Erasmus+

Educational for Drone (eDrone)

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Course program structure and content design

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Introduction / Foreword

This deliverable provides the decisions that have been made about the contents of the course program. A detailed list of the topics of interest being subject of the course program are included in this report. Specifically, it outlines the program content being common to the different profiles. It takes account the specific priorities of the Partner Country involved in terms of specialists trained within higher education, based on the demand and need for them within the economy and within other areas of social life.

Information is gathered from the contributions of the different partners involved.

1. Specific topics of interest for course program

Specific topics of interest for each partner country are provided.

ARMENIA

Agriculture, construction, geology, archeology.

BELARUS

The Republic of Belarus is showing great interest in the development and use of drones. We have a number of government-owned and private-sector firms specializing in drone development, payload and widespread use in a wide variety of fields. Training programs related to drone control are available at the Belarusian State Aviation Academy, and in the use of information obtained from drones - in most of the leading universities of the Republic, including at a number of natural faculties of the Belarusian State University. In connection with the rapid development of this direction, there are quite a lot of young people interested in obtaining and deepening knowledge in this direction. Unfortunately, the laws governing the use of drones are currently underdeveloped. However, the main interest is in civilian applications and practical use of drones in various applications. During the implementation of the project, the employees of the Belarusian State University developed a number of new certified courses and modernized the existing ones to improve the level of education in the development of hardware and software for drones, as well as the practical use of information obtained from them. Graduates of the Belarusian State University undergo training practice, complete their theses and are subsequently assigned to work in companies related to the development and use of drones.

GEORGIA

Drones industry is developing in Georgia. We have more and more emerging fields, where drones are supposed to be used. More and more young people are interested in the practical use of the technology. We don't have any degree studies or curriculums incorporated in study programs at Universities or at Schools. While conducting the CIA courses we came across with the demand that this field is growing and a lot of people are interested to deepen knowledge in this direction. So, the law regulating the field is very important among the interested people. It should be mentioned, that the Agency of Civil Aviation of Georgia is doing a great job and they have defined the regulatory framework for drone's usage. Also, The main interest comes on civil applications and drones practical uses in different applications. Accordingly, In Georgia we have developed certified courses, that give attendees knowledge and experience in the practical use of Drones. After the successful completion of the certified course, several attendees will have the possibility to have internship in the companies working in the field of drones.

MOLDOVA

According to the user needs reports prepared within the WP1, the CIA courses were developed for a wide spectrum of professionals: agriculture, journalism, education, security, etc. In Moldova 4 editions of CIA courses were developed. The main interested areas are:

- *Journalism*
- *Agriculture*
- *Archeology*
- *Traffic Security*
- *Cadastral service*
- *Education*
- *Drone construction*
- *Border security*
- *etc.*

2. Target specialists by country

The general profiles of the selected candidates for following CTT and CIA courses are detailed below for each partner country.

ARMENIA

The specialists have been trained at the European universities during the CTT courses. They have been selected as CIA instructors, also some other specialists have been trained by them and are

teaching in the frames of CIA courses. The majority of the specialists are the ones with technical backgrounds.

BELARUS

CTT candidates were selected based on motivation to develop new programs, experience in teaching theory courses and practical exercises. and were selected for skills and knowledge, as well as the ability to convey knowledge, plan practical sessions. All CTT trainers were selected from the staff members of the Belarusian State University.

CIA course attendees are engineering and science students.

GEORGIA

CTT candidates were selected according to the skills and knowledge and ability to deliver knowledge, plan practical workshops. The main restriction here, while selecting the CTT trainers, was that they should have been the employees of the University, in order to be hired in the project.

CIA course attendees were mainly the students studying in engineering and exact sciences. Also, the specialists working in forestry, environment agencies and engineering teachers, who can then transfer the knowledge and experience to their students.

MOLDOVA

The CTT candidates were selected taking into account the courses they have to teach. In this way the selected trainers were from all Moldovan Partner institutions and the courses were distributed between the Moldovan Partners according to the table below:

Modules I. Technology of drones	Responsible partner
Drone Architecture	Moldova State University
Drone Avionics	Moldova State University
Drones Equipment for Measurement and Monitoring	State Agrarian University of Moldova Moldova State University
Processing of Measurement Data	State Agrarian University of Moldova

Drone piloting	Civil Aviation Authority Moldova State University
Drone Maintenance	Civil Aviation Authority
Modules II. Lows and drone regulations	Civil Aviation Authority ACAPOL
Modules III. Civil applications	Civil Aviation Authority ACAPOL Public Administration Academy State Agrarian University of Moldova Moldova State University

All selected teachers were employees of the Moldovan partner institutions and each of them had to be able to study and then to train attendees in the selected area according to the above list.

According to the user needs reports prepared within the WP1, the CIA courses were developed for a wide spectrum of professionals: agriculture, journalism, education, security, etc. In Moldova 4 editions of CIA courses were developed.

The participants in the first edition were the employees from the companies questioned for user needs identification within the WP1 and employees form the Associate Partners organizations. According to the project description, the first edition of the CIA course was free.
The first edition attendants' profiles were:

- *Journalism*
- *Agriculture*
- *Archeology*
- *Traffic Security*
- *Cadastral service*
- *Education*
- *Drone construction*
- *Border security*
- *Governmental agencies.*

For the second edition (04.03.2019-03.06.2019) the enrolment process was done during different events: Science Day (10 November 2018, student conference (February 2019), exhibitions, etc.) As result, 17 attendees began the 2nd edition of the CIA on March 4, 2019. The second edition attendants' profiles were:

- *Agriculture*
- *Cadastral service*
- *Education*
- *Drone construction*
- *Governmental agencies.*

The enrolment process for the third edition of the CIA courses was done according to the suggestions given by the attendees in the previous editions: the group of attendees for CIA should be more homogeneous in order to improve the courses' quality. In this regard, the 3rd edition was delivered for the employees from the General Inspectorate of Border Police of Republic of Moldova.

The 4th edition of CIA courses was delivered for the attendees from the National Patrol Inspectorate of the Internal Affairs Ministry of the Republic of Moldova.

3. Demand within the national economy and areas of social life

Specific demands are explored for each partner country and are reported below.

ARMENIA

Agriculture is one of the key sectors of Armenia's economy, which provides about 15% of GDP. 31.3% of the employed in the country are involved in agriculture. The RA Ministry of Agriculture has currently developed a strategic document on the main directions ensuring the economic development of the RA agriculture, according to which one of the main strategic directions of the RA agricultural development is the development of agricultural infrastructure; agricultural sustainability. Drones technologies can be the guarantors of those main factors for development.

The program of the Government of the Republic of Armenia aims at the targeted use of unused agricultural lands, increasing the level of access to irrigation water, application of new technologies in the field, upgrading of tractor equipment, support for the introduction of agri-food system equipment, food security systems Prevention of diseases, development of non-agricultural activities in rural communities, introduction of insurance system and creation of favorable conditions for economic activities in agriculture. The use of drones will definitely facilitate those operations and their management.

Construction in Armenia is developing at a fast pace. It is planned to carry out the construction of a number of buildings during the next 8 years. To this end, Armenia plans to invest a number of innovative mechanisms. In this context, the use of drones can become one of those mechanisms and make the distribution of resources more efficient and optimal.

BELARUS

The use of drones in forestry is of the greatest interest for our republic. Especially for the control of forest fires (priority - the Chernobyl zone), as well as the state of forest lands. In addition, precision farming is of increasing interest. At the same time, the development of target equipment, navigation and automatic control facilities is also a priority.

GEORGIA

The main demand in usage drones in national economy and social life is for shooting weddings, events etc. and there are mainly self-trained pilots. Slowly, new fields are emerging where Drones are being used, like agriculture, forestry, archeology, environmental monitoring. The aim of the project was to create the course that would answer the demands of the specialists in different fields. That was the main idea of starting certified courses in practical use of drones. So, the interested people will be able to find jobs in the field of their interests.

MOLDOVA

The CIA courses, developed within the eDrone project, are vocational training programs for all interested people and organisations showing a spread interest of different economic sectors.

Within 4 editions almost all the participants in the CIA courses were employees from different organisations, professionals from different areas:
Public security – 18 users
Customs security – 13
Agriculture – 8 users
Academia – 7 users
Interested people for drone personal use – 6 users
Mass media – 2 users
Archaeology – 2 users
Logistics – 2 users
Public services – 3 users
Cadastre – 5 users
Drone technology – 2 user

4. Detailed Course programs

Drones are an emerging technology presenting a huge potential for the development of civil applications and services. Indeed, thanks to the remote driving and sensing technologies, drones are able to collect qualitative and quantitative data on a given environment during the flight. The main civil application fields using drones are (i) agriculture, (ii) surveillance, (iii) aerial photography, (iv) gas mission detection, (v) fire mission detection, (vi) environmental monitoring, (vii) archaeology, (viii) monitoring of photovoltaic systems, (ix) monitoring of structures and buildings and (x) power lines inspection. All professionals working in these fields can take advantages of drones because they allow to: (i) reduce the time and the cost required for monitoring or measurement processes, (ii) reach sites with difficult access and (iii) automatize monitoring/measurement procedures, e.g. by using the autopilot function. The diffusion of drone technologies will empower existing professions and will create new job opportunities, especially for youth. For example, owing to the heterogeneous competences required in using drones, experts in the design of mission, drones equipment, driving, data processing will be required by the job market. New job opportunities are strongly encouraged by the Europe 2020 strategy as stated in the European Commission Communication “Youth on the Move”. The more important aim is to give graduates the expertise they need for employment as operators, observers, sensors operators of drones. Students will learn about the engineering aspects of drones. These courses will prepare the student to operate a drone within current law restrictions and guidelines within the national airspace. These courses are divided into three main parts: Technologies, Civil applications and finally laws. The most important part is Technologies, made up of six modules: Architecture, Avionics, Sensors, Piloting, Processing of data and finally Maintenance.

The CTT and CIA course programs cover the same perimeter with 8 identified hot topics:

- C1. Drone architecture: The different components of a drone and its functions will be provided.
- C2. Drone avionics
- C3. Drones equipment for measurement and monitoring
- C4. Drone piloting
- C5. Processing of measurement data
- C6. Laws and regulations
- C7. Drone Maintenance
- C8. Civil applications

In Georgia we have added to the CIA course the module of Entrepreneurship. That ensures the support of startups and developing new ideas in the field of drones. This is the final module of the course, it means, that after theoretical knowledge and practical work the attendees of the course will be able to develop new ideas, identify problems and find technological solutions in this industry. This kind of vision is important for ensuring the sustainability and impact of the project over the education and economy spheres of Georgia.

At the Belarusian State University, specially for graduates, with the help of the psychological service of the university, courses on adaptation to the labor market are organized.

Conclusion

This deliverable demonstrates that the specific needs of each partner country have been explored. Even if a common basis needs has been identified some topics remain specific. The constructed course programs for both CIA and CTT provides an attractive spectrum of knowledge and skills