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SEnDIng

D6.2

EVALUATION PLAN AND TOOLS

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Document Version-Status:	SEnDIng_DLV6.2-final
Submission date:	M8
Dissemination level:	Public

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Co-funded by the Erasmus+ Programme of the European Union

Deliverable factsheet

Project Number:	591848-EPP-1-2017-1-EL-EPPKA2-SSA
Project Acronym:	SEnDIng
Project Title:	Sector Skills Alliance for the design and delivery of innovative VET programmes to Data Science and Internet of Things professionals

Title of Deliverable:	Evaluation plan and tools
Work package:	WP6 "Quality assurance and evaluation of project"
Task:	6.3 Evaluation of project's outcomes and its impact
Document identifier:	SEnDIng_DLV6.2-final.docx
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Delivery Slip

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PROJECT SUMMARY

SEnDIng project aims to address the skills' gap of Data Scientists and Internet of Things engineers that has been identified at the ICT and other sectors (e.g. banking and energy) at which Data Science and Internet of Things have broad applications. To achieve this goal, SEnDIng will develop and deliver to the two aforementioned ICT-related occupational profiles two learning outcome-oriented modular VET programmes using innovative teaching and training delivery methodologies.

Each VET program will be provided to employed ICT professionals into three phases that include: (a) 100 hours of on-line asynchronous training, (b) 20 hours of face-to-face training and (c) 4 months of work-based learning. A certification mechanism will be designed and used for the certification of the skills provided to the trainees of the two vocational programs, while recommendations will be outlined for validation, certification & accreditation of provided VET programs.

Furthermore, SEnDIng will define a reference model for the vocational skills, e-competences and qualifications of the targeted occupational profiles that will be compliant with the European eCompetence Framework (eCF) and the ESCO IT occupations, ensuring transparency, comparability and transferability between European countries.

Various dissemination activities will be performed – including the organization of one workshop at Greece, Bulgaria and Cyprus and one additional conference at Greece at the last month of the project – in order to effectively disseminate project's activities and outcomes to the target groups and all stakeholders. Finally, a set of exploitation tools will be developed, giving guides to stakeholders and especially companies and VET providers, on how they can exploit project's results.

TABLE OF CONTENTS

1 Introduction

The scope of this deliverable is to specify the steps and instruments that will be used to evaluate the project. The evaluation will cover two main axes: the outputs (deliverables) of the project and the main activities (curricula and training material, e-learning platform, vocational training, and certification) of the project that are implemented under tasks WP2, WP3, WP4 and WP5. There activities are the following:

- **WP 2**: Learning outcomes identification and design of vocational curricula/educational modules and training/assessment methodology (WPL: **ESI CEE**, M4-M15)
  - Task 2.1 - Development of desired learning outcomes in terms of knowledge, skills and competences
  - Task 2.2 - Reference model for the interpretation of existing research evidence and surveys into specific skills, e-competences and qualifications needs of Data Scientists and IoT Engineers
  - Task 2.3 - Design of trainings' vocational curricula/educational modules
  - Task 2.4 - Training methodology development
  - Task 2.5 - Training monitoring and assessment methodology development
- **WP 3**: Implementation of training material (WPL: **UCY**, M9-M20)
  - Task 3.1 – Development of training material for DS trainings
  - Task 3.2 – Development of training material for IoT trainings
  - Task 3.3 – Development of training material for upskilling of transversal skills
- **WP 4**: Implementation of skills certification mechanism (WPL: **UNICERT**, M16-M33)
  - Task 4.1 – Recommendations for validation, certification & accreditation of provided VET programs
  - Task 4.2 – Design of Data Science VET program certification scheme
  - Task 4.3 – Design of Internet of Things VET program certification scheme
- **WP 5**: Design of e-learning platform and delivery of vocational trainings (WPL: **ULS**, M9 - M33)
  - Task 5.1 – Specifications of e-learning environment and survey of available solutions
  - Task 5.2 – Installation, operation and support of e-learning platform
  - Task 5.3 – Provision of vocational trainings, support of learners and certification of skills provided

We would like to mention that this is the first version of project evaluation plan that will be updated, when the core outputs of the project will be produced (curricula and training material, e-learning platform, VET program and certification mechanism).

2 Evaluation tools

The main tools that will be used for the evaluation of project outcomes and core activities are questionnaires, surveys, WPs quality reports (including impact evaluation reports) and observations.

- **Questionnaires**. A questionnaire consists a research instrument that is composed by a series of questions for the purpose of gathering information from respondents. Although questionnaires are often designed for statistical analysis of the responses, this is not always the case and they are also used for evaluation purposes.
- **Survey**. The term survey refers to a strategic design of both quantitative and qualitative research and it relates to both practical and tactical matters to do with the detailed design of an instrument to be used [1]. Undertaking a survey is essential when there is a need for information relevant to the direct experience of a project beneficiaries.
- **WPs quality reports**. These reports include an overall description of WPs achievements and their potential impact to target groups. This reports can support the evaluation of project outputs and its core activities.
- **Observations**. It is a tool that can be used to monitor or evaluate a process or situation and document evidence of what is seen and heard. Observation is used in a variety of ways in evaluation. Often it is a transit method that leads to other methods. For example, an evaluator can initially pay attention to a wide variety of factors. In this case the evaluation begins with exploratory observation. This exploratory step helps narrow the study and refines the evaluation strategy. The next step could be a more focused observation using checklists. Or the exploratory observation might lead to other evaluation methods such as surveys, in-depth interviews, focus groups, secondary data or other strategies [2].

Also, where applicable other evaluation tools will be utilized (i.e. interviews with key stakeholders and focus groups).

3 Evaluation of deliverables

As has been defined in deliverable "D1.5 Project Management Plan", the task leader is responsible for the submission of a task's deliverables, in accordance with the timing and conditions set out in the project. The project coordinator will enforce a strict schedule of deliverable submission and assure high level quality of deliverables produced. To assist fruitful and effective collaboration between partners, regular project meetings will be organized especially in preparation of major deliverables. The work package leaders send to the project coordinator the final drafts of the scheduled WP deliverables at least one month before the deliverables deadline in order to pass through the quality assurance process.

To ensure the maximum quality of each deliverable and for evaluation purposes, a set of review procedures will be applied which are described in detail in project quality assurance plan (Deliverable 6.1). The partner responsible for the production of the deliverable should ensure that those procedures are applied and deadlines are met. For each deliverable a peer review system is defined, where at least two reviewers are appointed by the Work Package Leader after a consultation with the Technical Manager on the basis of their expertise on the deliverable's subject.

The timeline that will be applied for the completion of each deliverable is the following:

- 4 weeks before the deliverable's submission deadline, the Work Package Leader appoints the reviewers.
- 2 weeks before the deliverable submission deadline, a final draft should be made available to reviewers.
- 1 week before the deliverable submission deadline, the comments of the reviewers should be addressed in the deliverable and the deliverable should be sent to the partners for their comments and/or approval.
- Once the deliverable is approved by all partners it is forwarded to the Project Coordinator for the final approval.

Where necessary, the deliverables authors will be asked to promptly modify the document to ensure that is complies with the contractual obligations.

In case that nonconformity to the standards are reported, the respective partners responsible for completing the activities and producing the deliverable should address the nonconformity in one week's period. The reviewers should perform a review of the corrected actions to ensure that the deliverable covers the standards.

4 Evaluation of project main activities

The evaluation of project main activities will be done based both on quantitative and qualitative data. The main sources of this data will be:

- Surveys and questionnaires targeting target groups that will be distributed physically during the implementation of project workshops and final conference.
- Surveys and questionnaires that will be distributed to trainees at the completion of each training phase (online, face to face and work based learning).
- Surveys and questionnaires that will be distributed to companies participating in the design of the VET program.
- WP quality reports produced internally in the project.
- Data analytics that the eLearning platform will provide (i.e. number of enrolled users at each course).

The evaluation of project main activities will take place at the end of each WP and at the end of the project.

4.1 Curricula and training material

SEnDIng consortium will develop curricula that combine technical knowledge and skills at Data Science and IoT domains with transversal skills and competences. The curricula will be multi-disciplinary, covering three disciplines (Data Science, Internet of Things and Transversal Skills), modular, defining separate educational modules for each discipline, and learning outcomes-oriented.

The stakeholders involved at the evaluation of curricula and training material are project partners, trainees and other (i.e. VET providers). The tools that will be exploited for the evaluation of the quality and effectiveness of the curricula and training material are:

project partners using,

- questionnaires collected internally,
- WPs quality reports including impact evaluation reports,
- Observations,

trainees using,

- surveys and questionnaires,

and other stakeholders using,

- Surveys and questionnaires

Qualitative Indicators

The qualitative indicators that will be exploited for the evaluation of the quality and effectiveness of the curricula and training material are the following:

- Indicator 1: Structure of the curricula, modules and training material
  - Is the structure of the curricula effective?
  - Is the structure of the training modules effective?
  - Is the structure of the training material effective?
- Indicator 2: Content of the modules
  - Is the content of the modules interesting?
  - Are the additional resources provided interesting?
  - Are the evaluation quizzes challenging?
- Indicator 3: Quality of training material
  - Does the training material promote learner's interactivity?
  - Is the format of the training material effective?
  - Is the training material easy to read and follow up?
  - Are all figures and tables of high quality?
  - Is the authoring of the training material of high quality?
- Indicator 4: Potential impact to the target groups
  - Do the material covers your expectations?
  - Do the material contributes to your upskilling at Data Science and/or IoT technologies?
- Indicator 5: Reuse of training material
  - Is it easy to reuse and extend the training material?
- Indicator 6: Diversity of curricula's learning outcomes
  - Do the learning outcomes covers both technical knowledge and skills with transversal skills and competences?

Quantitative Indicators

In addition to the aforementioned qualitative indicators, the following quantitative indicators will be utilized to evaluate the curricula and training material.

- Indicator 1: Number of curricula developed
- Indicator 2: Number of educational modules developed
- Indicator 3: Number of open educational resources developed

- Indicator 4: Number of training videos developed
- Indicator 5: Number of presentations developed
- Indicator 6: Number of training hours covered by the training material
- Indicator 7: Number of stakeholders involved in the evaluation of curricula and training material.
- Indicator 8: Number of surveys, questionnaires developed
- Indicator 9: Number of learning outcomes defined
- Indicator 10: Effectiveness of training methodology
- Indicator 11: Effectiveness of trainees assessment methodology

4.2 E-learning platform

For the delivery of VET program, an e-learning platform will be utilized. This platform will host self-paced online courses, which the trainees should attend. The stakeholders involved in the evaluation of e-learning platform are project partners, trainees and other (i.e. VET providers). The tools that will be exploited for the evaluation of the quality and effectiveness of e-learning platform are the following:

project partners using,

- questionnaires collected internally,
- WPs quality reports including impact evaluation reports,
- observations,

trainees using,

- surveys and questionnaires,

other stakeholders using,

- surveys and questionnaires.

Qualitative Indicators

The qualitative indicators that will be exploited for the evaluation of the quality and effectiveness of the e-learning platform are the following:

- Indicator 1: User friendly and accessibility
    - Is the design of the platform user-friendly?
    - Is the platform responsive when using different type of devices (i.e. smartphones, tablets)

- Indicator 2: Usability
  - Is the navigation to the courses straightforward?
  - Are the tools (i.e. wiki, discussion forum, chat) provided by the courses adequate and useful?
  - Is the search engine provided effective?
  - Is the registration procedure easy and straightforward?
- Indicator 3: Reliability and performance
  - Is the performance of the platform good?
  - Is the availability of the platform high?

Quantitative Indicators

In addition to the aforementioned qualitative indicators, the following quantitative indicators will be utilized to evaluate the e-learning platform:

- Indicator 1: Number of registered users
- Indicator 2: Number of online courses developed
- Indicator 3: Number of enrolled users at each course
- Indicator 4: Number of enrolled users successfully completing each course
- Indicator 5: Number of online training hours
- Indicator 6: Number of surveys conducted
- Indicator 7: Number of participants in the surveys

4.3 Vocational training

SEnDIng VET program will be delivered in three phases:

- Online training. The first phase of the training will be delivered through self-paced online courses aiming to upskill the trainees at Data Science and IoT technologies.
- Face to face training. The second phase of the training will be delivered face to face aiming to cultivate the transversal skills of the trainees.
- Work based learning. The third phase of the training will be delivered in a real work place.

The stakeholders involved in the evaluation of vocational training are project partners, trainees and other (i.e. VET providers). The tools that will be exploited for the evaluation of the quality and effectiveness of the vocational training are the following:

project partners using,

- questionnaires collected internally
- WPs quality reports including impact evaluation reports
- observations

trainees using,

- surveys and questionnaires

other stakeholders using,

- surveys and questionnaires

Qualitative Indicators

The qualitative indicators that will be exploited for the evaluation of the quality and effectiveness of the vocational training are the following:

- Indicator 1: Effectiveness of online training
- Indicator 2: Effectiveness of face to face training
- Indicator 3: Effectiveness of work based learning
- Indicator 4: Effectiveness of whole vocational training
- Indicator 5: Profile of companies participating in vocational training
- Indicator 6: Profile of trainees participating in vocational training
- Indicator 7: Achievement of learning outcomes on behalf of trainees
- Indicator 8: Individual learning experience of trainees
- Indicator 9: Support of trainees during the vocational training
- Indicator 10: Effectiveness of assessment methods applied
- Indicator 11: Contribution of vocational training to fill the skills gap at Data Science and/or IoT domains

Quantitative Indicators

In addition to the aforementioned qualitative indicators, the following qualitative indicators will be utilized to evaluate the vocational training:

- Indicator 1: Number of companies participating in the vocational training
- Indicator 2: Number of employees participating in the vocational training
- Indicator 3: Hours of online training (total and per trainee)
- Indicator 4: Hours of face to face training (total and per trainee)
- Indicator 5: Months of work based learning (total and per trainee)
- Indicator 6: Numbers of trainees completed successfully the vocational training

4.4 Certification mechanism

At the end of the vocational training, the trainees will take part in a final exam aiming to certify the learning outcomes they got. The stakeholders involved in the evaluation of the certification mechanism are project partners, trainees and other (i.e. VET providers). The tools that will be exploited for the evaluation of the quality and effectiveness of the certification mechanism are the following:

project partners using,

- questionnaires collected internally
- WPs quality reports including impact evaluation reports
- observations

trainees using,

- surveys and questionnaires

and other stakeholders using

- surveys and questionnaires

Qualitative Indicators

The qualitative indicators that will be exploited for the evaluation of the certification mechanism are the following:

- Indicator 1: Effectiveness of certification procedure
- Indicator 2: Degree of difficulty of certification exams
- Indicator 3: Guidance given to trainees during the certification exams
- Indicator 4: Place at which the certification exams took place
- Indicator 5: Applicability and transferability of the recommendations done for the validation, certification & accreditation of provided VET programs

Quantitative Indicators

In addition to the aforementioned qualitative indicators, the following qualitative indicators will be utilized to evaluate the certification mechanism:

- Indicator 1: Number of trainees participating in the certification exams (per program –Data Science or IoT- and totally)
- Indicator 2: Number of trainees taking the certification (per program –Data Science or IoT- and totally)

- Indicator 3: Number of recommendation done for the validation, certification & accreditation of provided VET programs.

5 Project evaluation plan

This section presents the project evaluation plan. The following tables summarize the evaluation tools, the quantitative indicators and the qualitative indicators that will be used during project lifetime to evaluate the outputs of the project and the activities under WP2, WP3, WP4 and WP5.

WP 2: Learning outcomes identification and design of vocational curricula/educational modules and training/assessment methodology

Main outputs	**Evaluation tools**	**Quantitative indicators**	**Qualitative indicators**
1. Learning outcomes of VET program 2. Reference model 3. VET curricula 4. Training methodology	1. Surveys among target companies, partners, and other stakeholders (i.e. VET providers); 2. Individual interviews with key representatives of the industry;	1. Number of curricula developed	1. Structure of the curriculum, modules and training material
		2. Number of educational modules developed	2. Content of the modules
		3. Number of learning outcomes defined	3. Quality of training material

5. Training monitoring methodology 6. Trainees assessment methodology	3. Impact evaluation reports from project partners and WP leaders; 4. Observations 5. Others (if applicable)	4. Number of stakeholders involved in the evaluation of curricula and training material	4. Potential impact to the target groups
		5. Number of surveys, questionnaires developed	5. Reuse of training material
			6. Diversity of curriculum learning outcomes
			7. Effectiveness of training methodology
			8. Effectiveness of trainees assessment methodology

WP 3: Implementation of training material

Main outputs	Evaluation tools	Quantitative indicators	Qualitative indicators
1. Data Science training material 2. IoT training material 3. Transversal skills training materail	4. Surveys among target companies, partners, and other stakeholders (i.e. VET providers); 5. Impact evaluation reports from project partners and WP leaders; 6. Observations 7. Others (if applicable)	1. Number of open educational resources developed	1. Structure of the curriculum, modules and training material
		2. Number of presentations developed	2. Quality of training material
		3. Number of training hours covered by the training material	3. Reuse of training material
		4. Number of training videos developed	4. Potential impact to the target groups
		5. Number of stakeholders involved in the evaluation of training material	

		6. Number of surveys, questionnaires developed	

WP 4: Implementation of skills certification mechanism

Main outputs	Evaluation tools	Quantitative indicators	Qualitative indicators
1. Recommendations for validation, certification & accreditation of provided VET programs 2. Data Science VET program certification 3. IoT VET program certification	4. Surveys among target companies, partners, and other stakeholders (i.e. VET providers); 5. Impact evaluation reports from project partners and WP leaders; 6. Observations 7. Others (if applicable)	1. Effectiveness of certification procedure	1. Number of trainees participating in the certification exams (per program –Data Science or IoT- and totally)
		2. Degree of difficulty of certification exams	2. Number of trainees taking the certification (per program –Data Science or IoT- and totally)
		3. Guidance given to trainees during the certification exams	3. Number of recommendation done for the validation, certification & accreditation of provided VET programs
		4. Place at which the certification exams took place	

		8. Applicability and transferability of the recommendations done for the validation, certification & accreditation of provided VET programs	

WP 5: Design of e-learning platform and delivery of vocational trainings

Main outputs	Evaluation tools	Quantitative indicators	Qualitative indicators
1. Online courses 2. VET program 3. Certification	1. Surveys among target companies, partners, and other stakeholders (i.e. VET providers) 2. Individual interviews with key representatives of the industry 3. Impact evaluation reports from project partners and WP leaders; 4. Observations	1. Number of registered users	1. User friendly and accessibility of eLearning platform
		2. Number of online courses developed	2. Usability of eLearning platform
		3. Number of enrolled users at each course	3. Reliability and performance of eLearning platform
		4. Number of enrolled users successfully completing each course	4. Effectiveness of online training
		5. Number of online training hours	5. Effectiveness of face to face training
		6. Number of surveys conducted	6. Effectiveness of work based learning

	5. Others (if applicable)	7. Number of participants in the surveys	7. Effectiveness of whole vocational training
		8. Number of companies participating in the vocational training	8. Profile of companies participating in vocational training
		9. Number of employees participating in the vocational training	9. Profile of trainees participating in vocational training
		10. Hours of online training (total and per trainee)	10. Achievement of learning outcomes on behalf of trainees
		11. Hours of face to face training (total and per trainee)	11. Individual learning experience of trainees
		12. Months of face to face training (total and per trainee)	12. Support of trainees during the vocational training
		13. Numbers of trainees completed successfully the vocational training	13. Effectiveness of assessment methods applied

			14. Contribution of vocational training to fill the skills gap at Data Science and/or IoT domains

6 References

[1] R, Colin. (2002). A Resource for Social Scientists and Practitioner-Researchers, Real World Research, Second Edition, Blackwell.

[2] R, Krueger. (2017). Observation in Evaluation, University of Minnesota, USA.