

IS-ENES3 Deliverable D3.N°5

Synthesis on activities to broaden communities

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ABSTRACT

A s part of WP3-NA2 (user interaction) various activities were undertaken to broaden the user community of the products developed by the IS-ENES3 project. This report describes the various activities shortly, analyzes what worked well and what did not to broaden the user community and gives some recommendations for future projects.

Based on the information in this report, we can conclude that the objective to broaden the community was reached. A considerable number of (potential) users in Eastern Europe was reached, new young climate researchers were reached and a considerable number of VIA researchers.

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Executive Summary

This report gives a synthesis of the activities within the IS-ENES3 project to broaden the user community and it describes the challenges and gives recommendations for further projects.

The schools organized were:

- 3 virtual schools on the use of climate data for impact assessments (60 participants)
- 1 school at location on AI en ML for Climate data (School for Data Science for Climate modeling, Athens, 36 participants)
- 2 schools at location in Eastern Europe (70 participants)

There were many participants from Eastern Europe, good gender balance, and good balance between climate researchers and VIA researchers (Vulnerability, Impact and Adaptation) in most schools. It was more difficult to reach users from the commercial climate services community.

Also shorter events were organized:

- Demonstrations/presentations at EGU, EMS and AQUA360 conferences (4 to 10 per event)
- One day trainings at location in the Netherlands (19-21 per event)
- Webinars or online clinics/workshops on ESGF and access to CMIP and CORDEX data, bias adjustments, ESMValTool (58 to 145 subscribers per event)

The online activities all had a considerable number of subscribers from Eastern Europe or outside Europe. All online activities had some subscribers outside the climate research community, but the activities on the Access to CMIP6 and CORDEX data and on bias adjustments had large numbers of VIA researchers.

Besides also several workshops (mainly online) were organized on standards and user requirements. The online workshops on standards attracted many more participants than the similar workshops at location organized before. Most participants were from the climate research community. The online workshops on climate indices for Eastern Europe also attracted many participants with backgrounds in impact research.

Based on the above information we can conclude that the objective to broaden the community was reached. A considerable number of (potential) users in Eastern Europe was reached, new young climate researchers were reached and a considerable number of VIA researchers.

1. Introduction and objectives

● 1.1 Introduction

A lot of data is generated and tools are developed in Climate science, which are useful also for other disciplines. However, these climate data and tools are not always easy to find, easy to use, etc. To broaden the use of climate research results, specific activities have to be undertaken to understand the obstacles for use of climate data, to get a better view on the requirements of various potential user groups, and help has to be organized for these potential users (e.g. training, guidance material, etc.). At the same time the existing user community has to be informed about new developments, and new/young scientists in these communities have to get informed and involved.

This report gives a synthesis of the activities within the IS-ENES3 project to broaden the user community, describes the challenges and gives recommendations for further projects.

● 1.2 Objectives on broadening user community in the Work package on user interaction

WP3/NA2 aimed at further engaging with the community of existing and potential users of IS-ENES services. This is done through widening the user base through training, engaging the community in co-constructing standards and expressing needs, and engaging the younger generation in interdisciplinary approaches. Target users were the climate researchers and the vulnerability, impacts and adaptation (VIA) researchers. WP3/NA2 also targeted societal innovation through the emerging climate service providers. Within The IS-ENES3 project WP3-NA2 specifically focused on broadening the user community, whereas the other Network Activities (NA work packages) focused more on engaging the existing communities.

The first objective of this WP was to widen the IS-ENES user community especially toward new science, as well as towards industry and societal users, strengthening the innovation dimension of the IS-ENES3 project. A two-way dialogue was sought, where we tried to include requirements and wishes of communities into our activities to get wider participation, also outside of academia.

The second objective was to nurture the existing ENES users/stakeholders community creating deeper links and mutual understanding between users and developers via a number of co-construction actions such as workshops and training. One key goal was to train the younger generation of scientists and climate service experts (also keeping the gender balance in mind) via schools, furthering the successful cross-disciplinary network of expertise promoted by ENES for the last 15 years.

The third objective is to expand community standards which serve the ENES community, in collaboration with the user community. Although this activity did not explicitly focus on broadening or nurturing the user community, indirectly the activities contributed to this. Standards in Earth system science are numerous and it is key to evaluate which can be used or adapted for IS-ENES use and which need to be developed. The existing standards used by ENES are not necessarily the same as the standards in user communities (e.g. impacts). Collecting and exchanging information on standards and requirements/wishes on standards and providing training can help to stimulate use of climate data and tools.

2. Organized activities

● 2.1 Overview of tasks and approaches

Within WP3-NA2, 4 tasks were defined. Tasks 1 and 2 focused especially on broadening the user community. Task 3 on community standards mainly focused on the existing community of climate models and climate scientists using climate data, but also partly on extending the user base. Task 4 focused on user requirements and wishes. These activities focused a lot on the existing community of climate scientists, but also information from tasks 1 to 3 from new (potential) users was collected.

● Task 1: Widening the user base for science and societal innovation

Several activities were undertaken to reach a wider community, focusing on different user groups. These activities were clearly linked with the activities on user requirements, since it is important to know what makes the tools and climate information useful and usable. Short events, webinars and multi-day trainings were organized to reach new user groups especially within the VIA community and Climate Services. Special attention was paid to reach more people from Eastern Europe. The activities that were organized were based on the data and tools developed within IS-ENES (e.g. on ESMValTool, ICCLIM, Climate4Impact portal), but they were also based on expressed user requirements (e.g. more hands-on exercises, webinar on bias-adjustments). Also some short events were organized at conferences where the various communities often go and at locations such as at universities, research institutes. This way it does not require much effort for the (new) users to attend the activities.

● Task 2: Training and resources: nurturing the community

Schools were organized in order to provide training for the younger generation scientists. These schools were an opportunity to foster interdisciplinary approaches on data, focusing on gathering climate and impact modelers (Schools on the interface between climate and impact models) and climate scientists with computer and data scientists (Summer School on Data Science for Climate

Modelling). The idea behind the schools on climate data for impact assessments was to bring together climate and impact scientists since they often need each other's expertise for good impact and adaptation studies. Working together during the schools could help to create better understanding between climate and impact researchers and could help to create a network that they can use to help each other afterwards. The idea behind the Data school was to improve the skills to use the large data sets that are often produced in climate modeling and to emphasize the need for collaboration between climate scientists and data and computer scientists.

- Task 3: Community standards

Task 3.1: Many standards are used in climate modeling and tools for processing climate data. These standards are developed further to include wishes/requirements of the existing user groups and/or wishes/requirements of new user groups. In this task activities (workshops, interviews, etc.) were organized to advance existing community vocabularies and standards such as for CMIP, climate indices, Climate and Forecasting Conventions, ES-DOC. During these activities recommendations were formulated for further development and improvement of the standards and these were partly also operationalized in IS-ENES3. Although this activity focused especially on the existing user community, in some of the activities it was tried to broaden the community by inviting people from other regions. Special workshops were organized in Eastern Europe on Climate indices requirements. Climate indices are often used by a broad community for many applications outside the climate modeling community.

Task 3.2: New standard on scientific provenance of model evaluation. This task focused especially on the existing network and collected information through an inventory.

- Task 4: User feedback and requirements

Task 4.1: Project wide user requirements (data, models, tools). During tasks 1, 2, 3 and other interactions with users in other WPs (e.g. access activities) feedback is collected and a synthesis of related technical and services requirements will be provided to the rest of the project. This is supplemented with desk research on information from other projects or from institutional sources. No specific activities were organized for this task to reach a broader audience.

Task 4.2: Specific user requirements. This task conducted a community survey to review the needs and expectations of a variety of end users both existing and future (climate model developers, VIA researchers, climate service providers) on climate model evaluation and documentation.

- **2.2 Schools**

- **2.2.1. Schools on Climate data use for impact assessment**

Climate and impact modeling communities often show little overlap, although climate data are used by the impact community and the climate community develops climate data for the impact community. In these schools (called Impact schools) climate and impact researchers (and some climate service providers) were put together. Lectures were given on climate science and climate data, but also on impact modeling and climate services, and the challenges that people can experience working in interdisciplinary groups. As part of the schools they also worked together on a case study. Due to COVID-19 the schools were transformed to virtual schools. In total 60 persons participated in the 3 virtual schools, with a considerable number of people from Eastern Europe. There was a good balance between climate and impact researchers and between genders. Although the schools attracted especially young scientists, some more experienced people also participated. They often gave valuable information on their own field of expertise and on their experiences with using information from other disciplines. These schools are described in more detail in D3.2.

Impact School	Nr. participants	Male/female	Climate/impact/ climate services	From Eastern Europe*	From outside Europe*
Nov-dec 2020 (online)	20	13 / 7	10 / 9 / 1	13	0
Mar-Apr 2021 (online)	19	10 / 9	9 / 9 / 1	4	3
May-Jun 2021 (online)	21	11 / 10	9 / 11 / 1	5	1
Total	60	34 / 26	28 / 29 / 3	22	4

*For this the country in which people worked/studied was used. Regularly people from outside Europe were working/doing a PhD in a European country.

- **2.2.2. School on Data Science for Climate Modelling**

The aim of this school (one week, M34) is to increase expertise and skills on theoretical and practical concepts of Data Science, building upon and mainly targeting how to accelerate scientific discovery from data. Young scientists learnt how to analyze, visualize and report on massive datasets, in the scientific domain as well as how to apply data-intensive and data-oriented paradigms and solutions to address scientific discovery in climate science. Driven by the theoretical background provided by climate, data and computer science experts, the school adopted a hands-on approach for maximizing results focusing on the usage of datasets linked to the IS-ENES data services. The school strengthened the individual expertise of the participating climate and computer

scientists, as well as, leverage and emphasize the need of collaboration between them, helping early career scientists with different backgrounds to meet and network. This school is described in more detail in D3.2.

Data School	Nr. participants	Male/female	Climate/Machine Learning/both	From Eastern Europe*	From outside Europe*
Sept 2022 (Greece)	36	18 / 18	17/13/6	34	2

*For this the country in which people worked/studied was used. Regularly people from outside Europe were working/doing a PhD in a European country.

● 2.3 Trainings and demonstrations at location

- Demonstration¹, April 2019: 2 splinter meetings with demonstration of the Climate4Impact portal, (EGU , 9th April 2019, Vienna, By Maarten Plieger and Wim Som de Cerff)
- Demonstration², September 2019: 2 side meetings with demonstration of the Climate4Impact portal, (EMS , 12th September 2019, Lyngby, by Janette Bessembinder)
- School on climate data for impact assessments³ (3-day training, May 2022, Cluj-Napoca, Romania): lectures on types of climate data, challenges in using them, climate impact models for agriculture, hydrology and health, and hands-on exercises with climate data and impact models. 1-Day case study together with the group on CDO and ICCLIM
- School on CDO and ICCLIM (3-day training, May 2022, Cluj-Napoca, Romania): lectures on CDO and ICCLIM and hand-on exercises with these tools. 1-Day case study together with the group on impact assessments
- School on climate data for impact assessments and high resolution climate data⁴ (4-day training, November-December 2022, Prague, Czech Republic): lectures on both challenges in using climate data, high resolution climate modeling, access to climate data and hand-on exercises
- Trainings on C4I portal and access to climate data at the Technical University Delft and Wageningen University (separate trainings), The Netherlands (7-8 February 2023; Christian Pagé) Lectures on new Climate4Impact portal and notebooks, ESGF, climate model data, ICCLIM and practicals.

¹ <https://is.enes.org/training-detailed/#EGU2019-C4I>

² <https://is.enes.org/training-detailed/#C4I-demo-2>

³ <https://is.enes.org/training-detailed/#ee-school>

⁴ <https://is.enes.org/central-and-eastern-europe-autumn-schools/>

Short trainings	Nr. Participants	Male/Female	Climate/impact/climate services	From Eastern Europe ¹	From outside Europe ¹
C4I splinter meetings, EGU, April 2019	10	? ²	?	?	?
C4I side meetings, EMS, Sept 2019	8	? ³	?	?	?
May 2022, Romania, 2 courses	30	13 / 17	15 / 15 / 0	28	0
Nov. 2022, Prague	40	20 / 20	27 / 12 / 1	35	1
Febr. 2023 Courses Dutch universities ⁴	40	?	?	?	?
Total³	128	33/37	42/27/1	63	1

¹For this the country in which people worked/studied was used. Regularly people from outside Europe were working/doing a PhD in a European country.

² a ‘?’ indicates that this was not recorded. Later in the project in most cases more detailed information was collected after assessing our need to better know our audience.

³ minimum number if not all was recorded.

⁴ For the course at Wageningen University there were 14 male and 5 female participants, of which 4 had a background in Climate Services, 10 in Environmental Science, 2 in Plant Science, 1 in Animal Science and 2 in Food Science. The course in Delft attracted especially climate scientists

● 2.4 Webinars and online workshops

- Webinar⁵, September 2019: follow up on side meetings at EMS on the C4I portal (16th September, 2019, by Maarten Plieger, Bernadet Overbeek, Janette Bessembinder
- Webinar⁶, June 2020 (replaced the splinter meetings at the EGU in 2020), Access to CORDEX and CMIP6 climate data through the ESGF portal (June 15, by Christian Pagé and Paola Nassisi)
- Workshops⁷ and survey, May-September 2021: on climate indices for Eastern Europe (May 17 and September 27, 2021, by Vladimir Djurdjevic and Aleksandra Krzic) In

⁵ <https://is.enes.org/training-detailed/#C41-web-1>

⁶ <https://is.enes.org/workshops-detailed/#cordex-webinar> From this webinar YouTube videos were made. By February 9th, 2022 the 4 videos of this webinar had 2 390 views in total.

⁷ <https://is.enes.org/workshops-detailed/#climate-indices>

between the workshops also a survey was held in which 32 persons participated, of which 24 were from Eastern Europe and 24 had a background in climate.

- Workshop, September 2021: Climate Data and Climate Data Tools for Impact Assessments in the Water Sector AQUA360 conference (1st September 2021, by Rutger Dankers and Janette Bessembinder)
- Webinar, demonstration Climadjust and virtual clinic⁸, October 2021: Bias-adjustments: Introduction webinar on available methods and tools and virtual clinic (October 14, 18 and 21, 2021, by Mathieu Vrac, Douglas Maraun, Juan José Sáenz de la Torre Lasierra, Janette Bessembinder)
- Webinar and workshop⁹, June 2022, Introduction to ESMValTool. Introduction webinar on the ESMValTool (June 13, by Klaus Zimmermann), and workshop with ESMValTool (June 27, led by Remi Kazeroni)
- Webinar¹⁰, October 2022: Introduction to the IS-ENES3 climate for the data services for the EU Outermost territories (October 12, 2022, by Guillaume Levavasseur and Christian Pagé)

⁸ <https://is.enes.org/training-detailed/#virt-clinic>

⁹ <https://is.enes.org/training-detailed/#esmvaltool-training>

¹⁰ <https://is.enes.org/training-detailed/#outermost-territories>

Webinar/ workshop	Nr. Partici- pants	Male/ Female /prefer not to say	Climate/impact/ climate services/ other	From Eastern Europe ¹	From outside Europe ¹
C4I follow-up webinar, Sept 2019	6-7	? ³	?	?	?
CORDEX/CMIP6 webinar, June 2020 ²	58	24 / 34 / 0	31 / 13 / 5 / 9	39	1
AQUA360, September 2021	4	?	0 / 4 / 0 / 0	?	?
Bias-adjustment webinar, demonstration and virtual clinic ² Oct 2021	145	80 / 60 / 5	86 / 39 / 20 / 0	17	39
ESMValTool webinar, June 2022 ²	108	64 / 42 / 2	83 / 6 / 9 / 0	6	39
ESMValTool workshop, June 2022 ²	64	26 / 37 / 1	50 / 5 / 9 / 0	3	30
IS-ENES3 data services outside Europe, webinar, Oct 2022	6	3/3/0	?	-	6
Climate indices Eastern EU, workshop May + Sept, 2021	76	34 / 42/0	?	36	5
Total	467- 468	231 / 218 / 8	250 / 67 / 43 / 9	101	120

¹ For this the country where people worked/studied was used. Regularly people from outside Europe were working/doing a PhD in a European country. Greece was not included.

² The number of people that subscribed to the webinars/workshops is mentioned. The number that participated is lower, but the webinars were recorded and the recordings were made available also to those that could not attend during the live webinar. For the activities on bias-adjustment no distinction was made between the participants of each activity

³ a “?” indicates that this was not recorded. Later in the project more detailed information was collected.

● 2.5 Workshops on standards

Workshop on standards for the following subjects were organized, mainly in the period 2020-2021. Due to COVID-19 many of these were online workshops. The number of participants and their background was not recorded as well as for the other activities in the former paragraphs.

For the two online meetings on Climate and Forecast Conventions (CF) the number of participants was more than 100. This is much more than the typical attendance of 30 - 40 at previous face to

face meetings. Virtual meetings are proving to be a useful method of engaging with newer members of the CF community and more will be held in the future (see M3.4¹¹).

Five meetings were held on CMIP6 Data Request in 2020. The documents mentioned in M3.4 do not give information on the number of participants, but these meetings mainly attracted people from the existing climate research community.

¹¹ <https://is.enes.org/milestones/>

3. Synthesis and recommendations

● 3.1 Challenges experienced

COVID-19: Due to COVID19 there were no physical meetings during about 2 years. This made networking more difficult. Face-to-face meetings offer much more options to talk to participants personally, and therefore are probably better for networking. Networking is more difficult with virtual events; people do not start a chat that easily with someone virtually. This can be overcome a little by organizing “come-back” events (done after the June event) or using break-out sessions with small groups.

Reaching people from specific communities: This task tried to extend the existing community with young Earth Science Scientists and people from VIA research and the climate services industry. Reaching young climate scientists is not that difficult, since they are easily reached or integrated in the existing climate research networks. Reaching the VIA community is more difficult. Part of the climate researchers has also contact with VIA researchers (through projects, institutes in their own country or through international projects and conferences, e.g. Climateurope, PRIMAVERA, ECCA), but not all. Therefore it takes more effort to find existing VIA research networks.

Difficult to reach commercial organisations, or organizations outside research

- Reaching people for these virtual events also depends a lot on the networks that we have already or that we can reach through our colleagues. This may need some more effort. We do have a good channel to reach people in Eastern Europe through PANNEX, but we should try to reach more impact researchers and climate service providers (although e.g. Climate KIC, ISIMIP and ECCA are good starting points, but many partners also have some personal contacts that could help in the various countries).
- Conferences such as the EGU, AGU, EMS attract many climate scientists. At these conferences only a limited number of impact researchers, (commercial) climate services providers or other people are present. Commercial companies do not often come to these conferences to participate in sessions (some do present themselves in stands). Therefore, it is not that easy to broaden the community beyond young climate scientists.
- Another disadvantage of these conferences is the conference fee and the travel costs. These may be a barrier for people from certain countries and they may be a barrier for e.g. impact researchers if they do not expect them to be a lot of strong interest to them (in this case side events to conferences of impact researchers are needed, e.g. ECCA).

Advertising at conferences of side events/splinter meetings:

The side-meetings or splinter sessions at the EMS and EGU cannot be found that easily in the programmes for these conferences. Therefore, flyers were made to distribute at the conferences and the sessions were promoted through the IS-ENES3 website, newsletter and twitter account, the partners of IS-ENES3, the CLIMLIST and PRIMAVERA mailing lists, the partners of IS-ENES3 and through twitter accounts of projects such as Climateurope and PRIMAVERA and the ENES portal.

Organising of short activities at location With COVID-19 it was impossible to organize short activities at location during about 2 years (from March 2020 to about March 2022). Therefore less short activities were organized than originally planned. Short activities at location also have the difficulty that they attract people that work or live close to that location or that are at that location for other activities. For the last option (other activities/workshops/conferences at location) one depends on these other activities. Therefore, we decided to organize some longer activities at location after the COVID-19 period in Romania and the Czech Republic. Although the organization of these events took much more time, the advantage of these longer activities (3-4 days) was that they could attract participants from a broader region (mainly Eastern Europe) and from more diverse disciplines (mainly impact researchers). Therefore, we could focus specifically on interaction between participants from different disciplines.

New version of C4I late available: during the project a new version of the C4I portal was developed and in the meantime the old version was not actively maintained. However, the development of the new C4I portal took much longer than planned. Therefore, it was often not possible to use the old version anymore (too slow, too often bugs) and neither the new version could be used already (not operational yet). To overcome this problem we showed the options of the old version, explained the new developments, but often used other portals (C3S CDS and Climate Explorer especially).

● 3.2 What worked well

Although there were several challenges, it is worth mentioning also what went well during the activities.

Connection to networks in Eastern Europe: We could profit from the network in Eastern Europe of partners and of other EU-projects. Many people from Eastern Europe were reached in this project with the help of the PANNEX community.

Use of other networks to broaden the user base: Also the mailing lists of EU-projects such as Climateurope and PRIMAVERA were used to reach a broader community. This worked well during these projects, but unfortunately after these projects these mailing lists could not be used

anymore due to privacy rules. Also the CLIMLIST mailing list was used regularly with which we could reach people from all over the world.

Reaching young scientists in existing networks: the networks of the partners in the project could be used to reach young scientists, especially in climate science. This worked especially well for the schools.

Advantage of COVID-19: online meetings could be recorded more easily and made available later on, either on shared spaces (created specifically for the event) or on the IS-ENES YouTube channel¹². Virtual meetings do not have the first two disadvantages mentioned above (travel costs and fee, and mainly scientists at conferences). Therefore, in principle it is possible to reach a broader audience (also people from other disciplines, other countries or even other continents). During the webinar that we organized in June 2020 we had participants from many different countries (especially many from Eastern Europe). Besides many climate scientists, we had 11 impact researchers, 4 climate service providers, 1 person from a commercial company and 6 persons from governments.

Contributions from other WP's for several of the activities: partners from other WP's and organisations were very willing to participate in activities of WP3 for webinars, workshops, schools. This was very pleasant and gave the possibility to use all the expertise available in the consortium. It is also felt that this was good for the participants in the activities, since they could have contact with the various experts personally (although during part of the project mainly online).

Some follow up meetings for the participants of the schools: for nurturing the new contacts from the schools, it was useful to have various follow-up meetings (webinars, workshops, dinner at EGU) and a Linked-In group.

● 3.3. Objectives reached

The first objective of this WP was to widen the IS-ENES user community. This was done especially by organizing the schools, the short trainings/webinars. In chapter 2 an indication is given on how many people we reached with these activities.

The second objective was to nurture the existing ENES users/stakeholders community: this objective was reached with the workshops on standards (get feedback on requirements), with

¹² <https://www.youtube.com/@user-ce2sz8xc1r/videos>

webinars, workshops and schools (to inform on new subjects and offer some training). The schools were especially focusing on young and new users, but the rest was open to all users/stakeholders.

The third objective is to expand community standards which serve the ENES community, in collaboration with the user community. Although this activity did not explicitly focus on broadening or nurturing the user community, indirectly the activities contributed to this, especially the workshops on climate indices for Eastern Europe.

● 3.4 Recommendations

From the activities in this WP (and other WP's and projects) we learned which things worked well and what worked less. Based on these experiences we give the following recommendations to reach a broader community:

- Use networks from other projects, organizations, etc. to reach new potential users
- Go to the conferences, workshops, etc. of other sectors/disciplines to reach new potential users
- With short trainings go to the countries, universities, organisations that you want to reach
- Keep in mind what is the background knowledge of the new users that you want to reach and adjust your presentations and the programme of webinars, workshops, etc. to this. This way they will probably learn much more and will not be scared off by the jargon, technical challenges, etc. It is better to present limited information and help participants apply this information, than overload them with information without helping them to apply it.
- The above also implies that new users need more than one meeting/workshop/webinar to be able to use the offered information and tools and to get an overview of all the challenges using climate data. It would be good to also offer support afterwards, or to organize a series of some events. It can also help to bring new users of climate data into contact with climate researchers that can help them later on.
- The school and workshops did not ask for fees (and regularly also covered accommodation and food/drinks). For young participants and participants from poorer countries this reduced clearly the costs for participation and probably made it possible for them to participate.
- Online workshops and webinars can be very useful, since they reduce time and travel costs. Especially for new users these may be ideal for a first introduction to a subject (but the workshops should be organized in such a way that they are understandable for new users with little background knowledge)
- Integration of the networks for climate researchers, VIA researchers and climate service providers can be profitable for all participants since they can learn from each other: climate researchers can get a better insight in the use and challenges of use of climate data for

climate services and VIA research and VIA researchers and climate service providers may profit from the expertise of climate researchers for accessing, processing and visualizing climate data.