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IoT Train

Master of Engineering in Internet of Things



About the project

According to the survey of World Economic Forum, IoT aims to train one of the top technological drivers of change for the future of jobs, employment, skills and workforce strategy in the 4th Industrial Revolution. Forbes considers big data, data analytics, embedded smart sensors, remote monitoring systems, and machine learning as top 5 engineering skills in 2020. In order to prepare the society for such an enormous diversity, modernizing Higher Education (HE) towards integrating IoT skills for engineers is an extreme need. Consequently, providing a series of educational training that improves competitiveness and employability of engineers by 2025 is a must to address. The technological revolution happening by IoT as well as associated skills and expertise gaps by 2020 are not limited to Europe, but also influencing developing countries. As evidence, the middle-east and Africa is expected to invest USD 14.3 Billion on IoT by 2020 to keep up with the fast pace of development in this regard. The main goal of the IoTRAIN project is to achieve the modernization and internationalization of higher education in Iran, taking into account the huge changes introduced by Internet technologies in society and business, and to design, develop and enact teaching, peer-production and continuous improvement processes.

IoTRAIN is particularly designed to target the growing demand of professional IoT skills by enhancing the IoT-related trainings in Iranian HE institutions (HEI). In this regard, IoTRAIN covers a careful analysis of existing and future technological gaps in IoT and provides required trainings towards improving competitiveness of future Iranian engineers. IoTRAIN delivers an IoT competence model consisting of the state-of-the-art skills in IoT at the European and international standard levels. The provided model adopts up-to-date training materials of the European partners of the project and provides necessary high-level training with the aim of improving competitiveness of future Iranian. Furthermore, IoTRAIN delivers a Digital Engineering competence model consisting of the state-of-the-art skills in digitalization for engineers and experts following European and international standards.

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Disclaimer

"This project has been funded with support from the European Commission. This publication reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein".

All publications shall include the following statement to indicate that foreground was generated with the assistance of financial support from the European Union:

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An internal review process is established to perform a quality assessment of project deliverables prior to submission to the EC. The internal review process by the Quality Committee (QC) is used to improve the overall quality of the work/meetings/events and to ensure that results are useful for achieving the overall project results. Output from these technical reviews will be documented in a formal report including acceptance or non-positive recommendations from the reviewing team. Also, for the events such as hackathons and meetings, the reviewer is responsible to carefully supervise the quality and planning of the events and their venue/online platform. As a general rule, each project partner shall review his own results before transmitting them to someone else. The Deliverable Leader will be the first

instance to perform a quality control of deliverables. Further, all project deliverables will undergo a quality control of the Deliverable Reviewers (QC). The process can be seen in figure below that defines a detailed internal review process for project deliverables including the reviewers of the deliverables, the stages at which a review will take place and providing advice to reviewers for an effective review process.

Purpose of the document

This document aims to provide a sort of requirement analysis on already existing modules and required modules for having a complete IoT curriculum.

Goals and Objectives

IoTrain aims at enhancing the IoT skills of the engineers by developing and strengthening the Iranian and Iraqi HE training and curricula with state-of-the-art European standards and technologies. Concretely, motivations and objectives are as follows. It should be stated that these target groups are the same for both countries and in general for the whole region, so we state them together for both countries.

Motivation and aims of the proposal

- Modernizing ICT and engineering curriculum in Iranian and Iraqi HE systems through updating their existing relevant courses with IoT topics as a driving technology of tomorrow,
- Developing new courses and modules and building capacities to Iranian and Iraqi HE and releasing them as Master of Science in IoT,
- Specifically targeting IoT as one of the domains, which is of particular interest by the Iranian and Iraqi government, aligned with the national priorities of each country and is in accordance with global trends in business, industry and research,
- Targeting IoT as one of the most driving forces of tomorrow's societies,
- Promoting EU-Iran-Iraq cooperation in HE, which is persuaded by political decision makers of both sides.

Technical Objectives

IoT is a top technological driver which will change the future of jobs, employment, skills and workforce in the frame of the 4th Industrial revolution. Accordingly, the needs and requirements of tomorrow's job market have to be correctly identified and addressed in advance. Overall the

technical objectives of IoTRAIN are as follows:

- Identification of (a) industrial needs and business opportunities in the private sector which can be addressed with IoT skills (b) developing new IoT-competencies for engineers (c) filling gaps in current HE curricula with respect to the required IoT-skills in the industry (d) developing new research areas based on the needs of industries. These objectives will be achieved after intensive study of the educational and industrial situation in Iran and Iraq by the entire consortium.
- Providing IoT training modules by (a) adapting and improving the existing modules in European HE systems according to the needs of Iranian and Iraqi engineers, (b) developing new advanced and high quality teaching material for those lacking skills which are identified from the gap identification step. The materials will be prepared by prestigious researchers with long experience on the needs of industry and business on both sides.

Educational Objectives

- The goal of the project is the establishment and alignment of study programs for a Master of Engineering in Internet of Things for serving the industry in Iran, Iraq and the European countries
- The project aims to strengthen the links between university-enterprise cooperation, entrepreneurship and employability of graduates in Iran and Iraq.
- Conducting the culture of practice-oriented and industry-motivated training in Iranian and Iraqi HE systems which is historically more theoretically oriented.

Events

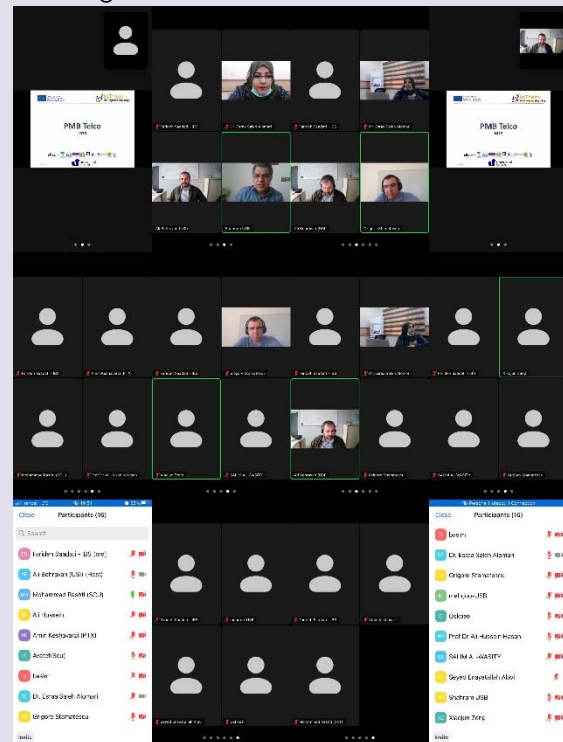
Summary of the Kick-off Meeting (KOM):

The KOM of the Erasmus+ IoTRAIN project was held online via the Zoom teleconference from 14.12.2020-16.12.2020. During the 1st day of the KOM, the partners introduced themselves and their responsibilities in this three-year project. Further, the Project Officers (PO) from the European Commission, Mr. Luigi Saia and Mr. Andrea Murzi, also participated in the meeting and mentioned some important points to the consortium.

The 2nd day of the KOM was allocated to WP1 (preparation), WP2 (development) and WP6 (management) to discuss capacity-building strategy, planning and development of IoTrain curricula, and management and coordination of the project, respectively. The 3rd day of the KOM included discussions regarding WP3 (quality plan), WP4 (dissemination), and WP5 (exploitation and sustainability) with the presentation of the quality control and monitoring plan, dissemination plan, and exploitation and sustainability plan, respectively. The KOM was finished with a discussion and Q&A session to decide some preparation points, e.g., the project domain, the social media accounts on Instagram and LinkedIn, logo, and the frequency of the monthly meetings (every 3rd Monday of the month from 11:00 CET to 13:00 CET). Further, some actions were planned, e.g., how to initiate the project website, the project management handbook structure, reporting of different deliverables in the early months of the project.

Monthly Meetings

The PMB members shall meet monthly or at any other time when necessary, aligned with the major project milestones. The meetings of the PMB are organized by the coordinator, who will also chair these meetings. Regular PMB Telcos are scheduled for every third Monday per month from 11:00 CET to 13:00 CET. In case of a change, information is circulated via the IoTrain mailing list.



Erasmus and IoTrain Consortium Meeting

The first meeting of the IoT Master's Degree Development Project was announced at 5:00 pm on Friday, December 17, 2021 at the Pardisan Hotel in Mashhad. After completing the hotel admission process, the members' introductory session and discussion of the pre-implementation plans of the first day of the session began with the presence of more than 60% of the members. In this meeting, Dr. Ali

Behravan, while welcoming the participants and expressing his satisfaction with such a scientific move, made a detailed reference to the programs that will be carried out during the three days of the meeting. The meeting ended after meeting the members and having dinner and taking souvenir photos at 6.30 pm.



The program of the first day of the meeting started at 8:00 am on Saturday, December 18, 2021 from the Pardisan Hotel in Mashhad with the breakfast of the participating members. After breakfast, all attendees traveled by VIP bus provided by Islamic Azad University-Quchan Branch to Quchan city, which is 135 km away from Mashhad, and arrived at Islamic Azad University-Quchan Branch at 10:00 am. The guests were greeted by the chairman, deputies and other colleagues, and the attendees were directed to the conference room (the venue for the first meeting).

The meeting officially began at 10:10 am with the recitation of Quranic verses and the playing of the national anthem of the Islamic Republic of Iran. At the beginning of the meeting, Dr. Ali Behravan, while welcoming the participants, began the meeting and gave a detailed overview of the IoT project and the activities that have been done so far in this regard. In the continuation of the meeting, the technical discussion of the work

continued with the presentation of the materials prepared by Dr. Ali Behravan and the present guests as well as other members who were present in the meeting virtually. According to the schedule, after the prayers and snacks, which were prepared from the traditional food of Quchan city, the attendees were directed to the meeting hall of Dr. Javanbakht to start the third meeting.



The meeting began with the recitation of Quranic verses, the playing of the national anthem of the Islamic Republic of Iran and the playing of a video introducing the different sections of the Islamic Azad University-Quchan Branch. First of all, Dr. Ehsan Pouladi Borj, president of the Islamic Azad University-Quchan Branch, while welcoming the participants, spoke about the Internet of Things and the need to launch this field in Iranian universities, especially the Islamic Azad University-Quchan Branch. Then, Dr. Moradi, the head of the Islamic Azad University of Khorasan Razavi and the president of the Islamic Azad University-Mashhad Branch, gave a short speech about this event. The meeting continued with a short speech and remarkable points related to this event by Dr. Asghari, vice president of Dr. Boroujerdi, International Affairs and Non-Iranian Students Affairs of the Islamic Azad University-Quchan Branch.

In the continuation of the meeting, Dr. Iman Lotfi, as the first keynote speaker, presented his material in the form of a PowerPoint file and virtually on the topic of the Internet of Things, which was followed by a question and answer session. As the second keynote speaker, Mr. Sanjari (a farmer in Quchan) gave a discussion on agriculture and its connection to the Internet of Things. The content of his speech was about the necessity of using the Internet of Things in the field of agriculture and reducing the costs of lack of careful handling by human agents, as well as the wide impact that the use and use of the Internet of Things can have in this field. After the presentation, the audience asked questions that were answered by him and the other attendees. Finally, Questionnaire No. D3.3 including Qualitative and Leading Assessment Questionnaire-General Meetings and Meetings was completed and collected by the audience in the hall.



After the second session, the guests visited research facilities including specialized laboratories, up-to-date equipment located in laboratories, welfare and sports facilities and other capabilities of the Islamic Azad University-Quchan Branch. According to the etiquette and hospitality, the dinner party program was held for the guests in one of the traditional restaurants

located in one of the summer houses of Quchan city. After dinner, the guests were taken by bus to Mashhad and Pardisan Hotel.

The second day of the specialized meeting started at 8:30 am December 10, 2021 in the Attar Hall of Pardisan Hotel. The topic of the first meeting was the development of IoT activities that have been done so far and are to be done in the future. In the second meeting, the topics related to the quality points of launching the field of Internet of Things were managed by Dr. Behravan and the dear guests included Prof. Xiaojun Zheng, Dr. Mahdi Bohlouli, Dr. Grigore Stamatescu and Dr. Roman Obermaisser also attended the meeting virtually. The meeting for lunch ended at 12:15 pm.



The first meeting of the second day started at 13:30 pm and immediately the topics of dissemination, exploration, sustainability and management. The project was discussed and exchanged with the virtual audience and guests, which also yielded good results. The meetings of this day ended at 16:30 pm. The morning programs of the third day of the meeting started at 8:30 am according to the announced schedule with the presence of the guests in the Attar Hall of Pardisan Hotel. The topics discussed and discussed in this section were mainly related to how to do WP1 program including D1.1, D1.2, D1.4, D1.5

and also WP2 program including D2.1 which the participants discussed in this relationship paid off. This section ended at 10:45 am.

The second session started on the morning of the third day at 11:00 am and after discussing the WP3 program including D3.1 and D3.2 as well as the WP4 program including D4.1, D4.2, D4.4, and D4.5 ended at 12:30 pm. Then, the survey forms were distributed among the participants and after answering them, the forms were collected. The place and time of the next meeting were informed and the meeting officially ended at 14:00 pm.



After the official end of the meeting, the attendees took souvenir photos with each other and at the end, gifts were presented to all the guests by the honorable president of the Islamic Azad University- Quchan Branch.

IoT Requirement and Market Needs Analysis Workshop

This workshop This workshop aims at discussing, and summarizing t This workshop This workshop he findings of the IoTrain market needs analysis survey (D1.2), which was conducted through a questionnaire distributed among various market players. At this event, after presenting a summary of the project findings, a number of stakeholder organizations will present

keynote speeches, including the current applications of IoT in their organization, as well as their demand for IoT related expertise. At the end, a discussion panel will focus on summarizing the key requirements in the target curriculum that could fill the current gap between academia and industry needs.

In this workshop, three market players from different market sectors, experience, and business models presented their IoT related work and their expectation from university graduates whom they may hire in this field.

1. *Khuzestan Water and Power Authority* is the largest water resource management organization, located in the southwest region of Iran. KWPA studies and manages surface and underground water resources and related utilities in the region. It belongs to the *government industry* sector of the market and is considered a *large enterprise*.
2. *Faraz Novin* is a well-established engineering and manufacturing company in the Oil and Gas production market of Iran, providing technologies, solutions, and services for enhancing oil well production. It belongs to the *Oil and Gas* market sector and is considered an *SME*¹.
3. *Paanaak IoT Solutions* is a startup company providing IoT solutions in various application fields including smart building and smart farming. Paanaak directly operates in the IoT field by manufacturing devices and software solutions for smart monitoring. It belongs to the *IoT industry* market sector and is considered a *startup*.

Deliverables

Market needs analysis and goal definition

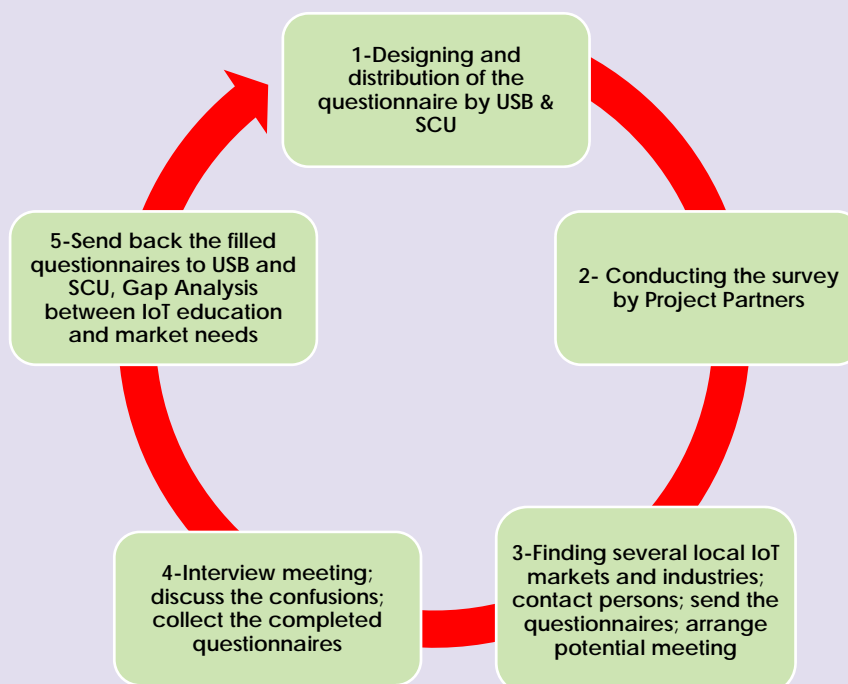
This report is related to the Deliverable number 1.2 of Work package 1 entitled “Market needs analysis and goal definition” of IoTrain Project. The report summarizes a variety of activities that have been performed for identifying market needs in IoT sector, in Iran, Iraq and Romania. For this purpose, various data collection procedures have been performed. An overview of the performed procedures is presented at Figure 1.

In the first step, we collected the data from some Iranian, Iraqi and European industries, which benefit from IoT. Afterwards, we analyzed inputs from each partner, which is presented in the next section as summary and analysis of IoT-related Questions. The aim of this survey is market needs analysis and goal definition of IoT local market and

industry. A questionnaire was prepared to evaluate the needs of various market sectors, including industry, to IoT related expertise, in order to propose the most relevant skills into the prospective educational curricula in higher education institutions. Various data collection procedures have been performed. In the first step, we collected the data from some Iranian, Iraqi and European market players (organizations, and industries) which benefits from IoT. Subsequently, we collected the filled forms and analysed the responses.

The filled questionnaires were received from 52 different stakeholders. Some responders have expressed their current IoT solution usage, some establishing IoT labs and some pilot (rarely production) IoT solutions in their institutions. The summary as well as the expressed responses indicate a great and developing demand for IoT related skills in various market sectors included in this survey, from manufacturing

Figure 1- The workflow of the IoT market needs analysis survey in the steps; Designing and distribution of the questionnaire; conducting the survey by project partners; Gap Analysis between IoT education and market needs



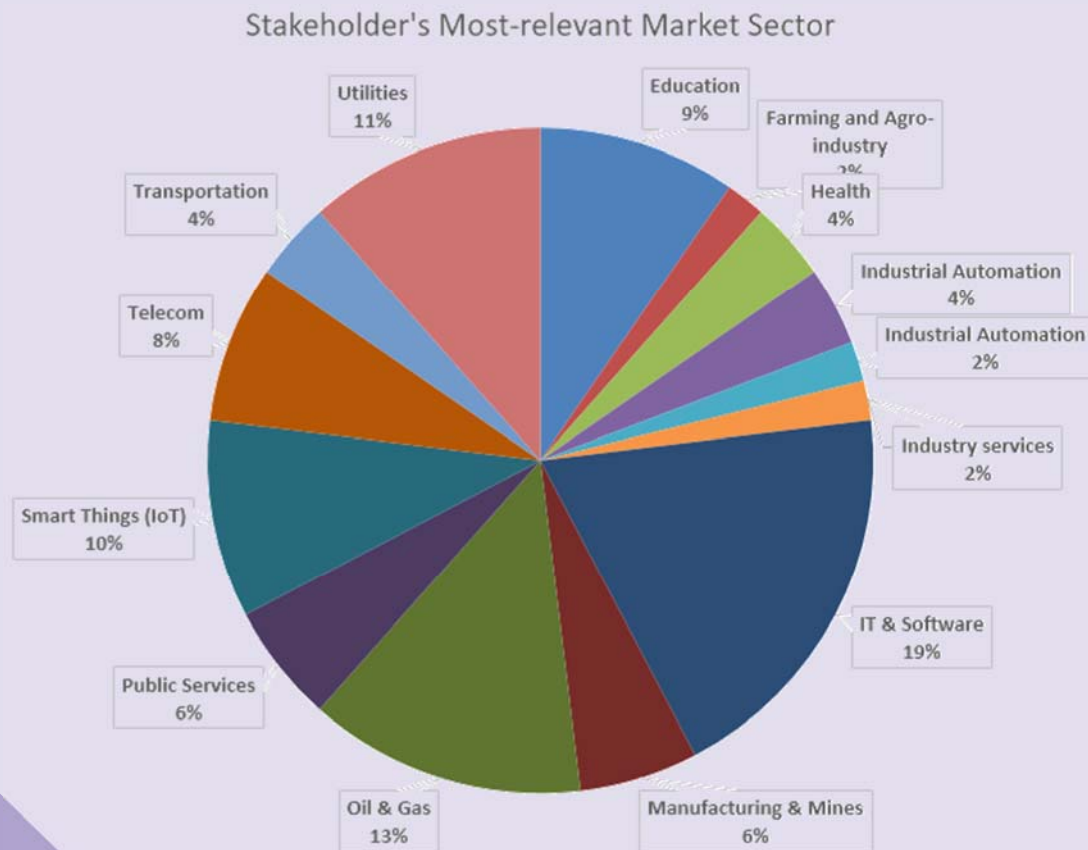
sector requiring the expertise for their production and safety, to educational institutions in need of IoT experts for elevating their training quality, and SW and telecom companies for improving their services.

D1.2 is fundamental step in addressing the needs and fulfilling the gaps in HE training in the domain of IoT with respect to the demands and skills needed by the market sector and industry and by considering the state-of-the-art technological progress in IoTrain. This deliverable contains information about the institutions, including their location and workforce and indicating the relevance of various IoT related application markets to their operations and activities in order to propose the most relevant skills into the prospective educational curricula in HE institutions. The survey contains three main sections: the introduction part

provides information on the goals and aspects of the IoTrain project as well as some guidelines on how to fill the questionnaire. The institutional information section collects information about the institutions, including their location and workforce. The market sector section, asks the responders to indicate the relevance of various IoT related application markets to their operations and activities.

Following the institutional information sections comes the main section of the questionnaire, containing a number of IoT related questions assessing the current IoT workforce as well as work skill requirements for relevant activities. While we have highlighted significant results throughout the main submitted report, this draft tries to summarize the achieved results. It highlights technical skills that are most needed by the market, and their most-demanded

Figure 2 - Stakeholders' statistics of most-relevant market sectors (based on answers to the questionnaire)



expertise level. Skills such as software engineering (SW), virtualization (VIR), security and privacy (SEC), and wireless technologies (WRL) have the highest average likelihood of being required by the market in the next 5 years, while skills such as interfacing circuits (INT), Block chain (BLK) and embedded systems (EMB) seem to be on the lowest demand. The immediate market needs are also more or less similar to the 5-year percentages, with SW, WRL, VIR, and SEC leading, and again BLK, INT, and EMB trailing.

Despite of observing high demand for wireless technologies and cloud/virtualization skills, is somewhat expected, embedded systems expertise showing one of the lowest market requirements is rather unexpected, since the knowledge of embedded systems is directly related to developing devices with IoT capabilities. Such skews in the results could be attributed to the relatively low number of responders in some sectors, as well as the fact that the responder's self-declared familiarity with IoT is not very high.

Moreover, we have explored the expected skill levels for prospective workers with each technical topic expertise. As observed, senior and junior engineers are most widely needed in the majority of technical topics, while R&D experts are usually the least needed. Therefore, probably a non-thesis-based program fortified with industry-sponsored labs and internships will serve the academia's purpose of training hands-on engineers that can solve market's immediate requirements, while approaching industry's aim of hiring workforce that are familiar with their challenges and needs. On the other hand, looking at the details of the results, and calculating the percentage of market players indicating skill levels for each technical area, we observe that

the technical areas with the highest demand for R&D experts are big data, High performance computing (HPC), edge computing and block chain, while for areas such as robotics, measurement technologies, sensors and networking skills.

This information is valuable for curriculum designers in prioritizing certain technical topics and in declaring the extent of educational material to be covered in the curriculum for each technical topic in order to provide the students with the demanded level of knowledge and expertise. Technical areas more wanted at the R&D level need to be covered with a research-oriented approach. On the other hand, those mostly wanted at engineering levels, need more hands-on experience. For example, to cover industry needs our courses may cover areas such as HPC & big data in more theoretical and scientific way with a research-oriented approach, while areas such as sensors, robotics and networks need a more practical and hands-on approach in their respective courses.

To access full-text report, click on the following link:

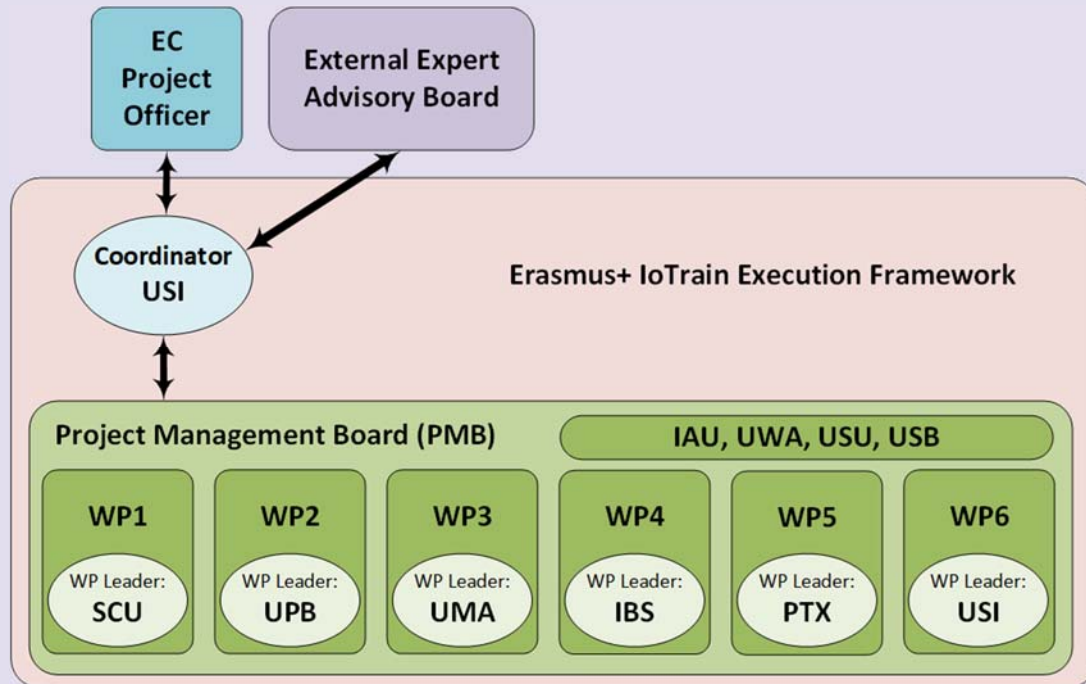
<http://www.iotrain.eu/wp-content/uploads/2022/04/IoTrain-Deliverable-D1.2.pdf>

Project management Handbook

The project handbook provides guidelines and information for the operation of the IoTrain project. It defines the rules and basic support for cooperation between partners and establishes procedures for documentation, quality management, management decision schemes and control procedures.

Key topics to be addressed in the handbook are:

- Project internal management structure



- Responsibilities
- Project internal processes
- overall scientific coordination,
- Group management (e.g.,

Figure 3 - Project Management Board

- (publication, internal review, etc.)
- Project infrastructure (IoTrain Intranet, communication, etc.)
- Risk management
- Quality control and monitoring plan

Project internal management structure

The project internal management structure of IoTrain involves different roles, including Coordinator, Work Package Leader, and Deliverable Leader. Each project partner participating in the IoTrain project is committed to constructively contribute to the achievement of the project goals and provides its input actively and on time. Nonetheless, management roles have been identified to ensure coordinated activities within IoTrain. On a project level the coordinator implements a proper management. On a work package level the work package leaders and deliverable leaders efficiently handle the necessary coordination. USI takes care of the following activities:

- prepare and follow-up project reviews, general assembly meetings, etc.)
- Project administration and reporting (including financial aspects, project indicators, etc.);
- management of amendments to the grant agreement and the consortium agreement;
- monitoring of the overall progress of project partners with their obligations,
- quality of the results,
- proper implementation of decisions of the general assembly,
- financial and legal aspects of the project,
- Communication between the EC and the IoTrain consortium including the collection and submission of deliverables, organization of project meetings, and engagement with the public.

The IoTrain project consists of 6 work packages (WP), and each WP is supervised by a WP leader. The WPs are

further divided into tasks (deliverables), foreseeing a deliverable leader (deliverable leader), for each task. WP leaders will strictly examine and monitor the progress of their WPs and will be responsible for the success of these WPs. The main responsibilities of the WP leaders are the

- overall coordination and planning within the WP,
- preparation of WP meetings,
- fulfillment of work package objectives,
- communication flow and adjustment between tasks,
- quality control of deliverables, and
- reporting to the coordinator
- Each deliverable leader is responsible for the
- planning and execution of the scientific and technical activities of the respective task, and
- Timely completion of deliverables due in its task.

Deliverable leaders provide required information to the work package leaders.

Project Management Scheme

The Project Management Board (PMB) is the decision making body of the IoTrain project. The PMB is composed of the coordinator and of one duly authorized representative from each project partner with decision-making power. Each member of the PMB has one vote and the PMB is responsible for the

- Overall direction and strategy of the project,
- All strategic decisions with regard to the technical objectives of the projects and to the content of the WPs (e.g. changes in the work plan, contract amendments),

- Termination of contract with respect to a project partner
- Regular participation in the monthly PMB telcos
- Keeping staff members of the respective organizations aware of their decisions and actions
- Providing the requested inputs to the PMB or the coordinator
- Ensuring that the quality is well maintained in each WP
- Coordination and adjustment between WPs
- Quality and progress control of deliverables
- Monitoring the effective and efficient implementation of IoTrain.
- Project internal processes (publication, internal review, etc.)

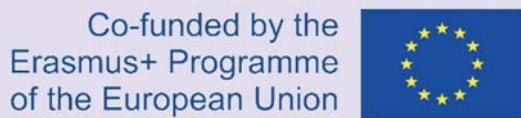
The IoTrain project internal operation is optimized by the definition of processes for recurring actions and other important procedures.

The project deliverables / publications addresses project results, academic publications, and other media as well (e.g., press releases, website). For this, the project partner uploads a draft version of publication to the project SharePoint and inform all the partners via mailing list at least 14 days before the submission. Then, the project partners have to send their feedback including the interest conflicts (statement of reason is needed) within 4 days to the deliverable leader. The deliverable leader will inform the Partners if objection was received and the deliverable leader/project partner and opposing Partner resolve interest conflict within 8 days. Otherwise, the Partner publish and provide information on publication for the Dissemination Report.

There are very important rules for the Project Deliverables / Publications, including the project website. Based on the rules of the EC, the project results / deliverables / publications / website must display Erasmus+ Logo which mentions "Co-funded by the Erasmus+ Programme of the European Union"



or

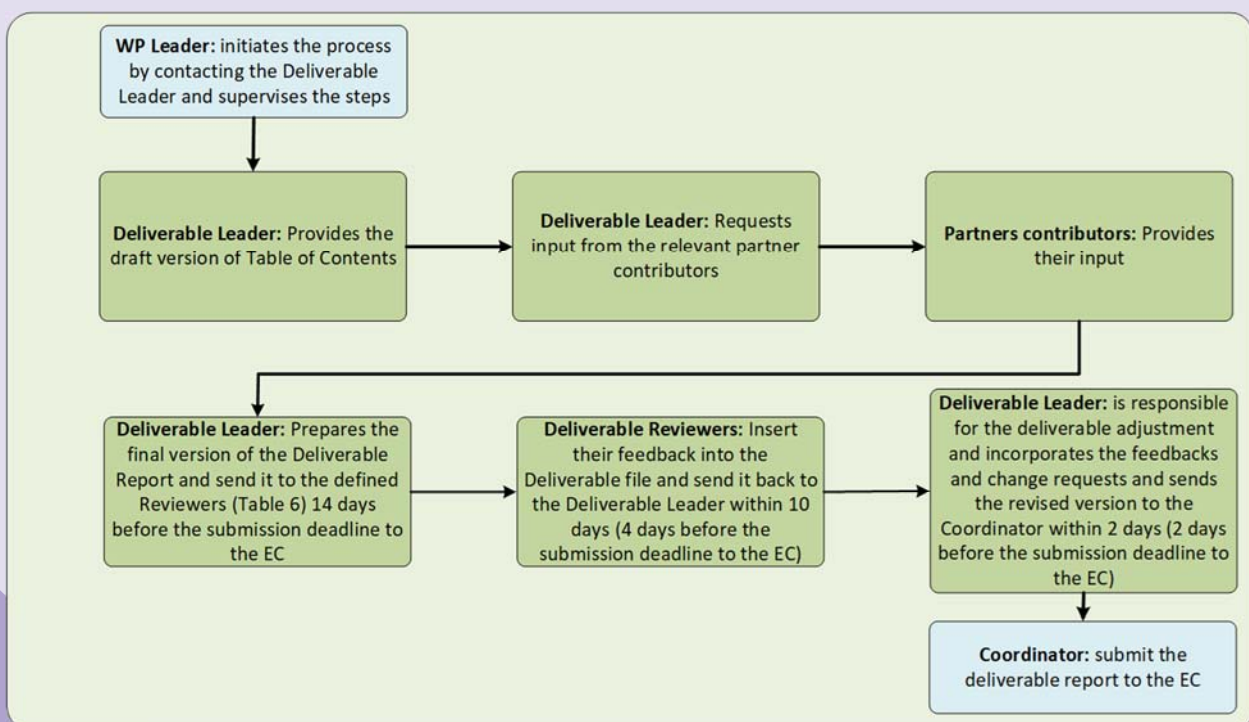


The project internal deliverable review process is balanced among all the IoTrain partners. For each deliverable, two partners have been selected to provide reviews. These reviews are submitted to the deliverable leader of the respective deliverable by storing them in the deliverable's subfolder in SharePoint. Table 6 provides and

overview on deliverables and partners responsible for reviews.

The identification of conflicts that arise in the course of the IoTrain project is within the responsibility of each project partner. Any arising dissent between project partners shall be communicated to the coordinator who then initiates the conflict resolution procedure. The conflict resolution procedure foresees the following three steps:

1. The coordinator shall contact the conflicting partners independently from each other to identify the point at issue. After having figured out the different viewpoints, the coordinator shall propose a solution. If this solution is accepted by the conflicting parties, a respective memo will be recorded. If no solution can be found, the conflict will be escalated to the next level.
2. In case step 1 fails, the conflict shall be communicated to the general assembly that shall elaborate solution scenarios and



then vote on these solution scenarios.

3. If level 2 fails, the final decision shall be taken by arbitration in Brussels under the Rules of Arbitration of the International Chamber of Commerce. The award of the arbitration will be final and binding upon the project partners concerned.

The coordinator reports any problems concerning the entire project such as serious delays, financial matters, contract matters, or defaulting partners to the EC project officer.

Project infrastructure (IoTrain Intranet, communication, etc.)

A project infrastructure has been set up to provide communication means and a dedicated intranet workspace for the IoTrain project. A Microsoft SharePoint server realizes the IoTrain intranet. It is a web-based file sharing and work support tool and that can be accessed by all project partners by using personalized login credentials.

Also, to communicate the project results to the interested public, a project website will be set up. The project website is available under www.ioTrain.eu. To enable effective communication within the IoTrain project, an email list has been set up (IoTrain@listserv.uni-siegen.de). The email list covers general items that are of interest for all partners, e.g., WP-related discussions and information exchange, information and requests from the EC, meeting preparation, etc. Teleconferences organized by the Coordinator are held with the Jitsi/Zoom web conferencing system

Reporting procedures

This section defines the reporting and documentation of resource usage and completion of deliverables. Every

partner reports the spent effort for the deliverables in which the partner participates. This process enables tracking of project progress and makes sure that potential problems are recognized early and time for corrective action remains. The basis for the reporting is the partner's internal system for recording worked hours using timesheets. Furthermore, WP leaders and deliverable leaders (supported by the general assembly, if necessary) will estimate the status of completion for the deliverables every month during the monthly meetings. The degree of completeness of deliverables will be expressed as a percentage.

The individual travel report will be used for the documentation of the travel, travel costs, and cost of the stay.

The Minutes of Meeting (MoM) is prepared for the documentation of any decisions or actions that are made during the meetings. The names of the representatives from each partner organization will be written in a table in the first page of the MoM. The second page of MoM shows time and date, title of the meeting, type of the meeting (face-to-face/virtual teleconference), description of the decision or action, the name of auctioneer who is the responsible partner, and the deadline (if needed).

Risk management

The quality and risk manager maintains and updates the list of risks and manage the identified risks. The set of risks identified in the description of work and the associated mitigation plans are continuously monitored, maintained and extended as necessary. The WP leaders report issues arising in the course of the quality control that might

pose a risk or increase the probability of a risk to the coordinator.

The technological and management risks that may arise during the duration of the project have been identified and mitigation strategies have been proposed. Project risks are potential threats (e.g., deviations from the project scope, the project schedule or project costs) to the project success. Risk management is used as a means to systematically manage the uncertainties within the IoTrain project in order to increase the likelihood of meeting the project objectives.

The objectives of risk management are:

- identification, analysis and prioritisation of risks
- planning and execution of preventive measures (risk avoidance)
- planning and execution of corrective measures (risk reduction)
- risk control

The progress reports, prepared quarterly by the WP leaders for the coordinator, contain an evaluation of risks. Thus, the coordinator assesses the risk probability on a regular basis and, if required, inform the General Assembly.

If risks are identified at the WP level and cannot be eliminated, the coordinator is notified and proposes corrective measures. Any identified risks that have impact on other WPs are communicated to the General Assembly.

Several technical challenges and risks have been identified with different probability levels and impact on the project objectives. The procedure to handle these risks is described. At the project start the list of identified risks is evaluated and updated. The list is

revisited every six months to track the progress of risks and risk mitigation.

To access full-text report click on the following link.

<https://www.iotrain.eu/wp-content/uploads/2022/04/D6.2.pdf>

Quality control and monitoring plan

To guarantee the project quality, the Quality Control and Monitoring Plan (QCMP) is with respect to the Logical Matrix Framework (LMF) by devising qualitative and Measurable indicators. A detailed task distribution regarding fulfilment of quality Benchmarks (see LMF) to project partners can then be provided according to this. The related factors - qualitative objective, progress indicators and associated measures can influence the project work.

- Qualitative objective is an important part of the project process to control quality. It is the general goal of the project, which focuses on better adapting to changeable situations and working collaboratively.
- Progress indicators show the status of the ongoing project and how the plan has been implemented. Detailed metrics like meetings, progress reports, deliverables, publications, developed courses, surveys and purchase process are included.
- Associated measures will monitor the project to ensure the smooth progress and manage risk. To improve project quality, adequate peer assessment tools should be provided. In addition to internal quality monitoring, external quality experts will be appointed to give feedback.

This QCMP is effective during the project lifespan, and all partners can take responsibilities to update and evaluate it, which can help reach the

optimal outcome. To access full-text report click on the following link.

<http://www.iotrain.eu/wp-content/uploads/2022/04/IoTrain-Deliverable-D3.1.pdf>

Report on Analysis of existing courses and resources

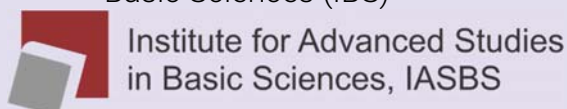
The IoT Consortium consists of:

The consortium consists of 10 partners including 4 European and 6 Iranian-Iraqi ones ranging from academia to industry. Involvement of non-academic partner, Petanux GmbH (PG), ensures harmonizing academic training with market needs and the necessary skills in the business sector and the European Industrial knowledge transfer to Iran, as a way to expand employment opportunities of students and internship programs.



Partner Country: Iran

- Shahid Chamran University of Ahvaz (SCU)
- University of Sistan and Baluchestan (USB)
- Islamic Azad University – Quchan Branch (IAU)
- Institute for Advanced Studies in Basic Sciences (IASBS)



University of sistan
and baluchestan

Partner Country: Iraq

- University of Wasit (UWA)
- University of Sumer (USU)



Internet of Things (IoTrain) is recognized as a revolution in engineering with various real world applications: climate change, health, manufacturing, environmental pollution, smart offices/vehicles, agriculture, energy, traffic management, intelligent cities. IoT aims to catch the future technological emerging results in the context of Industry 4.0 and cyber physical manufacturing systems from production to maintenance, customer relationship and marketing. Today, the Industrial Internet of Things (IoT) is one of the most popular technologies in the industry that supports digitalization of manufacturing in line with industry 4.0 strategies.

This report, as deliverable 1.1 of the IoTrain project, summarizes the outcomes of exploring and analyzing the existing relevant HE curricula, for the purpose of gap identification and

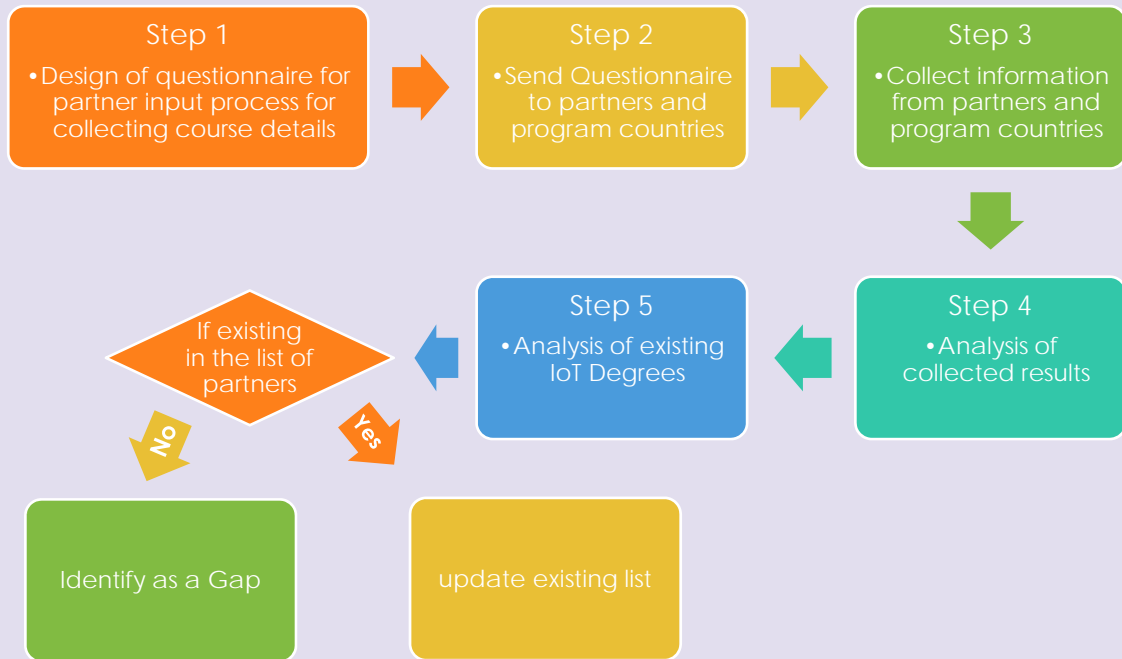


Figure 4 - Gap Identification Procedure

calibration of teaching material. The report will be the stepping stone for WP1 and will be largely promoted across Iranian and Iraqi HEIs and enterprises, as well as, policy makers in the Iranian and Iraqi HE sectors. The aim is to have a clear picture and a common understanding of the analysis results, their interpretation and consequences in order to design the required steps in adapting the contents of the proposed modules.

This report is the Deliverable 1.1 in Work package 1, entitled “Report on Analysis of existing courses and resources”. The report summarizes a variety of activities that have been performed for identifying gaps related to Higher Education (HE) in Iran and Iraq in IoT sector. For this reason, various data collection procedures have been performed. A high-level overview of the performed procedures is presented in **Error! Reference source not found..** In the first step, we collected the data from all Iranian, Iraqi and European partners through a pre-designed form

(questionnaire) shown in the next section. Afterwards, we collected the filled forms from each partner and analyzed the inputs.

The scope of the document

This document provides an overview of existing courses and modules being offered in the IoT studies worldwide. To this, we already analyzed most of well-known IoT programs and realized what is normally being offered in these programs. Afterwards and after having a concrete list of courses and modules, we analyzed which of these modules are already available in the consortium partnership and being offered by the consortium, partner and what modules need to be designed and prepared from scratch to complete our IoT curriculum. In this regard, we studies bachelor and master degrees of IoT in European, Iranian, Iraqi countries in particular and rest of the work as well.



IoTrain

IoTrain aims to enhancing the IoT skills of engineers with state-of-the-art European standards and technologies.



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