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# ICON-C, EXCLAIM, ICON-X

# ICON-C (Consolidated)

- There is a desire or even a need to clean up the ICON source-code base to be more **flexible** in terms of upcoming trends as well as to facilitate fast and agile development
- The current procedure of source-code management does not allow for **modular and independent development** (with the exception of parts that are already implemented as external libraries)
- A common understanding of the '**ICON infrastructure**' is not given, although all agree that it would be desirable to have such a common core
- A clear **separation of responsibility** for code parts and protection of different developments is helpful when working as a team – this refers to teamwork as 'you can rely on others and don't always have to worry about everything; this allows independent work on your own topic'



# ICON-C working group

A/ Work on refining the Development Process

B/ Implementation of a disable functionality, initially via `#ifdef` in FORTRAN

C/ Modularization of components: Proposal and prototypes

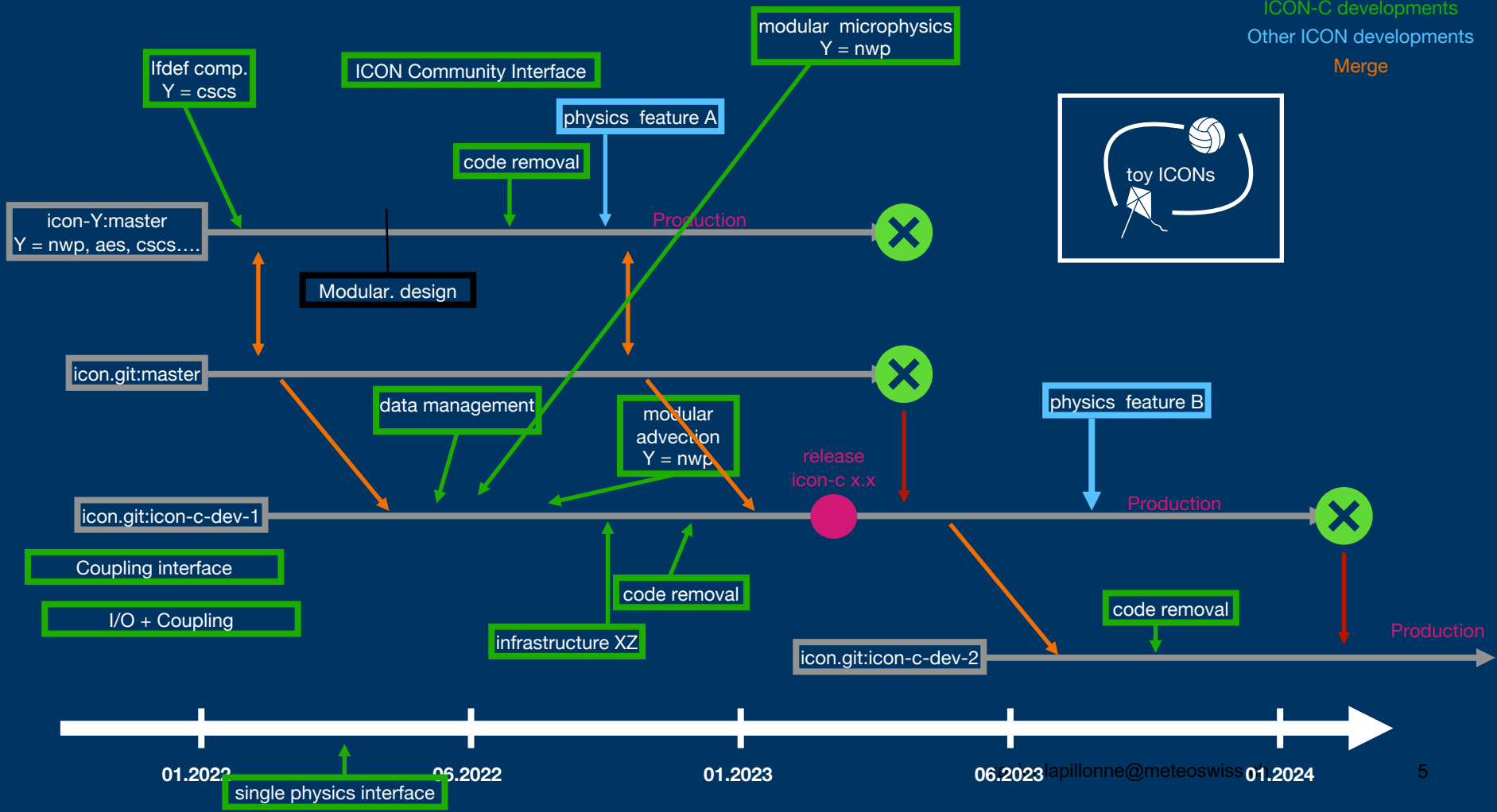
D/ Prototype Data Management

E/ List of suggested Infrastructure Measures

F/ Testing Hierarchy and Tools

# ICON-C Summary

- ICON-C is a **meta project** currently
- Many different activities involved (Warmworld, Exclaim, Interfaces, etc ... )
- We got ourselves going, we made a good start. Initial plan of having part of the work in the existing master seems not realistic anymore.
- We need to set our focus clearly to be successful with selected parts of the developments.
- There is the **risk** of not getting the productive line integrated into the new developments
- Need of dedicated resources towards the full integration of the activity.





# C2SM / EXCLAIM project

EXascale Computing platform for cLoud-resolving weAther and cllmate Models

## Goals:

- develop an **extreme scale computing and data platform** for cloud resolving weather and climate modeling – prepare for exascale system
- redesign the codes in the **framework of python based domain-specific languages**
- exploit efficiency gains at both the computational and algorithmic levels
- develop an analysis and storage framework to **deal with the exabytes of data** generated
- design concrete applications addressing scale-interactions in the ocean and atmosphere
- Performance target : 1 simulated year / day @ 1 km global

Large project : 1. Senior scientist, 2 post-docs, 6 Software eng. + in kind contributions from ETHZ, CSCS, EMPA, SDSC and MeteoSwiss



## EXCLAIM roadmap

Science Milestones

HPC system

### 1. Aquaplanet

- M1.1: global 10 km, Fortran+
- M1.2: global 10km, Python DynCore
- M1.3: global 1 km, Python DynCore

### 2. Global uncoupled

- M2.1: global 25 km, Fortran+
- M2.2: global 25km, Python DynCore
- M2.3: global 3 km, Python DynCore

### 3. Global coupled

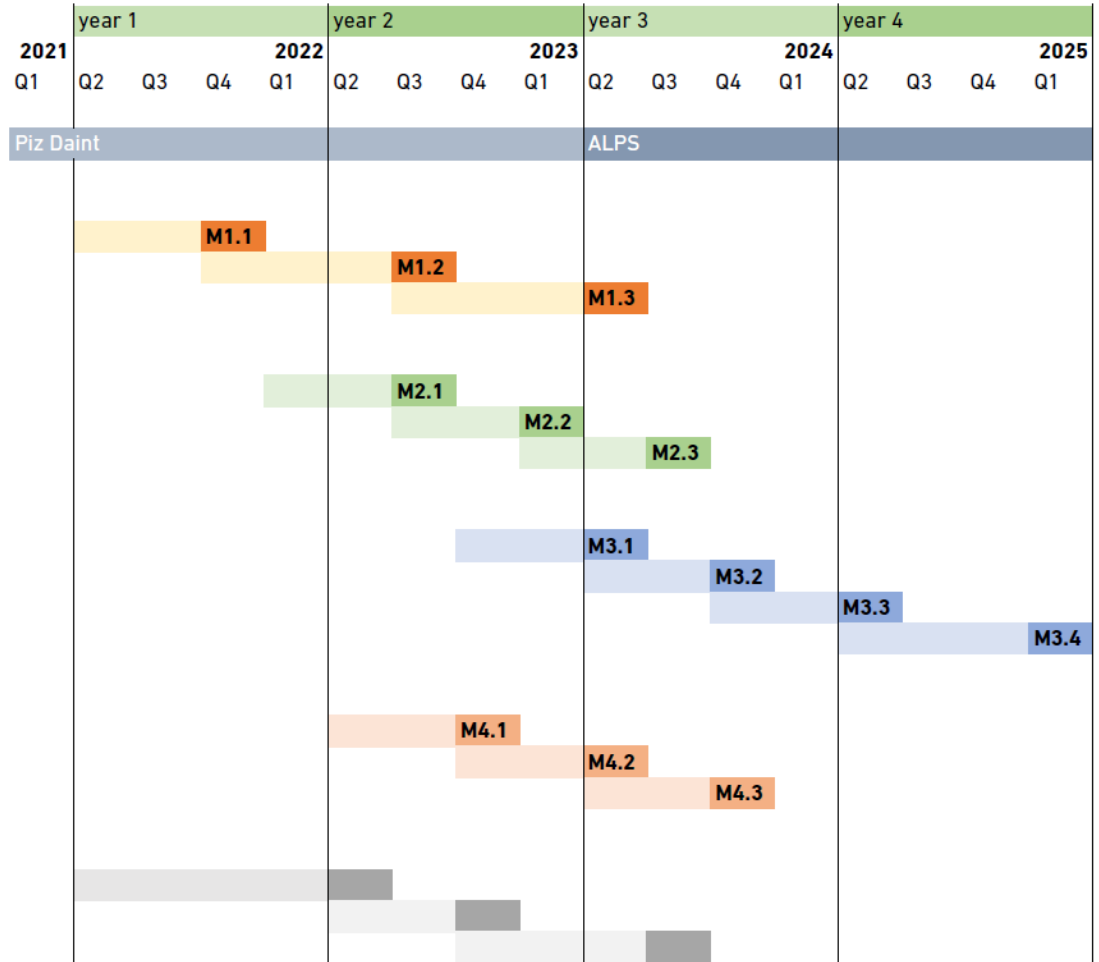
- M3.1: global 25 km, Fortran+
- M3.2: global 25km, Python DynCore
- M3.3: global 3 km, Python DynCore, 1-2 years
- M3.4: global 3 km, Python DynCore, decades

### 4. LAM Europe

- M4.1: LAM 12 km Fortran+
- M4.2: LAM 12km, Python DynCore
- M4.3: LAM 1km, Python DynCore

### Milestones ICON 22

- ICON on GPU (Open ACC)
- ICON 22 preoperational (open ACC)
- ICON 22 operational (open ACC)





# ICON-X (EXASCALE)

On going activities in EXASCALE and HPC theme

- ICON-GPU OpenACC port: current focus on the NWP configuration in particular
  - LAM application (MeteoSwiss, C2SM) planned for Q2 2022.
  - Global NWP : work ongoing at DWD
- Implementation of ICON on LUMI system (AMD GPU) – investigation on going.
  - Compilation of the OpenACC version
  - Translation to OpenMPU
- EXCLAIM : definition of the “python” DSL (Domain Specific Language). Implementation of the Dycore will start soon (Q1 2022). Work on the graupel parameterization.





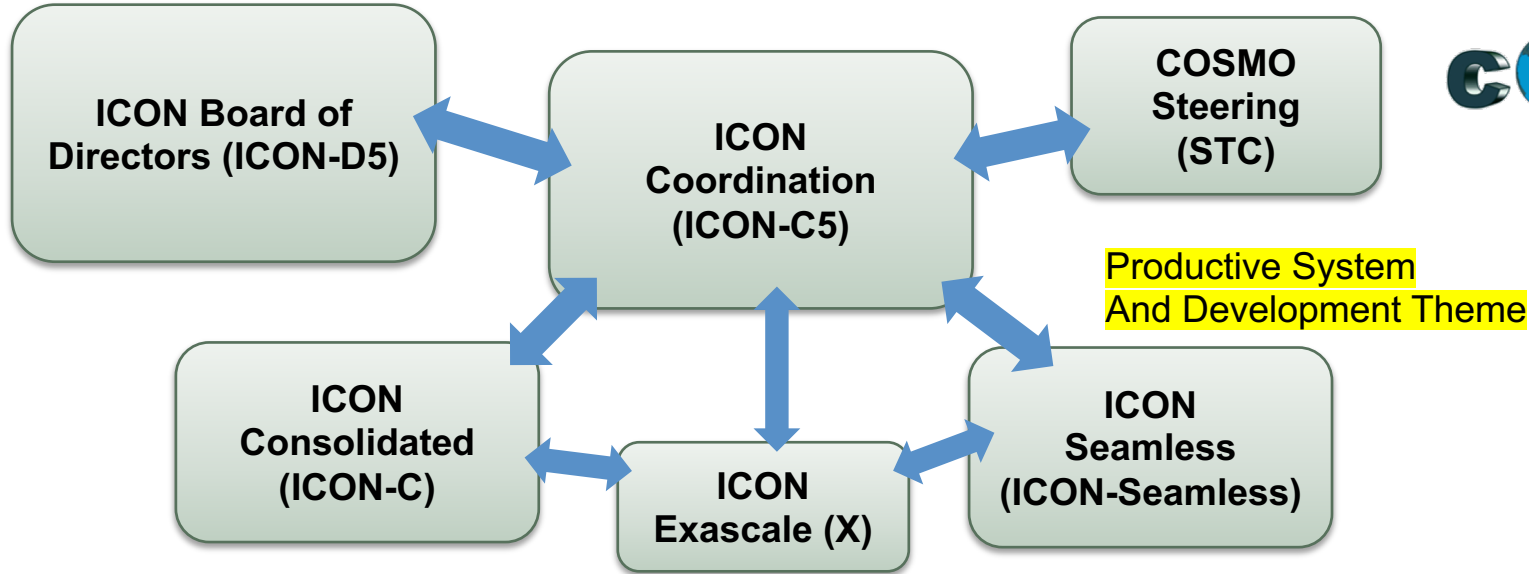
# ICON-X, EXCLAIM, WarmWorld

- Concerning DSL developments there are investigation in WarmWorld and EXCLAIM. There is no consensus at this stage
- The 2 projects will interact
- Link with ICON-C : allow for different interoperable solutions



# Add. Slides

# ICON Boards and Themes



Future System  
Development Themes