BALLOON LIVE COMPETITION

Concept paper and project description

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INTRODUCTION AND CONTEXT

In the digital era our sport faces many new challenges. One of them is certainly to keep ballooning attractive and interesting to everybody involved. This includes of course the public, who will ultimately help us keep balloon competition affordable. Sponsors will be motivated to financially support organizers setting up great events.
But the new technology also draws new possibilities on how we compete, organize competition, communicate between participants (pilots, crews, competition staff) and how we present or even interact with the public.

This project description aims at developing a practical long-term vision of how to leverage technology and enhance balloon competition in many ways.

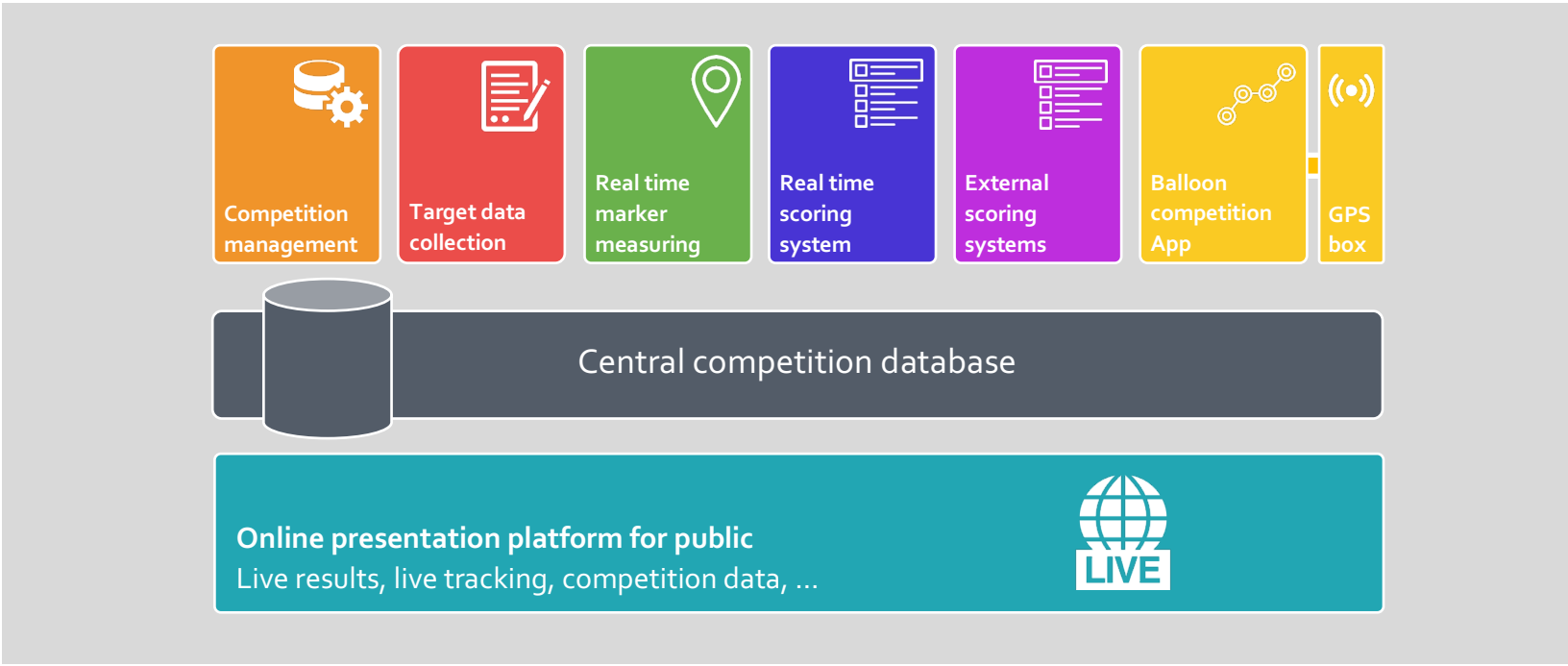
The overall goals at the base of the project are:

- To make the sport attractive to the public and the community
- To simplify competition scoring and management
- To keep the importance of physical target tasks

DESCRIPTION

OVERVIEW

The following overview explains how the different technology modules interact and thereby help to achieve the main goals of the entire project.



RESULTS IN GENERAL

In balloon competition results are achieved in 2 different ways:

- **Physical marker drops**: This method is basic and essential to a balloon competition. It is therefore one of the main goals to keep this as an important way of achieving results. Technology can though help measuring the result on a physical target.
    - Results determined using tape measurement can be collected and transferred to the central scoring database with a secured online form.

  Ultimately a system as described in "Real time marker measuring" can automate the measurement and data collection.

- **Electronic marker drops**: Marking a scoring position electronically has become popular over the past years to replace physical marker drops outside a close range around physical targets (outside MMA) and to some extend also in 3D tasks with a set target in the air (Star). Such marking will be possible using a tracking device. This information will be transmitted together with the track data to the central scoring database in real time.

- **Track points**: In some tasks the track point achieving the best result will determine the competitor's scoring position. Given the fact that only the track data is needed for live results to be calculated, and the flight track being transmitted to the scoring database, any scoring software connected to the database can determine the result and make it available for the public.

To get the results the fastest possible to the public (and all other participants), the data must be stored in a central database, and all systems measuring results or acquiring data, must be connected to the database.

SYSTEM DETAILS

CENTRAL COMPETITION DATABASE

A central competition database must be at the center of the project, having all data stored and available for all other integrated modules.

The database will include all information about:

- the event,
- the flights and tasks,
- the pilots and competition staff,
- the tracks,
- the measured results and
- all scoring information

For external modules (external scoring systems, Balloon competition app) an "Application programming interface", also called API, will be available to connect traditional scoring systems and make them use the data.

COMPETITION MANAGEMENT

A setup module is needed to configure the basic data for each event with:

- **General competition setup**
- **Flight and task definition**: This data is needed for the public of course but will also be used to adjust balloon competition app settings, data screens and options.
- **People management**: Pilots and officials are granted permissions for specific access. A pin (per event) will be used to access all relevant features and data, including transmission of data from the Balloon competition App.

The central database will serve as a competitor database for all competition and external scoring software. This will standardize the data used, in order to help presenting and analyzing results over multiple competitions and years. Calculating and presenting a world ranking list would be one possibility.

TARGET DATA COLLECTION

As traditional measuring teams will continue to measure the results by tape, a simple online submission form can help transmit the measured data directly to the central database. Mobile devices (smartphones and tablets) will give easy access to the form.

REAL TIME MARKER MEASURING

The real-time marker measurement system allows the physical markers to be measured automatically as soon as they are on the ground. Currently the technology is developed and evaluated with Noosphere.

Depending on cost of the system and markers such a system is only used at targets with public. The ranking of a pilot could be shown on a big screen shortly after the marker has landed.

The real-time marker system submits the marker position, time and coordinates to the central database similar to the target data collection.

PRESENTATION PLATFORM

An online presentation platform can get the results from the database at any time and publish them as they come in. Visually the results are available by task and by rank, including pilot information and flight track (see "Balloon competition app" below).

The platform can further integrate other features like:

- Sponsor visibility
- Social media streams
- Video streams
- Live chatting

EXTERNAL SCORING SYSTEMS

Trusted scoring system or software (eKlips, bscoring, BFAscoring,…) may be granted an access to the database. Depending on the features implemented, they will be able to read all available data or even write back calculated results, penalties or other data.

The central database will feature an API allowing these connections.

REALTIME SCORING SYSTEM

Ultimately, as a mid- or long-term goal to what has been described in the previous paragraph, an integrated real time scoring system can be added as an additional module. This system would replace the traditional scoring software used at events today.

Having all flight data in real time in the central scoring database, the score calculation can be done live and at any time.

Adding this scoring level module seems desirable and logical. But this is another big step to take and would involve some budget. No provisions are made for the moment. Such a module would be considered in a later phase.

BALLOON COMPETITION APP (NEW LOGGERS)

One of the key parts to the success of the entire project is the Balloon competition data, which includes

- 3D-position at a second-interval (flight tracking)
- electronic marking of certain positions (electronic marker)
- declarations made by the pilot (goal declarations and others)

All this data is available in flight and needs to be transmitted to the central scoring database for real time use.

An obvious way to do this is using smartphones or cellular-enabled tablets. As a data connection is not guaranteed all the time, the app must be capable of buffering and sending bundled data once connection is available again.

Pilot identification is already in place using a pin, as managed and distributed through the competition management module.

With the fast development of cellular networks over the next years and decade (see 5G), it is reasonable to assume that the connection and coverage will improve even more in all areas.

GPSBOX

Because all cell phones have different types of GPS, and often the GPS data is further modified by algorithms which are not ideal for ballooning, a separate GPS box is needed for higher class competitions (e.g. Cat1 & Nationals). Thus, the Balloon competition app would work without the GPS box for small competitions and for larger competitions the same app would be used with the external GPS.

The external GPS must include

- High quality GPS
- High quality barometric sensor (good variometer for near-miss)
- Preferably acceleration sensor (for collision detection)
- Safety & Security features for tamper-proofing the data
- Bluetooth (probably Bluetooth Low Energy) for communication with the phone
- Bluetooth or USB connection for communication with the pilot's laptop

A possible approach is to build a GPS box based on the SensBox from Flytec. The device contains all necessary hardware elements and we can get access to write our own firmware. This allows a tamper-proof implementation.

PROJECT PHASE 1 2018-2019

WATCHMEFLY.NET

Watchmyfly.net is a website developed by "Aunty Monkey" Andrew Robertson from Australia.

The site was initially designed for pilots to show their flights and track in real time. After first talks to the owner an interesting collaboration has started in 2017. Since then a few more developments have been that aim at the same goals defined in this document.

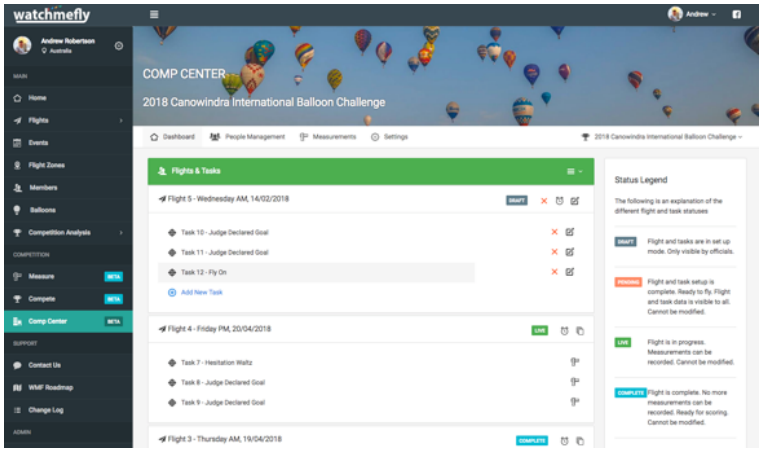
The site can be considered as having the biggest potential growing towards what is needed in ballooning competition. The following project plans are built on the fact that the owner and developer is open to further developments, stronger collaboration and partnership with the Ballooning commission

The following outlines how watchmefly.net has implemented or can develop some of modules:

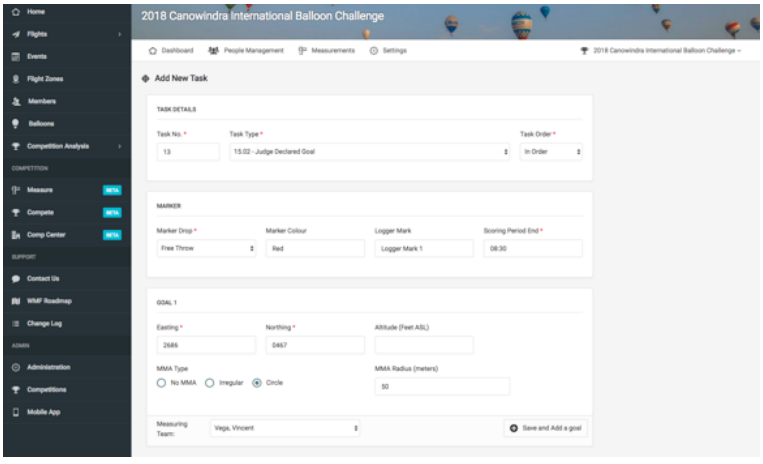
COMPETITION MANAGEMENT

The competition management contains all basic data. Being event centered, the general event, flight and task data can be entered. Pilots and officials are managed as users and can receive their personal event pin access codes by email.

Flight definition

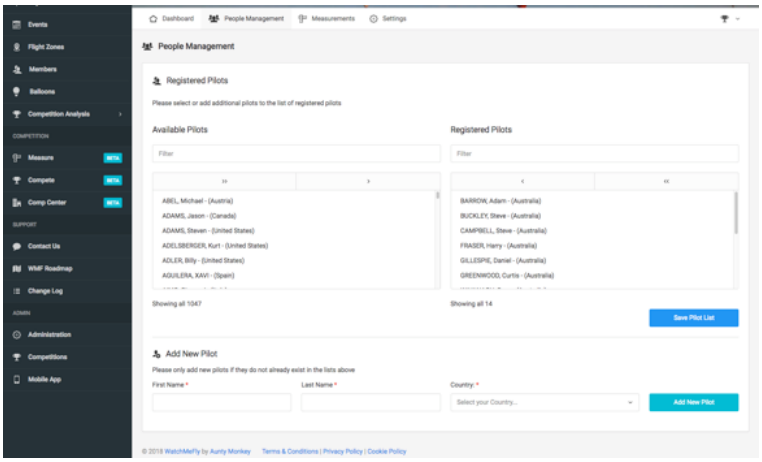


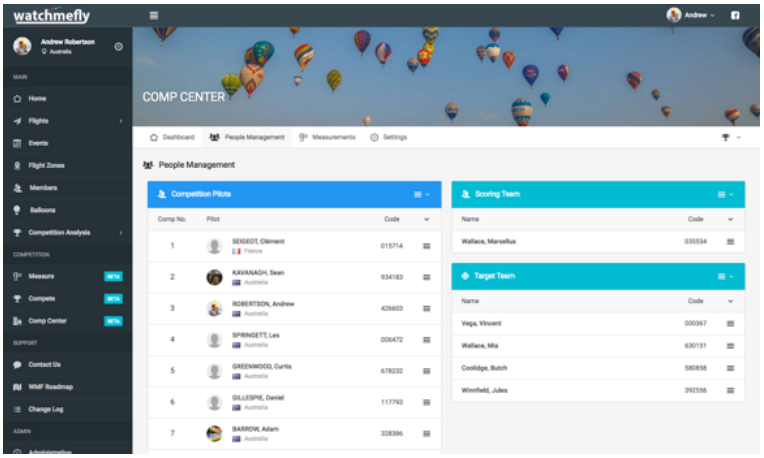
Task definition



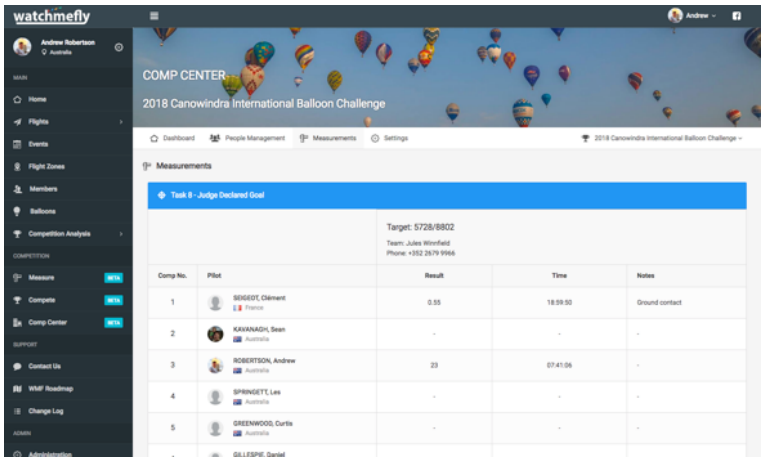
People management:

- Pilots
- Scorer
- Measurer





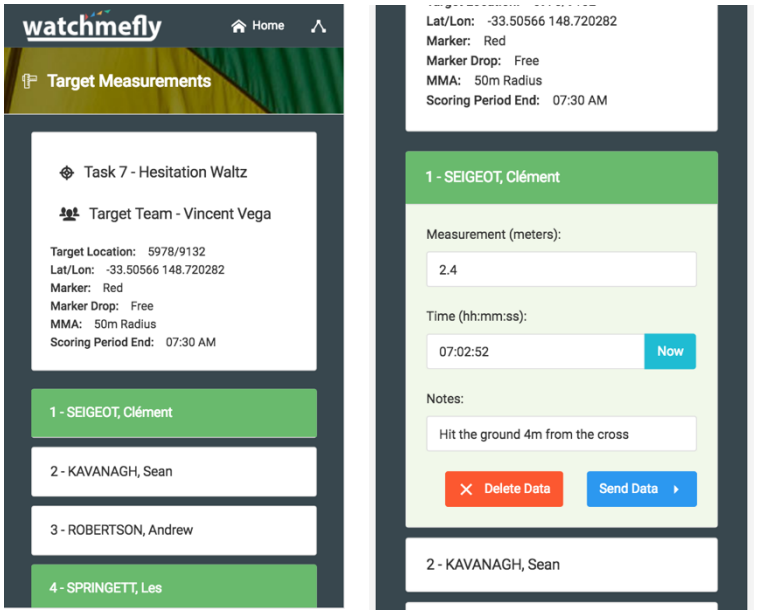
Measuring list

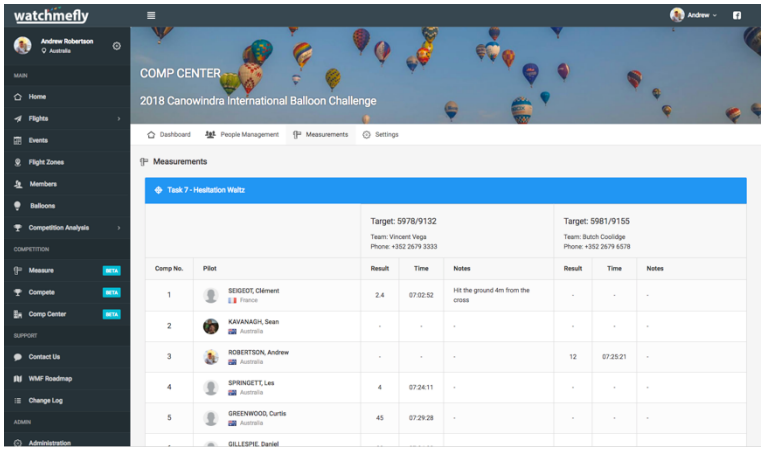


TARGET DATA COLLECTION

Target teams using traditional tape measuring to determine the results can collect and transmit the results to the database using the shown form.

Each chief measurer has only access to the relevant task data using his personal pin code.





FLIGHT REPORT FORM

The pilot will be able to submit his report form directly using an online form. The track data downloaded from a traditional GPS logger may be uploaded as well.

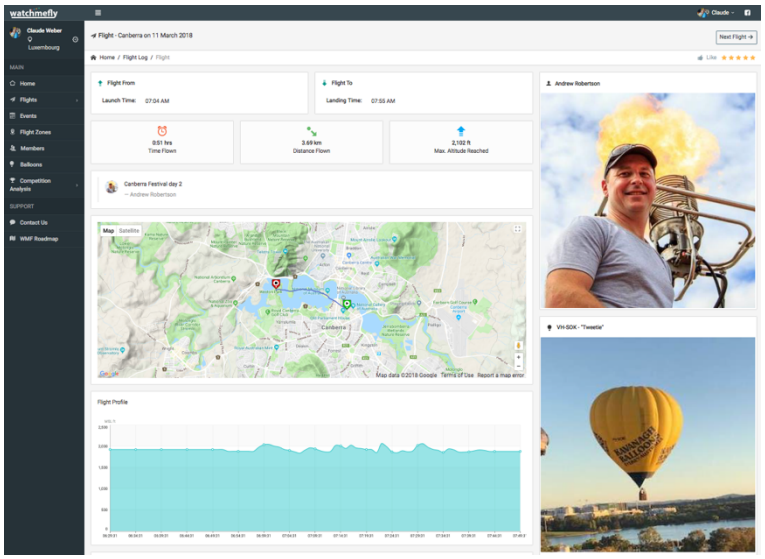
PRESENTATION PLATFORM

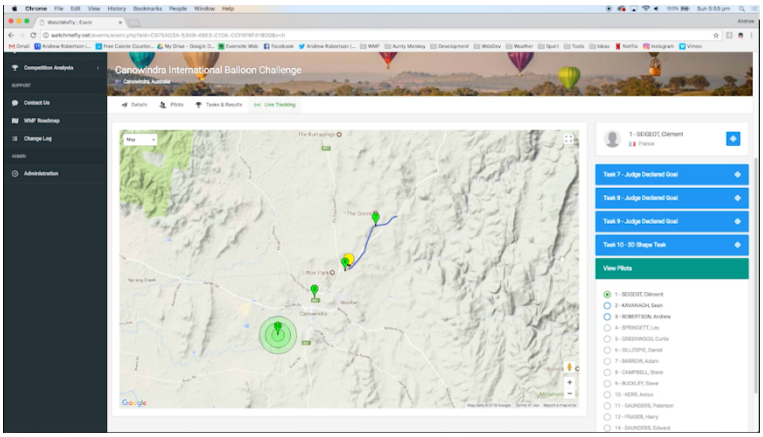
The goal of the entire concept is seeking to present results and tracking to the public in real time. The presentation platform for the public will take over this part.

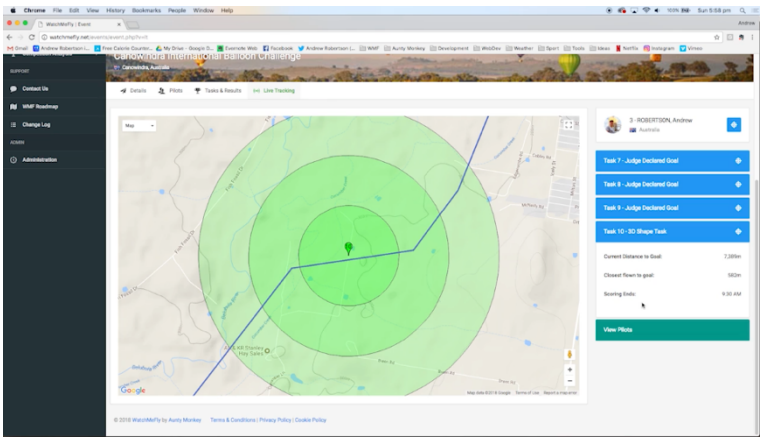
Watchmefly.net has already implemented most of what is needed:

- Pilot data
- Event data
- Task data and results
- Overall competition results
- Flight tracks
- Result analysis

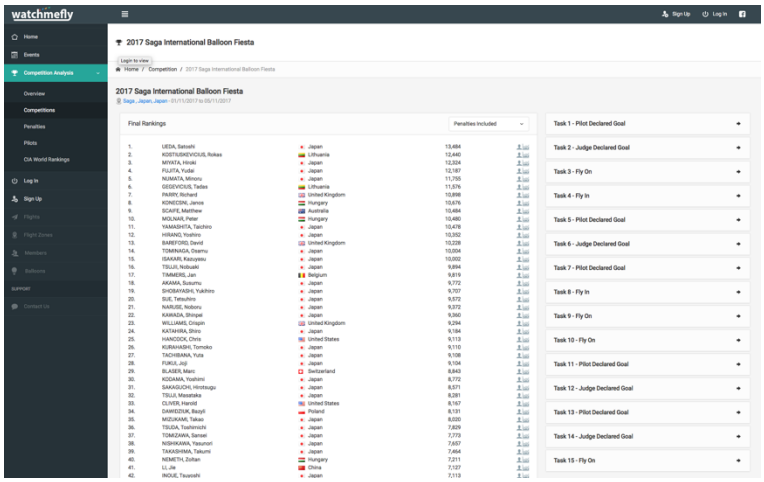
The data can be shown in real time, which changes the way we present our sport to the public.







Results are available, overall and per task



Furthermore, this way of presenting the competition to the public has big potential for events and FAI/CIA to promote and highlight their sponsors. This should of course generate more income in the project but it has not been taken into account in the initial budgeting.

DETAILS OF THE PROJECT DEVELOPMENT

In 2018 the development of the different features of watchmefly.net will continue. The following modules are scheduled to be ready by the 2018 summer season:

- Competition management
- Target data collection
- Flight report form
- Presentation platform (results and tracks)

Integration of sponsors is another important feature, to be included as soon as possible.

FINANCING

A upgraded web hosting plan is needed to support the larger load and traffic that will be generated once the system will be used actively in some competitions.

The costs, detailed in the attached financing document, can be summarized to the upcoming years:

In CHF	2019	2020	2021	2022
Operation cost	-	1500	2000	2000
Special development	-	2000	3000	3000

Will not be considered in investment budget calculation

FLIGHT & TRACKING APP

DETAILS

The development of a mobile app needs a different approach. Seeing the fast change and high level of technicality in the domain of mobile app development, a professional app development company must be in charge.

The app must be available on today's two main operation systems: iOS and Android.

In order to further reduce the cost, a first version or prototype (available 2018) may be developed together with a startup company, university institution or partner company. With growing features, updates and maintenance the development of the app must be in the hand of a professional company.

FINANCING

The full cost for an initial development has been estimated by professional app development companies to a maximum of 30'000 CHF, with the features to be implemented over 2-3 years.

A system of usage rights has been established to generate an income and thereby reimburse on the initial investment of the FAI. The income is based on

- a usage right per pilot per event
- a usage right per event for the management

The usage rights for pilots will be handled using in-app purchase. All other rights and rentals will be invoiced directly by FAI.

Also, part of the FAI investment must be taken from the profit generated by the running logger project.

In CHF	**2019**	**2020**	**2021**	**2022**
App development	-	20'500	5'000	5'000
Maintenance and adaptations	-	-	2'000	2'000

PROJECT PHASE 2 2019-2022

GPSBOX

DETAILS

The GPSbox needs first to be adapted to the specific needs of this project. A budget must be allocated for the creation of prototypes and special tools to develop new firmware.

A contract is in place with Volirium to cover ownership, work split and scenarios to guarantee that devices can be produced over the lifecycle of the Balloon Live project. The price structure of the GPSbox guarantees that the pilots are treated fairly.

At the 2019 plenary the decision was taken that no CIA owned pool of devices be created, but the devices be sold to participating pilots.

The CIA will buy 40 to 50 devices which will be used for testing in competitions later in 2020 (maybe decentralized) and early 2021. Most of those devices will be sold in 2021/2022 to pilots and NACs. Only about 10 devices are kept by FAI/CIA to have some spare devices for large Cat1 events.

FINANCING

In CHF	**2019**	**2020**	**2021**	**2022**
Prototyping	300	1'700	-	-
GPSbox acquisition		19'000	-	-
GPSbox sold	-	-3'000	-6'000	-3'000

OVERALL INVESTMENT BUDGET SUMMARY

In CHF	**2019**	**2020**	**2021**	**2022**	**Total**
Watchmefly.net	-	2'000	3'000	3'000	**8'000**
Flight & Tracking App	-	20'500	7'000	7'000	**34'500**
GPSbox	300	17'700	-6'000	-3'000	**9'000**
Total	**300**	**41'700**	**-6'000**	**9'000**	**51'500**
Budget approved by CIA plenary and FAI EB on May 18th, 2018 (w/o operation costs)	*29'500*	*20'200*	*9'700*	*9'700*	***69'100***

This total budget can be put up against the first logger project result so far. The first-generation logger project has a positive overall cash flow of about 68000CHF at the end of 2019. Some of this result is still available as CIA reserve and should be taken as a larger part of the investment in the new project. This will also allow us to keep the cost for the use of the new app and loggers lower for the organisers and pilots. Please refer to the financial model (version 2020) for further details.