CAPSTONE PROJECT SUMMARY

MSc TECHNOLOGY MANAGEMENT & INNOVATION

UAV Photogrammetry Workflow for Supporting Nature-Based Solutions Visualization

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Summary

Drones, known as Unmanned Aerial Vehicles (UAV), Unmanned Aerial Systems (UAS) and Remote Piloted Aircraft (RPA), have brought innovations to all professional fields, affecting directly and indirectly the delivery of basic products used in our daily lives. For instance, there is a good chance that the vegetables that you ate today came from a field that is monitored by a drone, or maybe the electricity used in your household is provided by a wind turbine maintained/monitored by drones. This technology has shown to be limitless since its introduction to the public. Exploring even further the capabilities of UAVs, this project will cover their applicability in Physi's product. Drones can provide powerful site surveying ability and analytical outputs for urban planning. For supporting projects, urban planners may use drones to create 3D maps and high-resolution aerial images.

According to the European Commission, nature-based solutions have the potential to address societal challenges by providing solutions "inspired and supported by nature, which are cost-effective simultaneously provide environmental, social and economic benefits and help build resilience. Such solutions bring more, and more diverse, nature and natural features and processes into cities, landscapes and seascapes, through locally adapted, resource-efficient and systemic interventions". [Nature-Based Solutions | Environment - Research and Innovation - European Commission. (2017, January 9). Europa.Eu. https://ec.europa.eu/research/environment/index.cfm?pg=nbs]

In Physi, drones are expected to solve a key issue in the visualization and data collection for decision-making. The use of the technology is going to create the "foundation" for further calculations on the impact of Nature Based Solutions (NBS). The so-called "foundation" is a tridimensional model generated from the geotagged pictures taken with a drone during an automated flight process over the project's area. Physi aspires to use the 3D model to apply NBS elements and initiate endeavors for the calculation of the NBS impact. For example, it is possible to take real measures in the 3D model, hence calculating areas. Combining the measures with the calculation of the impact of a specific NBS, Physi will have a powerful tool for decision-making and evaluating project opportunities.

The tridimensional model of a project area can be explored in various ways. The new workflow and technology are indeed useful and can innovate how the company works. The information that the project brings for the decision-maker is related to two key questions: Should Physi run the drone operations in-house or outsource the service? Each way will have different implications such as regulatory, financial and operational.

The capstone project is basing its content on online research, contact with service providers, checklists summarizing regulatory compliance, knowledge acquired in online courses, development of use cases in fieldwork with the hardware and software mentioned along with the project development. The framework adopted uses two scenarios: In-House UAV operations or out tasking the UAV service.

Commercial drones have become financially accessible and widely sold. And as a result, the related policy and regulation follow the trend. The European Union is a great example of it, and soon a unified rule that will allow operators to have a unique license to operate will be in place. The advancement in the regulation is a great step for the market and the benefits that it brings to society. This fact should weigh in Physi's decision in case there is a high demand for their services in the EU.

Whether to acquire a drone or out-task these operations to a service provider is a decision worth of extra thoughts. Benefits are present in both cases and studied in detail in this project. In-house UAV operations will give Physi full control over the process and allow possibility to develop a new revenue stream, knowledge, flexibility, but the liability remains with the company. In the case of out-tasking, there will not be a need for specialized staff or liability responsibility, but flexibility is compromised. In any of the presented situations, Physi will immediately have a portfolio of projects to demonstrate its capability and potential. Besides, along with projects a new information flow is created with the client, boosting engagement, and iterative feedback.

The project aims to develop documentation containing workflows, budgeting and finance breakdowns, service providers, regulation, and outputs of the use of UAV photogrammetry for Physi's decision-maker.

This paper aspires to bring a clear view for Physi's future operations and targets regarding the visualization of potential project areas and visual implementation of NBS elements, enabling the company to achieve its goals for the final product.