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D5.8 Individual, joint and external exploitation plans

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Change Log

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0.1	09/06/2017	Jean-Louis Liévin	Initial draft
0.2	23/06/2017	All partners	Inputs before consolidation
0.3	13/07/2017	Jean-Louis Liévin	Consolidation
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0.5	25/07/2017	Elena Simperl	Scientific Director approval
1.0	26/07/2017	Aneta Tumilowicz	Final QA

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1. Executive Summary

One of the main collaborative routes for the exploitation of the EDSA project was meant to be through the establishment of the European Data Science Institute (EDSI) as a body to lead data science training across Europe.

One of the outcomes of the project has been the evaluation of the market demand for such an Institute as well as the subsequent requirements in terms of resourcing and funding. This evaluation is / will be discussed in separate documents (the Project exploitation report, D5.4 and Establishing EDSI, D5.2).

From testing initial assumptions, it has been established that there is indeed an appetite for an EDSI-like organization from (in particular) large companies needing to upskill some of their employees in Data Science. That organization would in particular be expected to:

- Help them identify relevant courses in Data Science among thousands of offers,
- Would inform them about market trends, relevant tools and companies, etc.

In order to leverage the outcome of the project, maximise its impact but undertake a realistic go-to-market approach, the project partners have decided to implement the EDSI as an online Institute, to be maintained and promoted for at least one year beyond the end of the project by the relevant and voluntary partners.

This online Institute will provide:

- A dashboard offering a snapshot of demand in the field of data science,
- A practical tool helping to build a Data Science curriculum,
- A set of high-quality Data Science courses developed by the project partners as well as directing users towards equivalent courses from other institutions.

The online Institute will create market opportunities for the EDSA project partners as well as all for other interested parties.

The present document describes the individual exploitation strategies of the partners, in addition to the online exploitation route.

The project is composed of three types of partners:

- Academic partners (the Open University, the University of Southampton, KTH, TU/e)
- Research organisations (Fraunhofer, the Josef Stefan Institute)
- SME partners (the Open Data Institute, Persontyle, ideXlab)

Each partner has supplied their exploitation opportunities from the outputs of the EDSA project. In total, 18 opportunities have been identified by the 9 project partners. The high level view of the opportunities outlined in this document is as follows:

- For the Open Data Institute (ODI): Improving the content and delivery of ODI training; Increase ODI's exposure and network within the European data science community; EDSI - new opportunities for the delivery of data science training.
- For ideXlab: Coupling between open innovation and online learning resources; Reaching new customers.
- For Persontyle Group Ltd: Developing a machine learning study guide; Developing new Machine Learning MOOC Program (MOOCs) in collaboration with FutureLearn and the OU; Professional certification program.
- For Fraunhofer: Enhancing their data scientist courses; Providing a test bed for innovative data analysis methods.
- For JSI: Enhancing the operability of the VideoLectures.Net portal; Extending the PhD and MSc programs at "Jožef Stefan International Postgraduate School"; Internationalisation through multilingual services.
- For the Open University (OU): Increased visibility of the EDSA learning materials.

- For the University of Southampton (SOTON): Delivering data science graduate courses at the University of Southampton; Professional data science training.
- For KTH: Quality improvement and distribution of KTH learning materials.
- For TU/e: Increased visibility of EDSA data science training.

The opportunities are focusing on enhancing / improving / extending existing prospects and contents as currently proposed by partners. Their nature differ depending on the partner's main focus. The academic partners (the OU, SOTON, KTH, TU/e) will mainly exploit the results by improving their educational materials and distribution channels. The research partners (Fraunhofer, JSI) will also improve their courses, but also test and deploy their research outcomes in the context of learning analytics and training delivery. The commercial partners (ODI, ideXlab, Persontyle) will exploit adjacent business opportunities related to data science learning.

2. Introduction

As described in the project's Description of Action (DoA) work package 5, "WP5 develops an exploitation strategy for the outputs of the project based on the establishment of the European Data Science Academy (EDSA). WP5 will also coordinate individual partner and project wide strategic exploitation plans".

This document provides a detailed roadmap of the various outputs that will be exploited from EDSA, including the anticipated timeframe for each individual partner. The partners have identified a number of individual exploitation routes that can support the sustainability of the Academy. Following the testing of the market responsiveness to the services EDSA will offer, the most viable route for sustainability has been deemed to be making the outputs of the EDSA project available through an online Institute (i.e. European Data Science Institute - EDSI). This online institute would leverage the content created during the project and will provide further exploitation opportunities to partners. In order for this to succeed, the Institute would require an initial in-kind investment from partners.

By agreeing on the direction for the Academy (i.e. online institute), the exploitation strategy of the project is now aligned with the agendas of the individual beneficiaries. In order to demonstrate the value of the outputs of the project, the project partners express exploitation plans that integrate the outputs of the project within their current business development processes. We list them below starting with our SMEs, then our research organisations and finally the universities.

For each partner, we start with a brief presentation of the partner's activity, followed by a list of opportunity descriptions. Each opportunity description contains the following paragraphs:

- Description: a high-level description (1-2 paragraphs description);
- Impact and relevance: Gap addressed by the opportunity and relevance to the EDSA project;
- Commercial aspects: IP protection/licensing if relevant and high-level description of commercial terms;
- Actions: Is the opportunity already seized and next steps beyond the project to further develop it;
- Timing: high-level tentative milestones.

The individual exploitation plans will also contribute to the promotion of the Institute during at least one year after the end of the project. The partners' in-kind contributions to the EDSI will ensure the maintenance and promotion of the platform, as well as creating market opportunities for the EDSA project partners and more generally in the Data Science industry.

3. Individual exploitation plans

This section covers the individual exploitation plans of the partners. It contains a short description of the partner and its interest, as well as the opportunities the partner sees for exploiting results developed within the EDSA project.

3.1 Open Data Institute (ODI)

3.1.1 Partner description

The provision of training is a core activity for the Open Data Institute (ODI). The ODI's Learning Programme has established a globally recognised programme of training courses, online content, events and lectures focusing on open data, data science and innovation.

The ODI will exploit the results of EDSA to inform the development of its data skills framework, curriculum and training content. EDSA is also providing opportunities to engage with the data science community across Europe.

The ODI is delivering data science training as part of the EDSA project. Courses include Open Data in Practice, Finding and Preparing Data, Visualising Data, and Open Data Science. EDSA will directly shape the development of new curricula both for EDSA and in other ODI training forums. As well as public training, the ODI offers tailored in-house training, which is becoming increasingly popular with multinational commercial organisations. The educational resources and delivery channels of the EDSA project will be essential to ODI for fulfilling the requirements of the training activities and it is anticipated that they will be used extensively. A list of public ODI courses can be found on the courses page of the ODI website[1].

3.1.2 Opportunity 1: Improving the content and delivery of ODI training

Description

The ODI will continue to utilise the insights from the EDSA demand analysis to shape training content and materials. The analysis helped to identify new niches and currently unaddressed training needs to improve the content and delivery methods of ODI training. Insights gathered through the analysis are informing the revision and development of new courses - particularly online training, workshops and webinars. Following insights derived from the demand analysis, we will focus on creating further blended training approaches, similarly to the Visualising data workshop. Future Blended training will combine online, classroom and virtual options to ensure both an effective learning experience and scalability.

As outlined in our previous exploitation plan, our aim will be to build on insights from the EDSA project work by:

- **Integrating data science specific soft skills training:** The ODI is continuing to explore extending its curriculum through soft skills training as advised by the EDSA's demand analysis.[2] Our goal is to answer the question in what ways are classic soft-skills, like presenting, different for data scientists, and to find the most effective ways to develop these skills in data scientists. We are continuing to develop and refine the 'Finding Stories in Data' online course, which

[1] theodi.org/courses

[2] Please refer to D1.4, currently under review and unpublished. After review it will be available via the EDSA project website: http://edsa-project.eu/downloads/deliverables/

includes a focus on some of the key soft skills around compelling storytelling using data.

- **Using the ODI Skills framework to simplify learning journeys:** The ODI has piloted a skills framework to structure flexible journeys to data literacy. The goal is to provide learners with an easy to use tool to help them identify the skills they need and build a learning journey that suits them. The next iteration of the ODIs skills framework will allow learners to select the right course for them using the skills framework. Insights from this will be built into the EDSA skills framework.
- **Providing data literacy training:** Curriculum modules and feedback gathered through the EDSA will help to catalyse and further shape the ODI's offer for data literacy training. Data literacy has many dimensions, including ensuring that those commissioning and benefitting from data science activities understand enough to make the right decisions and investments. The output can be expected to include content and courses for use outside of data science teams.
- **Developing courses and content laterally related to EDSA:** This will include the development of new modules on "Data Exploitation including data markets and licensing".
- **Creating and curating flexible content types:** Guided by the new insights from the dashboard, we will identify priority content areas and create content to meet learner needs. The content will be designed to be flexible, meaning it can be incorporated into different kinds of learning journeys. For example a case-study that can be used as a standalone piece of content, but that also has some associated lecture notes so that it can be used by a trainer in an ODI node as part of a workshop.
- **Improving learner experience**: We will include insights from EDSA's learning analytics statistics in order to improve the delivery and learning experience for ODI training courses.

Impact and relevance

The ODI's expected impact from this activity is to increase the ROI on data science projects by improving the way that data is understood across all levels of organisations. The ODI has delivered training to more than 7,500 people from the public and private sectors, thereby fuelling data-driven innovation and making Europe more competitive. In this context, the expansion of the ODI's course and content offer is important to continue serving industry demands as effectively as possible.

Commercial aspects

The ODI generates revenue from training courses in multiple formats, including public and bespoke face-to-face training and via development of customised online material for clients. The ODI also develops free and openly available online content, which leads to participants signing up for paid-for training. New courses developed as a result of the EDSA project will follow the same revenue model.

Actions and timings

The following high-level actions will need to be taken:

- Further development of the 'Finding Stories in Data' online course to skills identified from the dashboard i.e. Soft skills (on-going)
- Creation of "Data Exploitation including data markets and licensing" online course in line with the skills identified in the dashboard (Q1 2018)
- Revision and adaptation of EDSA data literacy training to align with ODI skills framework (on-going).

3.1.3 Opportunity 2: Increase ODI's exposure and network within the European data science community

Description

Through the EDSA project, the ODI has accessed a wide pool of data scientists, networks and projects across Europe. This has substantially increased the ODI's exposure to new communities and commercial sectors, offering an opportunity to expand the ODI's European network. Through this exposure and by developing a continued relationship with small, medium-sized and large companies, we are continually looking at new business development opportunities, e.g. by delivering bespoke data science training.

Impact and relevance

The ODI will look at its extensive global network, including industry sectors within Europe where our network would benefit from additional and stronger relationships. As previously mentioned, the ODI has developed and is planning further development of data science courses. The ODI will focus on addressing the soft skills gap identified from the demand analysis, as well as adapting and creating content in line with the insights produced from the dashboard. Additionally, we plan to explore new options for delivering data science and data literacy training customised to various industry sectors. This ongoing work is also in line with EDSA's main project ambition of closing the data science skills gap across Europe.

Commercial aspects

Through continual engagement with this community, the ODI can promote the use of the dashboard and can improve the offerings of EDSA. From building and maintaining commercial relationships, the ODI will be able to generate further revenue through the promotion of our courses.

Actions and timings

- Continue to explore options with participating organisations on further training needs and potential delivery (ongoing).

3.1.4 Opportunity 3: EDSA Charter - new opportunities for the delivery of data science training

Description

D5.1 outlined the sustainability goals of EDSA beyond the life of the project. More recently, the consortium have tested the validity of these options in more detail, and will pursue a non-commercial arrangement in the short term. The founding partners will look to ensure the sustainability of EDSA's assets, through an in-kind investment. This arrangement will allow the relationships and networks that have been built to continue to be supported, while opportunities for other commercial and non-commercial work is sought e.g. further funded projects with consortium partners, commercial opportunities across the network etc.

Impact and relevance

The ODI will continue to strengthen business relationships with the project consortium partners, and disseminate the outputs of the project beyond the life of the project, for example, the dashboard and training courses. The ODI has an extensive global network, including industry sectors within Europe, which it will continue to grow through engagement with the data science community by providing tailored data science training and open learning resources for a wider audience as a result of the project. Supporting members of this network to connect with partners within the consortium, and nurturing future opportunities for collaboration, will support the momentum towards closing the data science skills gap in Europe.

Commercial aspects

The ODI generates revenue through delivery of bespoke training packages, as well as working collaboratively on projects with the aim of increasing data science and data literacy skills. Commercial opportunities may arise from the ongoing business relationships between the project consortium, utilising and sustaining the outputs of the project. This could be in the form of a funded project or a shorter commercial arrangement for training delivery. The ODI also has a network of ODI Nodes across Europe, who actively participate in revenue generating projects, meaning our network of delivery partners for future work is embedded across multiple countries and industries.

Actions and timings

The following high-level actions will need to be taken:

- Develop consortium partnership agreements (Q3 2017).
- Final approval of EDSA Charter by all project partners (Q3 2017).
- Establishing and kick-off of Academy (Q1 2018).

3.2 ideXlab

3.2.1 Partner description

ideXlab is an ambitious start-up focused on open innovation. More specifically, ideXlab is like a meet.com between innovative companies and hard-to-find expertise. As even the largest companies cannot keep up with the pace of the technology evolution in every domain, ideXlab has developed a unique solution to pinpoint for them the most specialist experts around the world, and make the matchmaking easier. Its Open Innovation platform analyses more than 200 million technical documents and can reach more than 10 million academic experts around the globe. These numbers will continuously increase over the next few years. Its core market – innovative enterprises – comprises more than 1 million companies worldwide.

The ambition of ideXlab with EDSA is to couple online learning resources with open innovation, therefore gaining the capability to offer and push educational resources in addition to providing access to expertise.

3.2.2 Opportunity 1: Coupling between open innovation and online learning resources

Description

ideXlab is about technologies and strategies for open innovation and on instruments to mediate between industry problems and expertise available in the market. Data science covers a set of skills that are becoming increasingly relevant within industry. It is therefore an ideal test bed to investigate new business opportunities, in particular expanding the existing ideXlab product portfolio through new services relying on online learning resources. Online learning resources can become a natural extension of open innovation by offering to innovating companies, in addition to intermediation services with experts, some educational resources to upskill their employees.

Impact and relevance

Companies, and SMEs in particular, use open innovation mechanisms and platforms to gain access to external expertise to help them solve internal problems. Bringing in the right knowledge and skills to address recurrent problems is essential to ensuring long-term competitiveness. In this sense online learning resources can become a natural complement to open innovation tools: while open innovation provides easy access to external expertise, online learning resources provide an efficient mean to increase internal expertise. In the project, ideXlab was particularly interested in the relationship

between its current open innovation core business (as an intermediary between companies and external experts) and training material. ideXlab will extend its current algorithms which are used to identify and rank experts according to a question submitted by an enterprise to cover and identify relevant online learning resources such as MOOCs. These resources could be used to train in-house staff.

Commercial aspects

The EDSA (Academy) Terms and Conditions will apply, as well as the usual ideXlab Terms and Conditions.

Actions

The coupling aspects between open innovation will be developed in an agile way, testing the market interest. The coupling can work both way :

- from ideXlab platform to learning resources platforms, for ideXlab visitors that want to access learning resources before / in complement with their use of the ideXlab Open Innovation platform
- From learning resources platforms to the ideXlab platform, for visitors of learning resources platforms (EDSI-like) that would like to find specialists and explore an Open Innovation process thanks to the ideXlab platform.

This idea will be gradually socialised to some early customers and ideXlab traffic will be monitored to assess the market interest.

Timing

During the last period of the EDSA project, ideXlab will test how the coupling may apply, and how it might be extended from data science to other disciplines.

This will be developed through an initial Beta service implementation that will be socialised with a set of early customer for feedback, improvement and need assessment, if possible beyond data science.

3.2.3 Opportunity 2: Reaching new customers

Description

Through its contributions to the EDSA project, ideXlab will engage with new prospects having specific needs in data science training (e.g. CIOs of French R&D groups). Such companies will have requirements and strive to collaborate with research entities and other companies to solve specific big data problems. The model may also be applicable to other domains in high demand (e.g. biomimetics, additive manufacturing, smart materials, Internet of Things, etc.) where course material would lead to developing new business opportunities.

Impact and relevance

This activity will contribute to the promotion and dissemination of the EDSA project outputs. In particular, it will help to expand the user base of both EDSA's and ideXlab's products, thereby growing a sustainable client base.

Commercial aspects

The EDSA Terms and Conditions will apply, as well as the usual ideXlab Terms and Conditions.

Actions

ideXlab will re-use and promote whatever dissemination material will be made available by the project or the Academy :

- Webinar and blog post on links between open innovation and online educational material
- Webinar and blog post on data science state-of-the-art as found by ideXlab platform and EDSA educational resources
- Promotion of the above through face to face and conferences opportunities

Timing

The activity will start immediately when EDSI content is made available.

3.3 Persontyle

3.3.1 Partner description

Persontyle has already developed a comprehensive set of data science and engineering learning opportunities for people to develop better insights and deliver meaningful value using data. Persontyle offers instructor-led courses, bootcamps, and open learning programs that provide a hands on learning environment, training labs designed to cover real-world use cases, and applied knowledge of the data science practices and tools.

Persontyle, through its education initiative called "School of Data Science & Engineering", is focused on spreading and democratizing access to big data, data science, data engineering and machine learning skills. Please note that "School of Data Science & Engineering" is not an accredited institution (i.e., we do not award degrees).

Persontyle will exploit the results of the project by refining and balancing its current data science and engineering, machine learning and advanced analytics curricula and plans to offer on demand eLearning programs and specialized industry focused training. Persontyle, in collaboration with EDSA, will design and deliver open learning events and workshops across Europe for business and technology professionals to develop new data skills. Additionally, Persontyle will leverage the output of the demand analysis work to design new data science training programs.

3.3.2 Opportunity 1: Developing a machine learning study guide

Develop and publish a study guide for anyone who wants to learn practical machining learning using R.

Description

Develop a comprehensive guide with 19 modules focused on a practical introduction to machine learning and predictive models, which is intended to serve as a fundamental resource for data scientists, analysts and programmers. The guide will help develop an applied understanding of the principles of machine learning and enable them to develop practical solutions using predictive models.

Impact and relevance

There is an unfortunate air of mystique that surrounds the advanced machine learning techniques. Too many data scientists and data science stakeholders fear that actual deep understanding of the algorithms is beyond them. This is a serious problem, for without this understanding it is impossible to consistently do good work within data science. Nor is it possible to explain why what succeeds did succeeds – or, sometimes more pressingly, why what will succeed will succeed.

This guide aims to show readers that they can understand these techniques. For it is a wonderful truth that the advances of machine learning that are changing the world are no more than the layering of a number of simple techniques. Once it is evident what these simple techniques are and how they fit together, their patterns are clear and the mirage of complexity dissolves.

Commercial aspects

Actions

Publish the final version of the guide including the following four new modules:

- Gaussian Processes
- Tree based methods
- Support Vector Machines
- Neural Network and Deep Learning

Timing

First version of study guide already published. Version 2.0 to be released by December 2017.

3.3.3 Opportunity 2: Develop new Machine Learning MOOC Program (MOOCs) in collaboration with FutureLearn and OU

This flexible online machine learning program will enable learners to master the subject of machine learning in depth — ideal for developing career or preparing for further study.

Description

Though it has been an area of active research for over 50 years, machine learning is currently undergoing a renaissance driven by Moore's law and the rise of big data. Large private and public investment in the area has given us self-driving cars, practical speech recognition, effective web search, and a vastly improved understanding of the human genome.

In partnership with EDSA and FutureLearn, we will develop a practical programme that uses hands-on examples to step through real-world application of machine learning. This will enable participants to understand the basic concepts, become confident in applying the tools and techniques, and provide a firm foundation from which to explore more advanced methods.

The aim of this programme is to provide both a deep understanding of the techniques and practices of machine learning and to expose a wide set of resources capable of being wielded by the data scientist and analyst in their work. Participants will encounter explanations of the theory behind the algorithms and models they are exposed to, giving them an understanding of the strengths and weaknesses of each which they should be able to use to reason about suitable approaches to real life problem – and to communicate such reasoning to other stakeholders in such problems.

Programme outline:
Course 1 - Machine Learning Essentials
Course 2 - Basic Machine Learning Methods
Course 3 - Machine Learning using Open Source and Cloud Platforms
Course 4 - Advanced Machine Learning Methods

Impact and relevance

This programme is aimed at a number of audiences. These include professional data scientists, data analysts, developers, and those aiming to become such, advanced undergraduate and postgraduate students, and researchers from areas outside data science looking for a guide to the utilization of these techniques in their work.

Machine learning is a core element of data science and by attending this program participants will be able to understand the art and science of discovering patterns and making intelligent predictions from big data. They will also be able to define machine learning, articulate why it matters, and discuss its relationship to analytics, data science, and big data. Participants will practically learn the most commonly used machine learning methods, covering both supervised and unsupervised learning.

Commercial aspects

Actions

- Finalise the contract with OU.
- Design and development of content for course 1 and course 2.

Timing

Machine Learning MOOC Program already started.

3.3.4 Opportunity 3: Professional certification program

Design and develop an outline of the professional certification program based on the inputs of the demand analysis and inputs from other EU projects like Edison.

Description

The certification program will help professionals and job seekers to demonstrate their big data and data sciences expertise and gain recognition for one of the most sought after skills in technology today.

Impact and relevance

There is strong demand for accredited and certified data scientists across Europe. Once designed and launched, candidates who meet the preparation requirements and pass a certification exam will receive many benefits:

- Industry recognition for widely sought after data science skills;
- official designation and logo that can be used on business cards and online profiles;
- digitally verifiable credential for employers and clients.

Commercial aspects

License terms for this work need to finalised as part of the certification program design work.

Actions

- Work with EDSA project members and publish a broad outline of the certification programs after the end of the project.

Timing

Broad outline of the certification program to be published by August 2018.

3.4 Fraunhofer

3.4.1 Partner description

Through its Academy, Fraunhofer offers outstanding courses of study, certificate courses and seminars to specialists and managers based on the research activities of the Fraunhofer institutes. Fraunhofer will exploit the project results for Fraunhofer's "Data Scientist Training", which targets professionals with face-to-face trainings in small groups.

Since 2013, Fraunhofer has given face-to-face courses for professional data scientists in different sectors and on different topics. In 2015 these courses were complemented with courses from other institutes in Fraunhofer's Big Data Alliance and were added as a new programme to the offers of Fraunhofer Academy. Course development was partially supported by the professional school of EIT Digital. In 2016

a certification programme of three stages was added. At the first and most basic stage, a five-day course called "Data scientist basic level" provides the basic vocabulary for data scientists. This course is a joint effort of four institutes. At the second stage, certificates have been developed for advanced courses on data analytics and scientific data management. The certificates are issued by Fraunhofer's independent department for personal certification.

Fraunhofer also hosts the multilingual open education platform SlideWiki.org, which is used for a number of eLearning activities.

3.4.2 Opportunity 1: Enhancing our data scientist courses

Description

We want to enhance our face-to-face courses with online material for self-study. It can serve several purposes: as a motivation to take a course, to prepare for a course, to prepare for the exam after a course, and for further learning after the course. As a side-effect of our engagement in EDSA, we hope to raise the reputation of our courses.

Impact and relevance

Face-to-face courses are expensive. Therefore our participants are asking for further material for self-study to make the best use of the course. Such information should be provided by online learning resources, such as those we submitted to EDSA.

Commercial aspects

Good and comprehensive online material is expensive to produce and to maintain. This is a serious issue due to the dynamics of data science. Tools and technologies change rapidly. The learning material we developed for EDSA was therefore designed as an introduction, while our face-to-face courses can be kept up-to-date more easily.

Actions

Since 2016 we have recommended the two online modules which we developed for EDSA as preparatory material for our two corresponding face-to-face courses. Time and again we are approached to develop further online material. We had and will have discussions with EIT Digital to develop our basic certificate course into a blended course for the EIT Digital's professional school and the European market. With our help, the online learning platform "University4Industry", a partner of Fraunhofer's Academy, is developing introductory material on machine learning for industrial analytics in Germany. We applied to a call of the German ministry of research to set up an online lab for practicing machine learning and combine it with a new certificate course on advanced learning. We would like to register such courses at the future EDSI.

Timing

- QIV 2017: Evaluate projects and opportunities resulting in the production of new supplementary online material for our face-to-face courses. Consider their registration at EDSI.

3.4.3 Opportunity 2: Providing a test bed for innovative data analysis methods

Description

The EDSA use-case - analysis of job posting trends for demand monitoring - provides for a very valid test-bed for the data analysis methods being developed by Fraunhofer.

Impact and relevance

Data mining algorithms and methods for clustering and trend analysis can be applied to this real-world application, by taking the extracted job posts as input.

These methods will complement the (manual) exploratory data analysis functionalities provided by the EDSA dashboard, and provide further insights based on the results of fully-automated analysis. The latter are being developed in separate efforts being undertaken by Fraunhofer researchers. The methods, which can operate on any time series, are intended for integration within the dashboard to produce insights for the EDSA use-case, i.e., gauge trends and project future directions in skill demands based on past data.

Commercial aspects

The re-use of the data analysis methods tailored for the EDSA use-case will be bound by the EDSA agreement. Commercial use by third parties is also possible within that context but appropriate remuneration to Fraunhofer is expected.

Actions

The methods will be integrated in the EDSA dashboard to showcase their value for this use-case, as a proof-of-concept.

Timing

- Ensuring that the results of the EDSA Acquisition Task conform with the input required for the Data Analysis methods (completed)
- Tailoring the existing method being produced by FRAUNHOFER for the EDSA use-case (completed)
- M30-M36: Integrating the methods in the EDSA dashboard
- Beyond the project lifetime: Generalise data analysis methods to apply to other use-cases.

3.5 JSI

3.5.1 Partner description

JSI will exploit project results along three main lines:

1) Through the VideoLectures.NET portal.

2) By extending the PhD and MSc programs at “Jožef Stefan International Postgraduate School”.

3) Through the “Knowledge For All” foundation.

VideoLectures.NET is an award-winning free and open access educational video lectures repository that currently offers over 20k of educational videos distributed through 579 categories.

Jožef Stefan International Postgraduate School (IPS) is an independent higher education institution in Ljubljana, Slovenia. IPS was established by the Jožef Stefan Institute (JSI) and is strongly supported by industry (Gorenje, Kolektor, Salonit) and an international network of cooperating universities and research institutes from the European Union, the USA, Japan, and a number of other countries.

Knowledge for all Foundation[3] is a foundation that enables the provision of online academic videos, papers, technical reports, software and other materials, and actively promotes their free accessibility. Through its activities, the foundation promotes the spread of knowledge and rigorous academic debate to anyone with access to the internet anywhere in the world.

3.5.2 Opportunity 1: Enhancing the operability of the VideoLectures.Net portal

Description

Through the VideoLectures.NET portal, the goal is to structure thousands of video lectures within the proposed curricula as well as integrating learning analytics mechanisms to follow the progress of the student population.

Using applications developed within EDSA demand analysis task, we aim to connect demand for data science in Europe with supply of training materials available at the VideoLectures.Net portal.

Impact and relevance

By integrating additional functionality and dissemination we aim to increase the audience of the VideoLectures.NET portal from approximately 15,000 unique users per day towards a few tens of thousands.

Commercial aspects

Unless otherwise noted, Data Science videolectures presented on VideoLectures.NET portal use Creative Commons Attribution Noncommercial No Derivative Works licenses.

JSI applications developed within EDSA project are based on BSD licenced tools.

Actions

Since the start of EDSA project we have over 1600 of Data Science videos published in 2015-2016.

We are developing the connection between the applications from demand analysis task and VideoLectures.NET portal. In particular, within EDSA dashboard we provide recommendations of relevant videolectures for each job (http://jobs.videolectures.net).

Timing

Already started: Integration of demand analysis applications with VideoLectures.NET portal (active work until M36, prototype available in M24).

Already started: Recommendations for data science videos from VideoLectures.NET portal at EDSA website. More details can be found on the following link: https://edsa-project.eu/video-lectures (active work until M36, first results already available at EDSA website).

Already started: Learning analytics tools for VideoLectures.NET portal (active work until M36, first results already available, described in EDSA deliverable D3.3).

Already started: Support of connections between demand for data science professionals and data science training materials (start date: M19, completion date: M36, prototype available at: http://jobs.videolectures.net).

Already started: Increase the audience of the VideoLectures.NET portal (start date: M19, completion date: M36).

[3] http://videolectures.net/k4a/

3.5.3 Opportunity 2: Extending the PhD and MSc programs at "Jožef Stefan International Postgraduate School"

Description

Extending the PhD and MSc programs by introducing additional, specialized data science materials for training at "Jožef Stefan International Postgraduate School", supported by high quality online content and services.

Impact and relevance

Data Science courses developed through the EDSA project fill the content gap for the existing courses at the "Jožef Stefan International Postgraduate School".

Commercial aspects

Unless otherwise noted, JSI training material developed within EDSA project have Creative Commons Attribution Non-commercial No Derivative Works license.

JSI applications developed within EDSA project are based on BSD licenced tools.

Actions

JSI developed training materials for EDSA online course "Foundations of Big Data" and EDSA curriculum topic "Statistical / Mathematical Foundations". The following exploitation actions are planned for the opportunity 2:

- extension of the "Jožef Stefan International Postgraduate School" courses with available EDSA training materials;
- providing recommendations to students about available EDSA trainings - online, blended and face-to-face courses.

Timing

Completed: Developed materials for EDSA online course "Foundations of Big Data" (completion date: M12).

Completed: Developed curriculum for EDSA online course "Statistical/Mathematical Foundations" (completion date: M18).

Already started: Recommendations about available EDSA trainings to the students of the "Jožef Stefan International Postgraduate School" (start planned for: M19, completion date: M36).

3.5.4 Opportunity 3: Internationalization through multilingual services

Description

Exploitation through the "Knowledge For All" foundation with the primary goal of internationalization through multilingual services and dissemination in non-English speaking parts of the world.

Impact and relevance

The multilingual demand analysis data obtained through the EDSA demand analysis and connected to VideoLectures.NET portal allow to fill the existing internationalization and dissemination gap.

Commercial aspects

Unless otherwise noted, JSI training material developed within EDSA project and Data Science video lectures have Creative Commons Attribution Non-commercial license.

JSI applications developed within EDSA project are based on BSD licenced tools.

Actions

The multilingual nature of data within EDSA project allows for internationalization and exploitation of achieved results via "Knowledge For All" foundation. The VideoLectures.NET portal itself contains a set of multilingual options. JSI actively performs dissemination of all achievements in this area:

- direct dissemination through VideoLectures.NET portal;
- dissemination through the events covered by "Knowledge For All" foundation.

Timing

Already started: Work with multilingual data. In particular, JSI started the multilingual demand and supply data analysis within demand analysis task and integration of the results into VideoLectures.NET portal (completion date: M36).

Already started: Active dissemination of achieved results (completion date: M36).

3.6 The Open University (OU)

3.6.1 Partner description

The Open University (OU) is a major provider of free and open online learning materials worldwide, reaching more than 65 million downloads on Apple's iTunes U.[4] Most downloads originated from the English-speaking countries, closely followed by other European countries. While some of the eBooks are free, many are offered at an affordable price, contributing to the sustainability of the undertaken educational activities. OpenLearn,[5] an OER repository from the OU, is used by over 4.5 million users each year and has had over 38 million learners since its launch in 2006. The site averages 400,000 unique visitors a month with over 10,000 hours of learning materials including 8,000 hours taken from undergraduate and postgraduate modules. The OU's Stadium[6] facility supports a vast range of educational webcasts within the OU and external clients. Since its launch in 2000, Stadium has hosted a total of 1,488 public webinars. On average, Stadium receives approximately 2,000 visits per month and 1,400 unique visitors. The OU has a strong relationship with the BBC and co-produces a number of highly popular science programs such as COAST,[7] Bang Goes the Theory[8] and Frozen Planet.[9] The BBC programme "Don't Panic: The truth about population" featuring Hans Rosling, which forms the basis for a forthcoming FutureLearn MOOC on "Data visualisation for Development", had over 1.2 million viewers.

3.6.2 Opportunity 1: Increased visibility of the EDSA learning materials

Description

The OU will integrate the developed curricula, educational resources and learning pathways into the courses taught at the OU. The project's educational resources will be reused, repurposed and further developed by existing and emerging OU courses. Following the established tradition of open learning,

[4] http://projects.kmi.open.ac.uk/itunesu/impact/

[5] http://www.open.edu/openlearn/

[6] http://stadium.open.ac.uk/webcast-ou/

[7] http://www.bbc.co.uk/programmes/b006mvlc

[8] http://www.bbc.co.uk/programmes/b00lwxj1

[9] http://www.bbc.co.uk/programmes/b00mfl7n

the resources will be offered via iTunes U and our open institutional learning management system (LMS). Interactive eBooks and courses will be published based on the project's learning resources, delivered through a wide range of platforms, including iOS and Android devices, as well as desktop computers. Suitable materials will be added to our FutureLearn MOOC offerings and project results will also be taken up by periodic summer schools and various seminars organised by OU researchers across the world, such as the ESWC Summer School.

Impact and relevance

The EDSA learning materials and learning pathways will be a valuable addition to the relevant courses offered by the OU. Additionally, EDSA will benefit from the increased visibility of its learning materials and learning pathways, as these will be made available via the worldwide renowned educational channels of the OU.

Commercial aspects

The EDSA learning materials are distributed using Creative Commons licenses, thus allowing the reuse, repurposing and republishing of the materials. Commercial use of the materials may also be allowed depending on the used licences.

Actions

The EDSA eBook has been made available via the EDSA courses portal[10] and will be updated throughout the duration of the project. The EDSA learning pathways will also be made available via the EDSA dashboard[11] and the EDSA courses portal. The EDSA learning materials have been taught by OU tutors in the previous versions of the ESWC Summer School and will be taught again in the next versions of this annual event.

Timing

There have been regular updates of the EDSA eBook throughout the duration of the project. The eBook and other learning materials, including the learning pathways, will remain available online via both the EDSA dashboard and the EDSA courses portal, as a sustainable result beyond the end of the project. Additionally, the EDSA learning materials will be taught in the annual ESWC Summer School throughout the duration of the project and beyond.

3.7 The University of Southampton (SOTON)

3.7.1 Partner description

SOTON delivers a range of higher education courses at Bachelor, Master and PhD level, and has been leading in developing MOOCs for the FutureLearn platform since its release. The WAIS group at Southampton has an excellent marketing output, with projects and initiatives of the group (e.g., in the areas of linked data, open data, web and data science) regularly featured in highly visible programs and media channels, including the BBC, Financial Times, Times, Wired, and Communications of the ACM.

SOTON will exploit project results for both educational and industrial purposes. The educational material for cross-border and cross-sector data analytics produced in this project will contribute to the training of graduate students in an MSc data science programme, as well as through Southampton's cross disciplinary doctoral training centre that has been funded to train 90 students for four year Web

[10] http://courses.edsa-project.eu

[11] http://edsa-project.eu/resources/dashboard/

Science PhDs. SOTON will also disseminate the training materials for data management courses provided by the Administrative Data Research Centre for England (ADRC*e), which SOTON leads, for different levels of researchers.

3.7.2 Opportunity 1: Delivering data science graduate courses at the University of Southampton

Description

Expanding the graduate programmes on offer at the University of Southampton, we have begun providing an MSc in Data Science since September 2015. This includes two new face-to-face modules related to the modules we have released within EDSA: Foundations of Data Science and Data Visualisation. Having been awarded a HEFCE grant, we are now offering Data Science 'conversion' courses, allowing graduates from disciplines such as Physics and Chemistry to take modules that can equip them with the technical skills required for studying data science.

Impact and relevance

Data science courses are varied and can focus on numerous different elements of the wider discipline. By basing our MSc programme on the EDSA curriculum, particularly drawing on our experience developing the curriculum for Foundations of Data Science, we ensure that a broad coverage of the data science pipeline is provided to students, who can then choose to specialise their knowledge on a number of optional modules covering topics such as data mining and machine learning. On the conversion courses, students can choose from a mix of modules within their original discipline and from within the department of Electronics and Computer Science, allowing them to combine their new technical knowledge with continued development of their own subject expertise and domain knowledge.

Commercial aspects

Learning materials are being developed as part of the EDSA project and are therefore disseminated openly - the course slides are therefore available as self-study learning resources through the EDSA course portal.

Actions

The Data Science MSc launched in September 2015, making use of the curricula developed for Foundations of Data Science and Data Visualisation in WP2. The development of the Data Science conversion courses is now currently in progress. The first addition, will be a module through which to teach graduates of all backgrounds the technical and programming skills required to begin to undertake data science training which will be offered as part of the Data Science MSc from autumn 2017. Upon completion we will offer a range of Data Science MSc courses to graduates from a range of disciplinary backgrounds, meaning that they will be able to join a course which will teach them the discipline-specific techniques about data analysis along with the general programming and computational knowledge that will allow them to take advantage of big data technologies and cloud computing.

Timing

Already started: Development of Foundations of Data Science (ongoing since Q2 2015) and Data Visualisation courses (ongoing since Q3 2015). Development of the programming and computational thinking module for EDSA curriculum (ongoing since Q4 2016), to be used in the conversion courses.

3.7.3 Opportunity 2: Professional data science training

Description

EDSA significantly helped SOTON to build an international profile in data science, and as a result were able to secure private investment to develop a curriculum for Continuing Professional Development (CPD) courses. We have created the Southampton Data Science Academy, which provides courses informed by the demand analysis carried out in WP1, and are aligned to the curriculum from WP2. These will be online-based professional paid-for courses that will target those workers wishing to upskill into data science areas. The first course, data science fundamentals (technical) was released in November 2016, and the remainder will be released over the course of 2017 and 2018.

The courses cover the following topics:

- Data science fundamentals (technical)
- Data science fundamentals (non-technical)
- Data science for digital marketing
- Data science for healthcare
- Data science for finance

Impact and relevance

Providing training that is accessible to the public regardless of their location or circumstances is essential in order to allow anyone to acquire the skills necessary to become a data scientist. By offering high-quality, paid-for training targeted at professionals, rather than graduates, we ensure that we cover a broad range of audiences.

Commercial aspects

As professional CPD courses, these will be charged for and revenue will be split between the University of Southampton and the private investors.

Actions

The CPD courses are currently in development, with the first, data science fundamentals (technical), having run for the first time in November 2016. The current development schedule for the remainder of the courses is as follows:

- Data science fundamentals (non-technical): Q2-3 2017
- Data science for digital marketing: Q2-3 2017
- Data science for healthcare: Q3-4 2017
- Data science for finance: Q1-2 2018

Timing

Completed: Development of the first CPD in fundamentals of Data Science was released in November 2016 and modified in February and March 2017. It is running its third iteration, which started June 2017.

Already started: Development of second and third CPD in Fundamentals of Data Science (non-technical).

Next to be done: Deployment of second CPD course (Summer 2017, repeating), and development of two other domain-specific variants (Starting Q3 and Q4 2017 respectively, and then ongoing).

3.8 Kungliga Tekniska Högskolan (KTH)

3.8.1 Partner description

Education and training is an essential part of KTH activity as an academic institution. KTH is Sweden's biggest technical university, delivering education to more than 14,500 Bachelor and Master students, as well as 1,700 doctoral students. Additionally, KTH provides tailored corporate training, commissioned education and further education for professionals. KTH is a core partner of EIT Digital; it participates in education in both the Masters and Doctoral schools.

KTH will exploit results of the project via the coordination of several masters programs: "Software Engineering of Distributed Systems" at KTH, the "Data Science" program of EIT Digital, the "Data Intensive Systems" specialization of the EIT Digital Master program "Cloud Computing and Services" and a newly developed "Autonomous Systems" Master program. Additionally, KTH will work on the incorporation of project results into relevant Erasmus Mundus programs (both Master and Doctorate) and into a set of commissioned courses given to external industrial organizations.

3.8.2 Opportunity 1: Quality improvement and distribution of KTH learning material

Description

KTH considers the work on the EDSA project as a part of its total efforts in enhancing learning materials and training opportunities in the area of Data Science. Spreading online materials and information about the given courses via EDSA extends the awareness about KTH efforts in this area. Exploiting of the EDSA consortium's training approaches leads to a better standardization of the delivered material, learning analytics and delivery channels. The main opportunity for KTH with respect to exploitation includes contiguous improvement of the quality of produced learning materials, exploitation of the developed training delivery channels, usage of EDSA demand analysis tools for adjustment of the training strategy to the real market needs and joint development of the training through both existing (for example, together with TU/e in the EIT Digital Master programs) and new channels.

Impact and relevance

The gap addressed by the opportunity is a possibility to build learning materials and perform training not only from the general university education perspective but also by adjusting them to dynamic demands from markets and provide opportunities for professions to get access to high level education materials in the relevant subjects.

Commercial aspects

We assume that IP rights in the exploitation of KTH results in EDSA will be based on the rules and regulations following from the Swedish law and the EDSA Consortium Agreement.

Actions

Changes to the curricula of Master programs "Software Engineering of Distributed Systems" (KTH) and "Cloud Computing and Services" (EIT Digital Master program) were performed, taking into account EDSA demand analysis results. Further adjustments of the developed learning materials and curricula expect to reflect changes in the market demands.

Timing

- Already happening: learning materials for "Data Intensive Computing" module are provided to deliverables (started on M24 and continues until the latest deliverables on M36).
- Next: collecting a feedback from participants of the learning activities (will happen continuously with releasing final feedback analysis results on M36).
- Future: modification of the existent DS module and further development of a "Data Intensive Computing" module based on obtained feedback and demand analysis (next releases of updated materials will be on M30 and then on M36)

3.9 Technische Universiteit Eindhoven (TU/e)

3.9.1 Partner description

As a university, TU/e's core process is teaching. In the context of the Data Science Center Eindhoven (DSC/e), a new Bachelor program and Master program on data science are launched in 2016 and 2017. DSC/e is the biggest data science initiative in the Netherlands. TU/e will develop several MOOCs and possibly other courses in EDSA. Using process mining analysis techniques, TU/e and the DSC/e can contribute unique analysis techniques in order to extend current learning analytics capabilities. Within EDSA, DSC/e will apply their process mining techniques on most of the MOOCs developed within EDSA. TU/e's unique expertise in areas such as process mining, visual analytics and social computing will be disseminated in the EDSA. In the context of the Data Science Center Eindhoven (DSC/e) we also aim to develop new professional education (post academic courses) on data science. Moreover, DSC/e will use EDSA to disseminate its data science toolbox incorporating tools like ProM.

3.9.2 Opportunity 1: Increased visibility of EDSA data science training

Description

EDSA provides TU/e the opportunity to develop and improve MOOCs on the topic of process mining. This helps both TU/e and DSC/e to increase visibility and reach people otherwise unreachable. The first MOOC on process mining attracted 45,000 registered students, and within all runs so far we have reached over 100,000 students. This order of magnitude of visibility cannot be achieved easily through other means. At the same time, the MOOCs educate many people in the area of process mining, something that would be infeasible otherwise.

Successful online courses part of EDSA can engage large amounts of students, and contribute to the reputation and visibility of TU/e. The success of EDSA benefits TU/e, by showcasing the quality of its teaching through its MOOCs that are part of EDSA.

Impact and relevance

The impact is multifold. First of all students and professionals are introduced to TU/e and DSC/e as institutes. Secondly the topic of process mining gains greatly in recognition. This is observable by the fact that many people pro-actively approach us for collaboration, also on the topic of process mining. Furthermore, prospective personnel (at PhD, postdoc and assistant professor level) is attracted to the DSC/e by following the MOOCs. Applying our process mining techniques in the context of learning analytics helps not only the EDSA project and their partners, but also our research since we gain concrete data and related questions to further improve our state-of-the-art techniques.

Commercial aspects

Although hard to measure, the increased market visibility has a positive impact on the number of students for the bachelor and master courses, specifically the ones focussing on data science. Commercially the effect of the MOOCs has been that parties are contacting us pro-actively for contract research, for instance through funded PhD projects. Also other collaborations are initiated through the MOOCs, for instance MSc final projects or case study collaborations. Each of which would be hard to achieve otherwise.

Actions

TU/e plans to keep the MOOCs running and up-to-date, even after the EDSA project has finished, since we see the positive impact it has on a multitude of aspects. In case the upcoming MOOCs from TU/e are very successful in the purpose of this opportunity, TU/e will continue creating new MOOCs to amplify these results.

Timing

The MOOC "Process mining: data science in action" is currently running regular sessions, attracting several thousands of (new) students in each run. The MOOC "Process mining with ProM" launched on July 11, 2016 and ran 5 times as of June 2017, attracting over 10,000 students in total. In August 2017 the third and final MOOC will be delivered by TU/e: "Process mining in healthcare", in collaboration with several researchers worldwide. Beyond the project we expect to keep the MOOCs running, with regular content updates.

4. EDSA business value

This section summarises the expectations given within the previous section but also brings into account the point of view of the different partners in a more focused future-customer perspective.

4.1 Expectations of SME partners

4.1.1 ODI

The ODI expects to extract substantial business value both directly from the EDSA's project work as well as subsequent activities:

- Engagement with new audiences and potential clients through consortium relationships, wider network building and increased exposure of ODI's courses and training offering.
- Engaging more with stakeholders in data science, this also includes involvement with new industry sectors across the EU.
- Working in partnership with the consortium and third parties, for example the EDSA Charter to ensure the sustainability of EDSA beyond the lifetime of the project.
- Development of new products, such as online content and courses, which can be repackaged and sold to other external clients.
- Strengthening business relations with EDSA partners, either existing relationships (e.g. University of Southampton), or new ones (e.g. Open University).

4.1.2 ideXlab

ideXlab contributed to market analysis, collaborated on demand analysis and on the promotion of the curricula and resources developed through open innovation channels. ideXlab expects to extract substantial value both directly from the EDSA's project work as well as subsequent activities:

- The EDSA project commanded adaptations to the ideXlab platform to contribute to the EDSA dashboard.
- Engagement with potential and present clients to present and discuss ideXlab courses and training offering.
- Strengthening partnerships with EDSA project members.

4.1.3 Persontyle

Persontyle contributed to demand analysis using an already established network with industry, academia and leading researchers in the field of data science, machine learning, big data analysis and data engineering. Persontyle worked with EDSA partners on the development of data science curricula and to design, organize and deliver community learning events and training programs. Persontyle expects to extract substantial value both directly from the EDSA's project work as well as subsequent activities:

- Developing a machine learning study guide;
- Develop a new Machine Learning MOOC Program (MOOCs) in collaboration with FutureLearn and OU;
- Professional Certification Program;
- Manage and operate European Data Science Institute / Academy (EDSA Academy) in collaboration with other partners and industry members.

4.2 Expectations of research organisations

4.2.1 Fraunhofer

Fraunhofer applied its competences to multilingual content authoring on the basis of its SlideWiki technology, and a quantitative analysis of job demand. It collaborated on the delivery of content through face-to-face training.

Further value is expected from further exploitation activities such as enhancing data scientist courses and providing a test bed for innovative data analysis methods, including time series analysis using the same methods developed in EDSA but generalising them to target additional use-cases.

4.2.2 JSI

JSI contributed the library of thousands data science related materials at the VideoLectures.NET portal, skills in curricula building for data analytics and natural language processing topics, and data analytics tools and skills in the segment of learning analytics to monitor and visualize the progress of students. JSI expects to extract substantial value both directly from the EDSA's project work as well as subsequent activities:

- Enhancing the operability of VideoLectures.Net portal;
- Extending the PhD and MSc programs at "Jožef Stefan International Postgraduate School";
- Internationalization through multilingual services.

4.3 Expectations of academic partners

4.3.1 OU

The OU applied its competences to the development of the educational curricula of the project and the associated learning resources and learning pathways. It also collaborated on the development of the EDSA dashboard and on the delivery of learning resources via the EDSA courses portal. The OU expects to extract substantial value both directly from the EDSA's project work as well as on increased visibility of the EDSA learning materials.

4.3.2 SOTON

SOTON applied its competences to dissemination and community building through the Web Science Trust and the Web Observatory networks. It collaborated to disseminate training materials to businesses. More value is expected from further exploitation activities such as:

- Delivering Data Science graduate courses at the University of Southampton;
- Professional data science training.

4.3.3 KTH

KTH used its competences for applying the results of the project in its Master programs as well as in EIT ICT Lab programs where it is involved. KTH collaborated on the development of curricula and on developing and providing training activities.

KTH expects to extract substantial value both directly from the EDSA's project work as well as on quality improvement and distribution of KTH learning material

4.3.4 TU/e

TU/e contributed its expertise on event driven data science (process mining and visualization), the development of analytics-related course materials and the development of ProM-based learning analytics solutions that exploit event data to understand learning processes and performance.

It gained concrete data and related questions to further improve its state-of-the-art techniques and expects to extract additional value by enjoying increased visibility of their research and course material.

5. Conclusion

The project is composed of three types of partners:

- Academic partners (OU, SOTON, KTH, TU/e)
- Research organisations (Fraunhofer, JSI)
- SME partners (ODI, Persontyle, ideXlab)

One of the outcomes of the project has been the evaluation of the market demand for a European Data Science Institute (EDSI) as well as the subsequent requirements in terms of resourcing and funding. This evaluation is discussed in separate documents (the Project exploitation report, D5.4 and Establishing EDSI, D5.2).

The Institute (starting as an online institute) will create market opportunities for the EDSA project partners as well as all for other interested parties. The present document described the individual exploitation strategies of the partners in addition to the online exploitation route.

Each partner has supplied their exploitation opportunities from the outputs of the EDSA project: in total, 18 opportunities have been identified by the 9 project partners. These opportunities complement the main exploitation route of the content created by the project that will be pushed through the online European Data Science Institute.

The opportunities are focusing on enhancing / improving / extending existing opportunities and contents as currently proposed par partners. Their nature differ depending on the partner main focus:

- The academic partners (OU, SOTON, KTH, TU/e) will mainly exploit the results by improving their educational material and distribution channels;
- The research partners (Fraunhofer, JSI) will also improve their courses but also test and deploy their research outcomes in the context of learning analytics and learning delivery;
- The commercial partners (ODI, ideXlab, Persontyle) will exploit adjacent business opportunities related to data science learning.

These plans will complement the main exploitation route for the project, i.e. the online Institute that will be maintained and promoted during at least one year after the end of the project. This is expected to create market opportunities for the EDSA project partners as well as all for other players in the Data Science industry, contributing to the ambition of the EDSA project and to the EU commission expectations.