How can we best pool our individual resources and expertise to establish a joint Earth system modelling capability in Germany?

Iris Ehlert (DKRZ)

Our vision

- Our ambition is to create a world-leading, multiscale, seamless Earth system modelling system, usable in research, operational applications, training, and education.

- The modelling system considers German expertise, does not exclude international components but avoids dependencies and has a fit-for-purpose transparent governance structure.

A world-leading,
multiscale, seamless Earth
system modelling system

natESM

How do we get up there?

To provide such a system, we need to...

- Share national resources and accelerate scientific and technological developments

- Establish a new level of sustainable institutional collaboration to develop this system

- Build a flexible infrastructure enabling configurations that allow resolution, length of simulation, complexity, and ensemble size to be tailored to a specific scientific question or application.

Our strategy connects mission and vision.

A world-leading, multiscale, seamless Earth system modelling system

natESM

Build a community that pools resources and expertise and establishes the next-generation joint Earth-system-modelling capability

s t r a t e g y

Our values form the foundation of our strategy.

A world-leading, multiscale, seamless Earth system modelling system

natESM

s t r a t e g y

Build a community that pools resources and expertise and establishes the next-generation joint Earth-system-modelling capability

1. Reciprocity
2. Openness
3. Scientific diversity
4. Congruence of institutional and collective goals

We already agreed upon technical criteria.

1. Well-defined interfaces between Earth system components
2. Allows simulations from global to local
3. Exascale-ready
4. Scalable workflows
5. Portability
6. Modularity
7. Data assimilation capacity
8. Diagnostic capacity
9. User-friendly and well documented
10. Traceability, reproducibility and version control
11. Standardization
12. License of useful open-source type

Strategy is not a static plan but a dynamic process.

- We are in a far-reaching change process that might question the current circumstances of an institution.

- A variety of changes in structures and processes might generate uncertainty, unease and a multitude of questions.

- Our strategy is agile.

- Hence, we should design our communication process as agile as our strategy.

To be discussed

- Which components are already well established, also in the international context?

- Are all required components of an ESM included?

- How can regional information be obtained within the strategy?

- What quality assurance procedures need to be put in place?

- More?

FAQs and potential answers

- What is required for a component model to be part of the natESM strategy?

  - Sufficient control through the German community

  - Long-term institutional commitment

  - Has to conform to agreed technical criteria

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- How much model diversity is desired and meaningful?
  - Hard to answer in general
  - Diversity potentially has a high technical price tag (e.g., porting effort)

How far have we come with the implementation?

Established governance structure

Community
Volunteers for cooperation in working groups

Working Groups

- Identify components and interfaces
- Make suggestions for stepwise integration of system components following technical characteristics
- Work out details of ESM
- Meet regularly
- Report regularly to steering committee and coordinator

Coordinator

- Neutral person at a natESM-member institution.
- Communicates with all parts of natESM and ensures transparent strategy-development process

Support Team

- Integration of the components of the full ESM system
- Quality control
- Management of Git repositories
- Advice and help for working groups and ESM components

Steering Committee

- Composed of community members
- Defines strategy, governance, basic configurations, working groups
- Core components represented
- Institutional responsibility for complete system
- Ensure FTEs as collective effort

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Currently funded by BMBF

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16

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17

We wish to bring our strategy to life now.

1. We should lay the foundation for the formation of specific working groups today.

- Technical criteria already established.
- Sprints allow us to see where we stand, how ready the codes are that we have, and if the codes could fit for the future emerge through the developments that the sprints enable

2. We need to agree on a communication strategy.

- How can we meaningfully bundle the different perspectives, competencies and experiences of the institutions and integrate them into the strategy?
- Which media should be chosen for communication and information (email, Zoom, homepage, etc.)?
- How to integrate suggestions into implementation process?
- How to deal with differences between stakeholders in the process flow?

1. Formation of working groups

We should lay the foundation for the formation of specific working groups today.

- In the past, we had working groups for governance, infrastructure, and components and configurations (Similar to today's WG: components (WG1), interfaces (WG2), missing model components (WG3))

- What expertise should the members of a working group have and how are they selected?

  → Anyone who is interested in contributing to the specific topic of a working group can volunteer to participate.

- How long the working groups will exist is uncertain and will be decided in an agile manner.
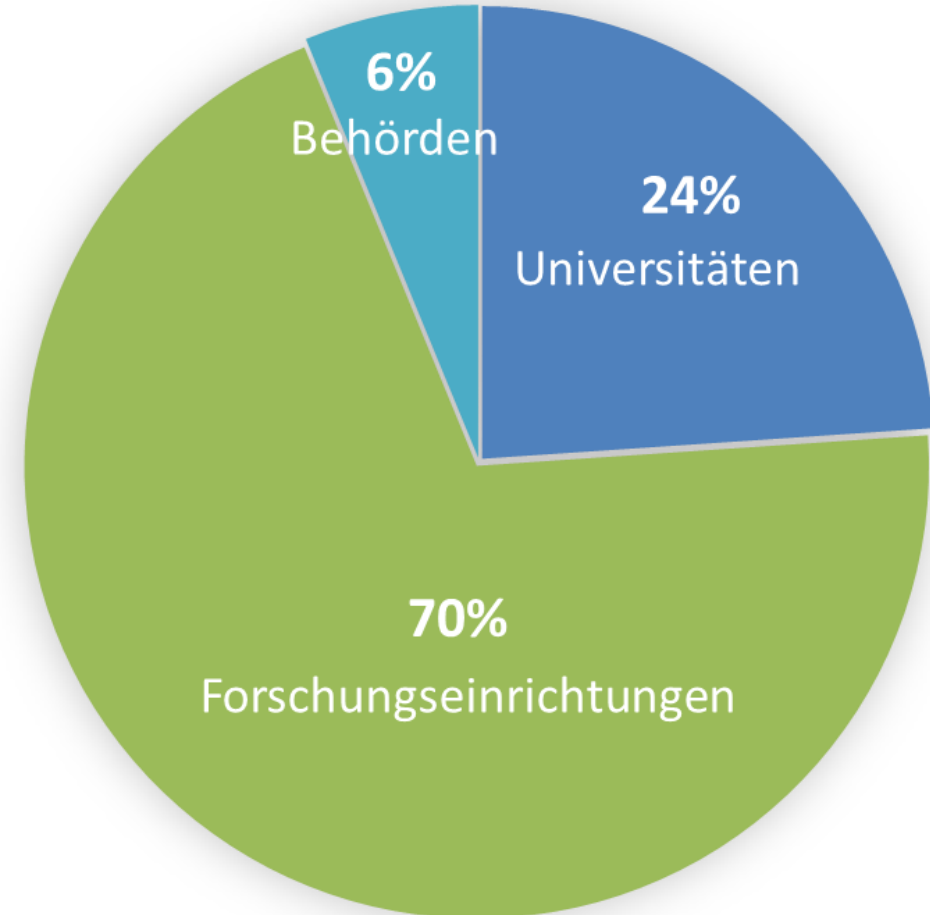
What is the role and task of a working group?

- WG members are tasked with answering a specific question that is relevant to the successful implementation of a specific topic and is of concern to the whole community, such as:

    - Be responsible to ensure that a component works together with other components in a more complex setup;

    - Bring all challenges concerning their special topic into interaction with other working groups and components.

    - Always have an eye on the fact that the implementation or coupling or whatever is just one part of the whole process.

    - Ensure that the codes of the components are accessible to the community (at least at a defined date). We need openness in the interest of a scalable workflow.

    - Take care of the intellectual property rights of the code.

2. Communication strategy

Current composition of those interested in natESM

1. **70 % Forschungseinrichtungen**
   146 Personen aus 28 Einrichtungen

2. **24 % Universitäten**
   50 Personen aus 25 Universitäten

3. **6 % Bundesbehörden**
   13 Personen aus 3 Bundesbehörden

6%
Behörden

24%
Universitäten

70%
Forschungseinrichtungen

Communication channels available for natESM

Communication media must meet four conditions.

Medium	Short-term	Regular	Interactive	Permanantly available
Email	x			
Community workshop		x	x	
Newsletter		x	x	
Website				x
?				

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Mattermost?				

I'm happy to support you in making natESM known in your institution!

- I'll visit your institution and give a presentation on natESM.

- Your institution and colleagues can consider whether natESM is of interest to you.

- You decide how and with whom your institution is most likely to contribute to natESM and how it can benefit from the collaboration.

Maybe the first step might be an email to us requesting a sprint check.

Press start

▶ 1 PLAYER

▶ 2 PLAYER

▶ **MULTIPLAYER**

The end is just the beginning.

T. S. Eliot

Thank you for being an active part of natESM!