ANNEX V - Guidelines for the Design Reviews

Team Name:

Country:

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1. INTRODUCTION

1.1. Mission objectives

Describe the key objectives of your secondary mission and the reasons why you selected that mission.

Here, summarise briefly the main purpose of your scientific investigation (or technical demonstration if that's the case) and explain how the CanSat will serve that purpose. If relevant, provide any brief scientific background that motivates your investigation.

This should be a short, easy-to-read introduction to your project that anyone from the general public could understand.

2. CANSAT DESCRIPTION

2.1. Mission outline

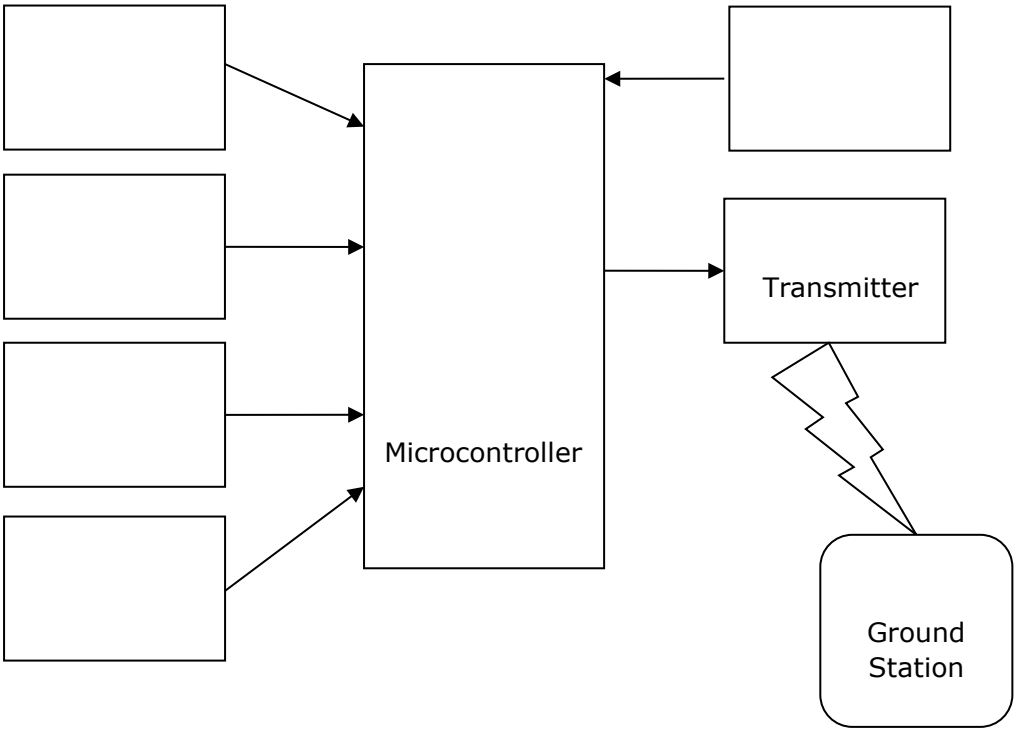
Give a more detailed but concise overview of how your mission will be carried out. Define which objectives should be reached in order for the CanSat launch to be considered successful. When you write up your results in the CanSat Final Paper after launch, you will need to assess how successful your mission was, according to the requirements you define here.

E.g.: Design and build a CanSat to be launched and deployed from a rocket at an altitude of about 1000 metres. The CanSat is to descend no faster than 11 metres per second. Once landed, the CanSat will measure the soil surface temperature and record the data every 10 seconds for two hours minimum. (This is just an example definition – the mission of your team might be completely different.)

Name the key elements that you will use to accomplish your objectives (e.g. sensors, cameras, materials to be tested, etc.) and what data you will collect. Provide some relevant scientific context that is useful for understanding why you selected this mission. You should include the results that you expect from analysing your data (your research).

We are providing you with a block diagram that is not completed; you should fill it in with all the functional and/or physical blocks of the experiment and describe in general how these elements interact, without providing any technical detail.

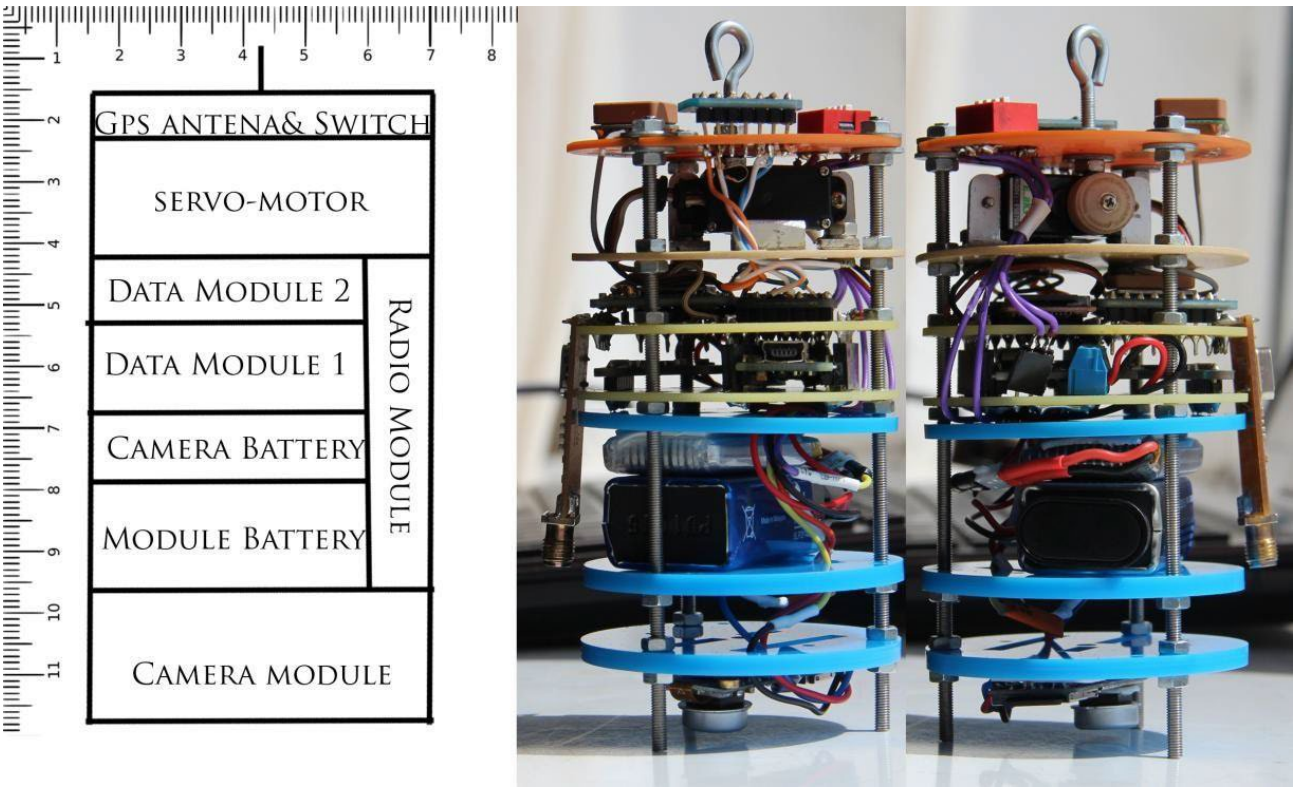
Block diagram:



2.2. Mechanical/structural design

Summarize the mechanical design, the material used for the CanSat structure (the case) and how every component is mounted to the structure. Identify and explain the major components of the CanSat and include a drawing, picture or diagram of how the CanSat structure will look and where the major components such as the main board, sensors, transmitter, and battery will be placed.

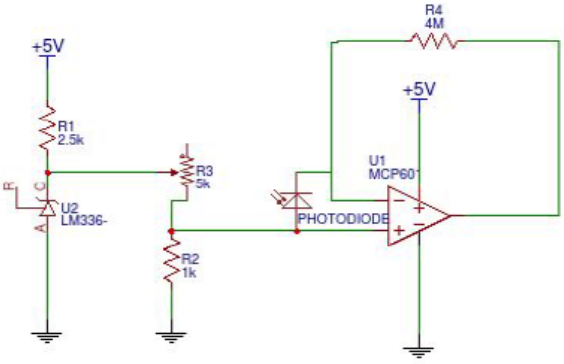
Mechanical drawings and a list of parts (sensors used) may be provided as an Appendix to save space if needed, as well as a detailed explanation of what each part of the CanSat does.



The figure above is an example of a mechanical diagram, made by a team in the 2016 European CanSat Competition. It was accompanied by a paragraph describing the purpose of each component.

2.3. Electrical design

Describe the electrical interface (and selected components) of the CanSat – you can use electronic drawings such as the one to the right from a previous CanSat team. Make sure to add labels.



If applicable, describe the usage of the RF link (data rate of downlink, protocol, data rate of uplink).

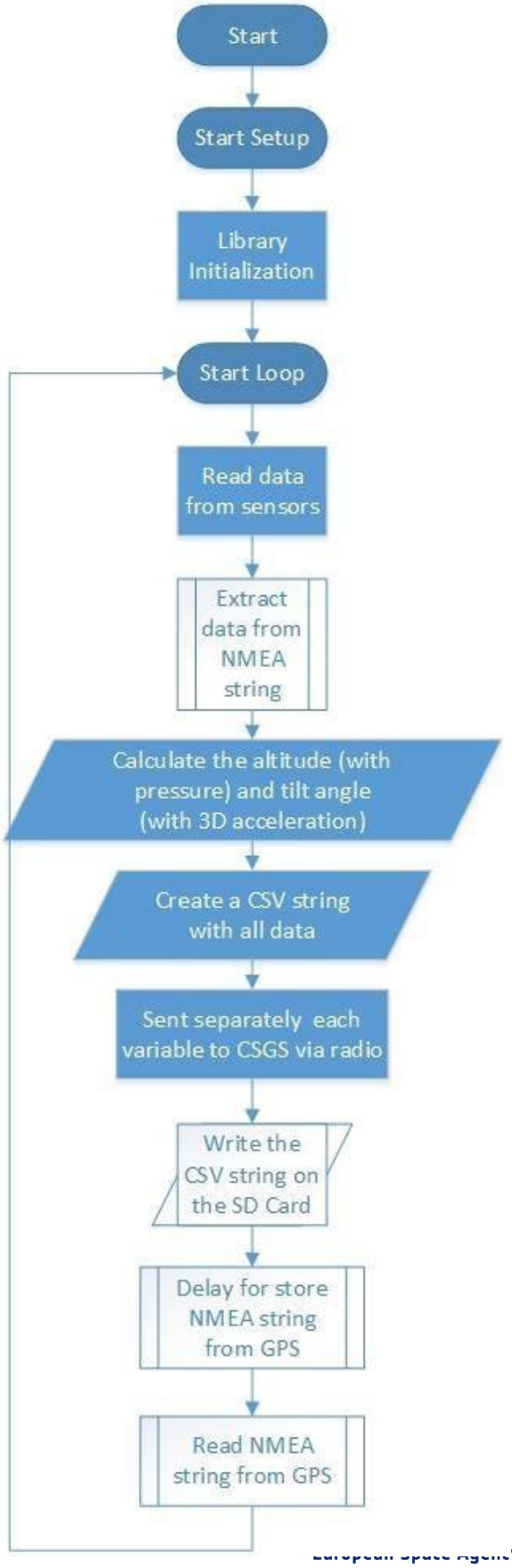
2.4. Software design

Describe the software design of the CanSat and how it is expected to work and summarize the On-Board Data Handling (OBDH).

Provide a flow diagram of the software program flow (see the example included from a previous team). If applicable, describe different software modes.

Estimate the amount of data gathered and discuss its storage on-board the experiment or its transfer to the ground segment.

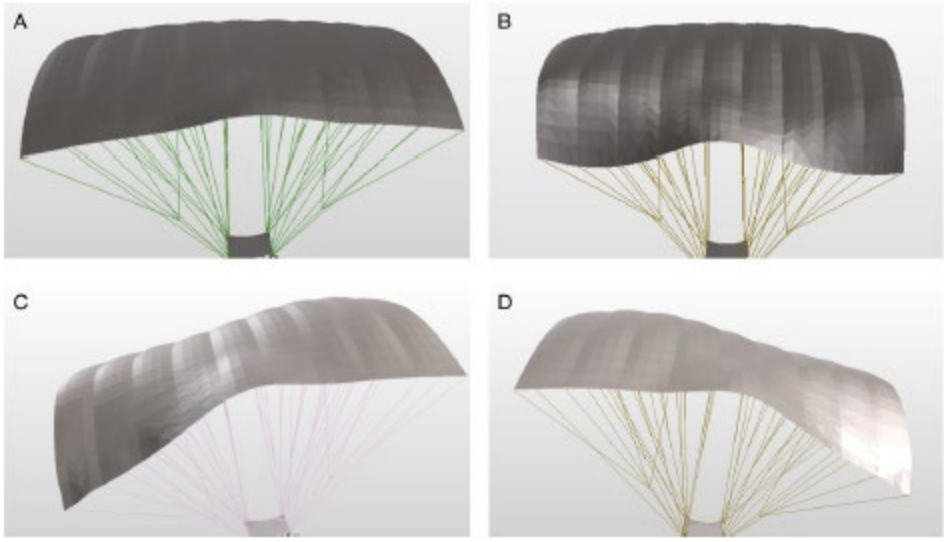
Indicate what programming language(s) and development environments are used.



2.5. Recovery system

Give a brief description of the recovery system used and the method used to affix it to the CanSat structure. You can add a photograph of a design, or digitally-made diagrams similar to the example below from a former CanSat team.

Indicate the expected flight time.



2.6. Ground support equipment

Summarize all equipment that is part of the experiment but that does not fly on the rocket. Usually, this is the ground segment, one or several computers that receive data from the experiment, a radio receiver, etc. Describe the software design of the ground segment and summarize the handling of received data.

Indicate the transmitter frequency that you would like to use for data transmission/reception between your CanSat and the ground station. ESA will confirm each team's frequency once the requests from all teams have been gathered.

3. PROJECT PLANNING

3.1. Time schedule of the CanSat preparation

Provide a schedule that includes the phases of design, prototyping, construction, testing and all key dates and deadlines. *You are allowed to place the schedule in an Appendix to save space if needed.*

4. RESOURCE ESTIMATION

4.1. Budget

List all the prices for the elements that are part of your CanSat (regardless of them being sponsored or not). Don't account for other sponsorship items like money for the flight tickets. The total budget of your CanSat should not have exceeded 500€, as described in requirement 14. Include 95€ as the cost of any CanSat kit provided by ESA. *You are allowed to place your budget in an Appendix to save space if needed.*

4.2. External support

List the organisations, departments or companies that provide sponsorship or in-kind support. For example, professors of a university or institute, local companies or nearby research laboratories, facilities to which access is possible, etc. Mention any support or expertise which is lacking as well. *You are allowed to place your list of external support in an Appendix to save space if needed.*

5. TESTING

Summarise the tests you have completed and describe all the tests that will be performed to verify that your CanSat can carry out both the primary and secondary missions.

Describe also any tests developed to verify the correct deployment of the recovery system of the CanSat (parachute, airbag, etc.).

You can add videos, graphics or pictures. Here is an example of parachute drop tests performed in 2018:
https://www.youtube.com/watch?v=V2FDjx_bcqQ&feature=youtu.be

6. LESSONS LEARNT FROM THE NATIONAL COMPETITION (ONLY APPLIES TO TEAMS SELECTED VIA NATIONAL COMPETITION)

Describe the challenges that you faced in the National Competition and how the members of your team reacted to them.

Explain what changes you had to make throughout the launch campaign (if any), and how this previous experience will help you improve your CanSat and your team performance in general.

You are allowed to place your lessons learnt in an Appendix to save space if needed.

7. OUTREACH PROGRAMME

Include a summary list or table of all outreach actions performed or planned and media coverage received. This should include:

- The URL of the website / blog / social media platform
- Any performed outreach actions, e.g. publishing press releases, contacting journalists, designing a logo or information brochure
- Summary of media coverage, e.g. newspaper articles, radio/TV interviews, internet news articles, etc.
- Presentations given by the team members, e.g. at the school or a local event
- Exhibitions of the experiment, e.g. at a fair or school open day

Please provide links. *Copies or photographs of the above are allowed to be placed in an Appendix to save space if needed.*

8. REQUIREMENTS

In order to be able to launch the CanSat safely from the Rocket, the CanSat should meet the requirements listed in the guidelines.

You are allowed to place the characteristics and power budget table in an Appendix to save space if needed.

8.1. Characteristics

Complete the following table by specifying the exact characteristics of your CanSat. Please make sure that the figures (numbers) indicated here correspond to the same figures and their units as in other sections of the document.

Characteristics	Figure (units)
Height of the CanSat	
Mass of the CanSat	
Diameter of the CanSat	
Additional length of external elements (along axial dimension)	
Flight time scheduled	
Calculated descent rate	
Radio frequency used	
Power consumption	
Total cost	

8.2. Power budget

As an example of showing how you meet the requirements, you can calculate how long will your batteries last with the required power by the used components.

Device	Voltage (V)	Current (mA)	Power (mW)
Radio module			
Camera			
Temperature sensor			
etc			
Total power (sum of all)			

After completing this table and getting your battery capacity (in mAh), you will be able to calculate and indicate how long will your batteries last (should always be more than 4 hours). If batteries are used, give information about their type and characteristics.