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Educational for Drone (eDrone)
(Project Number 574090-EPP-1-2016-1-IT-EPPKA2-CBHE-JP)

WP4. OEDs setting-up

D4.1 – Equipment purchase and OED Regulation

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Introduction

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D4.1. – Equipment purchase and OED Regulation

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INTRODUCTION / FOREWORD

One of the main objectives of the eDrone project is the creation of the Office of Education for Drone (OED), meant to ensure the teaching activities of the continuous training program "Education for Drone" in each partner country, involved in the project: Moldova, Armenia, Georgia and Belarus.

Within Work Package 4, in each Partner Country participating to the eDrone project a OED have been created for VET activities about innovative technologies embedded in drones and civil application designing, building and controlling using drones. To this end in each OED will be hosted specific didactical laboratories for practical learning activities. Moreover, within eDrone project a ICT platform have been developed for supporting the learning activities. Taking into account the fact that teaching activities include not only theoretical courses, OED is also a real platform for practical lessons within the courses. Moreover, in each OED will be hosted a laboratory for practical learning activities in order to implement both software and hardware components for drones.

From the perspective of the sustainability aspects of the project, the created OEDs will ensure both the activity of the continuous education program "Education for drone", as well as other relevant activities in the field of drone application: new research projects, technological transfer activities, contracts economic etc.

1. Procurement procedure of the equipment

1.1. Moldova

Procedure for equipment purchase Moldova State University (USM) initiated based on the Moldovan law, the public procurement procedure for the eDrone equipment. In Moldova, operational responsibility for this procedure is delegated to an agency – The Public Procurement Agency. The Public Procurement Agency (http://tender.gov.md) operates with an emphasis on supervising individual procurement. The extent to which individual contracting authorities can develop their own policy appears minimal (Ref: Public Procurement Law and Policy in the Republic of Moldova, http://www.ncu.moldova.md /public/files/publication/armonizare/SLAG_PP_ENG.pdf). In particular, the MSU ensured publication of all notices of intent regarding the eDrone procurement contracts in relevant media (http://tender.gov.md/ro/bap) in a manner enabling the:

i)   market to be open to competition *and*

ii)   any interested economic agent to have appropriate access to procurement arrangements prior to the award of contracts and express the interest in obtaining the contracts.

The publication on http://tender.gov.md/ro includes at least basic information on the contract, qualitative selection criteria, award method, contract award criteria and any other additional information the economic agents need in order to take decisions on whether to obtain the contract or not. All contracts shall be awarded using a transparent and impartial procedure to prevent corrupt practices. Deadlines for submission of expressions of interest and tenders are long enough for economic agents of the other party to conduct a meaningful assessment of the tender and prepare their own tender. All participants must know in advance the rules, criteria for selection and contract award. These rules apply equally to all participants. The parties award contracts in a transparent manner to the most economically advantageous tender or tender offer with the lowest price. Final decisions will be communicated to all applicants with no delay. Upon the request of an applicant whose tender offer was rejected, the reasons shall be disclosed in sufficient detail to permit

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review of the decision. The Parties shall ensure that any person who has or has had interest in being awarded a particular contract and that has been or is likely to be damaged due to an alleged violation, has the right to seek efficient and unbiased legal protection against any decision taken by the contracting entity on that contract award. During the eDrone equipment purchase no contestation has been received.

Taking into account the specific character of the equipment need to be purchased in the eDrone project, the public procurement procedure was repeated two or more times according to the national Procurement Law.

1.2. Armenia

The procurement system in Armenia is mainly regulated by the RA Law on Procurements adopted on December 12, 2016. The type of procurement system is mixed: the Law provides opportunities to conduct procurements both electronically and paper-based. The Law has a separate article defining which documents are required to ensure the record and storage of the information on the procurement procedure, validity of the data required from bidders and rules of e-procurement (see Article 8 of the Law).

According to the regulation of the Law, Procurement Complaint Review Board consists of up to 3 members, who are appointed for five years by the RA President upon nomination of the RA Prime Minister. The member is not in labor relations with the Republic of Armenia and may not hold any other office or perform other paid work during his term, except for scientific, pedagogical and creative work. Thus, the Board member can't be from either civil society or from state sector during his/her term but in the same time there are no limitations or criteria of their previous activities, thus, Procurement Complaint Review Board members can be previous employees or representatives of both public and private sectors.

There are four methods of procurements – 1) Electronic auction, 2) Contest (tender), 3) Request for quotations, 4) Single-source procurement. In its turn, Contest can be open or closed. Closed contest can be targeted or regular. The Contest is the preferable

procurement method. Only in cases stipulated in the law, other methods of procurement can be used. It should be noted, that the previous Law also defined four methods of procurements, but the terminology was different – 1) Open procedure, 2) Competitive dialogue, 3) Restricted procedure and 4) Negotiations. Also, Open procedure was recognized as the preferable and basic procurement method by the Law.

The Law provides for exemption in case of procurement only for public undertakings (entities) in three cases:

1) Products that will be resold or leased to third parties, provided that the undertaking concerned enjoys no special or exclusive right to sell or to lease the subject of such contracts, and other undertakings are free to sell or to lease similar products;

2) Goods, services or works for the purpose to perform relevant activities in a third country, under conditions not involving their use within the Republic of Armenia.

3) Goods, services or works for the purpose to perform other activities than relevant activities. In cases when the contract is intended to cover several activities and among them at least one is a relevant activity, but it is objectively impossible to determine for which activity the contract is principally intended, the procurement shall be made according with the provisions of this law.

The abovementioned exemption is the only exemption from the PPL. Previously, before the adoption of the new Law on Procurements on December 12, 2016, there was another exemption, which was stating, that unless otherwise stipulated by the Republic of Armenia laws, the provisions of the Law on Procurements are inapplicable in case of procurement for state or community non-commercial (non-profit) organizations and entities with over fifty percent of government or community shareholding. This provision of previous Law was not included in the acting one; as a result, the scope of exemptions from PPL was narrowed.

1.3. Belarus

BSTU is a legal entity which property is owned by the Republic of Belarus. The procurement procedures for the legal entities with property owned by the Republic are regulated by the Decree of the Council of Ministers of the Republic of Belarus of March 15, 2012 No. 229 "On the improving of the relations in the field of the procurement of goods (works, services) at the own expense".

According to the above regulation, the organization carries out the procurement at its own expenses via the contests, electronic auctions and other types of procurement on a competitive basis, as well as the procurement procedures from a single source.

The procurement procedure from a single source can be carried out in a limited number of cases, for example, if the competitive procurement procedure has been recognized as failed; if an additional purchase of goods in amount not exceeding the volume of previously conducted initial purchases is necessary from a previous supplier to ensure compatibility with previously purchased goods; if the purchase is made from manufacturer or its sales organization, including those in the Register of Manufacturers of Goods and their Sales Organizations of the National Unitary Enterprise "National Center for Marketing and Price Study".

In other cases, procurement is carried out using tenders, electronic auctions and other types of competitive procurement procedures. An invitation to participate in any form of competitive procurement procedures is placed in the public domain in the Tenders Information System (icetrade.by) and must contain:

- the name of the type of procurement procedure;

- the name and location of the organization;

- the description of the subject of procurement, its volume, place and time of the delivery of the goods;

- the source of financing for the procurement;

- the method for obtaining procurement documentation;

- the term for the preparation and submission of proposals;

- requirements for the list of participants of the procurement procedure;

- other information in accordance with the procurement procedure at the own expense.

The term for the preparation and submission of proposals for participation in the tender and electronic auction for the suppliers is at least 20 calendar days.

The not prescribed by law restriction of access of suppliers to participate in the procurement procedure is not allowed. Any legal or natural person may be the participant of the competitive procurement procedure, with the exception of those included in the register of suppliers who are temporarily not allowed for procurement.

The individuals who are personally interested in the results of the procurement may not be the members of the commission created to conduct the procurement procedures.

The procurement documentation contains:

- requirements for quality, technical characteristics of the goods;

- place, terms and conditions of delivery;

- the form, timing and procedure for payment for the goods;

- the draft of the procurement contract;

- the procedure, place, deadline for the preparation and submission of proposals for participation in the procurement procedure;

- the list of documents submitted by the participants of the procurement procedure to confirm their compliance with the established requirements;

- the criteria and method for evaluating and comparing proposals of participants in the procurement procedure.

The winner in the competitive procurement procedure is the person offering the best conditions in accordance with the criteria and method of evaluation and comparison specified in the procurement documentation.

There is a list of goods the purchase of which at the own expense does not apply to the legislation above. Of the entire list, only item 9 "Purchases of goods in the amount of up to 1000 basic units (27 000 BYN, about 10190 EUR) per transaction..." can relate to some goods purchased by BSTU under the eDrone project.

1.4.   Georgia

Ivane Javakhishvili Tbilisi State University has conducted the Procedure for equipment purchase according the Georgian law, regulating the procurement system. In Georgia the procurement procedures are carried out by the State Procurement Agency through Georgian electronic Government Procurement system – which is the official portal of state procurement in Georgia. It ensures open, transparent and competitive environment for any participant of state procurement procedures.

TSU itself has conducted the procurement procedure in appliance with the Georgian Law of procurement according to which the Agency of State Procurement gives the separate procurement codes to the equipment that was due to purchase within the framework of eDrone Project. Therefore, the list of equipment for setting up OED has been divided therefore the list of equipment for setting up OED is divided into five parts: Printers, Pieces for Drones, Drones, video cameras and computers. This is why the procurement should be done separately.

TSU has announced the tenders on the abovementioned platform (procurenment.gov.ge) After that the agency ensures that the market is open to competition and any interested economic agent has the equal access to the information and has the opportunity to express the interest in obtaining the contracts.

The publication on Procurenment.gov.ge should include information on the contract, qualitative selection criteria, award method, contract award criteria and any other additional information the economic agents need in order to take decisions on whether participate or not in the tender. All contracts shall be awarded using a transparent and impartial procedure to prevent corrupt practices. All participants must know in advance the rules, criteria for selection and contract award. These rules apply equally to all participants. The parties award contracts in a transparent manner to the most economically advantageous tender or tender offer with the lowest price. Final decisions will be communicated to all applicants with no delay. Upon the request of an applicant whose tender offer was rejected, the reasons shall be disclosed in sufficient detail to permit review of the decision. The Parties shall ensure that any person who has or has had interest in being awarded a particular contract and that has been or is likely to be damaged due to an alleged violation, has the right to seek efficient and unbiased legal protection against any decision taken by the contracting entity on that contract award.

Taking into account the specific character of the equipment that was needed to be purchased within the framework of eDrone project, the public procurement procedure was repeated several times according to the national Procurement Law. Since October 2017 TSU has started procurement procedures. The first challenge was the market research, as there were not enough companies who could provide the listed items. Also, during the purchasing period the several tenders were disqualified.

2. OEDs setting-up. List of the equipment purchased and its utilisation

2.1. OED MSU

In the period September 2017-June 2018 the OED of MSU has been developed within the eDrone project. For this purpose an adequate hall have been renovated and supplied with all needed furniture with the support of MSU Rectorate. Taking into account the fact that both CTT and CIA courses include both theoretical and practical lecturer, the

OED included the classroom and laboratory (see picture in the Annexes). The OED of MSU has been opened on June 4th 2018 just at the beginning of the CTT courses in Chisinau, attended by the teachers from the partner country universities and taught by the trainers form program countries involved in the eDrone project.

Moldova State University purchased the OED equipment as follows: the first lot included the specific equipment within the project; the second lot included the most necessary equipment for the ICT platform, which could be purchased from the first instalment of the project; the rest of the equipment included items from both categories and were purchased from the second instalment of the eDrone project.

As the OED USM ensured the CTT courses, which took place in June 2018, the first instalment of the eDrone budget was almost entirely used to equip the OED, which was a decision made by the project team in coordination with UNISANNIO.

The initial list of the equipment to be purchased within the eDrone project is presented in the table below:

Items	Price
ASUS ZENBook UX303LA-C4157H,13.3",(Intel Core i5-4210U, 1.70GHz, Ivy-brudge, 8Gb DDR3 RAM 500Gb HDD,Intel HD 4000 Graphics, Card Reader, Wi-fi N, BT4, HDMI,1,400kg)	1,050.00
Intel Server P4308RPLSHDR	1,400.00
APC BR550GI Power Saving Back-UPS Pro550	200.00
HGST TOURO DESK 4TB USB3.0 for periodical data backup	200.00
Software for development of educational material for elearning modules - Articulate Rapid E-learning Studio '09 Pro	1,050.00
2 Personal Computers: unit system CPU Intel Core i5 3,0 GHz, MB LGA S-1155, RAM 8 GB DDR3, HDD 500 Gb, DVD-RW, Graphic	1,300.00
2 x Monitor 21.5" LG E2242C-BN, G.Black (1920x1080, 5ms, LED5M:1), (TFT+LED backlight , Full HD 16:9, 192	500.00
APC BR550GI Power Saving Back-UPS Pro550	200.00
DELL XPS 13 XPS13ULT-7858seLV Ultrabook (i7- 4500U, 1.80GHz,8GB RAM, 256 GB SSD, Touchscreen, Intel HD Graphics 4400, Windows W8	1,700.00

HP64)	
Brother MFC-J6520 DW	270.00
TP-LINK TD-VG3631 Wireless N300 VOIP ADSL2+ Moden Router	120.00
Samsung Galaxy Tab S 10.5 " , Octacore Quad 1.9 GHz, 3GB RAM Internal storage 16 GB, 4GLT and Wifi	600.00
n. 2 Flight controller (Ardupilot)	800.00
n.1 Frame	50.00
n.5 Motors (Brushless Motor)	350.00
n. 5 ESC	150.00
n. 15 Propellers	60.00
n. 1 Transmitter	500.00
n.1 Receiver	50.00
n.2 Battery	120.00
Charger	20.00
Wireless telemetry link	50.00
Other laboratory accessories (e.g.cables, soldiering station, solder wires, pliers, screwdriver, mechanical nuts, washers, screws, boards for prototyping	4,000.00
Camera (GoPro HERO 4)	300.00
Multispectral camera	4,000.00
infrared camera FLIR camera	3,000.00
Laser scanner Phoenix aerial systems	5,000.00
Environmental monitoring platform (Air Quality Sensors for Smart Cities)	2,000.00
Other sensors platform	2,500.00
Pix4Dmapper Pro	6,500.00
Phantom 3 Professional	2,500.00
n5 Min: quad-core i7 16 GB ram, NVIDIA GeForce 750M GPUs	12,500.00
Total granted	**53 040**

All the items, except the *Software for development of educational material for e-learning modules – Articulate Rapid E-learning Studio '09 Pro* were purchased in due time for being able to utilize in the deployment of the CTT and CIA, starting in June 2018. Instead of the *Software for development of educational material for e-learning modules* the

MSU use the ICT platform developed in the A4.2. of the eDrone project and the educational platform MOODLE (http://moodle.usm.md/moodle/course/index.php?categoryid=208) because the university have already implemented the Moodle e-learning platform. Moodle presents the content in SCORM packages to learners, and saves data from learner interactions with the SCORM package. Instead, it was suggested the opportunity to purchase the 3D Printer and supplier for it, which are needed to assure the sustainability of the CIA practical activities. The updated list of equipment based on the improved technical performance and the current needs of MSU in order to deploy the CTT and CIA within the approved eDrone budget was approved during the meeting in Tbilisi on July 6th 2017.

The changes in the prevision list of the equipment was done taking into account the necessary of equipment for each modules both for CTT and CIA deployment within the approved eDrone budget. The list of the purchased equipment is presented below:

Item	Description
OED teaching and didactical equipment	
2 Netbook	ASUS 14.0" S410UN, Intel Core i7, 1.80GHz, 8Gb DDR3 RAM, 500Gb HDD, Intel HD 4400 Graphics, Card Reader, Wi-fi N, BT4, HDMI
Server	DELL, PY TX2550 M4 Tower, CPU 8 core, min freq. 3,0 GHz, SmartCach 20 Mbm Ram 64 Gb HDD 5TB
2 Back-UPS	Out: 230V, Transfer time ~6ms, selftest, 4 IEC 320 C13
External HD	4TB USB3.0
Visual classroom system	Projector ACER 116517ABD, projection screen, accessories, magnetic & marker whiteboard
Computer for office	ACER, CPU Intel Core i7 3,0 GHz, MB LGA S-1155, RAM 8 GB DDR3, HDD 500 Gb, DVD-RW, Graphic
2 Multifunctional	2 b&w MFP Lexmarc MX 310dn (printer+scanner+copier) for the

printers	eDrone Laboratory and OED office, and 1 color MFP Lexmarc MX 410dn (printer+scanner+copier) for the eDrone Laboratory, LAN+Wireless support
Wireless router	Wireless VOIP ADSL2+ Modem Router
Tablet	Octacore Quad 1.9 GHz, 3GB RAM Internal storage 16 GB, 4GLT and Wifi iPad Pro 11 inch +Celular 256GB Space Gray
2 Tablets	Samsung Galaxi Tab S2 9.7
4 computers for work in classroom	ACER Nitro 50-600 with 27" Big Screen Monitors BenQ GW2765HE QHD 1440P IPS LED, NVIDIA GeForce 750M GPUs
Drone and drone applications equipment	
Flight controller	Ardupilot Mega 2.6-2.8: Accelerometer, Magnetometer, Barometer, GPS, compas, microSD slot or DataDlash chip on board
Frame	F450 frame: 4 motors, D=450-500mm, m=250-400gr.
Arduino Starter Kit	Kits for building drone projects
2 Multicopters	DongYang D800-X4, RC
HC-SR04 Ultrasonic Range Finder	Ultrasonic distance sensor
24 XK Allen X250 quard-Copter 250 Racer (Mode2)	2.4GHz Transmitter, LiPoly battery
Brushless Motor	KV 2000, Idle current 1A, m=30-40gr.
ESC	Con. Cur = 25-30A, programming card, m=8-15gr.
Propellers	R=8'', carbon fibre
Transmitter	16 channels, USB, card slot, 2.4 GHz
Receiver	5 Ghz, m=6gr.

Battery	3S (11.1V), 2000mAh; Phantom 4 Series Battery 15.2V 5350mAh, Intelligent Flight Battery for DJI Phantom 4, DJI Phantom 4 Pro, DJI Phantom 4 Pro V2.0, DJI Phantom 4 Advanced Drone, Li-Polymer
Charger	Out: 0.1-6A, 2-20V, Temp. sensor, 10 charger profiles
Wireless telemetry link	433mHz
Other laboratory accessories	Cables, soldiering station, solder wires, pliers, screwdriver, mechanical nuts, washers, screws, boards for prototyping
3D printer	DaVinci 3D Printer 1.1 Plus, WIFI, camera monitoring, SLA/ FDM (?), 200x200x200 mm3, Layer 0.1mm
3D scanner	3D scanner Ciclop Estop Laser
3D printer filament	1.75 mm PLA/ABS/PET or photopolymers
Camera	GoPRO HERO compatible, HD FPV 1080p
Multispectral camera	Multispectral Survey camera Survey 3W
Infrared camera FLIR camera	FLIR Vue Pro R
Laser scanner Phoenix aerial systems	LiDAR 3D mobile scanner, RP LiDAR A3
Environmental monitoring platform	Flying laboratory SOWA, model SmartCity SOWA, environment monitoring platform
Other sensors platform	Environment monitoring sensors set
Phantom 3 Professional	DJI Phantom 4 Pro drone
Drone bench	Drone bench for drone testing DronesBench Index (IDB)
Pix4Dmapper	Create maps from images taken by drones: Pix4D drone mapping &

Professional drone-mapping	photogrammetry software tools with a flight app, desktop, and cloud platforms, perpetual software license
Flight simulation software	Flight simulation of different drone models and in different weather and landscape conditions
Total expenses	**52 722,21 Euro**

Equipment purchased within the eDrone project are located in the OED and has been used during the deployment of the CTT and the CIA for teaching both theoretical and practical lecturers.

2.2. OED Armenia

By the decision of NPUA Rectorate the OED was placed in the territory of Aerial Robotics Scientific Research Educational Laboratory which was established in October 2017. Taking into account the fact that CIA courses include both theoretical and practical lecturer, the OED included the classroom and laboratory (see picture in the Annexes). The OED of NPUA was opened officially on February 6th 2020. At the moment two training courses (Edition one and Edition two) are organized (because of pandemic of coronavirus they are currently postponed).

The initial list of the equipment was:

Item	Price
ASUS ZENBook UX303LA-C4157H,13.3",(Intel Core i5-4210U, 1.70GHz, Ivy-brudge, 8Gb DDR3 RAM 500Gb HDD,Intel HD 4000 Graphics, Card Reader, Wi-fi N, BT4, HDMI,1,400kg)	1,050.00
Intel Server P4308RPLSHDR	1,400.00
APC BR550GI Power Saving Back-UPS Pro550	200.00
HGST TOURO DESK 4TB USB3.0 for periodical data backup	200.00
Software for development of educational material for elearning modules - Articulate Rapid E-learning Studio '09 Pro	1,050.00
2 Personal Computers: unit system CPU Intel Core i5 3,0 GHz, MB LGA S-1155, RAM 8 GB DDR3, HDD 500 Gb, DVD-RW, Graphic	1,300.00
2 x Monitor 21.5" LG E2242C-BN, G.Black (1920x1080, 5ms, LED5M:1), (TFT+LED backlight , Full HD 16:9, 192	500.00

APC BR550GI Power Saving Back-UPS Pro550	200.00
DELL XPS 13 XPS13ULT-7858seLV Ultrabook (i7- 4500U, 1.80GHz,8GB RAM, 256 GB SSD, Touchscreen, Intel HD Graphics 4400, Windows W8 HP64)	1,700.00
Brother MFC-J6520 DW	270.00
TP-LINK TD-VG3631 Wireless N300 VOIP ADSL2+ Moden Router	120.00
Samsung Galaxy Tab S 10.5 " , Octacore Quad 1.9 GHz, 3GB RAM Internal storage 16 GB, 4GLT and Wifi	600.00
n. 2 Flight controller (Ardupilot)	800.00
n.1 Frame	50.00
n.5 Motors (Brushless Motor)	350.00
n. 5 ESC	150.00
n. 15 Propellers	60.00
n. 1 Transmitter	500.00
n.1 Receiver	50.00
n.2 Battery	120.00
Charger	20.00
Wireless telemetry link	50.00
Other iaboratory accessories	500.00
Camera (GoPro HERO 4)	300.00
Multispectral camera	4,000.00
infrared camera FLIR camera	3,000.00
Laser scanner Phoenix aerial systems	5,000.00
Environmental monitoring platform (Air Quality Sensors for Smart Cities)	2,000.00
Other iaboratory accessories (e.g.cables, soldiering station, solder wires, pliers, screwdriver, mechanical nuts, washers, screws, boards for prototyping	4,000.00
Pix4Dmapper Pro	6,500.00
Phantom 3 Professional	2,500.00
n5 Min: quad-core i7 16 GB ram, NVIDIA GeForce 750M GPUs	12,500.00
Total granted	**51,040.00**

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NPUA received the first part of the funding for the project in April 2017. Starting from the very first days of the project, the participants actively discussed the list of equipment that was approved at the first consortium meeting in December 2017 in Chisinau, Moldova.

Taking into account that the Armenian legislation has gaps in the procurement process stipulated by international projects, it was decided to receive at least 3 price offers from the different companies and ask the eDrone project coordinator to choose a winner. The biddings from three different companies received and asked Prof. Daponte to approve the winner company (see Annex 1), but due to gaps in RA legislation, the university management decided to postpone the purchase of equipment until the end of 2018.

Being in constant contact with Prof. Daponte, Armenian companies engaged in drone design and manufacture as well as NPUA colleagues from other participant universities, where OEDs were also established, NPUA project team proposed to partially change the list of the first part of the equipment, taking into account the experience of colleagues and new technologies that appeared during the project. A new list of the first part of the equipment has been sent for approval and clarification. The positive response from EACEA was received (see Annex 2).

After that, in mid-December 2018, NPUA again received 3 biddings from 3 different companies and again asked project coordinator to approve the winner company (see Annex 3), however, this time the management of the University refused to pay due to the above mentioned reasons.

In parallel with this, a letter from the NPUA management was sent to the Ministry of Finance of RA with a request to clarify the situation. It follows from the answer, which we received in mid-January 2019, that under certain conditions, university can purchase equipment if there are at least 3 biddings.

On April 19, 2019, the National Erasmus+ Office in Armenia organized a meeting with representatives of the ministries of Economy and Finance of Armenia, EU Delegation to Armenia and Armenian universities, at which the final explanations were given on what

to do in the case of the procurements within the framework of international projects (in particular, Erasmus +).

It became clear that a tender should be conducted, according to the Law on Public Procurement of RA and Framework Agreement between EU and RA. Since by this time University of Sannio has already transferred the second part of the funding (NPUA received this money in June 2019), project team has compiled an updated list of already the second half of the equipment and sent for approval.

EACEA approval was obtained on September 19, 2019 (see Annex 4), after which, together with the relevant departments of the NPUA, all the necessary documents were prepared for the tender in accordance with the Law on Public Procurement of RA. The tender for the entire list of equipment took place at the end of November, and at the mid-December 2019 the winners were announced and signed the contracts of delivery of goods.

The 1st changed part

#	Description	Qty	Total in EUR
1.	Charger ISDT 600 Watt	2	284
2.	Remote control -Futaba 14 SG	2	1377
3.	Data transmitter- dragonlink (antenna assuring constantly receiving information)	2	891
4.	Dragonlink Receiver	4	486
5.	Cube autopilot Carrier Board	3	729
6.	Cube autopilot Mini Board	3	292
7.	Cube autopilot V2.1	6	2187
8.	Video transmitter – Receiver HD	2	810
9.	Gimbal+Controller + Camera HD	2	810
10.	Motor T-Motor U3	30	3159

#	Description	Qty	Total
11.	ESC ALPHA 40A LV	30	1823
12.	Propeller- T-Motor 12" Pair Carbon	20	810
13.	Crazyflie 2.0 Nano Quadcopter Kit	10	1944
14.	RioRand Crazyradio 2.4Ghz nRF24LU1+	10	405
15.	Monitor Dell P2715Q 27"	1	1296
16.	Yuneec H920 + 18x Zoom Camera gimbal	1	4050
17.	Raspberry Pi3+	2	122
18.	Quad Frame	3	365
19.	Hexa Frame	3	486
20.	Joystick for Drones	2	81
TOTAL			22405

The 2nd changed part

#	Description	Qty	Total in EUR
1.	vidia JETSON NANO	2	287
2.	Yuneec typhoon H	1	1312
3.	DJI RoboMaster S1	4	3116
4.	FabPro 1000 Full 3D Printer	1	7790
5.	CO2 Laser cutter	1	5330
6.	Notebook	2	1640
7.	PC & monitor	2	1640
8.	Printer, Scaner, Xerox	1	410
9.	Solder station	2	246
10.	Screw, nuts e.t.c	1	410
11.	Battery Lipo 4S 5000mah	6	738
12.	Tools for Lab	1	1640

13.	3D CNC 3 Axi		1	3690
TOTAL				28249
Total expenses				**50 654 Euro**

Equipment purchased within the eDrone project are located in the OED and has been used during the deployment of the CIA for teaching both theoretical and practical lecturers.

2.3. OED Belarus

The Belarusian OED is placed at the Department of Organization of Production and Real Estate Economics of the BSTU. The OED was established 02.04.2019. The Office has one classroom with the appropriate furniture provided by the BSTU, that allows to perform the CIA.

The changes in the list of the equipment have been done in accordance with the project registration procedure by the Ministry of the Economy of Belarus taking into account the equipment necessary for the CIA performing within the approved budget. The list of the equipment allowed for the purchase by BSTU is presented below:

No	Name of goods, works and services	Unit of measurement	Amount	Cost (EUR)
1	License for software for processing data received from a drone (quadrocopter)			9 000,00
2	License for drone training software (quadrocopter)			1 150,00
3	accumulators	pieces	12	2 080,00
4	N-tech PC	pieces	4	4 200,00
5	Server	kits	1	5 000,00
6	Uninterruptible power system	pieces	5	600,00
7	Monitor	pieces	5	2 000,00

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8	Information panel	pieces	1	500,00
9	The tablet	kits	3	1 500,00
10	A laptop with a licensed operating system complete with a bag, a computer headset and a mouse	kits	1	1 200,00
11	Multispectral camera	pieces	1	6 000,00
12	Quadcopter	kits	5	18 400,00
13	Multifunction device	pieces	1	400,00
14	Wireless router	pieces	1	45,00
15	Switch	pieces	1	35,00
16	External hard drive	pieces	2	250,00
17	External DVD drive	pieces	1	40,00
18	Magnetic whiteboard with consumables	pieces	1	65,00
19	Electrical wires and wiring accessories, cables, adapters and connectors			50,00
20	Office Supplies and Consumables			525,00
Total granted				53 040,00

The purchase procedure is being carried out at present according to the Decree of the Council of Ministers of the Republic of Belarus of March 15, 2012 No. 229 "On the improving of the relations in the field of the procurement of goods (works, services) at the own expense". The procurement procedures are in a possibility of their delaying due to the coronavirus situation.

2.4. OED Georgia

By the decision of TSU Administration the OED was placed in the territory of FAB LAB Taking into account the fact FAB LAB is the space for engineers and people interested in

new technologies, eDrone laboratory will be promoted better among the parties. The official opening of the OED at TSU was planning by 6th of March 2020, but because of pandemic the ceremony was postponed. The first edition of CIA courses was conducted and the second one has been postponed.

The initial list of the equipment to be purchased within the eDrone project is presented in the table below:

Items	Price
ASUS ZENBook UX303LA-C4157H,13.3",(Intel Core i5-4210U, 1.70GHz, Ivy-brudge, 8Gb DDR3 RAM 500Gb HDD,Intel HD 4000 Graphics, Card Reader, Wi-fi N, BT4, HDMI,1,400kg)	1,050.00
Intel Server P4308RPLSHDR	1,400.00
APC BR550GI Power Saving Back-UPS Pro550	200.00
HGST TOURO DESK 4TB USB3.0 for periodical data backup	200.00
Software for development of educational material for elearning modules - Articulate Rapid E-learning Studio '09 Pro	1,050.00
2 Personal Computers: unit system CPU Intel Core i5 3,0 GHz, MB LGA S-1155, RAM 8 GB DDR3, HDD 500 Gb, DVD-RW, Graphic	1,300.00
2 x Monitor 21.5" LG E2242C-BN, G.Black (1920x1080, 5ms, LED5M:1), (TFT+LED backlight , Full HD 16:9, 192	500.00
APC BR550GI Power Saving Back-UPS Pro550	200.00
DELL XPS 13 XPS13ULT-7858seLV Ultrabook (i7- 4500U, 1.80GHz,8GB RAM, 256 GB SSD, Touchscreen, Intel HD Graphics 4400, Windows W8 HP64)	1,700.00
Brother MFC-J6520 DW	270.00
TP-LINK TD-VG3631 Wireless N300 VOIP ADSL2+ Moden Router	120.00
Samsung Galaxy Tab S 10.5 " , Octacore Quad 1.9 GHz, 3GB RAM Internal storage 16 GB, 4GLT and Wifi	600.00
n. 2 Flight controller (Ardupilot)	800.00
n.1 Frame	50.00
n.5 Motors (Brushless Motor)	350.00
n. 5 ESC	150.00
n. 15 Propellers	60.00

n. 1 Transmitter	500.00
n.1 Receiver	50.00
n.2 Battery	120.00
Charger	20.00
Wireless telemetry link	50.00
Other laboratory accessories (e.g.cables, soldiering station, solder wires, pliers, screwdriver, mechanical nuts, washers, screws, boards for prototyping	4,000.00
Camera (GoPro HERO 4)	300.00
Multispectral camera	4,000.00
infrared camera FLIR camera	3,000.00
Laser scanner Phoenix aerial systems	5,000.00
Environmental monitoring platform (Air Quality Sensors for Smart Cities)	2,000.00
Other sensors platform	2,500.00
Pix4Dmapper Pro	6,500.00
Phantom 3 Professional	2,500.00
n5 Min: quad-core i7 16 GB ram, NVIDIA GeForce 750M GPUs	12,500.00
Total granted	**53040**

The changes in the prevision list of the equipment was done taking into account the necessary equipment for CIA deployment within the approved eDrone budget. The list of the purchased equipment is presented below:

Item	Qty	Description
Flight controller	6	HX4-06057 (Cube & Here 2 (Pixhawk 2.1 Standard)
Frame	6	Hobbyking™ HMF X240 Quadcopter Frame Kit
Brushless Motor	24	MultiStar Viking 1308- 4100KV (Brushless Outrunner Drone Racing Motor (CW) – (CCW)
ESC	24	Turnigy Multistar 32bit 12A Race Spec ESC 2~4S (OPTO)
Propellers for built multirotor	30	Lumenier 5x3.5 - 2 Blade Propeller (Set of 4 - Black) 2x CW and 2x CCW

RC Transmitter + reciever	6	Turnigy 9X 9Ch Transmitter w/ Module (AFHDS 2A system) Turnigy iA6C PPM/SBUS, 8CH 2.4G AFHDS 2A Telemetry Receiver
Battery fo RC Transmitter	6	ZIPPY Flightmax 2500mAh Transmitter Pack (Futaba/JR)
Battery for built multirotor	12	Turnigy 1300mAh 2S 20C Lipo Pack (w/XT60)
Charger	2	Turnigy P606 LiPoly/LiFe AC/DC Charger (EU Plug
Wireless telemetry link	6	Wireless telemetry link - HolyBro Transceiver Telemetry Radio Set V2 (433mhz)
Arduino UNO	6	Arduino UNO - starter kit
IMU	6	IMU - MPU-9250
Ultrasound	6	Ultrasound - HC-SR04
GPS	6	GPS - NEO6M
Pro multirotor for payloads	1	DJI Matrice 600 Pro
Other laboratory accessories	1	soldiering station Baku 702.
	1	cables 40 x 1 Pin Female To Female Jumper Cable Set. Length: 120mm. Pin Spacing:1mm;
	1	096-JGO SCREWDRIVER 38 PCS HKSDB0338;
	1	Digital multimeter 890D
3D printer	1	Anycubic 3D-171 Upgraded Full Metal I3 Mega 3D PRINTE
3D printer filament	10	1.75 mm PLA/ABS/PET or photopolymers
3D Scanner	1	EinScan SE Desktop 3D Scanner
Infrared camera	1	FLIR-duo thermal camera
Multispectral camera	1	Parrot Sequoia
Laser scanner Phoenix aerial systems	1	RPLIDAR A2M8 + Barrel connector
Environmental monitoring platform	1	Flying laboratory SOWA

Item	Qty	Description
Back-UPSs	2	Tripp Lite / AVRX750UD
External HD	1	Seagate Basic / STJL5000400
Computer for office	2	Dell OptiPlex 3070 MT/octacore i7 8 GB RAM,
Monitor	2	Dell 24 Monitor - E2420H
Netbooks	2	Dell Vostro Notebook 3590 / N2068BVN3590EMEA01_200
computers for work in classroom	4	Dell Precision 3630 octacore i7 16 GB RAM, NVIDIA Quadro P1000 GPUs/Dell 27 Monitor- E2720H
Tablet	1	Samsung / Galaxy Tab Active 2 LTE 16GB / SM-T395
Netbooks	2	Dell Vostro Notebook 3590 / N2068BVN3590EMEA01_200
computers for work in classroom	4	Dell Precision 3630 octacore i7 16 GB ram, NVIDIA Quadro P1000 GPUs/Dell 27 Monitor- E2720H
Pix4Dmapper Professional drone-mapping	1	Create maps from images taken by drones: Pix4D drone mapping & photogrammetry software tools with a flight app, desktop, and cloud platforms, perpetual software license

The items shown in the table below, could not been purchased due to the start of pandemic COVID 19 that unfortunately has influenced on the process. The market research was held and the invoice for 21000 GEL (aprox. 7000 EUR) was annulled:

Drone to learn how to fly	EACHINE E38 WiFiFPV Quadcopter
Pro multirotor for payloads	Six axis drone. Ready to Fly+Universal Gimbal (3-Axis)+video transmitter 5.8 GHz + video receiver+2xBattery 10000 mah

Framing within project budget

Equipment purchasing was implemented in line with the project requirements and within the initial budget provided by the project. In the following table of the foreseen and spent amount is reported for each university OEDs.

Partner	Project budget, EUR	Project expenses, EUR
P9. Moldova State University	53 040	52 722,21
P13. National Polytechnic University of Armenia	51 040	50 654
P14. Belarusian State Technological University	53 040	-
P16. Tbilisi State University	53 040	39687,84 EUR

3. The dissemination events provided by the OEDs

3.1. OED MSU

In order to disseminate the OED, the eDrone project and the CIA courses a range of activities have been developed.

1. Between July 12 and 15, 2018, the archaeological site of the Moldova State Univrsity in the Saharna, Rezina district, took place in the 8th edition of the Saharna Summer Colloquium on Archaeological Complexes in the Iron Age Settlements, organized by the Thracian Research Laboratory of the State University of Moldova in collaboration with the "Gavrilă Simion" Eco-Museum Research Institute of Tulcea (Romania). The MSU eDrone team participated in the Saharna International Colloquium on Archeology, conducting a master class on eDrone application in the archeology area (http://usm.md/?p=19802&lang=ro).

2. 14 Jun 2018: His Excellency Bartłomiej Zdaniuk, Ambassador Extraordinary and Plenipotentiary of the Republic of Poland to the Republic of Moldova has visited the Office for Education for Drones (OED) at the Moldova State University. **His Excellency Bartłomiej Zdaniuk**, Ambassador Extraordinary and Plenipotentiary of the Republic of Poland to the Republic of Moldova has visited the Office for Education for Drones (OED) at the Moldova State University. In His visits, the Ambassador has strong supported and encouraged eDrone project activities and the international collaboration. Further information are available at: http://usm.md/?p=19456&lang=ro

3. **Another dissemination activity in the project was the participation of the MSU eDrone team in the** XXIIth International Exhibition of Inventions, Research and Technological Transfer "INVENTICA-2018", and the XXIIth International Conference of Inventions between June 27-29, 2018 in Iasi in the Lost Steps Hall of the "Gheorghe Asachi" Technical University of Iasi, Romania. There were presented 530 patents and technology transfer projects, as well as scientific papers related to the innovation and scientific research. The participants list included the representatives of universities, research centers, companies and NGOs from different countries, such as Romania, USA, Canada, Egypt, Republic of Moldova, Russian Federation, Poland, and Malaysia. Moldova State University (MSU) team members of the Erasmus+ eDrone project, Prof. Florentin Paladi and Ms. Tatiana Bulimaga, have participated in the Exposition and Conference. Among another 14 research and technology transfer projects presented by the MSU, as a recognition of the quality of eDrone project and its impressive deployment results,

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such as OED & CTT courses, the "INVENTICA-2018" Organizing Committee has awarded **the Gold Medal and Diploma of Excellence for the Erasmus+ "Educational for Drone (eDrone)" project (**Universitatea de Stat din Moldova » Noi succese ale cercetătorilor USM la Expoziţia Internaţională de Invenţii „Inventica 2018")**.

4. **Chisinau, 10 November 36 research institutions from the country participated in the 8th issue of Science Day, which took place today at the National History Museum of Moldova.**

   The event was organized by the Ministry of Education, Culture and Research, in partnership with the National History Museum, National Institute of Economic Research, Institute of Zoology, Institute of Physiology and Sanocreatology, Institute of Genetics, Plant Physiology and Protection, Institute of Geology and Seismology and other institutions supported by the European Union through the EU Program for Research and Innovation (2014-2020) Horizon 2020. eDrone Project was presented

to this important event and attracted the attention of several people and young students.

5. **The eDrone project OED, CTT & CIA courses were awarded Silver Medal and Diploma of Excellence at EUROINVENT-2019 and Book Salon.** The 11th Edition of EUROINVENT – European Exhibition of Creativity and Innovation were held in Iasi, Romania, May 16-18, 2019 at Palace of Culture Iasi. The event promotes creativity and innovation in international context. There were presented about 600 patents and projects, as well as scientific books and journals related to the innovation and scientific research. The participants list included the representatives of universities, research centres, companies and NGOs from about 45 countries, such as Romania, USA, Canada, Egypt, Portugal, Iraq, Republic of Moldova, Russian Federation, Poland, and Malaysia. Moldova State University (MSU) team

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members of the Erasmus+ eDrone project, represented by Ms. Tatiana Bulimaga, have participated in the Exhibition and Book Salon. Among another 10 elaborations and projects presented by the MSU, as a recognition of the quality of eDrone project and its impressive deployment results, such as OED, CTT & CIA courses, the "EUROINVENT-2019" Organizing Committee has awarded **the Silver Medal and Diploma of Excellence for the Erasmus+ "Educational for Drone (eDrone)" project.** At the same time, the **Handbook for the CIA courses (Authors:** Natalia NEDEOGLO, Corneliu ROTARU, Anton DANICI, Valeriu SEINIC, Veaceslav SPRINCEAN, Constantin VOZIAN, Valeriu CAZAN, Ion CORCIMARI, Eugenia CEBOTARU, **Coordinators: P**asquale DAPONTE, FIlorentin PALADI, Tatiana BULIMAGA) **has awarded the Diploma of Excellence of the Book Salon.**

6. For dissemination purpose the OED of MSU team organized seminars and introductory lecturers with future attendees of the CIA courses. 28 June 2019: The Tiraspol State University has attended an introductory training course for drone in the framework of eDrone activities (https://www.facebook.com/photo.php?fbid=2320859647959825&set=a.661689250 543548&type=3&theater).

7. In order to disseminate the eDrone project, the CIA courses and the OED a range of TV interviews have been realized by he MSU eDrone team:

- http://edroneproject.org/index.php/news/145-10-july-2018-rtr-moldova-tv-channel-about-the-edrone-project-activities

- http://edroneproject.org/index.php/news/140-a-new-website-talk-about-edrone-laboratorul-de-pilotare-a-dronelor

- http://edroneproject.org/index.php/news/139-another-moldovan-national-tv-channal-jurnal-tv-about-the-edrone-project-current-activities

- http://edroneproject.org/index.php/news/137-edrone-on-the-moldovian-tv-channel-tvr-moldova

3.2.   Armenia

17 February 2020. "Unmanned Aerial Vehicle Training" course started in the OED (Office for Education for Drone) laboratory created within the frames of eDrone project at National Polytechnic University of Armenia (NPUA).

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The short-term training program was developed as an outcome of trainings organized during eDrone project. Within the frames of the course NPUA and ASUE lecturers also teach on the areas (construction, agriculture, emergencies, etc.) and capabilities of civil use of drones.

On **February 26**, a meeting took place between the Civil Aviation Committee, UNDP in Armenia, Ministry of Emergency Situations, Erasmus + National Program Office, "Locator" CJSC, Aviation Training Center, NPUA and ASUE within the frames of eDrone project in the Civil Aviation Committee. The Draft of Technical Assignment for the Working Group on the Regulation of UAVs within the framework of the National Disaster Risk Reduction Platform was discussed.

The next step should be elaboration of the common educational program on the base of eDrone CIA curricula which will be used for different purposes by wide range of stakeholders.
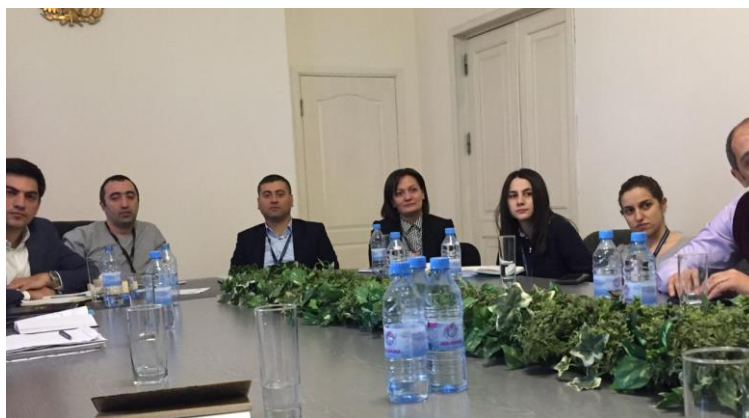
27 February 2020. The presentation of "Unmanned Aerial Vehicle Training" course and tour around the OED (Office for Education for Drone) laboratory created within the
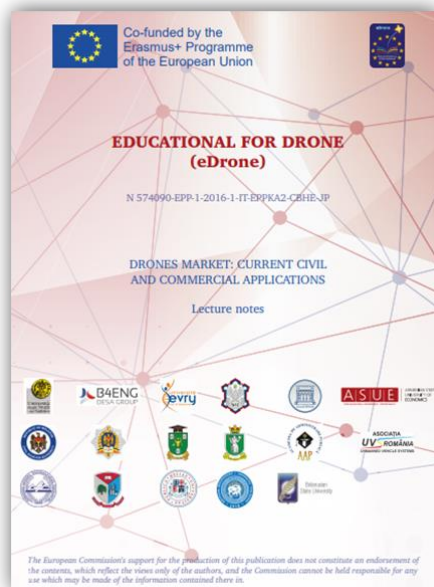
frames of eDrone project at National Polytechnic University of Armenia (NPUA) was held for all stakeholders.

At the end of the event, some of the students have already registered for the 2nd "UAV Training" course, which will launch on March 2.

- Printed lecture notes for the CIA attendees (ASUE)

3.3. Belarus

In order to disseminate information about the OED, the eDrone project and the CIA courses a range of activities have been developed by BSTU eDrone team.

1. In the period from April 8 to 12, the International ICT Forum "TIBO". The TIBO Forum is held in the Republic of Belarus on an annual basis and represents a platform for the exchange of new achievements and best practices in the field of information technology. Representatives of BSTU eDrone team acted as speakers at the ICT forum and raised a number of issues related to the development of regulatory legal acts that regulate drone activities, the introduction of UAV developments in the industry of the Republic of Belarus and other issues:

1) Round table "The use of small unmanned aerial vehicles in order to monitor and track the life cycle of agricultural plants, optimize the use of fertilizers and monitor the movement of agricultural machinery." The use of high and medium resolution remote sensing data for agricultural monitoring.

2) Round table "Integration of drones into the concept of "smart city ": the use of drones as a monitoring tool and obtaining spatial information; use of drones during construction works, calculation of earth masses during construction, optimization of road construction, construction of accurate orthophotomaps, 3D modeling of construction objects and transport infrastructure of modern cities; conducting thermal imaging to account for heat loss in the heating networks of settlements" Educational technology in the field of drones.

3) Round table "Modern systems for dispatching and ensuring safe air traffic of drones. Control systems and counter drones. Legal regulations the use of drones in the Republic of Belarus" Drone detection and suppression systems.

1. In the period from April 18 to April 19, 2019, competitions were held on the masterless drone piloting skill of the title "The Best Calculation of Unmanned Aircraft Systems of Bodies and Units for Emergency Situations of the Republic of Belarus". During competition, BSTU eDrone team presented CIA courses for representatives of the Ministry of Emergency Situations of the Republic of Belarus.

2. In the period from May 15 to 16 2019 in Minsk, the National Exhibition and Forum Security Center took place, in which the representatives of BSTU eDrone team presented OED office and CIA courses. The following issues were discussed: new technological capabilities of drones as an element of a security system; the use of drones to solve industry problems, automation, software, the capabilities of thermal imaging equipment and video surveillance cameras.

The audience was attended by industry experts from various professional segments such as security, law enforcement agencies, the Ministry of Emergencies, the Ministry of the Interior, Forestry, transport infrastructure (bridges, roads), railways, aviation, energy, communications, surveying and cartography, etc.

3. On September 27, in Vitebsk (Belarus), a conference was held on the features of the use of drones in industry «Practical application of industrial quadrocopters. The range of tasks to be solve» The following issues were discussed:

1) The use of drones as a tool for monitoring and obtaining spatial information, visual inspection and control, autonomous survey of the terrain; the use of drones during construction work, the calculation of earth masses during construction, the identification of areas requiring repair, the optimization of road construction, the quality control of road surfaces. Mapping with new precision, building accurate orthophotomaps, 3D modeling of construction sites and transport infrastructure of modern cities. Monitoring the targeted use of land and unauthorized construction, conducting thermal imaging to account for heat losses in the heating networks of settlements, as well as in the areas of public safety, inspections, search and rescue operations, firefighting and law enforcement.

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2) Legal regulation of drone status Features of the use of drones in accordance with applicable law, the main provisions of regulatory legal acts, the legitimate use of airspace.

3) Aircraft detection and suppression systems. Modern systems for dispatching and ensuring safe air traffic of unmanned aerial vehicles. Control systems and counteraction to drones.

4. The team takes an active part in Open days of the university, exhibitions of the "Fair of professions" and other carrier orientation events with a presentation of the OED office and CIA courses.

3.4. Georgia

TSU team has started spreading the information about the eDrone from 2017. The first working meeting was held with the National Environmental Agency to offer them cooperation and promote planned CIA courses. As their employees are working with drones and they were interested in qualification raising.

Several meetings were held with the Agency of Aviation of Georgia. They are partners of our project and support the practical part of OED functioning.

In 2017 at the international conference for Distance learning Development the presentation was held by TSU team and the information about the future Drone CIA courses were promoted.

The OED at TSU has been promoted at the City Hall of Tbilisi and the cooperation plans are made to start project.

CIA courses were promoted within the university and outside.

Conclusion

The OEDs are one of the main results of the eDrone Project from a range of factors:

- The OEDs assure the teaching activities during the CIA courses deployment both theoretical and practical activities;
- The OEDs will assure the sustainability of the eDrone project, in particular the continuity of the CIA courses within VET paradigm: MSU create the program for professional continuing education "Education for drone" for all interesting persons.
- The OEDs are a true platform for further activities related to drones: new research project, knowledge and technology transfer, economical contracts etc.

In this regard the financial support of the eDrone project, especially the part of the budget allocated for equipment purchase for OEDs setting-up is very important for each partner country involved in the project.

Equipment purchasing was implemented in line with the project requirements and within the initial budget provided by the project. In the following table of the foreseen and spent amount is reported for each university OEDs.

Institutions	Project budget, EUR	Project expenses, EUR
P9. Moldova State University	53 040	52 722,21
P13. National Polytechnic University of Armenia	51 040	50 654
P14. Belarusian State Technological University	53 040	?
P16. Tbilisi State University	53 040	39687,84

Fig.1. OED of MSU

Fig.2. OED of MSU

Fig.3. OED of MSU

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