PRISM overview: from the FP5 project to a sustained effort

Eric Guilyardi, IPSL/CNRS & CGAM

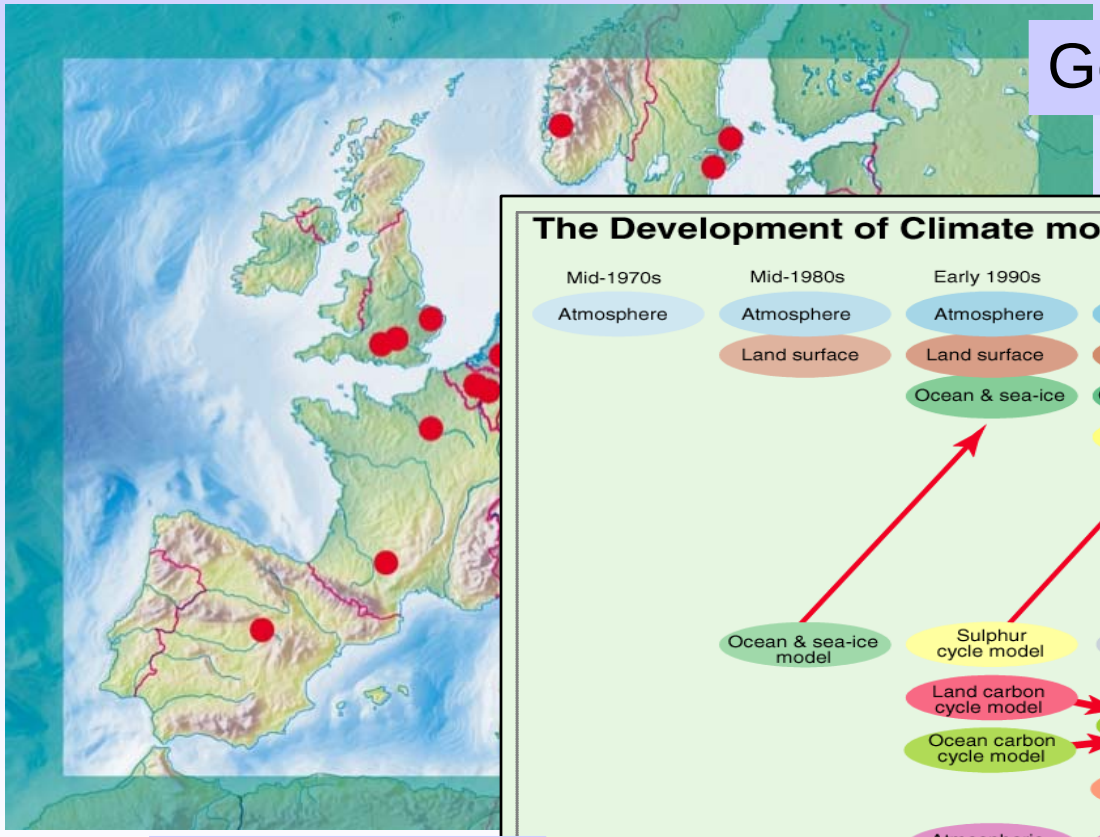
- **Scope and drivers**
- **PRISM project achievements**
- **The PRISM sustained initiative (PSI)**
- **Next steps: PRISM and the community**

PRISM Community Meeting 2005, Toulouse, Nov 16-17

Scope and drivers

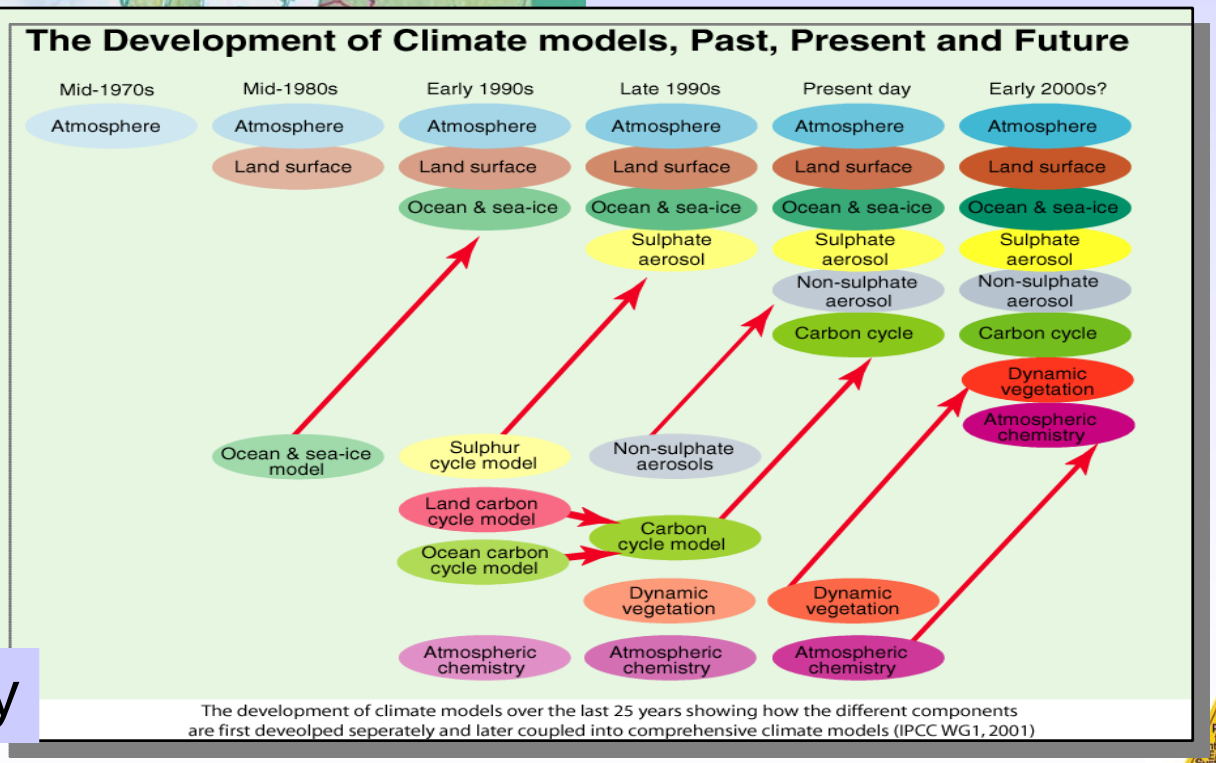
Why a common software infrastructure ?

- **Earth system modelling expertise widely distributed**



Geographically

Thematically



Why a common software infrastructure ?

- **Earth system modelling expertise widely distributed**
  - Scientific motivation = facilitate sharing of scientific expertise and of models
  - Technical motivation = the technical challenges are large compared with available effort
- **Need to keep scientific diversity** while increasing efficiency – scientific and technical
- **Need for concerted effort** in view of initiatives elsewhere:
  - The Earth System Modelling Framework, US
  - Frontier Project, Japan,
  - ...

PRISM concept

« Share Earth System Modelling <u>software infrastructure</u> across community »

To:

- share development, maintenance and support
- aid performance on a variety of platforms
- standardize model software environment
- ease use of different climate model components

PRISM is at **interface** between **ES science needs** and **IT best practice**

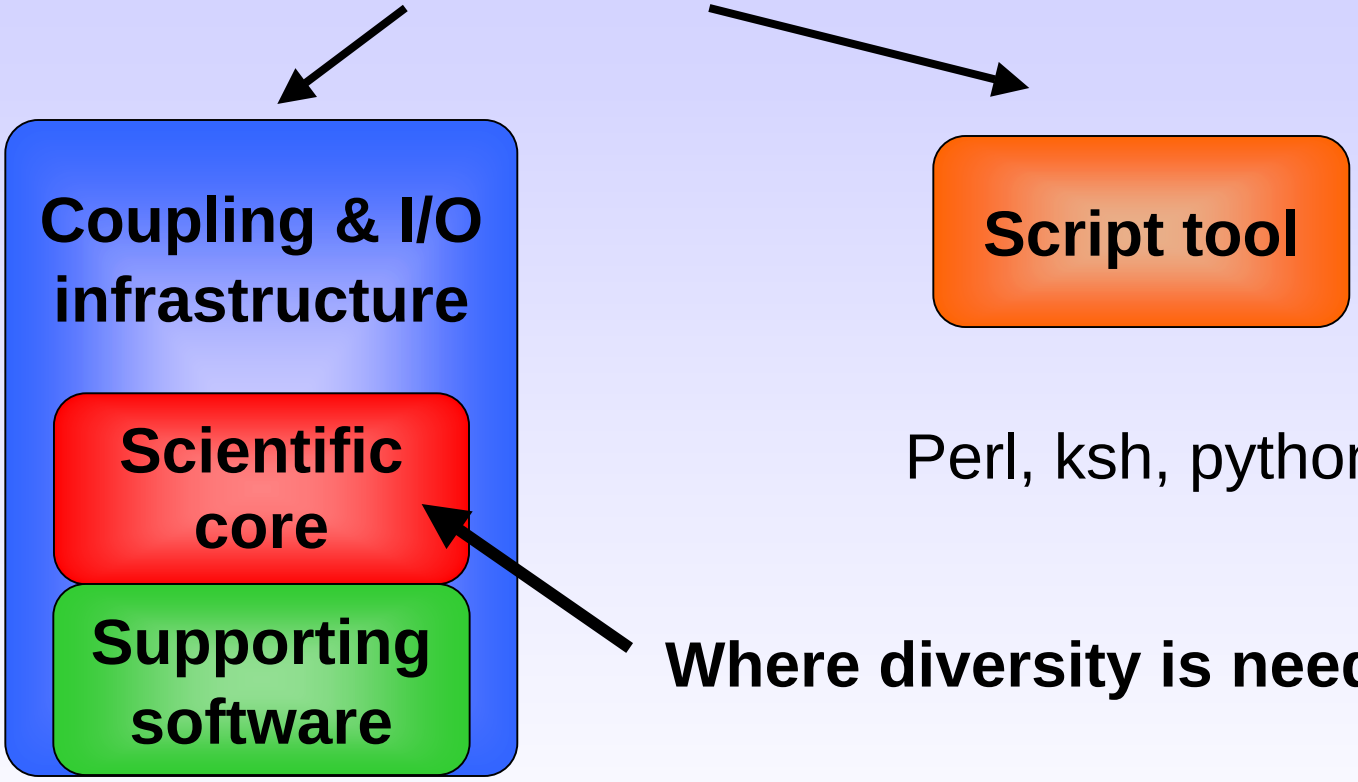
(hence not dealing with physical interface)

Expected benefits

- **High performance ESM software**, developed by dedicated IT experts, available to institutes/teams at low cost:
  - helps scientists to focus on science
  - helps key scientific diversity (survival of smaller groups)
- **Easier to assemble ESMs** based on community models
- Shared infrastructure = **increased scientific exchanges (AR4!)**
- **Computer manufacturers** inclined to contribute:
  - efficiency (porting, optimisation) on variety of platforms
  - next generation platforms optimized for ESM needs
  - easier procurements and benchmarking
  - reduced computing costs

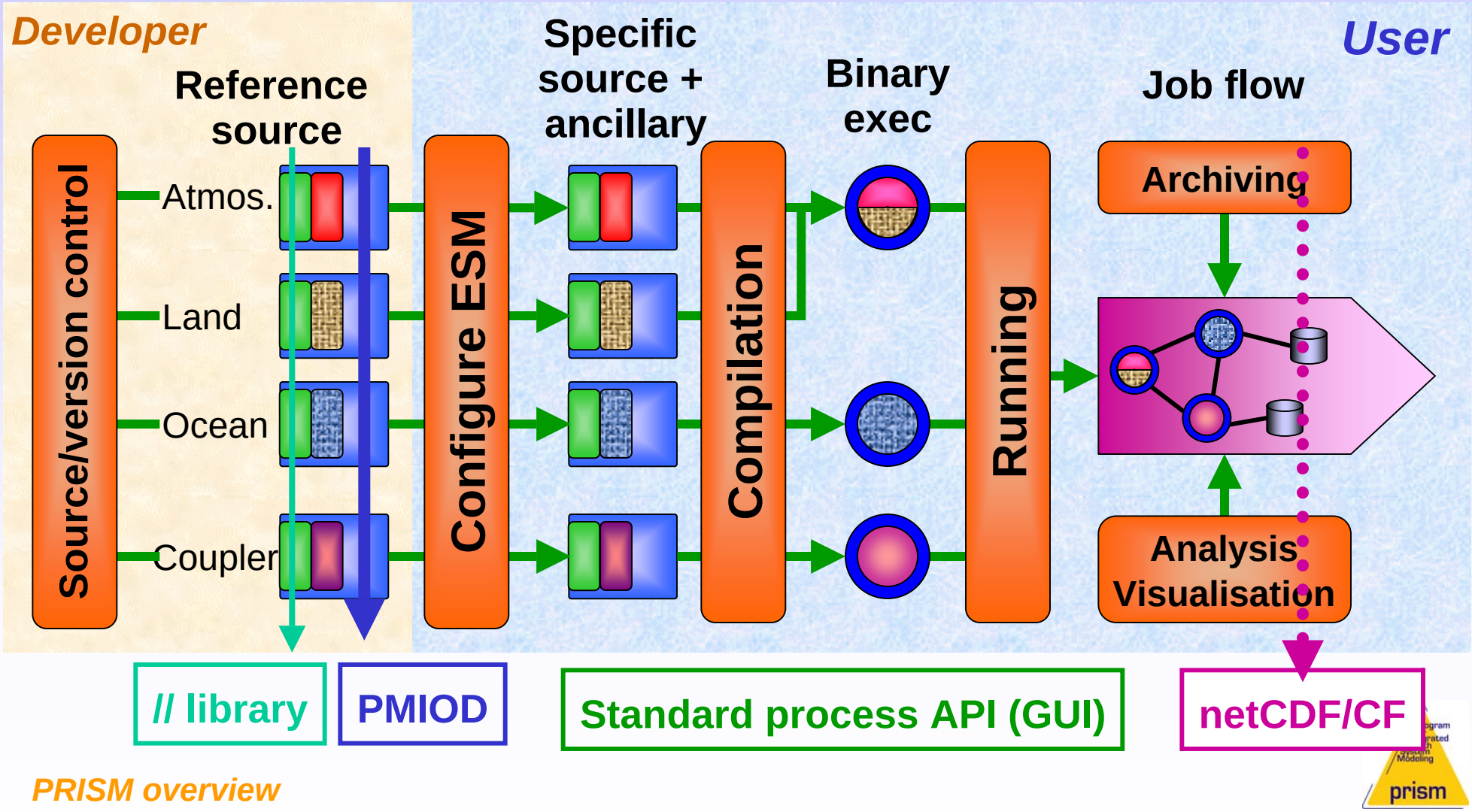
Software infrastructure of an Earth System Model

= **sources** (ESM code, script tools) and processes



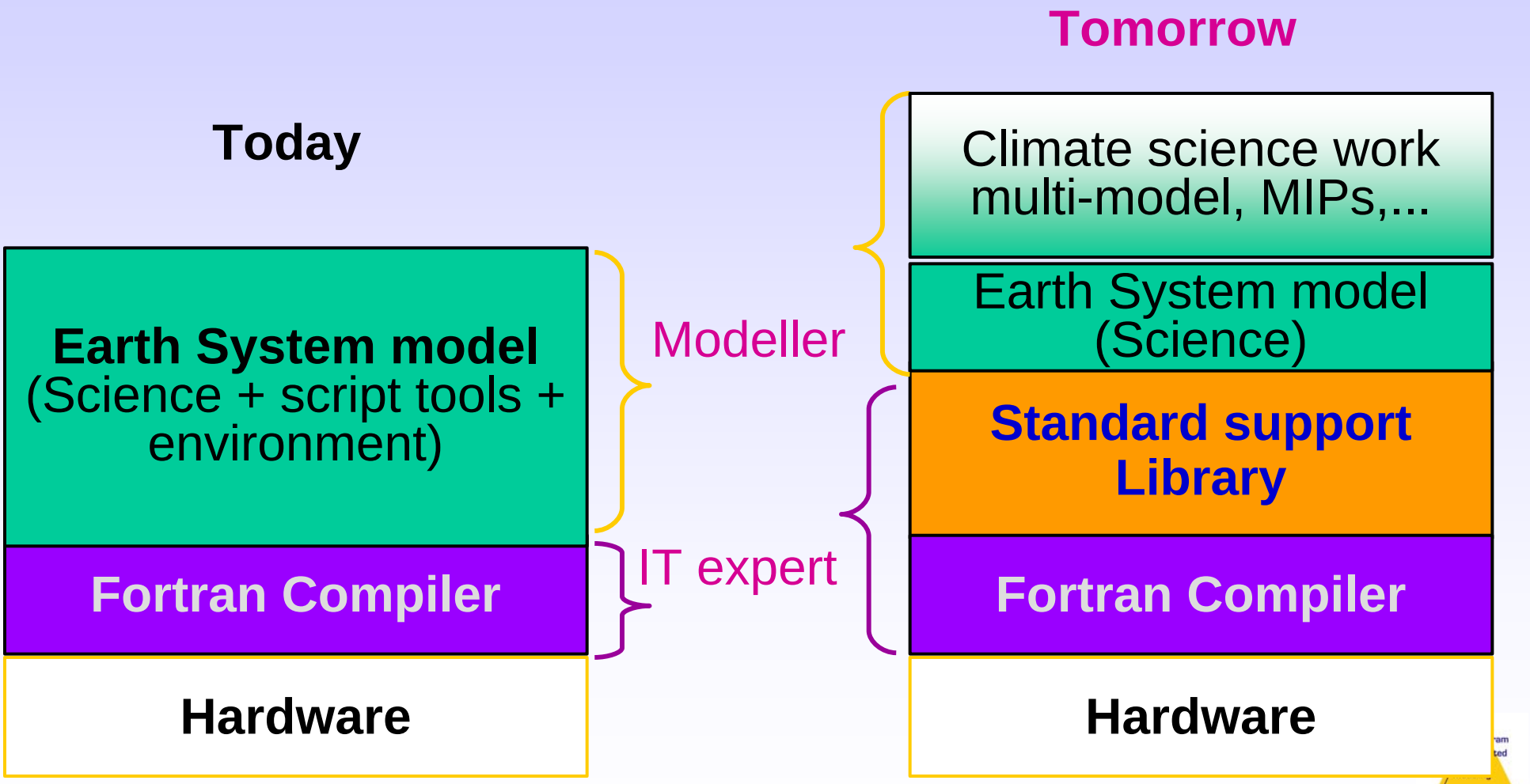
Using the software infrastructure of an ESM

= sources (ESM code, **script tools**) and **processes**



The long term view

Towards standard ESM support library(ies)



The PRISM FP5 project

The PRISM project

- Program for integrated Earth System Modelling
  - 22 partners
  - 3 Years, from Dec 2001 - Nov 2004
  - 5 Mill. € funding, FP5 of the EC (~80 py)
  - Coordinators: G. Brasseur and G. Komen

System specifications

The science :

- General principles
- Constraints from physical interfaces,…

The modelers/users:

- requirements
- beta testing
- feedback

The technical developments:

- Coupler and I/O
- Compile/run environment
- GUI
- Visualisation and diagnostics

The community models

- Atmosphere
- Atmos. Chemistry
- Ocean
- Ocean biogeochemistry
- Sea-ice
- Land surface
- …

Let’s <u>NOT</u> re-invent the wheel !

System specifications - the people

Reinhard Budich - MPI, Hamburg
Andrea Carril - INGV, Bologna
Mick Carter - Hadley Center, Exeter
Patrice Constanza - MPI/M&D, Hamburg
Jérome Cuny - UCL, Louvain-la-Neuve
Damien Declat - CERFACS, Toulouse
Ralf Döscher - SMHI, Stockholm
Thierry Fichefet - UCL, Louvain-la-Neuve
Marie-Alice Foujols - IPSL, Paris
Veronika Gayler - MPI/M&D, Hamburg

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Luis Kornblueh - MPI, Hamburg
Claes Larsson - ECMWF, Reading
Stefanie Legutke - MPI/M&D, Hamburg
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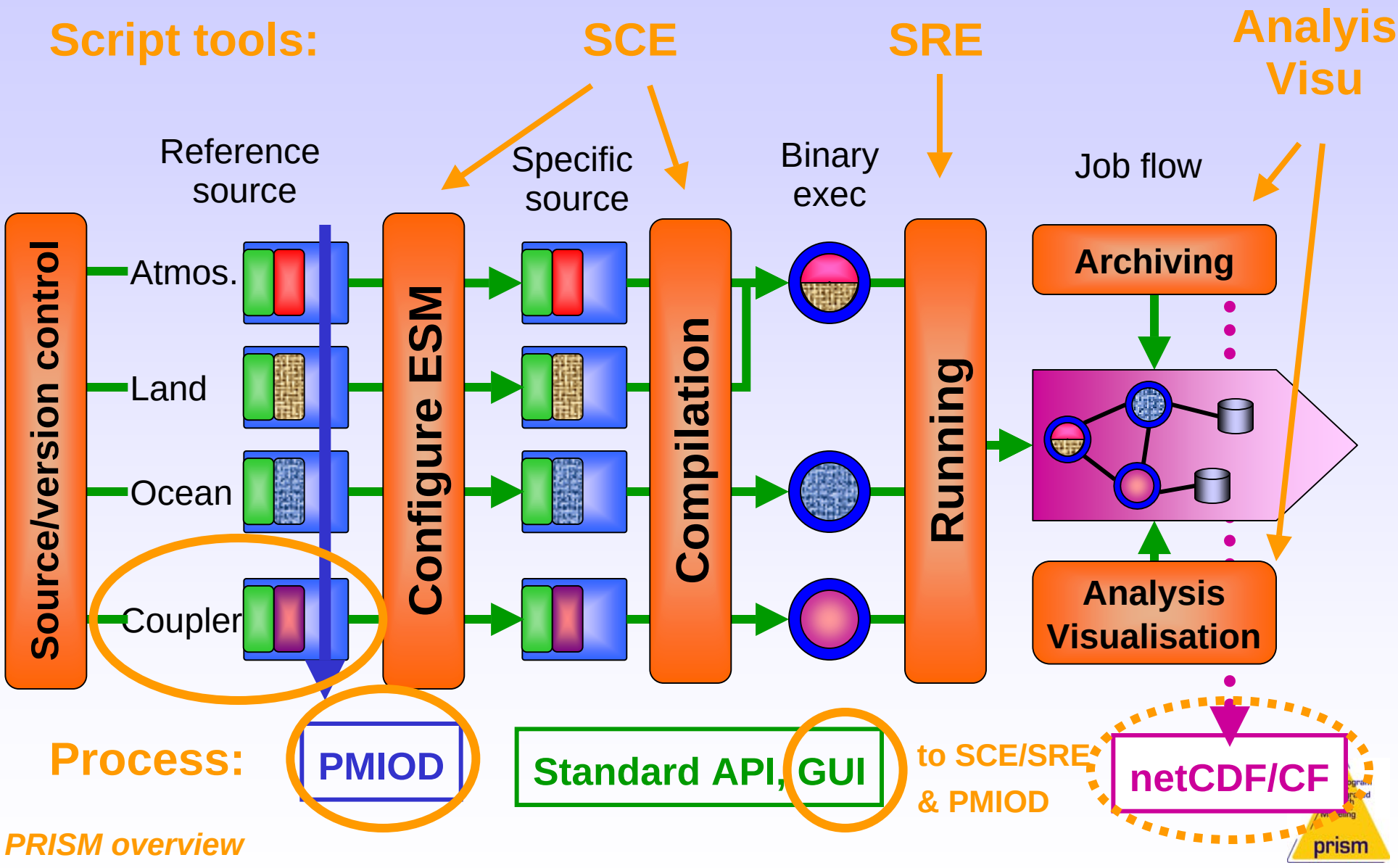
Anne de Montety - UCL, Louvain-la-Neuve
Serge Planton - Météo-France, Toulouse
Jan Polcher - LMD/IPSL, Paris
René Redler, NEC CCRLE, Sankt Augustin
Martin Stendel - DMI, Copenhagen
Sophie Valcke - CERFACS, Toulouse
Peter van Velthoven - KNMI, De Bilt
Reiner Vogelsang - SGI, Grasbrunn
Nils Wedi - ECMWF, Reading

PRISM project achievements:

- Software environment (**the tool box**):
  1. a standard **coupler and I/O** software, OASIS3 (CERFACS) and **OASIS4**
  2. a standard **compiling environment** (SCE) at the scripting level
  3. a standard **running environment** (SRE) at the scripting level
  4. a **Graphical User Interface** (GUI) to the SCE (PrepIFS, ECMWF)
  5. a GUI to the SRE for **monitoring** the coupled model run (SMS, ECMWF)
  6. standard **diagnostic and visualisation** tools

- **Adaptation** of community Earth System component models (GCMs) and **demonstration coupled configurations**
- A well co-ordinated **network of expertise**
- **Community buy-in** and trust-building

PRISM project developments



Community collaborations

Active collaborations:

- **ESMF** (supporting software, PMIOD, MOM4)
- **FLUME** (PRISM software)
- PCMDI (visualisation, PMIOD)
- CF group (CF names)
- NERC (BADC & CGAM) (meta-data, PMIOD)
- ...

PRISM has put Europe in the loop for community-wide convergence on basic standards in ES modelling

Earth System modelling infrastructure recognised as core activity of WCRP's newly established Modelling Panel (WMP)

Need for meta-data standards

1. **Model meta-data** (basic meta-data, **needed for model intercomparison**)
   - outputs (CF +CMOR-like library, file names,…), model description, grids, …
2. **Coupling+I/O infrastructure meta-data** (**required for component swaping***)
   - component coupling+I/O description (PMIOD,...)
3. **Process meta-data**
   - Source control, model configuration, compiling,...

→ **More discussion/structure needed**

Next steps: PRISM and the community

Where do we stand today ?

- PRISM project has delivered a **tool box**, a **network of expertise** and **demonstrations**
- Acts as an single **entry point** to the ES modelling community (from “outside”)
- No general institution agreement on all tools and standards *yet*, but **no plans to develop own independant framework** either
- **Community buy-in and expectations** growing

What is needed now:

1. **Sustainability**

   → **PRISM sustained initiative** **(2004)**

2. **Review of specifications/user needs**

   → **PRISM user survey** **(2005)**

PRISM Sustained Initiative (PSI)

- Since January 2005: the PSI to coordinate and provide effort to fulfil:
  - Software maintenance and service support,
  - Support for adaptation of models to PRISM,
  - Development against current requirements of adapted models,
  - Development against future requirements
  - Coordination with community
- Partners

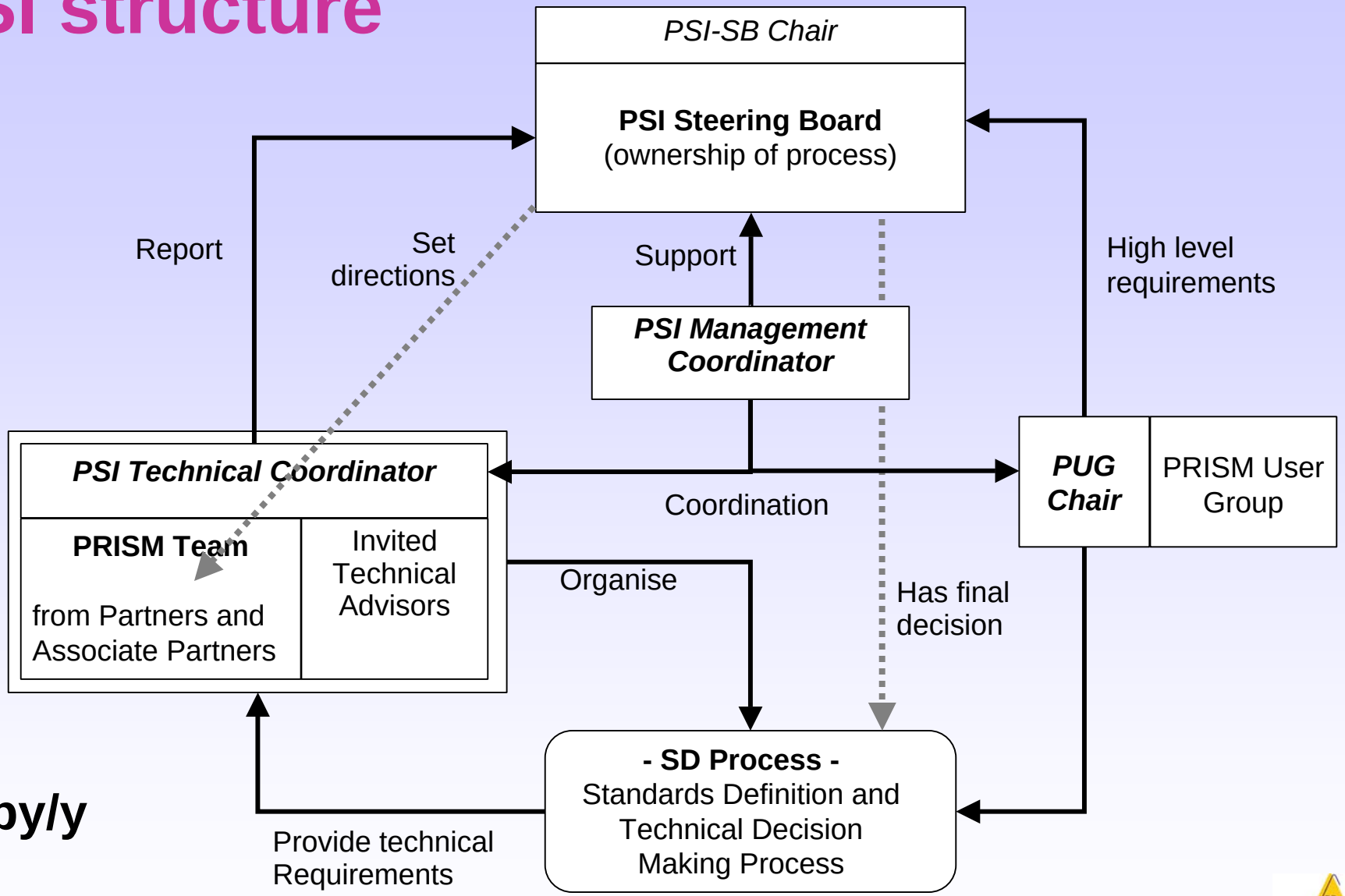
  Contribute significant effort, form the PSI Steering Board

  CERFACS, CNRS, ECMWF, Met Office, MPI-M&D, NEC-CCRLE

  Associate Partners

  CGAM, CRAY, MPI-M, NEC, SGI, SMHI, SUN, (IBM)

PSI structure



~ 9 py/y

Reviewing community needs

Given that:

- Demand on software infrastructures "*at interface between Earth System science needs and IT best practice*" is high
- PSI has limited manpower
- Coordinating development across many institutions while keeping flexibility is demanding
- Usage of existing tools is unequal
- Standards meta-data are key for "interoperability"

What is the best strategy for the future ?

Goal of PRISM community meeting

1. **Inform** community of PRISM team activities (Session 1)
2. **Review** community use (User Survey) (Session 2)
3. **Define** ES science needs/priorities (Session 3)
4. **Capture** suggestions/ideas on organisation (Session 4)

Outcome (by Feb 15th 2006):

- propose strategy and work plan to PRISM Steering Board and community

Thank you