

FACTSHEET OF ARTIFICIAL INTELLIGENCE DEFINITION AND TRAINING OF THE AI SOLUTION

D.T2.3.2

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Introduction

One of the main outputs of ProsperAMnet is the 'Service Export Radar'. This online tool developed in the project, aims to support managers of Advanced Manufacturers (AM) within the decision making process regarding the export of services. Therefore, the tool provides three different user scenarios how Advanced Manufacturers can evaluate their opportunities to export their services in different countries, namely by automating the search for competitors, customers and partners in the respective countries. Relevant information is collected with the help of Artificial Intelligence (AI).

In order to develop this tool, the research group analysed more than 1800 company websites within in total two annotation phases. Annotation in this case was done by extracting relevant information from the company`s website and categories it into the developed annotation scheme. These huge amounts of annotations are necessary to train the AI to collect the correct information automatically. Further, the involved Business Support Organisations (BSO) collected use cases that show what companies would like to know from the radar and describe possible application in practice.

Once the service export radar is developed, AMs from all the involved Central Europe (CE) countries, namely Austria, Germany, Italy, Czech Republic, Slovenia, Slovakia, and Hungary are being invited through a call for participation to use the radar. Further, the functionalities, benefits and the results of the radar are being presented and discussed together with stakeholders within round tables, which are implemented in each involved CE-country.

This factsheet gives an insight into how artificial intelligence is used in the ProsperAMnet project and shows step by step the way through the annotation process.



1. Preliminary work - setting the basics

There are four main project partners involved in the development of the service export radar - University of Szeged, University of Applied Sciences Upper Austria, University of Passau and Business Upper Austria. Within this core-working group, all steps regarding the development of the AI solution were discussed and set by those partners. The developed knowledge and the process steps were regularly presented to the whole consortium.

1.1. Starting point & schedule

The starting point was the idea to develop a tool, the so-called 'Service Export Radar' that assists Advanced Manufacturers in service export by providing relevant information with the use of AI. This tool should be publicly available on a webpage (platform), together with the Industrial Service Excellence Monitor (O.T1.1), the Networking Tableau (D.T2.3.6), the Expert Hub Linking Center (D.T3.1.4) and other information on the ProsperAMnet project.

This initial idea had to be further developed, so there were *several questions to be answered and decisions to be taken*, e.g.:

- How should we work together as a project team? Who should be involved in which way in the development process?
- How should we define "Advanced Manufacturers"? Which companies belong to this category?
- Which aspects of service export do we want to focus on? (market entry, strategic decisions, operational challenges, ...)
- Which kind of information is relevant for Advanced Manufacturers? Which of the relevant information should be included in the Radar?
- Which Artificial Intelligence methods should be used?
- Which sources are available and should be used? Which relevant information can be gathered using publicly available sources?
- For which countries should we gather data?
- Which languages should the system be able to process? In which languages should the system offer the output?
- How should we categorize the services that we analyze?

Once these questions were answered by an iterative process, we gathered the relevant data, conducted the annotations and develop models to extract the information automatically. Finally, the development of the visualization of the tool - the interface for the Radar - could be started. To do this, it had to be defined what exactly should be displayed to the user and in which way.

After the development of the tool - expected until mid-April - the Business Support Organizations (BSO) that are involved in the project will be trained to use the Radar so that they are able to act as experts when companies in their country need support in the context of service export and using the Radar. Further activities based on the Service Export Radar are included in workpackage T3. In summer 2021, the pilot action for implementing the Service Export Radar in the CE-countries involved (O.T3.3) will start. Within this pilot action, at least 20 AMs will use the Radar. In a final step, the results gained from the Radar will



be analyzed, presented and discussed in round table sessions that will be organized by the involved project-BSOs in their country. Based on the feedback of the users, the radar will be further improved.

Following figure shows the schedule of the development process for the Radar.

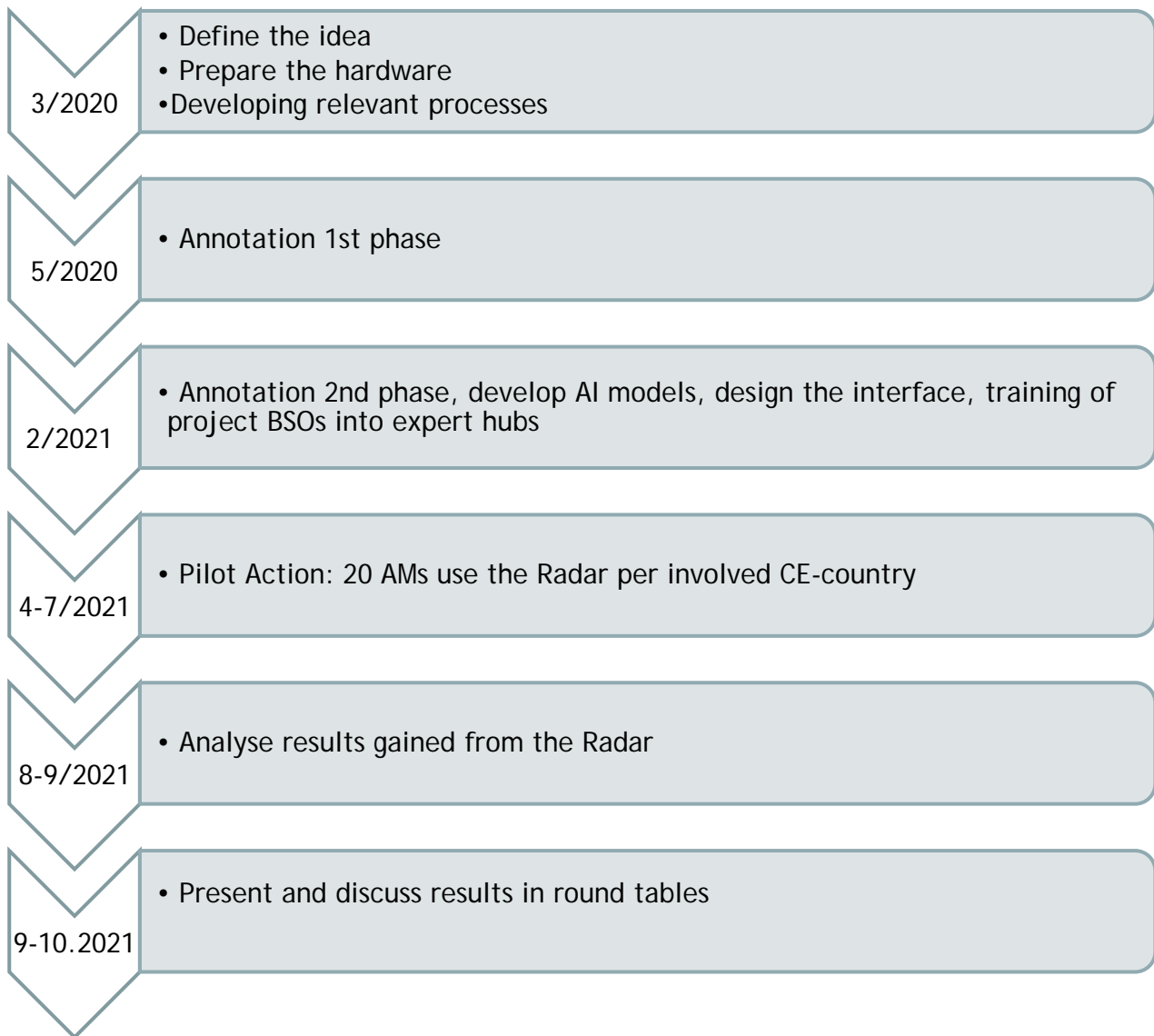


Figure 1: Schedule for the development of the AI solution and further activities based on the results of the Radar

1.2. Definition of the output

As stated above, some questions had to be answered in order to start with gathering the data, conducting the annotations and developing the front-end layout of the tool. These questions as well as how they were tackled and answered are listed in the following section.

- How should we work together as a project team? Who should be involved in which way in the development process?
 - The project partnership consists of 10 partners: three higher education institutions and seven BSOs. For the development of the Service Export Radar, mainly the three higher education



institutions are responsible. The BSOs are involved in some specific tasks within the development phase; their focus is on implementing the Radar in their region and promote it to companies.

- Therefore, the University of Applied Sciences Upper Austria (LP), University of Passau (PP2) and University of Szeged (PP9) were mainly responsible for the development of the radar. LP and PP2 contributed the domain knowledge from servitization and internationalization, PP9 was responsible for the technical part (AI).
- As the development process needed a lot of discussion, regular meetings between these three partners were held, mostly online. In these meetings, the concrete tasks for the partners, relevant processes and next steps were defined.
- The BSOs were not involved in the whole development process, but in case that information was needed from all project countries, specific tasks were given to them (e.g. finding the most important export countries).
- At the beginning of 2020, Business Upper Austria (PP6) joined the development group, bringing in the practical expertise from working closely with companies.
- How should we define “Advanced Manufacturers”? Which companies belong to this category?
 - After some discussion, we agreed to define “Advanced Manufacturers” mainly as the enablers of advanced manufacturing. To operationalize the definition we defined them as companies being in the groups 26, 27 or 28 according to NACE codes, which includes the following sectors:
 - NACE 26: Manufacture of computer, electronic and optical products
 - NACE 27: Manufacture of electrical equipment
 - NACE 28: Manufacture of machinery and equipment
- Which aspects of service export do we want to focus on? (e.g. market entry, strategic decisions, operational challenges)
 - To be able to provide relevant information for companies, we had to define the situation of the companies as well as the decisions for which the information should be helpful. First, we decided that we focus on companies that already exported products in a specific country and are now thinking about which services can be offered in this country. Therefore, we excluded companies that want to export products to a new country.
 - Second, there was the question if we should focus on strategic questions (e.g. which kind of services should be offered?) or more on the operative questions (e.g. how to send employees to a specific country?). Although the operative questions are of high importance for companies, we decided not to focus on them, mainly for two reasons: there are already webpages and tools offering this kind of information and due to all the legislative aspects of this, it is hard to automatically extract and display this information for the companies’ specific need correctly. Therefore we decided to focus on strategic questions like the following:
 - Which services should be offered in a specific country?
 - Which partners are available to collaborate with?
 - Which of the companies’ competitors are active in a specific market?
 - Additionally we defined that it is important to deliver sector specific results and to take into account the size of the company.
- Which kind of information is relevant for Advanced Manufacturers? Which of the relevant information should be included in the Radar?



- To find out which information is relevant for companies, we asked experts from companies as well as business supporting institutions. Then we clustered the questions and the relevant information for customers. As explained above, we concentrated on the strategic questions, not on operational aspects. A further focus was given by the decision of the source of information, which will be explained later.
- Which Artificial Intelligence methods should be used?
 - Artificial Intelligence enables many applications in business and market research. We decided based on our needs as well as on the expertise of the University of Szeged to use machine learning techniques as well as Natural Language Processing. Natural Language Processing enables the understanding of text and machine learning enables the learning a large quantity of examples. Using Natural Language Processing as well as Machine learning means that we have to provide the system with many examples of texts from which they can learn (=training data). This enables the system to analyze other texts on its own and automatically.
- Which sources are available and should be used? Which relevant information can be gathered using publicly available sources?
 - One important decision was on the sources of information that we analyze. One main criterion was that the information is publicly available on the internet, so we can gather it as well as new data that comes up in the future. Another criterion was that it is readable and interpretable from a Natural Language Processing point of view. However, the main criterion was that it contains the relevant information for our users, the Advanced Manufacturers. In addition, the sources should contain as much relevant information as possible, avoiding to analyze many sources simultaneously, which needs a lot of effort and decreases the accuracy of the results.
 - One possible source were business news articles. However, most of the information in business news is quite general and therefore it is quite hard to select the relevant articles and extract information there.
 - After some discussion, we decided to focus on the webpages of companies as almost all companies have a webpage, they are publicly available and the information there is specific to the company. Webpages contain many relevant information for our purpose: products offered, services offered, company size, revenues, in which countries they are active, partners ...
 - Therefore, we decided to use company webpages as the main source. With this decision, the kind of information that will be part of the Radar has specified again: Out of all the information relevant for Advanced Manufacturers that have already sold products in a specific market and now want to sell services there as well, we focused on information for strategic decisions that was available on company webpages. All the information that we wanted to extract is structured in the annotation scheme for the first phase of annotation.
- For which countries should we gather data?
 - This question is linked to the questions of languages. After some discussion and research of export statistics from the relevant NACE groups, we decided to focus our analysis on the seven project countries (Austria, Germany, Italy, Slovenia, Slovakia, Hungary, Czech Republic) as well as United States, United Kingdom and France. United States, France and United Kingdom are the most important trade partners for Advanced Manufacturers from our project countries. Additionally, the analysis of English webpages can be easily done by most of the partners. The analysis of French webpages can be accomplished by some annotators.
- Which languages should the system be able to process? In which languages should the system offer the output?



- The most important language that our system should be able to interpret is English, as most company webpages have an English webpage. Additionally, we decided the system should also be able to interpret Czech, German, Slovenian, Slovakian, Hungarian and French. This enables, that the system can analyze all the webpages from the countries we want to gather data from.
- How should we categorize the services that we analyze?
 - To analyze different kinds of services, we had to decide on a service typology. We considered relevant typologies that were used in service literature and we decided to use (with some slight changes) the typology of Partanen, Kohtamäki, Parida & Wincent (2017). The final version of the typology used can be found in the annotation scheme.

Finding the answers to all these questions, took quite some time, discussions was structured as an iterative process. Therefore, we had a short delay in starting with the annotations. However, as nearly all these decisions had an impact on the annotation scheme that was the basis for the annotation, we were able to start the annotations only after deciding on all of these questions.

1.3. Preparation of the hardware

In addition to all the decisions on how the Radar should work and how it should be developed, the University of Szeged was responsible for purchasing the equipment necessary for the server and the Machine Learning and Language Processing tasks. This task has been finished, and therefore they were able to work on the modelling of the annotation data as well as developing and hosting the ProsperAMnet platform/webpage (D.C.1.1.), including the Industrial Service Excellence Monitor (O.T1.1.).

2. Conducting the annotations

The aim of the annotation is to generate a training and validation set for machine learning. The information annotated should help the system to learn to analyze webpages on its own. Based on this information, the following questions should be answered:

- Which companies offer which kind of services?
- With which partners do these companies collaborate with?
- Which companies, that are similar to the own company, are active in a certain market/offer a specific kind of service/use a specific partner?

The annotation process itself has been split up into two phases.

2.1. Annotation phase 1

The annotation started in March 2020 after the preliminary work (chapter 1) has been finished. An annotation scheme was developed that contained the instructions as well as the template for structuring the relevant data that was extracted from the company webpages. Most of the partners have been involved in the annotation process. The first phase of the annotations has been finished in September 2020.

Beside the development of the annotation scheme, a list of relevant company websites had to be searched and provided to the annotators. The main coordinating partner of the whole annotation (e.g. assess



companies to the annotators) was the Lead partner. To have one partner having a general overview was very important in order to avoid double annotation. Regarding the development of a list of company webpages to annotate, each partner provided a list of possible companies that are categorised in NACE codes 26, 27 or 28 to the Leadpartner. After checking if these companies were already annotated, the companies were assigned to the annotators. As soon as the annotators finished their work, all the annotations were collected, checked and aggregated into one document. This document was sent to the University of Szeged who then started the work on the data and trained the systems based on the annotation data.

2.1.1. Developing the annotation scheme

First step was the development of the annotation scheme in an excel sheet, indicating relevant data that are searched at project websites. The scheme is based on a literature research and is divided into two major sections and overall extracts thirty-one pieces of information. We collected rather general information such as the company name, URLs, country, the NACE-code the company is operating in, revenue, number of employees, if the company has a product and/or service webpage, if the webpage indicates different customer segments, as well as customer references. Table 1 shows the information that has been collected at company's websites.

Table 1: Annotation scheme, annotation phase 1

Category		Detailed instruction for the annotators
	Company name	Insert the complete company name that you can find in the imprint
	URL (starting page)	Insert the URL of the starting page of the company
	Country	Insert the Country of the company
	Language	Insert the language of the website, which you use for the analysis. If possible, use the country-specific language of the analyzed company.
NACE Code	Code (26,27,28, 0)	NACE-classification refers to product-page. If there is no product-page, have a look at the general description of the company and insert the link of the relevant page. For a deeper understanding of the different NACE Codes, have a look at the NACE classification.
	Page (products)	Insert the link of the product-page. Please notice, in case the links of the subpages follow the same structure (EXAMPLE: www.companyx.com/products/generator ; www.companyx.com/products/pumps and so on, you don't need to annotate the subpages so the annotated link would look like this -> www.companyx.com/products)
Ownership	Headquarter (1) Subsidiary (2)	Check, if the annotated company is the headquarter/single site or a subsidiary
	Page	Insert the link(s) where you found the information
Number of employees	Number	For number of employees you can insert an exact number or a range, depending on the data that you can find. Please note you can use the group figure (of the whole multinational) if the annotated company is an headquarter, otherwise, specifically figures for subsidiary are needed. If they are not available, leave this field blank.



Category		Detailed instruction for the annotators
	Page	Insert the link(s) where you found the information
Revenue	Number	Search for information about the revenue of the company. The standard format for revenue is Mio EUR. If you use another format, please state explicitly. Please note you can use the group figure (of the whole multinational) if the annotated company is an headquarter, otherwise, specific figures for subsidiary are needed. If they are not available, leave this field blank.
	Page	Insert the link(s) where you found the information
	Customer segments page	Just insert the page where this information can be found without classifying it
	Customer references page	Just insert the page where this information can be found without classifying it
Partner	Distribution partner page	We distinguish between solely distribution partners, solely service partners and partners in general. If only the word partner is mentioned insert the link in column "service and distribution partner"
	Service partner page	We distinguish between solely distribution partners, solely service partners and partners in general. If only the word partner is mentioned insert the link in column "service and distribution partner"
	Service and distribution partner	We distinguish between solely distribution partners, solely service partners and partners in general. If only the word partner is mentioned insert the link in column "service and distribution partner"
	Services page	Insert the link of the pages where services are mentioned. Please notice in case the links of the subpages follow the same structure (EXAMPLE: www.companyx.com/services/installation ; www.companyx.com/services/maintenance and so on, you don't need to annotate the subpages so the annotated link would look like this -> www.companyx.com/services)
	Service level	Examples Service Level information: Gold: Service support within 1 hour; Silver: Service support within the same day; Bronze: Only online support; Insert the link(s) where you found the information
	<i>service categories</i>	<i>see table 2</i>
	Job Ads Service Technician	Check if there are any job ads for service technicians (who work at the customer's site) at the webpage. If you find some, please insert the URL
additional information (optional)	information	This category is optional. If you found important information that not fits to the existing categories, you can add this information here. You can add some remarks as well.
	Page	Insert the link(s) where you found the information

Further, we collected service specific information. Therefore, a scale for industrial service offerings was developed based upon service taxonomies (Baines et al. 2013; Gebauer et al. 2010; Homburg, Fassnacht, and Günther 2003; Mathieu 2001a; Mathieu 2001b; Partanen et al. 2017; Oliva and Kallenberg 2003). Table 2 shows an overview of the used service categories.



Table 2: Overview of service categories

No.	Service category
1	pre-sales services
11	product demonstrations
12	customer seminars
2	product support services
21	Warranty
22	technical user training
23	customer consulting and support by phone
3	product lifecycle service
31	installation services
32	repair service
33	spare parts
34	Maintenance
4	R&D services
41	research service
42	prototype design and development
43	feasibility studies
5	operational services
51	project management
52	service for operating the product for the customer
53	service for operating customer's processes
6	financial services
61	Pay on demand
62	Instalment payment
63	Leasing
64	Rental system
65	Pay per use

2.1.2. Training of the annotators

After the annotation scheme has been developed, the annotation process could start. Project members have primarily conducted the annotation itself. Since the annotations are very time-consuming, some annotating partners decided to hire external annotators, as this can also be done by someone who is not directly involved in the project.

However, each annotator has been trained regarding on how to do the annotations, so that everyone could work independently - of course in regular consultation with the main coordinating partners. One of the



members of the core working team has conducted the training of the annotators. In this training, the goal of the annotations were explained, the annotation scheme has been discussed parameter by parameter with many practical examples.

In order to ensure a high quality of the annotations, each annotator had to finish the same set of five test annotations. After finishing the sample companies, the results were discussed together. At this feedback meetings, open questions or issue, which came up during the annotations, were discussed and misconception regarding different service categories cleared. Additionally, during the feedback meetings good practice experience from the different annotators were shared and improved the overall understanding of the task. Then the annotators received companies to annotate in tranches of 25-50 companies. The annotations were checked by a trainer and feedback provided to the annotators.

2.1.3. Instructions for the annotation

Instructions for the annotations were provided to all annotators. These instructions were directly included in the excel sheet where the company websites were annotated.

Instructions:

- *Within the annotation of Company-Websites, insert specific URLs. You can add more than one link if you find the information on several pages. In this case, separate them by semicolons (;)*
- *In case of 1-pager websites (e.g. www.multiax.com) click on the specific side and copy the concrete link (#fields) (-> click on right mouse button -> "copy link location")*
- *You can use additional sources as well (LinkedIn, Xing) to find the data BUT only if the link can be found on the company's website*
- *If you cannot find the information on the webpage do not enter this information. Leave the cell empty. Otherwise, the algorithm learns to find information that is not existing.*
- *Please search for the necessary information at the whole website and also consider the excel sheet "Annotation Markets"*
- *If there are sub-sites with relevant information which have the same structure you can just insert * (https://www.erema.com/en/success_stories/IDobj=2447 => https://www.erema.com/en/success_stories/*)*
- *Always insert: name, webpage, country, language*
- *If possible, use the local language version of the webpage.*
- *Each information that you annotate, always insert the page where you found this information.*
- *For "number of employees" you can insert an exact number or a range, depending on the data that you can find.*
- *The standard format for "revenue" is Mio EUR. If you use another format, please state explicitly.*
- *For service types, use the following Code system (you also find this information in the excel-sheet in comment box): (→ see table 2)*
- *You can annotation more than one category or subcategory in one cell.*
- *If you add multiple service categories in one cell, separate them by semicolons (;)*



- Column "Additional information": this category is optional. If you found important information that doesn't fit to the existing categories, you can add this information here. You can add some remarks as well.

Further, detailed information on the included NACE codes and examples of manufactured products were provided to the annotators, see figure 1 and figure 2.

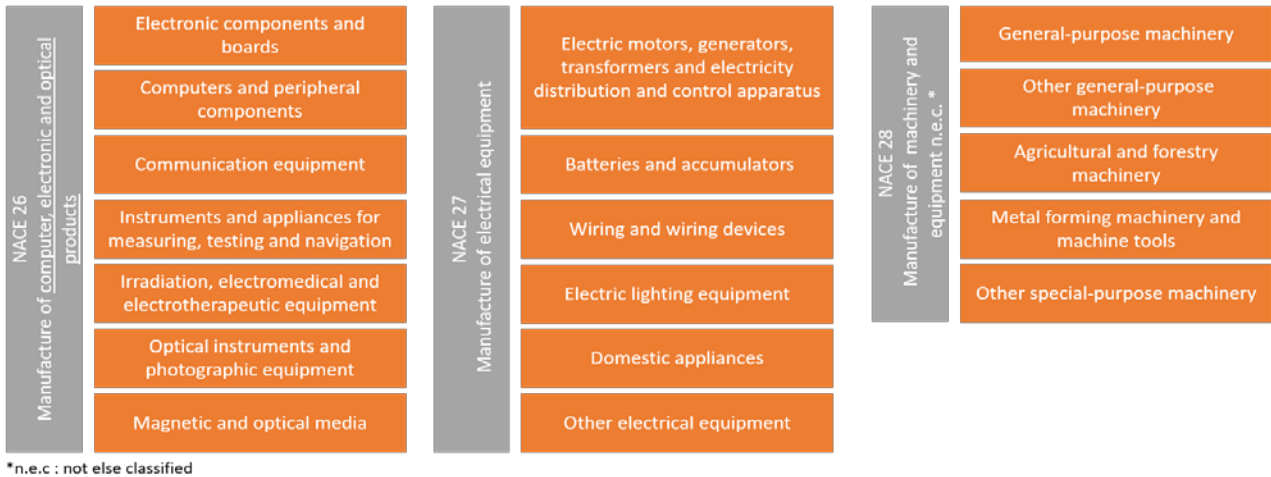


Figure 2: Overview/Examples manufactured products in NACE class 26, 27, 28; Source: <https://www.euregiolocator.eu/downloads/NACE-Codes.pdf>

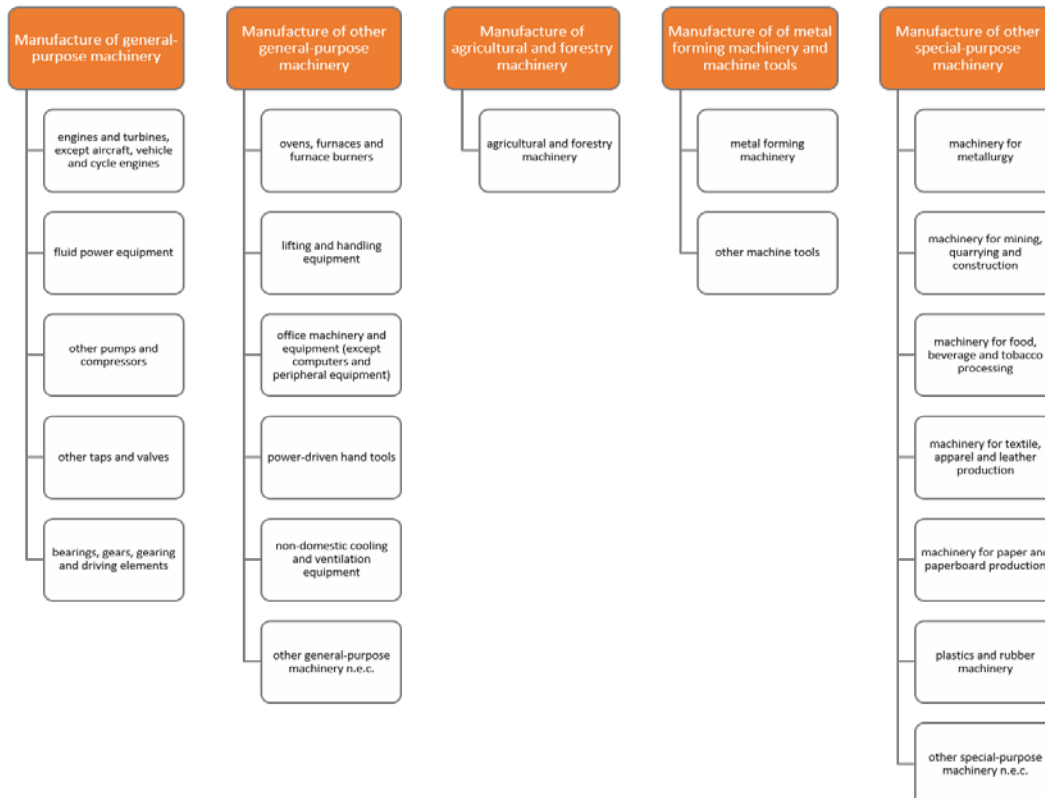


Figure 3: Detailed overview of manufactured products in NACE class 28; Source: <https://www.euregiolocator.eu/downloads/NACE-Codes.pdf>



2.2. Annotation phase 2

This phase started in October 2020 and lasted until December 2020. For some categories, a lot of information (a few hundred entries) was found within the first phase of annotations (e.g. product page, service page, maintenance, spare parts...). However, for other categories (operational services, financial services ...), only very few entries (20 or 30) were found. To train the algorithms we decided to collect at least 100 entries for each category.

Therefore, in the second phase of the annotation, a more focussed annotation was conducted. Categories where enough information was already available were excluded and only those critical categories (11, 12, 41, 43, 51, 52, 53, 61, 62, 63, 64), where more information was needed, got analyzed. In this way, we focused the search only on the relevant categories and the annotation of one webpage could be done faster.

The goal of the second phase was to have at least 100 entries for each category to train the algorithm. For this, each BSO involved in the annotation had to do at least 150 annotations. University of Passau, University of Szeged and University of Applied Sciences Upper Austria have done the search for companies and provided all involved BSOs with the instructions and companies that had to be annotated.

2.2.1. Description of service categories

In order to do the annotation correctly, the annotators had to understand the different service categories. This was especially important in the second annotation phase, as the focus has been on the more complex service categories, which were often not well understood and therefore overlooked.

Table 3 shows the service categories that were included in the template in the second phase of the annotation.

Table 3: Overview of service categories included in annotation phase 2

Code	Service category	Description	Examples
11	Product demonstrations	This category refers to demonstrations of the product, either at the customers site, at the producers site or at some exhibitions, fairs or other events.	https://www.intelligrated.com/en/about-us/demo-centers/ ; https://www.heatandcontrol.com/parts-and-services/ ;
12	Customer seminars	This refers to seminars for the customer before the sale of the product. This category does not include training sessions after the sale for e.g. the operator of a machine. The focus of these seminars is on managers or peoples in the purchase department.	https://www.linde-mh.com/en/Solutions/Consulting/ ; https://abs1.net/consulting/ ; https://www.schenck.co.uk/seminars-6/introduction.html ;
41	Research service	This refers to research as a service. It does not include general research done by the company, only research that is done explicitly for a customer.	https://www.wrighteng.co.uk/research-development/ ; https://www.tetrapak.com/services/expert-services/ ;



Code	Service category	Description	Examples
43	Feasibility studies	This category focusses on services that check if a given product or service works correctly and can be integrated in the process of the customer, e.g. simulations.	https://www.linde-mh.com/en/Solutions/Consulting/Material-Flow-Consulting/ ; https://www.automatedproduction.co.uk/our-process/ ; https://gcorner.co.uk/engineering-solutions/engineering/ ;
51	Project management	This refers to services that handle the management of specific projects for the customer, e.g. a modernization of an assembly line is not only implemented by the seller, but the organization of the whole project is done as well by the seller.	https://www.intelligrated.com/en/services/lifecycle-management/ ; https://www.bastiansolutions.com/solutions/service/project-execution-services/management/ ; https://www.heatandcontrol.com/parts-and-services
52	Service for operating the product for the customer	This category refers to a service, where the seller does not sell the product (e.g. a machine), but operates it with his own personnel at the customers site.	
53	Service for operating customer's processes	This category refers to a service, where the seller does not sell a product (e.g. a machine), but operates a part of the customers process with his own personnel (usually including some machines of the seller as well).	https://www.beumergroup.com/i/residential-service-general/ https://www.vanderlande.com/life-cycle-services/building-blocks/operate/mhs-operations/ http://www.abtproducts.com/manufacture/
61	Pay-per-use	In this case the customer does not pay for the product, but for the output the product generates.	https://www.citizenmachinery.co.uk/services/citizen-finance/ https://www.zumtobel.com/com-en/finance.html
62	Instalment payment	In this case the customer does not pay the whole sum at a time, but pays it in smaller parts.	http://www.puckettmfg.com/creditapplication.html https://mainstreetbusinesscapital.com/NEDCO-Financing
63	Leasing	The seller is leasing its products to the customer instead of selling it.	https://www.linde-mh.com/en/Solutions/Financing/ http://www.coemfg.com/coe-improving-its-customer-service/
64	Rental system	The seller rents its products instead of selling it.	https://www.linde-mh.com/en/Solutions/Financing/ http://spi.publishpath.com/services

All other service categories that have been included in the template of the first annotation phase (warranty, technical user training, customer consulting and support by phone, testing, test rigs, quality assurance,

installation services, repair service, spare parts, maintenance, retrofit/modernization/upgrades, prototype design and development) were not included in the annotation process in phase 2 any more.

2.2.2. Annotation guideline

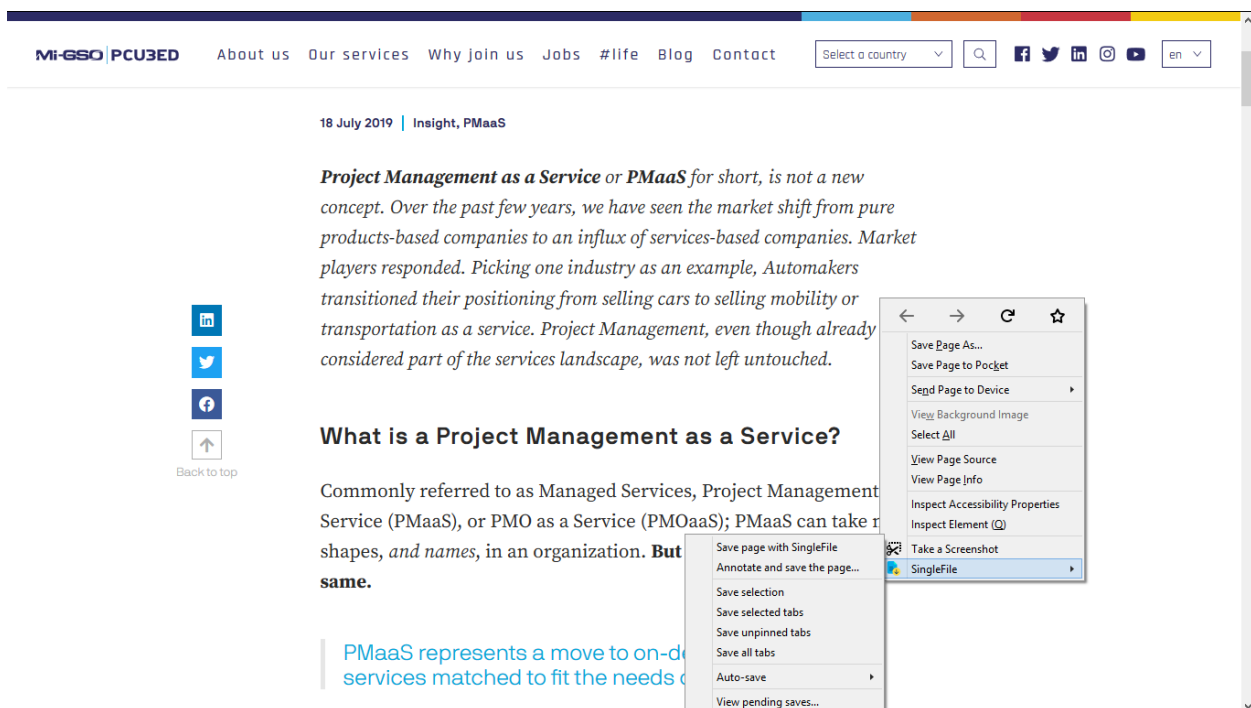
The more focused search on less different service categories allow the annotators to switch to different style of annotations. Therefore, the University of Szeged further provided the annotators with an annotation guideline, indicating the details how to use the browser extensions tool “Single-File” for the annotation process:

Get the Single-File browser add-on

The first step is to install the annotation tool, which is Firefox addon Single-File (or its Chrome version).

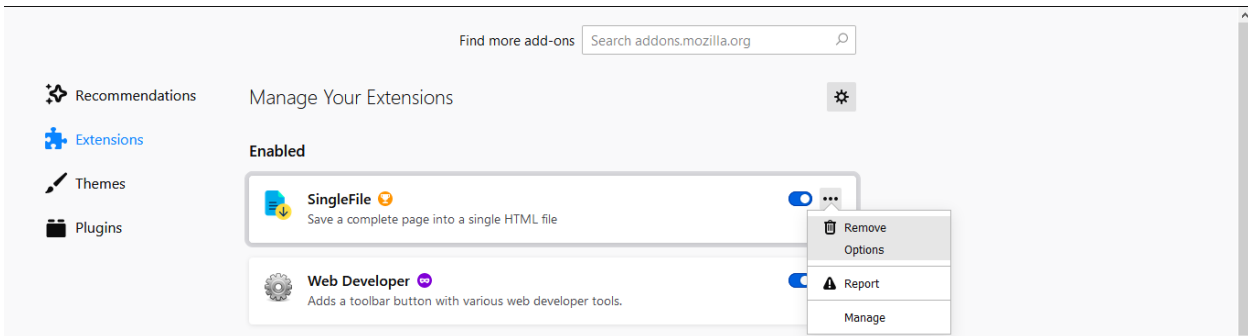
After installation is finished, you will have a plugin readily accessible from your browser (probably a restart is needed after the installation).

If the installation went properly, right clicking in the browser would allow the users to annotate and save websites, as also illustrated by the screenshot below:



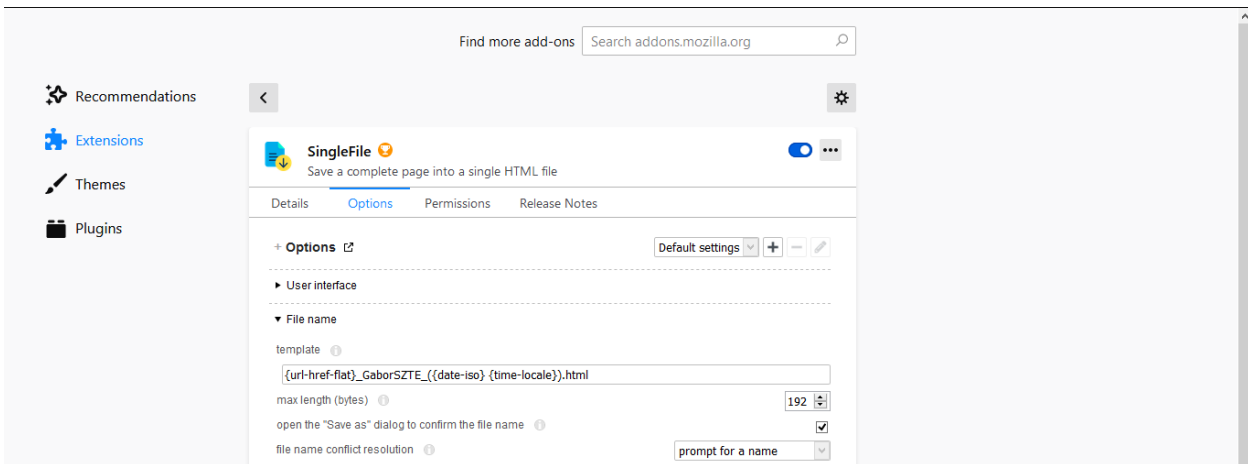
Allowing custom filenames for saving

It would be needed to use customized file names for the annotated websites, which needs to be enabled first. Once the addon is installed into the browser, press Ctrl+Shift+A in order to open the list of browser add-ons and select the options for Single-File as it can be seen in the below screenshot. Note that if you are using Chrome instead of Firefox, you can access the extensions you installed from the upper right corner of your browser (More : > More tools > Extensions).



Once you have navigated to the settings, you can specify a common naming convention for the files that you create during the annotation process. This common naming template should look like: **AnnotatorID_{url-href-flat}.html**

In the previous template make sure that you replace the annotatorID with such a value that identifies you (e.g. GaborSZTE in my case).



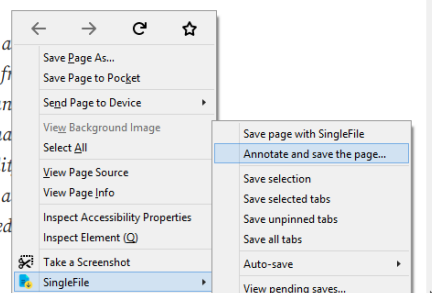
Another important step is to select the checkbox for opening the “Save as” dialog to confirm file name when adjusting the settings. After the above settings for saving the annotations have been invoked, you are ready to start annotating websites.

Annotation

Performing annotation is as easy as right-clicking on the website you would like to perform some annotation on and selecting the “Annotate and save the page”... button.

18 July 2019 | Insight, PMaaS

Project Management as a Service or PMaaS for short, is not a concept. Over the past few years, we have seen the market shift from products-based companies to an influx of services-based companies. Automating the process of project management has become a key player responded. Picking one industry as an example, Automating the process of project management has become a key player responded. Picking one industry as an example, Automating the process of project management has become a key player responded.



Once the annotation tool is activated, you shall see a toolbar including highlight tools of various colors at the top of the browser as seen below.




Highlight selected text in pink
 Mi-GSO | PCU3ED About us Our services Why join us Jobs #life Blog Contact Select a country Search Facebook Twitter LinkedIn Instagram YouTube en


Project Management as a Service or **PMaaS** for short, is not a new concept. *Over the past few years, we have seen the market shift from pure products-based companies to an influx of services-based companies. Market players responded.* Picking one industry as an example, Automakers transitioned their positioning from selling cars to selling mobility or transportation as a service. *Project Management, even though already considered part of the services landscape, was not left untouched.*

What is a Project Management as a Service?
 Commonly referred to as Managed Services, Project Management as a Service (PMaaS), or PMO as a Service (PMOaaS): PMaaS can take many

This round of annotation will focus on the identification of 11 service subcategories organized into four major categories (pre-sales, R&D, operational and financial services). The four major service categories are listed in the table below.

Category name	Category code
Pre-sales	1
R&D	4
Operational services	5
Financial services	6

If a website includes clues about a company offering a certain service subcategory, then that file should be annotated and saved using the save button that is located in the middle of the toolbar for the Single-File browser extension.



Save the page
 Mi-GSO | PCU3ED About us Our services Why join us Jobs #life Blog Contact Select a country Search Facebook Twitter LinkedIn Instagram YouTube en

Project Management as a Service or **PMaaS** for short, is not a new concept. *Over the past few years, we have seen the market shift from pure products-based companies to an influx of services-based companies. Market players responded.* Picking one industry as an example, Automakers transitioned their positioning from selling cars to selling mobility or transportation as a service. *Project Management, even though already considered part of the services landscape, was not left untouched.*

It is important that services belonging to the different major service categories are expected to get saved into different annotation output files. What it means is that the same annotation file should not contain annotations towards services that belong to different major service categories (e.g. pre-sales services and R&D services at the same time).

If a webpage happens to contain clues towards multiple major service categories, then multiple annotation files should be created for the same webpage, in order to avoid the mixing of the services



belonging to different major service categories in a single file. Within an annotation file describing the same major service category, the annotations should be performed according to the coloring conventions found in the next tables.

1: pre-sales services	
11: product demonstrations	yellow
12: customer seminars	green

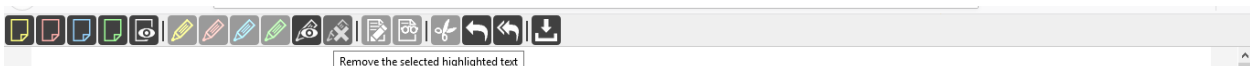
4: R&D services	
41: research service	yellow
43: feasibility studies	green

5: operational services	
51: project management	yellow
52: service for operating the product for the customer	green
53: service for operating customer's processes	blue

6: financial services	
61: Pay-per-use	yellow
62: Instalment payment	green
63: Leasing	blue
64: Rental system	pink

When you are done with highlighting all the relevant text snippets on a website for a given major service category, make sure that the name of the file you save the annotations begins with the category code for the major service category you were annotating. For example, if you were annotating R&D services (major category code 4), make sure that the name of the file you save your annotations begins with a 4.

If you make a mistake during annotation, you can remove any erroneously placed highlighting at any time by using the "Remove the selected highlighted text" from the toolbar at the top of your screen.





Uploading the annotations

Compress (e.g. into a zip file) the annotated HTML files that you saved on your local disk using the naming conventions described earlier, then upload this compressed file into the shared Google Drive with the shared credentials.

Additional notes

For more convenient processing of the annotations we would like you to use a new naming convention for the files created by the annotation tool SingleFile. Instead of using the old file template which was

`{url-href-flat}_AnnotatorID_({date-iso} {time-locale}).html`

You are expected to use the new file naming template

`AnnotatorID_{url-href-flat}.html`

As before, you can set this up within the settings of SingleFile. In case you need some refresher on how to do this, see the section [Allowing custom filenames for saving](#)

Additional remarks:

- main categories (at the beginning of the file names) should consist of a single digit (i.e. either 1,4,5,6)
- **bad example:** 41_google.com_AnnotAdam.html 42_google.com_AnnotAdam.html
- **good example:** 4_AnnotAdam_google.com_.html
- url should be given by the single file plugin (it was not a problem so far)
- annotator name must not contain underscore
- use the highlighters carefully: coherent text should be selected with one use of highlight (use the remove selected highlight tool to correct mistakes)
- try to avoid adding texts with one use of the highlighter over areas where there is a lot of whitespaces.

2.2.3. FAQ

Based on the experiences from the first annotation phase, a FAQ manual for the annotators was compiled in the second phase.

Questions & Answers

What if I am not sure how to annotate a specific information?

In case you are not sure please insert the information in the annotation sheet and mark the cell in red. This means for us as lead partner that we will check this information again and correct it if necessary. Please do not insert information where you are not sure about without marking the cell in red, as this could lead to incorrect annotations.



What is the difference between “service for operating the product for the customer” and “service for operating customer’s processes”?

A “service for operating the product for the customer” is a service, where the seller operates a specific product, e.g. a machine, for the customer. For example, a seller of packaging machines does not only sell the packaging machine but operates this specific machine within the customer's company by sending his personnel that operates the machine. In comparison a “service for operating customer’s processes” is when the seller takes over a whole process of the customer. For example, a seller of packaging machines does operate the whole packaging processes of the customer, not only one machine.

What to do if links indicate relevant service types, but website content is locked upon visiting? (e.g. visitor needs to be a registered partner first to view the content)

Please annotate only websites that are freely available, as otherwise it is very difficult for the system to learn from it.

What to do if I am redirected to another website upon link visit? (e.g. especially problematic if visiting the link from another country)

In this phase of the annotation, it doesn't matter if you change to another webpage (e.g. other country webpage, company within a holding). Important is that you annotate and save the page where you find the information.

Which service category should I use when the relevant text belongs to no category/more than one category/is not specific (e.g. unspecified financial services)?

In case the text does not refer to none of the categories, do not annotate this part of the text. If it fits to more than one category, you can use this part of the text for both services, that means mark it in both colours. If the text is not specific enough to assign it to a category, do not annotate it.

Should non-searchable text (such as information provided on an image) be included? (e.g. a picture states revenue number, but it is unavailable in text)

Please annotate only readable text, no images.

If one service offered by a company is mentioned on different subpages of their website, should it be annotated only once or as often as it is on the whole webpage?

In this case annotate it at least once. Even better is if you annotate every text on the webpage where there is information on that service category. The more examples we gather the more training material for the system. Please do annotate as well all the text that refers to a specific service category on one subpage of the webpage.



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