Interreg CENTRAL EUROPE
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European Union
European Regional
Development Fund

DELIVERABLE O.T1.2

Map of the project consortium competences, online benchmarking

Document Control Sheet

Work package Number	WP1
Work package Title	Competence map for smart specialisations in CE
Activity Number	AT1.1 – AT1.6
Activity Title	
Deliverable Number	O.T1.2
Deliverable Title	Map of the project consortium competences, online benchmarking tool
Dissemination level	Public~~/ Restricted / Confidential~~
Main author	SIAV and GAPR
Contributors	FH JOANNEUM
Quality Assurance	Project Partners

Versioning and Contribution History

Version	Date	Author/Editor /Reviewer	Contributors	Description/Comments
_v01	05.2018-08.2018	Gabriella Bettiol with Team (SIAV) and Artur Ochojski with Team (GAPR)	Franz Niedrl with Team (FH Joanneum)	Development and final version
	30.11.2018	Artur Ochojski		This document

0. Rationale

The idea of the **online benchmarking tool for competences mapping** has been developed during the RP2 as a D.T1.6.1. The key aim of the tool is set upon **offering an online standardised map of competences of regional observatories available in several countries of Central Europe**. Based on the audits of Regional Observatories, the specificity of services and offered datasets is displayed in a modern and functional mapping tool. **Two key features** were implemented to the online benchmarking tool. The first one (**a c-map**), with a clear intention to **address the needs of SMEs and to inform them on the offers of Regional Observatories**. The second one (**a b-learning**), to **help the SMEs learn based on the benchmarking** feature, i.e. to enable the comparisons within the reference groups and to identify possible areas of improvement of the ROs (based on good practices) as well as to establish a network of ROs collaborating towards RIS implementation and monitoring across Central Europe.

Accordingly, **with the c-map** the SMEs can easily navigate through the map of Europe looking for localisations of Regional Observatories, identifying smart specialisations targeted by the ROs, as well as browsing advanced features including the nature, dissemination level and price of the offers. Since the implementation of Regional Innovation Strategies is targeting support to SMEs based on the smart specialisation, the businesses can find relevant business information on the partners of ROs, their networks and other valuable info.

The competence map (c-map) can be used freely by all the interested parties including, the EC, regional stakeholders interested in RIS as well as research organisations. The competence map is indented to expand regarding more functionalities and area covered. Thus, WPT3 activities will be held consequently allowing to extend the interest of ROs and to make use of the competence map in promoting the RIS-based activities addressing the needs of SMEs in Central Europe.

The **ROs can identify their potential by using the benchmarking feature and they can learn** on the performance of the other observatories. The access to the tool is offered only to the ROs who agreed to provide details of their activities during the auditing phase of the project. Thus, it is believed to be a truly adding-value tool as it will be one of the distinctive features of the ROs network. ROs can compare their activities using the statistical benchmark data against other ROs. They can also look for comparisons based on the similarity index introducing the level of innovativeness in similar regions. It should significantly improve the learning effect within corresponding ROs from clustered regions. The benchlearning tool will finally incorporate the so-called demand overlayer, that is a set of information on the expectations reported by SMEs regarding the services and datasets needed. This should help the ROs to improve their performance in RIS implementation as well as monitoring.

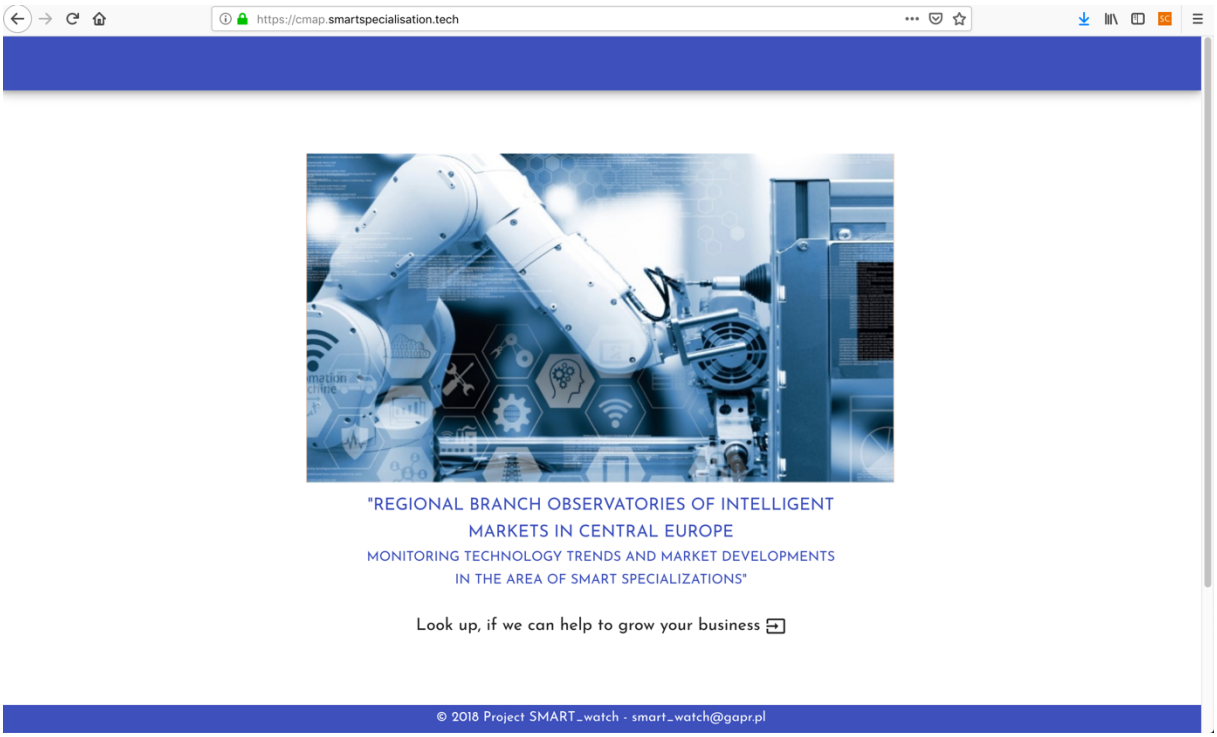
The benchlearning can also be used directly by WPT4 beneficiaries. Namely, the regional stakeholders, including policy-makers and other regional actors responsible for monitoring and for implementation of the current and future regional innovation strategies will be given an opportunity to learn on the activities and ROs efficiency.

1. The online benchmarking tool for competences mapping – c-map

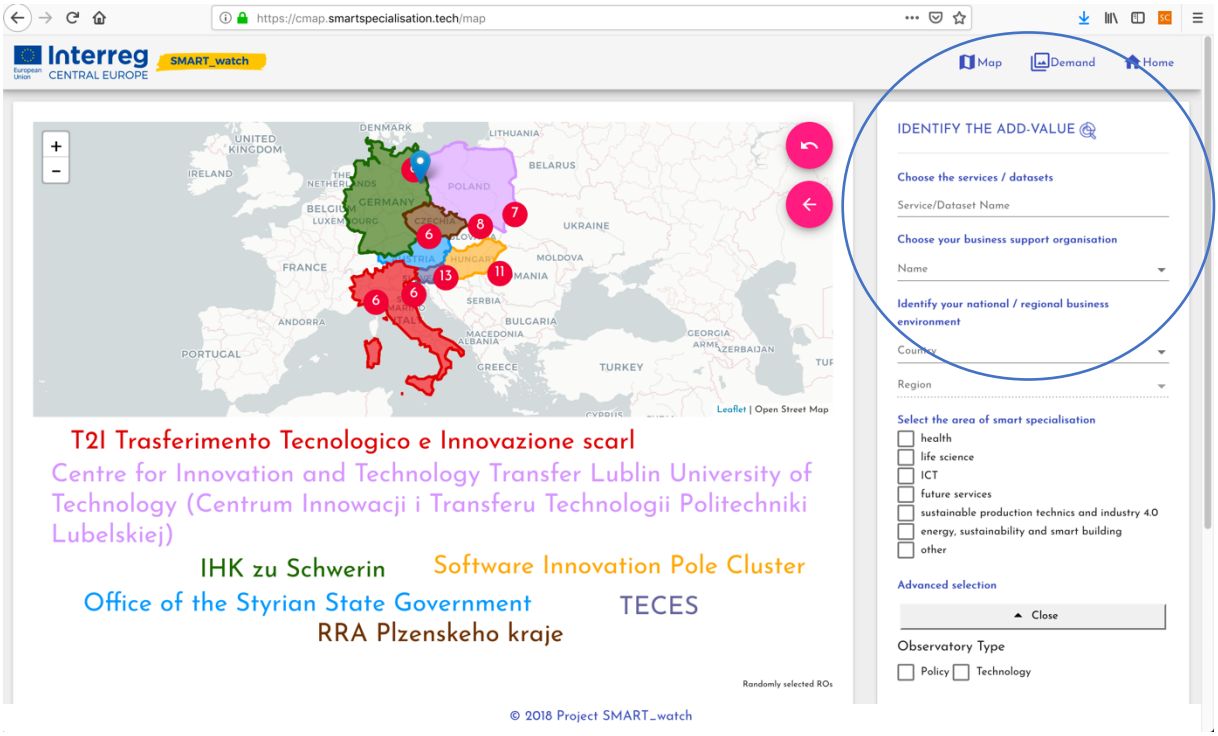
The benchmarking tool offers several opportunities to identify the value offered by regional observatories to SMEs. The filters applied to the c-map allow to select geographical coverage of the support, particular RO and the type of services / datasets availabe. Selections of smart specialisation and types of ROs apply consequently. Further functionalities are displayed as business-card type of information. Short history of the RO, the add-value for business (incl. up-to-date and future services/datasets description) and collaborators are listed.

To access the online benchmarking tool for competence mapping, plase use the link: https://cmap.smartspecialisation.tech

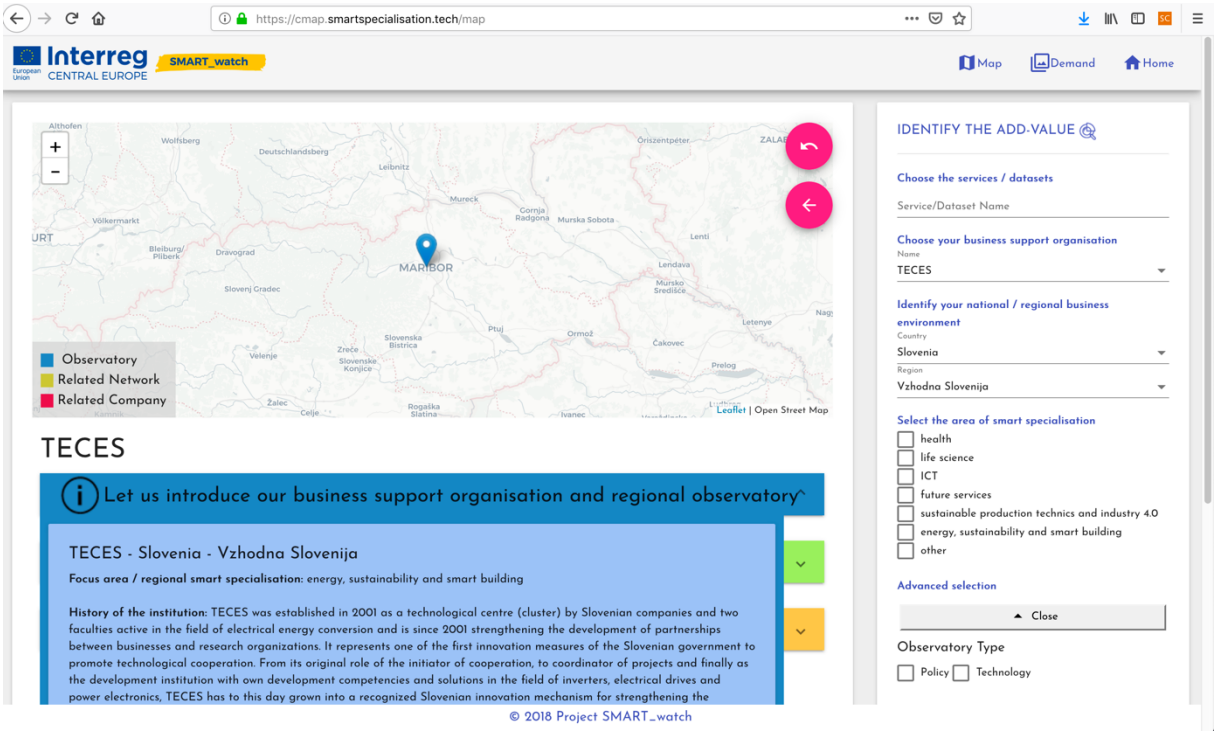
The welcome screen will direct you to the map with ROs‘ competences.



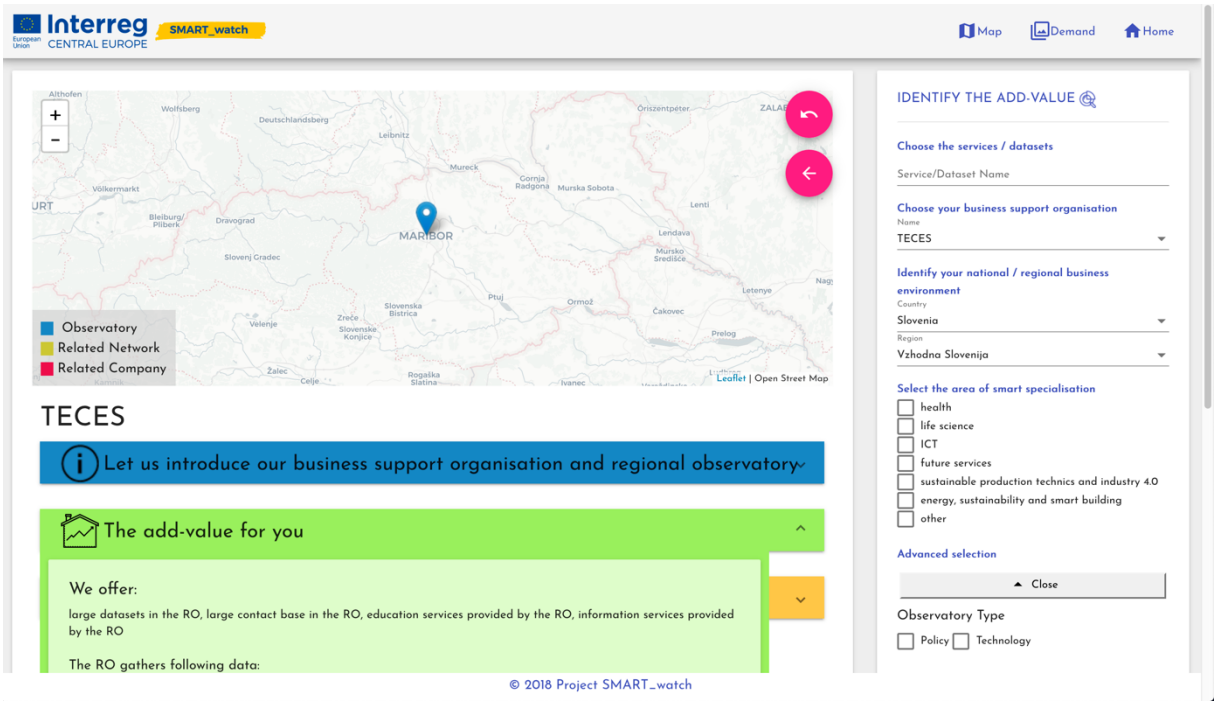
Use the upper-left box to navigate several functionalities of the competence map.



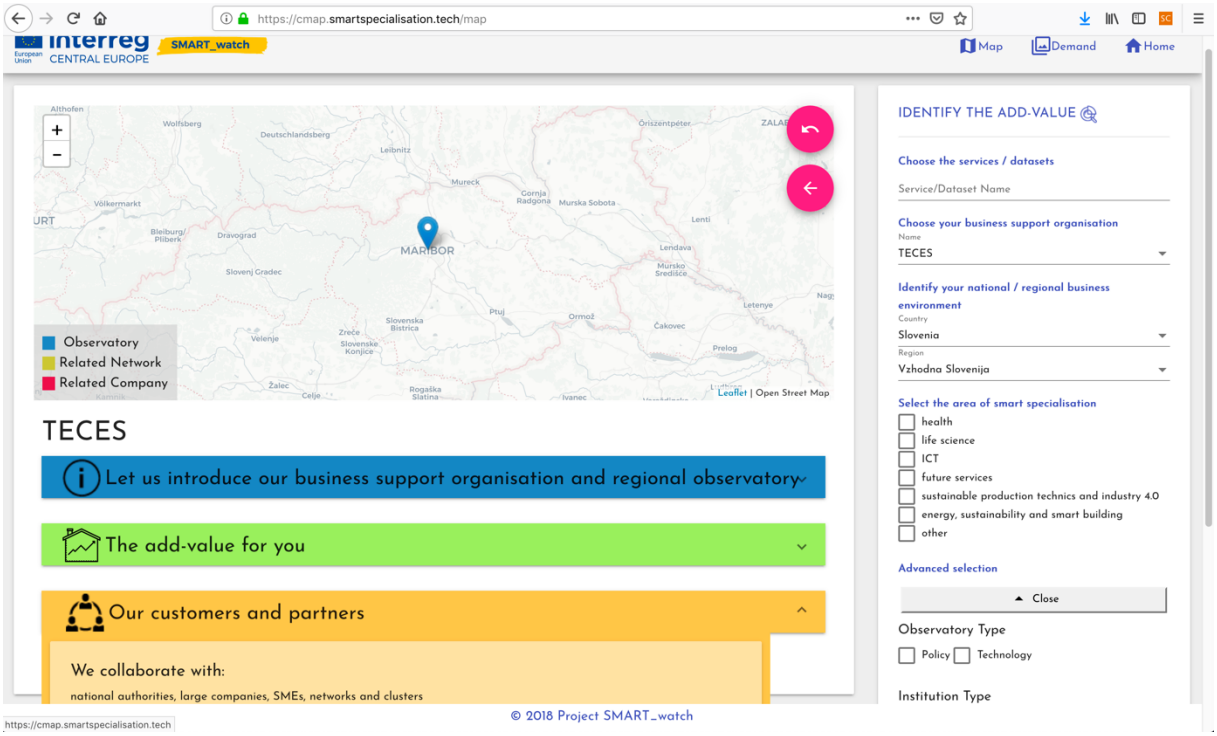
You may wish to select directly the RO either with the geographical map or with the cloud of tags. It will lead you to some basic facts on the RO.



Should you need information on the add-value the RO can offer, see the selectable bars on the lower left.



Further features will appear, once a selection of customers and partners is made.

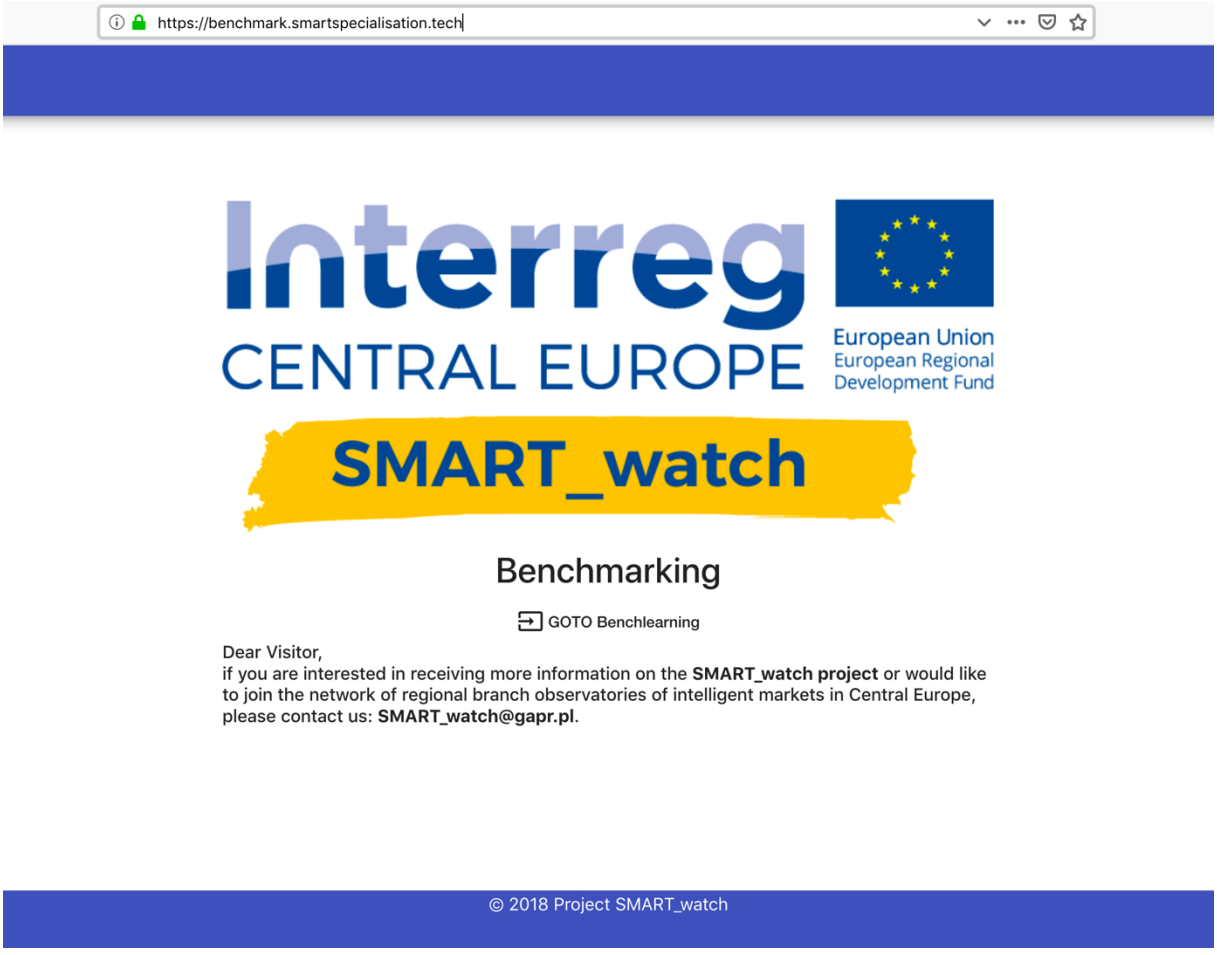


2. The online benchmarking tool for competences mapping - b-learning

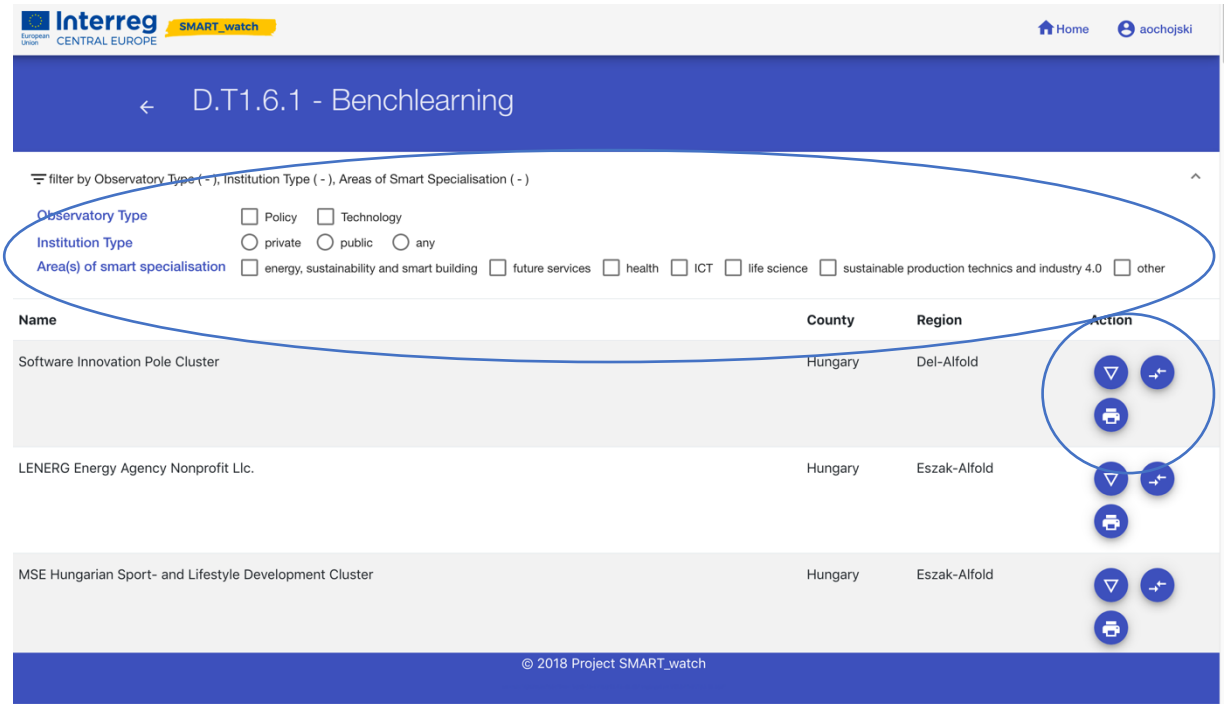
Here, the benchmarking tool offers several opportunities to learn on the competences of ROs. The main issue targeted by this tool is to provide the apropriate level of comparability. As mentioned the similarity concept has been utilised by the tool.

To access the online benchmarking tool for competence mapping, one should use the link: https://benchmark.smartspecialisation.tech/ Access is granted upon request.

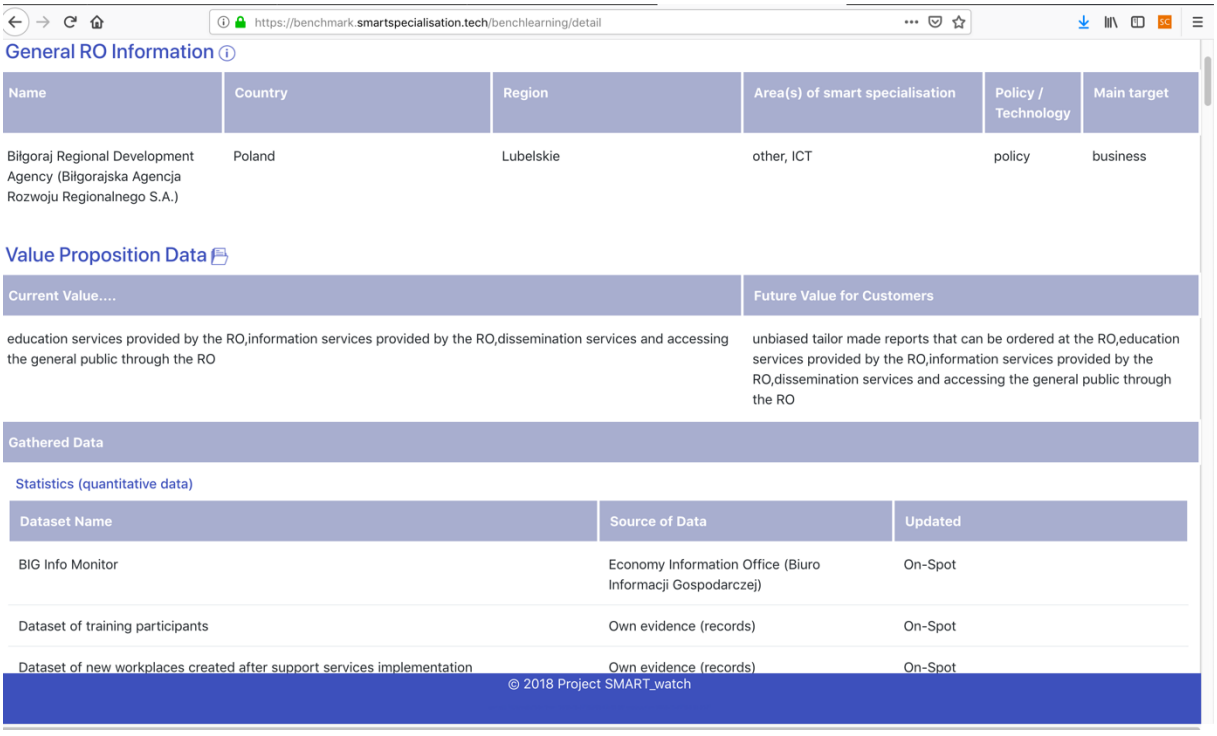
The welcome screen will direct you to the navigation page with ROs listing.



Here, the ROs can learn on the copmpetences they have and compare it with the other ROs. A selction panel located over the names oft he ROs can be used.



Simple information can be extracted with the icon marked with a triangle.



The comparisons made under the “compare icon“ allow to identify the most similar and the most distant RO. Further learning can follow several oft he possible categories of comparison.

The b-learning is offering several new options. Thus, the similarity concept is to be continuously developed together with the ROs.

C-Map Functionality

The C-Map shows all ROs which were entered into the Audit tool in a map. As the initial zoom level shows a map of Europe, the markers of the different observatories are clustered. If a user zooms in the map, the single marker gets visible for the different regions. All countries have different colours:

Country	**Colour**
Austria	blue
Czech Republic	brown
Germany	green
Hungary	orange
Italy	red
Poland	purple
Slovenia	grey

Table 1 Colours which identify a country

Bellow the map there is a tag cloud which includes a selection of the observatory names. Initially it shows one observatory name per country in the colour of the country.

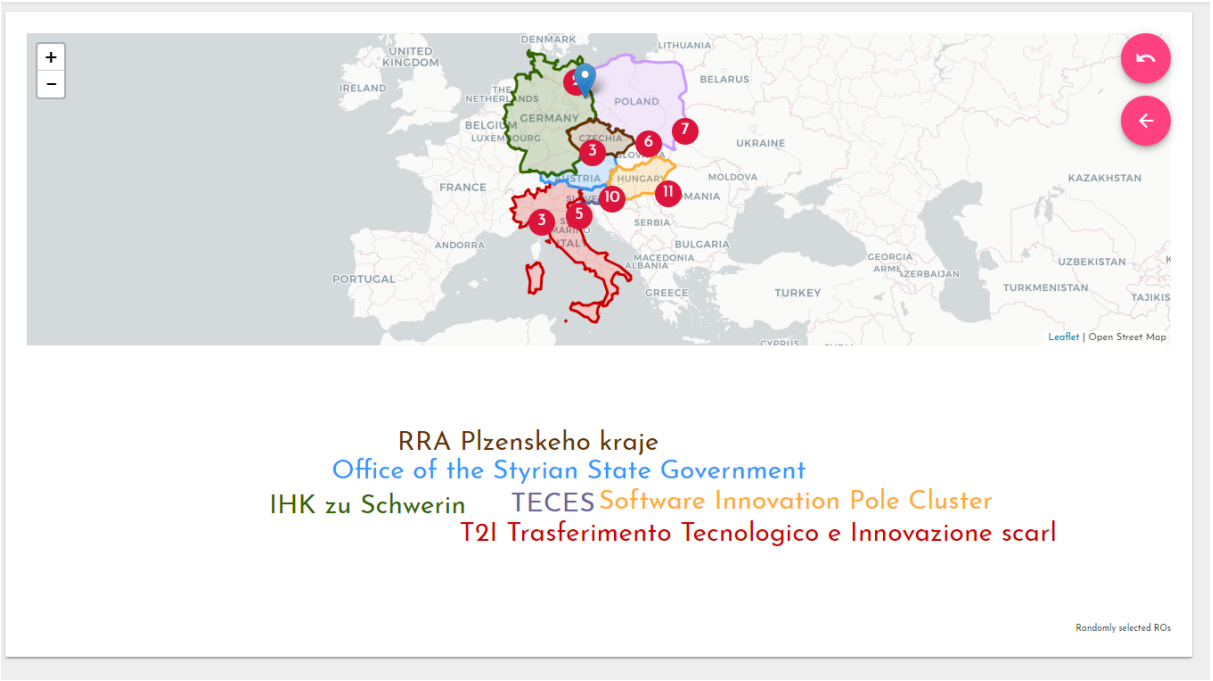


Figure 1 initial C-Map

If the user hovers a marker, the name of the observatory, its region, city and contact mail address gets visible. If a user clicks a marker the network of the observatory gets visible. Another possibility to show the network is to click on the name of the observatory within the tag cloud. Then within the network, the observatory itself is a blue marker. All related network partners are marked with a yellow icon and the related companies with a red marker. If the user hover one of this partner markers, the name of the network or company partner and the city get visible. The tag cloud bellow the map areas disappears and a sections with details about the observatory appears. This section includes the name of the observatory with a link to its website and three business cards.

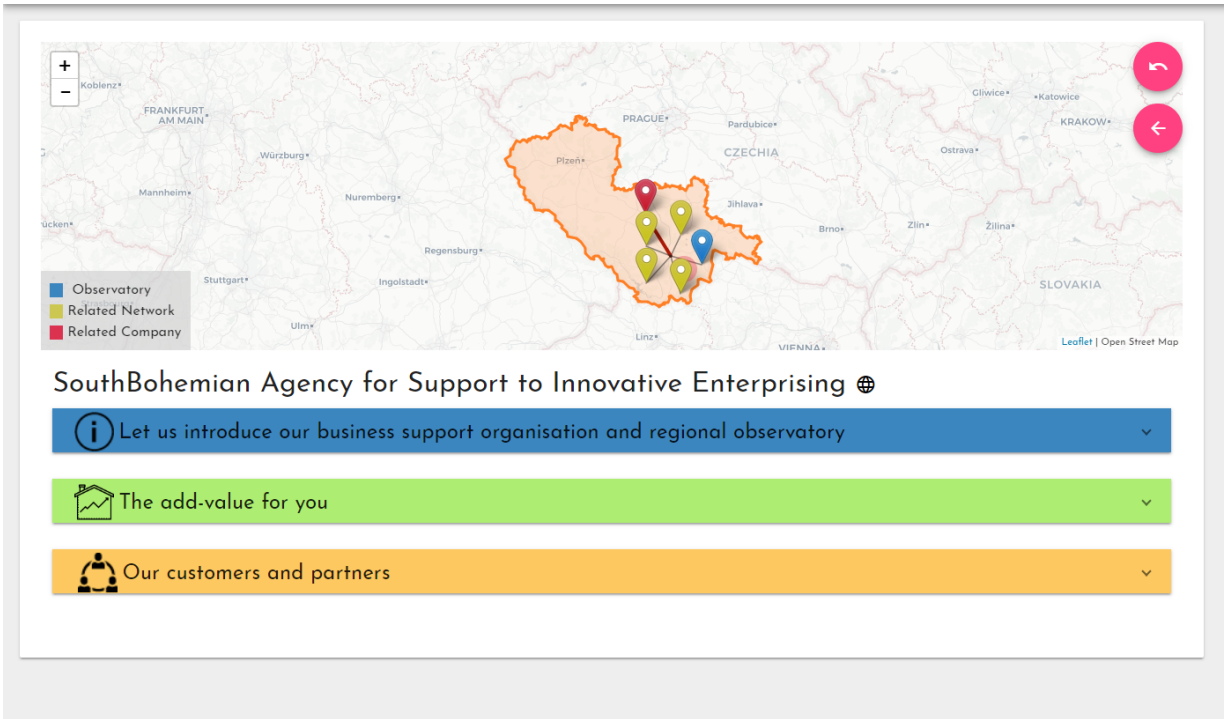


Figure 2 C-Map network with closed business cards after an observatory was selected

The first business card provides general information about the RO. It includes the observatory`s name, region and country. As well as its areas of smart specialisation. Additionally, some details about the history of the institution and the RO are outlined. The second business card describes things which are offered by the RO and which will be offered in future. Apart from that offered services and gathered data of the RO are outlined within different categories. The third business card lists the segments which are targeted by the RO. Apart from that all network partner as well as all company partners are listed together with a comment about the entries. Also the long term framework partnerships and the operational partnerships of the RO are listed with a description.

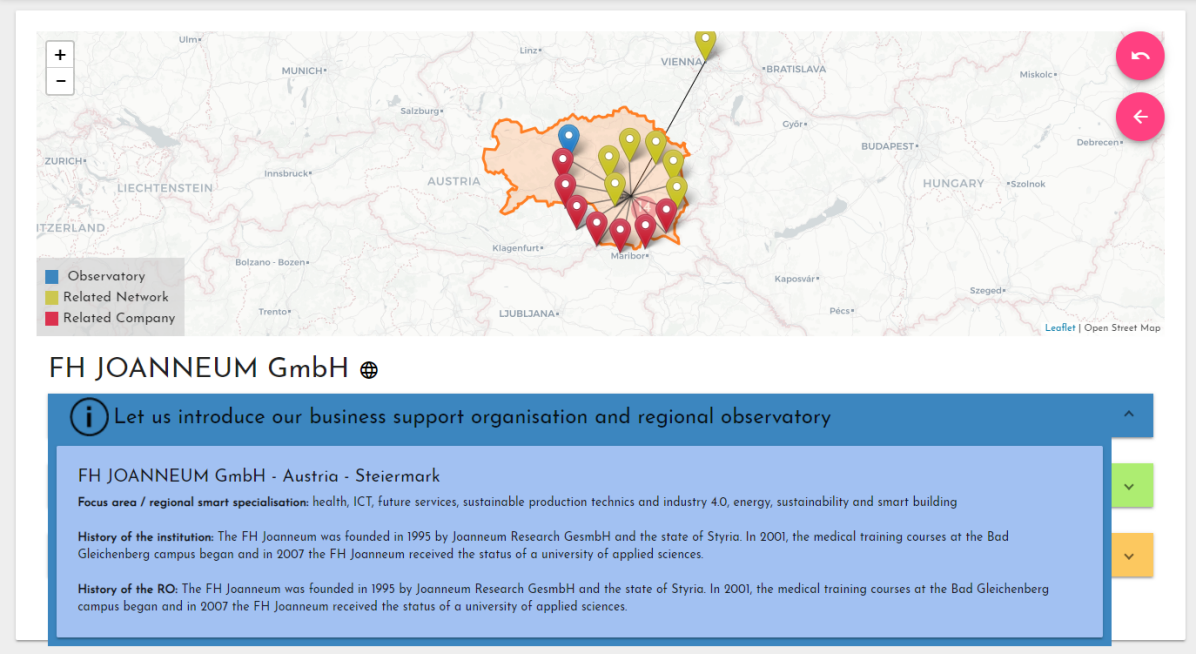


Figure 3 C-Map network with open business card

There are two buttons in the upper right corner of the map. The upper one allows the user to reset the map to the initial settings. This button also resets all filter settings. The arrow bellow is only visible if a network is shown. Then it can be used in order to show all observatories within the region of the selected observatory.

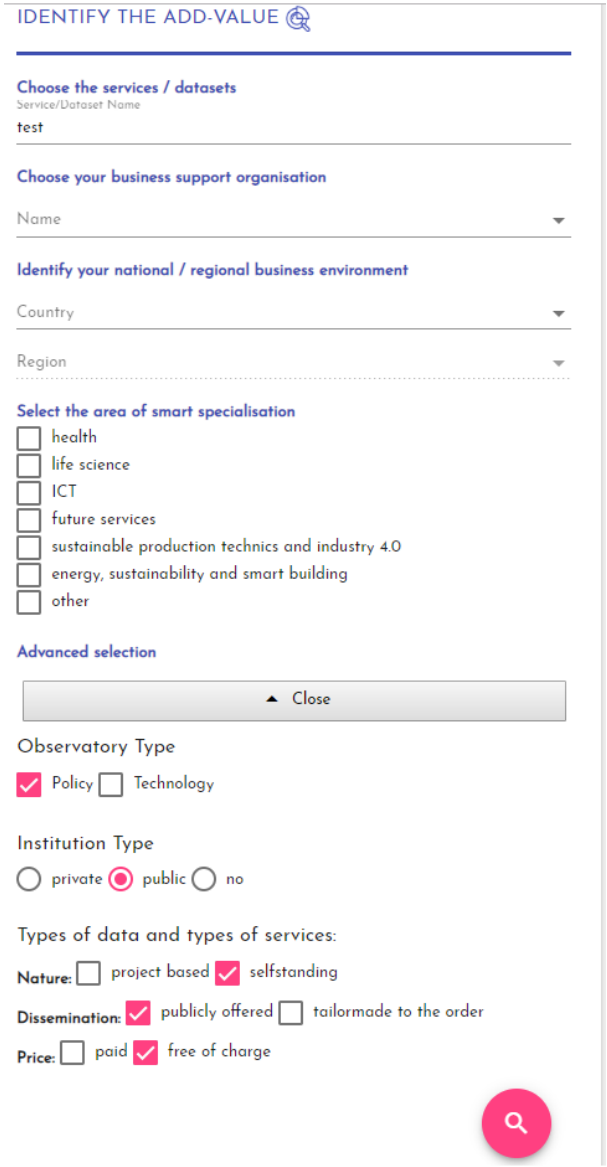


Figure 4 C-Map menu with advanced selection opened

Apart from that the C-Map provides different filters:

- It is possible to filter for different service or dataset names. In a text field characters can be entered and suggestions are provided which includes this characters. If the user hover one of these texts, the name of the observatory which includes the text in its dataset or service entries gets visible. If the link is clicked the network of the observatory gets visible in the map and bellow the business cards appears.
- It can be filtered by observatory name, by country and per region. These filters are provided in a drop down. These three filters depend on each other. If nothing is selected it can be chosen between all observatories and all countries. If no country is selected it is not possible to select a region. If a country is selected, all regions of this country can be filtered and the observatory drop down only includes these observatories, which are located in this country. If a region is selected only observatories within this region can be selected. If an observatory is selected without filtering for country and region before, these two filters are automatically set to the country and region of the selected observatory. In order to show the result of the filter within the map it is necessary to click the search button.
- It can be filtered for observatories which provide certain areas of smart specialisation. Therefore, checkboxes for all areas of smart specialisation are provided. They are connected with an or condition. If one of the areas which are selected is included in an observatory, this observatory is shown in the map and its name in the tag cloud bellow

the map. In order to show the result of the filter within the map it is necessary to click the search button.

- Also an advanced selection can be done by opening an additional section within the filter. Here it can be filtered by observatory type, institution type and type of data and services. These filters depend on each other and it is necessary to click the search button to see the results within the map and the tag cloud. The observatory types policy and technology are connected with an and condition. If both are selected only observatories which have both types are listed. Concerning the institution type a radio button out of private, public or no need to be chosen. The types and services are outlined within the categories nature, dissemination and price and they provide multiple checkboxes. These checkboxes are connected with an or condition. So only one of them need to be fulfilled in order to see the result in the map.

C-Map Data

Used field from the audit tool	**Comments**
1.1 Name of the observatory	used for filtering and visible within the map
1.2 Country	used for filtering and visible within the map
1.2 Region	used for filtering and visible within the map
1.2 Observatory Website	visible in the title of the detail view when an observatory is selected
1.3 Area of smart specialisation	visible in the first business card and used for filtering
1.4 Type of observatory	used for filtering
1.6 Type of institution	used for filtering
1.8 City	is used to get the coordinates of the observatory marker via geocoding
1.11 history of the institution	visible in the first business card
1.12 history of the RO	visible in the first business card
2.2 customer segments	visible in the third business card
2.3 related networks including general information	these data are used to draw the network if an observatory is selected. Therefore, the field city is geocoded in order to receive its coordinates. These data are also visible in the third business card. Nevertheless, these data are only used within the c-map if the checkbox “Show the entries in the cmap” is selected. Otherwise the

	network cities are not included in the network view of the map and only the general information text is visible in the third business card.
2.4 related companies including general information	same like 2.3
3.1 current values for customers	visible in the second business card (“We offer:”)
3.2 future values for customers	visible in the second business card (“We will provide in the next years”)
3.7 gathered data	visible in the second business card
3.8 offered services	visible in the second business card
6.1 long term framework partnerships including general information	visible in the third business card but only if the checkbox “Show the entries in the cmap” is selected and in the row sensitive “false” is visible. Otherwise only the general information is visible in the third business card
6.2 operational partnerships including general information	same like 6.1

Table 2 data which are used within the C-Map

C-Map Technical Details

The same backend like for the audit tool is used. This means also Spring framework is used and the database is a MongoDB. The only difference is that there is no authentication necessary to access the c-map. The frontend uses Angular 5 and the map is implemented using ngx-leaflet[1] and ngx-leaflet-markercluster[2]. To geocode the cities of the observatories, networks and companies nominatim from openstreetmap[3] is used.

[1] https://github.com/Asymmetrik/ngx-leaflet

[2] https://github.com/Asymmetrik/ngx-leaflet-markercluster

[3] https://nominatim.openstreetmap.org/

Benchlearning Functionality

The first page shows a list of all observatories, their countries and regions. For each observatory different actions like “Show details”, “Compare RO” and print a report are available. The list of ROs can be filtered by observatory type, institution type and areas of smart specialisation. Between the observatory type there is an and-condition while between the areas of smart specialisation there is an or-condition. All three filters are connected and the observatory list is filtered automatically if the selection for one of them changes. As the filter is located in a drop down there is a text which shows the selected key words, also if the filter section is closed.

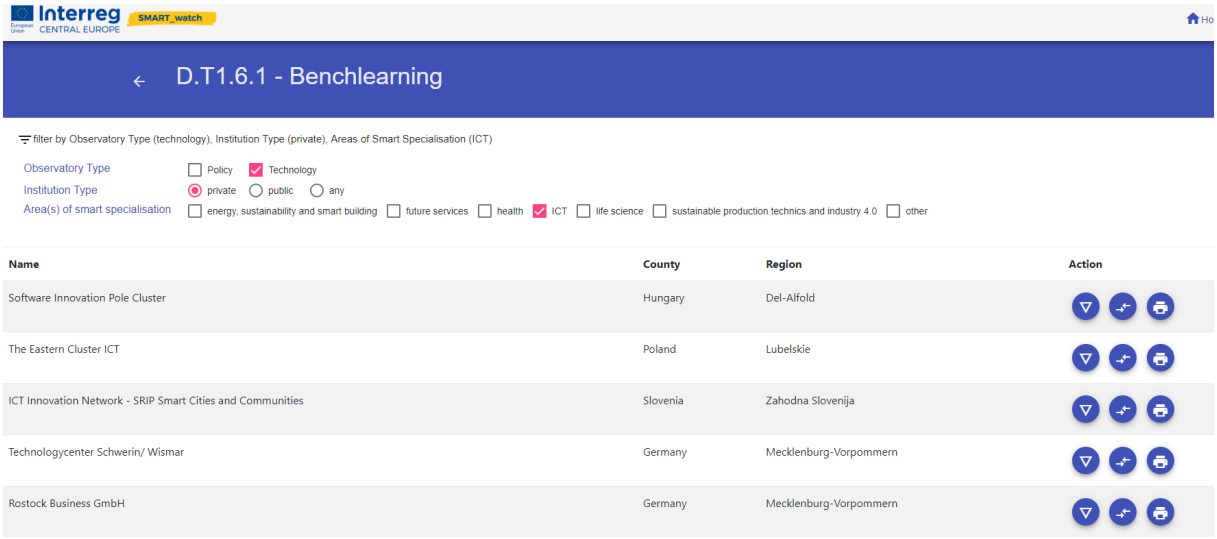


Figure 5 Benchlearning initial page with filter selection

If the “Show details” button is selected, the fields which are relevant for the Benchlearning section are listed together with the data which were entered in the audit tool.

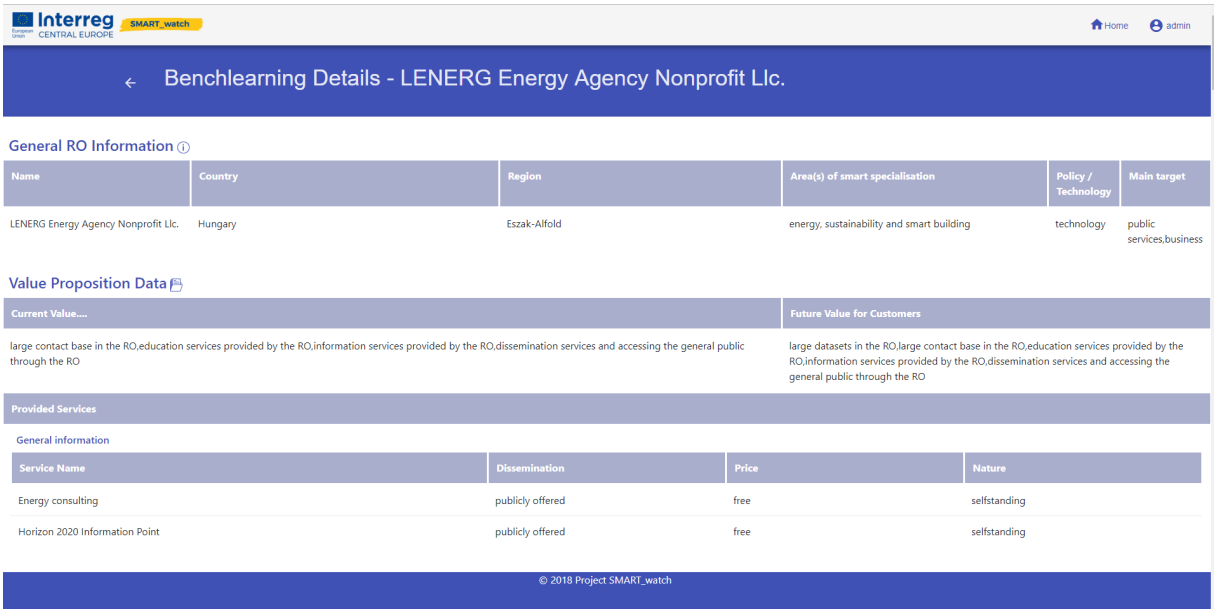


Figure 6 Benchlearning details after the „Show details" button for one observatory was clicked

If the "Compare RO" button is clicked the Benchsimilarity page appears. Based on the data which were gathered with the audit tool, the similarity between the selected RO and all other ROs is calculated with the Pearson Correlation Coefficient here. The results are visualised in a bar chart. Bellow there is a table which shows all ROs ordered by name and their total similarity, as well as the similarity in the sections "basic info", "customer segment", "value proposition", "key resources", "key partners", "customer relationships" and "channels".

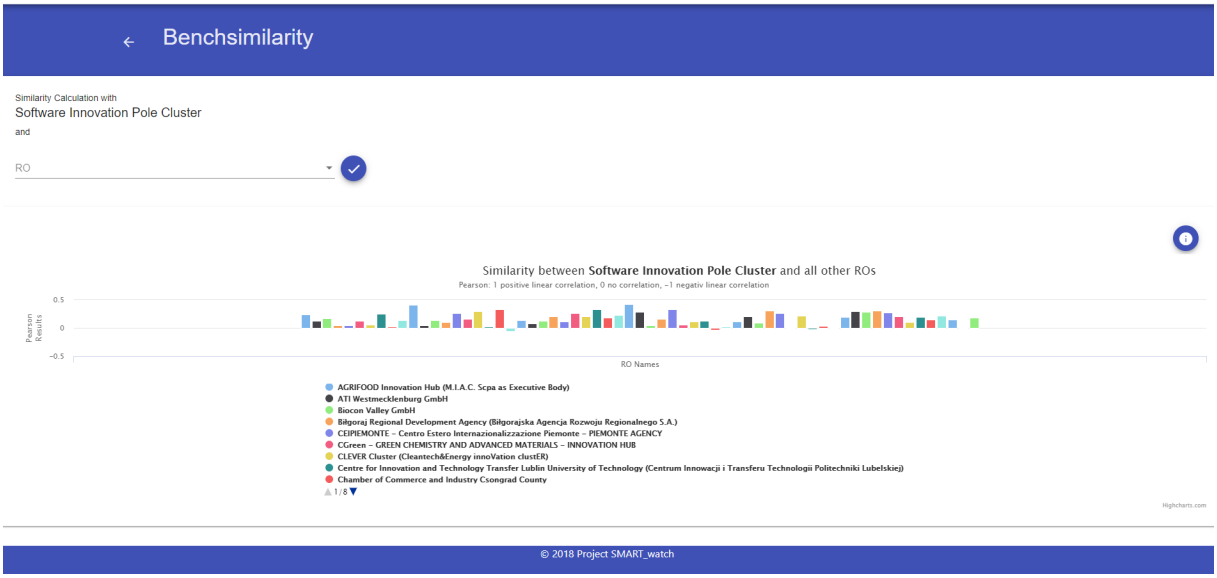


Figure 7 Benchsimilarity initial page with the bar chart which shows the similarity between the selected and all other ROs

If in the overview bar chart one bar is selected by click, a new bar chart appears. This charts visualizes the similarity per section. To compare the selected RO with a certain RO there is also another possibility. In the header there is a drop down, where the names of all ROs are

listed. If one RO is selected and the check button clicked, the new bar chart with the details appears. To show all ROs again, the point “all” can be selected within the drop down.

Figure 8 Benchsimilarity with a bar chart which shows the total similarity between the two selected ROs as well as the similarity per section

On the right side of the bar chart there is an info button which provides information about the Pearson Correlation Coefficient and the used data.

If the print button in the Benchlearning-overview site is selected the dissemination level need to be selected, a quality control, version, author, contributor and comments entered. If the print button is selected then, a new pdf report is generated with the data, which were visible, when opening the details for the observatory.

Benchsimilarity Data

As it can be seen in the table, the values of the used variables are usually 0 or 1. This means that only the existence or the non-existence is considered. Thereby the existence and the non-existence are regarded as equally important. I.e. these properties are assumed to be symmetrical. In two cases, the values of the variables are divided into categories. So that values between 0 and 3 are possible.

The data from following sections in the audit tool are used for calculations:

1.3 areas of smart specialisation	7 fields for each answer with a value 0 if it is not selected, and 1 if it is selected
1.4 type of observatory	two fields with 0 or 1
2.1 main RO target	two fields with 0 or 1
2.2 customer segments of the RO	seven fields with 0 or 1
3.1 current value for customers	nine fields with 0 or 1 including other

3.2 future value for customers	nine fields with 0 or 1 including other
3.7 gathered data	four fields with 1 if there is at least one entry and 0 if there are no entries
3.8 offered services	ten fields with 1 if there is at least one entry and 0 if there are no entries
5.2 background and missing competences	one entry with 0 if it is No and 1 if the answer is Yes
5.4 budget covered	15 fields with three entries per year. 0 for the both entries which are not selected and 1 for the selected entry.
6.1 long term framework partnerships	one field with four different values. 0 if there is no entry, 1 if there are 1-3 entries, 2 if there are 4-6 entries and 3 if there are more than 6 entries
6.2 operational partnership	nine fields with 1 if there is at least one entry and 0 if there are no entries
7.4 RO characteristics	four entries with 0 if a field is not selected and 1 if a field is selected
7.5 RO characteristics	two entries with 0 if a field is not selected and 1 if a field is selected
7.6 customers and general users	two fields with four different values. 0 if there is no entry, 1 if the numbers are between 1 and 100, 2 if the numbers are between 101 and 500 and 3 if the number is greater than 500
8.1 RO premises location	four fields with 1 for the selected entry and 0 for the other entries
8.2 customer visit RO premises	one entry with 0 if it is No and 1 if the answer is Yes
8.3 location of RO premises is	four fields with 1 for the selected entry and 0 for the other entries
8.4 customer service group channels	nine fields with 1 if there is at least one entry and 0 if there are no entries

Table 3 data which are used to calculate the similarity between one RO and all other ROs

Benchmark Technical Details

The same backend like for the audit tool is used. The users for this tool are the same like for the audit tool. There is only one difference within the roles. A user with the role “AUDITOR” is

not allowed to access the benchmark side. All users with the roles “ADMIN”, “LEAD-PARTNER” and “PARTNER” can use the benchmark side. Apart from that they can create users with the role “BENCHLEARNING” and these users are then only allowed to access the benchmark side. The frontend is implemented using Angular 5 and the angular-highchart[4] library is used to create the bar charts.

To calculate the similarity on the backend four different algorithms are implemented. At the moment the Person correlation coefficient is used. In statistics, the Pearson correlation coefficient is a measure of the linear correlation between two variables X and Y. It gives information about the magnitude of the association, or correlation, as well as the direction of the relationship. The result is a value between +1 and −1, where 1 is total positive linear correlation, 0 is no linear correlation, and −1 is total negative linear correlation.

- A correlation coefficient indicates the extent to which dots in a scatterplot lie on a straight line.
- Correlations are never lower than -1. A correlation of -1 indicates that the data points in a scatter plot lie exactly on a straight descending line; the two variables are perfectly negatively linearly related.
- A correlation of 0 means that two variables don't have any linear relation whatsoever. However, some non linear relation may exist between the two variables.
- Correlation coefficients are never higher than 1. A correlation coefficient of 1 means that two variables are perfectly positively linearly related; the dots in a scatter plot lie exactly on a straight ascending line.

[4] https://github.com/cebor/angular-highcharts#readme