EDISON

building the data science profession

EDISON

Education for Data Intensive Science to Open New science frontiers

Project no. 675419
Coordination and Support Action
Funded by the Horizon 2020 Framework Programme of the European Union

Call identifier: H2020-ICT-2015-1
Topic: **INFRASUPP-4-2015 - New professions and skills for e-infrastructures**
Start date of project: **1 September 2015 (24 months duration)**

Certification scheme plan

Due date:	31/08/2016
Submission date:	31/08/2016
Deliverable leader:	EGI.eu

Dissemination Level

☒	PU:	Public
☐	PP:	Restricted to other programme participants (including the Commission Services)
☐	RE:	Restricted to a group specified by the consortium (including the Commission Services)
☐	CO:	Confidential, only for members of the consortium (including the Commission Services)

List of Contributors

Participant	Short Name	Contributor
EGI.eu	EGI.eu	Małgorzata Krakowian (Author)
EGI.eu	EGI.eu	Sy Holsinger (Author)
University of Amsterdam	UvA	Wouter Los (Reviewer)
University of Stavanger	UiS	Tomasz Wiktorski (Reviewer)
Engineering	ENG	Andrea Manieri (Reviewer)

Change history

Version	Date	Partners	Description/Comments
0.3	27/05/2016	EGI.eu	Draft based on decision made during face to face meetings
0.4	06/06/2016	EGI.eu	Further work on the content
0.5	09/06/2016	EGI.eu	Re-structure based on initial content
0.6	28/06/2016	EGI.eu	Update version prior to EDISON F2F (Rome)
0.7	13/07/2016	EGI.eu	Business model contributions
0.8	20/07/2016	EGI.eu	Introduction and Certification scheme; Circulated for internal project review
0.9	02/08/2016	EGI.eu	Full report review; content expansion
1.0	03/08/2016	EGI.eu	Version for external review
2.0	22/08/2016	EGI.eu	Internal version to revised external review comments/feedback
3.0	30/08/2016	EGI.eu	Final version for EC submission

Executive summary

The EDISON project is working on building the Data Science profession. One task within this mission is to ensure that universities have the structured information they need to provide students with courses that will not only support them in completing their formal studies, but also help them later in their professional life. On the other hand, those already in the professional world require a means to formalise either existing knowledge, acquire knowledge to help them in their daily work, or support those wishing to move into a new career field. The EDISON certification scheme focuses on the latter standalone certification scenario rather than academic courses in order to offer a formal, internationally recognised certification for professional individuals outside the academic environment that are of value to the career objectives of the certification candidates.

Nowadays, for almost every profession, and especially newly forming ones, it is important that individuals are able to demonstrate their ability through an internationally recognised certificate so that employers are confident to judge the level of skills and competences held by potential employees. At present, there are certifications on the market for the Data Science profession that confirm the completion of classes, trainings and programs; however, they do not cover all knowledge areas required from today's Data Scientists (e.g. EMC2, aCAP – both data analytics focused). This is inline with the overall existence of EDISON and the aim of the Competences and Skills Framework and Body of Knowledge, which responds to the lack of a comprehensive articulation of the Data Science Profession. Therefore, the certification will inherently fill in the existing certification gap.

During the first year of the EDISON project, participants of Work Package 4 analysed two types of certification schemes based on popular and recognised certifications (APM Group, PMI) and compared them with personal experiences or work in other European projects as well as types of certification structures (level-based; self-contained modules). This analysis was focused on the structure of the scheme and not the content per se.

Due to the fact that the Data Science profession is evolving over time and is based on a wide range of skills from different domains, it was decided to opt for self-contained certification followed in the field of project management, which has similar requirements. Thanks to that decision, all targets groups (e.g. students, professionals and self-taught Data Scientists) can benefit and will be able to find an appropriate certification product best suited for them. It will also be easy to adjust the certification syllabus to the changing and not yet well-defined Data Science profession.

The EDISON project plans to define three certifications for: 1.) Learners wishing to demonstrate an understanding of the fundamental knowledge, terminology and activities of Data Science e.g. Data Scientist Associate, 2.) Experienced Data Scientists who would like to prove/improve their proficiency e.g. Data Science Specialist, and 3.) Experienced Data Scientists who would like to prove expertise in a given Data Science domain e.g. Data Scientist Expert in [domain].

It is not enough to create a certification scheme, but how it will live on beyond the end of the project also needs to be understood. This is one of the biggest challenges facing the project as whole. Any certification scheme requires that ownership, or at least custodianship of the scheme is clarified. As the certification is not the only output of the project, any business model definition needed to be analysed with the larger picture in mind.

The project identified two potential options thus far: leverage an existing organisation with established connections such as German based non-profit called "ITEMO - IT Education Management Organisation" or create a new organisation from the ground up such as a non-profit, limited company or European Economic Interest Group. Either way, any organisation will then need to liaise with a Certification Authority, which is important not only to provide validity to the certification, but also to increase the quality of the certification by ensuring standard practices are implemented through its development (currently TUV SUD being considered). Finally, training organisations will be required to provide the relevant training and offer participants the formal certification. The overall business and financial processes were modelled including licensing and IPR issues.

The second half of the project will look at putting into place the overall scheme that was discussed, analysed and agreed over the first project year.

TABLE OF CONTENTS

1 Introduction

Nowadays, for almost every profession, and especially newly forming ones, it is important that individuals are able to demonstrate their ability through an internationally recognised certificate so that employers are confident to judge the level of skills and competences held by potential employees. At present, there are certifications on the market for the Data Science profession that confirm the completion of classes, trainings and programs; however, as mentioned in Deliverable 2.2[1], they do not cover all knowledge areas required from today's Data Scientists (e.g. EMC2[2], aCAP[3] – both data analytics focused). This is inline with the overall existence of the EDISON project and the aim of the Competences and Skills Framework and Body of Knowledge, which responds to the lack of a comprehensive articulation of the Data Science Profession. Therefore, the certification will inherently fill in the existing certification gap.

The main goal is to ensure that certifications designed by EDISON are able to support the formalised learning requirements of the Data Science profession. The project aims to design a Data Science certification scheme that can be offered as a formal, recognised certification for individuals that are of value to the career objectives of the certification candidates. The possible future Certification Ownership is discussed in Section 3.1.

While working on the topic of Data Science certification, the following European Qualifications Framework (EQF) recommendation[4] was taken into consideration:
- It must clarify what the candidate is expected to know, be able to do, and understand
- It must be based on reliable and valid assessment procedures able to capture the essence of the knowledge, skills and competences held by an individual
- Its value will depend on a formal stamp of approval or recognition, confirming that the process has been appropriately carried out and that the certification can be trusted.

1.1 Project requirements

As an outcome of discussions within the project, the following main requirements concerning the certification have been identified:
1. It should be suitable for any Data Scientist candidate: both for students as well as for professionals
2. It should avoid prerequisites which could be an obstacle for self-taught Data Scientists
3. It should be aligned to other outcomes of the EDISON project such as the Competence Framework, Body of Knowledge and Model Curriculum, so that they can complement each other and provide maximum value for the Data Scientists' profession
4. It should be easily adaptable by education institutes.

1.2 Target groups

EDISON project, with its certification, is targeting three groups: data scientists, employees and academic sector.

Individuals such as data scientists or those who want to become one, will benefit from the certification by setting themselves apart from the competition by recognising their skills and knowledge through a unified certificate. For individuals who became a data scientist through self-study and/or on the job experience will be given an opportunity to demonstrate their professionalism with a formal certificate.

On the other side of the market, the organisations/employees can use EDISON certification as a trusted means to identify, recruit and retain top data science talents. Courses and trainings provided

---

[1] http://edison-project.eu/project-deliverables
[2] https://education.emc.com/guest/certification/exams.aspx?m=Data%20Scientist%20EMCDS
[3] https://www.certifiedanalytics.org/associate_cap.php
[4] http://eur-lex.europa.eu/legal-content/EN/ALL/?uri=uriserv:c11104

by different institutes are delivered on various levels of advancement and, as mentioned in Deliverable 2.2, with different coverage of knowledge. Thanks to the EDISON certification, not tied to any course or training, employees can expect that any candidate, with the certificate, would demonstrate a certain unified level of skills and knowledge.

The EDISON project had also foreseen that the academic sector could profit from the certification. EDISON certification presents a great opportunity for institutes when their diplomas are not recognised in other countries or does not carry as much weight as prestigious institutions. By adding the EDISON certification to the programme, academic institutes will give an opportunity to be recognised for their students.

1.3 Analysis

During the first year of the EDISON project, Work Package 4 analysed the two most popular existing types of certification schemes: multiple level and self-contained.

1.3.1 Multiple level certification

Multiple level certification schemes are structured in building blocks towards a full certification. This kind of structure leads a candidate through the whole education path – from beginner to expert. Each candidate needs to first demonstrate basic knowledge prior to further in-depth knowledge in particular areas.

The organisation of a certification in building blocks is suitable for those individuals who need guidelines and prefer to be certified in smaller blocks of knowledge and at the end of the certification path demonstrates full expertise. It also supports the need for specialisation within the given knowledge area when full certification is not required.

From the maintenance point of view, such structure requires that there is up front knowledge of all building blocks in order to keep them consistent with each other. Due to that fact changes require revision of all certifications, this becomes labour intensive.

This type of certification is used by educational institutes when students need to pass tests or examination for each knowledge area separately to reach the final level and be certified for the whole course or training.

Other examples of multiple-level certifications can be found in the portfolio of the APM Group (APM Group - The Accreditor[5]), which is an international professional accreditation and certification body, accredited to international standards by UKAS (United Kingdom Accreditation Service). The APM Group runs a wide variety of schemes throughout the professional disciplines such as Project Management and Service Management, for example PRINCE2™ and ITIL (see Figure 1).
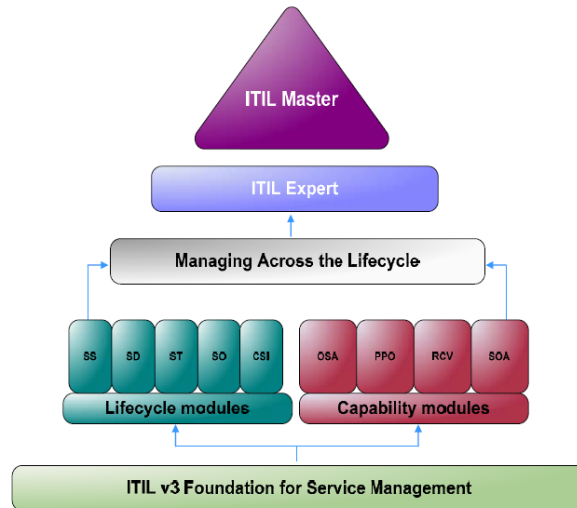
---

[5] http://www.apmgroupltd.com/

Figure 1 ITIL V3 Qualifications Scheme Structure[6]

1.3.2 Self-contained certification

Self-contained certification is structured in a way that each certification is independent and covers all knowledge areas. This structure allows the candidates to choose a certificate at a given/chosen level while still covering all knowledge and competences. Another advantage of such structure is the fact that the candidate does not have to take multiple certifications to demonstrate a professional level as there are no prerequisites between levels i.e. professional levels do not require certification on the elementary level to be obtained first.

From the maintenance point of view, self-contained certifications are easy to be adapted to changing market demand, as well as knowledge area coverage. This kind of certification is suitable for professions built on a variety of skills, multi-disciplinary, and where an evolution of the knowledge required is expected over time.

Examples of self-contained certifications can be found in the portfolio of the Project Management Institute[7] (PMI), the world's leading non-profit membership association for the project management profession. PMI has over 600,000 members and certificate holders in more than 185 countries.

The certifications offered by PMI recognise knowledge and competence in project management and related fields and have been awarded to more than 400,000 practitioners worldwide. PMI's standards for project, programme and portfolio management are the most widely recognised standards in the profession. The standards are developed and updated by PMI volunteers with experience in every type of project, to provide a common language for project management around the world.

PMI offers a comprehensive certification programme for project practitioners of all educational and skill levels. To be eligible for these credentials, candidates must first meet specific educational and project or programme management experience requirements and also must agree to a code of professional conduct. No certification is a pre-requisite for another (See Figure 2 below).

---

[6] ITIL-V3-Qualification-Scheme-Brochure_v1.5_LIVE_FEBRUARY2011
[7] http://pmi.org/

PMP	PgMP	PfMP	CAPM
Project Management Professional	Program Management Professional	Portfolio Management Professional	Certified Associate in Project Management

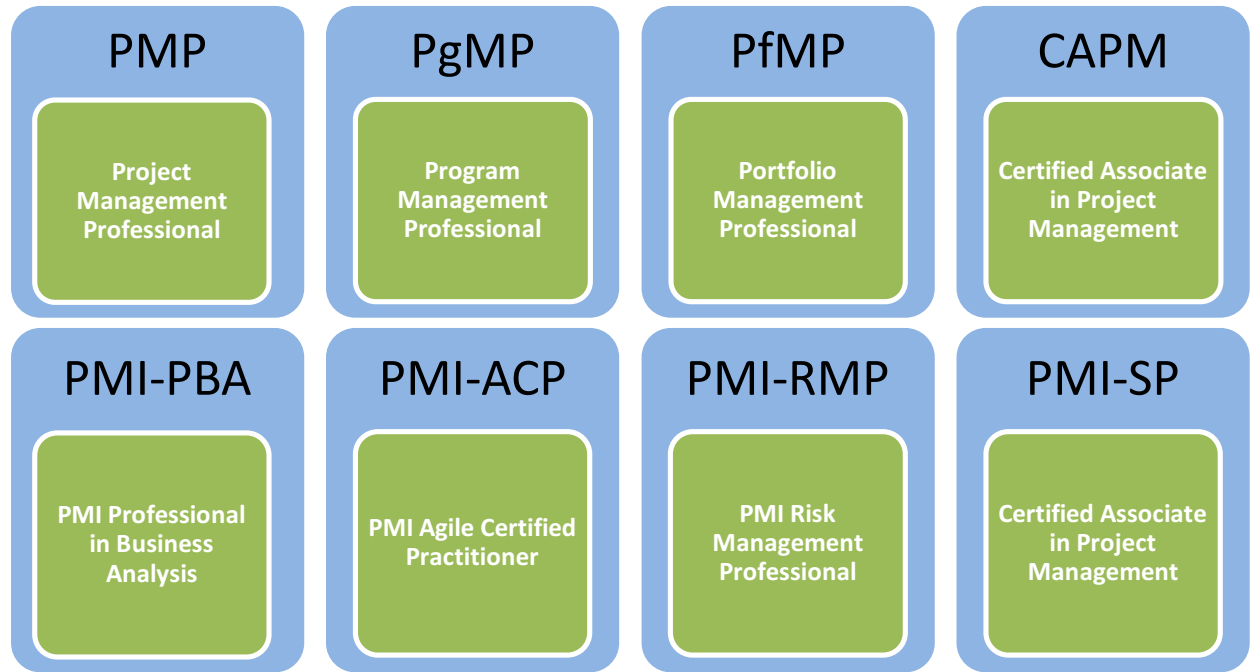| PMI-PBA	PMI-ACP	PMI-RMP	PMI-SP
PMI Professional in Business Analysis	PMI Agile Certified Practitioner	PMI Risk Management Professional	Certified Associate in Project Management

Figure 2 PMI family of certification

1.3.3 Result of the analysis

Both types of certifications have been analysed against the main requirements mentioned in Section 1.1:

	Self-contained certification	Multiple level certification
1. Suitable for any Data Scientist candidate: both for students as well as for professionals.	Suitable for both students and professionals. This structure allows the candidates to choose a certificate at a given/chosen level and still covering all knowledge and competences.	More suitable for students. It leads a candidate through the whole education path – from beginner to expert.
2. Avoid prerequisites that could be an obstacle for self-taught Data Scientists.	Certifications are independent from each other and allow the choosing of any level depending on need.	The candidate needs to go through the whole education path – from beginner to expert.
3. Aligned to other outcomes of the EDISON project such as the Competence Framework, Body of Knowledge and Model Curriculum, so that they can complement each other and provide maximum value for the Data Scientists' profession.	Easy to adapt to changes in EDISON outcomes and the evolution of the Data Science profession.	Maintenance requires knowing up front all building blocks and keeping them consistent with each other. Due to that fact changes require revision of all certifications.
4. It should be easily adaptable by education institutes.	Easily adaptable by education institutes e.g. final examination where all knowledge areas are covered by the course.	Can be adapted by education institutes where course structure is based on the same structure as the certification or it can be partially adapted depending on which part of knowledge the course is covering.

The above table shows that the self-contained certification structure better fulfils EDISON requirements, even if requirement no.4 has some constraints on education institutes.

Due to the fact that the Data Science profession is evolving over time and is based on a wide range of skills from different domains, a self-contained certification scheme seems to be more suitable and easier to maintain in the future.

Based on discussions within the project, it was decided to opt for self-contained certification. Thanks to that decision, all targets groups (e.g. students, professionals and self-taught Data Scientists) can benefit and will be able to find an appropriate certification product best suited for them. It will also be easy to adjust the certification syllabus to the changing and not yet well-defined Data Science profession.

2 Certification Scheme structure

Taking into account project requirements, the scheme structure will be based on the Body of Knowledge[8]. The knowledge areas will be covered by each certification, but with different levels of detail.

At first, the EDISON project will plan to define three certifications for:
- Learners wishing to demonstrate an understanding of the fundamental knowledge, terminology and activities of Data Science.
    - The objective is focused on an understanding of the overall knowledge areas. The purpose is to certify that a candidate has gained knowledge of the Data science terminology and basic concepts.
    - E.g. Data Scientist Associate,
- Experienced Data Scientists who would like to prove/improve their proficiency.
    - The purpose is to certify that a candidate has working experience as a Data Scientist
    - E.g. Data Science Specialist,
- Experienced Data Scientists who would like to prove expertise in a given Data Science domain
    - E.g. Data Scientist Expert in [domain].

For each certification, the following information needs to be defined according to ISO/IEC 17024:2012 Conformity Assessment -- General requirements for bodies operating certification of persons[9]:
- Syllabus
    - Certification title
    - An outline and summary of topics to be covered by the certification.
    - The percentage of questions from each knowledge domain, defined by Body of Knowledge that will appear on the examinations. These percentages are used to determine the number of questions related to each domain that should appear on the multiple-choice format examination.
    - How long each course should be e.g. 1 day (8 hours).
- Examination
    - Prerequisites
        - Conditions and recommendations before the examination
    - Duration
        - How long the examination will last
    - Type
        - Defining the number of questions and format (e.g. Multiple choice, True/false, Matching, Short answer, Problems/computational questions)
    - Grading method
        - Defining how many options are correct, how points are awarded and whether there are different weights depending on the difficulty of the question
    - Passing score
        - Defining passing rate which can be different for each knowledge area or be calculated overall
    - Delivery
        - Defining medium (e.g. online or Paper Based)
        - Who can conduct the examination (e.g. certification authority)
    - Lifespan
        - Defining lifetime of certification, rules for extension and recertification
    - Other rules and regulations
        - Provisions for additional time relating to language
        - Pricing and discounts (e.g. for students)
        - Payment and refund, cancellation policy

---

[8] D2.1 CF-DS and BoK definition
[9] http://www.iso.org/iso/catalogue_detail?csnumber=52993

3 Business Model Framework

One of the biggest challenges facing the project as whole, which is not unique to EDISON, is to define how the outputs of the project will live on beyond the end of the project. Input was provided from WP4.2 "Business model definition" to ensure that this activity was complementary and inline with other project outputs. The following sections look specifically at the initial business model framework for the EDISON certification scheme, as other project outputs are out of the scope of this specific report and will be covered in subsequent activities (e.g. D4.3 "Sustainability plan and implementation."). The information presented has been analysed, discussed and shaped over the first year of the project. A dedicated section on the remaining aspects to be defined during the last project year is also provided, which will be fed into WP4.3 "Sustainability" kicking off in PY2.

3.1 Certification Ownership

A major factor, which again is not limited only to the certification scheme, is the organisation that will maintain the EDISON outputs beyond the end of the project. Though the formal EDISON sustainability activity (T4.3) officially starts in PY2 (M13), the certification activity has already raised several questions and requirements that are feeding the larger discussion.

Any certification scheme requires that ownership, or at least custodianship of the scheme is clarified. While the partners all remain very interested in the EDISON certification scheme, as it complements the body of knowledge and model curricula, it is realistic to suggest that without the project to bind them together, it becomes harder to mobilise effort to sustain and thus maintain the certification scheme. Therefore, it is imperative for sustainability that there is somebody to take custody of the scheme post-project.

Regarding the certification, the project has identified two potential options thus far:
- ITEMO[10] - IT Education Management Organisation
- New organisation to be established (e.g. non-profit, European Economic Interest Group)

3.1.1 ITEMO and control of the EDISON certification

3.1.1.1 Organisational Model

ITEMO (IT Education Management Organisation) is a non-profit organisation registered in Germany (a 'Verein'[11]) set up to take custody of a number of training schemes around IT management and development standards and approaches. It was established by a group of IT management professionals, including the FedSM project coordinator (as mentioned the project that created the FitSM IT service management standard) and the chairman of an ITSM training organisation mITSM (the Munich Institute of Service Management).

ITEMO was considered first, based on existing relationships with the EGI Foundation, an EDISON project partner. The idea was to investigate if a similar agreement that was made with ITEMO, wherein they act as the organisational home of both the FitSM[12] standard, training scheme and other FedSM project outputs, could be a viable option for hosting the EDISON certification scheme beyond the end of the project. From initial discussions, ITEMO not only expressed interest, but also strongly felt that it was a strong candidate to be considered by the project moving forward. ITEMO also has established relationships with the certification authority TUV SUD[13], which is being considered by the EDISON project (see section 3.2)

Organisationally, ITEMO would support the EDISON certification by inviting any interested member from the project participants to contribute to the maintenance and evolution of the scheme as member of ITEMO, and create a formal "EDISON Working Group". As ITEMO is a democratic

---

[10] http://itemo.org/
[11] http://en.wikipedia.org/wiki/Eingetragener_Vereinpayment
[12] http://fitsm.itemo.org/
[13] http://www.tuv-sud.com/home_com

organisation, this gives the EDISON participants a reasonable measure of control in the future of ITEMO in general, as well as maintaining their influence over the EDISON scheme and brand. The control of the EDISON certification scheme by ITEMO is achieved through a license granted to ITEMO to make use of the project foreground in accordance with the EDISON Consortium/Grant Agreement. This license would be nonexclusive, meaning without rights to sub-license.

EDISON will need to develop a policy for the inclusion of future members not originating from the project as it is foreseen that as EDISON expands, so will those interested in ensuring its evolution.

3.1.1.2   Business and financial model

ITEMO serves as the intermediary for agreeing on an on-going pricing model and signs the relevant agreements between them and TÜV SÜD. The financial model works through a percentage from the exam fees paid to TÜV SÜD by the training participants (via the registered training organisations - see figure 4 below), which are given/paid to ITEMO. This small fee helps to offset the running costs of ITEMO and the costs associated with maintaining the certification schemes, though it typically not enough to make any profit, especially as ITEMO is a non-profit and not part of their business model.

The intention is that between the income from TÜV SÜD and other potential certification organisations, revenue will be sufficient to support some effort and costs (such as travel costs for EDISON WG members to support regular meetings and also to support other costs such as some design or web tool/hosting costs (if needed, see 3.1.1.3).

ITEMO is discussing internally other revenue streams that can be generated, such as from organisational sponsorship of ITEMO, which unlike personal membership incurs a fee to help support the organisation.
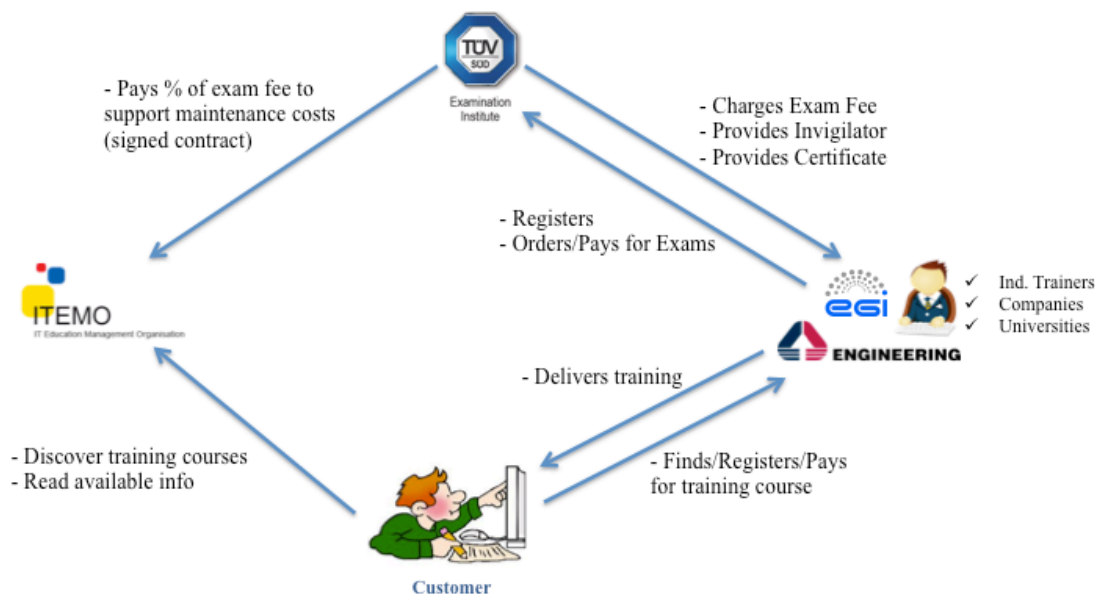

Figure 2 Business Model: Processes

3.1.1.3   Website and communication channels

EDISON is currently working on a community portal, therefore it may not be required that ITEMO operates the full official EDISON certification scheme website. At the minimum, however, they would still offer some informational pages about EDISON. ITEMO could also offer mailing list services and related tools in order to support the management of the Working Group.

3.1.2   New organisation

Without the support or reuse of any existing organisation such as ITEMO, the logical alternative is to establish a new organisation currently being referred to as "EDISON-After-EDISON". During project

year two, different organisations will be analysed through T4.3 comprising non-profits, limited companies and European Economic Interest Groups (EEIG) as examples.

There are several issues in establishing a new organisation that will need to be considered, such as substantially increased costs/overhead (financial and administrative); full responsibility to establish relationships and contracts (e.g. certification authorities); completely new marketing and brand development; etc. However, a new organisation does offer full control over the future of the certification scheme, any potential profits and provides a single umbrella for all EDISON outputs limiting the decoupling of project results.

3.2 Certification authority

A certification scheme is ideally backed by a certification authority, which not only provides validity to the certification, but also increases the quality of the certification by ensuring standard practices are implemented through its development.

TÜV SÜD is an internationally recognised certification authority that is supporting a number of ISO standards as well as FitSM. While leveraging the existing relationship with TÜV SÜD is important to establish the EDISON certification due to the large impact on potential customers, there is no intention to provide a monopoly to TÜV SÜD on EDISON certification. Instead, an ideal situation would be to have multiple certification partners, providing some competition on quality and pricing; however the project must start somewhere and TÜV SÜD is an ideal candidate.

3.3 Training Organisations

Any willing and able organisation wishing to offer participants the formal certification can also provide the relevant training. Some level of control needs to be maintained, which is required by TÜV SÜD. TÜV SÜD requires that training organisations be registered with them. This is for any organisation that wants to organise either internal or external EDISON trainings and will require exams for training participants who wish to receive the formal certification. A policy will need to be established to define the general criteria for EDISON training organisations.

The figure below shows the roles and responsibilities of the various entities, including the training organisations. Engineering and the EGI Foundation serve as examples to demonstrate the model, but these can be any company, training institute or university with the skills and interest in offering such training course.
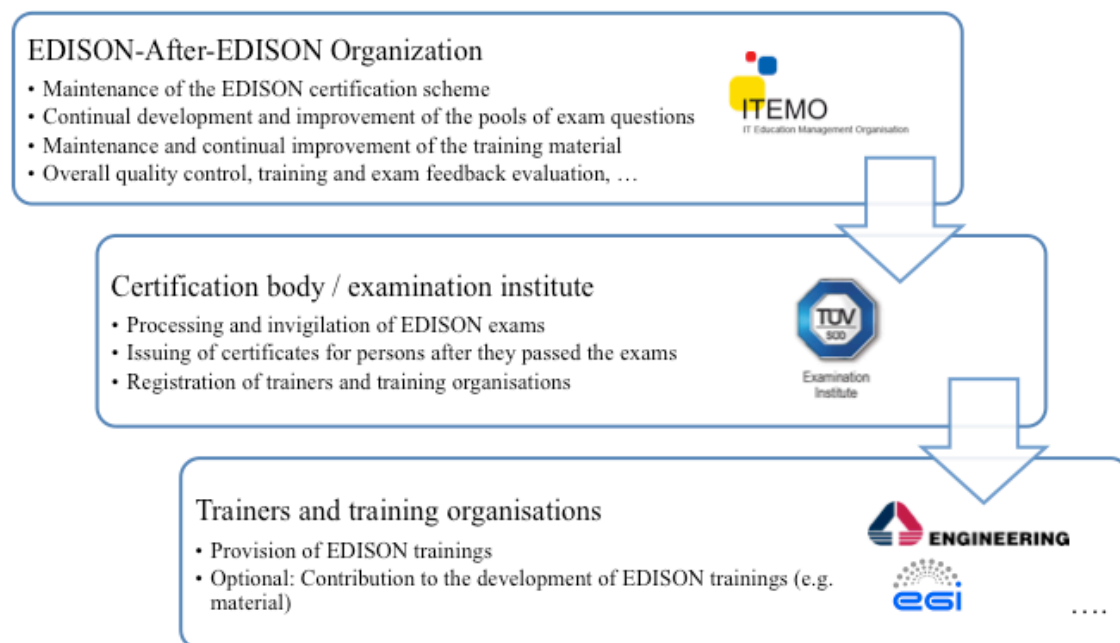

Figure 3 Business Model: Roles and Responsibilities

3.4 Licensing and IPR

Any use of project foreground will need to comply with the EDISON consortium/grant agreement. In the case of ITEMO, this license would grant ITEMO sufficient ability to use the EDISON output to let it continue the development and maintenance of the brand and certification scheme. In the future, it might be possible to consider a more formal transfer of ownership, but this would impose a heavy administrative and legal load on the participants. The non-exclusive license is the more achievable and immediate solution to the sustainability challenges EDISON faces.

Regarding any material produced for the certification scheme itself e.g. syllabus, training material, although not part of the project objectives/activities and will most likely be done by interested training organisations, EDISON will look at the various options through Creative Commons to ensure attribution to project outputs as well as implement any control measures deemed necessary such as non-derivatives and commercial usage.

The topic of IPR licensing for EDISON outputs is more thoroughly addressed in Deliverable 1.2: Register of IPR licences.

4   Conclusions and Future plans

This report summarises the work carried out over the first year of the project, specifically around the creation and development of an EDISON Certification Scheme. Several popular and recognised types of certification schemes as well as types of certification structures were analysed and selected.

Once the certification structure was defined, activities moved into how the EDISON model curricula and body of knowledge could map into the certification scheme leading to the identification of at least three EDISON certifications for 1.) Learners wishing to demonstrate an understanding of the fundamental knowledge, terminology and activities of Data Science e.g. Data Scientist Associate 2.) Experienced Data Scientists who would like to prove/improve their proficiency e.g. Data Science Specialist 3.) Experienced Data Scientists who would like to prove expertise in given Data Science domain e.g. Data Scientist Expert in [domain].

It is clear that it will not be enough to simply define a certification scheme, but also how the scheme could/will live on beyond the end of the project. This is one of the biggest challenges facing the project as whole. Therefore, the initial business model framework specifically for the EDISON certification scheme was analysed, discussed and shaped over the first year of the project with the remaining aspects defined to be tackled during the last project year.

The project identified two potential options thus far: leverage an existing organisation with established connection, German based non-profit called "ITEMO - IT Education Management Organisation" or create a new organisation from the ground up such as a non-profit, limited company or European Economic Interest Group. Either way, any organisation will then need to liaise with a Certification Authority, which is important to only provide validity to the certification, but also to increase the quality of the certification by ensuring standard practices are implemented through its development (currently TUV SUD being considered). Finally, training organisations will be required to provide the relevant training and offer participants the formal certification. The overall business and financial processes were modelled including licensing and IPR issues.

Several questions resulted from the first year study that will need to be addressed and processes put in place during the second half of the project. These can be summarised as:

Certification Scheme	Business Model
• Define courses titles	• Decide on EDISON-after-EDISON org.
• Write full descriptions	• Agree on licensing/IPR
• Complete specification matrix	• Start relations with Certification Authority
• Structure exam format, duration and requirements	• Define pricing scheme/prices
• Write questions	• Establish list of interested training providers

Create promotional text, material, build community awareness, etc.