

IS-ENES3 Deliverable D6.1

First periodical report on service statistics for models and tools

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ABSTRACT

IS-ENES services for European ESMs (Earth System Models) and Software Tools have been provided to the user community for the first 18 months of the IS-ENES3 project. The services are continuously monitored and KPIs are collected every 6 month from the groups that run the service endpoints.

This deliverable compiles the results of the first three KPI reporting periods and evaluates the outreach of services based on these findings.

Revision table			
Version	Date	Name	Comments
0	19/05/2020	Initial draft	
1	16/06/2020	Revised version	
2	18/06/2020	Release for review	
3	09/07/2020	Final version	

Dissemination Level			
PU	Public		
CO	Confidential, only for the partners of the IS-ENES3 project		

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Executive Summary

IS-ENES services for European ESMs (Earth System Models) and Software Tools have been provided to the user community for the first 18 months of the IS-ENES3 project. This is a continuation and extension of services provided in earlier phases of the IS-ENES project. The current phase includes the following installations:

- HadGEM/UKESM (ESM) by MetO
- EC-Earth (ESM) by the EC-Earth consortium
- NorESM (ESM) by met.no and UniRes
- OASIS (infrastructure tool) by CERFACS
- XIOS (infrastructure tool) by CNRS-IPSL and CERFACS
- Cylc/Rose (infrastructure tools) by the MetO
- ESMValTool (infrastructure tool) by DLR, BSC and NleSC

These installations constitute the service endpoints for the user communities. The main objective for the services is the easy access to information, provision of interfaces between ESM/tool developers and users, and the definition of interfaces for feedback from user communities.

All services are continuously monitored using the following key performance indicators (KPIs):

- KPI 1: Number of released versions
- KPI 2: Active contributors
- KPI 3: Issues opened/closed
- KPI 4: Mails or forum messages exchanged

KPIs are gathered every 6 months from all service providers. The first three KPI reporting periods (i.e. 18 months in total) are covered in this report and evaluation shows that all services have maintained an active level. The KPIs cover in particular the provision of updated software to the user (KPI1), the activities to maintain momentum in the development (KPI2). The quantitative uptake of the services by users (KPI3+4) and the quantitative response activities by service providing groups (also KPI3+4).

1. Objectives

The overarching objective for VA1/WP6 is to maintain, extend, and improve the services around the main European ESMs, the NEMO ocean model, and related critical infrastructure software tools. These services help to efficiently connect the respective development and user communities and thus support the usage and development of European ESMs as well as the exploitation of climate model data.

In order to monitor the effectiveness of level 2 services for European ESMs (cf. task 2) and for European infrastructure tools (task 3), KPIs have been set up at the beginning of the project period. This deliverable describes the KPIs that were identified for the work package, reports the collected KPIs for the first reporting period, and other service activities in tasks 2 and 3.

2. Methodology and Results

2.1 Key Performance Indicators (KPIs) for VA1/WP6

The KPIs for this work package have been discussed among VA1/WP6 partners and have been chosen to match the following criteria:

- support sustainability for services w.r.t. the previous project IS-ENES2
- ensure ability for all partners to deliver the KPIs for ESM and software tools services

In particular, the following KPIs will be gathered every six months, starting in June 2019:

KPI 1: Number of released versions

The number of releases and the respective version numbers that were published (through channels chosen by the respective group, e.g. public software repositories) during the reporting period. Used to track activity related to provision of improved software.

KPI 2: Active contributors

Number of people that have actively contributed to the development of the ESM/software tool during the reporting period. Could be retrieved from the version control system. Used to track development resources dedicated to serve the user community.

KPI 3: Issues opened/closed

The number of issues that were (i) opened, and the number of issues (ii) closed, in the issue tracking system of the ESM/software during the reporting period. Used to track (i) the level of service usage by the community, and (ii) the response by the development groups.

KPI 4: Mails or forum messages exchanged

Either the number of mail exchanges between developers and users or the number of messages exchanged in dedicated discussion forums concerning the ESM/software tool, accumulated during the reporting period. Used to track the service usage and interactions between ESM/software tool developers and users.

These KPIs reflect to a large degree the development cycle for large software development projects, which is in good agreement with the work flow of the participating institutes. Thus, all groups were able to regularly provide the KPIs without major overhead.

The KPIs reflect, on the other hand, the interaction between the modeling/development groups and their user community. KPI1 (releases), for example, indicates how users can rely on updated and improved versions of the software they need. Another example, KPI3, measures interactions both ways: The number of “issues opened” indicates how much users turn to the service providers, asking for help. Thus, this number provides an indication as to how much the service is used. The “issues closed” metric monitors the response of the service providers, as they answer the incoming questions or solve problems.

Even though a common set of KPIs is used for all models/tools, there are differences in the particular services individual groups offer. Some rely more on mails or forum messages, while others use their ticketing services much more extensive. Some use a more frequent release schedule, while others package larger changes in infrequent releases. Thus, the actual quantities of the KPIs can have systematic differences between the service providers. This had to be taken into account when evaluating KPIs between groups. Another aspect is the temporal evaluation of KPIs. There may be phases with high activity alternating with periods of lower service usage. The pre-CMIP6 phase is an example of intensive development for the ESMs, which leads presumably to a higher service activity levels.

The next three sections give a detailed list and evaluate the KPI collections for the first three half-year periods of IS-ENES3. A summary in diagrams for all KPIs for all groups and collection periods is given in section 2.7.

2.2 First half-year collection of KPIs

The first KPI period covers 6 months from 1/1/2019 until 30/6/2019:

Institute	ESM/tool	KPI 1 (versions)	KPI 2 (contributors)	KPI 3 (issues)	KPI 4 (messages)
CERFACS	OASIS	0	5	12 opened 4 closed	151
SMHI	EC-Earth	4 (3.3.0,	26	69 opened 77 closed	16

		3.3.0.1, 3.3.1, 3.3.1.1)	
MetO	Rose/Cylc	Service provided and activity reported in ESiWACE	
CNRS-IPSL	XIOS	0	3 - 14
CNRS-IPSL	NEMO	1 (4.0)	40 93 opened 109 closed 8 (forum only)
UniRes, met.no	NorESM	0	ca. 25 15 ca. 100 extern > 1000 intern
DLR, BSC, NleSC	ESMValTool	1 (v2.0a2)	27 76 opened 123 closed ca. 80

All services have been active under the first reporting period. The actual range of KPI values varies between the services, which indicates that groups prefer different service activities. The differences may also reflect the differences in the size and structure of the user communities. Nevertheless, it can be seen by looking at KPIs 3 and 4 together that services work in both directions: users get in contact with the service endpoints and groups provide services by reacting upon that contacts.

The service for the Cylc work flow manager was implemented within the Centre of Excellence (COE) program ESiWACE during this period, in order to investigate its use by the community. At the end of ESiWACE, it has been transferred to IS-ENES3, in agreement with IS-ENES' mission. The Cylc KPIs are included in the following KPI reporting periods.

2.3 Second half-year collection of KPIs

The second KPI period covers 6 months from 1/7/2019 until 31/12/2019:

Institute	ESM/tool	KPI 1 (versions)	KPI 2 (contributors)	KPI 3 (issues)	KPI 4 (messages)
CERFACS	OASIS	0	6	8 opened 1 closed	127
SMHI	EC-Earth	1 (3.3.2)	25	85 opened 124 closed	5
MetO	Cylc (core only)	2 (7.8.4, 8.0.a1)	11	108 opened 63 closed	53
	Rose	1 (2.0a1)	7	11 opened 8 closed	

MetO	HadGEM UK-ESM	2 (06+12/2019)	60	195 opened 203 closed	ca. 500-1000
CNRS-IPSL	XIOS	0 (166 commits)	3	4 opened 0 closed	87
CNRS-IPSL	NEMO	1 (4.0.1)	29	20 opened 100 closed	100
UniRes, met.no	NorESM	1	25	100 (incl CMIP6)	>5000
DLR, BSC, NleSC	ESMValTool	8 (2 ESMValTool, 6 ESMValCore)	35	110 opened 193 closed	ca. 5000

The second reporting period covers a lot of service activities across all groups. Particularly the ESM services have a high level of user interactions, which can probably be attributed to a phase of intensive CMIP6 activities.

2.4 Third half-year collection of KPIs

The third KPI period covers 6 months from 1/1/2020 until 30/6/2020:

Institute	ESM/tool	KPI 1 (versions)	KPI 2 (contributors)	KPI 3 (issues)	KPI 4 (messages)
CERFACS	OASIS	0	5	4 opened 1 closed	168
SMHI	EC-Earth	2 (3.3.2.1, 3.3.3)	23	47 opened 131 closed	0
MetO	Cylc (core only)	4 (7.8.5, 7.8.6, 7.9.0, 7.9.1)	8	71 opened 48 closed	30 (forum only)
	Rose	1 (2019.01.3)	3	4 opened 1 closed	
MetO	HadGEM UK-ESM	2	88	236 opened 236 closed	780
CNRS-IPSL	XIOS	0	1	2 opened 0 closed	25

CNRS-IPSL	NEMO	1 (4.0.2)	41	57 opened 100 closed	150
UniRes, met.no	NorESM	1	35	44 opened 29 closed	ca. 5000
DLR, BSC, NleSC	ESMValTool	9 (3 ESMValTool, 6 ESMValCore)	36	102 opened 100 closed	ca. 5000

The third period for KPI reporting shows regular service activities for all groups and user communities. It is noted that the number of messages for NorESM and ESMValTool are estimated because their respective message channels are very frequently used. For ESMValTool, this indicates most likely a fast growing user community, while in the case of NorESM, this reflects the fact that the model is part of the much larger CESM community.

2.5 Other service activities

Beside the service activities that are covered by the KPIs, which relate to level 2 services on European ESM plus services for European infrastructure tools, there are complementary service activities that relate to level 1 services for models and tools. Particularly, the update and maintenance of the ENES Portal (portal.enes.org → Models&Tools) information for models and tools has been worked on under the reporting period. For the models and tools covered by the KPI collection, the corresponding web pages have been completely revised to reflect the CMIP6 status while retaining the previous versions information, where applicable. Model and modeling group descriptions have been updated, as well as contact information for model and tool users.

Of particular importance are comprehensive model descriptions that are kept at the ES-DOC (search.es-doc.org) service. WP6 has encouraged modeling groups to complete ES-DOC information about CMIP6 versions of participating models. Where available, the ES-DOC model information is linked at the ENES Portal pages, which allows for easy access to detailed model descriptions for the users. Model information for EC-Earth and UKESM are available at ES-DOC at the time of writing this deliverable, while information for NorESM is still being processed by the ES-DOC team prior to publication. Model information of further European ESMs (CNRM-CM6, CNRM-ESM2, IPSL-CM6, MPI-ESM) have been made available at ES-DOC as well.

2.6 A note on download numbers

It has been mentioned before that the KPIs for this work package have been selected, among other reasons, such as to provide continuity with respect to the previous IS-ENES phase (IS-ENES2). One KPI that has not been continued is the “Number of downloads” from the websites of the participating model and tool groups. It has turned out that the majority of groups are not

able to provide download statistics for their model or tool. Thus, due to the extension of the service to a larger number of models and tools, this particular KPI has been dropped.

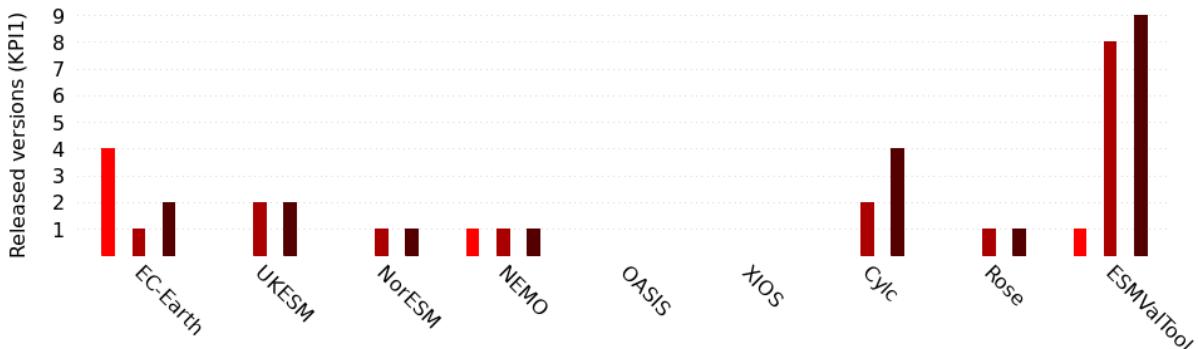
The reason for the groups not being able to provide download statistics is primarily the distribution model for the software. Models and tools tend to be more freely available to users, particularly without prior registration. This would make any download statistics at least very inaccurate, if not impossible.

A number of models and tools provide their software via Github (e.g. Cylc, ESMValTool), others use institutional servers (e.g. NEMO, XIOS via forge.ipsl.jussieu.fr), which are openly available. For some models (e.g. EC-Earth) the access to the software is restricted due to licensing reasons, but the downloads as such are not recorded in a way that could provide meaningful statistics.

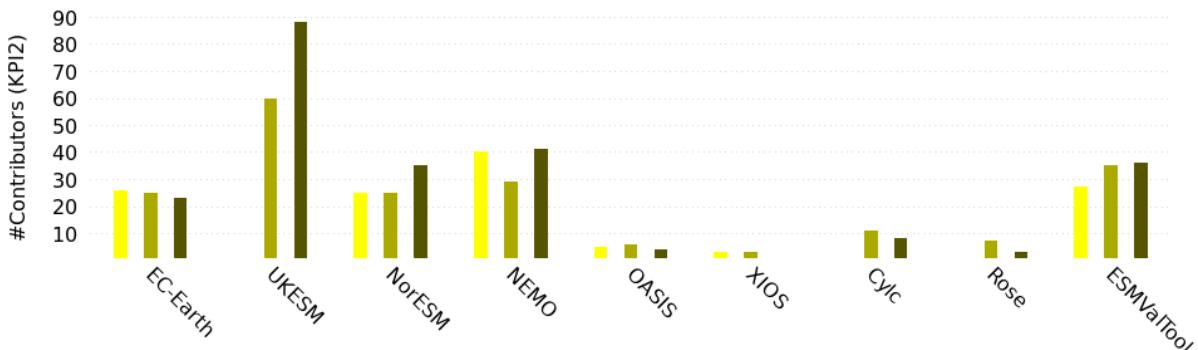
2.7 KPI Summary and overview

The following figures show a graphical summary for all KPIs for all models and tools, and for all three reporting periods. The values for the reporting periods are ordered from left till right, for each of the models/tools, and given color shades from light (period 1) to dark (period 3).

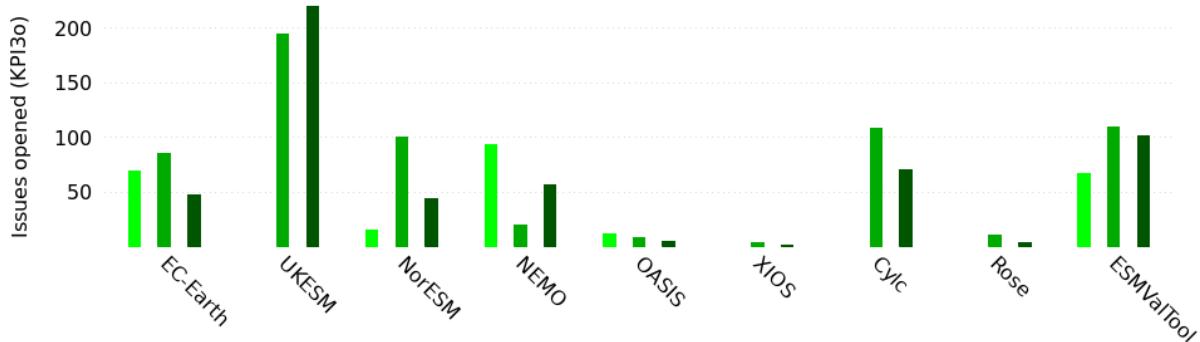
KPI 1 – Released versions:



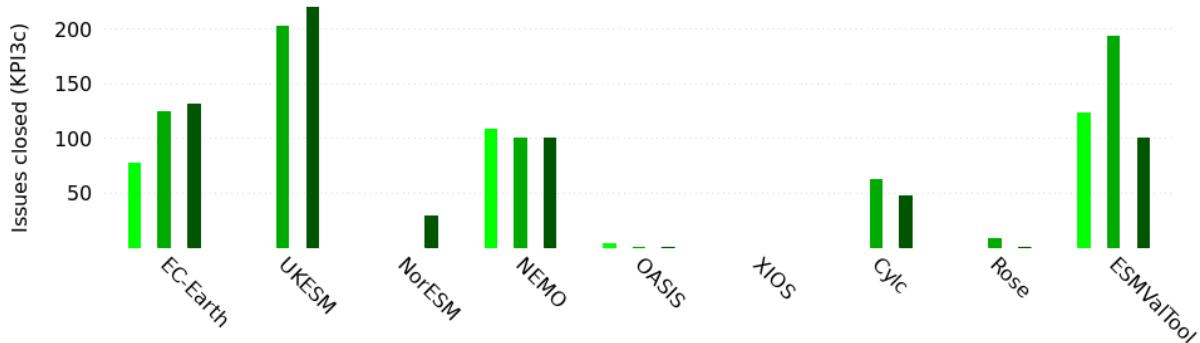
KPI 2: Contributors:



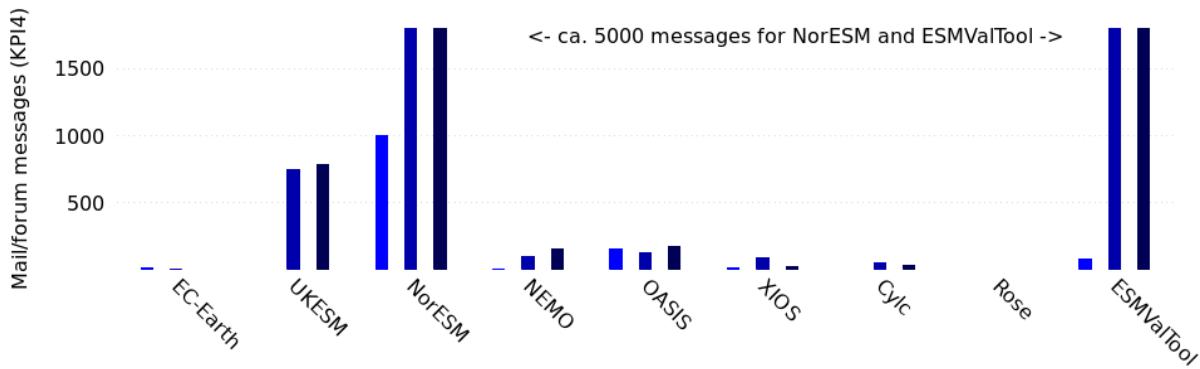
KPI 3: Issues opened



KPI 3: Issues closed:



KPI 4: Mail/forum messages:



3. Conclusions and Recommendations

IS-ENES Services on European ESMs and software tools have been maintained and substantially extended with respect to IS-ENES2. Three software tools (Cylc/Rose, XIOS, ESMValTool) and three ESMs (EC-Earth, HadGEM/UK-ESM, NorESM) are regularly reporting service KPIs, in addition to OASIS and NEMO, which have already done this in the previous IS-ENES2 phase.

The extension to new ESMs and tools means that a substantially larger user community makes use of IS-ENES level 2 services for European ESMs and services for European infrastructure tools.

All ESMs and tools have maintained a high level of service activities, as proven by the KPIs in the first three KPI reporting periods. All groups have actively developed their software (KPI2) and all except for OASIS and XIOS have provided new versions to their respective users (KPI1). The services are widely used by the community (KPI3, opened issues) and all groups make great effort in providing help to users (KPI3, closed issues). While most of the groups rely on issue tracking as a main tool for user interaction, some seem to prefer user forums for communication (KPI4, e.g. CERFACS/OASIS). Either way, an intensive exchange between service providers and user communities can be observed.

There are, overall, quantitative differences between groups, regarding the users interactions covered by KPI3 and KPI4. This reflects to a large degree the differences in the respective user groups, mostly regarding the size, but possibly also the structure (e.g. development vs downstream usage).