# COSMO Priority Project: Establishing COSMO to ICON migration for Licensees' Countries (C2I4LC)

**Version Date: 29.08.2022**
**Duration: 01/9/22-31/10/23**
**Total FTEs: 2.62 + X**
**Collaboration between WG6, WG4 and WG5**
**Project Leader:** Bogdan Maco **(NMA)**

## Motivation and Goals

The COSMO model has been used operationally under a licence agreement by the national meteorological services of the United Arab Emirates (NCMS), Brazil (INMET), Oman (DGMAN), Botswana (BMS), Brazilian Navy (DHN), and Turkmenistan (Turkmen Gidromet). The annual licence fee for the operational usage of the COSMO model is 20,000 € per service but there is no charge for least developed countries. This allows e.g. Burkina Faso, Egypt, Georgia, Indonesia, Kenya, Madagascar, Malawi, Mozambique, Nigeria, Pakistan, Philippines, Rwanda, Sudan, Tanzania, Ukraine, Vietnam, and Zimbabwe to use the COSMO model free of charge. There are also a few weather services which are evaluating the usage of our model system. Among them are the national weather services of Armenia, Azerbaijan, and South Africa. They currently have a scientific licence.

The funds acquired from licence fees are used to support the scientific development tasks of COSMO, to promote collaboration between COSMO partners and for training activities, with the aim to enhance the model performance. The COSMO spirit was built during the years by many meetings which were partly funded by the licensees countries.

Although it is still under negotiations it seems that ICON will be an open-source code and the payment to COSMO will be for support activities. Furthermore, COSMO can give ICON users a sense of community and an added value worth paying for.
The last COSMO model, version 6.0, was released at the end of 2021. For the next five years, the COSMO consortium will provide maintenance (bug fixes) for the COSMO-model users. This PP establishes the framework for the support activities that aim for a smooth migration from the COSMO model to ICON-LAM for licensees' countries around the world.

The goal of the PP is to establish a dedicated team that will start the migration process. This includes defining the requirements for a future support framework as well as establishing the necessary tools (hard- and software). The overall goal of the proposed priority project is to pave the way for a smooth transition from the COSMO model to ICON-LAM for licensing countries in future years.

In the future, a single point of contact could unify COSMO support and other support activities, e.g. for academia.
A collaboration between WG6 (Reference Version and Implementation), WG4 (Interpretation and Applications) and WG5 (verification and case studies) is needed for the PP success. Furthermore, the CLM community is facing the same challenges.

## Description of individual tasks

### Task 1. Extend COSMO/ICON users community - Requirements

**Subtask 1.1: With WG4 finalize the COSMO user's Technical Feedback survey.**

A first draft of the survey already has been done in the PP COMFORT (ICON-COMpetence in FORecasTing) and it is available in the link:

http://www.cosmo-model.org/content/support/survey/default.htm

The survey should be finalized and sent to a mailing list created in PT COMFORT with a cover letter to achieve the goals of this PP.
Subtask 1.1 is included for the completeness of the PP and the results are obtained from PP COMFORT (no FTEs allocated).
**Deliverables:** A survey ready to be sent to COSMO Licensees' Countries (obtained from PP COMFORT)

**Participating scientists:**

Theodore Andreadis (HNMS), Dimitra Boucouvala (HNMS), Yoav Levi (IMS)
Review by all.

**Subtask 1.2: Analyze the survey answers**

Create a file with all the COSMO users' information. Have some basic statistics to understand the willingness of the COSMO users to migrate to ICON-LAM as well as their need for support activities/software such as postprocessing and verification.

This information will be provided together with WG4, from PP COMFORT.

Create a list of users that are interested to run ICON-LAM in the cloud (AWS, Google or Azure)

Subtask 1.2 analysis will be done together with PP COMFORT. FTEs will be given only to participants who are not part of PP COMFORT.

**Deliverables:** A list with the users' info including the exact number of users/ countries wishing to be assisted during the implementation and running phase of the ICON model and their willingness to run ICON-LAM in the cloud.

**Participating scientists**

Bogdan Maco (NMA)
Rodica Dumitrache (NMA)
Dimitra Boucouvala (HNMS)
Yoav Levi (IMS)
Grzegorz Duniec (IMGW)
Riccardo Scatamacchia (COMET)

## Task 2. Support scheme for Licensees

A possible support activity scheme is sketched in Fig.1. In the following, we will provide a description of the tasks and scope of the individual boxes.

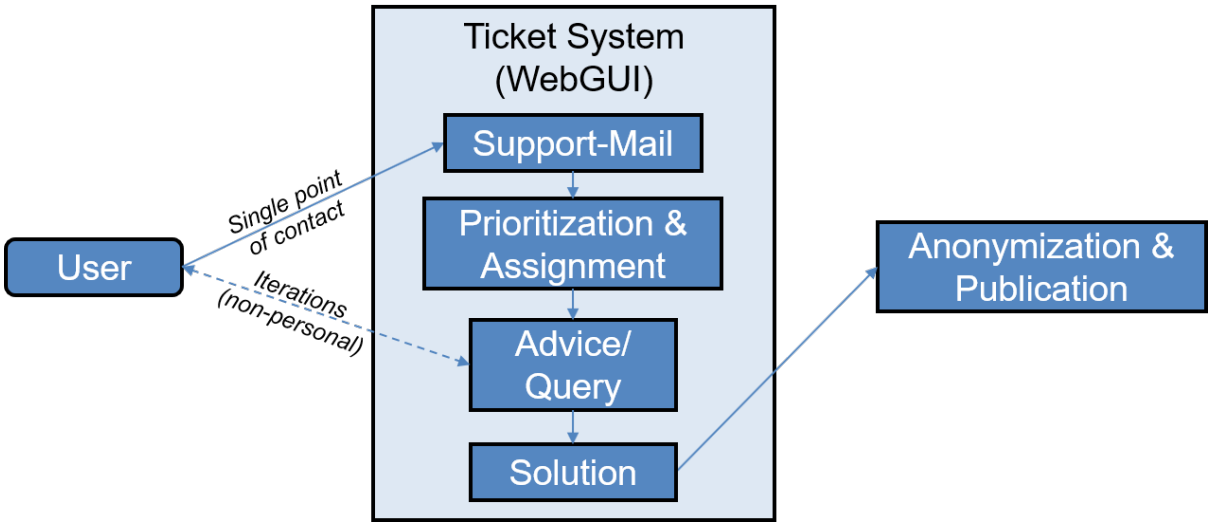


**Figure 1:** Possible Support activity scheme

**User:** Although the scope of this PP targets specifically national meteorological services with a license, a basis should be set to concentrate all support activities. Thus, persons from the whole ICON community are a ***user*** in this context.

**Support-Mail:** As the arrow pointing at ***Support-Mail*** suggests, a single point of contact is needed for all users. The separation, who takes care of the support request, can be conducted at a later step.

**Prioritization & Assignment:** This step of the support workflow is crucial. The first-level support team separates support requests into two lines. Requests from national meteorological services are given a high priority and the support is provided by COSMO. All other requests are given normal priority which means that support is provided by COSMO or the ICON community. All support requests will receive a timely (at least automatic) reply. We suggest that for high-priority users support will be provided within one working day. bogdThe ***Assignment*** part should classify the support level and make suggestions for the responsible person.

**Advice & Query:** Support often requires some iterations before a solution is available.

**Solution/Anonymization & Publication:** When a solution is reached, it is internally visible to the support providers. This is already a step forward! Ideally, this solution should also be visible to everyone outside the support group to reduce the overall support load.

The proposed system has the major advantage that the support requests are internally visible to everyone who provides support. Although the blue and the green line are separated in terms of the support providers and prioritization, the individual requests are still visible to every support provider. This avoids duplicate work.

The first immediate action will be the definition of a single point of contact (generic e-mail account), followed by establishing a request handling system. The detailed technical steps that have to be taken are outlined in subtask 2.1. This technical framework then needs to be filled with people who provide the support. This is further described in subtask 2.2.

**Subtask 2.1: Web page design and tracking software**

In detail, this subtask consists of the following work packages:

- **E-mail address for a single point of contact**, ideally using a dedicated top-level domain.
- Setting up a suitable **tracking software**, which could be one of the following: Jira (proprietary), Request Tracker (open source)
- **Creating a dedicated web page including a FAQ page** which should point out the main implementation steps and the most common errors. This web page will also include links to documentation and ICON set-up info.

**Deliverables:** Single point of contact, dedicated domain and website, request tracking software up and running.

**Participating scientists**

Rodica Dumitrache (NMA)
Bogdan Maco (NMA)
Grzegorz Duniec (IMGW)
Riccardo Scatamacchia (COMET)
Theodore Andreadis (HNMS)
Alon Shtivelman (IMS)
Daniel Rieger (DWD)
Uli Schättler (DWD)

**Subtask 2.2: Assign a COSMO expert to each support level and possible problems.**

This subtask fills the technical framework from the previous subtask with the experts to provide the support. The following steps are necessary:

- Create a list of potential problems in the C2I process according to the participants' experience.
- Create a list of experts and assign possible problems to them (either management decisions or PL, depending on the exact context at the moment of the task fullfilment)
- Investigate the need for a “load balancing” system by tracking the load of individual experts.

**Deliverables:** A list of experts with areas of expertise

**Participating scientists**

Bogdan Maco (NMA)
Rodica Dumitrache (NMA),
All

## Task 3. User Support Activities

### Subtask 3.1: Training course

If needed, assist DWD with C2I4LC experts to give some of the lectures. The cost for the expert travel will be covered via a COSMO activity proposal.

**Deliverables:** If needed participation in the training course.

**Participating scientists**

Rodica Dumitrache (NMA)
Uli Schättler (DWD)

### Subtask 3.2: Documentation

Create a short user guide for considering the computing resources, compilers and other specific requirements, including possible problems such as:

Besides the existing documentation (ICON Tutorial) we need a “Quick Installation Guide” (e.g. included in the ICON Tutorial in a similar way as the Summary for Policymakers in the IPCC reports). This should cover the basic things like:

- How to use configure scripts (and what they do)
- Compilation
- Libraries
- Icon Tools
- Model (installation)
- Namelist setting
- Icon grid generator + ExtPar
- using the grid generator
- Fieldextra

Note: Software that is currently not officially supported needs a management decision. This applies especially for the ICON Tools and the webinterface for grid & external parameter generation

**Deliverables:** a short user guide

Added to: https://www.cosmo-model.org/content/support/icon/default.htm

**Participating scientists**

Theodore Andreadis (HNMS)
Alon Shtivelman (IMS)
Bogdan Maco (NMA)
Grzegorz Duniec (IMGW)
Riccardo Scatamacchia (COMET)
Ulrich Schättler (DWD)

**Subtask 3.3: ICON setup information**

- provide some basic setups: mid-latitude, tropical
- often help is needed just to find the correct namelist setting
- investigation of run-time errors and crashes: IMPORTANT: for all partners, we need their grids, external parameters and setups to be able to reproduce problems
- Solutions should be cross-checked (4-eyes principle)?

The exercises from the training course can be used as test data set to check if the model is running in principle.

**Deliverables:** basic setups

**Participating scientists**

Uli Schättler (DWD)
Alon Shtivelman (IMS)
Bogdan Maco (NMA)
Grzegorz Duniec (IMGW)
Riccardo Scatamacchia (COMET)

### Subtask 3.4: Setup a concept of how to handle data supply requests

Many support requests currently target data-related questions, either operational or test data sets. These support requests will likely also be sent to the support mailing list in the future. Thus a concept is needed on how these requests can be forwarded/resolved.

**Participating scientists**

Uli Schättler (DWD)

…

## Task 4. Establish the framework for verification

One of the Licensing conditions granting the ICON-Software for National Meteorological and Hydrological Services (NMHS) for purposes of official duty, is:

“The NMHS is obliged to yearly release to the Licensor in the form described in the Appendix the evaluation and verification of any work or service for which the supplied ICON-Software was used and, if applicable, to discuss with the Licensor on the occasion of work-related meetings any developments to the ICON-Software necessary to install and run the software produced by the NMHS and to release to the Licensor the evaluation results resp. the further-developed ICON-Software in a suitable form.” (from the contract draft)

Hopefully, by 2024 some countries will have semi-operational ICON-LAM runs. Until then, together with the new ICON-LAM uses, understand the users' needs and what we can do (with our very limited resources) to help the users to perform verification that will be useful for both the users and the ICON developers.

Define the way how to prepare the minimum verification required to fulfil the obligation of verification, based on the performance of their model over their area.

**Deliverables:** Establish a method of verification of the NMHS to fulfil the licence condition

**Participating scientists**

Flora Gofa

### Task 5. Implementation of the migration plan to ICON-LAM

**Deliverables:** by the end of 2024 paying countries should have the possibility to migrate to ICON-LAM by 2026 in all other counties.

**Participating scientists**

All

As the support activities will be tracked every actual full day of support will be counted as 0.005 FTE

### Task L. Project leadership

Given the extent and distribution of the project team, some administrative activities should be included in this task (regular web conferences, information exchange through e-mail, etc).
This will support better collaboration and enable the information exchange flow between project participants.

## Risks

On the one hand, lack of cooperation and willingness from the licensee countries to migrate from OCSMO to ICON-LAM. On the other hand lack of resources in the COSMO consortium to fulfil all needed support.

## Links with other projects or activities

- COSMO WG4

- COSMO WG5
- COSMO PP C2I
- CLM Community

## SUPPORT TEAM

| Name | Country | e-mail |
|---|---|---|
| Rodica Dumitrache | Romania | claudia.dumitrache@meteoromania.ro |
| Uli Schättler | Germany | Ulrich.Schaettler@dwd.de |
| Daniel Rieger | Germany | daniel.rieger@dwd.de |
| ???? | Switzerland | |
| Riccardo Scatamacchia | Italy | riccardo.scatamacchia@aeronautica.difesa.it |
| Theodore Andreadis | Greece | theodore.andreadis@yahoo.com |
| Dimitra Boucouvala | Greece | dbouc_gr@hotmail.com |
| Grzegorz Duniec | Poland | grzegorz.duniec@imgw.pl |
| Bogdan Maco | Romania | bogdan.maco@meteoromania.ro |
| Alon Shivelman | Israel | alons@ims.gov.il |
| Yoav Levi | Israel | leviyo@ims.gov.il |
| Massimo Milelli (WG6) | CIMA | massimo.milelli@cimafoundation.org |
| Flora Gofa (WG5) | Greece | flora.gkofa@hnms.gr |
| Andrzej Mazur (WG4) | Poland | Andrzej.Mazur@imgw.pl |
| Christian Steger (CLM) | Germany | Christian.Steger@dwd.de |

## Participating scientists

Bogdan Maco (NMA) (0.78 FTE)

Rodica Dumitrache (NMA) (0.21 FTE)

Massimo Milelli (CIMA) (0.16 FTE)

Dimitra Boucouvala (HNMS) (0.08 FTE)

Theodore Andreadis (HNMS) (0.12 FTE)

Alon Shtivelman (IMS) (0.16 FTE)

Daniel Rieger (DWD) (0.08 FTE)

Yoav Levi (IMS) (0.08 FTE)

Uli Schättler (DWD) (0.27 FTE)

Grzegorz Duniec (IMGW) (0.16 FTE)

?? (MeteoSwiss)

Riccardo Scatamacchia (COMET) (0.16 FTE)

Flora Gofa (HNMS) (0.2 FTE)

Andrzej Mazur (IMGW) (0.16 FTE)

Christian Steger (DWD) (0 FTE)

## Estimated resources

**Table 1. Analysis of Resources**

| # | **Task** | **Contributors** | **FTE SON 2022** | **FTEs DJF 2022** | **FTEs MAM 2023** | **FTEs JJA 2023** | 2023-2027 |
|---|---|---|---|---|---|---|---|
| 1.1 | With WG4 finalize the COSMO user's Technical Feedback survey | Dimitra Boucouvala, Theodore Andreadis, Yoav Levi, Christian Steger | | | | | |
| 1.2 | Analyze the survey answers | Rodica Dumitrache, Dimitra Boucouvala, Bogdan Maco, Yoav Levi, Grzegorz Duniec, Riccardo Scatamacchia, Christian Steger | | | | | |
| 2.1 | Web page design and tracking software | Rodica Dumitrache, Bogdan Maco, Grzegorz Duniec, Riccardo Scatamacchia, Theodore Andreadis, Alon Shtivelman, Uli Schättler, Daniel Rieger, | | 0.48 (0.04 each) | 0.48 (0.04 each) | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | Yoav Levi, Massimo Milelli, Andrzej Mazur<br>Dimitra Boucouvala | | | | | |
| 2.2 | Assign a COSMO expert to each support level and possible problems | Rodica Dumitrache, Bogdan Maco, ALL | | 0.24 (0,12 each) | | | |
| 3.1 | Training Course | Uli Schättler, Rodica Dumitrache | | | 0.02 (0.01 each) | | |
| 3.2 | Documentation | Theodore Andreadis, Alon Shtivelman, Bogdan Maco, Grzegorz Duniec, Riccardo Scatamacchia, Uli Schättler, Andrzej Mazur, Massimo Milelli | | | 0.32 (0.04 each) | | |
| 3.3 | ICON setup information | Uli Schättler , Alon Shtivelman, Bogdan Maco, Grzegorz Duniec , Riccardo Scatamacchia, Andrzej Mazur, Masimmo Milleli | | | 0.28 (0.04 each) | | |
| 3.4 | Setup a concept of how to handle data supply requests | Uli Schättler ... | | | 0.1 | | |
| 4.0 | Establish the framework for verification | Flora Gofa | | | | 0.2 | |
| 5.0 | Implementation of the migration plan to ICON-LAM | | | | | | According to the actual time used (0.005/day) |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| L | Project leadership | PL | 0.125 | 0.125 | 0.125 | 0.125 | |
| **TOTAL 2022-2023** | | | **Aprox. 2,62 FTEs** | | | | |
| | | | | | | | |