Hello everyone, I am Josephine and together with my colleagues Aida and Martijn I will present our DSE project, the Rent-a-Copter, a novel personal air transportation system.

First, let’s go back to just over a year ago. It’s a nice Thursday morning and you’re super motivated to go to work. You look on your phone… and you see this… traffic, just endless morning traffic.

It’s a picture all of us can image, sitting in traffic to get to work. Draining all of your motivation before you even started your day.

Even during this health crisis, it’s a recurring part of life. Some expect it to only get worse as many people might switch to cars for their daily commute away from public transportation.

But we have a solution to the problem: Air transportation, that can carry you over a distance of 30 km through urban environments. To save space in public, the device should be stored within a cubic metre and it should be able to carry 110kg. Next to that, it is made easy-to-use with smartphone controls. It will be a rental system, which is unique in the urban air mobility market. And to aid in reaching climate change goals, it is designed to be as sustainable as possible.

To achieve these goals, we started with 3 concepts. In order of the slides, we have: the quadcopter, the helipack and the ice cream cone. To choose which is the most suited for the job, they are put through a trade-off. UNIQUE

First up are some minor criteria, like cost, size, performance, user friendliness and the required automation. There is already a division starting to form. Next are some more important criteria, namely the noise, sustainability, and maintenance. The division is even larger now. There is one last and very important criterion left, which is the safety. Based on the numerical results, the concepts rank as they’re presented here, where the helipack is the overall winner of the trade-off. There is one problem with this. The helipack fails on 2 major criteria, that will be hard to compensate for in the design. It is thus decided to create a compromise.

We take a quadcopter as the core, due to its overall favourable result, with the high performance of the helipack rotors and the comfort of the ice cream cone’s cabin. In the trade-off, this leaves us with good performance, user friendliness and a healthy level of automation, while being safe and with great noise potential. There is also a favourable result for sustainability and cost. The bad result for maintenance and volume are taken and dealt with. We have then worked out this concept further in a technical design, for which I will give the floor to Aida.

Let’s look ahead at the future of the project. At this point, further development can be started with a detailed design. Parts are worked out further and the complete integration of the subsystems is detailed. After that, the planning can be started of Rent-a-Copter production for both prototyping and final production. With a prototype, testing can be done after which the design can be certified for flight by the authorities. After initial production and setup of operations, the service life can begin.

It is estimated that this development process will take around 10 years, which is similar to other aerospace projects. Scaling up the team could speed up the development. It is then expected that after a service life of 12 years, the break-even point could be reached at a moderate fleet increase of 1000 units per year. Increasing the production capacity can make the project reach this point even faster.

So, that is it for our design. We’ve highlighted the most important design factors of the rent-a-copter. Special thanks go to a few companies. MGM Compro, for aiding in the design and for giving information on the motors, motor controllers and battery management systems; Joulz, for their information on the charging operations. We also have some external experts to thank: Novita Saraswati from TNO for assistance with the sustainability of the system. Furthermore, we would like to thank Dr. Bruno Santos and Dr. Irene Fernandez Villegas from TU Delft for their expert advice. And lastly the teaching staff, consisting of our TA, Robert Coenen; our coaches Dr. Wei Yu, Dr. Ing. Christoph Bode and our principal tutor Dimitrios Zarouchas.

Off course, we also thank you for your attention during this presentation about the Rent-a-Copter. We will now take questions.