DELIVERABLE 1.3
Verifying Partners' Facilities

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LIST OF CHANGES

Version	Date	Change Records	Author
1.0	Feb. 10, 2020	Whole document	Fabrizio Granelli (UNITN)
1.1	Feb. 11, 2020	Additional survey considerations	Mohammad Zakariya Siam (IU)
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1. INTRODUCTION

1.1 Scope and Objectives

In the context of IREEDER project, this report will survey the facilities of all partners to ensure continuity to the IREEDER project. The survey gathered information about the number of departments and students, laboratories, library, existing subjects for the project topics and their contents, number of academic staff members and their previous experiences, international relations, and many other facilities like the video conference instruments and hall.
This deliverable represents the report based on the results of the survey.

In the rest of this document, the partners will be indicated by their short names as follows:

Partner	Acronym	Country
Al-Hussein Bin Talal University	AHU	Jordan
Mutah University	MU	Jordan
Università degli Studi di Trento	UNITN	Italy
Instituto de Telecomunicações	IT	Portugal
Universidade De Vigo	UVIGO	Spain
Isra University	IU	Jordan
The University of Patras	UPATRAS	Greece
Philadelphia University	PU	Jordan
Tafila Technical University	TTU	Jordan
University of Central Lancashire Cyprus	UCLAN	Cyprus

1.2 Structure of the Document

The present document is organized as follows:

- The current section describes the scope, objectives and structure of the document.
- Section 2 provides an overview of each partner.
- Section 3 provides a description of the questionnaires used to analyze the partners' facilities
- Section 4 provides an analysis of the results of the surveys
- Section 5 concludes the document and provides some comments on the results.

2. Partners' Overview

In this Section, an overview of each partner involved in the IREEDER project is presented.

2.1 Al-Hussein Bin Talal University

Al-Hussein Bin Talal University (henceforth, AHU) was founded in 1999 and was the first higher educational institute established during the reign of H.M. King Abdullah II. At the beginning, the university was a branch of Mutah University occupying a temporary campus in the city of Ma'an and was relocated to a permanent campus in September 2004, 9 Km North West of the city of Ma'an. AHU is a public coeducational university located in the heart of the southern region, 210 Km from the Capital Amman.

AHU is a comprehensive public university in a self-contained campus and has student population representing nearly every Governorate in Jordan. Over the past few years, AHU has grown to include eight colleges offering bachelor's degree programs in natural and environmental sciences, business, nursing, education, humanities, IT and engineering. In addition, AHU has two Deanships; the Deanship of Student Affairs and the Deanship of Scientific Research. Moreover, AHU has nine scientific centers that are heavily engaged in research and development projects. The ultimate goal of these centers is to serve local and national communities, improve students' life quality and knowledge delivery in various study programs.

2.2 Mutah University

Mutah University (MU) was established in 1986 in the southern part of Jordan. It has 13 faculties including 44 academic departments with more than 700 faculty members. The number of graduate and undergraduate students currently enrolled at the university exceeds 24,000 students; were 20% of those students come from more than 50 countries. In 2011, MU has begun to make its mark in the QS World reputation. MU has several scientific and research centers that are actively engaged in cutting-edge research and academic issues. One of the most active centers, among MU's scientific and research centers, is Prince Faisal Center for Dead Sea, Environmental and Energy Research (PFC-DSEER). MU has been involved in many activities related to renewable energy activities on national and international levels. Beside the research activities in different aspects on renewable energy systems; solar thermal including CSP technology, PV and wind energy and bioenergy, MU enrolled in several international activities.

2.3 Tafila Technical University

On the seventeenth of January 2005, a Royal Decree has been issued to establish Tafila Technical University (TTU) which currently contributes to the development of higher education in Jordan. Since then, the university has sought to realize the objectives for which it was established. On top of these objectives are the reinforcement of spiritual and moral values, national pride, Arab Islamic identity, and the development of students' talents, with emphasis on the qualities of leadership and citizenship. The ways to realize these objectives include offering higher education opportunities, disseminating knowledge

about the constructive role of the Arab-Islamic civilization in the progress of human civilizations, and meeting the communal need for specialists in the fields of science and technology, and arts. Having a qualified generation would help our country encounter contemporary and future challenges in various fields of life. In addition, the university encourages scientific research, sets findings into practice and uses modern technologies for the overall development of Jordan.

TTU has seven colleges: Engineering, Science, Business, Education, Arts, Student Affairs and scientific research and graduate studies. The number of university students at the beginning of 2016 has reached approximately six thousand students spread over different programs: Bachelor program, two-year intermediate diploma program, higher diploma program and master program. The number of faculty members has recently reached (237), whereas the number of the administrative staff amounted to (631).

2.4 Philadelphia University

Philadelphia University (PU) is a private university was established in 1989 as a national higher educational institution. The university is located 20 km to the north of Amman, on the road to Jerash. Philadelphia University has eight faculties and a student body of more than six thousand students. Its academic staff consists of over 300 faculty members, who hold degrees from a wide range of distinguished universities. It has a vision of being one of the most highly recognized Jordanian University well-known educational conglomerates in Jordan in the spheres of teaching and learning, research, and community services according to international standards. By Preparing graduates who are well-equipped with knowledge, skills and values and who are highly motivated to lifelong learning and capable of fulfilling contemporary requirements. In addition to foster academic research and graduate studies; support innovation plans; and establish a productive partnership with local community.

2.5 Isra University

Isra University (IU) is a private university was established in 1991 in Amman. It teaches 28 bachelor's degree programs and 11 master's degree programs. In addition to teaching, research and enterprise activities are central to IU mission because they help to enhance teaching, learning and services provided by the university to the surrounding community. As a result, the Research and Enterprise Office (REO) has been established at the beginning of the academic year (2014/2015) in order to serve as a liaison between the research community residing within Isra University and the private sector. Therefore, the REO is administratively responsible for the management of technology transfer aspects namely, Intellectual Property, Commercialization and Research Support within IU.

2.6 Universita degli Studi di Trento

Universita degli Studi di Trento (UNITN) is a dynamic, middle-size University (with about 16,000 students) located in the North East of Italy. Founded in 1962, it has constantly pursued the improvement of the quality of research and teaching and the strengthening of its international dimension, networking with qualified universities and research centers from all over the world, making its campus international and encouraging the presence in

Trento of foreign visiting professors, researchers and students. The strong commitment in international research and mobility projects has boosted its attractiveness and position in both national and international rankings.

It is structured in 14 Departments and Centers (Economics & Management, Law, Sociology & Social Research, Humanities, Psychology & Cognitive Science, Civil Environmental & Mechanical Engineering, Industrial Engineering Information Engineering & Computer Science, Physics, Mathematics, International Studies, Integrative Biology, Mind/Brain Sciences, Agriculture Food Environment) that promote, coordinate and manage the university teaching and research activities.

The broad academic offer is complemented by a proven experience in the organization of double, multiple and joint degrees, international Master and PhD programs, student and staff mobility, summer schools, workshops, joint projects shared with partners over the years also under different EU schemes (e.g. Erasmus+, LLP-Erasmus, Leonardo da Vinci, Erasmus Mundus, Tempus, Jean Monnet, ALFA, Asialink, Bilateral Cooperation Programme EU-Canada/Australia/China, etc.).

UNITN participates also in 2 EIT KICs: EIT Digital and EIT Raw Materials. International activity records outstanding levels with 116 FP7 and 47 Horizon2020 research projects, 22 ERC projects, about 10% of international students, widespread international exchange mobility thanks to EU and international programs and a significant number of bilateral agreements with prominent institutions and organizations all over the world.

2.7 Instituto de Telecomunicações

Instituto de Telecomunicações (IT)) is a Portuguese private, non-profit organization. IT's mission is to create and disseminate scientific knowledge in the field of telecommunications and associated applications in order to both improve higher education and training, both at graduate and postgraduate levels, and to improve the competitiveness of Portuguese industry. The Aveiro pole of IT currently has about 50 PhD researchers, many of which holding also teaching positions, plus 120 other researchers, with expertise on telecommunications (wireless and optical), and networks. IT has been involved since its foundation in several projects in the area of wireless communications and associated applications, both at national and European level, namely in the FP4-ACTS, FP5-IST, FP6-IST and FP7-ICT programmes (e.g. SAMBA, ASILUM, MOBYDICK, MATRICE, 4MORE, ORACLE, UNITE, DAIDALOS, FUTON, CODIV, WHERE, HURRICANE, PEACE, COGEU, C2POWER, WHERE2, GREENET, CODELANCE, ROMEO and SALUS), as well as in Networks of Excellence, and also within other European initiatives, such as CELTIC, ENIAC-JU, ARTEMIS-JU, ITEA, and CATRENE, in projects such as MOBILIA, LOOP, ARTEMOS, THINGS2DO, ACCUS, CarCoDe, NewP@ss and BENEFIC, to name a few. Within IT, the Mobile Systems group is a visionary and cutting-edge research group within the Wireless Communications Research Area at the Instituto de Telecomunicações – Aveiro (ITAV). The competence of the team is focused on targeting innovative solutions in 4 principle domains, namely in providing Ubiquity, Convergence, Optimized and Secure solutions for communication networks of the future.

2.8 University of Central Lancashire Cyprus Limited

University of Central Lancashire Cyprus Limited (UCLAN) encompasses a wide range of research activities in Electrical and Electronic Engineering, IoT, ICT and Cybersecurity. The School of Sciences adopts an interdisciplinary approach in its research activities which is implemented through research clusters which are formed within the School and carry out research in various areas including Electrical Engineering, Wireless communication and wireless sensor networks, IoT, Ubiquitous and Context-aware systems, Network Security, Communication, Data Management and Mining, Electronics and Instrumentation, Localization/Positioning etc.

2.9 Universidade De Vigo

Universidade De Vigo (UVIGO) is a young public academic institution officially founded in 1989 that has managed to consolidate itself in time as a reference of modernity and innovation in Galicia. It has three main objectives: to provide higher education services with high quality rates and oriented to promote work placements among its students, giving priority to internationalization; to promote a basic and applied research through competitive research groups at an international level; and to transfer its knowledge and scientific advances to the society in order to foster an intelligent, sustainable and integrating growth of all its surrounding territory.

The UVIGO is organized in three campuses, placed in three different cities: Vigo, Pontevedra and Ourense; all of them in the South of Galicia, Northwest of the Iberian Peninsula. Our institution leads a Campus of International Excellence, awarded by the Spanish Ministry of Education in 2010, a Campus of the Sea that gathers the teaching and researching efforts of seven public universities in Galicia and North of Portugal, as well as those of two national research organisms. In its three campuses at Ourense, Pontevedra and Vigo, our institution offers degree programs in the fields of engineering, science, humanities, technology and legal-social studies. These are distributed among nearly thirty centers where research groups also carry out R&D activities. A network of own research centers completes the research infrastructure map.

Its internationalization aim makes the UVIGO the Galician university offering more student exchanges and receiving and sending the greatest number of students with Erasmus, Erasmus Mundus, ISEP (USA) and bilateral programs with third country institutions. Courses regarding the European Integration process at the UVIGO are present at all educative levels of the institution, thanks to the support over the years of the different Government teams and its professors, with 21 Jean Monnet actions, including two Jean Monnet chairs, one Ad Personam Jean Monnet Chair and one Jean Monnet Centre of Excellence, whose aim is to train staff specialized in territorial cooperation, to contribute to the European construction through territorial cohesion and to spread the history of the European construction.

The general objectives of the UVIGO concerning internationalization are to promote the exchange of professors, researchers, students and administrative staff, and prepare them for the global labor market; to gain recognition in the international education market, establishing strategic partnerships especially with Latin America and Mediterranean

countries, and internationalizing the teaching and research; to promote innovative international projects within a framework of multilateral and cross-border cooperation and to attract and retain the best. The UVIGO has participated in the last 15 years in more than 80 EU education funded projects.

2.10 The University of Patras

The University of Patras (UPAT), official name in Greek: PANEPISTIMIO PATRON, is the third largest in Greece concerning the size of students' potential, the faculty members, administrative personnel, number of departments, and accredited students' titles. It includes 25 Departments with a large number of sectors and consequently a great range of disciplines, which operate 112 laboratories and 14 clinics fully equipped. The University of Patras has ~25000 undergraduate and ~3300 postgraduate students. The University of Patras holds the third place in absolute number of publications among the Greek Universities, but with significantly lower number of faculty members than the leading Universities.

The research activities of the Laboratory of Atmospheric Physics (www.atmosphere-patras.gr, LAP) (to be involved in this project) focus on theoretical and experimental study of solar radiation transfer in the atmosphere. LAP's scientific personnel have acknowledged expertise in the synergetic use of ground-based measurements and satellite estimations of cloud and aerosol optical properties with radiative transfer model results for the estimation of solar irradiance reaching the ground.

UPAT research staff has an extensive experience on theoretical and experimental studies of solar radiation transfer from the involvement in EU funded projects such as PAUR I & II, INSPECTRO, SCOUT-O3, EARLINET, ENORASIS and others. It has actively participated in the COST Action ES1002 and in the FP7 project DNICast. UPAT is responsible for the preparation of the Hellenic solar atlases of global and direct normal irradiance, based on estimations of cloudiness from processed satellite images and aerosol climatologies. UPAT is a member of the Copernicus Academy Network which aims to develop lectures, training sessions, traineeships as well as educational and training material to empower the next generation of researchers, scientists, and entrepreneurs with suitable skill sets to use Copernicus data and information services to their full potential. In this frame, UPAT participates in the new Erasmus+ project EO4GEO (2018-2021): Towards and innovative strategy for skills development and capacity building in the space geo-information sector supporting Copernicus user uptake.

3. THE SURVEY

The survey was structured as follows, and addressed to each partner of the IREEDER consortium:

Which partner do you represent?
Which programs are being taught in your institution?

Are there any programs are being taught in your institutions and not listed above? Please add them
In any of the programs you have in your institution, do you teach the following courses?
Do you have a laboratory for Internet of Things?
Do you have a laboratory for Renewable Energy?
Do you have a laboratory for Cyber Security?
Please list all the main devices, educational and training kits related to the Internet of Things laboratory
Please list all the main devices, educational and training kits related to the Renewable Energy laboratory
Please list all the main devices, educational and training kits related to the Cyber Security laboratory
How many academic staff, engineers, and/or technicians that are expert in Internet of Things?
How many academic staff, engineers, and/or technicians that are expert in Renewable Energy?
How many academic staff, engineers, and/or technicians that are expert in Cyber Security?

Detailed answers to the survey are available at the following link:
https://docs.google.com/forms/d/1WZXk-2vSnsR7FfStwBTp1WgwA9RVJlScVaLSIfSxyRw/edit#responses

4. SURVEY ANALYSIS

The first questions were used to verify the completeness of the survey (Figure 3.1) and understand the different degrees active at the different institutions (Figure 3.2). The latter information is extremely relevant in order to understand how to position the courses developed within the project inside the students' curricula. Given the target to implement the course during the B.Sc. degree and the high variability of the backgrounds, the IoT, RE, and CS courses will be developed as elective courses.

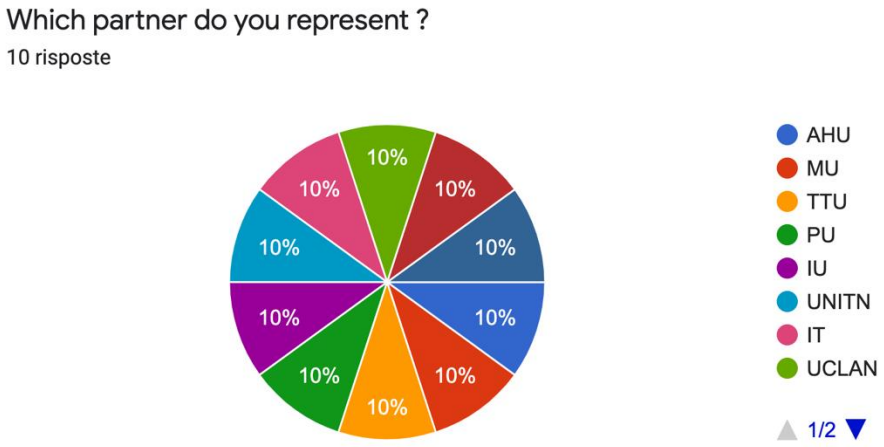

Figure 3.1. Institutions answering the survey.

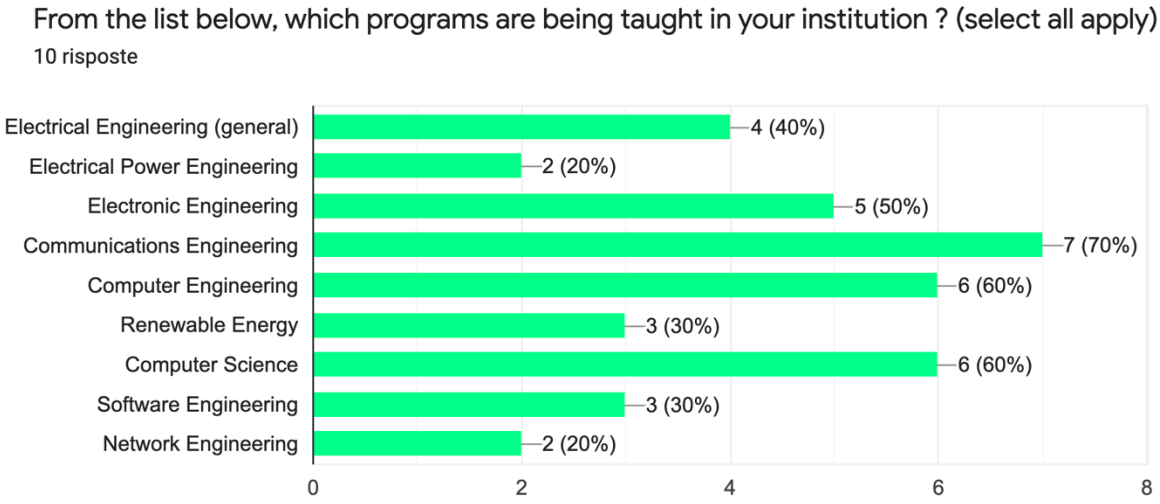

Figure 3.2. Distribution of the active program within the IREEDER consortium.

The rest of the feedback acquired by the survey is summarized in the next paragraphs of this Section.

First of all, Jordanian partners, as expected, do not have courses or laboratories on the topics of Internet of Things, Cybersecurity and Renewable Energy, while the European partners combined cover all the subjects. This demonstrates the proper balance of the IREEDER Consortium.

Table 3.1 describes the number of staff or professors on IoT, CS and RE per institution:

Table 3.1. Distribution of the academic staff within the IREEDER consortium.

Which partner do you represent?	How many academic staff, engineers, and/or technicians that are expert in Internet of Things?	How many academic staff, engineers, and/or technicians that are expert in Renewable Energy?	How many academic staff, engineers, and/or technicians that are expert in Cyber Security?
TTU	0	3	0
MU	0	3	0
PU	1	4	3
IU	3	6	5
AHU	1	1	1
UCLAN	24	2	2
UPAT	0	6	0
IT	5	2	6
UNITN	2	1	2
UPAT	0	4	0
UVIGO	8	0	4

As described in the table, the presence of experts in the field at Jordanian partners' premises is quite in line with the situation of European partners. This will ease the continuous teaching of the IREEDER courses even after the end of the project.
More in details, IU provides globally the highest number of professors in the three considered topics, and covers properly the three subjects, such as PU and AHU. However, PU is more oriented towards renewable energy and cybersecurity. The other two Jordanian partners, TTU and MU are clearly more focused and interested on renewable energy.

Another important observation is on the expertise of the EU partners, where EU partners that in charge of holding the training workshops in the three different topics have a sufficient number of experts in the corresponding topics. Specifically UCLAN will be in charge of IoT teaching material and training, UVIGO will be responsible of Cybersecurity and UPAT will be in charge of the Renewable energy source although all the partners that have expertise in these 3 thematic areas are expected to contribute in all of them.

The next question in the survey was:
In any of the programs you have in your institution, do you teach the following courses? Please select all apply

The answers were as in the following chart:

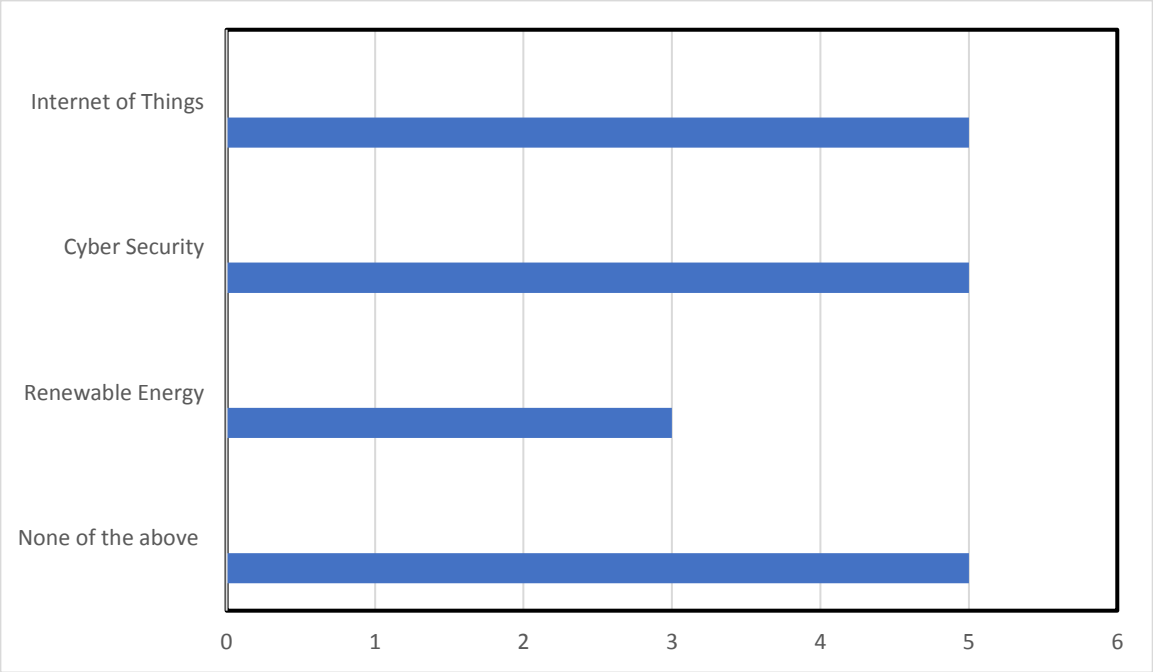

Figure 3.3. The existence of IREEDER topics at the IREEDER consortium

From the above chat, it can be easily shown that 50% of the partners teach Internet of Things courses, 50% of them teach Cyber Security courses, 30% of them teach Renewable Energy courses, while 50% of them have none of those courses.

The next question was:

Do you have a laboratory for Internet of Things?

The answers were as shown in the following pie chart:

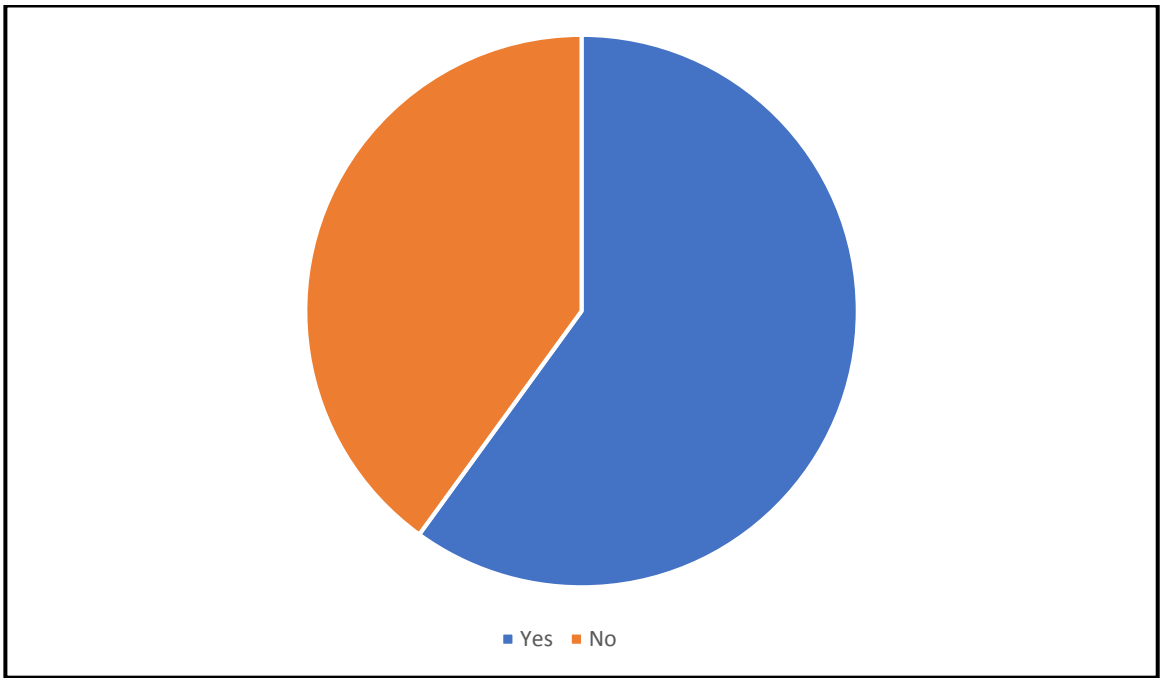

Figure 3.4. Existence of IoT laboratory within the IREEDER consortium

From the above pie chat, we can see that more than half of the partners (60% of the partners) have laboratory for Internet of Things, while 40% of them don't have.

The next question was:

Do you have a laboratory for Renewable Energy?

The answers were as shown in the following pie chart:

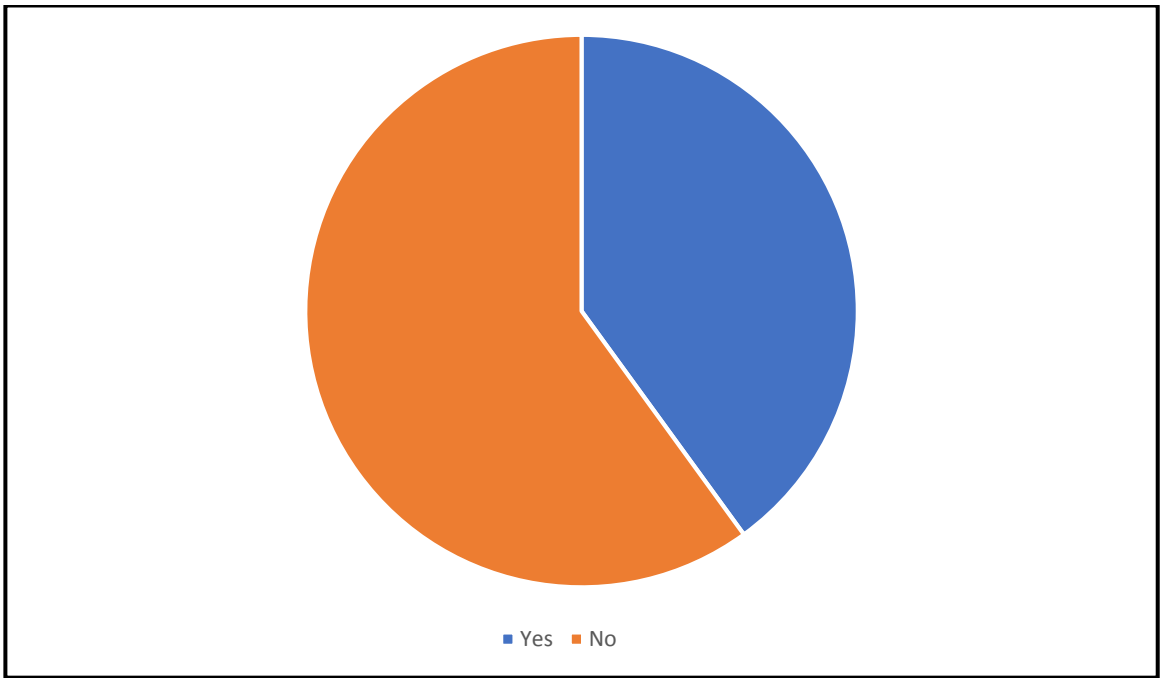

Figure 3.5. Existence of RE laboratory within the IREEDER consortium

From the above pie chat, we can see that less than half of the partners (40% of the partners) have laboratory for Renewable Energy, while 60% of them don't have

The next question was:

Do you have a laboratory for Cyber Security?

The answers were as shown in the following pie chart:

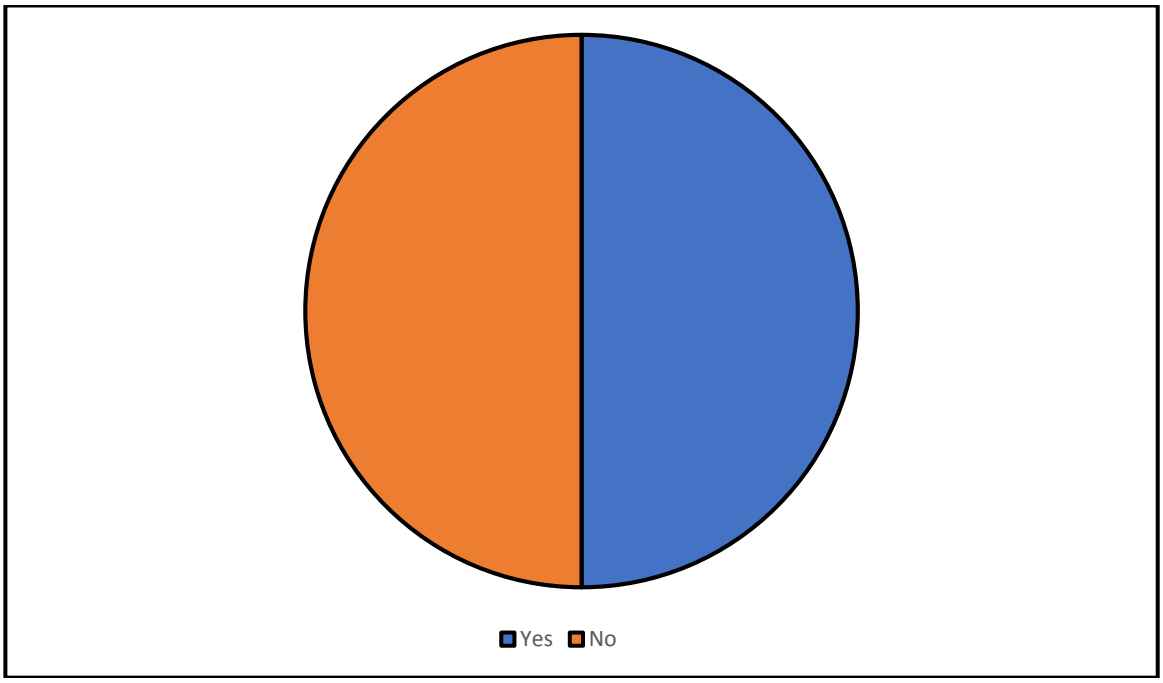

Figure 3.6 Existence of CS laboratory within the IREEDER consortium

From the above pie chat, we can see that half of the partners (50% of the partners) have laboratory for Cyber Security, and half of them (50%) don't have

The next question was:

Please list all the main devices, educational and training kits related to the Internet of Things laboratory.

The answers were as follows:

- None.
- BeagleBoneBlack (+sensors). NRF51/NRF52 devices. ZigBee devices (MicaZ, Zolertia). USRP (SDR devices). Wi-Fi and Bluetooth dongles.
- Mostly Arduino-based and ARM-based micro controllers together with various sensors and actuators.
- Wearable sensor device controller for smart watches, Samsung galaxy J1008 smart Phone.
- Raspberry Pi, Arduino platforms + several simple sensors, complete LoRA network.

It is clear from the above answers that some of the partners (Jordanian partners) still don't have any device, educational and training kit related to the Internet of Things laboratory. This conclusion supports the need for the IREEDER project.

The next question was:

Please list all the main devices, educational and training kits related to the Renewable Energy laboratory.

The answers were as follows:

- None.
- Wind energy labs, solar energy labs and renewable energy workshop.
- Solar thermal simulator, solar PV simulator, and solar wind simulator.
- Solar and Wind Power Generation Kits, Simulators (UCLan)
    - IKS Solartrainer kit (http://www.iks-photovoltaik.de/en/training-systems/solartrainer-junior/overview/)
    - IKS WindTrainer Kit (http://www.iks-photovoltaik.de/en/training-systems/windtrainer-junior/overview/)
    - PSIM v.12 Simulator
    - Free version of Power World Simulator
    - Actual photovoltaic panels to construct IV curves under different sunlight conditions using power meters.
- Geometrical concentration of solar concentrators using the Monte Carlo solar ray tracing noncommercial software "Tonatiuh" (https://iat-cener.github.io/tonatiuh/). Use of Arduino technology and open source software for the monitoring and performance assessment of thermal solar systems. Application to a flat plate solar collector. Solar radiation measurements with pyrheliometer and pyranometer devices.

We can conclude from the previous answers that some partners have really good devices, educational and training kits related to the Renewable Energy Laboratory. However, some of them don't have any.

The next question was:

Please list all the main devices, educational and training kits related to the Cyber Security laboratory.

The answers were as follows:

- None.
- Computers.
- BeagleBoneBlack + Cryptocape. Networking equipment (routers, switches). Smartphones. Private cloud. Wi-Fi devices.
- Mostly freeware tools in Linux

- Samsung galaxy J1008 smart phone for cyber security, laptop running windows 10 with latest updates.
- A dedicated virtualization framework (being currently updated) to run viruses and treats while emulating the Internet topology.

We can also conclude similar conclusion regarding this question as in the previous question; as some partners have also really good devices, educational and training kids related to the Cyber Security Laboratory. However, some of them don't have any. This conclusion again supports the need for the IREEDER project.

CONCLUSIONS

This deliverable analyzed the partners' facilities and staff composition in order to define the appropriateness and necessary actions to make the IREEDER project sustainable in the long term.

From the previous survey, it can be easily shown that there is a difference in the facilities of the IREEDER project partners, which will be addressed in the project.

Based on the outcome of the survey, IREEDER Consortium seems to be well balanced and appropriate to address the proposed challenges. The universities from Jordan are ready to introduce the new course within the curricula and have already some local professors and educators capable of making the program sustainable in the long term.

This survey has confirmed the availability of expertise in the three European partners who will be in-charge of the three training workshops and courses:

- University of Central Lancashire, Cyprus – Internet of Things
- University of Patras – Renewable Energy
- University of Vigo – Cybersecurity

ANNEX (detailed answers to the survey)

IREEDER Partners' Facilities Survey

This survey aims at identifying the IREEDER partners' facilities in Internet of Thing (IoT), Renewable Energy (RE) and Cyber Security (CS).

Which partner do you represent ? *

- ○ AHU
- ○ MU
- ◉ TTU
- ○ PU
- ○ IU
- ○ UNITN
- ○ IT
- ○ UCLAN
- ○ UVIGO
- ○ UPAT

From the list below, which programs are being taught in your institution ? (select all apply) *

- [ ] Electrical Engineering (general)
- [x] Electrical Power Engineering
- [ ] Electronic Engineering
- [x] Communications Engineering
- [x] Computer Engineering
- [ ] Renewable Energy
- [ ] Computer Science
- [ ] Software Engineering
- [ ] Network Engineering

Are there any programs are being taught in your institutions and not listed above ? Please add them *

Intelligent System Engineering
Mechatronics Engineering

In any of the programs you have in your institution, do you teach the following courses ? Please select all apply *

- [ ] Internet of Things
- [ ] Cyber Security
- [ ] Renewable Energy
- [x] None of the above

Do you have a laboratory for Internet of Things ? *

- ○ Yes
- ◉ No

Do you have a laboratory for Renewable Energy ? *

- ○ Yes
- ◉ No

Do you have a laboratory for Cyber Security ? *

- ○ Yes
- ◉ No

Please list all the main devices, educational and training kits related to the Internet of Things laboratory *

None

Please list all the main devices, educational and training kits related to the Renewable Energy laboratory *

None

Please list all the main devices, educational and training kits related to the Cyber Security laboratory *

None

How many academic staff, engineers, and/or technicians that are expert in Internet of Things ? *

0

How many academic staff, engineers, and/or technicians that are expert in Renewable Energy ? *

3

How many academic staff, engineers, and/or technicians that are expert in Cyber Security? *

0

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From the list below, which programs are being taught in your institution ? (select all apply) *

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- [x] Electronic Engineering
- [x] Communications Engineering
- [x] Computer Engineering
- [ ] Renewable Energy
- [x] Computer Science
- [x] Software Engineering
- [x] Network Engineering

Are there any programs are being taught in your institutions and not listed above ? Please add them *

No

In any of the programs you have in your institution, do you teach the following courses ? Please select all apply *

- [ ] Internet of Things
- [ ] Cyber Security
- [ ] Renewable Energy
- [x] None of the above

Do you have a laboratory for Internet of Things ? *

- ○ Yes
- ◉ No

Do you have a laboratory for Renewable Energy ? *

- ○ Yes
- ◉ No

Do you have a laboratory for Cyber Security ? *

- ○ Yes
- ◉ No

Please list all the main devices, educational and training kits related to the Internet of Things laboratory *

None

Please list all the main devices, educational and training kits related to the Renewable Energy laboratory *

None

Please list all the main devices, educational and training kits related to the Cyber Security laboratory *

None

How many academic staff, engineers, and/or technicians that are expert in Internet of Things ? *

0

How many academic staff, engineers, and/or technicians that are expert in Renewable Energy ? *

3

How many academic staff, engineers, and/or technicians that are expert in Cyber Security? *

0

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- ○ UCLAN
- ○ UVIGO
- ○ UPAT

From the list below, which programs are being taught in your institution ? (select all apply) *

- [x] Electrical Engineering (general)
- [ ] Electrical Power Engineering
- [x] Electronic Engineering
- [x] Communications Engineering
- [x] Computer Engineering
- [x] Renewable Energy
- [x] Computer Science
- [ ] Software Engineering
- [ ] Network Engineering

Are there any programs are being taught in your institutions and not listed above ? Please add them *

Yes; mechanical engineering, machatronics engineering, civil engineering, architecture engineering

In any of the programs you have in your institution, do you teach the following courses ? Please select all apply *

- [x] Internet of Things
- [x] Cyber Security
- [x] Renewable Energy
- [ ] None of the above

Do you have a laboratory for Internet of Things ? *

- ( ) Yes
- (•) No

Do you have a laboratory for Renewable Energy ? *

- (•) Yes
- ( ) No

Do you have a laboratory for Cyber Security ? *

- ( ) Yes
- (•) No

Please list all the main devices, educational and training kits related to the Internet of Things laboratory *

NA

Please list all the main devices, educational and training kits related to the Renewable Energy laboratory *

Wind energy labs, solar energy labs and renewable energy workshop

Please list all the main devices, educational and training kits related to the Cyber Security laboratory *

NA

How many academic staff, engineers, and/or technicians that are expert in Internet of Things ? *

One

How many academic staff, engineers, and/or technicians that are expert in Renewable Energy ? *

Four

How many academic staff, engineers, and/or technicians that are expert in Cyber Security? *

Three

IREEDER Partners' Facilities Survey

This survey aims at identifying the IREEDER partners' facilities in Internet of Thing (IoT), Renewable Energy (RE) and Cyber Security (CS).

Which partner do you represent ? *

- ○ AHU
- ○ MU
- ○ TTU
- ○ PU
- ◉ IU
- ○ UNITN
- ○ IT
- ○ UCLAN
- ○ UVIGO
- ○ UPAT

From the list below, which programs are being taught in your institution ? (select all apply) *

- [ ] Electrical Engineering (general)
- [ ] Electrical Power Engineering
- [x] Electronic Engineering
- [x] Communications Engineering
- [ ] Computer Engineering
- [x] Renewable Energy
- [x] Computer Science
- [x] Software Engineering
- [ ] Network Engineering

Are there any programs are being taught in your institutions and not listed above ? Please add them *

Cyber Security

In any of the programs you have in your institution, do you teach the following courses ? Please select all apply *

- [ ] Internet of Things
- [ ] Cyber Security
- [ ] Renewable Energy
- [x] None of the above

Do you have a laboratory for Internet of Things ? *

- ○ Yes
- ◉ No

Do you have a laboratory for Renewable Energy ? *

- ◉ Yes
- ○ No

Do you have a laboratory for Cyber Security ? *

- ◉ Yes
- ○ No

Please list all the main devices, educational and training kits related to the Internet of Things laboratory *

Nothing

Please list all the main devices, educational and training kits related to the Renewable Energy laboratory *

Solar thermal simulator, solar PV simulator, and solar wind simulator

Please list all the main devices, educational and training kits related to the Cyber Security laboratory *

Computers

How many academic staff, engineers, and/or technicians that are expert in Internet of Things ? *

3

How many academic staff, engineers, and/or technicians that are expert in Renewable Energy ? *

6

How many academic staff, engineers, and/or technicians that are expert in Cyber Security? *

5

IREEDER Partners' Facilities Survey

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- ◉ UVIGO
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From the list below, which programs are being taught in your institution ? (select all apply) *

- [ ] Electrical Engineering (general)
- [ ] Electrical Power Engineering
- [ ] Electronic Engineering
- [x] Communications Engineering
- [ ] Computer Engineering
- [ ] Renewable Energy
- [ ] Computer Science
- [ ] Software Engineering
- [x] Network Engineering

Are there any programs are being taught in your institutions and not listed above ? Please add them *

- Cyber Security.

The three programs are being taught the Telecommunication Engineering School (professors participating in IREEDER teach in those programs). All the other programs are also taught at the University.

In any of the programs you have in your institution, do you teach the following courses ? Please select all apply *

- [x] Internet of Things
- [x] Cyber Security
- [ ] Renewable Energy
- [ ] None of the above

Do you have a laboratory for Internet of Things ? *

- [x] Yes
- [ ] No

Do you have a laboratory for Renewable Energy ? *

- [ ] Yes
- [x] No

Do you have a laboratory for Cyber Security ? *

- [x] Yes
- [ ] No

Please list all the main devices, educational and training kits related to the Internet of Things laboratory *

BeagleBoneBlack (+sensors). NRF51/NRF52 devices. ZigBee devices (MicaZ, Zolertia). USRP (SDR devices). Wi-Fi and Bluetooth dongles.

Please list all the main devices, educational and training kits related to the Renewable Energy laboratory *

None.

Please list all the main devices, educational and training kits related to the Cyber Security laboratory *

BeagleBoneBlack + Cryptocape. Networking equipment (routers, switches). Smartphones. Private cloud. Wi-Fi devices.

How many academic staff, engineers, and/or technicians that are expert in Internet of Things ? *

8 (in the group that is participating in IREEDER). Our school is the Telecommunications Engineering school, so most of the academic staff is expert in one or other aspect of the Internet of Things.

How many academic staff, engineers, and/or technicians that are expert in Renewable Energy ? *

0

How many academic staff, engineers, and/or technicians that are expert in Cyber Security? *

4 (in the group that is participating in IREEDER). There are more persons at the school with expertise in Cyber Security.

IREEDER Partners' Facilities Survey

This survey aims at identifying the IREEDER partners' facilities in Internet of Thing (IoT), Renewable Energy (RE) and Cyber Security (CS).

Which partner do you represent ? *

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- ( ) IT
- ( ) UCLAN
- ( ) UVIGO
- ( ) UPAT

From the list below, which programs are being taught in your institution ? (select all apply) *

- [x] Electrical Engineering (general)
- [ ] Electrical Power Engineering
- [ ] Electronic Engineering
- [x] Communications Engineering
- [x] Computer Engineering
- [ ] Renewable Energy
- [x] Computer Science
- [x] Software Engineering
- [ ] Network Engineering

Are there any programs are being taught in your institutions and not listed above ? Please add them *

No

In any of the programs you have in your institution, do you teach the following courses ? Please select all apply *

- [ ] Internet of Things
- [ ] Cyber Security
- [ ] Renewable Energy
- [x] None of the above

Do you have a laboratory for Internet of Things ? *

- ○ Yes
- ◉ No

Do you have a laboratory for Renewable Energy ? *

- ○ Yes
- ◉ No

Do you have a laboratory for Cyber Security ? *

- ○ Yes
- ◉ No

Please list all the main devices, educational and training kits related to the Internet of Things laboratory *

none

Please list all the main devices, educational and training kits related to the Renewable Energy laboratory *

None

Please list all the main devices, educational and training kits related to the Cyber Security laboratory *

None

How many academic staff, engineers, and/or technicians that are expert in Internet of Things ? *

one

How many academic staff, engineers, and/or technicians that are expert in Renewable Energy ? *

one

How many academic staff, engineers, and/or technicians that are expert in Cyber Security? *

one

IREEDER Partners' Facilities Survey

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- ○ IT
- ◉ UCLAN
- ○ UVIGO
- ○ UPAT

From the list below, which programs are being taught in your institution ? (select all apply) *

- [x] Electrical Engineering (general)
- [ ] Electrical Power Engineering
- [x] Electronic Engineering
- [ ] Communications Engineering
- [x] Computer Engineering
- [ ] Renewable Energy
- [x] Computer Science
- [ ] Software Engineering
- [ ] Network Engineering

Are there any programs are being taught in your institutions and not listed above ? Please add them *

Cybersecurity (Postgraduate)

In any of the programs you have in your institution, do you teach the following courses ? Please select all apply *

- [x] Internet of Things
- [x] Cyber Security
- [x] Renewable Energy
- [x] None of the above

Do you have a laboratory for Internet of Things ? *

- [x] Yes
- [ ] No

Do you have a laboratory for Renewable Energy ? *

- [x] Yes
- [ ] No

Do you have a laboratory for Cyber Security ? *

- [x] Yes
- [ ] No

Please list all the main devices, educational and training kits related to the Internet of Things laboratory *

Mostly Arduino-based and ARM-based micro controllers together with various sensors and actuators.

Please list all the main devices, educational and training kits related to the Renewable Energy laboratory *

Solar and Wind Power Generation Kits, Simulations in PSIM, PowerWorld Simulators

Please list all the main devices, educational and training kits related to the Cyber Security laboratory *

Mostly freeware tools in Linux

How many academic staff, engineers, and/or technicians that are expert in Internet of Things ? *

2

How many academic staff, engineers, and/or technicians that are expert in Renewable Energy ? *

2

How many academic staff, engineers, and/or technicians that are expert in Cyber Security? *

2

IREEDER Partners' Facilities Survey

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Which partner do you represent ? *

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- ○ PU
- ○ IU
- ○ UNITN
- ◉ IT
- ○ UCLAN
- ○ UVIGO
- ○ UPAT

From the list below, which programs are being taught in your institution ? (select all apply) *

- [ ] Electrical Engineering (general)
- [ ] Electrical Power Engineering
- [x] Electronic Engineering
- [ ] Communications Engineering
- [ ] Computer Engineering
- [ ] Renewable Energy
- [ ] Computer Science
- [ ] Software Engineering
- [ ] Network Engineering

Are there any programs are being taught in your institutions and not listed above ? Please add them *

No

In any of the programs you have in your institution, do you teach the following courses ? Please select all apply *

- [x] Internet of Things
- [x] Cyber Security
- [ ] Renewable Energy
- [ ] None of the above

Do you have a laboratory for Internet of Things ? *

- [x] Yes
- [ ] No

Do you have a laboratory for Renewable Energy ? *

- [ ] Yes
- [x] No

Do you have a laboratory for Cyber Security ? *

- [x] Yes
- [ ] No

Please list all the main devices, educational and training kits related to the Internet of Things laboratory *

Wearable sensor device controller for smart watches, Samsung galaxy J1008 smart phone

Please list all the main devices, educational and training kits related to the Renewable Energy laboratory *

None

Please list all the main devices, educational and training kits related to the Cyber Security laboratory *

Samsung galaxy J1008 smart phone for cyber security, laptop running windows 10 with latest updates

How many academic staff, engineers, and/or technicians that are expert in Internet of Things ? *

5

How many academic staff, engineers, and/or technicians that are expert in Renewable Energy ? *

2

How many academic staff, engineers, and/or technicians that are expert in Cyber Security? *

6

IREEDER Partners' Facilities Survey

This survey aims at identifying the IREEDER partners' facilities in Internet of Thing (IoT), Renewable Energy (RE) and Cyber Security (CS).

Which partner do you represent ? *

- ○ AHU
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- ○ IT
- ○ UCLAN
- ○ UVIGO
- ○ UPAT

From the list below, which programs are being taught in your institution ? (select all apply) *

- [ ] Electrical Engineering (general)
- [ ] Electrical Power Engineering
- [ ] Electronic Engineering
- [x] Communications Engineering
- [x] Computer Engineering
- [ ] Renewable Energy
- [x] Computer Science
- [ ] Software Engineering
- [ ] Network Engineering

Are there any programs are being taught in your institutions and not listed above ? Please add them *

We have several specializations within the EIT Digital Master School programme, such as Cloud and Network Infrastructures, Big Data, Cybersecurity, etc. More info here: http://www.masterschool.eitdigital.eu/

In any of the programs you have in your institution, do you teach the following courses ? Please select all apply *

- [x] Internet of Things
- [x] Cyber Security
- [ ] Renewable Energy
- [ ] None of the above

Do you have a laboratory for Internet of Things ? *

- [x] Yes
- [ ] No

Do you have a laboratory for Renewable Energy ? *

- [ ] Yes
- [x] No

Do you have a laboratory for Cyber Security ? *

- [x] Yes
- [ ] No

Please list all the main devices, educational and training kits related to the Internet of Things laboratory *

Raspberry Pi, Arduino platforms + several simple sensors, complete LoRA network environment (sink+2 sensors)

Please list all the main devices, educational and training kits related to the Renewable Energy laboratory *

N/A

Please list all the main devices, educational and training kits related to the Cyber Security laboratory *

A dedicated virtualization framework (being currently updated) to run viruses and treats while emulating the Internet topology.

How many academic staff, engineers, and/or technicians that are expert in Internet of Things ? *

2 Professors

How many academic staff, engineers, and/or technicians that are expert in Renewable Energy ? *

1 Professor (partially, mostly on smart grid)

How many academic staff, engineers, and/or technicians that are expert in Cyber Security? *

2 Professors

IREEDER Partners' Facilities Survey

This survey aims at identifying the IREEDER partners' facilities in Internet of Thing (IoT), Renewable Energy (RE) and Cyber Security (CS).

Which partner do you represent ? *

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- ○ UVIGO
- ◉ UPAT

From the list below, which programs are being taught in your institution ? (select all apply) *

- [ ] Electrical Engineering (general)
- [ ] Electrical Power Engineering
- [ ] Electronic Engineering
- [ ] Communications Engineering
- [ ] Computer Engineering
- [x] Renewable Energy
- [ ] Computer Science
- [ ] Software Engineering
- [ ] Network Engineering

Are there any programs are being taught in your institutions and not listed above ? Please add them *

no

In any of the programs you have in your institution, do you teach the following courses ? Please select all apply *

- [ ] Internet of Things
- [ ] Cyber Security
- [x] Renewable Energy
- [ ] None of the above

Do you have a laboratory for Internet of Things ? *

- ( ) Yes
- (•) No

Do you have a laboratory for Renewable Energy ? *

- (•) Yes
- ( ) No

Do you have a laboratory for Cyber Security ? *

- ( ) Yes
- (•) No

Please list all the main devices, educational and training kits related to the Internet of Things laboratory *

no

Please list all the main devices, educational and training kits related to the Renewable Energy laboratory *

1. Geometrical concentration of solar concentrators using the Monte Carlo solar ray tracing non commercial software "Tonatiuh" (https://iat-cener.github.io/tonatiuh/).
2. Use of Arduino technology and open source software for the monitoring and performance assessment of thermal solar systems. - Application to a flat plate solar collector.
3. Solar radiation measurements with pyrheliometer and pyranometer devices
4. Assessment of thermal solar collector characteristics
5. Concentration of solar radiation with Fresnel lenses
6. Wind turbine power and efficiency
7. Characterization of I-V curve of photovoltaic panels and performance calculations in laboratory and ambient conditions
8. Spectral response of photovoltaic panels
9. Assessment of thermal emission coefficient

Please list all the main devices, educational and training kits related to the Cyber Security laboratory *

no

How many academic staff, engineers, and/or technicians that are expert in Internet of Things ? *

none

How many academic staff, engineers, and/or technicians that are expert in Renewable Energy ? *

4

How many academic staff, engineers, and/or technicians that are expert in Cyber Security? *

none