Project Management Report

(Mobile Robot TwIRTee)

Team members:

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I. Introduction

The aim of our project is to provide functionalities to control the rover using a joystick and displaying on a monitor its location in real time.

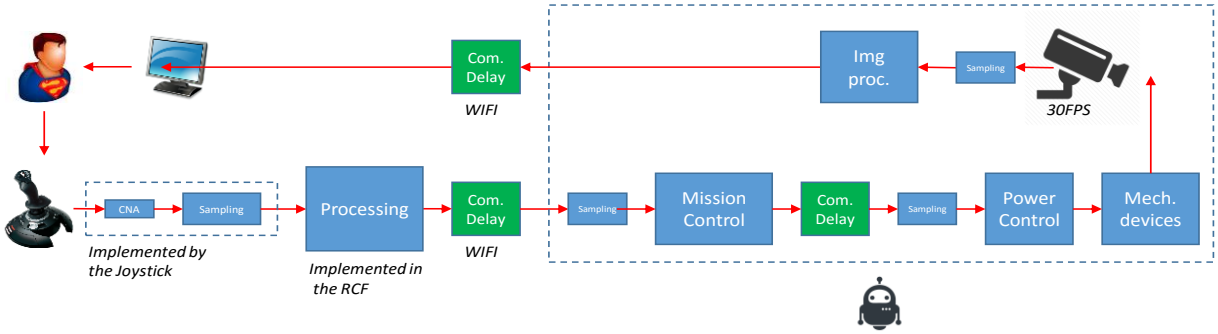
This document describes the process followed to develop this application and test that have been performed to validate its functionalities. It also covers the project achievements along the "actual" baseline that will be compared with the initial one.

The document states the management, control and tracking of this project.

II. Project Scope

In order to achieve our client's expectations, the following main modules have been identified then decomposed into small clear and independent tasks:

- Communication between the behavioral software and the Joystick
- Communication between the behavioral software and the Rover
- Communication between the behavioral software and the Interface (HMI)
- Design and implementation of HMI
- Development of the behavioral software
- Project documentation including,
    - User Guide for HMI
    - Software Architecture document
    - Test Cases and Test Reports
    - Project Plan



III. Risk Management

Here are the following risks that have occurred and how they have been controlled:

#	Risk	Risk Description	Impact	Mitigation Strategy
1	Lack of knowledge of the used software	Team might not be familiar with the tool and software (ARINC661, eclipse) that will be used	Low	**This risk has been identified before the start of the project.**
2	Modification of requirements	Client redefining the requirements several	Medium	We had to organize a meeting with the client to definitely set the requirements
3	Lack of working environment	The working environment provided by the customer might not be available.	Low	**This risk has been identified before the start of the project.** We booked a room at ISAE for the duration of our project
4	Unavailability of Rover	The Rover might be shared between different teams or might not work as expected	Medium	We developed a simulator to test our code
5	Software Merge Issues	As different members work on the same module the files changed may encounter merging issues	Low	**This risk has been identified before the start of the project.** Use of Git by daily updating files onto git and using the updated files to make further changes

Lessons learned from it: It is important to correctly identify the risks and to plan a mitigation strategy associated with a correct amount of time. Thus, we can avoid delays on the project.

IV. Final work status

Modules	Implementation status	Coding	Documentation	Testing
Java Client	**Implemented**	Integrated	Completed	Completed
Behavioral Code - Mode States	**Implemented**	Integrated	Completed	Completed
Behavioral Code -Joystick Behavioral Code	**Implemented**	Integrated	Completed	Completed
HMI Interface	**Implemented**	Integrated	Completed	Not Applicable
Simulator	**Implemented**	Integrated	Completed	Not Applicable
UDP Server	**Implemented**	Integrated	Completed	Completed

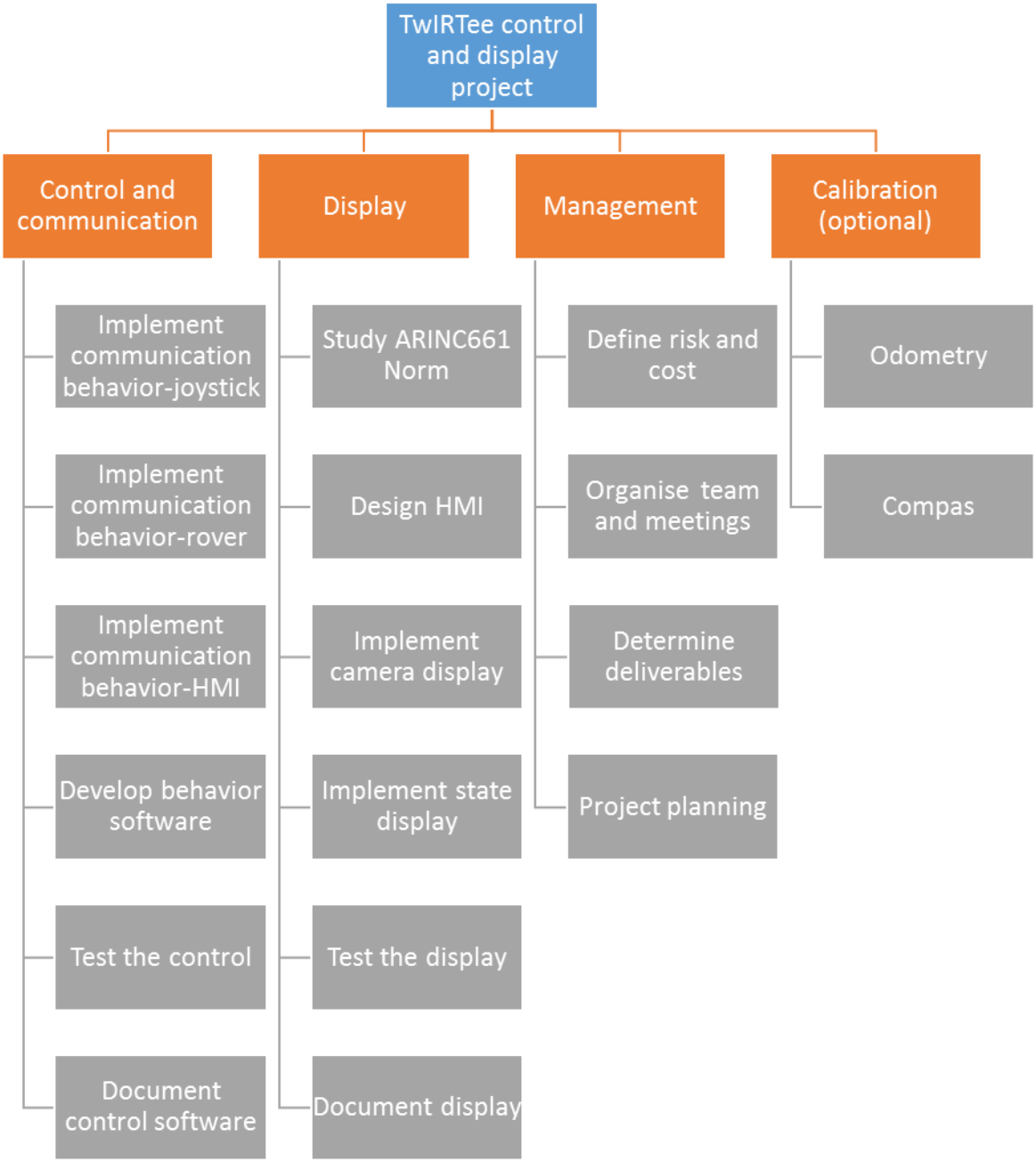
V. Project Deliverables

Here is a list of our project deliverables:

Deliverables	Yes/No
Source code with comments	Yes
Executable	Yes
TwIRTee_RemoteControlHMI_Technical_Documentation	Yes
Operational tests: ScenarioTesting.ods	Yes
Project management report	Yes

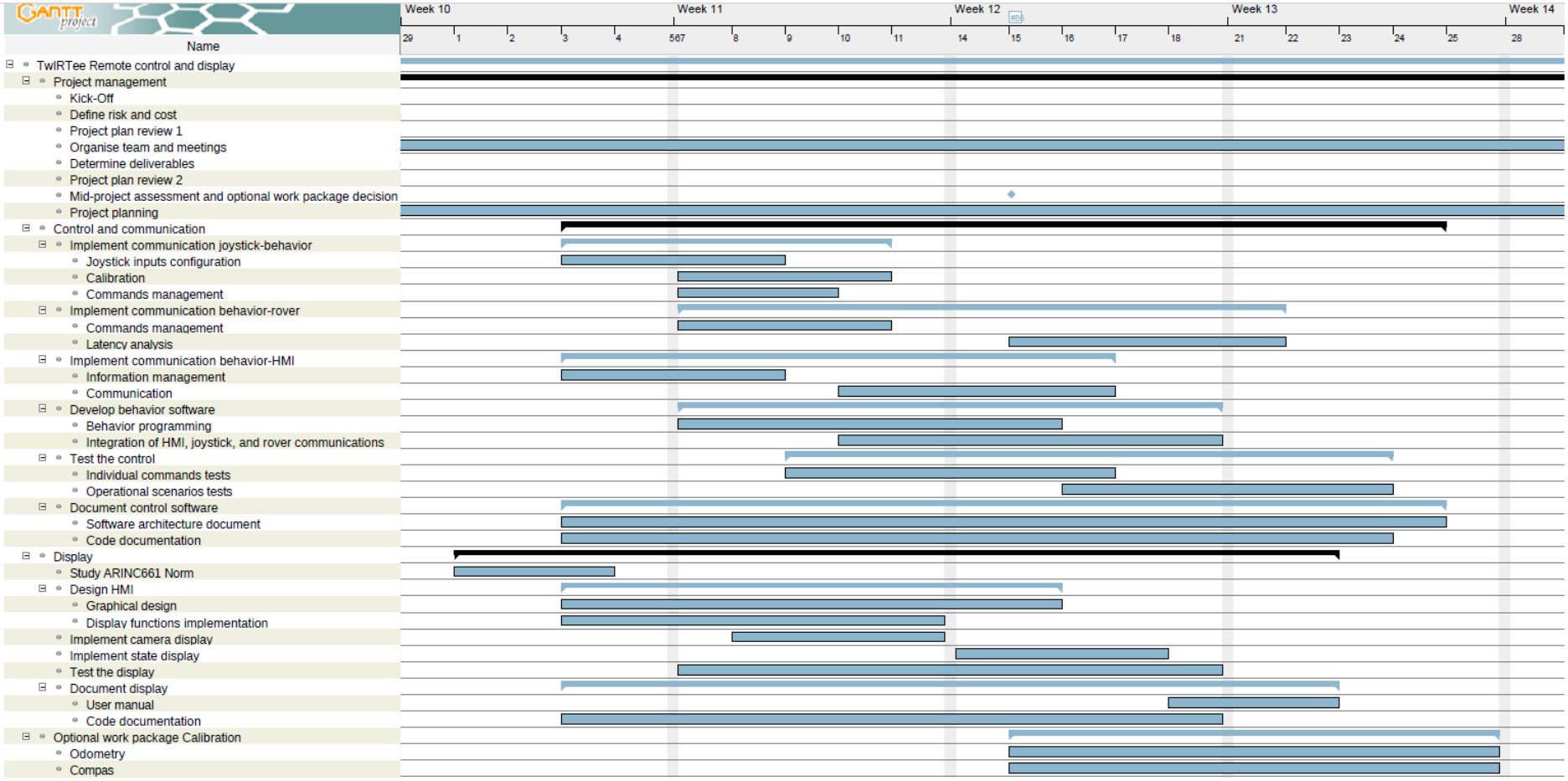
VI. Work Package Identification

The Requirements are segregated into the following Work Packages (WP):



VII. Baseline and evolution of the project

Initial Baseline:



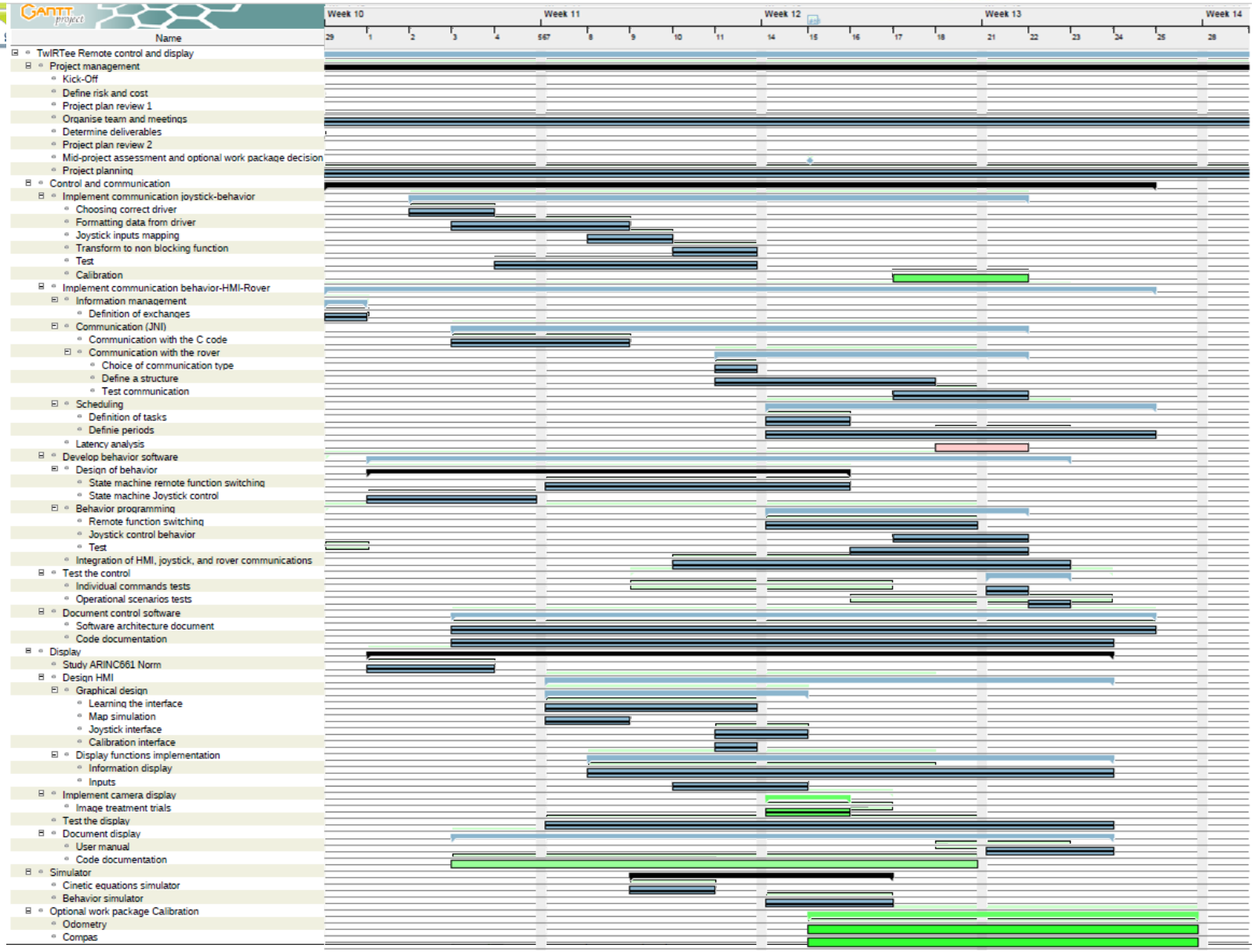


Figure 1 Comparison mid-project vs achievement

WHAT CHANGED AND WHY:

Calibration did not need to be developed as the joystick is automatically calibrated through the driver. Image treatment trials were out of scope and we spent very little actual time on it.

Since all functions were tested independently as they were developed the final operational tests took less time than planned.

At the midpoint of the project we decided after evaluating the work left to do on the main work package that there was not enough time to develop the optional work package.

Long time spent in the implementation details of the FSM, only finished on 15th march. The high level requirements were analyzed first and did not change, but when we started actually doing it we needed more clarity and after a 1st review with the client the implementation had to be modified. Later we made a second review that led to further changes.

But the time spent in the design allowed for faster coding (less functional bugs to resolve): only one day for the joystick FSM, 2 days for the button switch REM-AUTO (a bit trickier).

The final integration finished later than planned, because of the delay of the FSM implementation.

VIII. Project cost

PROJECT TASK	Cost estimation	Hours spent
Project management	115	110
Implement communication joystick-behavior	56	50
Implement communication behavior-rover	38	50
Implement communication behavior-HMI	40	60
Develop behavior software	55	100
Develop Simulator	36	80
Test the control	60	60
Document control software	40	30
Study ARINC661 norm	60	40
Design HMI	20	50
Implement camera display	20	10 (research)
Implement state display	28	50
Test the display	30	40
Document display	58	30
Optional work package calibration	140	0
Total	776	750

Time spent before the beginning of the project was about 15 hours for each member.

In the initial plan the available time in March for the project was 665 hours: 7 hours of work a day for 5 people, 19 days. We lost half a day because of a lab that had to be scheduled during project time.

The initial project cost estimate was based on the possibility of an optional work package.

Without the optional work package, it needed 636 hours (a bit under budget), and with its inclusion 776 hours (a bit over-budget).

The plan was to assess at mid-project the advancement of all tasks. In case we were in advance we would divide the tasks of the optional work package to the less busy team members. Otherwise we would use the margin to finish the main work package.

In the end we finished the implementation of the FSM just before the mid project meeting point and decided that we needed all remaining available time to finish the main work package.

IX. Lessons learned

Throughout the project, lessons were learnt and opportunities for improvement were discovered. As part of continuous improvement process, documenting these lessons learnt help the project team discover the root causes of the problems that occurred and avoid them in future projects.

What went well?

1. We all quickly learned how to use the imposed tools and discovered new tools.
2. All documents given by our client were well detailed, as a result, implementation part was quite straightforward for most the elements of the project.
3. Configuration management went very well. As all project related files was stored onto GIT. Maintaining the files and synchronizing the code was very easy. We were also able to provide the client with an access.
4. Team cohesion was good, we all worked together and helped each other.

What did not work well?

1. The FSM implementation was changed several times and time was lost as a result, it delayed the final integration. As a consequence, we were not able to accommodate for the optional work package.
2. Buggy implementation of J661 library made developing the HMI a bit tedious.
3. Communication and discussion on the evolution of each member's tasks were not frequent enough.

What surprises did the team have to deal with?

1. The rover was not available, even late in the project development. A simulator was developed early on and allowed to test all functionalities.
2. We could not work from IRT, but the risk was planned for and we were able to work from ISAE.
3. We needed to specify the UDP frame format as there were not provided.
4. Limitations on access rights on ISAE computers made bringing our own computers a necessity as soon as we wanted to make tests with the joystick.

Were the project goals attained? If not what changes need to be done to meet goals in the future?

1. The primary goals were reached, but not the optional ones.
2. Maybe that for such a short time project, design should be discussed very early on (even before the actual start of the project), but since the Masters schedule is very packed, before March we had to spend most of the time allotted on the project management part and very little on the technical part.