Prep the Box project

*Concept and context*

The goal of Experiment Design 2020 is to create a modular, off-grid measurement system to perform experiments (almost) anywhere in the world without the need of external hard- and software. A project like this consists of many different sub-projects concerning the power supply of the box and the environmental control systems. However, all these sub-projects must be placed somewhere, shielded from the environment in some way. The Prep the Box project is the sub-project that takes care of the casing and interior structure of the off-grid measurement system. An important, hands-on project essential to the mail goal, since without a proper framework there will be no off-grid measurement system.

This project started with a box on wheels made from metal beams with a wooden floor and plated sides and a roof, all of which can easily be assembled and disassembled. Our job was to create a suitable casing from this box, in which all other groups can place their components, creating the off-grid measurement lab. An important note is that as a group we required that the measurement system should be modular, i.e. all the hardware components should be easily replaceable to redesign the box for different experiments.

We started by having discussions with all the different groups to see which specifications the box should meet and to get an idea for the general design of the box. A consensus was reached that the top part of the box would hold all the hardware needed to run the experiment (power supply, temperature control, vibration measurements etc.) and the bottom part would hold the experiment unit, encased by a vibration isolation chamber. Furthermore, the box should be watertight, since it is must be able to withstand rain, and it should be able to maintain a temperature inside the box in which the hardware can function.

The modularity of the top part of the box (containing the hardware) will be made up from rails, suspended from the ceiling. Different hardware modules can be placed in these rails and then connected. By placing the modules in rails suspended from the ceiling it will be easier to create an air flow between the different elements to either cool or slightly heat-up the modules. The vibration isolation chamber will be fastened onto the framework of the bottom part of the box. Inside this chamber one can then place its experiment modules.

The main part of this project was to communicate with all the different sub-groups. Each sub-project requiresd a certain amount of space and in the box only a limited amount of space was present. As in all projects, it was a process of negotiation, making concessions and taking the limitations into account for the final design of the box.

As for the final design, some tests will be carried out in order to see whether our chosen adjustments have been the correct ones. One test one could think of is for example the adjustable leg system to make the box even on terrains with differing slopes, and measuring the temperature in the watertightly sealed box when a warm object is placed inside to see whether we need to add ventilator shafts.