IS-ENES3 Milestone M2.4

The adapted process to build the ENES Foresight Infrastructure Strategy *(Initially named "First Strategy Workshop")*

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Author: Fanny Adloff (DKRZ)
Reviewers: Sylvie Joussaume (IPSL-CNRS), Bryan Lawrence (UREAD-NCAS)
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ABSTRACT

The IS-ENES3 description of activities was written in the pre-pandemic era, and we had initially planned a "First Strategy Workshop" to launch the process of building the new **ENES Foresight infrastructure strategy** for the coming decade 2023-2032. We obviously had to adjust the plans with the pandemic. Initially planned as a synthesis of the First Strategy Workshop, this Milestone has been readapted accordingly, and we now explain the new process, present the outcome of the ENES Foresight Strategy Kickoff telco as well as the chosen methodology and the next steps.

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1. Introduction to the ENES Foresight infrastructure strategy

ENES, as part of previous IS-ENES projects, has developed foresight strategies in **2012**, with a mid-term update in **2017**. These foresight strategies have linked climate science aspirations to infrastructure requirements. An update of this strategy for the coming decade is now due.

IS-ENES3 is thus carrying an update of the ENES foresight infrastructure strategy for the coming decade, linking climate science aspirations to infrastructure requirements. This is ***not*** a science strategy but an ***infrastructure strategy informed by science requirements.***

For this purpose "infrastructure" includes software (models and tools), hardware (HPC, analysis systems, networks), and the necessary people and skills. For software we are particularly interested in capabilities and libraries where these are likely to be shared and/or introduce dependencies on progress. This foresight is prepared in collaboration with the EC funded ESiWACE2 project.

While this strategy will be important to support the sustainability of the infrastructure, it requires a specific process to build a long-term vision of the European ENES infrastructure strategy.

The contribution of the institutions involved in climate modelling research across Europe is crucial. While previous strategies have been developed in dedicated science meetings, of necessity (post-pandemic) we have now set up a different process (presented in paragraph 2) to gather the plans and needs of the institutions involved in climate modelling research across Europe.

2. A new process adapted to the pandemic circumstances

Fig. 1 presents a sketch of the different phases we have adopted for the ENES Foresight Infrastructure Strategy process, from its launch to the final document.

We started with a 1-hour kick-off virtual meeting early March 2022 with senior representatives from climate modelling groups to establish the methodology for building the strategy. This is now being followed up with bilateral meetings to focus content. After that, we will draft a Foresight Strategy 2023-2032 document and will ask the representatives from modelling groups to provide feedback in autumn. We aim to finalise the process with a follow up in-person science meeting (covid permitting) toward the end of the year to finalise the strategy document.

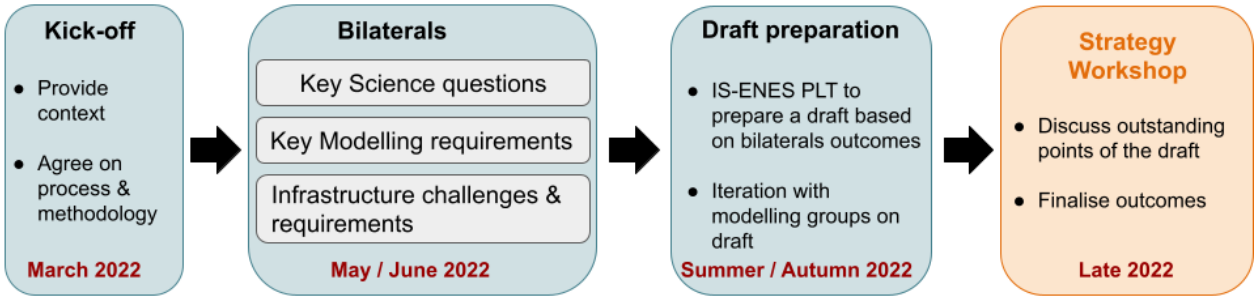

Fig. 1: Timeline of the ENES Foresight Infrastructure Strategy 2023-2033 process.

3. The kickoff and agreed methodology

We have had the kickoff virtual meeting early March 2022. This meeting gathered high level representatives from the following European institutions: National Centre for Atmospheric Science (NCAS), UK MetOffice, Meteo-France/CNRM, Institut Pierre Simon Laplace (IPSL), Max Planck Institute for Meteorology, German Climate Computing Center (DKRZ), Euro-Mediterranean Center on Climate Change (CMCC), Swedish Meteorological and Hydrological Institute (SMHI), NORCE, Danish Meteorological Institute, Cerfacs, Helmholtz-Zentrum Hereon, Stockholm University and Hungarian Meteorological Services.

The meeting aimed at gathering the European climate modelling institutions to (1) present the concept of ENES Foresight Infrastructure Strategy, (2) assess whether they are willing to engage in the process, and (3) define together the best methodology to gather the required outcomes.

This kickoff meeting has shown that there is a clear interest from represented modelling groups to engage in building ENES Foresight Infrastructure Strategy for 2023-2032. It was also raised that we might gain in being more inclusive as we share some challenges with operational activities.

Fig. 2 presents a description of the thinking behind the methodology agreed for handling the telcos; starting by identifying the ***Key science questions*** to derive the ***Key modelling requirements*** and associated ***requirements and challenges*** in terms of ***infrastructure.*** In doing so, consider related operational and research collaborations, and any necessary advances in foundational science that

depend upon, or impact upon, infrastructure, defined as (at least): large facilities, federated infrastructure, shared software, and the need for skilled people.

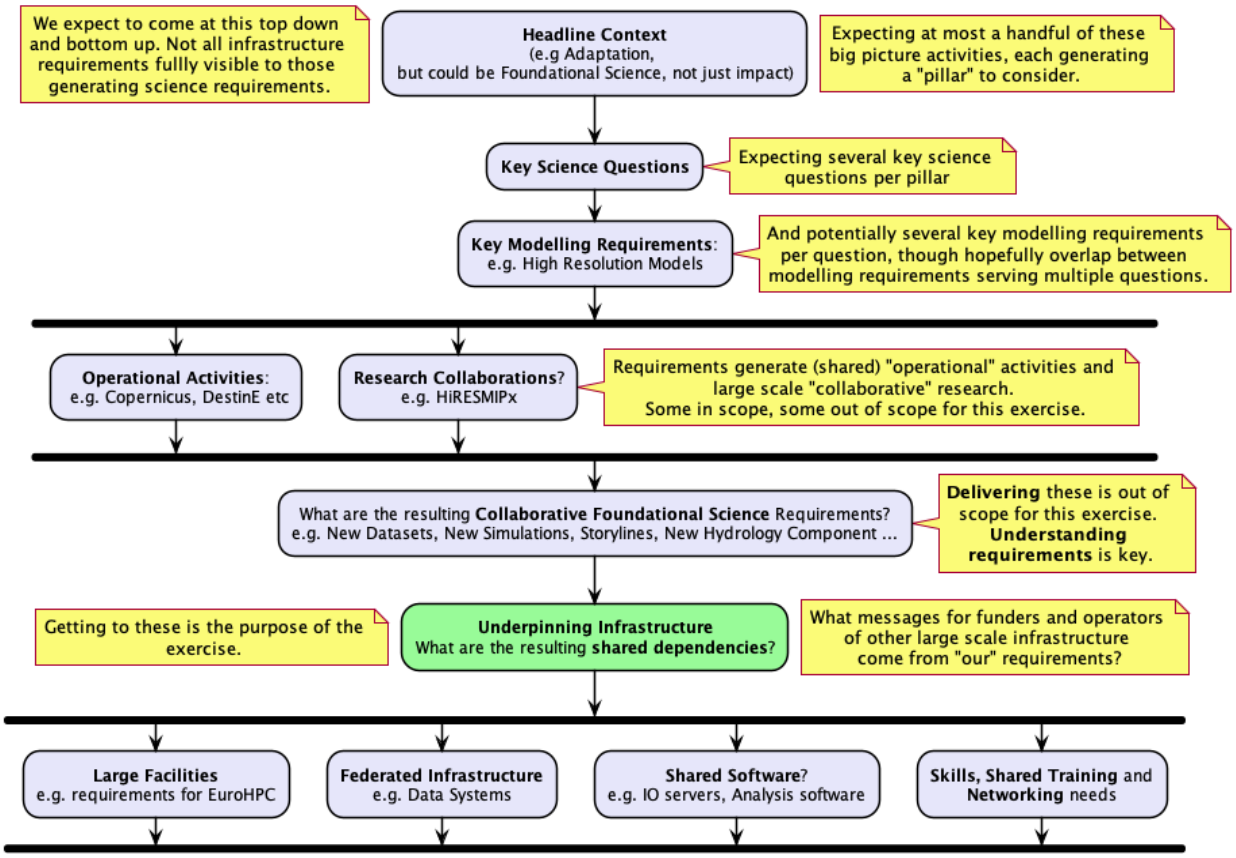

Fig. 2: Methodology proposed to extract the infrastructure requirements starting from key science questions. The diagram represents a possible order through the discussion as an aide memoire, rather than a prescribed set of questions and discussion topics.

It was finally agreed at the kickoff that the next steps would be to proceed with bilateral telcos to gather the individual institutional requirements following the agreed methodology.

4. Bilateral telcos – what to expect?

We have now (June 2022) started to have bilateral telcos to generate content. The idea is ***not to filter*** science questions and requirements, but to ***aggregate*** them.

As agreed at kickoff, we engage with individual institutions or with a small group of institutions who are likely to share similar needs in terms of infrastructure requirements, following the agreed methodology (Fig. 2), starting from phrasing ***Key Science questions*** to derive the ***Key modelling requirements*** and associated ***requirements and challenges*** in terms of ***infrastructure***.

We expect a handful of *priority modelling* activities for each group which revolve around some **specific science question** (or capability development). We expect modelling groups to have their own priorities alongside and within the WCRP grand challenges[1] and lighthouse activities[2].

We expect that for each of their priority activities, we will be able to identify the **key requirements on "model infrastructure"**, and the **key dependencies on research collaborations** and (third party) **operations**. We want to tease out the "infrastructure aspects" of those requirements and collaborations.

In some cases there may be **foundational science requirements** rather than overarching driving questions (or they might be linked).

Finally, the groups will be aware of some of the **underpinning infrastructure dependencies** (e.g. on a skilled workforce, appropriately configured and federated data systems, shared software, HPC platforms etc).

5. Next steps towards the Foresight strategy document

From the bilateral telcos, we expect to tease out common elements between groups, but we will also reflect all requirements in the strategy even if they are not shared - the goal is to provide a document one can use to influence both their own thinking as well as influence funders - both national and pan-national.

The notes and recordings from the bilateral telcos will be used to provide the material we write into the strategy - and the groups will be able to refine how their requirements appear in the strategy later this year.

Finally, after a series of iterations on the strategy draft in autumn, we aim to finalise the process with an in-person Science Meeting to discuss the outstanding points and agree on a final version.

[1] https://www.wcrp-climate.org/grand-challenges/grand-challenges-overview
[2] https://www.wcrp-climate.org/lha-overview