skytech

Professional Quadcopter Operation

OWNERSHIP Dilemma

Danny Eylon

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1. Scope:

- This document is an analysis of aspects affecting and determining the successful use of a Quadcopter system in professional applications.
- The current analysis illustrates aspects that are not obvious and/or well known to decision makers concerning ownership versus out-sourcing decisions.

2. Background:

- In recent years, Quadcopters have become very popular in a wide variety of professional applications, including Homeland Security, Law Enforcement, and First Responders, etc.
- Due to enormous advancements in the technology, the platform—as well as the payload and the ground-station—are easy to operate and affordable.
- The cost of a Quadcopter (with payload and ground station) varies between approximately a few thousand to 20 thousand dollars. A single person, with minimal training, can operate the platform. In addition, the system seems pretty reliable and cost-effective.
- The dilemma stems from all the above-mentioned benefits. Professional users cannot and should not limit themselves to analyzing acquisition aspects only, but have to take into account "ownership" and "best value" performance as well. These more complex issues lead to the following analysis points:
    a) The use of a quadcopter for professional applications makes it a "system" that has to integrate communication, chain-of-command, operational profiles, flight patterns, quantity of airborne platforms, types of payloads, licensing, training, certification, regulations and more.
    b) The professional use of Quadcopter systems, requires a supporting organization. The dilemma becomes, whether this organization should become a part of the user organization or can it be "outsourced" thus leaving the "headache" to the experts?

3. Quadcopter organization – Tasks and Responsibilities:

For the sake of simplicity and clarity, we will detail in this chapter only the most important and cost-driving aspects.

3.1. Acquisition:

The variety of products, platforms and payloads is enormous and continues to grow monthly. At the same time, products that were the most attractive yesterday will be more than outdated tomorrow. The pace of technology variations makes it hard to keep up with, thus experts are required to support this stage in the process. At the same

time, cost-effectiveness is very much determined by the ability to tailor the adequate technology available to the relevant time-span.

3.2. Mission:

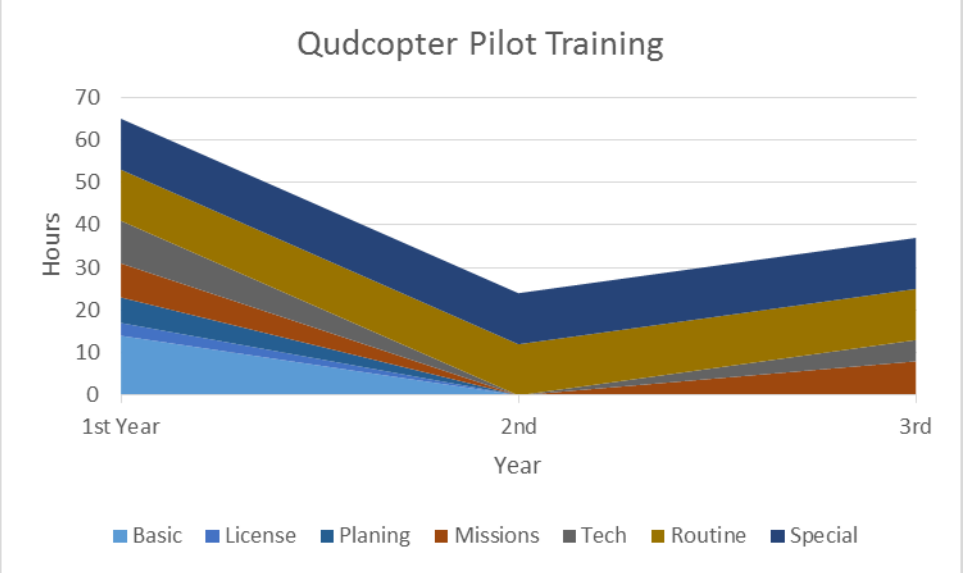
- By the end of the day, the Mission of any Quadcopter is to place a relevant sensor above a given object or area, since the "line-of-sight" and the "aspect angle" are much better from that angle.
- Mission definition, includes: What type of sensor we need, ranges, aspect angle, resolution, type of data, communication, etc. In most cases, professional users, require different missions, whether in parallel or at different occasions. The best-fit solution for the entire mission scenario is of utmost importance.
- Acquiring a system and not being "able to produce" is very frustrating, affecting future decisions and having a negative cost impact.
- Just for clarification, the following is a list of the most common missions, requiring different payloads, to be considered:
  - ✓Target Detection/Recognition/Identification
    - Electro-Optical
    - Infra- Red
  - ✓GIS
  - ✓Change Detection
  - ✓Surveillance
  - ✓Tracking
  - ✓Search

3.3. Mission and Flight planning:

- Each mission has to be planned and a suitable flight plan has to be attached to it, to assure successful results.
- Mission and flight planning require well trained and certified personnel.
- Planning has to be comprehensive and include technical as well as operational aspects, communication, data logging and retrieving. Last, but not least, worst-case and emergency aspects have to be considered and solutions made ready.
- The professional Quadcopter statistics show:
  - ✓50% of missions are aborted without "bringing home" any relevant result.
  - ✓90% of aborted missions are aborted due to insufficient planning.
  - ✓Almost 15% of platforms are crashed. Appropriate planning and training can reduce this figure dramatically.

3.4. Training and Certification:

- Although Quadcopter operation stems from "hobby model airplane" operation, it is not comparable. The professional applications, concerning technology, requirements and required results make life much more complicated.
- The professional operator has to be trained and retrained to keep up with technology leaps that are always occurring.
- Certification of pilot and platform require official and recognized training courses, as well.
- The investment in training is often neglected, resulting in harmful short cuts. The following graph exhibits the average training effort required to keep a professional pilot well trained and certified (over a 3 year period):



3.5. "Turn-Key" Service Provider:

Skytech as an end-to-end "turn-key" Quadcopter service provider:

- ✓ Is able to provide the required technical services and operational experience necessary.
- ✓ Will optimize the platform, payload and pilot for the required mission.
- ✓ Has all the required Software and Hardware expertise to provide the most cost-effective solution to any customer need.