



Education for Digitalization of Energy

Deliverable 5.5

BSDE presentation

and strategic roadmap

for the deployment of the action plans

Status – Version: V2.0

Delivery Date (DOW): 31/12/2023

Distribution - Confidentiality: Public

Authors:

Fernando de Cuadra (COMILLAS),

Keywords:

Blueprint, Training, Digitalisation, Strategy, Business model, Stakeholders, Marketplace

Abstract:

EDDIE is an Erasmus+ project funded by the EC within the SSA framework. The goal is to develop a self-sustainable long-driven strategy (Blueprint) towards the digitalisation of the European Energy sector, bringing together all the relevant stakeholders. This document describes the strategy, based on the creation of “the Entity”, an institution that will provide –or help provide- services to the main stakeholders, and coordinate a Large-Scale Partnership created as part of the strategy. This institution will manage a WEB platform to support the services and perform dissemination tasks. The services to be provided should help the digital-skills acquisition process: training, recruiting, working, re-training, identifying current skill gaps, and forecasting future needs. Some candidate services are analysed and evaluated in the document. The main stakeholders considered are Industry (Energy and ICT sectors), Education (VET, University, and others), Administration (national and regional levels), research institutions of any kind, and the European framework (projects, institutions, programs and centres). Other special stakeholders are related to potential partnership opportunities: associations, clusters, social networks and platforms. Some tasks described in the document are directly related to the services, while other tasks are helpful to perform and/or to add value to those services – mainly the definition of standard templates and skills-description models. Based on the comparative analyses of candidate services and the specification of the future Entity, an implementation roadmap is discussed, considering the self-sustainability of the strategy and its compatibility with the current and future European framework.

DISCLAIMER

The European Commission's support for the production of this publication does not constitute an endorsement of the contents, which reflect the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein. All EDDIE consortium parties have agreed to full publication of this document.

Neither the EDDIE consortium as a whole, nor a certain party of the EDDIE consortium warrant that the information contained in this document is capable of use, nor that use of the information is free from risk, and does not accept any liability for loss or damage suffered using this information.

	Participant organisation name	Short	Country
01	UNIVERSIDAD PONTIFICIA COMILLAS	COMILLAS	Spain
02	NATIONAL TECHNICAL UNIVERSITY OF ATHENS	NTUA	Greece
03	RHEINISCH-WESTFAELISCHE TECHNISCHE HOCHSCHULE	RWTH	Germany
04	FOSS Research Centre for Sustainable Energy – U. of Cyprus	FOSS	Cyprus
05	Politecnico di Milano – METID	POLIMI	Italy
06	Kungliga Tekniska Högskolan	KTH	Sweden
07	Fundación Obra Social y Monte de Piedad de Madrid – Escuelas Profesionales Padre Piquer	PIQUER	Spain
08	Centrul Roman al Energiei	CRE	Romania
09	REPSOL SA	REPSOL	Spain
10	IBERDROLA	IBERDROLA	Spain
12	DNV	DNV	Spain
13	EDSO for Smart Grids	E.DSO	Belgium
14	NTT Data Italia SPA	NTT	Italy
15	NOVEL Group	NOVEL	Luxembourg
16	University of Cologne Business School	UCBS	Germany
17	Institute of Energy Economics at the University of Cologne	EWI	Germany

ACKNOWLEDGEMENT

This document is a deliverable of EDDIE project. This project has received funding from the European Union's Erasmus+ Sector Skills Alliance program under grant agreement N° 612398.

The opinions expressed in this document reflect only the author's view and in no way reflect the European Commission's opinions. The European Commission is not responsible for any use that may be made of the information it contains.

Document History

Version	Date	Contributor(s)	Description
V1.0	31/01/2023	Fernando de Cuadra (and other EDDIE Consortium members)	Proof of partial development (TechReport#2)
V2.0	31/12/2023	Fernando de Cuadra Carlos Mateo Ernesto Barrios (Repsol) (and other EDDIE Consortium members)	Final delivery

Document Reviewers

Date	Reviewer's name	Affiliation
25/12/2023	Juan Carlos del Real	Universidad Pontificia Comillas
25/12/2023	Pablo García González	Universidad Pontificia Comillas

Table of Contents

Executive Summary	8
1. Introduction: the process and results of the EDDIE project	9
1.1. EDDIE proposal: objectives and plans	9
1.1.1. Description of WP5 goals in the EDDIE proposal	9
1.1.2. Blueprint definition and exploitation: during and after EDDIE	10
1.2. Methodology and tasks	11
1.2.1. Analysis of the adaptive learning process for digital skills	12
1.2.2. Analysis of the elements/components of a training programme	13
1.2.3. Analysis of tasks related to the strategy	14
1.2.4. Proposal of candidate tasks and services to help the digitalisation process	15
1.2.5. Development of a standard “language” to describe skills	16
1.2.6. Development of a standard template for training programmes.....	16
1.2.7. Identification of best practices in different aspects of the process.....	16
1.2.8. Definition or identification of “flagship programmes”.....	17
1.3. WP5 organisation: tasks, planning, and deliverables	17
1.4. Partial results	19
1.4.1. Candidate services to be provided by the Entity	19
1.4.2. Standard “language” to describe skills.....	20
1.4.3. Standard template for training programmes	21
1.4.4. Creation of the Entity.....	22
1.4.5. Results from other tasks	23
1.5. Organisation and contents of the rest of the document: the roadmap to the future of EDDIE	26
2. WEB portals: analysis of business models	27
2.1. General topics about online marketplaces	27
2.2. Options to exploit online marketplaces	28
2.3. Strategies and metrics	29
3. European framework: portals and platforms	33
3.1. Skills, jobs, and employment web portals.....	33
3.2. Educational and training web portals.....	33
4. Stakeholders: map and database	35
4.1. Characteristics of stakeholders.....	35
4.1.1. Classification	35
4.1.2. Possible roles with respect to participation and contribution	36
4.1.3. Mapping criteria and interpretation	37
4.2. Maps of stakeholders for different marketplaces.....	37
4.3. Database characteristics	41
5. Business models: a comparative analysis	43
5.1. Comparison of the marketplaces	43
5.2. Prioritisation of the marketplaces.....	45
5.3. Funding, costs, and sustainability.....	46
6. Prototype of the training marketplace	49
6.1. Project analysis.....	49
6.2. Abstract data structure.....	50
6.3. Design and development	50

6.3.1. Manage training tab	51
6.3.2. Register/Edit training page.....	52
6.3.3. Validation workflow	52
6.3.4. Search training page	52
6.3.5. Training detail page.....	53
7. Proposed strategy: the Entity and the LSP	54
7.1. Legal nature and organisation	54
7.2. Human, digital, financial, and legal resources	55
7.3. Roadmap	56
8. Attached documents: summaries	58
8.1. Research and dissemination portal	58
8.2. Training programmes marketplace	58
8.3. Jobs marketplace.....	59
8.4. Tools and systems marketplace	59
8.5. Syllabus elements to define skills	60
8.6. Training programmes template.....	61
8.7. Cost-benefit analysis.....	61
8.8. Comparative tables and evaluation criteria	61
8.9. Prototype of the Training Marketplace.....	61

List of Figures

Figure 1. Structure of Work Packages in EDDIE.....	10
Figure 2. WP5 planning in EDDIE: tasks, deliverables, and workforce.....	10
Figure 3. The adaptive-learning process for digital skills.	12
Figure 4. “Training programme” analysis: tasks and products.	13
Figure 5. Compilation of tasks related to the education (training) for digital skills.	14
Figure 6. Description of deliverables in WP5.....	17
Figure 7. Tasks and sub-tasks in WP5 and in the context of EDDIE.	18
Figure 8. Services proposed: improving the adaptive-learning process for digital skills.....	19
Figure 9. Relations among services and auxiliary tasks.	20
Figure 10. Syllabus elements (skills) from the training-contents side.	21
Figure 11. Topics that could be included in the Template to describe training programmes.....	22
Figure 12. Topics that could be used to identify and classify best practices.....	24
Figure 13. Relation between the stakeholders’ database and the implementation of services.	25
Figure 14. Strategies assigned to a map of stakeholders for a given service.....	37
Figure 15. Strategies assigned to the stakeholders of the Research and Dissemination Portal.	38
Figure 16. Strategies assigned to the stakeholders of the Tools and Systems Marketplace.....	39
Figure 17. Strategies assigned to the stakeholders of the Jobs Marketplace.....	40
Figure 18. Strategies assigned to the stakeholders of the Training Programmes Marketplace.....	41
Figure 19. Relation between the stakeholders’ database and the implementation of services.	42
Figure 20. Comparative table of the marketplaces (jobs, training, tools & systems, research & dissemination)....	44
Figure 21. Evaluation criteria of the marketplaces (jobs, training, tools & systems, research & dissemination).	46
Figure 22. Summary of the cost-benefit analysis.	47
Figure 23. Sensitivity to the annual fee per vendor and the net annual vendor increase.	47
Figure 24. Sensitivity to annual publishing fee per programme and the average #programmes per vendor.	48
Figure 25. EDDIE Training lifecycle.....	49
Figure 26. EDDIE Training visualization.....	49
Figure 27. EDDIE Training Marketplace Logical data structure.	50
Figure 27. Requirements for the EDDIE Entity to be created.....	55

Definitions, Acronyms and Abbreviations

BSDE	Blueprint Strategy for Digitalisation of Energy
EACEA	Education, Audiovisual and Culture Executive Agency
EC	European Commission
ECTS	European Credit Transfer System
EDDIE	Education for Digitalization of Energy
EQF	European Qualifications Framework
ESCO	European Skills, Competences, Qualifications and Occupations
ICT	Information and Communication Technologies
LSP	Large-Scale Partnership
P.O.	Project Officer
SSA	Sector Skills Alliances
STEM	Science, Technology, Engineering and Mathematics
VET	Vocational Education and Training
WP#	Working Package number #

Executive Summary

This document is the final version of the deliverable “D5.5: BSDE presentation and strategic roadmap for the deployment of the action plans” (WP5-Blueprint: approach), due on December 31st, 2023 (Month 48 of project EDDIE).

The structure of the document responds to the chronological evolution of tasks and partial results. However, detailed descriptions are gathered in attached documents, to ease the understanding of the overall strategy. The first -long-section describes the work done so far in EDDIE, connected to the future. The rest of the sections are directly oriented to the future evolution of the strategy.

EDDIE is an Erasmus+ project funded by the European Commission within the Sector Skills Alliances (SSA) framework. The goal is to develop a self-sustainable long-driven strategy (Blueprint) towards the digitalisation of the European Energy sector, bringing together all the relevant stakeholders. This goal requires facing relevant challenges to match the current and future demand for digital skills, such as:

- Contribute to the evolution of the training ecosystem to include the required digital skills -Vocational Education and Training (VET) and beyond.
- Contribute to an effective re-training in digital skills of the current and future workforce of the Energy Sector
- Improve the attractiveness of the Energy Sector as a career choice for a digitally skilled workforce.

EDDIE will produce relevant documents and recommendations, but the main expected result is the BSDE (Blueprint Strategy for Digitalisation of Energy). The strategy is based on the creation of an institution (hereinafter the Entity) that will provide –or help provide- services to the main stakeholders involved in the digitalisation of the Energy Sector. The Entity will also coordinate a Large-Scale Partnership on Education for the Digitalisation of the Energy System (hereinafter the LSP), already created as part of the strategy, and under the framework of the European Pact for Skills.

The Entity is already designed and will be legally constituted in February 2024. Its bylaws and structure have been already defined and approved by the founding members, as a non-profit, low-cost, and self-sustainable association based in Brussels. The main tasks performed by the Entity will be (1) Management of a WEB platform to support the intended services, and (2) Dissemination, including the organisation of events and the elaboration of reports, and (3) Coordination of the activities of the LSP.

The analysis of services to be provided is based on helping the digital-skills acquisition process. This process includes training, recruiting, working, and re-training, based on identifying current skill gaps and forecasting future needs. The candidate services selected are: (1) Research and dissemination portal, (2) Training programmes marketplace, (3) Jobs marketplace, and (4) Tools and systems marketplace. All these services would be specialised in the core area of EDDIE: the digitalisation of the Energy Sector.

The main stakeholders considered are Industry (Energy Sector and sub-sectors, ICT Sector), Education (training providers in VET, University, and others), local Administration (national and regional levels), research institutions of any kind, and the European framework (projects, institutions, programs, and centres). Other special stakeholders are related to potential partnership opportunities: associations, clusters, social networks, and platforms.

Some tasks included in the Working Package, and therefore described in this document, are directly related to the services, and analysed as business models –because of the desired sustainability of the strategy. Some other tasks are helpful to perform and/or to add value to the services; for instance, the definition of a standard template for training programmes, or a standard “language” to describe skills.

With respect to previous documents related to the strategy, this deliverable adds two main contents. First, the comparison of the marketplaces, their evaluation, and a cost-benefit analysis to analyse their viability; second, the analysis of the different options for the implementation of such strategy (the roadmap) considering the sustainability of alternative business models and the European context. In terms of practical achievements, the main news to add are (1) the already mentioned creation of the LSP, (2) the proximity to the constitution of the Entity, and (3) the development of a “beta” version of one of the candidate WEB services, the training programmes marketplace.

1. Introduction: the process and results of the EDDIE project

This document is the final version of the deliverable “D5.5: BSDE presentation and strategic roadmap for the deployment of the action plans” (WP5), due on December 31st, 2023 (Month 48 of project EDDIE). Previous versions were delivered to prove the progress made in the tasks related to WP5 and to get early feedback about the proposed strategy.

This introductory section tries to explain the process by which the strategy has been defined and polished, starting from the proposed plan of the project, and evolving consistently with partial findings and internal/external debate.

Sub-section 1.1 recalls the EDDIE goals and plans as expressed in the original proposal. Sub-section 1.2 describes the working methodology -and its main scheduled tasks- carried out during the execution of the project. Sub-section 1.3 clarifies the relations of the actual methodology with the original proposal, matching tasks, results, and deliverables. Section 1.4 gathers the main results obtained so far, in a comprehensive way. Finally, sub-section 1.5 provides a roadmap for the rest of the document, which is devoted to the deployment of the strategy in the future (coordinated from the EDDIE Entity, or Association, and the recently created LSP).

1.1. EDDIE proposal: objectives and plans

This section is devoted to placing WP5 and its tasks in context. First, according to the original proposal; second, within the development of the project its four years span. The differences between the tasks performed during EDDIE and the long-term strategy are also clarified.

1.1.1. Description of WP5 goals in the EDDIE proposal

The long-term objective of EDDIE is to help create (and continuously maintain in a sustainable way) a highly skilled workforce available for the improvement of the competitiveness of the European Energy Sector and for a sustainable growth through successful digitalisation.

The WP5 goals, at the core of the EDDIE project, are:

- Develop: Blueprint Strategy for the Digitalisation of the Energy value chain (BSDE).
 - Based on a sustainable cooperation (and partnership) among key stakeholders.
 - Matching current and future demand of skills with the supply from education/training providers.
- Provide concrete examples –and recommendations- of policies/initiatives.
 - At national/regional level
 - Aiming at addressing skills shortages and mismatches
- Including:
 - VET and beyond, at EQF levels 4 to 8, both for I-VET and C-VET
 - References to ECTS, ECVET, EQF, EQAVET, ESCO.
 - Technical, green, soft, and digital skills

Some EDDIE and WP5 extra features are:

- Energy-worker skill-profile database, tools and modules, curricula for addressing sector skill gaps.
- Europe-wide certification strategy, for informal and formal education across Europe.
- EU targets, two global frameworks: Energy Union Package, commitments in COP21.
- Sustainable, low carbon, climate-friendly economy, ... consumers at the centre, smart-grid technologies, active neutral market facilitation, integration of flexibility services.
- Stakeholders’ database, addressing profiles, interests, and contacts, including the Energy Sector, the education community (including tools vendors, in-company universities, and other agents), and other sectors (decision-makers, environmental, social, public, media...).

The EDDIE project is structured into the Work Packages shown in Figure 1. The planning of Work Package 5 is described in Figure 2, in terms of tasks, deliverables, and participation of partners (workforce).

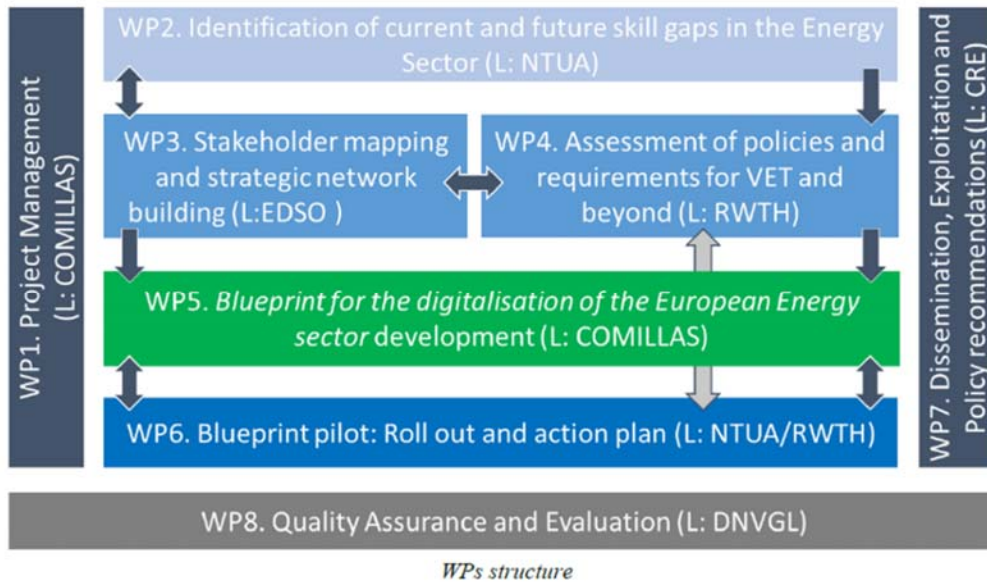


Figure 1. Structure of Work Packages in EDDIE.

Scheduling

WP	Title	Leader	6	12	18	24	30	36	42	48
WP5	Blueprint for the digitalisation and decarbonisation of the European Energy	COMILLAS								
T5.1	Review and structuring of the current skill map in the energy sector	COMILLAS								
T5.2	Analysis of levers to reduce skill gaps	KTH								
T5.3	Design of specific recommendations and overall action set	COMILLAS								
T5.4	Blueprint strategic roadmap	COMILLAS								

Deliverables

WP	Title	Leader	6	12	18	24	30	36	42	48
WP5	Blueprint for the digitalisation and decarbonisation of the European Energy	COMILLAS								
D5.1	Specification, conceptual design and application to the partial results com	COMILLAS								
D5.2	Intermediate draft templates for educational programs	KTH								
D5.3	Final education programmes and training activities	KTH								
D5.4	Recommendations on how to improve the educational frameworks in the fo	COMILLAS								
D5.5	BSDE presentation and strategic roadmap for the deployment of the action	COMILLAS								

Partners participation (days)

WP	Title	Leader	1.COMILLAS	2.NTUA	3.RWTH	4.FOSS	5.POLIMI	6.KTH	7.PIQUER	8.CRE	9.REPSOL	10.IBERDROLA	11.GE	12.DNV	13.EDSO	15.NOVEL	16.UCES	17.EWI
WP5	Blueprint for the digitalisation and decarbonisation of the European Energy	COMILLAS	792	201	149	258	134	352	211	262	272	321	220	60	155	189	60	114

Figure 2. WP5 planning in EDDIE: tasks, deliverables, and workforce.

1.1.2. Blueprint definition and exploitation: during and after EDDIE

The BSDE (Blueprint Strategy for Digitalisation of Energy value chain) includes a long-term strategy, a business model to sustain it, and a roadmap to implement them in a progressive way.

The definition of the BSDE comprises a systematic analysis of the following issues:

- What to do? The tasks, and the purposes of those tasks (products, results).
- Who may do the tasks? The identification of the different stakeholders and their roles.

- Why would they do the tasks? The cost/benefit analysis to drive the diverse stakeholders to participate.
- How to manage, promote and coordinate the strategy? The definition and creation of the Entity and the LSP.

The definition and creation of the Entity is one of the main results derived from EDDIE-WP5. Some characteristics already defined are: type of organisation (association, foundation, institute, chair...), structure (regional, sectorial), funding strategy (membership, access fees...), membership rules if any, services provided (roles-tasks), contributions, etc.

A critical point that deserves some clarification is the relation between the EDDIE project itself and the BSDE model after the termination of EDDIE, or even better, the transition from EDDIE to the Entity.

Every task and role in the present and future of EDDIE has been analysed to define the Blueprint strategy. However, it does not imply that those tasks and roles could or should be performed during EDDIE.

During EDDIE, the idea was to define tasks and roles, propose systematic procedures to perform them, and propose a business model for the future Entity (such that the initiative can be self-sustainable). To prove the feasibility and consistency of the concept, some of those tasks have been partially developed within the EDDIE project scope:

- analysis of skill needs and gaps (WP2)
- analysis of stakeholders (WP3 and WP5)
- analysis of the current education context (WP2 and WP4)
- definition of program templates and examples (WP5)
- development of program instances in depth (WP6)
- suggestions of policies and action plans (WP4 and WP5)
- dissemination actions (WP7)

However, the critical task during EDDIE-WP5 was to define a strategy, and a business model to allow the deployment of that strategy, without the direct funding of the Agency (EACEA-EC) in a sustainable way and a much more ambitious context, i.e., at a European scale for the whole Energy Sector. In other words, EDDIE must lead to an autonomous and scalable Entity in charge of managing and promoting the strategy. The exploitation model of EDDIE is identified with this transition process.

1.2. Methodology and tasks

This section is devoted to the process applied in WP5 to fulfil its goals and, therefore, the goals of EDDIE -i.e., the strategy. There are relevant questions to be answered to design the strategy in detail. Some of them are:

- What types of tasks and services are relevant in the skill-acquisition process?
- What results or products would be valuable to the stakeholders?
- Who are the stakeholders that will provide or receive those services, and what would be their roles?
- How should the Entity be defined (legal nature, funding, membership, roles, tasks and contributions)?
- Finally, how can the strategy fit best in the European framework (institutions, plans and projects)?

The analysis required to answer these questions has been carried out in several steps. First, the adaptive-learning process for digital skills has been analysed. Second, the training programme has been studied in detail because it plays a leading role in the abovementioned learning process. Third, and based on the two previous steps, an exhaustive list of tasks related to the strategy has been gathered in a structured way. The fourth step is the proposal of specific services to be analysed. Finally, some auxiliary tasks and products have been defined because they are useful to perform and/or to add value to the services. These tasks include the definition of a standard template for training programmes, a standard “language” to describe skills (the “syllabus”), the identification of best practices in different aspects of the process, and the definition of “flagship programmes”.

1.2.1. Analysis of the adaptive learning process for digital skills

This process includes training, recruiting, working, and re-training, based on identifying current skill gaps and forecasting future needs. It provides a first sketch of the types of stakeholders involved in the process, and the types of tasks to be performed.

Figure 3 shows a schematic representation of the target process to be improved, i.e., the digital skills acquisition through training and recruiting. This process is already working (of course) and in constant evolution. The main stakeholders (Energy Sector companies, digital systems developers, and Education & Training providers) do their best to adapt to the constantly changing needs, with the participation of other entities such as administrations, research groups, and professional associations.

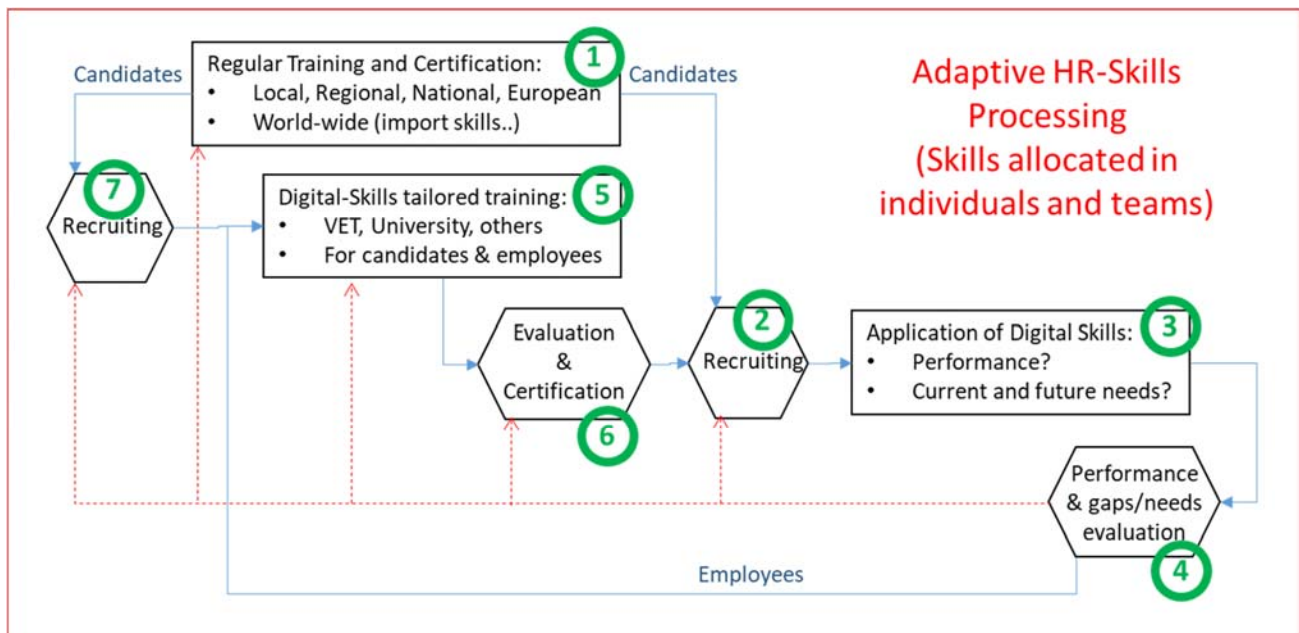


Figure 3. The adaptive-learning process for digital skills.

In Figure 3, concepts are represented as follows:

- Blue arrows represent the flow of skilled individuals, and therefore the flow of their skills and expertise.
- Black boxes represent activities. Using their numeric labels, the main activities are:
 - In (1) and (2), training.
 - In (1) and (6), certification.
 - In (2), recruiting of employees.
 - In (7), recruiting of students.
 - In (3), job development in the Energy Sector.
 - In (3) and (4), research about digital tools and systems, new and upgraded jobs in the Sector, and the digital skills related to them.
- Red arrows represent information flows from research about technology trends, methods, tools, and future jobs (including diagnoses, prospective results, needs and requirements, suggestions, directions, and policy recommendations).

This breakdown of the process into blocks and skill flows allowed a first-pass analysis of stakeholders and tasks.

- **Stakeholders:** Universities, research institutions, VET schools, MOOC platforms, other training providers, the Energy Sector industry, the ICT industry, national and regional administrations, social networks, head-hunter companies and platforms, training marketplaces, consulting companies, certification & quality agencies.

- **Tasks:** Training, research about training needs and methods, forecasting of future needs, performance evaluation, requirements definition, job definition, selection, dissemination and search of job openings, sponsorship, quality evaluation, certification, dissemination and search of training opportunities.

The main challenge of EDDIE was to design and implement a strategy to improve this process in terms of efficiency, flexibility, adaptability, agility, and quality in general.

1.2.2. Analysis of the elements/components of a training programme

Skills acquisition in general, including digital skills, will take place through a combination of daily work and specialised training. Training is critically required for qualitative improvements or changes in skill sets. The context of a specialised training programme was used to analyse the “what to do” issue (tasks, products, and results).

Figure 4 shows a version of this analysis. The training programme is described as a project in a waterfall model, with its typical phases: specification, design, implementation, and the final test-validation phases (in this case, certification, and feedback/validation). The target is to identify as thoroughly as possible the relevant topics and concepts related to the tasks in the BSDE model.

In Figure 4, for each phase of development, three groups of concepts are gathered:

- Targets and products, which are the main results of the phase.
- Tasks and resources required to obtain the expected targets or products.
- Related topics, tasks, and products. These are general research activities and products that may help the systematic development of specialised programmes. For instance, the definition of a general template for training programmes may help classify best practices or describe programmes in a standard style, which will help provide recommendations and find the right programme for each need.

This analysis provides further details about tasks such as sponsorship, research, jobs, and skills definitions, and -especially- about the tailored training process.

Training PROGRAMMES		EDDIE AND BEYOND: STAKEHOLDERS roles, cost/benefit analysis	
PHASE	TARGETS/PRODUCTS	TASKS/RESOURCES	RELATED TOPICS/TASKS/PRODUCTS
Specification	Target skills	Strategic prospective of skill needs, trends	Academic taxonomy of skills
	Target jobs	Local/particular assesment of skill needs	Functional taxonomy of jobs
	Students profiles, requirements	Employees performance assesment	Functional taxonomy of tools/systems
	Skill-increments, target gaps	Graduate-skill assesment, official education	Models/templates of questionnaires
		Labour market assesment, any education	Policies for education administrations
			Help skill-jobs research & standards
Design	Academic model	Define admission requirements (profiles)	(Taxonomy of tools and systems)
	Business model	Define training contents and goals (skills)	Re-use of training modules. IPRs?
		Select digital tools and licensing	Analysis/dissemination of best practices
		Develop detailed contents	Define training-programmes templates
		Select facilities (virtual/physical)	
		Tuition model, grants, internships	
	Define hiring mechanisms and market		
	Sponsorship		
Implementation	Recruited students	Dissemination, marketing, prescription	Pilot programmes
	Training	Recruiting	
	Individual evaluation	Teaching and evaluation	
	Economic results	Management, including PPRR	
Certification	Certified skills	Certify individual skills	Analysis of certification processes
	Certified programme	Certify training programme	
Feedback/ Validation	Hired individuals, good yield	(Employees performance assesment)	Monitor employees/alumni
	Good performance in company	Employees/alumni feedback	(Models/templates of questionnaires)

Figure 4. “Training programme” analysis: tasks and products.

1.2.3. Analysis of tasks related to the strategy

The analyses described in previous sections allow a further step, focussed on the types of tasks and their characterisation: topics addressed, products and results, and their ultimate purpose in the BSDE context. The results are shown in Figure 5.

The tasks may be organised by types and topics as follows – all of them focussed on the training for digitalisation of the Energy Sector:

TASKS (1)		OUTCOMES (1)	
TYPE	TOPIC	PRODUCTS AND RESULTS	PURPOSE
Research	Strategic (long-term) prospective:	Reports	Help skill-jobs research & standards
	skill needs, trends, tools, jobs, labour market, graduate skills	Databases, WEB portals	Policies for education administrations
	Consider: skill-jobs research, projects (ESCO, CEDEFOP)	Tools, models (templates of questionnaires)	Policies for companies: training, recruiting
Consulting	Specific and short-term diagnosis: performance, skill gaps, tools, jobs, labour market, graduate skills	Reports	Policies for education providers
Research	Job-Tools-Skills-Background skills analyses	Re-usable academic/training patterns	Help skill-jobs research & standards
	Consider: skill-jobs research, projects (ESCO, CEDEFOP)	Programmes design criteria	Help programmes design
	Consider academic curricula (skills-courses-programs)		Help curricula updating/adaptation
Design	Programmes: Types of business models	Training programmes templates	Dissemination of best practices
	Programmes: Types of academic models	Classification criteria	Create databases for training programmes
Research	Training techniques and methods	Identification of best practices	Help training
	Training contents, resources, cases	(Re-usable) training modules and contents	Dissemination of best practices
Design	Specific training programmes	(Re-usable) training programmes	Help training
Supply resources	Trainees (students) from companies	Students	Training feasibility and quality
	Trainees (students) from recruiting processes	Contents	
	Trainers, teachers	Academic resources, tools	
	SW licences for tools, simulators, systems	Financial resources	
	Contents and cases (re-usable, adaptable, copyrights)		
	Physical facilities (classrooms, labs)		
	Virtual facilities (on-line platforms)		
Grants, internships, tuitions			
Training	Specific programmes (diverse types and models): recruiting, teaching, evaluation, management	Skills acquisition	Education for Digitalization of Energy
Research	Validation and certification methods and entities (certification of training and certification of skills)	Reports Validation/Certification methods & tools	Policies for administrations, companies, education providers, candidates, others...
Validation & certification & monitoring	Training providers	Certified providers and programmes	Quality assurance
	Training programmes	Certified skills and candidates	Better hiring processes
	Skills and candidates (students)	Performance assesment (reports)	Better performance of employees
Compilation & dissemination	Research contents	Research portal	Education for Digitalization of Energy
	Training Programmes	Programmes marketplace, recruiting	(promotion of the process in general)
	Tools and systems	Tools marketplace	
	Jobs & openings, Candidates, CVs	Jobs marketplace	
Sponsorship & dissemination	Specific programmes	Marketing	Sustainability of the process (in general)
	Specific tasks: research, consulting, design...	Funds, resources	
	The ENTITY (EDDIE) in general	Recruiting	

Figure 5. Compilation of tasks related to the education (training) for digital skills.

1. Research
 - Skills: validation, certification, and standardisation. Existing and future frameworks.
 - Future tools, technologies, and businesses: skill gaps, job profiles.
 - Training models, methods, and contents.
 - Best practices, policies, and recommendations.
2. Consulting (specific companies and businesses).
 - Short-term analysis: available skills, short-term needs, skills gaps.
 - Recruiting and re-training strategies.
3. Design.
 - Templates for efficient training programmes; “flagship” training programmes for usual needs.
 - Specific training programmes and training contents.
4. Supply resources (by partnership, collaboration, or sponsorship).
 - Human: managers, trainers, supervisors, students.
 - Physical: facilities, platforms, labs, HW, SW licenses, advertisement resources.

- Academic: designs, contents, methods, documentation.
- Financial: funds, grants, internships, tuition fees.
- 5. Training
 - Management, organisation.
 - Teaching, supervision, and evaluation
- 6. Validation, certification, and monitoring.
 - Training institutions, programmes, skills.
 - Performance. alumni career.
- 7. Compilation, dissemination, and networking.
 - Research contents.
 - Training Programmes.
 - Tools and systems.
 - Jobs & openings, Candidates, CVs.

These tasks may be later related to the stakeholders, to analyse their roles and motivations to join –or collaborate with- the BSDE business model (cost/benefit analyses). In fact, a critical issue is to relate them to the special stakeholder, the EDDIE-entity (or the Entity) since the future failure or success of the initiative will depend on an adequate and realistic design.

1.2.4. Proposal of candidate tasks and services to help the digitalisation process

Most of the tasks identified in the previous section require intensive resources, and therefore the possibility of being performed by the Entity does not seem realistic. During EDDIE, some research and design results were achieved using the EACEA funding. However, the Entity is conceived as a low-cost non-profit organisation, with a reduced – hopefully- stable workforce (unless fund-raising, which is one of its regular activities, were extremely successful).

If the case of gathering enough funds, some tasks could be performed internally. For instance:

- Research, elaboration of reports (acting as a digital-skills observatory for the Energy Sector).
- Compilation, dissemination, and networking of related contents.
- Validation, certification, and monitoring of related contents or activities.
- Design of specific training contents.

However, it is a conservative assumption that the resources of the Entity will be limited, so it is better to consider it as an enabling agent, helping others do multiple tasks with their own resources:

- Research, about jobs, skills, trends, best training practices, and so on.
- Training activities.
- Consulting, conceived as applied research tailored for specific companies and businesses.
- Design of different elements:
 - Templates, taxonomies, and databases.
 - Training programmes for specific sets of skills, or professional profiles.
 - Training programmes for specific businesses or activities (“flagship” programmes) of the Energy Sector.
- Supply or demand resources, either human (trainees, teachers, workers), virtual (funding, contacts and networking, SW, platforms, training programmes), or physical (facilities, HW, laboratories).

As a result of the analyses of possible strategies, most of these tasks will be embedded later into the functionality of four candidate portals or marketplaces, conceived as activity enablers: (1) research and dissemination portal, (2) training programmes marketplace, (3) jobs marketplace, and (4) tools and systems marketplace.

In any of these portals, the level of responsibility of the Entity over the contents must be decided. Several options are:

- a. The Entity generates and stores the information. Highly resource-consuming + full responsibility.
- b. The Entity validates (evaluates and even certifies) and stores the information. Resource-consuming + responsible for the quality of the information, the sources, and the methods.

- c. The Entity validates (evaluates and even certifies) the sources and provides links to information stored elsewhere. Less resource-consuming + responsible for the quality of the sources.
- d. The Entity provides links to information stored elsewhere. The added value relies on the organisation, centralisation, and ease of use (not quality assurance)

It is essential to find which portals could be more useful to fill gaps in the education-digitalisation-energy ecosystem, while requiring a reasonable development and maintenance effort, so that they could -more likely- be sustainable during a bootstrapping roadmap. It is also a point to further analyse the current marketplaces that could be leveraged to obtain EDDIE's objectives without developing a new solution from scratch.

1.2.5. Development of a standard “language” to describe skills

The idea was to find a common language to describe skills, as training targets and job-profile requirements. This language should be simple but thorough enough, and the format should be compatible with WEB forms to be filled (used for contents descriptions and for searches/queries).

This common language should therefore describe characteristics of skills, skill gaps, training goals, profile requirements of candidates for jobs, and profiles for candidates to training programmes. The language should be designed by attributes/descriptors in different dimensions: knowledge areas, functional and transversal skills, specific tools/languages/technologies, and quantifiers both for extension (ECTS) and for the level of abstraction (EQF). It may constitute the “body of knowledge” of the digitalised-energy ecosystem.

It was suggested to approach the definition of the language from two perspectives and try to reconcile them. One was the current contents of actual training programmes, and the other the description of professional profiles required in job offers. A new job profile may be generated in the Energy Sector because of a new type of business that requires new jobs, or because of the upgrading of existing jobs. In any case, new job profiles will arise to handle new technologies, tools, and systems, and therefore there will be some skills to acquire.

The fact of being a common language explains why this task was directly relevant for the candidate services “2. New jobs-skills relations” and “3. General templates for programmes”, and indirectly relevant for services such as research, training, and job portals. The task was related to WP2 and WP4 in the EDDIE context.

1.2.6. Development of a standard template for training programmes

The goal of this task was the definition of a general template valid for any training programme. This template should be a set of structured data describing its business model and its academic model.

Since the training programme is at the core of the skill-acquisition process, this task was related to multiple tasks and services:

- It makes use of the results of the standard language for skills (“Syllabus elements”) to describe the contents of the programmes.
- It is of course critical for the training portal, to allow uploading and searching programmes in a systematic way.
- The template will be used in the description of “Flagship programmes”.
- The elements of the template will be useful to classify in a systematic way the “Best practices” in the whole skill-acquisition process.
- Finally, it might be related to the “jobs marketplace” in two ways: first, in cases where recruiting and training are integrated into a single activity; second, because certain job profiles may be specific targets of some training programmes.

In the EDDIE context, this task was assigned mainly to WP5 itself; but it is indirectly related to other WPs, such as WP2 and WP4 because of the overall consistency of the project.

1.2.7. Identification of best practices in different aspects of the process

This task was relevant in WP5 at multiple levels.

In the strict context of the EDDIE project (see Figure 2), it was a relevant component of a specific deliverable, “D5.4 Recommendations on how to improve the educational frameworks in the focus countries”. Moreover, the compilation and analysis of best practices inspired the whole strategy, so it strongly influences this deliverable (D5.5 BSDE presentation and strategic roadmap for the deployment of the action plans). This task is closely related to WP4, in terms of the analysis of education systems in Europe, and it has provided interesting reports.

In terms of the sustainable extension of the EDDIE activities (i.e., the future services provided by the Entity), there are several relations to the tasks and services proposed. On the one hand, the comparative analysis of best practices is a subject of continuous research and dissemination, and therefore is a potential content of the research portal. On the other hand, the business models of the different services must consider potential competitors and partners. Current best practices in research portals, training portals, etc., must be identified and analysed to think of functionalities that could add value to the services (competition) and synergies with other platforms (partnerships).

1.2.8. Definition or identification of “flagship programmes”

This task consists of the selection and/or development of outstanding training programmes, in the context of the digitalisation of the Energy Sector. They may be selected for different reasons: adequate training goals, good structure and organisation, or any other characteristic considered an example of “good practices”. This is why it is related to “Best practices”. It also shows direct relations to several services, since these flagship programmes may be specific contents of the dissemination and training portals, and even in the jobs’ portal when -as mentioned before in the description of “General template for programmes”- recruiting and training are integrated into a single activity.

1.3. WP5 organisation: tasks, planning, and deliverables

This section relates the actual tasks performed during the project to develop the strategy to the original tasks and deliverables described in the proposal (see Figure 6).

Id	Title (report)	Leader	Due	Description
D5.1	Specification, conceptual design and application to the partial results compiled from other work packages	COMILLAS	24	It will contain a consolidated view of the skill gaps, the stakeholders and the current policies and requirements, assessing and stressing the ones with the highest usefulness to define the BSDE and providing an initial draft view on how this can be applied to build the blueprint
D5.2	Intermediate draft templates for educational programs	KTH	24	This deliverable contains the pre-design of education programmes, initial and continuous training activities
D5.3	Final education programmes and training activities	KTH	36	This deliverable contains the main results of the works in T5.2, i.e., education programmes, initial and continuous training activities, together with their expected relative impact in the correction of skill gaps.
D5.4	Recommendations on how to improve the educational frameworks in the focus countries	COMILLAS	43	This deliverable will contain the list of actions identified to improve the educational frameworks. The report will present the results covering a set of focus countries in representative regions, so that these results can also be applied to other countries with similar characteristics. The pre-defined focus countries are Germany, Spain, Sweden, Greece
D5.5	BSDE presentation and strategic roadmap for the deployment of the action plans	COMILLAS	48	This report will present the priorities assigned to each of the actions defined in the previous tasks. Based on these priorities, the report will propose a strategic roadmap for their deployment. The results of the pilot will be compiled and analysed to determine if corrective actions to the roadmap are required, according to the scheme proposed in Figure 1

Figure 6. Description of deliverables in WP5.

Deliverables D5.1 and D5.5 correspond to the BSDE development. D5.1 is an intermediate stage firmly anchored in WP2, WP3 and WP4 results. D5.5 adds the creative and strategic elements: business model analyses, design, roadmap for deployment, and first prototyping stages.

Deliverables D5.2 and D5.3 are related to training programmes templates and examples. Some of these examples may become “Sectorial Flagship Programmes”, as described before.

Deliverable D5.4 is the outcome of in-depth analyses of the skill mismatches, the best practices, and the strategy. It refers to the main elements of the template (business-model and academic-model elements). Some measures and recommendations from D5.4 are applicable to the BSDE itself, while others will be addressed to other agents, such as administrations, companies, and training providers.

Figure 7 gathers in the same planning diagram:

- In yellow, the different WPS of EDDIE.
- In light blue, the original tasks in WP5, from the EDDIE proposal.
- Red cells represent milestones for specific deliverables.
- The tasks defined in Section 4, i.e., the plan defined during the EDDIE project, are represented in white background, and their expected duration, in light green.

WP	Title	Leader	12	18	24	30	36	42	48
WP2	Identification of current and future skill needs in the Energy Sector	NTUA							
WP3	Stakeholder mapping and strategic network building	EDSO							
WP4	Assessment of policies and requirements for VET and beyond	RWTH							
WP5	Blueprint for the digitalisation and decarbonisation of the European energy sector	COMILLAS							
T5.1	Review and structuring of the current skill map in the energy sector	COMILLAS							
T5.4	Blueprint strategic roadmap	COMILLAS							
	(5) BSDE roadmap: analysis of options, priorities, sustainability								
	(5.1) Research and dissemination portal								
	(5.2) Training programmes marketplace								
	(5.3) Jobs marketplace								
	(5.4) Tools and systems marketplace								
	(5.5) Marketplaces for other services								
	(6) Technical assessment on BSDE implementation (WEB portal development)								
T5.2	Analysis of levers to reduce skill gaps	KTH							
T5.3	Design of specific recommendations and overall action set	COMILLAS							
	(1) Modular and hierarchical structure of syllabus elements								
	(2) Analysis of skills demand (and job profiles) due to digital innovation								
	(3) Definition of a General Template for training programmes								
	(3.1) Definition of academic model								
	(3.2) Definition of business model								
	(4) Analysis of best practices to produce recommendations								
	(7) Design and standardisation of "Sectorial Flagship Programmes"								
WP6	Blueprint: Roll out and action plan	NTUA, RWTH							
WP	Title	Leader	12	18	24	30	36	42	48

Figure 7. Tasks and sub-tasks in WP5 and in the context of EDDIE.

A simplified matching between the tasks identified in the previous sub-section and the original tasks planned in the proposal is also represented in Figure 7 by their vertical order. In simple terms:

- Tasks (5) – from 5.1 to 5.5- and task (6) are directly related to the original tasks T5.1 and T5.4. Therefore, they have been the main sources to produce deliverables D5.1 and D5.5.
- Task (3) and task (7) are related to the original task T5.2. Therefore, they are the main sources to produce deliverables D5.2 and D5.3.
- Task (4) is directly related to the original task T5.3. Therefore, it is the source to produce deliverable D5.4.
- Tasks (1) and (2) are auxiliary to other tasks, as explained in their respective descriptions (see Section 4)

Of course, there are multiple indirect -or weaker- relations among the different tasks, but it is not worth trying to describe all those relations. In fact, all the concepts present in the proposal -such as strategy, recommendations, roadmap, levers, and action sets- are related to one another.

1.4. Partial results

This section is devoted to gathering the decisions, conclusions and -in general- results derived from the methodology described in the previous section. First, the decision about candidate services provided by the Entity, and auxiliary tasks required for those services. Next, the results from the main tasks identified (the standard language for skills, the template for training programmes, and the creation of the Entity itself. Finally, other tasks are gathered in the last sub-section: best practices, technical assessment, and flagship programmes.

1.4.1. Candidate services to be provided by the Entity

These are the services that have been initially selected because of their potential to be part of the BSDE (Blueprint Strategy for Digitalisation of Energy):

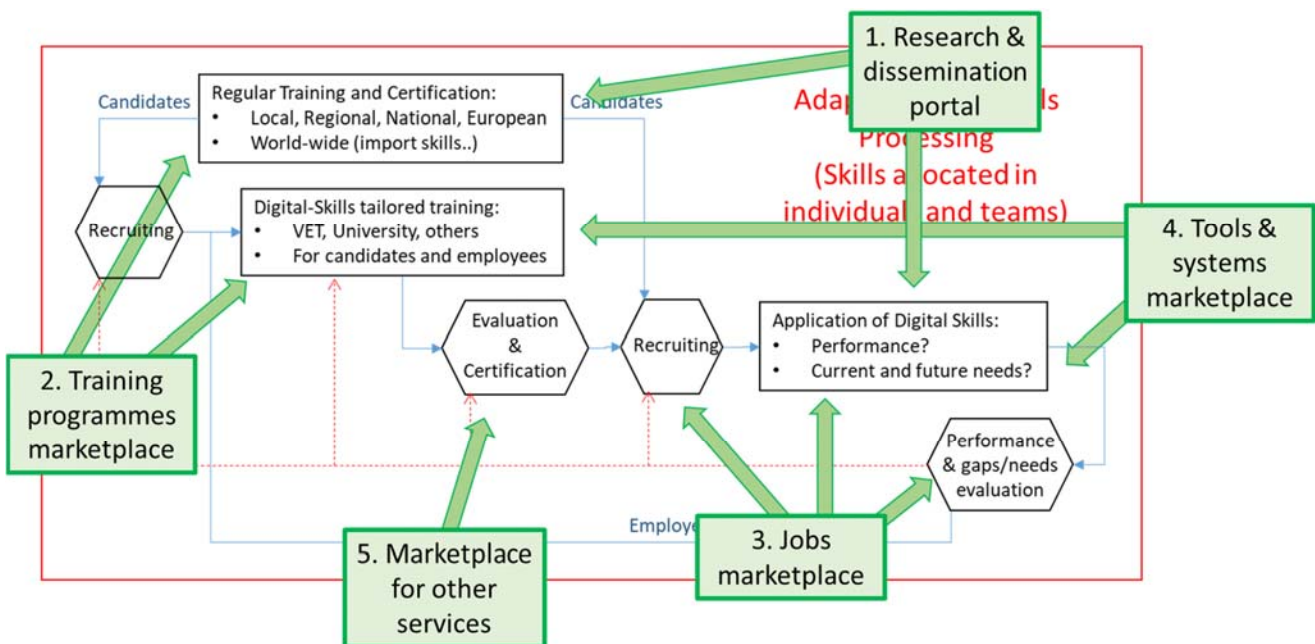


Figure 8. Services proposed: improving the adaptive-learning process for digital skills.

1. Research and Dissemination platform:

Online platform in which EDDIE stakeholders share research and dissemination contents about the digitalisation of the Energy Sector. Contents may include -or provide links to- papers, reports, projects, events, databases, institutions, news, posts, interviews, and so on.

2. Training Programmes marketplace:

Online platform in which EDDIE stakeholders -mainly training providers- advertise training programmes devoted to the digitalisation of the Energy Sector. Training programmes will be described by standard templates, attributes, and keywords, to allow "search and select" functions according to specific needs. It may include "flagship programmes" and re-usable contents provided by EDDIE as an additional service.

3. Jobs marketplace:

Online platform in which EDDIE stakeholders -mainly from Industry- advertise job openings, directly related to the digitalisation of the Energy Sector. Job profiles and requirements will be described by standard templates, attributes, and keywords, to allow "search and select" functions according to specific needs. It may include candidate profiles (normalised CVs) from individuals or from other job marketplaces.

4. Tools and Systems marketplace:

Online platform in which EDDIE stakeholders -mainly vendors and consulting companies- advertise digital tools, systems and services directly related to the digitalisation of the Energy Sector. Products will be described by

standard templates, attributes, and keywords, to allow "search and select" functions. It may include SW and platform communities, open-source contents, technologies, and standards.

5. Marketplace for other services:

To be defined, according to feedback and proposals from stakeholders. They may include consulting, assessment, validation, certification, or recruiting/head-hunting (always focussed on the digitalisation of the Energy Sector).

Figure 8 represents how these services are related to the main blocks of the adaptive-learning process for digital skills.

The four initial services have been analysed separately, and the results are included as separate files (attached documents). The summaries are included in the last section of this document. The added value of each of these services is critical for their successful and sustainable implementation.

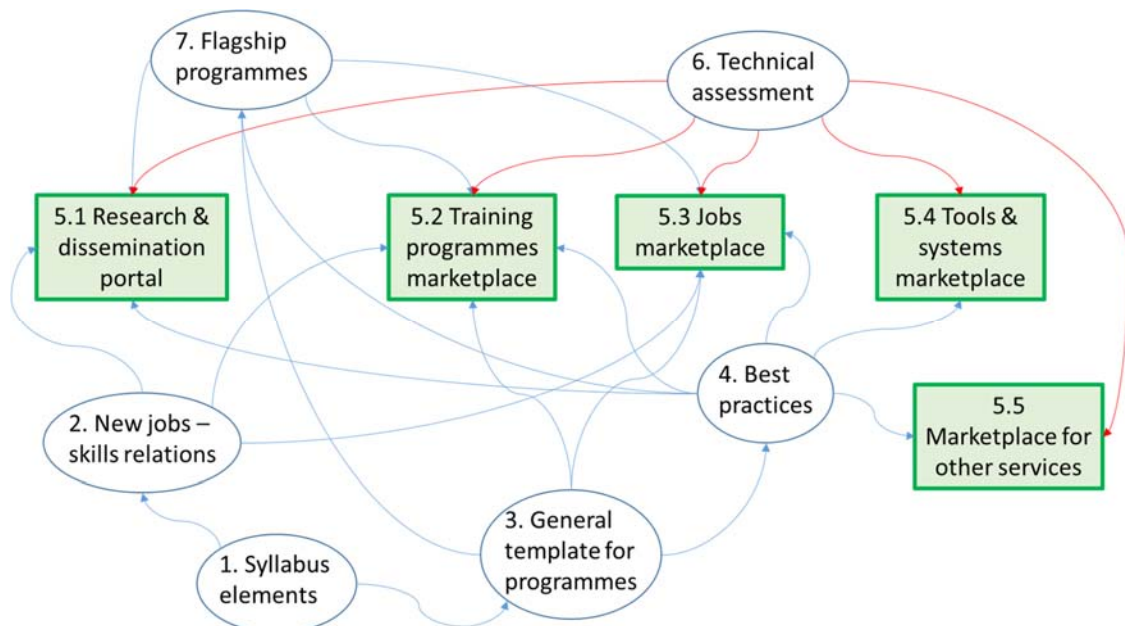


Figure 9. Relations among services and auxiliary tasks.

Figure 9 shows the relations between the candidate services and the auxiliary tasks described in the methodology section. The results of these auxiliary tasks are described below and completed by final summaries and attached documents.

1.4.2. Standard “language” to describe skills

The standard language is the practical outcome of two auxiliary tasks represented in Figure 9: “1. Syllabus elements” and “2. Jobs-skills relations”. The results are also gathered in a separate (attached) file, and the summary is included in the last section of this document.

As described above, this task consists of the definition of a structured catalogue of training contents, as a common language for skills, skill gaps, training goals, profile requirements for candidates for jobs and training programmes.

Figure 10 represents relations among innovation, skills demand, skills supply, and the corresponding gaps to be covered by training programs. The analysis was done from both ends (innovation in job profiles and existing training contents) corresponding to the two auxiliary tasks already mentioned. “1. Syllabus elements” from existing training programmes was the first and main task, while “2. Jobs-skills relations” was a secondary task, used to provide feedback to the first, checking the completeness and adequacy of the language.

A generic training programme will be defined as a structure of training blocks. For instance, degree→ semesters→ courses/subjects→modules/units. The criteria to stop breakdown are not theoretical, but administrative and practical: for example, the minimum block to be evaluated/certified/validated, for professional or academic

purposes. Syllabus elements will be used to describe the contents of elementary training blocks, and therefore –by extension and accumulation- the contents of any training programme.

The main elements in this “body of knowledge” are organised as families (such as the five groups shown in Figure 10) and blocks. This classification is not exclusive, but just an aid to reaching final keywords or descriptors. Keywords that belong to more than one block will be included in all the related blocks. For instance, “Digital Control” is a descriptor that should be accessible from both the ICT and the STEM families.

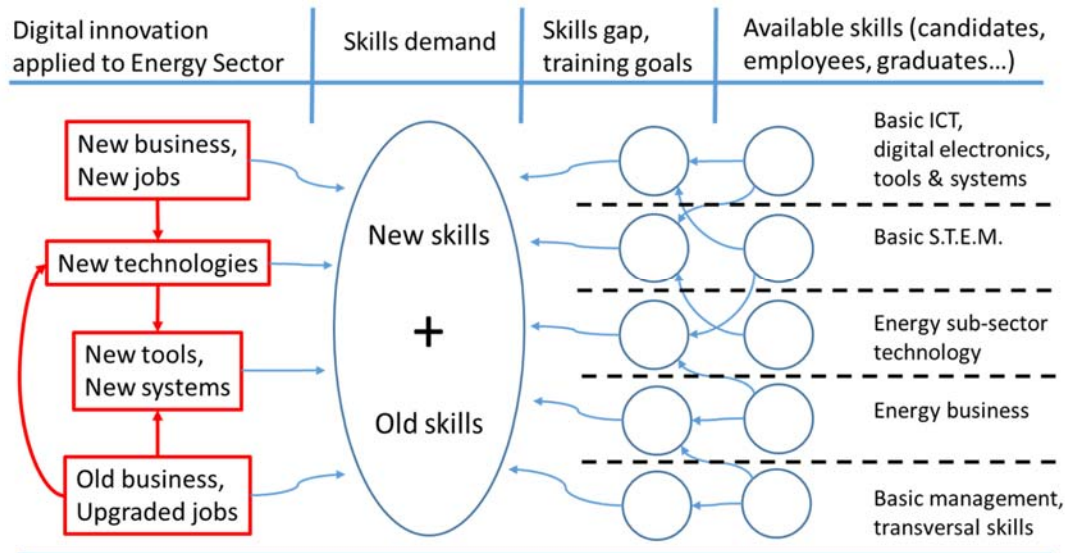


Figure 10. Syllabus elements (skills) from the training-contents side.

In addition to the list of knowledge contents using keywords, other dimensions are used to describe skills:

- Keywords for transversal or domain-independent skills, such as modelling, design, implementation, testing, validation, communication.
- The ECTS load.
- An orientative EQF level.
- (Maybe) some space for freely defined keywords, such as commercial names of specific tools, methods, programming languages, operating systems, and so on.

The final version of the blocks is documented in a dictionary or user-manual style. Moreover, it has been implemented in a WEB-style form so that skill sets may be uploaded and searched easily.

Partial results or versions have been checked against test cases, including internal cases (Pilot courses and “flagship programmes” in EDDIE, job profiles analysed in EDDIE) and external sources, and other databases such as ESCO. Concerning job profiles analyses, some relevant sources are:

- Skills gaps found through questionnaires in WP2 (most of them are new technologies).
- New or updated job profiles.
- New business and/or systems (for instance, Smart Grids, Energy Communities...).
- New tools or systems. Languages, platforms, protocols, standards...

It is important to gather the “classical” Energy Sector skills together with the new digital skills. In most job profiles, domain knowledge will be required to successfully apply the new digital tools to the Energy business. For instance, the general topic “Big Data” has its own knowledge and training requirements; however, “Big Data applied to Smart Grids management” also requires specific skills in Smart Grids.

1.4.3. Standard template for training programmes

The results of this task are gathered in a separate deliverable (D5.3), and the summary is included in the last section of this document.

Figure 11 shows the results of the analysis of elements/components of the development of training programmes.

The different tasks are here split into two categories, (1) the business model, for management and organisation topics that many similar programmes may share, and (2) the academic model, for the specific skills-acquisition process (contents, teaching/learning methods, and so on). This table has been used as the starting point for defining a general template for training programmes.

PHASE	BUSINESS MODEL	ACADEMIC MODEL
Specification	Description of methods used and proof to support the professional/technical relevance of the programme	Definition of target jobs, target skills. Taxonomies: skills, jobs, tools/systems.
Design	Use of facilities (virtual/physical) and resources	Definition of requirements/profiles for students
	Roles and functions of different stakeholders involved. Includes hiring mechanisms (if any)	Definition of skill-increments, target gaps. Contents and training goals.
	Financial structure: sponsorship, subsidies/grants, tuition, remuneration and costs	Detailed contents. Re-use of training modules. IPRs?
	Dissemination, marketing and recruiting procedures	Teaching and evaluation methods
	Digital tools licensing	Use of digital tools
	Detailed operations planning	Detailed timetables, academic planning
	Certification entities and methods	Certification criteria (detailed)
Implementation success records	Feedback and validation methods	Validation criteria (detailed)
	Recruiting success (quantity)	Individual certification: results
	Financial success (profit, sustainability)	Programme certification: results
		Alumni feedback: results
	Employers feedback: results	

Figure 11. Topics that could be included in the Template to describe training programmes.

The final version of the template is form-oriented, to ease the structured and guided uploading of descriptors in the database supporting the “Training Programmes Marketplace”.

1.4.4. Creation of the Entity

EDDIE has produced relevant documents and recommendations, and even some pilot training programmes, but the main expected result is the BSDE (Blueprint Strategy for Digitalisation of Energy). The strategy must seek the sustainability of the activities beyond EDDIE. We believe that the only way to keep stakeholders engaged is to provide valuable services, and those services should be beneficial enough to be monetizable to a certain extent.

The strategy is based on the creation of an institution (the Entity) that will provide –or help provide- services to the main stakeholders involved in the digitalisation of the Energy Sector. This Entity may provide marketplaces (specialised WEB portals) to connect stakeholders, match supply and demand, and disseminate useful information.

The creation of the Entity is imminent. The idea was proposed and disseminated in the project meetings (including the International Advisory Board), and the process of obtaining preliminary commitments from institutions has been successful enough to launch the association (and we expect more adhesions when the association is already created). The detailed statutes of the Entity are already approved, and the ideas that support its creation are widely shared among partners:

- There is an excellent opportunity in that our Strategy, framed with the Pact for Skills, may become a reference for “education for energy transformed by transition and digitalisation”. Thus, the mission of the Entity could be to become the reference body for skills education (all levels) in the Digitalisation of the European Energy Sector.
- The Entity will be a non-profit, low-cost, and self-sustainable association, based in Brussels.
- The Entity will serve as a showcase or marketplace to connect stakeholders and disseminate useful information, by means of specialised WEB portals.
- The level of responsibility of the Entity with respect to the information displayed will be low. The Entity will evaluate the stakeholders before they are registered and enabled to publish contents. Stakeholders will be responsible for their own contents, although the Entity may supervise the quality and adequacy of the

contents. Only short contents –news, descriptors, and summaries- will be stored by the Entity, being large amounts of information referred to by links.

- The main tasks performed by the Entity would be (1) Management of a WEB platform to support the intended services, (2) Dissemination, including the organisation of events and the elaboration of reports, and (3) Coordination of the activities of the LSP.
- The development of the Entity will follow a prototyping-style lifecycle. Viable intermediate products should be planned to attend to the cost/benefit criteria of the potential members (stakeholders), focussing on the maximum value/effort ratio of the different ideas.
- The strategy must produce a clear roadmap for the incremental implementation of the services.

Concerning statutes and organisation, the participation of key stakeholders in a reduced working group has been quite productive, as well as the contributions of Pierstone (the law firm acting as legal advisor) and Zabala, the consulting company specialised in European projects that worked with the Consortium in the preparation of the proposal. In fact, Zabala will belong to and work for the Entity, as Technical Secretariat, and doing dissemination, marketing, and fund-raising activities.

The core of the platform is the database to support the Strategic Network Alliance (which has been materialised as the LSP), built in the project managed by Comillas, as EDDIE Coordinator, and to be transferred to the Entity. Types of participation/involvement are hierarchical, such as (1) Founders, (2) Members, (3) Partners, and (4) Users and Associates.

Several governing levels are defined accordingly: General Assembly composed of members, Governing Board composed of founders and critical members, and Secretariat (assigned to Zabala, as said before). Partnership relations will be established with platforms, projects, and institutions with similar or complementary goals: education, digitalisation, energy, employment, and research about skills and technology trends. For instance, a relevant example is InnoEnergy, already committed to the initiative.

Funding of the Entity will be based on the following:

- Membership: small fees (around 3 to 5 k€ per year). Distinctions may be made among board members and the rest, and maybe between profit and non-profit institutions. The fees would be condoned eventually in case of external funding.
- Funding from EC based on research and innovation projects and any other opportunities.
- In addition, in the medium or long term, income from the services provided by the Entity.

1.4.5. Results from other tasks

This sub-section describes other auxiliary tasks related to services and strategy: best practices, technical assessment, and flagship programmes.

Analysis of best practices to produce recommendations

This task is meaningful in EDDIE at multiple levels. It has been a relevant line of work in WP4, because of best practices in training at different educational levels and contexts and because of the European Framework analysis. It is also a relevant component in WP5, because of a specific deliverable, “D5.4 Recommendations on how to improve the educational frameworks in the focus countries”. Moreover, the compilation and analysis of best practices inspires the whole strategy, so it has a strong influence in the final deliverable of this document “D5.5 BSDE presentation and strategic roadmap for the deployment of the action plans”.

This task is also relevant for the sustainable extension of the EDDIE activities. On the one hand, the comparative analysis of best practices is a subject of continuous research and dissemination, and therefore is a potential content of the research portal. On the other hand, the different services' business models must consider potential competitors and partners. Current best practices in research portals, training portals, etc., must be identified and analysed, to think of functionalities that could add value to the services (competition) and synergies with other platforms (partnerships).

Note also that some elements of programme templates could be used to classify best practices, and “flagship programmes” may be labelled as “best practices” for specific training purposes.

Examples of good practices are specific programmes, projects, institutions, platforms, or anything that helps training with specific purposes. However, the “best practice” factor may be related to a partial training phase, such as the specification or the implementation, or to a particular aspect of training, such as the organisation, the contents, or

the methods. Figure 12 shows a structured set of topics used to identify best practices and to classify them by their purpose, type of activity, or level of success.

PHASE	BUSINESS MODEL	ACADEMIC MODEL
Specification	Methods of interaction with industry (energy and digital) for: technology trends, labour market, skill needs	Definition of target jobs, target skills. Taxonomies: skills, jobs, tools/systems.
	Methods for employees performance assesment	
	Methods for graduate-skill assesment, official education	
Design	Use of training-programmes templates: business	Use of training-programmes templates: academic
	Select facilities (virtual/physical) and resources	Definition of requirements/profiles for students
	Roles and functions of different stakeholders involved. Includes hiring mechanisms (if any)	Definition of skill-increments, target gaps. Contents and training goals.
	Financial structure: sponsorship, subsidies/grants, tuition, remuneration and costs	Develop detailed contents. Re-use of training modules. IPRs?
	Design of recruiting process: dissemination, marketing, recruiting procedures	Teaching and evaluation methods
	Digital tools licensing	Select digital tools
	Detailed operations planning	Detailed timetables academic planning
	Define certification entities and methods	Certification criteria (detailed)
	Define feedback and validation methods	Validation criteria (detailed)
Implementation	Dissemination, marketing, prescription	Teaching and evaluation
	Recruiting	
	Management, including PPRR	
Certification	Certify individual skills. Process.	Individual certification: results
	Certify training programme. Process.	Programme certification: results
Feedback/	Alumni feedback: process	Alumni feedback: results
Validation	Employers feedback: process	Employers feedback: results

Figure 12. Topics that could be used to identify and classify best practices.

This task has provided a list of examples of good practices, and the analysis of what elements or aspects of each example is considered a good practice. Finally, some relevant conclusions -“lessons learned”- including the criteria to identify a good practice in this context.

Technical assessment on BSDE implementation (WEB portals design)

The services of the Entity proposed here will be implemented through WEB portals for different -but partially complementary- purposes. Therefore, their prototype versions and the business models of their advanced versions will require technical work, in terms of database technology and design, contents specifications, functional requirements, architectural designs and interaction requirements, hosting requirements (including costs and technical specifications), management, security, and so on.

Other topics included in this task are the reliance on existing social networks towards maximum efficiency, techno-economic analysis of design options, and the legal implications: data protection, copyright, and intellectual property issues.

In the EDDIE context, this task belongs mainly to the WP5 itself; but it is directly related to WP3, since the analysis, compilation, and implementation of the network of stakeholders is linked to the services portals. We believe that the only way to maintain an active network of stakeholders is to get them involved in specific activities of mutual interest.

It is also closely related to WP3 in practice because the access to the WEB portal (or portals, depending on how the different services are implemented) will be linked to the stakeholders' database, as shown in Figure 13.

The current specification of the stakeholders' database places the institution at the centre. In fact, free-lance individuals are conceived as elementary institutions. The institution will be responsible for the contents of the different portals, acting the individuals on behalf of their institutions under different levels or profiles: administrator, representative, and member. Each profile will have specific editing (and uploading) permissions for the contents of the portals. The design of the data structures, both for stakeholders and contents, should facilitate searches and queries. Therefore, closed menus of options and selection lists should be implemented whenever possible.

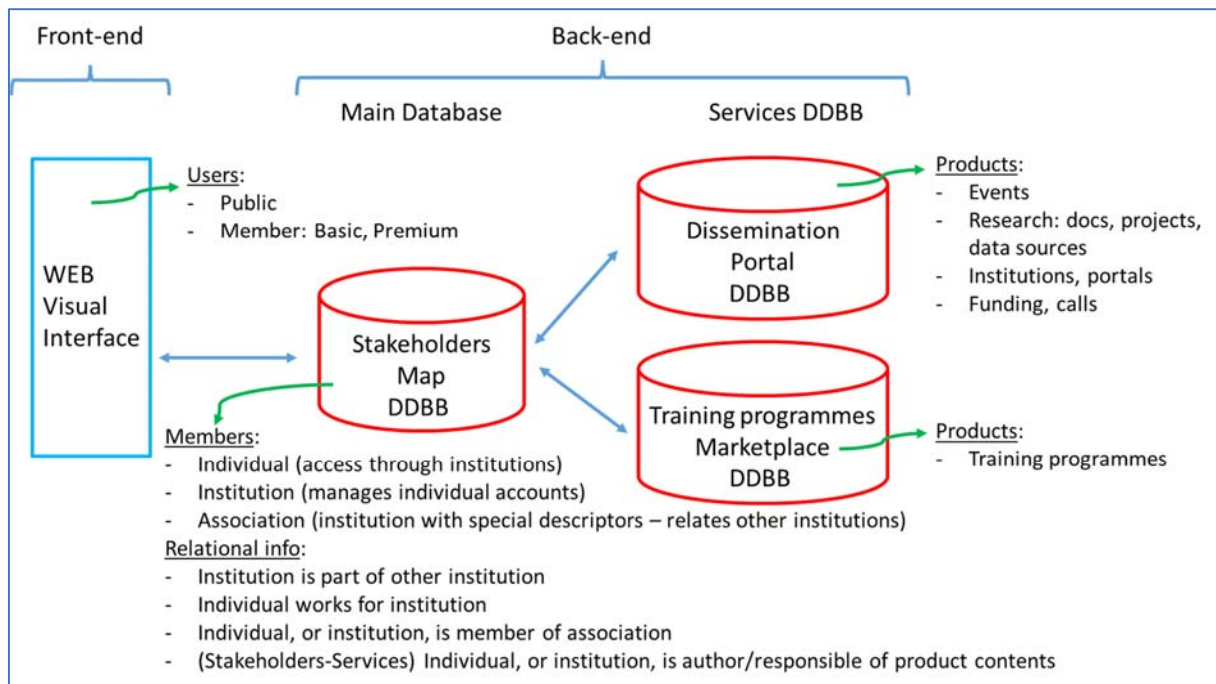


Figure 13. Relation between the stakeholders' database and the implementation of services.

The database of stakeholders is already developed and integrated into the EDDIE WEB site. The “Training programmes Marketplace” is already developed (beta version, see Section 6) and connected to the database of stakeholders.

Concerning the service portals, their analyses provide specification and design documents to allow successive prototypes, with automatic data-import features for version upgrading -minimising editing efforts between successive prototypes. Business models have been developed, mainly for the first service implemented, to obtain techno-economic estimations of the resources required for full-scale versions of the different databases and services to analyse their feasibility and priority in the implementation roadmap.

In terms of methods, it is suggested to follow an incremental prototyping strategy. The implementation is based on WordPress with plug-ins.

With respect to the contents of the different databases, these are some decisions and directions:

- Clear separation between public and private.
- Select a minimum set of attributes (of a stakeholder, or any other element) relevant to the intended service to be provided.
- Structured information –as far as possible and as far as practical.
- Only English language when possible + local identifiers when useful.
- Fixed menu of options + the “others” option if required.
- Templates for database entries, enabling queries and easy uploading. This is applicable to stakeholders' info, and also to training programmes, job profiles, events, tools, systems, or any other entity handled by the Blueprint business models.
- Links to additional information whenever the level of detail exceeds the database needs or the practical possibilities. Three examples: (1) beyond the basic attributes describing a company, a link to the WEB page of the company will be included as a standard attribute, (2) beyond the descriptive attributes included in the template of a training programme, a link to the provider's website will give access to full details and registration, and (3) beyond the basic attributes of a candidate to hiring or recruiting processes, a link to a CV document will be provided as a standard attribute.

Definition or identification of flagship programmes

This task consists in the selection and/or development of outstanding training programmes, in the context of the digitalisation of the Energy Sector. They may be selected for different reasons: training goals, structure and organisation, or any other characteristic considered an example of “good practices”. This is why this task is related to “Best practices”. It is also related to the services, since the flagship programmes may be specific contents of the dissemination and training portals, and in the jobs portal when recruiting and training are integrated.

The Entity may contribute by selecting good programmes from the market, providing guidelines and contents to develop new programmes, and/or certifying the quality or adequacy of these programmes. During EDDIE, this activity has been distributed among several deliverables:

- WP5: In D5.3 as examples for the general template, and in D5.4 as recommendations and good practices.
- WP&: as specific Pilot Activities since some of them are training modules or programme.

1.5. Organisation and contents of the rest of the document: the roadmap to the future of EDDIE

This document is the deliverable “D5.5: BSDE presentation and strategic roadmap for the deployment of the action plans”. It describes the proposed strategy and how the strategy has been devised, in order to allow educated feedback. The structure of the document responds to the chronological and causal evolution of tasks and partial results. Detailed descriptions are gathered in attached documents, to keep the main document readable.

This block (Section 1) has covered the process followed to reach the current state of the strategy. It includes the original proposal, the methodology followed during the process, and the results obtained so far. It also includes references to attached documents that extend these topics; the final Section 7 contains summaries of these documents. The rest of the document is devoted to the projection into the future of the work done and the results already obtained.

Section 2 is devoted to a general analysis of WEB portals and the characteristics of their alternative business models. Since one of the main components of the strategy is the implementation of services through WEB portals, this general overview is relevant enough.

Section 3 analyses WEB portals in the European framework, especially those related to education, skills, jobs and employment, digitalisation, and energy. These are potential partners or competitors, or at least benchmarking cases.

Section 4 summarises the design and implementation of the Stakeholders’ Database, and the map of stakeholders (influence and motivation) for the different services proposed. It is included here, instead of being just referred to (as a deliverable of WP3) because this database and the stakeholders themselves are at the base of the design and implementation of the strategy.

Section 5 compares the parallel analyses carried out on the candidate services: (1) research and dissemination portal, (2) training programmes marketplace, (3) jobs marketplace, and (4) tools and systems marketplace. The documents about each of the parallel business models are attached, but here they are compared against each other in terms of services, funding opportunities, stakeholders and roles, products, contents, and detailed operations: tasks and requirements.

Section 6 summarizes the implementation of the prototype of the training marketplace, including the possibility to add new programmes, manage them, visualize samples, and perform searches with a filter and with a chatbot.

Section 7 is devoted to the strategy itself, maybe the most important section of this document. It will cover the creation of the Entity in three blocks or sub-sections: (1) legal nature and organisation, (2) human, digital, financial, and legal resources, and (3) roadmap towards feasibility and sustainability.

Finally, the already mentioned Section 8 includes the summaries of attached documents, each one at a different state of maturity, and each one dealing with a relevant task that provides self-contained results: the four documents related to business models (services), the standard language to define skills, and the training programmes template.

2. WEB portals: analysis of business models

This section provides a general overview of the alternative business models behind WEB portals. Additional insights are also provided for those options and features more compatible with the strategy of EDDIE and the portals here proposed.

2.1. General topics about online marketplaces

Platforms that link buyers with sellers are known as online marketplaces. The marketplace operator typically does not maintain inventory of its own but instead assists buyers and sellers with completing a transaction.

Online Marketplace's responsibilities may include logistical management and facilitation of payments. However, it will allow sellers to focus on their primary competency: supplying the right product to the right customer. Although markets can take on various shapes and sizes, they are mostly classified as horizontal or vertical.

- Horizontal. Markets that operate horizontally provide consistent service across numerous product categories. eBay customers can buy anything from clothing to gadgets, for example.
- Vertical. Vertical marketplaces are focused on a single product category but include various services. Let's take a market for unique sneakers as an example: StockX handles product identification and quality control, as well as payment and shipment. Additionally, it allows them to serve as a reliable source for prospective clients.

Marketplaces are built by the transactions between buyers and sellers. However, in the initial phase, the three pillars (buyers, sellers, and transactions) must be attracted from scratch. You can offer more value to your clients if you recruit more sellers. A higher value attracts more buyers, which increases the value of the seller. Therefore, you can increase the attractiveness of your marketplace if you want first to attract consumers or sellers (or both at once).

Advantages of the Online Marketplace Business Model

When compared to other business types, online marketplaces show some positive features:

- Networking effects. A platform can grow organically into a marketplace when it has enough consumers and sellers. It will naturally attract more customers and users if it is attractive and valuable to your target client group, whether the customers recommend the platform to their friends or users provide exciting comments.
- High user-engagement rate: Marketplaces that typically rely on recurrent sales usually have a high level of engagement. This is because a market facilitates communication and discovery, attracting customers in search of the best prices or simply browsing stores.
- Hard to replicate: People are likely to remain loyal to the platform once it is established. Competitors who wish to surpass will need a superior product and a network of comparable size. The process is time-consuming and costly. Moreover, the top position of established marketplaces makes them challenging to dethrone.
- Data creation: Marketplaces produce many (consumer) data, which operators may sell, or use them to enter new or related businesses.

An obvious flagship example is Amazon. The Amazon's case analyses the data obtained from its sellers and sells it under the Amazon Basics brand. It is common for companies to prioritize their items over those of the original suppliers.

Disadvantages of the Online Marketplace Business Model

When compared to other business types, online marketplaces show some negative features:

- Dependence on other platforms. Many marketplaces (e.g., real estate or automobile listings) have a low purchase frequency, making brand building more challenging. Therefore, they must continue advertising on platforms such as Google and Facebook for customers to find them. As a result of the limited number of touchpoints, it is far more challenging to build a brand through repeated interactions.

- **High set up cost.** The cost of developing a marketplace includes building the necessary technology stack, advertising to attract buyers and suppliers, and hiring the essential personnel. It may take considerable effort and money to build a substantial revenue stream.
- **Many competitors.** Despite the high setting-up costs, competition is often fierce in a marketplace concept because of its potential growth and viability. A growing number of investors are willing to spend financial resources to help businesses compete.
- **Quality assurance.** The quality of vendors, products and services (including delivery) can vary greatly. Marketplace owners and managers should take this into account and invest in their seller communities. Verifying the authenticity of products and establishing a logistic network for efficient transportation are among their possible responsibilities.

2.2. Options to exploit online marketplaces

Marketplaces appear in a variety of shapes and sizes. The public immediately associates the internet with online e-commerce enterprises like Amazon or eBay, but this is far from being the only way to exploit Internet businesses. There are multiple types of marketplaces present in the modern era. Some of the options that may be combined to build up a specific business model are briefly described here:

- a) Sign-up fees model.
- b) Commission, selling-fees, transaction-fees, and payment-fees models.
- c) Subscription-fee model.
- d) Freemium model.
- e) Listing model.
- f) Featured Ad Placement.
- g) Sponsored products and stores, and ads from third-party advertisers.
- h) Pay per lead (lead-fees) and bidding-fees models.
- i) Promote the marketplace through affiliates and referrals.

a) Sign-up fees model

A sign-up fee is a one-time payment received from sellers applying to sell on your marketplace platform. The easiest way to build a marketplace business is to collect a sign-up or registration fee.

In early-stage ventures where selling fees are not economically viable due to low sales volumes, sign-up fees may be a viable business model for the marketplace. However, they will remain sustainable for the long run only if you combine them with a different earning strategy.

b) Commission, selling-fees, transaction and payment fees

The most common marketplace strategy is one that charges a fee for each successful transaction. An operator of the platform then charges a fixed or variable fee for the product transacted. Marketplace businesses, such as online retailers and marketplace operators, rely heavily on sales or commissions.

You can earn a tiny percentage of each sale by charging selling fees on your marketplace, often before the payment reaches the vendor. Flat-fee commissions and percentage-based commissions (or combinations of the two) are both common.

A transaction or payment processing marketplace is similar to a sales marketplace; however, charging fees for payment processing or transaction processing adds extra income to the just selling-fees strategy.

c) Subscription-fee model

Subscription-based marketplaces charge buyers and sellers separately or jointly. For customers, the selling point is that they will save money or have access to a great experience. A seller may be able to attract clients who are more likely to buy. When you subscribe, you can divide a large payment into numerous smaller amounts that are more manageable.

d) Freemium model

Freemium marketplaces allow both buyers and sellers to use their services for free. Adding features, offering premium memberships, and cross-selling into other services generate revenue.

This strategy is based on the principle that your free platform hooks people to sign up for your premium services. A balance has to be settled between free and paid services so that users do not suddenly abandon you.

The freemium model relies on a free starting service, but as your audience grows, you add paid features. The problem with this strategy is that the premium services must be of sufficient value for many of your users to become loyal premium customers.

e) Listing model

Some marketplaces charge providers for adding new listings. Each time a seller submits an offer to the website, the seller is charged with a fee (like paying for advertising), valid for a given period that could be extended by successive payments.

This pricing strategy is generally employed when the value of each listing is significant. For instance, it is used to list high-priced items, such as cars and houses.

This marketplace business model is quite popular with classified ads. A significant benefit is that it consolidates many listings into a single online location and ensures that those listings are widely advertised. Most classified ad networks do not assist in transactions.

f) Featured Ad Placement

The featured-ad strategy is frequently integrated into other marketplace options, such as commissions or listings. An additional fee can be paid by the seller in order that their listing appears first, or in a premium space. Once again, the primary problem is to get enough users to the site to entice sellers to pay for these premium advertisements.

g) Sponsored products and stores, and ads from third-party advertisers

Promoting products and profiles can enhance the capabilities of a marketplace platform. A large number of prominent marketplaces utilize the sponsoring revenue model.

A related approach is to allow third-party advertisers (as opposed to the marketplace members) to promote their products, services, or websites. In both cases, there are diverse “ad locations” in the design of the website and charge advertisers to publish their ads.

h) Pay per lead (lead-fees) and bidding-fees models

It is feasible to charge lead fees in a contract-based or service-based marketplace that does not handle orders directly. The marketplace will be able to browse a list of potential clients or transactions, but suppliers will have to pay to read the details of any specific agreement.

The value of bidding fees (in auction marketplaces) is somewhat like the revenue model of pay per lead, except you are billing the clients rather than the vendor.

i) Promote the marketplace through affiliates and referrals

The affiliate and referral programs on a marketplace do not constitute business models in and of themselves. Still, they can help increase revenues by increasing the number of clients and users.

Affiliate marketers promote the marketplace products without being members themselves. Referral marketing consists of existing marketplace members referring new visitors to the marketplace based on their own experience. These strategies are dependent on quality control and monitoring, and they consume resources -paying commissions or fees to affiliates and referrals.

2.3. Strategies and metrics

Most income plans involve “owning the transaction” and charging a commission on all transactions made through the site. As a result, the strategy is highly scalable and often quite rewarding.

The commission model does not make sense, however, in some cases, necessitating the development of alternative models. The best way to determine which business model is the best fit for a given concept is to experiment with several options and measure the results.

It is recommended to start with only one revenue source at a time to avoid being distracted. However, eventually, the business model, as it evolves, may subsequently take advantage of all the activities supported on the site.

There are many types of marketplaces. For example, business-to-business (B2B) and business-to-consumer (B2C) businesses may operate globally or locally, and vertically or horizontally.

How do to know if the current strategy is on the right track? A vital component of the approach is gauging the growth of the marketplace by tracking a few key indicators. The following are among them, and they are briefly described below:

- a) Net Revenue.
- b) Gross Merchandise Value (GMV).
- c) Gross & Contribution Margin.
- d) Customer Acquisition Cost (CAC).
- e) Net Promoter Score (NPS).
- f) Rake (Take Rate).
- g) Average Order Value (AOV).
- h) Liquidity.
- i) Repeat Purchase Rate (RPR).

a) Net Revenue

Net revenue is the actual revenue generated by the marketplace during a specified time. It is computed by multiplying the Gross Merchandise Value by the Take Rate.

Net Revenue = GMV x Take Rate

Therefore, we have a net revenue of \$10 million x 20% = \$2 million if we continue with our prior instances.

b) Gross Merchandise Value (GMV)

Gross merchandise value (GMV) is the total value of goods and services exchanged. The average order value is calculated by multiplying the quantity sold by the average order value.

GMV = Average Order Value x Total Sales

If your platform facilitates one million sales with an average value of 10 dollars, your gross merchandise value (GMV) is 10 million dollars.

If you want a more realistic representation of your GMV, you should subtract cancellations and returns. Therefore, you calculate based on delivered items rather than bookings.

c) Gross & Contribution Margin

Gross margin is calculated by subtracting net revenue from the cost of goods sold (COGS). Thus, the contribution margin provides a complete picture of profitability, although it provides an accurate profitability picture.

To determine the contribution margin, we subtract the cost of goods sold and other variable expenses such as customer service, research, and personnel hiring. As a result, the contribution margin is an excellent indicator of market profitability.

d) Customer Acquisition Cost (CAC)

The CAC metric shows how expensive it is for our organization to acquire customers and sellers on the platform.

A marketing and sales expense ratio is calculated by adding up all the costs and dividing them by the number of new clients.

CAC = Sales & Marketing Costs / New Customers

Therefore, if we spend \$5,000 on advertising and receive 100 new customers, our CAC equals \$5,000 / 100 new consumers = \$50 per new client.

It is critical to distinguish between CAC for buyers and sellers in the marketplace. Frequently, many marketing methods are used to develop these two sides.

Your objective is to keep CAC to a minimum. The more money spent acquiring a client or seller, the more value the client or seller must generate on the platform to break even.

e) Net Promoter Score (NPS)

NPS is another critical indicator for determining customer happiness and retention. A score is calculated by asking a customer, "On a scale from 0 to 10, would you recommend this product?"

People can be categorized into three types based on the scores they received:

- Detractors = score of 0 to 6
- Passives = score of 7 or 8
- Promoters = score of 9 or 10

NPS is calculated by dividing the percentage of promoters (customers who recommend you) by the percentage of detractors (customers who wouldn't recommend you).

$NPS = \% \text{ Promoters} - \% \text{ Detractors}$

If you have 35% promoters, 50% passives, and 15% detractors, your NPS is +20. A Net Promoter Score of more than 50 is considered exceptional.

You should measure NPS frequently to see how happy your consumers are over time.

f) Rake (Take Rate)

A take rate complements gross merchandise volume and helps us to understand how robust the market is. Take rate refers to the amount of money a business earns per transaction.

Commissions and fees (or other revenue sources) are divided by the total sales.

$Rake = (\text{Commission} + \text{Fees}) / \text{Total Sales}$

If a marketplace sells 10,000 USD in items in a specific period and makes 500 USD in commissions and 500 USD in fees, the Take Rate equals $(500 + 500) / 10,000 = 10\%$. So, the firm receives about 10% of those transactions.

Take Rates can vary a lot depending on the type of commodities sold and the value offered by your marketplace. Digital freelance marketplace Fiverr, for example, charges between 5% and 20% per transaction. eBay's marketplace, however, charges a maximum of 12%.

g) Average Order Value (AOV)

We can determine the company's revenue based on the average order value – in this case, on the transactional level. The AOV is calculated by dividing the transaction value by the platform's total sales.

$AOV = \text{Total Transaction Value} / \text{Total Sales}$

If you sell things worth \$10 million and your total sales are \$1 million items, the average transaction value is \$10. Comparing your AOV with that of competitors can help us understand how they perform.

Furthermore, we can also determine how hard it will be to attract buyers to the market. For example, commodities and services with higher prices are less likely to be bought by buyers.

h) Liquidity

Liquidity is the motor that drives our marketplace. It shows the market's activity at any given time. In terms of liquidity, we consider factors such as:

- Platform users – number of buyers and sellers.
- Amount of listings.
- The number of returns and purchases.
- Diversification of geographical locations (number of locations we sell at).

It is not an exhaustive list, and any company or model should be selected based on its strengths and weaknesses. An online marketplace's objective is to maximize liquidity. Therefore, our clients are more likely to engage with our product if we offer them multiple transactional options.

i) Repeat Purchase Rate (RPR)

New clients are expensive to acquire. Ideally, you would want to sell only to people who are already enrolled on your website.

Consider email or push notifications as a more cost-effective marketing alternative to advertisements. You can do this even after the user has entered your environment.

A repeat buy rate is the percentage of existing customers that make a second purchase. To calculate it, divide the number of consumers you have conducted at least two transactions with by the total number of consumers. This calculation should be performed regularly, i.e., for a particular year or month.

If your platform has 50,000 clients who have completed transactions and 1 million buyers. Therefore, your RPR equals $50,000/1,000,000 = 5\%$.

The vendor side of the platform can also track this rate—for example, the frequency of listing uploads by vendors. You can spend more money on customer acquisition if this percentage is higher. It is easiest to achieve this in an industry with a high rate of repeated sales.

There are many examples of pre-booked taxi trips (such as Uber and Lyft). However, a website selling used cars would need significantly more revenue since they are infrequently bought.

3. European framework: portals and platforms

This section analyses WEB portals in the European framework, especially those related to education, skills, jobs and employment, digitalisation, and energy. These are potential partners or competitors, or at least benchmarking cases.

The web portals to be analysed are related to different areas:

1. Skills, jobs, and employment.
2. Education, mainly but not only on energy and digitalization.

3.1. Skills, jobs, and employment web portals

In the first area, as highlighted in the EDDIE deliverable “D2.2 – Current and future skills need in the energy sector” the main reference points in the European Framework are the ESCO platform and CEDEFOP. The EDDIE project can benefit from the use of such tools/environments to help identify relevant occupations and skill needs in the energy sector, specifically considering digitalisation.

ESCO

The ESCO platform (<https://esco.ec.europa.eu/en>): European Union (EU) identifies and classifies the relevant professional occupations, skills and qualifications in European Skills, Competences, Qualifications and Occupations portal (ESCO portal to support job mobility across Europe. “A common language” for the labour market on subjects like employment, education, and training, ensures an efficient collaboration for employers (companies), job seekers, training providers and education bodies/institutions.

ESCO can be of use to describe the expected learning outcomes of the curricula to be designed and to understand the labour market trends and future skills needs better. The ambition of EU Commission is for ESCO to become a digital enabler of labour market mobility and the European classification for job mobility.

CEDEFOP

The CEDEFOP training platform (<https://www.cedefop.europa.eu/en>) identifies and anticipates future skill needs and potential skill mismatches. It provides high quality evidence on trends in the labour market and skill needs by producing regular skill supply and demand forecasts for Europe and analysing the potential labour market mismatches and imbalances. CEDEFOP also investigates skills and competence needs in selected sectors, has collected its own European data on skills and jobs, and is currently working on collecting and analysing data on skill demand using online job postings.

CEDEFOP provides a set of tools that present analytical data regarding sectoral skills, knowledge and occupations drawn from the ESCO and ISCO databases (<https://www.ilo.org/public/english/bureau/stat/isco/isco08/>). The toolset analyses job openings in Europe drawn from several job advertising platforms for each country. The required skills and competences are analysed and presented in several charts, providing useful insights.

3.2. Educational and training web portals

This section analyses different categories of web portals in the education area. They are both generic, thus covering different topics, and specific, covering topics related to digitalization and energy. Other useful examples could be drawn by the best practices research produced in the framework of WP4 of EDDIE, and related to the VET, university, or lifelong learning sector. Three groups have been defined: (a) professional education, (b) life-long learning, and (c) energy & digitalisation:

a. Academic web portals related to professional education

Several European universities provide courses for professional education listed in web portals “for professionals”. In their catalogue they list different courses usually organised by:

- Attendance format: online, blended, and face-to-face courses.
- Duration: from some hours to some months.
- Topics covered.

Some examples:

- Polimi Open Knowledge for professionals <https://www.pok4professionals.polimi.it/>
- Tu Delft Online Learning, with a specific area “for professionals” <https://online-learning.tudelft.nl/>

b. European and international platforms delivering MOOCs and online courses for lifelong learning.

These platforms provide courses on different topics, including Energy and Digitalization. Following some examples:

- Coursera <https://www.coursera.org/>
- EdX <https://www.edx.org/>
- Udacity <https://www.udacity.com/> (specific for digital education)

Some of these platforms are specifically related to professionals, so they could be mentioned also in the previous block. Following some examples:

- France Université Numérique <https://www.fun-corporate.fr/>
- LinkedIn Learning <https://www.linkedin.com/learning/>

c. European web portals related to the topic of energy or digitalisation

They provide several services, including training on the topics covered. Following two examples, funded in the first step by the European commission (EIT projects) and gathering different partners in providing high quality courses on the topic of digitalization and energy:

- EIT InnoEnergy <https://www.innoenergy.com/>
- EIT Digital <https://www.eitdigital.eu/>

4. Stakeholders: map and database

This section relates the general concept of “stakeholder” to the specificities of “business models for online marketplaces”. The database of registered stakeholders may include institutions with different roles:

- a) Members on the “Entity”. They will have some influence on its decisions and policies, as managers, members of the Board, or just by their voting power.
- b) Sellers, understood as the ones that upload contents:
 - a. From the supply side, those that are advertising services, products, professional profiles, or research contents.
 - b. From the demand side, those requiring services, products, specialised workforce, or research results/activities.
- c) Buyers, understood as the ones that browse the databases looking for specific contents. This role is optional, depending on the business model adopted:
 - a. The users of the website may not be registered at all. They are indeed stakeholders, but not present in the database.
 - b. In case of premium services, such as special access to contents or tailored reports, users will be registered in the database.

The same institution may play several roles. In fact, members of the Entity will be potential sellers and buyers by default. Types of stakeholders may be related differently to each of the business models to be analysed (online marketplaces), in terms of motivation/interest and relevance/influence.

4.1. Characteristics of stakeholders

A stakeholder can be defined as being a group, organization or individual that can either be impacted by a project or business, or on the other hand impact a business or project through their operations and performance. This is a general statement applicable to stakeholders having a vested interest in a any type business. In the EDDIE project the concept is similar, however instead of a single profit-oriented business, stakeholders must be interested in both (a) the mission/vision of the EDDIE Association and the LSP, and (b) their own commercial or strategic goals, so that the services provided by EDDIE must be profitable for them.

4.1.1. Classification

The EDDIE consortium identified different stakeholders that would possibly have an interest in the EDDIE project and more specifically in the different marketplaces presented in this deliverable and its annexes. These are mainly:

- Industry
 - Energy
 - ICT technologies
 - Equipment / infrastructure
 - Engineering / services
- Education
 - University
 - VET school
 - On-line platforms
 - Research institutes
- Administration
 - European Administration
 - National Administration
 - Regional Administration
 - Local Administration
- Social and others

Note that the above classification only applies to the primary nature of the stakeholder or institution. The database design allows for multiple choices and aggregations of characteristics, and specific attributes, so that the activities and areas of interest of each institution are properly outlined.

With respect to the roles played in a business model, stakeholders may be classified as internal or external, as primary or secondary, and as direct or indirect:

- Internal or External
 - Internal: stakeholders that exist inside the business. There are stakeholders who are directly affected by the project, such as the EDDIE Consortium.
 - External: are those who have an interest in the success of the platform but do not have a direct affiliation with the Consortium.
 - There is an intermediate situation, that could be identified with the LSP membership. These are institutions linked to EDDIE but with a weak commitment to the initiative.
- Primary or Secondary
 - Primary: also known as key stakeholders, have the highest level of interest in the platform because they are directly affected by its outcome. They actively contribute to the platform. These types of stakeholders include clients and project managers.
 - Secondary: also help to complete the project, but at a lower and more general level of interest. These types of stakeholders help with administrative processes, financial and legal matters.
- Direct or Indirect
 - Direct: are involve with the day-to-day activities. The Consortium is part of this type of stakeholders.
 - Indirect: pay attention to the finished project outcome rather than the process of completing it. Clients are this type of stakeholders. Through several questionnaires to these stakeholder groups, we have been able to map them according to their influence and interest in the Tools and System Marketplace:

4.1.2. Possible roles with respect to participation and contribution

Each type of stakeholder may adopt different roles when placed in specific scenarios. The list presented below is the result of a general run through the roles expected to emerge in the different possible marketplaces analysed in the EDDIE project. The following sections give an overview of the roles the different stakeholders are expected to play in each of these marketplaces.

- Client (demand side): Clients would be the companies and individuals who will use the products and services of the marketplace. They are the beneficiaries of the outputs.
- Supplier: This role would be taken up by the stakeholder groups that provide the contents of the marketplace (products, services, information...). They could be individuals or companies that are either part of the EDDIE consortium or even ones that are not.
- Collaborator: These would be the ones who ensure the proper development of the marketplace and add value to it. These stakeholders would have an interest in ensuring the project goes smoothly but without the need for a commercial or product supply relationship.
- Management: Those who will be in charge of managing the platform, they may be part of the EDDIE consortium or external as well.
- Investor: These are the ones who invest capital in the platform, with the expectation to earn a certain rate of return on that invested capital. This could include the EDDIE consortium who own the platform or external venture capital companies.
- Sponsor: These are the ones who provide resources because of a commercial, reputational, or strategic interest, not being direct participants in the transactions of products or services. This type of role includes both advertisement (private and public) and public funding related to policies and strategies.
- Partner: These are the ones who collaborate to obtain mutual benefits because of providing complementary or reciprocal services. "Partner" is a very general concept, so that any of the abovementioned roles may be interpreted as a partnership. However, it is included here to cover any other type of collaboration or synergy not already mentioned in the list. In the present scenario, the EDDIE association allows different levels of partnership (or commitment/responsibility), and also we have the LSP (Large Scale Partnership) which is a weak commitment by definition.

Note that from the strict business viewpoint of the Entity management, “clients” is a different -and more general- concept. In simple language, anyone who pays, either to obtain some kind of product/service, or any other benefit in return (operational, commercial, reputational, or strategic).

Note also that a single stakeholder may play multiple roles in the same or in different business models, so the classification of roles is not exclusive.

4.1.3. Mapping criteria and interpretation

In the following section, maps are presented portraying stakeholder interest in the EDDIE project’s different potential marketplaces vs the Consortium’s opinion of stakeholder influence in the project. The maps were then evaluated based on Figure 14 below. The figure explains how, according to the results of surveys and analyses, the EDDIE project -and the future Entity- should proceed in investing time and resources in dealing with the different stakeholder groups. The alternative attitudes or strategies are labelled as (a) maintain, (b) plan, (c) leverage, (d) plan, (e) invest, or (f) commit. More details can be found in the EDDIE deliverable “D3.2-Stakeholder’s Map” in order of importance within each area.

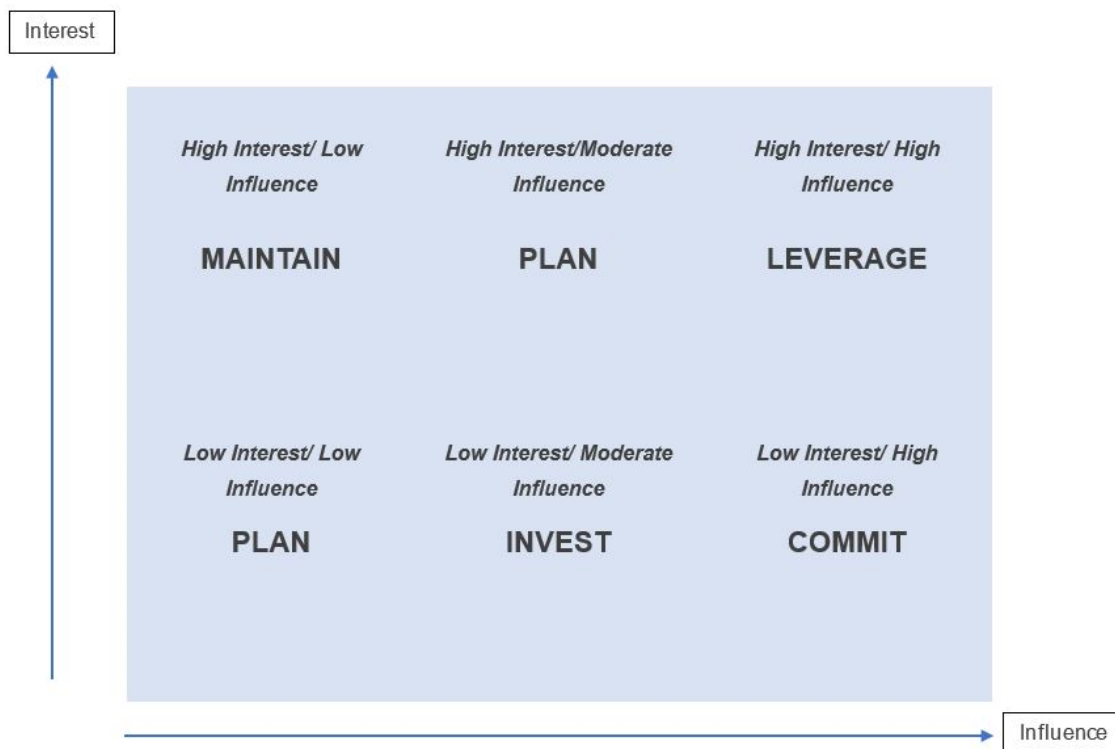


Figure 14. Strategies assigned to a map of stakeholders for a given service.

4.2. Maps of stakeholders for different marketplaces

This section presents maps displaying the combinations of stakeholder interests in the EDDIE project’s different potential marketplaces and the Consortium’s opinions about the stakeholders’ influence in the project.

As a result from the stakeholder mapping effort, it can be concluded that all the stakeholder groups are in a position of active collaboration and interest for all the possible platforms being planned for the EDDIE project, which facilitates the possible success of the business models proposed for the Entity.

Research and Dissemination Portal

Starting with the administration stakeholder group, this can fall within the client category as the EDDIE feed and the EDDIE Library will be open to everyone within the energy sector. It is foreseen that the roles the administration

stakeholder group will fulfil are mainly operational. The EDDIE database will eventually need a team to manage and maintain it, which also foresees the administration stakeholder group taking the lead.

The industry stakeholder group, in all its forms, will most likely have the role of both supplier and client. The industry stakeholder group could potentially contribute by uploading material to the EDDIE library and posting updates on the EDDIE Feed for example, ranging from showcasing different projects that they are working on or placing the spotlight on relevant topics, or using the platform as a source of research contents.

The education stakeholder group is foreseen, more specifically students of advanced topics, would have the role of client, as they would be accessing the EDDIE Library to find relevant materials. Given that stakeholders can use this portal to post research papers, dissertations, theses and more in the EDDIE Library and post updates on the EDDIE feed to build a network, the education stakeholder group would have a prominent role.

With regards to social & others it is foreseen that they will be both suppliers and clients. Like the education stakeholder group, the social & others group would also be making use of the portal as a source of information, but could also upload and supply materials.

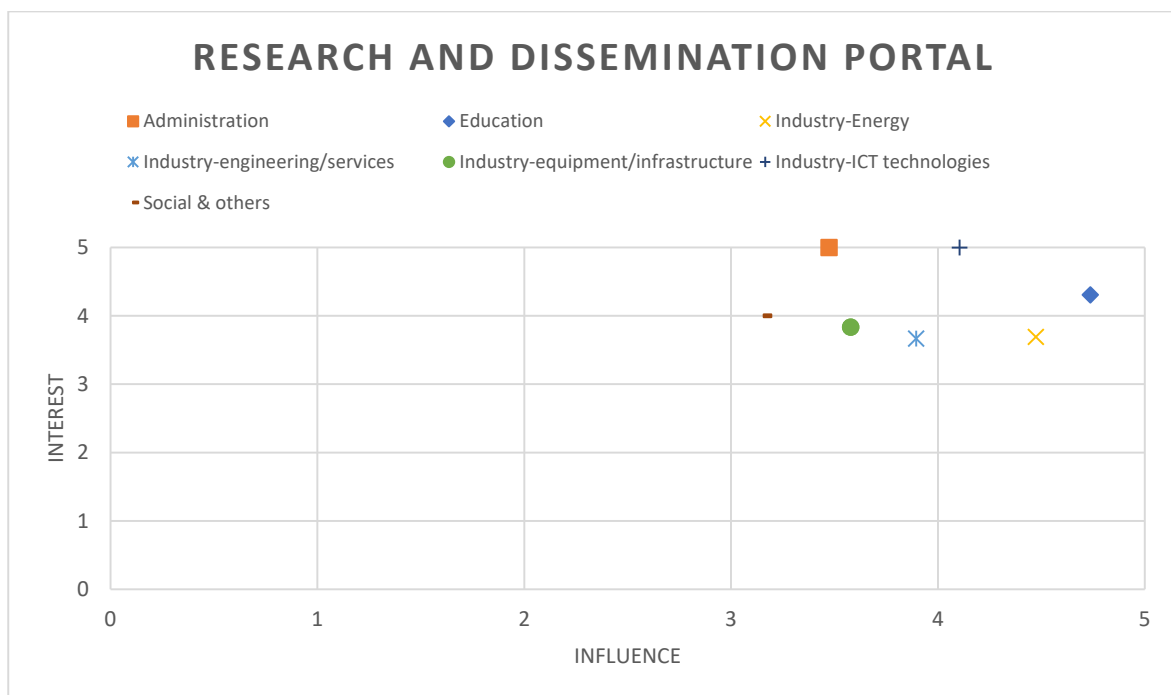


Figure 15. Strategies assigned to the stakeholders of the Research and Dissemination Portal.

In general terms, the map shows that all the stakeholder groups are in the area of high influence and high interest. Instructions here are to leverage on them and make sure to optimise their participation in EDDIE.

Tools and Systems Marketplace

Industry will be the main user of this Marketplace due to their high interest in the product, as well as the high influence attributed to this stakeholder group. For this marketplace, the industry stakeholder group will be expected to take the supplier and the client role. ICT, services, and equipment companies mainly as suppliers, and energy/engineering/equipment companies as clients. A business relationship is foreseen between the EDDIE consortium and external suppliers. Industry could also be the stakeholder group that plays other roles: investor, sponsor, collaborator, and partner in general.

Another stakeholder group to be considered is Social and Others because, although their interest and influence is not very high, it is foreseen that they can be large consumers of the materials on the platform, both as individuals but also as part of an organisation.

The stakeholders group Education is expected to be the main partner and collaborator of the platform due to the high interest shown and the high influence attributed to it. It is assumed that Administration will be responsible for

the management of the platform due to its high level of interest and influence, and that the Education stakeholder group may also participate in this role.

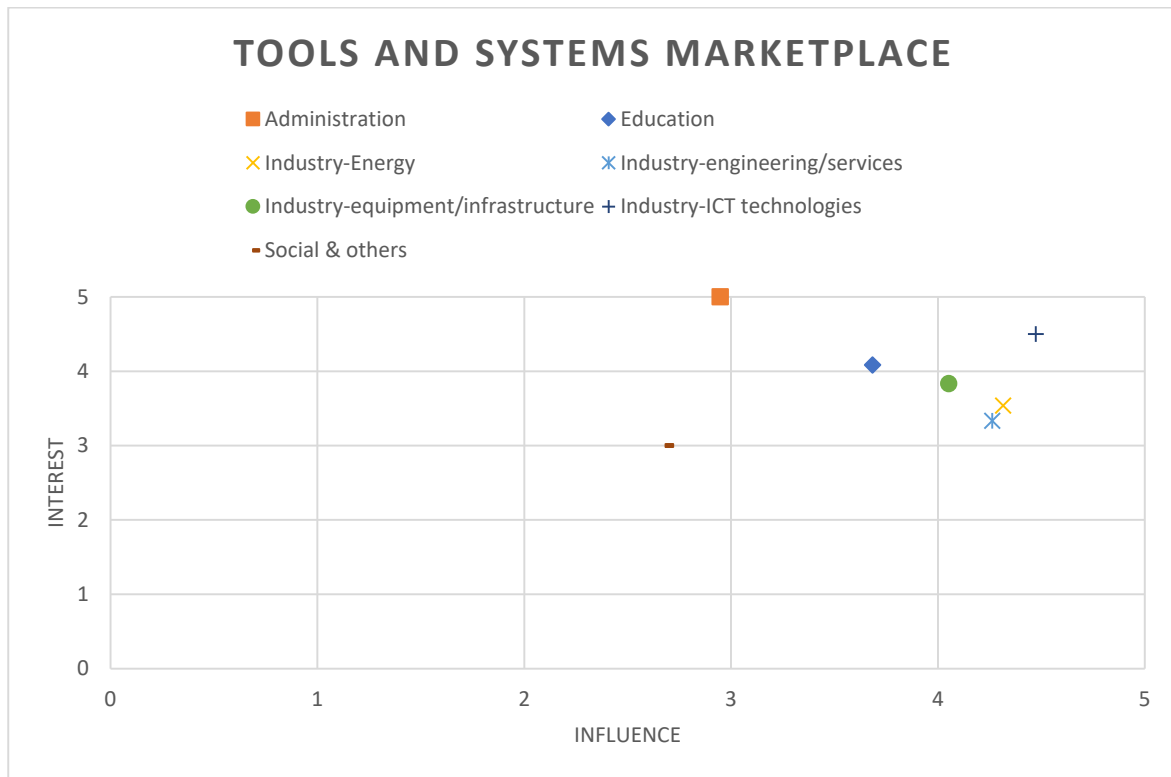


Figure 16. Strategies assigned to the stakeholders of the Tools and Systems Marketplace.

In general terms, the map shows that most of the stakeholder groups are in the area of greatest influence and interest. Instructions here are to leverage on them and make sure to optimise their participation in EDDIE. With regards to the Administration and Social & Others stakeholder groups, these fell in the moderate influence, high interest section. Instructions are to involve them with in the planning of the activities, but not take action yet.

Jobs Marketplace

The industry stakeholder group will mostly have the role of a supplier, meaning that they will be mostly posting job opportunities on the platform, to increase their workforce. This group might take up the investor role as well, considering the vastness of the industry and the large benefits this marketplace could have for industry.

Education stakeholders can be suppliers on one end of the spectrum, but also customers on the other. Starting with the former role as suppliers, stakeholders can use the marketplace to post vacancies for various job opportunities related to the energy sector, including researchers, PhD students, lecturers, and educators. On the other hand, it can also take up the role of client with students, accessing the EDDIE Jobs Marketplace to scope out possible jobs and internships that would bridge the gap between education and the job market.

The administration sector would be mainly suppliers and/or sponsors. Starting from suppliers, should any energy related vacancies come up to stakeholders, the Jobs Marketplace portal would be an appropriate platform where these job vacancies could be posted. As potential sponsors, different levels of the administration could see EDDIE as a support for public policies and strategies.

For the social & others group, the roles within this marketplace are expected to be diverse. As all other groups they could be suppliers and post job vacancies related to the energy sector. However, this group might also be a customer as especially taking into consideration the vastness the term 'others' implies. As an example, with regards to individuals particularly, this group will probably include job-hunting and head-hunting activities.

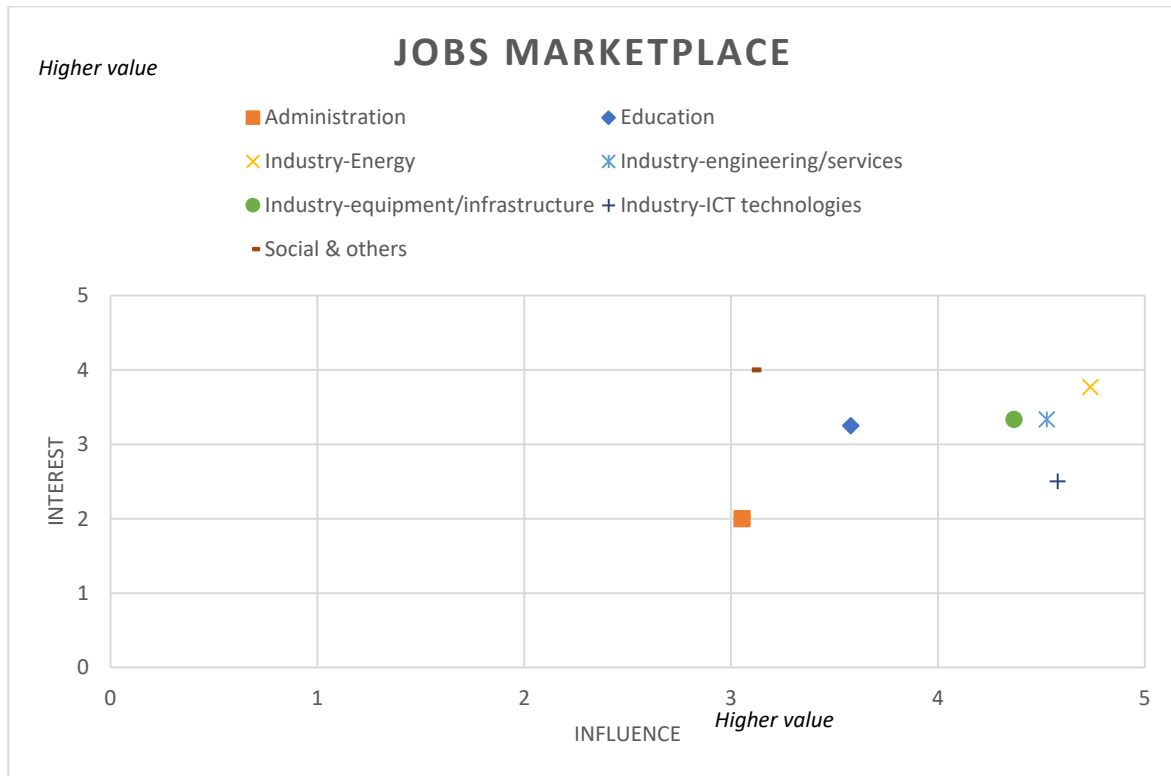


Figure 17. Strategies assigned to the stakeholders of the Jobs Marketplace.

In general terms, the map shows that most of the stakeholder groups are in the greatest influence and interest area, so the directive is to maintain them motivated and active. The Administration stakeholder group falls on the high influence, low interest part of the graph. In this case, the directive is to commit them as much as possible in the project without overwhelming them with tasks and work.

Training Programmes Marketplace

The main role of the education stakeholder group, as institutions, is obviously expected to be the supplier one. Education institutions would naturally be offering training programmes. As individuals -potential students- the role will be the client one.

Stakeholders in the energy sector may act as clients, given that students might be company employees, either in-company mode or as external training. This could be considered as an institutional role and as individuals working in the energy and engineering sectors.

The social & others stakeholder group would also most likely be considered clients on this marketplace for the same reasons mentioned formerly.

The administration stakeholder group would play similar roles as energy and industry, although less important. The administration institutions need qualified employees, especially in the departments related to energy and industry.

In general terms, the map shows that most of the stakeholder groups fall in the area of greatest influence and interest. Therefore, the directive is to maintain them motivated and active. The Industry ICT stakeholder group fell on the high influence, low interest part of the graph. In this case, the directive is to commit them as much as possible in EDDIE without overwhelming them with tasks and work.

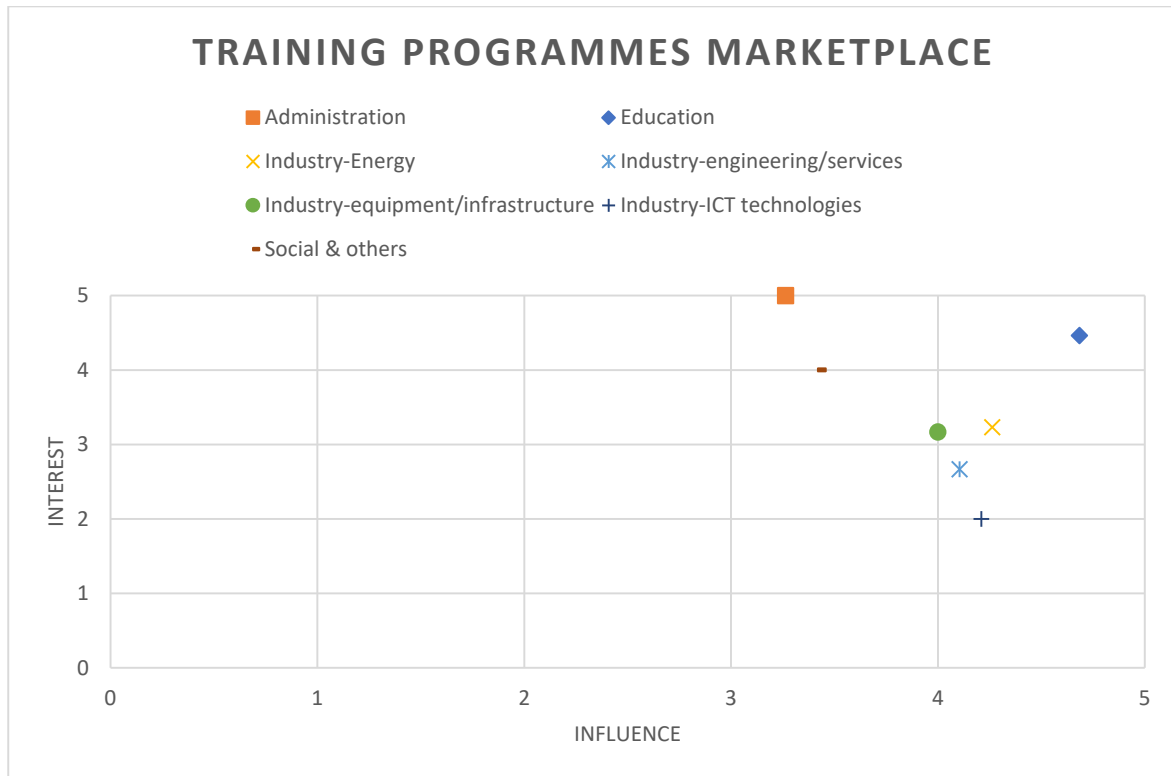


Figure 18. Strategies assigned to the stakeholders of the Training Programmes Marketplace.

4.3. Database characteristics

The current specification of the stakeholders' database includes the following statements:

- The main element of the database is the “institution” (a company, a university, and so on).
- Individuals may create accounts as one-person institutions, equivalent to a freelance profile.
- Individuals may access the database only through institutions. The same individual may have different accounts if he or she is related to multiple institutions, each account with its specific role. This includes the “freelance” profile institutions, so in fact there is no limitation.
- The EDDIE manager will accept an institution as a member, defining an individual account as the “administrator” of the institutional contents and accounts.
- The administrator of the institution will have the right to define individual accounts with two different roles (permissions), the “representative” role or the “member” role. The former may upload and edit institutional and personal contents, while the latter may only upload and edit personal contents.
- Associations are special types of institutions, but they only differ in the attributes (descriptors). Examples are projects, consortiums, and professional associations.
- The editing permissions apply to the description of elements in the database, and to the contents of the different services: news or papers in the research portal, or training programmes in the corresponding portal. Each specific content will have well-defined authorship and responsibility.
- The design of data structures, both for stakeholders and contents, should facilitate searches and queries. Therefore, closed menus of options and selection lists should be implemented whenever possible.

Figure 19, which is the same as Figure 13, shows how the “Stakeholders Map” database is the basis and the doorway to the specialised databases of contents devoted to the abovementioned marketplaces or portals. However, it has a value by itself, as a “who-is-who” directory that includes also a “who-does-what” map, and information about geographical scope, relations among institutions, areas of interest, and so on. This is intended to be a networking tool in the education-digitalisation-energy European ecosystem.

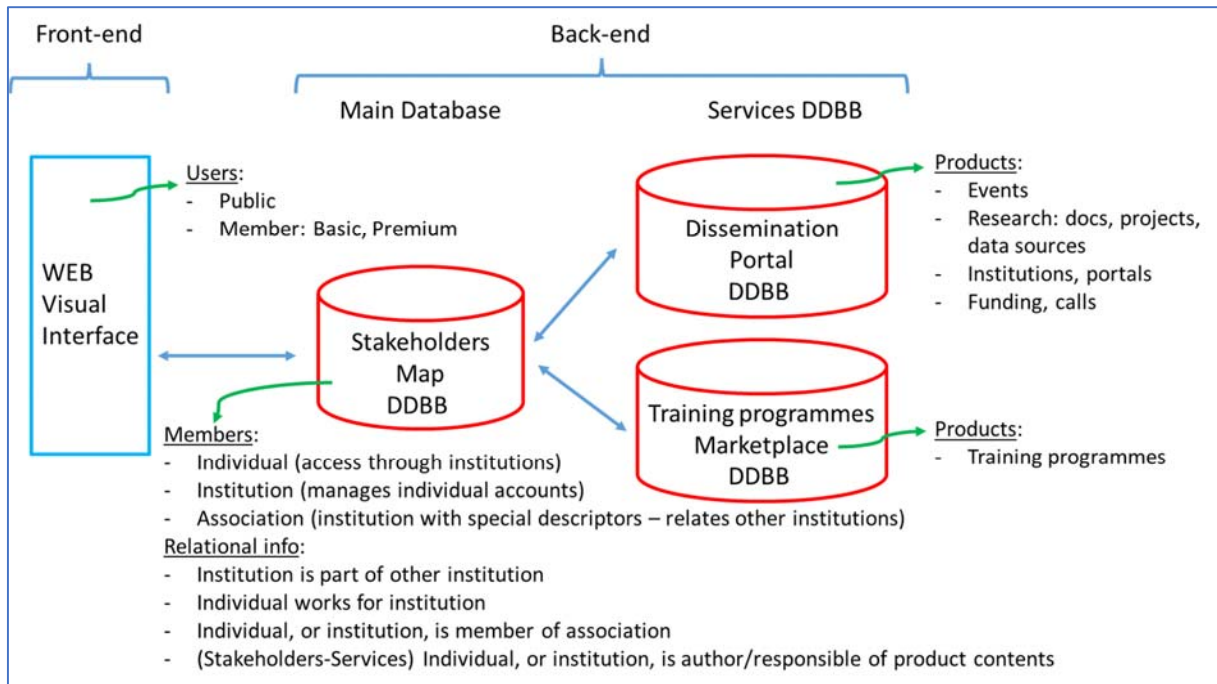


Figure 19. Relation between the stakeholders' database and the implementation of services.

During the last year of the EDDIE project, two critical steps have been completed, on top of the already created database: (1) the creation of the Entity and the LSP, and (2) the implementation of a draft version of one of the marketplaces, the Training Programmes Marketplace, described in Section 6 and in also in an annex. The choice of this particular marketplace has been based on the comparative analyses of business models and on the roadmap, both described in this document (sections 5 and 7).

5. Business models: a comparative analysis

This section gathers and compares the main results provided by the separate analysis of each of the marketplaces.

5.1. Comparison of the marketplaces

In the EDDIE Strategy, the development of four marketplaces has been proposed (1) research and dissemination, (2) training programmes, (3) jobs, and (4) tools & systems. This set of marketplaces aims to be rather comprehensive to address the digitalization of energy systems but, in the future, other marketplaces could be analysed, as for example those related to the quality assessment, certification, or accreditation processes. Separate documents analyse each marketplace in detail.

The structure and contents of these documents is the following. First, the executive summary. Second the core of the document, which is the business model description (scope, main features, services provided, detailed operations and functional requirements and canvas). Then the products and contents (types of elements, formats, and structures) and finally the stakeholder analysis (target stakeholders, European framework and roles and functions of the Entity). These documents are included as an annex to this deliverable.

A comparative analysis of these marketplaces is presented in the following Table and analysed subsequently.

Fields	Description	Marketplaces			
Marketplace	Name	Jobs	Training	Tools & systems	Research & Dissemination
Mission and Scope	Summary of mission and scope	Specialised and pioneer online platform for the search of jobs in the energy sector, with a special focus on digitalisation.	Training designed for the energy sector and digitalisation.	Online platform for the exchange of tools and systems	A Portal to share works, all in the energy sector and digitalization. share events and activities.
Characteristics	Types of users: user types or roles	Job seeker, recruiter	Individuals or organizations	Suppliers, Customers, Consulting Companies	Researchers, students, workers
	Administrator: Key functionalities	Delete, approve content / publish, statistics, technical support	Delete, approve content / publish, statistics	Delete, publish & approve content	Delete, publish & approve content
	Uploader: Key functionalities	Publish job offers, upload CVS, edit profile/offers, delete job offers, send messages, create and receive personal alerts, scheduling the publication of a job offer	Upload training programmes, edit, draft, delete	Give visibility to their products and services, sell them, and create partnerships	Upload research, work, pilots or events. Sharing Achievements.
	Seeker: Key functionalities	Search candidates' profiles, search jobs, classify, filter, apply, save searchers and track applications	Look for training programmes, match with skills, filter	Find specific products or services, search and filter results according to their needs	Search for research, works, pilots, events, ...
	Overview of the main services	Search for job offers and job seekers, online payment for the premium subscriptions.	Search for training programmes and link of training programmes with skills	Search for the three macro categories of products: Hardware and Software solutions, Data, and Services.	Share works, research, pilots, events and achievements and allow to search for them
	Competition landscape	Not specialised in the digitalisation of energy systems (Eurojobs, EuroJobsites, EURES).	Typical marketplace, like existing marketplaces online	No known competitors offering the same services, but there are sites specialised in one of the three categories of offerings above.	Institutional repositories, consortium websites, general purpose platforms, specialized journals, and conferences

Fields	Description	Marketplaces			
Marketplace	Name	Jobs	Training	Tools & systems	Research & Dissemination
Business Model	Types of businesses	B2C	B2C, B2B	B2C	B2C C2C B2B
	Monetizing Strategies	Freemium: Basic functionality can be used for free; all other features are available upon payment.	Free for training programme seekers and paid for sellers	Hybrid (Freemium and Commission business models)	Free for most functionalities complemented mainly with advertisement
	Main Income Sources	Jobs offers, Monthly fee per profile, Profiles creation, Visibility in the sector	Revenues based on Training seller fees paid per account and per programme.	Fees per Premium services, fees charged from successful transactions, Visibility in the sector	Payment for download of long works. Payment for advertisement of events
	Main Costs	Payments to internet providers, domain, hosting, marketplace platform, advertising and marketing campaigns, technical maintenance	Payments to internet providers, domain, hosting, marketplace platform, advertising and marketing campaigns, technical maintenance	Payments to internet providers, domain, hosting, marketplace platform, advertising and marketing campaigns, technical maintenance	Payments to internet providers, domain, hosting, advertising and marketing campaigns, technical maintenance
	Key performance indicators	New subscriptions, user retention, total professionals with free/premium subscription, total job offers, average applicants per job, applications per hire, job alert performance	Click on training programmes, Fee/Click ratio	New subscriptions, Type of Tools or Systems, Number of downloads, Average Tools or System Quality, Traffic, Gross Merchandise Value (GMV)	Users and stakeholder interaction with one another. Amount of works uploaded. Amount of works downloaded. Amount of new subscribers
Functional Requirements	Minimum critical functionalities	Multiple profile options, personalizing profiles, Job offers search/sort/filter, CV search/sort/filter, other support touchpoints, FAQ	Personalizing profiles, Training programmes search/sort/filter, FAQ	For the supplier, upload product and service offerings. For the Customers, products and services research, reviews.	Search Bar to be able to look for works with key words. Filters to be able to make the search easier. Personalisation of profiles.
Products (Concept)	Summary of the products available	Job offers (with skill requirements), Candidate profiles (with skills)	Training Programmes offer (with skill coverage)	Three macro categories of products provided by the platform: Hardware and Software solutions, Data, Consulting services.	EDDIE Library, EDDIE Feed
Stakeholders	List of stakeholders	Uploaders: Industry, Administration, Education, Social, Individual Seekers: Industry, Administration, Education, Social, Individual	Sellers: Learning consultants, Universities, Business Schools Seekers: Individuals, Organizations, Associations	Uploaders: Industry, Government, Education, Individual Seekers: Industry, Government, Education, Individual	Industry, Administration, Education, Social, Individuals. All stakeholders have a vested interest to share and keep themselves informed.

Figure 20. Comparative table of the marketplaces (jobs, training, tools & systems, research & dissemination).

All the marketplaces aim to specialize in the digitalisation of energy, aiming to differentiate from existing marketplaces, and providing an added value in this context. The tools & system marketplace is the only one that, by its nature, has less competition currently¹, and that could even aim to provide more general services. On one hand, the administrator key functionalities focus mainly on the upload or modification of the content. On the other hand, the uploader and seeker key functionalities use to be specific of the marketplace under analysis and related to the main services provided under each marketplace. Regarding the existing competition, in most cases, the existing platforms do not focus particularly on the digitalization of energy.

¹ In the tools & system marketplaces there are similar platforms but for other purposes.

Regarding the business models, in most of them the business to consumer (B2C) model could be applied, where the products or services move directly from the business to the end user. The monetizing strategies could be of various types combining from free models, to freemium or hybrid models, where some services could be free while others would be paid. The main costs are shared in many cases, this being beneficial to make the most of the synergies of developing simultaneously marketplaces of several types. Costs include among others, payments to Internet providers, domain, hosting, the development and maintenance of the platform, advertising, and marketing.

Key Performance Indicators could be of various types, from measuring the activity in the marketplace (e.g. total job offers, average applicants per job, number of clicks, number of downloads, etc.) to metrics more related to the cost benefit analysis (e.g. fee/click ratio, new subscriptions). The products are very specific of each marketplace; job offers and candidate profiles in the job marketplace; training programmes in the training marketplace; hardware and software solutions, data and consulting services in the Tools and System marketplace, and an EDDIE Library and EDDIE Feed in the Research & Dissemination Portal. In all the marketplaces, almost all the types of stakeholders considered in EDDIE should be involved, from the Industry, to the Administration, Education, Social stakeholders and individuals.

5.2. Prioritisation of the marketplaces

The implementation of the marketplaces should be gradual. To identify the most interesting marketplace to start with, a survey among the leaders of the marketplace working groups has been conducted. This survey contains evaluating criteria, categorized in two main groups thinking in the success of the selected marketplace, covering aspects of different nature, like the short- and long-term sustainability and the existing competition, that highlights the need for a new development in each domain. The two categories are (1) difficulties to obtain incomes, and (2) the cost sources. On one hand, the income difficulties address the competition in each marketplace, the complexity of the interaction with the user, the interest and motivation in the solution and the monetizing difficulties. On the other hand, the cost sources, include the complexity of the set-up and of the commissioning, the complexity of maintaining and updating the contents, as well as the requirements for quality assurance and the related responsibility.

The detailed assessment is included as an annex, including the justification for the evaluation of each marketplace. A summary of such assessment is included in the following Table. A lower criteria evaluation (1 point) means more favourable conditions for the implementation.

The marketplace that looks more promising and viable is the training marketplace. The reasons for this are the following. First, this marketplace is perfectly aligned with the EDDIE core goals. Currently, competition for training is limited to seminars and Internet offer, being difficult to aggregate information, while in the other marketplaces there are already similar platforms, at least for general purposes². Regarding the interest and motivation of the solution, this marketplace would be easy to communicate and understand by sellers and seekers, while some of the other marketplaces may need an effort to convince users of the added value of the marketplace or may be difficult to engage them due to other existing platforms. Regarding the maintenance and update of the contents, in the training marketplace, the cost would be low because it would be done by sellers, which are interested in having an updated offer. Regarding the quality assurance and the related responsibilities, in the training marketplace it would be easier because the possible risks or damages are more limited.

The research & dissemination marketplace is close to the training one in most of the aspects, but it would be harder to monetize, because the commercial interest of the products displayed.

Therefore, the marketplace that looks significantly the most interesting to deploy is the training marketplace. This aligns well with the EDDIE strategy and objectives, whose main objective is to contribute to the education in the digitalization of the energy sector. A training marketplace, specialized in this sector, the digitalization of energy, will directly contribute to pursue the improvement of the education in this sector, enhancing the visibility of the related training programmes, and supporting the students and existing workforce to acquire new skills and competences in this ambit, to have a skilled workforce that can achieve the needed transformation that digitalization and energy are demanding.

² In the tools & system marketplaces there are similar platforms but for other purposes.

Proposal description				Jobs	Training	Tools & Systems	Research & Dissemin.	
Evaluating Criteria (income difficulties, costs sources)		Criteria Description 1 = very low, very good 5 = very high, very bad	Crit Weight (%)	Crit. Eval. (1-5)	Crit. Eval. (1-5)	Crit. Eval. (1-5)	Crit. Eval. (1-5)	
1	Income difficulties	High competition	Many or leading existing similar products of platforms	15%	4	1	2	2
2		User interaction complexity	Complex or not intuitive functions / procedures	10%	2	1	1	2
3		Adoption and marketing difficulties	Low initial interest or motivation of the solution, difficulties to engage users	15%	3	1	3	1
4		Monetizing difficulties	Lack of willingness to pay or mechanisms for monetization	10%	4	2	4	3
5	Cost sources	Set up and commissioning complexity	Development and testing complexity of SW modules, database, interfaces, etc.	15%	4	4	4	4
6		Maintenance & Updating complexity of contents	Operations and resources related to maintenance and updating of contents	15%	4	2	4	3
7		High requirements for quality assurance and responsibility	Difficulties to ensure the quality of the contents and/or high responsibility for the Entity if contents are wrong	20%	5	2	4	4
				100%	3.85	1.90	3.25	2.80

Figure 21. Evaluation criteria of the marketplaces (jobs, training, tools & systems, research & dissemination).

5.3. Funding, costs, and sustainability

Following the above evaluation and analysis, the sustainability of the proposed solution -the training marketplace, has been analysed from a cost-benefit perspective. The cost-benefit analysis considers two scenarios, a conservative scenario with reduced costs and lower expected benefits, and an ambitious scenario with higher costs and investments, which could bring additional benefits.

The general template for the cost-benefit analysis includes many types of costs and benefits that are not applicable to this context. In the following, we focus only on the items that are applicable to this business. The costs are split into recurring and non-recurring costs. The non-recurring costs include the acquisition of hardware and desktops, material for telecommunications, and software. In addition, some furniture fixtures, and infrastructure are considered. There is also a need for organizational or support costs, labour and development. The recurring cost, include hardware and software maintenance and upgrades, computer supplies, renewal of desktops and IT infrastructure, help desk support, ongoing additional labour, staff costs, and user training. It also considers office leasing in the ambitious scenario. It must be noted that the significantly highest costs both in the conservative and ambitious scenarios are the staff costs.

The incomes or benefits include mainly EU Commission Funds to support the initiative and Entity Partners Funds. In the Entity Partners Funds, there are considered both an initial investment (sponsorships or contributions) and a membership fee. In addition, direct incomes generated from the marketplace services are estimated. In this

marketplace, it is considered that there are no buyer fees, but there are fixed and variable vendor fees, as well as advertisement invoicing. The major benefits would be the marketplace incomes and the Entity Partners Funds

SCENARIO	CONSERVATIVE			AMBITIOUS		
CONCEPT	TOTAL COSTS	TOTAL REVENUES	NET BENEFIT	TOTAL COSTS	TOTAL BENEFITS	NET BENEFIT (OR COST)
YEAR 1	115,000 €	128,469 €	13,469 €	194,200 €	284,000 €	89,800 €
YEAR 2	98,155 €	132,146 €	33,991 €	134,183 €	136,010 €	1,827 €
YEAR 3	79,327 €	115,447 €	36,120 €	136,196 €	138,050 €	1,854 €
YEAR 4	80,517 €	121,954 €	41,436 €	143,239 €	140,121 €	- 3,118 €
YEAR 5	81,725 €	128,483 €	46,758 €	147,312 €	142,223 €	- 5,090 €
YEAR 6	82,951 €	135,035 €	52,084 €	152,417 €	144,356 €	- 8,061 €
YEAR 7	84,195 €	141,611 €	57,416 €	144,553 €	146,521 €	1,968 €
YEAR 8	85,458 €	148,210 €	62,752 €	151,721 €	148,719 €	- 3,002 €
YEAR 9	86,740 €	154,833 €	68,093 €	150,922 €	150,950 €	28 €
YEAR 10	88,041 €	161,481 €	73,439 €	151,156 €	153,214 €	2,058 €
TOTAL	882,110 €	1,367,667 €	485,558 €	1,505,900 €	1,584,165 €	78,265 €

Figure 22. Summary of the cost-benefit analysis.

The detailed cost-benefit analysis is included as an annex. The minimal (conservative) scenario could be viable, while the maximum (ambitious) scenario is just close to viability. Thus, this analysis suggests that it would be preferred to start with a minimum organization and infrastructure to prevent compromising the viability of the proposal. It must be noted that, as shown in the annex, even in the minimal scenario, some public fund support would be required in the first years to launch this initiative in order not to have a net cost in the starting years. This would only be needed on the first years because in the long-term the incomes from the marketplaces and the Entity Partners Membership are estimated to be sufficient to cover the regular costs.

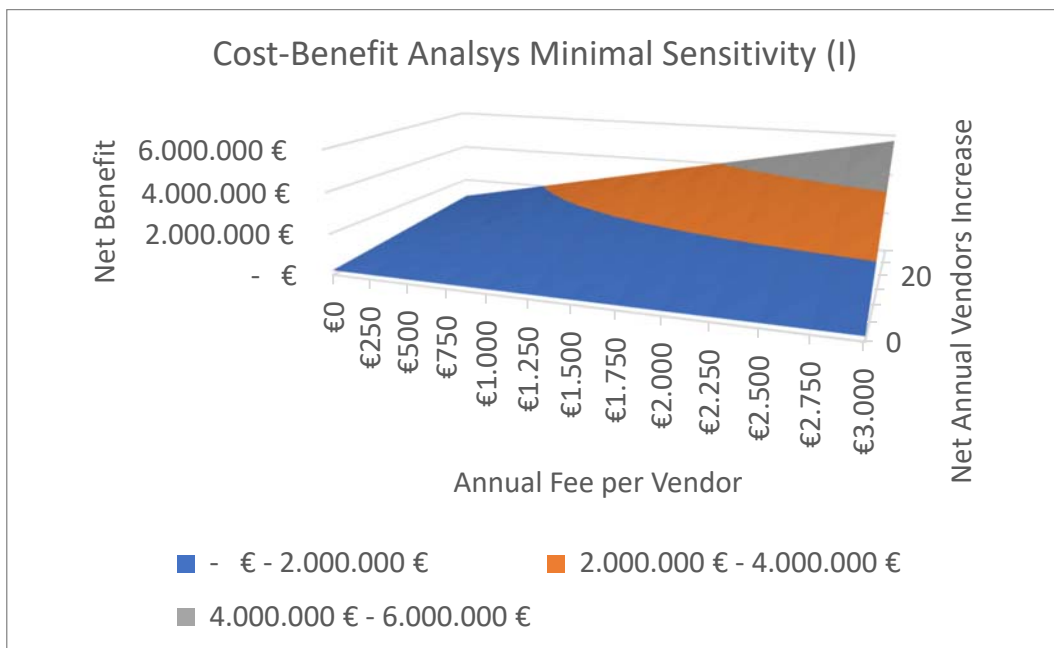


Figure 23. Sensitivity to the annual fee per vendor and the net annual vendor increase.

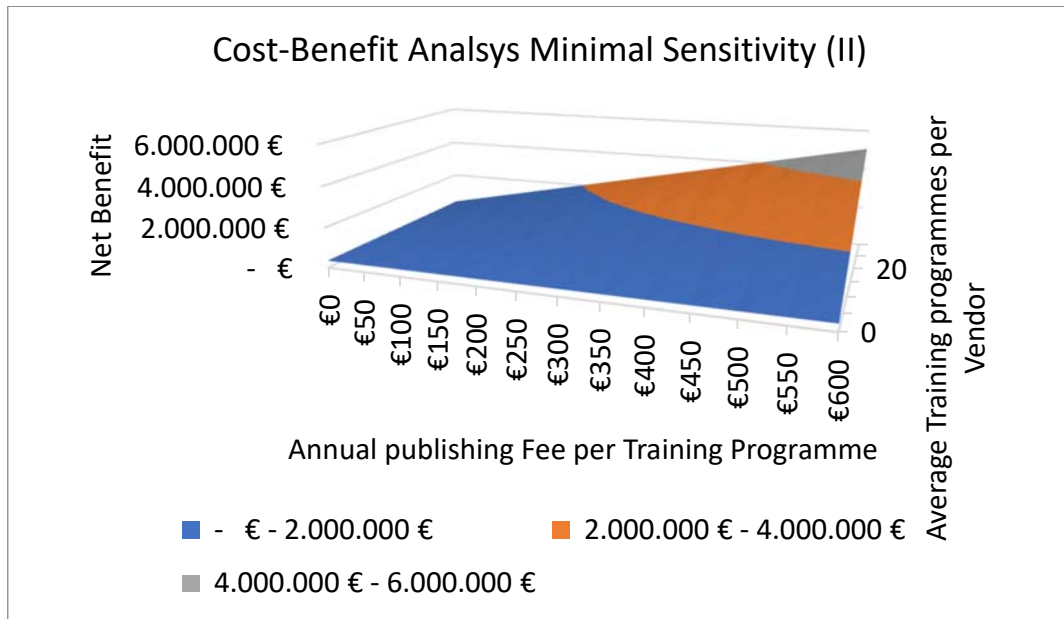


Figure 24. Sensitivity to annual publishing fee per programme and the average #programmes per vendor.

In addition, sensitivity analysis to the revenues have been carried out (see examples in Figure 23 and Figure 24) showing that in more optimistic scenarios, the net benefit in 10 years, could be significant. As the EDDIE Entity will be a non-profit organization, this could be devoted to the development of other marketplaces, as foreseen in the Strategy, or to other activities of the Entity aimed at fostering the education in the digitalization of energy systems.

6. Prototype of the training marketplace

This chapter summarizes the implementation of the Training Programmes Marketplace system on the Eddie-Erasmus website. The goal of this system is to make available to Institutions and Associations a tool for inserting and managing trainings on the EDDIE site, making it visible to potential students interested in improving their knowledge in the energy digitalization field. Further details are included as an annex to this document.

6.1. Project analysis

The first step in the project analysis has been the identification of the main actors involved in the Training Marketplace, the Training Supplier, and the Training Consumer.

The Supplier is a member of an Association or an Institution that offers several trainings, while the Consumer is a person interested in gaining more skills on Digitalization of Energy and wants to find a training to attend to. In addition to those figures, the Moderator is a member of an Association or an Institution that acts as a supervisor for the management of their Association/Institution trainings.

The Supplier can create and modify Trainings on behalf of its Institution or Association (Provider hereinafter). Once a Supplier has created/modified a Training, the Training will be marked as a draft. Once a Training is ready to be published, a Moderator will be notified who will approve or reject it, in which case it will return to draft for further modifications. Otherwise, the Training will be published and will be visible for all Consumers.

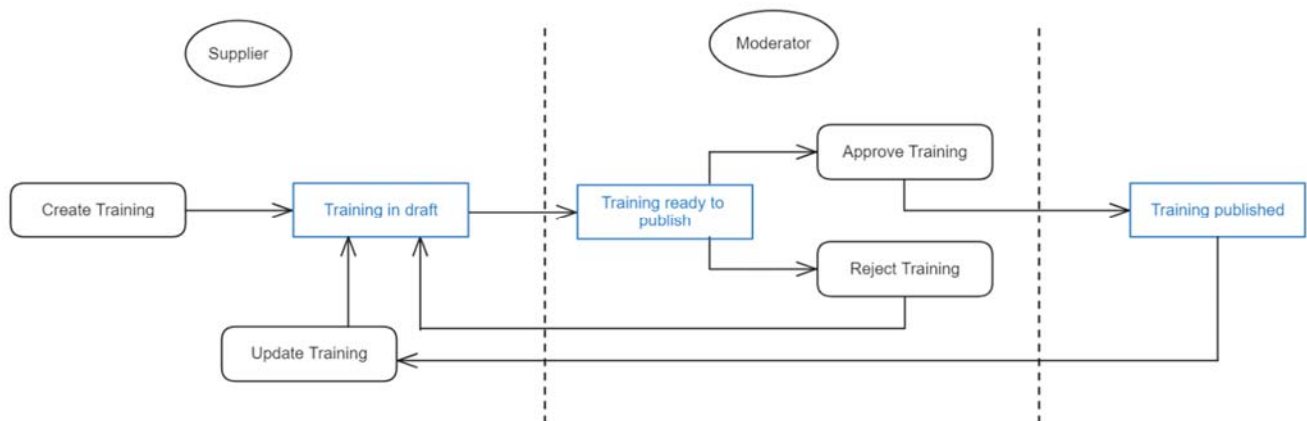


Figure 25. EDDIE Training lifecycle.

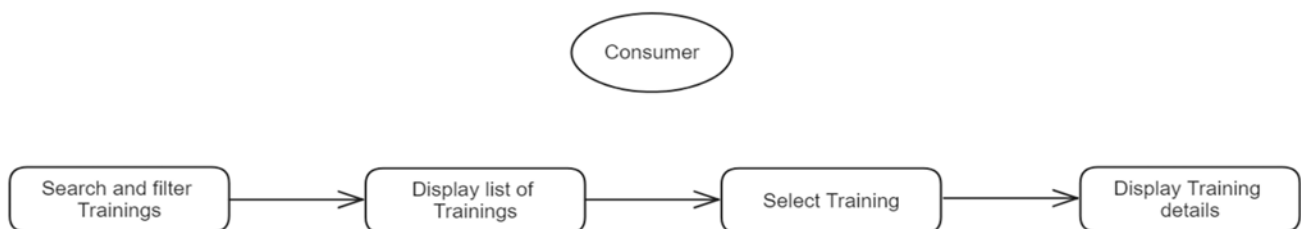


Figure 26. EDDIE Training visualization.

The Consumer, after being authenticated, can search through the published Trainings, filter them, and view the details of each one.

The fields are grouped by context/topic:

- 1- Contacts
- 2- Program Fact Sheet

- 3- Business and Operational Model
- 4- Learning and Teaching Model

6.2. Abstract data structure

The following diagram describes the relationships between the main actors and the entities of the Training Programme Marketplace. Consumers were deliberately omitted from the schema because have no relationships with the other actors/entities.

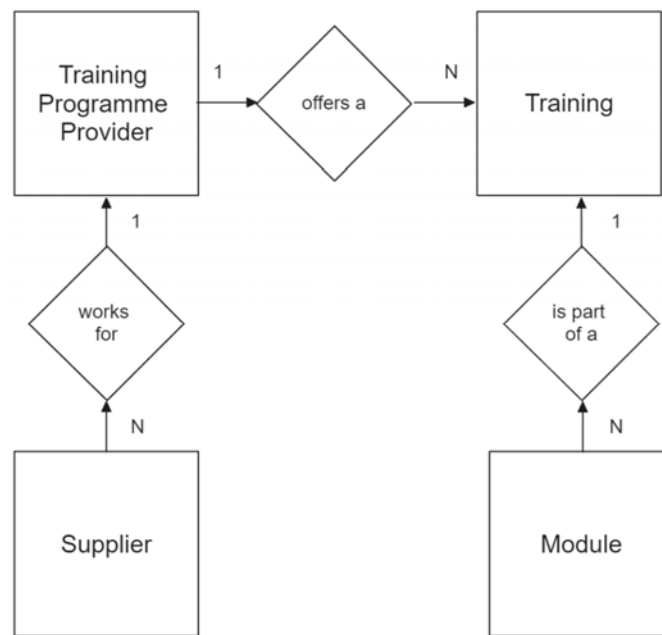


Figure 27. EDDIE Training Marketplace Logical data structure.

6.3. Design and development

In this section we are going to explain how we designed and developed the Training Programmes Marketplace to fit the needs emerged during the analysis.

An important goal in designing the data structure is to make it as generic as possible, in order suit the different types of training available on the market. With this aim in mind, the 'training module' was introduced, to enable the widest possible number of training programmes to be adequately brought into a standard structure, eliminating or minimising loss of detail.

Each Training programme have a variable number of modules with a maximum of 20, where each module is composed with the same set of fields. This structure can be used to store the typical segmentation of a training into courses, or blocks, or even topics.

Each field listed in the previous chapter, regardless of the context it belongs to, can be in one of the following groups: those related to the whole training, and those related to each single module.

When a field is included in the second group, it may contribute to determinate the value of the original field related to the training. In this case a parent-child relationship is established, where each child field (related to a module) participate in the value of the parent field (related to the training). This relationship has defined to as "bottom-up".

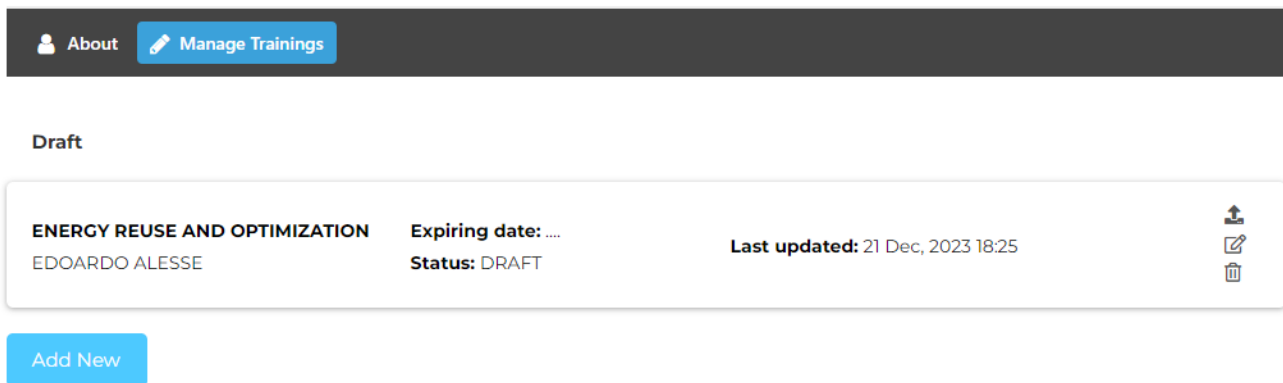
By analysing each field, a list was drawn up of those that are related to the module. Moreover, during this selection activity some other fields has been added to complete the information collection, such as the name of the module and the module description. This is the complete list:

- Name of Module.
- Module format(s).
- Module Language(s).
- Module start-end (approximate dates).
- Student’s estimated effort in working hours (measured in ECTS).
- Skill Gap Areas.
- EQF level.
- Module description.
- Module goals.
- Teaching descriptions.
- Functional skills.
- Scheduling.
- Program content.

Some of these fields are ‘bottom-up’, so for example the start and end dates of the whole training are automatically are extracted from the start and end of all the modules. Another example could be the module languages, all the ones selected in the modules will compose the final list displayed in the bottom-up table or on the Training Detail Page.




6.3.1. Manage training tab


To access his training programme set, the user allowed to manage them needs to authenticate and navigate to the “Manage Training” page by clicking the corresponding tab in the menu.



Into this page, the supplier sees the existing Training Programmes listed with some generic fields: title, author name, expiring date, status, and last modification date.

From this section he can choose what type of operation to do:

Add a new training.		When the supplier clicks this button, he or she accesses the Training Registration Page to create a new training.
Edit/update an existing training.		When the supplier clicks this button, he or she accesses the Training Registration Page to modify a previously created training.
Delete a training		By clicking this button the user can delete the related training.

Send a training for publication		This button allows the user to publish the training online.
---------------------------------	---	---

6.3.2. Register/Edit training page

ADD NEW:

Within this page, the supplier will see the newly developed form for entering training programmes. The design of this specific form has been carefully crafted to be understandable and easy to use. The goal of the 5-step breakdown is to provide the supplier with an easy way to write all the data needed to compile the training as quickly as possible and, above all, to facilitate the entry of a large amount of data.

The supplier can, at any step, stop filling the form and resume the compilation later with all the data already inserted saved in the relative training draft.

EDIT/UPDATE:

In the edit section the supplier will see the exact same form used for creating a new training, but with a slightly different behaviour. Starting by the title that changes from “**Register Training**” to “**Edit Training**”, then the user will see all the fields already filled with values previously entered.

At the bottom of each page a “**Save**” button is available to give the editor the possibility to keep track of every change he makes during the editing process.

SEND FOR PUBLICATION:

Clicking the button in the “**Manage Training**” page, the user is redirected to the last step of the form where the summary is displayed. The same behaviour can be achieved by finishing the compilation of the form.

Here the editor can see all the general information of the training programme, such as Program Name, author details etc... and can choose to save a draft version of it or send it for publication.

6.3.3. Validation workflow

After submitting the training information, a validation workflow will start to review the content entered by the supplier.

By clicking the “**Publish**” button in the form summary, an email will be sent to the Administrator of the Institution/Association linked to the editor account.

The training status will be changed from “**Draft**” to “**Pending Review**”.

After that, when the admin has reviewed the content, he can approve it (setting the status to “**Published**”) or reject it (rolling back the status from “**Pending Review**” to “**Draft**”).

6.3.4. Search training page

In the Search training page, the Consumer can search for trainings in which they are interested. The Consumer starts filling out some of the filters and then clicks the Search button to start the research.

Most of the filters are implemented as a dropdown menu. Those are:

- Certification
- EQF Level
- Starting Point of Program Design
- Admission Requirements
- Language
- Available for Free

In addition to those, there is a list of selectable functional skills (multiple options can be selected):

- | | |
|--|---|
| <input type="checkbox"/> Basic understanding | <input type="checkbox"/> Basic technical skills |
| <input type="checkbox"/> Design | <input type="checkbox"/> Development |
| <input type="checkbox"/> Maintenance | <input type="checkbox"/> Management |
| <input type="checkbox"/> Research | <input type="checkbox"/> Modeling |
| <input type="checkbox"/> Specification | <input type="checkbox"/> Documentation |
- Functional Skills

Finally, there is an accordion containing the module topics organized by blocks (multiple options can be selected from each list).

Once the results are loaded, the user can open the training preview by clicking on the title.

Simple Training
^

Training Page

Certification: Certificate of Accomplishment

Languages: French

Here a handful of information are shown:

- Certification
- Languages

Inside the training preview there is a link called “**Training page**”. Once the consumer clicks on it, he will be redirected to the Training detail page of that specific training.

6.3.5. Training detail page

In the Training detail page, the Consumer can get additional information on the chosen training, in particular:

- Site.
- Available for Free.
- Organization.
- Organization site.
- Scheduling.
- Internships.
- Admission Requirements.
- Starting Point of Program Design:
- Students Estimated Efforts in Working Hours.
- End Date of the program.

7. Proposed strategy: the Entity and the LSP

There is a great opportunity that the EDDIE Strategy will be framed within the European Pact for Skills, becoming a reference of “education for energy transformed by transition and digitalization”.

As a matter of fact, a Large-Scale Partnership (LSP) in skills for the digitalisation of the energy system was committed in the Digital Action Plan for Energy, published by the EC in October 2022. In the working document of this Action, EDDIE project was specifically referenced. This has been the base to the final strategy of EDDI, which is to integrate EDDIE results, and specifically its platform, within the activities of the LSP, and very importantly within the EDDIE Entity to be created as administrative core of the LSP.

The LSP has been already launched in Brussels, during an event held on December of this year, initially supported by 22 companies and entities / associations committed to contribute within the umbrella of the Pact for Skills. In the same event, it has been held the final event of EDDIE project, where it has been detailed the content of the EDDIE Entity, announced its bylaws and the secretariat activities, confirming the expected constitution of the Entity by January 2024, as a non-profit association based in Brussels.

The mission of the Entity, as a self-sustainable extension of the EDDIE project, would be to become the reference body for skills education (all levels) in the Digitalization of the European Energy Sector. To do this, the key stakeholders must be actively involved. The only practical way to guarantee the involvement of stakeholders is to offer activities and services that are useful and beneficial for all.

The main activity of the Entity will be to provide a platform to share training or disseminate skills in the context of the digitalization of the energy system. Additional services and activities may be conducted based on a cost-benefit analysis.

The core of the platform will be the database of a Strategic Network Alliance, now materialised as the LSP, built within the EDDIE project, and currently managed by Comillas as the EDDIE Coordinator. This database will be transferred to the Entity. To guarantee the sustainability of the Entity, it must be based, at least initially, on a lean structure and a reduced budget, with a close control over activities and expenses.

7.1. Legal nature and organisation

Figure 28 shows the results of brainstorming sessions about the requirements to be fulfilled by the Entity. Based on these characteristics, the current directions for the future Entity are summarized below.

The Entity will be created as a non-profit association, based in Brussels as per the Belgian laws.

The types of participation of institutions (stakeholders) in the Association will be:

- Membership
- Users, in general, who can access the platform / database, as far as they are registered.
- Partnerships: other platforms, institutions... with similar or complementary goals.

The funding sources of the Entity will be:

- Membership:
 - Small fees (around 3 to 5 k€ per year).
 - Distinctions may be made among board members (initially founder members) and the rest, and maybe between industrial and academic partners.
- Funding from EC based on research and innovation projects and any other opportunities.
- In addition, in the medium or long term:
 - Incomes from the services provided by the Entity: different portals, subscription fees, premium services, etc (see business models analyses in previous sections of the document).

As for the governing levels, the basic analyses suggest:

- General Assembly composed by all the members.
- Governing board, composed initially by the founding members.

- Secretariat (assigned to Zabala, at least in the initial phase).

The bylaws have been already developed and approved, based on the statutes of similar associations, best practices, and successful experiences within the European context and comparable origins (evolution of European projects and consortia). A reduced working group of founder members has been working closely with Pierstone (legal consulting firm) and Zabala, which will run the Secretariat activities.

REQUIREMENTS	
CAPABILITIES & ACTIVITIES	
Hire workforce	
Sub-contract services	
Including sub-contracts to members of the Entity	
Be sub-contracted or hired by third parties	
Including sub-contracts by members of the Entity	
Own assets, especially monetary and virtual (SW, databases, patents, copyright, WEB domains)	
Ask for public funds: calls, programs, projects...	
As member or leader of a consortium	
Earn income from services provided	
Consulting, research, other activities	
Manage data and services: data protection, subscription fees, pay-per-use, commissions...	
Organize events, publish reports, develop SW (databases, WEB portals, etc.)	
Offer grants and internships, awards, or other sponsorship activities	
Establish commercial and/or strategic partnerships	
GENERAL CHARACTERISTICS	
Non profit	
European scope	
Sectorial orientation: Energy, Education, Digitalization, Employment	
Independent on member institutions	
Legal independence (except for membership)	
Limited responsibility/liability of members	
Economic/financial independence (except for membership fees)	
Managerial independence (except for participation in the Board of representatives)	
No conflict in sub-contracting services to member institutions?	
Multiple types of members	
Public/private	
Education/industry/others	
Profit/non profit	
Elementary/compound (other associations, consortiums, etc.)	

Figure 28. Requirements for the EDDIE Entity to be created.

7.2. Human, digital, financial, and legal resources

As part of the cost-benefit analysis presented in Section 5.3, two scenarios, a minimal scenario with reduced costs and lower expected benefits, and a maximum scenario with higher costs and investments, which could bring additional benefits, have been studied. Under each scenario, different assumptions regarding the required human, digital, financial, and legal resources have been made.

The minimal scenario is out initial target. Some staff costs are devoted to management (although some volunteer work from members is assumed), as well as additional labour, such as the Secretariat tasks and the updating and maintenance of the training marketplace. This complements with the necessity of labour & taxes tasks with the support of lawyers & advisors, and the development of intellectual property. Regarding digital resources, the

acquisition of software and its maintenance along the project are required. In addition, external management and marketing services will be necessary to provide visibility to the Entity and to the marketplaces.

The obtention of these resources will need to come from several sources, including external public funds, Entity partners sponsorship and membership, vendor fees and advertisements. Under the maximal scenario, the establishing of an office to provide the services would be foreseen, this requiring in addition office leasing, furniture & fixtures, hardware, desktops & telecommunications acquisition, upgrades and maintenance, user training and others. The detailed assumptions regarding the resources needed under each scenario is available in the cost-benefit analysis that is included as an annex.

7.3. Roadmap

The roadmap is described here in four phases: (1) EDDIE project, (2) Launch and expansion, (3) Consolidation, and (4) Sustainable growth. These four phases will be described in terms of goals, bylaws and organisation, activities, and size (members and budget). The EDDIE Entity and the LSP will be included in a single scenario, since the LSP can be understood as the full set of stakeholders involved in the initiative (area of visibility and influence of the EDDIE strategy).

The following table summarises the main features of the roadmap. Some brief explanations maybe useful to understand the topics displayed in the table.

The EDDIE project phase does not require further explanations, though, because it just gathers the goals, tasks, organisation, and results of EDDIE.

The rest of the table is explained aspect by aspect since it is easier to appreciate the temporal evolution of the strategy.

In terms of goals, the expansion phase can be described as “grow and learn”. Consolidation brings a more controlled growth, finding a place in the European ecosystem, seeking stable or recurrent incomes, and adapting the Association for survival. Finally, the sustainability phase will come with a stable funding and activity, a consolidated role in the European ecosystem, and the full deployment of services.

Activities must be consistent with the goals. The expansion phase is dominated by dissemination, marketing, and fund-raising, together with the intensive dedication to the training marketplace success. Gathering experience to adapt the bylaws (and managerial habits) to growth is a relevant activity as well, to guarantee survival. Consolidation brings more institutional relations, especially with the European ecosystem, more fund-raising (and participation in projects and consortia), the monetisation of the marketplace, and exploiting synergies with other marketplaces to check which ones deserve full implementation in the future. Finally, the sustainability phase will deploy all the consolidated activities to a mature and regular status.

Concerning bylaws and organisation, the expansion phase will exploit the initial bylaws and the current leadership of EDDIE (Comillas with the full support and participation of the Board). The consolidation phase should come with a final version of the bylaws, adapted to reality and experience (like conflicts in singular cases), and adapted to the status acquired in the European ecosystem. Consolidation may also bring strategic alliances, and bylaws must respond to these challenges as well. Leadership of Comillas and the initial founders will be less important, and the new Board resulting from growth should take over in a natural and healthy way. Finally, the sustainability phase will come with a renewed and evolving leadership, stable alliances and -hopefully- a well defined role in the European ecosystem.

The size of the EDDIE initiative (Association + LSP) and the budget will respond to the level of success of the roadmap described above and in the following table. The expansion phase must rely in the membership fees, but additional funding must be raised to accelerate the process. The population of the training marketplace with programmes will be free of charge and considered as a marketing investment. In the consolidation phase the marketplace could be monetised, but in such a way to keep the existing suppliers and attract new ones, with moderate fees and specialised advertising only. Fund-raising and participation in projects must increase. Finally, the sustainability phase should bring stable incomes and activities, a solid foundation on the European ecosystem, and the exploitation in full of the WEB platform, with all its services implemented in full.

ROADMAP	Phase			
	EDDIE project 2020-23	Launch & Expansion 2024 (+ 2025 ?)	Consolidation + 1 year	Sustainable growth + ?
Goals	Diagnosis. Dissemination. Creation of the stakeholders' alliance Design of the strategy.	Fast (controlled) growth. Marketing, visibility. Training marketplace success. Funding: sponsorship, EC funds. Learn by doing.	Strategic growth. Presence in EC ecosystem. Training marketplace monetisation. Others? Funding: sponsorship, EC funds. Robustness, resilience.	Moderate strategic growth. Stable presence in EC ecosystem. Marketplaces success, full platform. Funding: sponsorship, EC funds.
Activities	State of the Art, best practices, methods. Reports and events. Creation of the Entity. Creation of the LSP Syllabus, template, training marketplace prototype.	Dissemination. Marketing. Fund-raising. Training marketplace development and growth. Case-based bylaws adaptation proposals.	Dissemination. Public & institutional relations. Fund-raising, projects. Exploitation of training marketplace. Other marketplaces, incremental extensions.	Dissemination. Public & institutional relations. Fund-raising, projects. Exploitation of full platform and services.
Bylaws and organisation	Project coordination. Comillas leadership. Entity bylaws and organisation. LSP agreement.	Initial bylaws. Comillas + founders (Board) leadership.	Adaptation of bylaws to experience & growth & EC ecosystem. Founders (Board) + Comillas leadership. Strategic alliances.	Stable bylaws. Strategic presence in EC Any (Board) leadership. Strategic alliances.
#Members & budget	Consortium. International Advisory Board. Involvement of EC DGs. Dissemination, and awareness.	Increase association members (medium rate). Increase LSP members (high rate). Populate training marketplace (free trials, high rate). Adapt activities to funds.	Increase association members (low rate). Increase LSP members (medium rate). Monetise training marketplace (suppliers, low fees, advertising?). Adapt to EC funds success, projects.	Increase association members (only strategic). Exploit alliances Monetise full platform (suppliers, low fees, advertising?). Adapt to EC funds success, projects.

8. Attached documents: summaries

This section includes summaries or introductory sections taken from the files that are attached to this central document (attached files).

8.1. Research and dissemination portal

The values and perks being offered to the relevant EDDIE stakeholders through the Research and Dissemination Portal are various however the fundamental one being offered through this portal would be the ability to share research results with other stakeholders including peers in various sectors such as the research field, the industry, other commercial players and policymakers. The Portal will ultimately lead to more information being readily available for research, given that such information will be easily accessible which will automatically improve research methods of those interested in the field. The Portal will give a more flexible approach to dissemination activities from the users as it is intended to be user friendly with uploads being easy and quick, and having the function of modifying documents that have already been uploaded. Lastly the portal will ultimately put Stakeholders in contact with one another, which in the end will enhance collaborations and reduce miscommunications between different Stakeholders from within the same stakeholder group and even across different Stakeholder Groups. The latter point is fundamental as miscommunication does sometimes exist between some EDDIE Stakeholders, which unfortunately is a contributing factor to the existing skill gaps in the energy sector.

The Research and Dissemination Portal will consist of three main components as explained in detail in the following sections. One should note that the database component has more of a functional element in order to ensure the functioning of the Research and Dissemination Portal rather than a contributory element as can be seen in the EDDIE Library and EDDIE Feed.

Database

- Built to store and show stakeholders data
- Stakeholders can register as institutions, associations or private members
- The database is common between the different portals & marketplaces within EDDIE

Eddie Library

- Section where Eddie members can access and use information such as:
 - Documents
 - Events
 - Funding opportunities
 - Reports & seminars

Eddie Feed

- "Networking section"
- Any member can post, share information and different kinds of material related to energy&digital
- Any member can follow and comment other members' posts

8.2. Training programmes marketplace

In this paper, we describe the development of the business model of an e-marketplace for e-learning materials. According to actual studies, current marketplaces – either public or private – will converge and integrate their processes and technologies. Marketplaces are supposed to be an easy way to put learning materials into the market and of merging the demand and provider side.

A lot of e-Learning materials, contents, and resources have been produced in the meantime by a lot of institutions. Problems arise concerning the marketing as well as the re-use and re-targeting of the materials for specific user needs and target groups. Marketplaces are supposed to be an easy way for those institutions to put their learning materials into the market and to sharpen their profile. Marketplaces provide benefits for buyers (e.g. personalization

and easier access), benefits for sellers/providers (e.g. new potential markets for exploiting their knowledge bases), and benefits for other trusted parties acting as partners. In this paper, we will clarify the development of an e-marketplace for e-Learning materials and describe crucial factors that are to be considered.

While for the development of a business model some standard aspects always must be taken into account, special emphasis has to be put on the requirements of business models dealing with e-Learning-materials as well as institutions like universities as potential provider.

8.3. Jobs marketplace

Nowadays, due to Internet, the way to search for and find jobs, as well as recruiting, has changed radically. The role of online platforms plays a major role in job search and recruitment, as it increases the possibilities of success for both the job seeker and the recruiter, with an upward trend in their use in the coming years.

There are many online job search platforms, but there are still not too many platforms that are focused and specialised in a certain sector, where the quality of both the job seeker and the job offer meet guaranteed high standards. This results in candidates who often do have the background and skills required for the position.

Digitalisation is changing the products and services offered by the labour market and the process in which they are delivered to the consumer. This is causing new worker profiles to emerge, shaping the composition of the available offers and the skills required for the performance of the job applied for.

This document analyses and defines a business model to implement a jobs marketplace platform in the web portal of the EDDIE (Education for Digitalisation of Energy Sector) project, detailing the main characteristics of the platform and the role that the stakeholders of the project will play, as well as the role of the Entity and the regulatory framework in the European Union. The platform will be exclusively for job searches in the energy sector with a large presence of job offers and profiles of job seekers with skills focused on the digitalisation that is transforming the European energy sector.

8.4. Tools and systems marketplace

The ultimate purpose of the platform is to create a bridge between the needs of those who have and offer digital products and services in the energy market and those who could benefit from them. The general interest is to increase the degree of digitisation of the sector, enabling all stakeholders to be up to date with the latest technologies, tools and systems that could support their business.

In view of the large amount of data and offers on the marketplace, registration for this cannot be without **EDDIE's database**, which will be a prerequisite regardless of the type of user and the role to be played.

Since the business model proposed for the platform is a mixture of Freemium and Commission, we are foreseeing the possibility that for the two types of users identified (Suppliers/Customers), there will be the possibility/need to pay a fee to upgrade to a premium user, to be able to access the additional benefits provided for this category of users.

Below is a list of the services that the marketplace will have:

- Upload of products/services offers.
- Search for data, systems, and services.
- Access to all the products uploaded by suppliers.
- Access to info about companies that make their products or services available on the platform.
- Online payment for the premium subscriptions.
- Subscription to the marketplace as customer or suppliers.
- Assistance for users.
- Special services for premium users.
- Online payment for services (TBV).

Below is framed the value added to the intended users, without distinguishing between premium or non-premium user status.

Value proposition for Customers:

- Opportunity to find specific products or services according to their needs.
- Personalised search and access to product and services.
- Broaden the vision of what the energy sector offers.

Value proposition for Suppliers:

- Give visibility to companies in the sector, which will offer their products and services.
- 360° vision of the market and the energy sector to gain awareness of the potential and be able to build their offering based on it.
- Discover the possibility of forming partnerships with other actors with whom it is possible to offer integrated products and/or services.

8.5. Syllabus elements to define skills

Analysing and describing educational and training modules, requires, in general, a structured language, consisting of descriptive keywords which can summarize knowledge areas. This can make the process of designing content for educational programmes easier and more concrete. To this end, the EDDIE project aims at defining a set of descriptors that will enable the process of analysing and designing educational content. The process of arriving at this language of syllabus elements is bi-directional, utilizing both existing educational material and the analysis of occupational profiles.

The output of this activity will be a “modular and hierarchical structure of syllabus elements” that will be used to describe new jobs, skills gaps, training requirements and therefore training specification. Moreover, it can be used to describe skills requirements which will enable the identification of candidates for training and for recruiting in general, and therefore jobs and training marketplaces.

In the context of EDDIE, this structure will be used to develop templates for educational programmes and additionally it will support the design and description of the pilot activities and training material.

In this context a generic training programme is defined as a structure of training blocks:

Examples: degree → semesters → courses/subjects → modules/units

The criteria for the breakdown of the structure are not just theoretical, but administrative and practical, so to be able for the minimum block to be evaluated/certified/validated (for professional or academic purposes). The Syllabus elements will be used to describe the contents of elementary training blocks, and therefore –by extension and accumulation- the contents of any training programme.

Part of the BSDE is the systematic relation between new job profiles and the required skills. In this direction, a common language of syllabus elements that can describe the required skills with a practical, complete, and universal way is of high importance for the success of the BSDE. Therefore, the structure of syllabus elements is evaluated through the description of real cases of job requirements to examine the functionality and completeness of the common language. The identification and collection procedure of trends in occupational profiles in the energy sector will validate and complement the common language for the syllabus elements, as well as create a database of occupational trends.

8.6. Training programmes template

The objective of this deliverable is to present the template for structuring and presenting data for educational programs. Although the name of the deliverable would indicate that it is “merely” providing a template into which data can be entered, the work contained within the associated tasks in WP5 and the results as reported in this deliverable are much more than this.

The development of the template has been done iteratively during a critical formative stage of the EDDIE project involving extensive work by several project partners. The work has involved identifying educational programs of several different formats and educational levels. This has created a multitude of data relevant to the training needs in the future digital energy system, ranging from self-paced online programs on artificial intelligence to vocational education for practicing engineers and technicians. To provide structure to such a wide array of training and learning activities the template, in essence a webform – has been essential.

The template also allows for further structuring of both existing and new programs thanks to the integration with EDDIE internal and external educational taxonomies. Within EDDIE the syllabus elements developed in WP4 has been a key part of the template by providing structure to data entry and program design. Furthermore, as example of an external taxonomy, the ISCED standard classification of education and training, provides further structure to facilitate not only design but also searching for programs fitting the need of prospective students and/or their employers.

The deliverable consists of a description of the design of the template illustrating the design steps and the gradual refinement of the data structure. IT also provides a user guide to the template as well as outlining use cases and proposals for further technical integration. Appended at the end of the deliverable is data from programs that have been used to test the deliverable.

8.7. Cost-benefit analysis

A detailed cost-benefit analysis to analyse the medium-term sustainability of the Entity has been conducted, considering that the training marketplace will be offered to the public in 2024. The cost-benefit analysis considers costs of different nature, split on recurring and non-recurring costs, as well as benefits and revenues from public funds, from the Entity members, and from fees and advertisement in the training marketplace. A minimal and maximum scenario are used to account for different levels of costs, that are expected to also have an impact in the corresponding revenues. The cost-benefit analysis performs a detailed analysis of the costs and benefits along a trajectory of 10 years, evaluating the yearly viability, and well as the whole viability along the analysed period. Two different sensitivities to the revenues, illustrate how the net benefit increases with the net annual vendors increase, with the annual fees, and with the number of training programs per vendor.

8.8. Comparative tables and evaluation criteria

Two additional tables are included as an annex. First, a comparative table analyses the differences and similarities of the different marketplaces, from different perspectives (i.e. mission and scope, characteristics, business model, functional requirements, products and involved stakeholders). This allows comparing the marketplaces with a quick glance, to better understand how synergies could be exploited. In addition, an evaluation criteria table is provided, assessing how each marketplace would behave differently in terms of income difficulties and costs sources. This allows to rank the different marketplaces in terms of their expected viability.

8.9. Prototype of the Training Marketplace

This annex describes in further detail the implementation of the Training Programmes Marketplace system on the Eddie-Erasmus website. The goal of this system is to make available to Institutions and Associations a tool for inserting and managing trainings on the EDDIE site, making it visible to potential students interested in improving their knowledge in the energy digitalization field.