Vibration and thermal testing for the university's CubeSat mission payload

PECI Group 2

EQUIPMENT REQUESTS

Siglent SDG2042X Signal Generator Returned

Notifications

- Your project proposal "Smart Greenhouse Monitor" was approved! You can now pick up the equipment at the lab: Rigol DS1054Z Oscilloscope, Raspberry Pi 5 Cluster. 13 Mar, 08:53
- Your equipment request for "Fluke 87V Multimeter" on project "Prosthetic Hand Project" was approved. You can pick it up at the lab! 13 Mar, 08:54

Projects Page

DETI Maker Lab

### Projects

All ongoing and past projects

My Projects + New Project

search by name, course or tag...

All Active Completed

**Solar-Powered Weather Station** PECI Group 7 6 3 active

Building an autonomous outdoor weather station powered by solar panels, using ESP32 and LoRa for...

**Autonomous Rover v2** PECI Group 3 5 4 active

Building a self-navigating rover for the campus competition using SLAM and LIDAR

**Smart Greenhouse Monitor** PECI Group 4 5 3 active

IoT-based environmental monitoring system for the campus greenhouse using LoRa and custom PCBs

**Prosthetic Hand Project** PECI Group 13 6 11 active

3D-printed prosthetic hand with EMG sensor control for low-cost accessibility

**CubeSat Structural Testing** PECI Group 7 5 9 completed

Vibration and thermal testing for the university's CubeSat mission payload



# DEMO SCENARIO

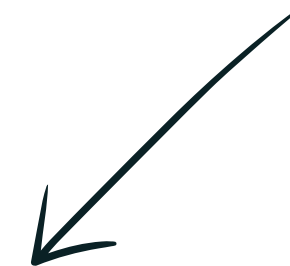
Student logs in



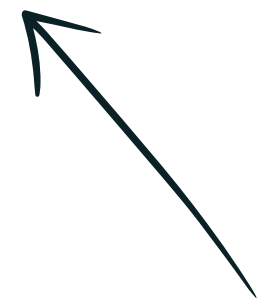
Student joins or  
creates a project



Student requests equipment



Technician reviews  
and approves



Status of project changes in  
the system and inventory is  
updated



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# THANK YOU

ANDRÉ SILVA, MANUEL MENDONÇA, JOÃO MARTINS,  
JAKUB SULIGA, LAURA GABRYJAŃCZYK