



Sprint 8

Challenges and results experienced during the MESSy-ComIn sprint



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Wilton Loch (DKRZ)**

General information: background/motivation



MESSy current status:

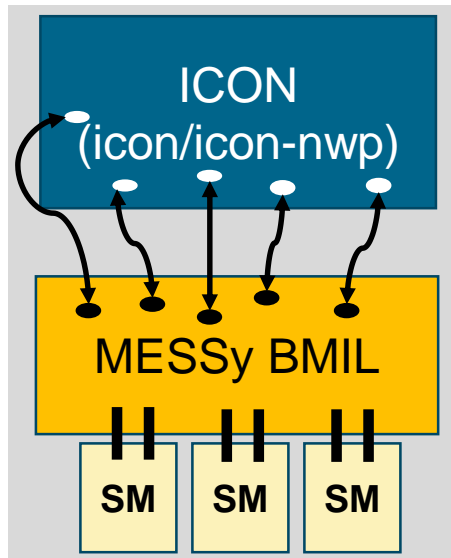


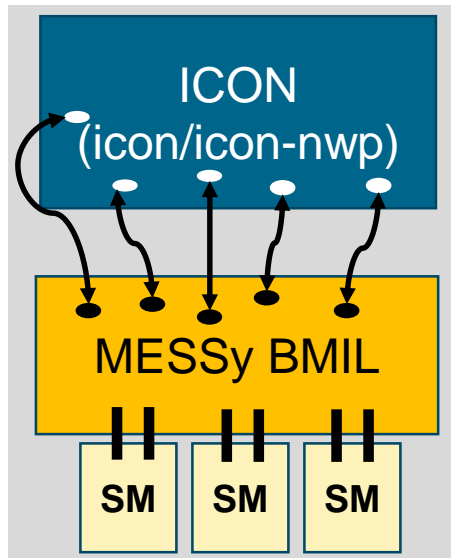
diagram by Patrick Jöckel (DLR)



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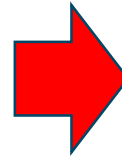
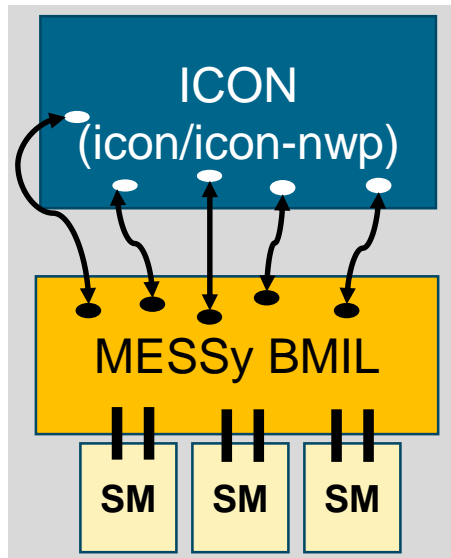


Goal: reduced effort to keep up-to-date with ICON developments

General information: background/motivation



MESSy current status:



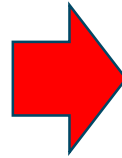
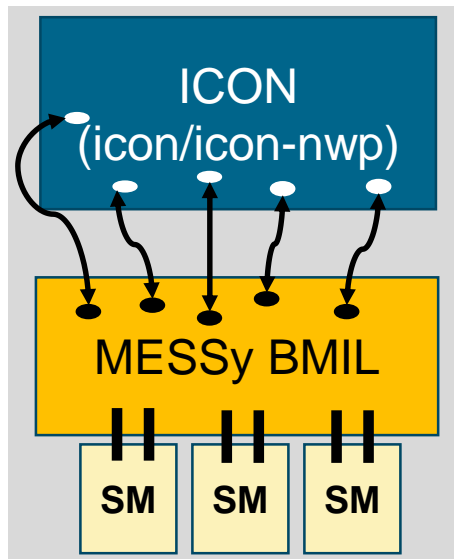
Goal: reduced effort to keep up-to-date with ICON developments



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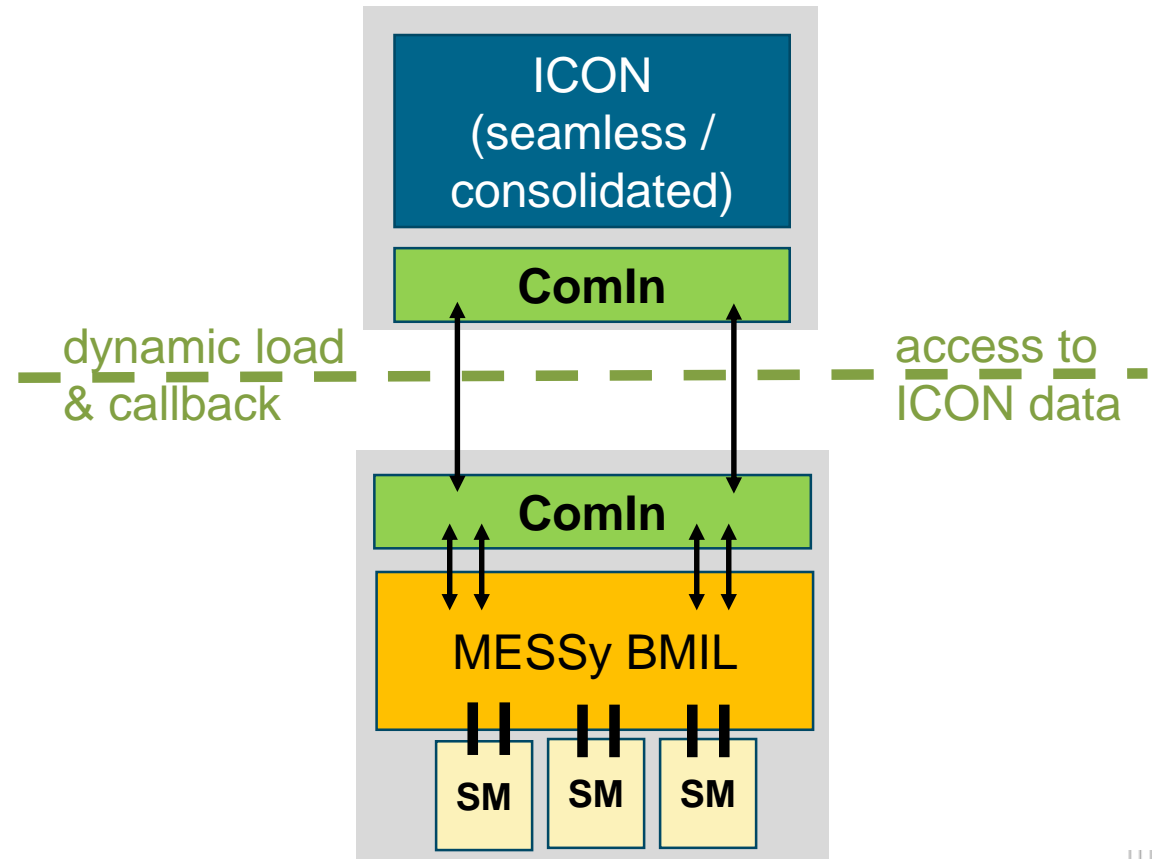


diagram by Patrick Jöckel (DLR)



General information: goal and approach

Goal:

- implement ComIn in MESSy and advance to a working setup
- original and new implementation co-exist during development, e.g. for evaluation
- document steps and challenges for other plugins

Approach:

- iterative implementation updates, checking functionality of intermediate steps
- workarounds/patches if either MESSy or ComIn do not support functionality at the moment

Reason for delays and challenges

- **preparing MESSy/ComIn setup that compiles**
however: flexible setup available now
- **amount of changes during initialization phase in MESSy**
- **registering additional tracers in ICON (via ComIn)**
some restructuring in MESSy around tracer handling, ensuring that sub-parts of routines which are now no longer required are still called
however: cleaner code
- **ComIn version quickly changing**
interface changes, patches for functionalities not yet available, ...
however: feedback from first complex plugin valuable for ComIn
- **ComIn development parallel to the sprint**
however: inclusion of RSE Wilton beneficial for ComIn development

1. Getting started and first tests

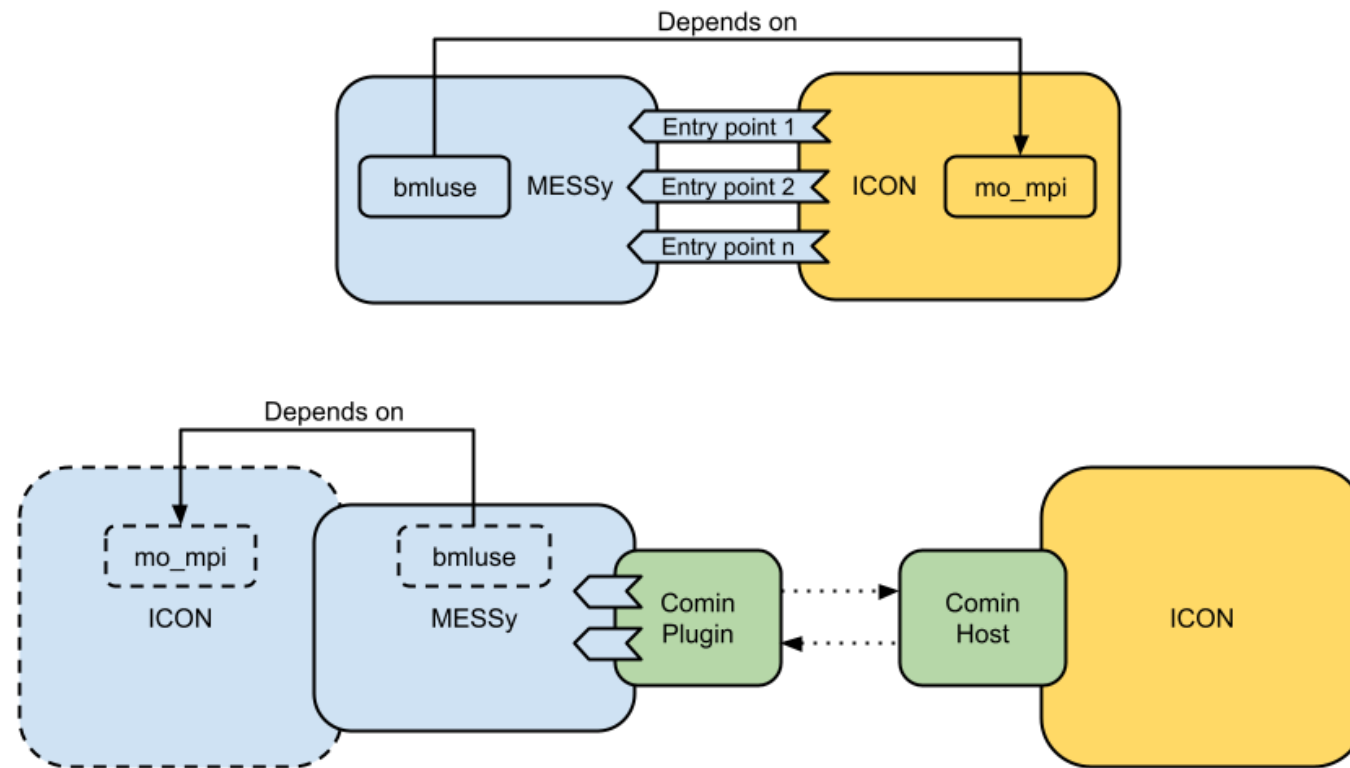


diagram by Wilton Loch (DKRZ)

2. Large part of model initialization phase ported to Comln

```
SUBROUTINE messy_comin_setup ()
```

```
CALL init_icon_get_mpi()
```

some workarounds

```
CALL comin_callback_register(EP_SECONDARY_CONSTRUCTOR,  
    messy_comin_constructor, ierr)
```

```
CALL comin_callback_register(EP_ATM_INIT_FINALIZE,  
    messy_comin_atm_finalization, ierr)
```

register callbacks

```
CALL messy_setup()
```

```
CALL messy_initialize
```

```
CALL messy_new_tracer
```

initialize MESSy and MESSy submodels

gather info on new tracers, receive descr. data

```
CALL messy_request_tracers
```

prepare MESSy tracer metadata and
call comin_var_request_add

```
END SUBROUTINE messy_comin_setup
```

2. Large part of model initialization phase ported to Comln

```
SUBROUTINE messy_comin_constructor ()
```

```
CALL messy_get_tracer_metadata_comin
```

receive tracer metadata

```
CALL messy_init_memory
```

receive pointers to ICON variables and tracers, init SM memory

```
END SUBROUTINE messy_comin_constructor
```

```
SUBROUTINE messy_comin_atm_setup ()
```

```
CALL messy_init_coupling
```

incomplete because MPI not fully set up

```
CALL messy_read_restart
```

```
CALL messy_init_tracer
```

read restart and initialize tracer fields

```
END SUBROUTINE messy_comin_atm_setup
```

3. Feedback for ComIn

Valuable feedback from first complex plugin for (further) ComIn development, e.g.:

- metadata expanded and access/set routines added
- all fields at cell centres are shared via ComIn, not just 3D and surface fields
- convenience function to retrieve time step of each domain
- some additional descriptive data

4. Additional updates within MESSy

- enable building MESSy as shared library (partly done before sprint)
- workaround in MESSy to not require hybrid vertical coordinate from ICON
- start preparation of YAXT backend in MESSy to provide MPI functionality
- update MESSy runscript to work with ComIn

Outlook (& open questions)

final parts of initialization

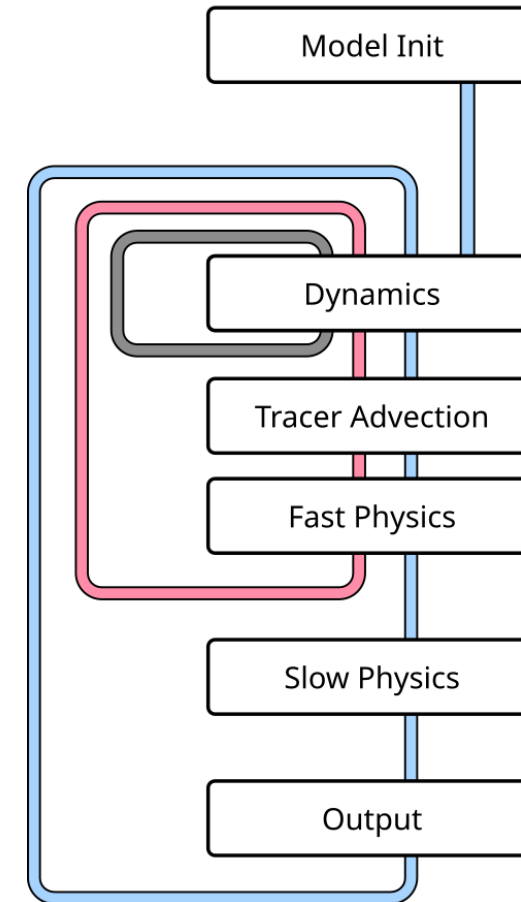
- set up MPI with YAXT

using ComIn during time loop

- add calls to current entry points in MESSy
- some workarounds e.g. for access to currently routine-local fields, masking regions for parameterizations

recommendations for community

evaluation of implementation



Prill et al., ICON tutorial

Impressum



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