

Project Title:
**MODERNIZING AGRICULTURAL PRACTICE USING
INTERNET OF THINGS**

Project Acronym:
MAPIoT

Grant Agreement number:
20-COP-0019

Subject:
**INTERNAL REPORT FOR 3RD TRANSNATIONAL PROJECT MEETING (TPM3)
17-19 JULY 2023¹**

Dissemination Level:
RESTRICTED TO OTHER PROGRAMME PARTICIPANTS

Project Coordinator:
“Lucian Blaga” University of Sibiu

Contributors:
ULBS/ USN

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| V1 | July 2023 | Month 3-20 | 01/12/2021 | 24 Months |

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1. General information

Between 2023 July 17-19, took place the 3rd Transnational Project Meeting (TPM3) of the MAPIoT project. It was attached into a separate file the agenda of the meeting - http://digifof.omilab.ulbsibiu.ro/static/docs/TPM3_Detailed_agenda_Sibiu_17-19_July_2023.pdf. It was developed in two stages: first one in Sibiu at Engineering Faculty, Lucian Blaga University of Sibiu (17 and 19 July) and second one was in Gârbova, Alba County, Romania (on July 18). The meeting was organised in the Casa Bună guest house, Gârbova. Mr. Peter De Boer, the Strategic Corporate Financial Manager of the DN AGRAR Group SA and Mr. Cătălin Mihacea, Manager of the Sibiu IT Cluster, were present in all the days at our 3rd TPM meeting and to the Multiplier Event.

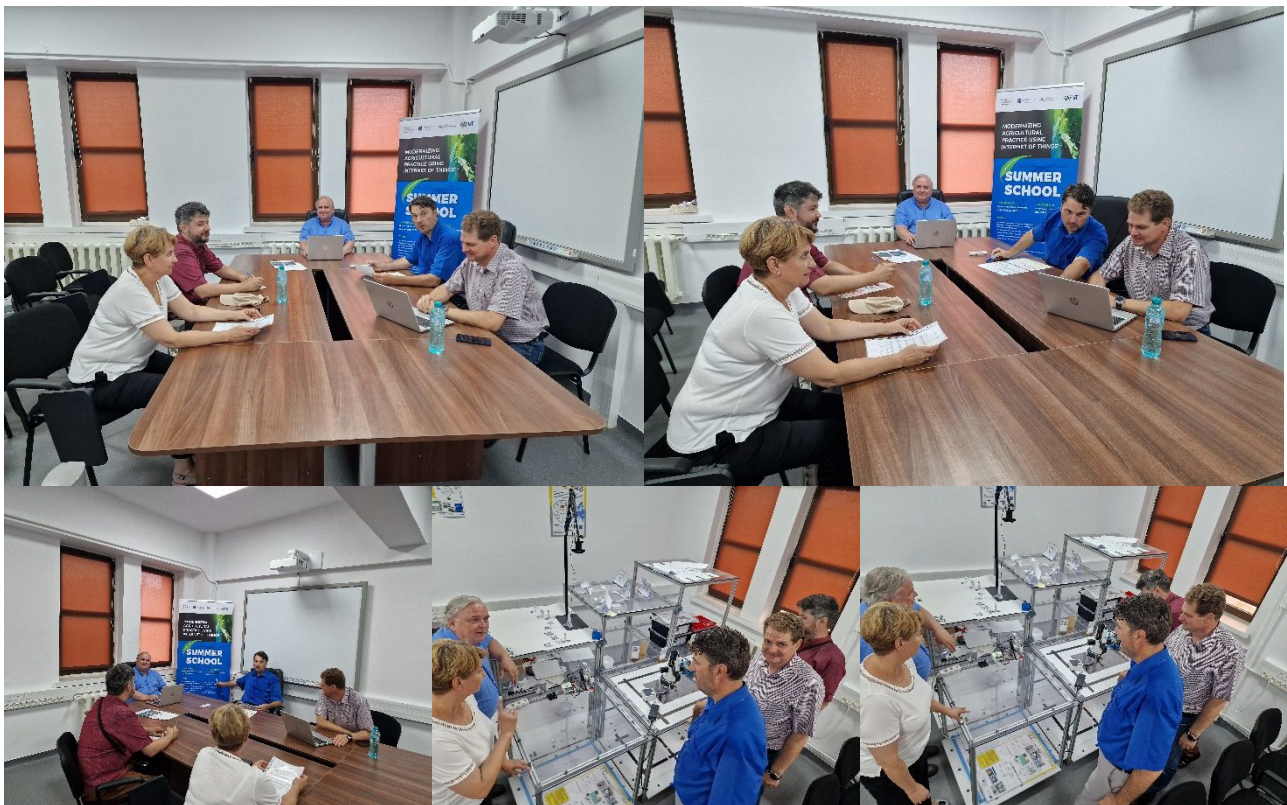


Figure 1. Lasse Berntzen and Romanian professors discussed in the Digital Transformation Lab (Room IM311) @Engineering Faculty

The participants to the 3rd TPM meeting were the four Romanian professors involved in the MAPIoT project (Adrian Florea – manager of the project, Anca Şipoş, Daniel Morariu and Ion Mironescu) and other colleagues from the Faculty of Engineering with whom the project manager collaborates in Energy Efficiency and Circular Economy projects (Dorel Stănescu and Radu Creţulescu) as well as collaborators of Professor Lasse Berntzen in another project developed in partnership with the Sibiu County Council (Claudiu Isarie and Mihaela Rotaru). Professors Delia Ştefenel, the Head of ULBS International Office and Radu Creţulescu who is member of the board of Computer Science and Electrical Engineering Department from Engineering Faculty, ULBS and who substitutes the head of department (prof. Daniel Volovici) revealed the importance of long-term collaborations between USN and ULBS and the necessity for further projects development.

The second day of TPM3 we visited DN AGRAR Group SA at Gîrbova. Before starting our meeting Mr. Peter De Boer presented us the DN AGRAR Group SA. This is the largest integrated livestock farm in Romania, with cow milk production and vegetable production. The group operates in the center of Transylvania, in Alba, Sibiu and Hunedoara counties. The company was founded in 2008 by Jan Gijsbertus de Boer and it is listed on the Bucharest Stock Exchange, AeRO market. DN AGRAR Group's debut on the capital market was marked by the successful completion of a private placement of shares in July 2021, attracting 24.8 million lei from investors. The company's main areas of activity are livestock, vegetal agricultural production, agricultural services, logistics, transport, tourism and business and management consulting services.

Adrian Florea (MAPIoT project manager), Anca Şipoş, Daniel Morariu, and Ion Mironescu (professors) participated from Lucian Blaga University of Sibiu. Lasse Berntzen (coordinator from USN partner), Peter De Boer, the Strategic Corporate Financial Manager of the DN AGRAR Group SA (<https://dn-agrar.eu/>) and Eng. Cătălin Mihacea, Manager of the Sibiu IT Cluster (<https://sibiu-it.ro/>) participated at TPM3.










Figure 2. Before the technical meeting of staff the ULBS team and students learn basics about DN AGRAR GROUP

Then, was discussed the list with the remaining activities from the second year of project (in progress or that follow), the documents prepared for students, lectures, and the second summer school challenges based on the experience from the first summer school. The focus was on the problems / challenges that occurred in organization of the second summer school and for estimating the additional budget required for organizing this summer school in Romania, Sibiu.

2. Discussion about the summer school

The discussion started with offering an opportunity for students to access all materials from the summer school. For this, a Google classroom called “*Summerschool Norway*” - <https://classroom.google.com/u/0/c/NTMxNzEwNDEyNjI3> was created and the possibility of Norwegian students who do not have a google account to access this classroom was discussed. It was discussed the final format of “*Certificate of attendance*” that will be received by every student who successfully completes all courses in the summer school. Also, the project members had a short discussion about the letter with 5 ECTS credits that will be received by every student that successfully finish the summer school.

CERTIFICATE OF ATTENDANCE

This is to certify that

Vendela Myhre Søliland

from _____ University of South-Eastern Norway,

participated in the summer school of the project
“Modernizing Agricultural Practice using Internet of Things”,
funded by EEA and Norway Financial Mechanism 2014-2021,
Education, Scholarships, Apprenticeships and Youth Entrepreneurship Program (ESAYEP)
in Romania, GRANT 20-COP-0019
organized by
“Lucian Blaga” University of Sibiu, Romania and
University of South-Eastern Norway

Faculty of Engineering, ULBS, Sibiu, Romania
July 17 – July 30, 2023

Project Manager,
Professor Eng. Adrian FLOREA, PhD

MAPIoT Summer School 2023 Working together for a green,
competitive and inclusive Europe

To whom it may concern,

MAPIoT Summer School: 5 ECTS-Credits
Organized by “Lucian Blaga” University of Sibiu, Romania, July 2023
Placed: Faculty of Engineering, Sibiu, Romania
Period: 16 July 2023 – 29 July 2023

With this letter, we would like to inform you about the workload and associated ECTS credits awarded in the “Modernizing Agricultural Practice using Internet of Things (MAPIoT)” Summer School.

MAPIoT is a project Financed by EEA and Norway Financial Mechanism 2014-2021, Education, Scholarships, Apprenticeships and Youth Entrepreneurship Programme (ESAYEP) in Romania GRANT 20-COP-0019. Based on this project two summer schools are organized, one in 2022 in Norway and one in 2023 in Romania. It focuses on development and application of digital technology in agriculture to transferring digital skills, knowledge, and technologies from Computer Science domain toward Agriculture, Food Processes and Safety improving efficiency. Its aim is to equip Bachelor and Master Students with knowledge for using techniques related to Internet of Things, Artificial Intelligence, Robotics and Smart Drones and their application in Agriculture and Food Safety Processes. To get more information on content, please visit <http://digitfor.omilab.ulbsibiu.ro/psm/content/mapiot/info>

The total workload per attending student is calculated to 126 hours, which corresponds to 5 ECTS credits awarded by “Lucian Blaga” University of Sibiu (ULBS). The workload is divided in the following way:

| Devoted to | Hours |
|------------------------------------|-------|
| Lectures | 32 |
| Exercises | 22 |
| Hackathon | 20 |
| Presentations | 22 |
| Self-study for written examination | 30 |

The students must visit all lectures during the two weeks of classes. In the supporting exercise units participants work on specific problems. At the Hackathon the students need to “Develop your own business in agriculture and food industry”. The final exam consists of a presentation based on student projects, as well as a written examination. The presentation takes place during the last day of MAPIoT Summer School. In the written examination students need to answer questions prepared by lecturers and distributed through an online platform.

If you have any further questions, please don’t hesitate to contact me!

With best regards,
Prof. Eng. Adrian FLOREA, PhD
Manager of MAPIoT project

Prof. Eng. Maria VINTAN, PhD
Dean of Engineering Faculty, ULBS

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Figure 3. The final format of “Certificate of attendance” and ECTS form

The second subject was the accommodation and meal for the Norwegians’ participants (teachers and students). Also, providing transportation in the two days of industrial’ societies visits was raised by Professor Daniel Morariu. Professor Anca Sipos addressed also the problem of providing students Lunch from project management budget.

At this summer school, in order to implement “Drones for gathering images and Computer Vision – theory and applications” course, we set a trip at Rusciori ULBS farm on 26th of July where we may fly with the drones purchased last year. Lasse Berntzen presented the purchased drones and made a short summary related to the performances offered by them.



Figure 4. Analyse the drone performance

Regarding the documents for course quality evaluation (QA) that the students, participants at this summer school, need to be completed for each course we decide that at the end of each course the students could complete the documents and at the end of summer school the students could complete rest of the forms.

On 19th of July we continued with the discussion about the second Multiplier Event that need to be organised closer to the end of the summer school and how can be realised and where. There were discussed some aspects regarding the possible guests. Adrian Florea proposed a list of possible guests from industry, and he said that some people already confirmed the participation (Peter De Boer from DN AGRAR Group SA, Cătălin Istratie from Agile Networks Technologies, Cristian Cîmpineanu from Sibiu IT Cluster, Anda Antonescu from Marquardt Schaltsysteme România). Also, guests from education sector will participate – Prof. Delilah Florea, the Assistant Rector of Samuel von Brukenthal National College Sibiu, Prof.dr.ing. Maria Vințan – the Dean of Engineering Faculty, Lucian Blaga University of Sibiu. Thus the agenda was established and part of the list of participants.

3. The MAPIoT project Web site

The meeting continued with debate about the MAPIoT web site problems issues during discussion about Intellectual Output 2 - Digital platform for transferring digital skills, knowledge and technologies from Computer Science domain toward Agriculture, Food Processes and Safety domain. Thus Adrian Florea presented the site <http://digifof.omilab.ulbsibiu.ro/psm/content/mapiot/info?view=activities> realised by the ULBS and illustrated the new elements that was added on the site in latest months. Adrian had shown the applications developed by the Romanian partner:

- App1: [Supervising and controlling White Wines Fermentation Parameters Evolution](#)
- App2: [IoT System for Irrigating and Monitoring a Thuja Conifer Nursery](#)
- App3: [Modelling and Simulation of an Automated System in an Agricultural Warehouse](#)
- App4: [Digital design of food manufacturing processes](#)
- App5: [AI, an essential tool for control process in food engineering education](#)

It was discussed what elements need to be put on the website by the Norwegian part. Lasse Berntzen agreed with these elements and presented the applications ideas from Norwegian part.

Adrian Florea presented the status of the applications and how can be used and the materials regarding the user manual that was realised. Anca Sipos pointed some aspects regarding the benefits that can be obtained with these applications. Daniel Morariu presents the server where the application for predicting using AI the parameters for Wine Fermentation is stored and the link that can be used by all peoples (<http://193.226.29.27/>) to access the application and made some simulations and predictions.

Adrian Florea presented the second application “IoT System for Irrigation and Monitoring a Thuja Conifer Nursery”, the elements that already was done and work as: all controllers for collecting data, the server that receives information’s from collectors, the server’s module (MongoDB database and MQTT Broker) that was realised and integrated on the same server. Daniel Morariu presented the detailed elements and how was integrated on the server. Also he had shown the web interface that was realised until that moment and what can be seen on the application. Also it was discussed how can this web application can be deploy on the web servers in order to can be accessed by all people, because the application need to have some pages that need to be restricted in order to be accessed and configured only by the farmer. Also, the farmer needs to have the possibility to establish exactly what information can be made public and what information can be made private.

In the third day of the TPM3 project meeting it was discussed the MAPIoT dissemination activities and the summer school schedule. Thus, Adrian Florea presented the LinkedIn page that already was created for the project (<https://www.linkedin.com/groups/9164050/>) and propose to present there also all the activities of the second summer school that will be organised in this period. All students from the summer school were announced about this dissemination media channel on LinkedIn and had suggested them to create an account on LinkedIn and share also this link on their private channels like Facebook or Instagram.

4. The article dissemination

The project partners had discussed about the Intellectual Output 1 - disseminating results through publishing articles to mainstream conferences or journals in the project topic. It was revealed that, this process of writing scientific papers till their acceptance and publishing, what was already realised and sent to conferences and journals for publication took a long time. The first achievement, the article with the authors Lasse Berntzen, Adrian Florea, “Design Thinking Applied to the Internet of Things - A Project on Technological Innovation in Agriculture and Food Processing”, ICDS 2022, The Sixteenth International Conference on Digital Society, Porto, Portugal, 26-30 June 2022, pp. 44-49, ISSN: 2308-3956, was already accepted and presented in the conference in June. It was highly appreciated by the conference reviewers that considered it as best paper.



Figure 5. The first article produced through MAPIoT project received the Best Paper Award at ICDS 2022 conference. Another article entitled Florea, A., Popa, D. I., Morariu, D., Maniu, I., Berntzen, L., & Fiore, U. (2023). *Digital farming based on a smart and user-friendly IoT irrigation system: A conifer nursery case study*. IET Cyber-Physical Systems: Theory & Applications was published in Wiley Publishing House - <https://ietresearch.onlinelibrary.wiley.com/doi/pdf/10.1049/cps2.12054>.

Anca Şipoş proposed to work for a new article that can be based on activities that were made together, with the following title: *Simulation-based learning, an essential tool in engineering education*.

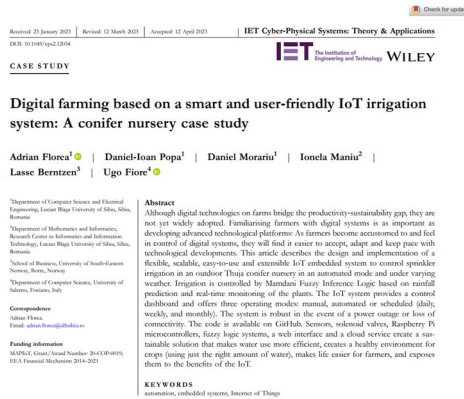


Figure 6. The second article produced through MAPIoT project was published in ISI journal Q3 (category COMPUTER SCIENCE, INFORMATION SYSTEMS (in ESCI edition))

5. The Action Lists, Scorecard indicators and Budget

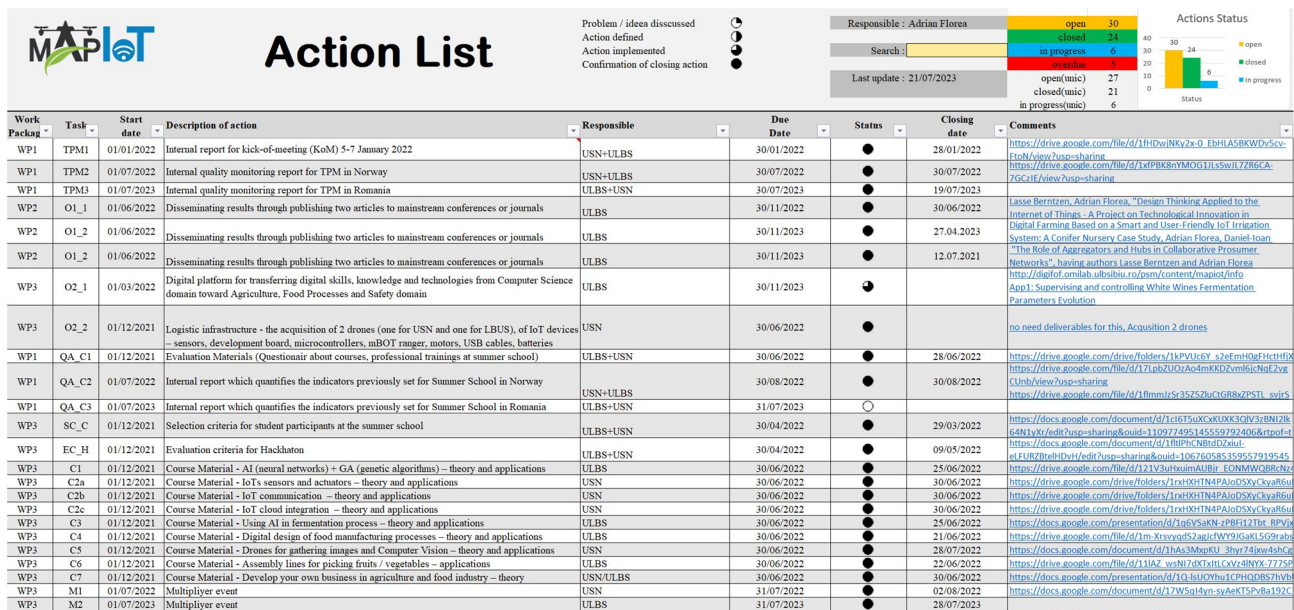


Figure 7. The status of activities developed through the MAPIoT project

Project TPM3/Summer School in Romania

| Romania July 2023 | Actual | Expected |
|---------------------------|--------|----------|
| Teaching staff | 8 | 7 |
| from Roumania | 7 | 4 |
| form Norway | 1 | 3 |
| 1 member from 2 companies | 6 | 2 |
| authority person | 1 | 1 |

| Students | Actual | Expected |
|---------------------------------------|--------|----------|
| ULBS - Computer Science | 7 | 5 |
| ULBS- Agriculture and Food Processing | 5 | 5 |
| USN - Information Science | 6 | 10 |

Dissemination

| Articles and publications | Actual | Expected |
|--|--------|----------|
| Scientific articles | 2 | 2 |
| Dissemination of project results to companies / Work Visits at Companies | 10 | 2 |
| Press articles | 4 | 4 |
| Shares on social media | 5 | 8 |
| Roll-up | 2 | 0 |
| Posters | 5 | 0 |

Figure 8. The indicators (selection) that need to be fulfilled through the MAPIoT project

At third day of the project meeting, in 19 July 2023 there were discussions about the activities developed through the project and which is the status of indicators until now. Actually all materials (the articles, the courses, the student selection criteria for the summer schools, the QA documents) were developed according with the initial plan. Some internal reports for this TPM3 and summer school event will be finished after 1st of August 2023.

In 19 July 2023 there was a discussion about the budget currently spent and reported in the intermediary report.

| Expenditure table | Approved budget (acc. to art.3 of agreement) or after amendment | Budget transfer (acc. to limits set out in art.3 of agreement) | Budget available after transfer | Costs declared (Euro) |
|---|---|--|---------------------------------|-----------------------|
| 1. Project management and implementation | 18000 | 0 | 18000 | 9462.00 |
| 2. Short term transnational mobility activities | 28263 | 0 | 28263 | 15614.00 |
| 3. Intellectual outputs | 31184 | 0 | 31184 | 11480.50 |
| 4. Multiplier events | 1100 | 0 | 1100 | 400.00 |
| 5. Special needs | 0 | 0 | 0 | 0.00 |
| 6. Exceptional costs | 9000 | 0 | 9000 | 6576.00 |
| Total costs: | 87547 | 0 | 87547 | 43532.50 |

| Institution name | Costs declared/Cost approved by PO | Project management and implementation | Short term transnational mobility activities | Intellectual outputs | Multiplier events | Special needs | Exceptional costs | Total costs (Euro) |
|------------------------------------|------------------------------------|---------------------------------------|--|----------------------|-------------------|---------------|-------------------|--------------------|
| Lucian Blaga University of Sibiu | Costs declared | 6462.00 | 15614.00 | 4250.50 | 0.00 | 0.00 | 0.00 | 26326.50 |
| Lucian Blaga University of Sibiu | Costs approved by PO | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| University of South-Eastern Norway | Costs declared | 3000.00 | 0.00 | 7230.00 | 400.00 | 0.00 | 6576.00 | 17206.00 |
| University of South-Eastern Norway | Costs approved by PO | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | o Costs declared | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | o Costs approved by PO | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | o Costs declared | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | o Costs approved by PO | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | o Costs declared | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | o Costs approved by PO | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | o Costs declared | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | o Costs approved by PO | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Total costs declared | | 9462.00 | 15614.00 | 11480.50 | 400.00 | 0.00 | 6576.00 | 43532.50 |
| Total costs approved by PO | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

| | | |
|------------------------------------|----------|------|
| Advanced payment received from PO: | 52528.20 | Euro |
|------------------------------------|----------|------|

| | | |
|--|-------|---|
| Percentage used from the 1-st advance payment: | 82.87 | % |
|--|-------|---|

| | | | | | | | |
|----------------|------------------------------|---------------------------|-------------------------|----------------------|------------------|----------------------|------|
| Budget summary | 1. Management&implementation | 2. Transnational Mobility | 3. Intellectual outputs | 4. Multiplier events | 5. Special needs | 6. Exceptional Costs | Info |
|----------------|------------------------------|---------------------------|-------------------------|----------------------|------------------|----------------------|------|

Figure 9. Budget estimation for first year of MAPIoT project

Largely, the ULBS spent more than 100% of its budget from the first year due to traveling costs and accommodation in Norway at TPM1, TPM2 and students summer school. USN spent more on equipment acquisition, supporting from management budget the Norwegian students' costs for participating at summer school and participation to ICDS 2022 conference. The estimation shows that aggregating costs from both partners is over the threshold of 70% percent allocated for first year of project!

6. Final discussions

At the end of TPM3 it took place a short discussion regarding to each of the partners thinking about continuing and proposing some new projects with involvement in the development of agriculture and food processing and the introduction of IoT in these areas. In this sense, the attention of each member

was drawn that during the visits that we will make to agricultural, food and environmental protection companies during the summer school, to try to identify different problems from this point of view to be able to continue and develop the ideas and achievements obtained in this project.

Lasse Berntzen proposed also a further project collaboration and applying for funding in order to replicate what we learned and developed through MAPIoT project to farmers (not students). Such of projects exist both in Norway and in Germany and represents a good opportunity to continue MAPIoT project and apply best practices regarding digitalisations and technology of Agricultural processes for Romanian farmers.

Finally, Lasse Berntzen proposed two good research ideas:

- The first refers to project members to think at possible implication in protecting and detecting the various problems that occur within the forests and especially the trees in the forest using IoT.
- The second targets precision agriculture, namely to use drones and image processing for detecting pests and weeds in crops and spraying just locally (where these exist) from drones with herbicide and substances for protecting the crops!