

DRIHM

DISTRIBUTED RESEARCH INFRASTRUCTURE
FOR HYDRO-METEOROLOGY

Model Chaining and Interoperability – the DRIHM and DRIHM2US Solution

DRIHM and DRIH2US Final Conference
Savona / Genoa, 24th – 25th Feb 2015
Q.K.Harpham, HR Wallingford



POLITÉCNICA



advancing the frontiers





Grand Challenges for Earth System Science

Forecasting Observing Confining Responding Innovating

To “deliver knowledge to enable sustainable development, poverty eradication, and environmental protection in the face of global change”.

International Council for Science Press Release, 11 Nov 2010

“a consensus list of the highest priorities for Earth system research”.

Dr Walt Reid, Task Team Chair





Grand Challenges for Earth System Science

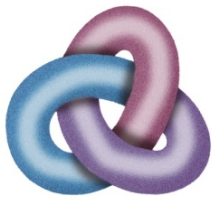
Forecasting Observing Confining Responding Innovating

Forecasting—Improve the usefulness of forecasts of future environmental conditions and their consequences for people.

Observing—Develop, enhance and integrate the observation systems needed to manage global and regional environmental change.

International Council for Science Press Release, 11 Nov 2010





Grand Challenges for Earth System Science

Forecasting Observing **Confining Responding** Innovating

Confining—Determine how to anticipate, recognize, avoid and manage disruptive global environmental change.

Responding—Determine what institutional, economic and behavioural changes can enable effective steps toward global sustainability.

International Council for Science Press Release, 11 Nov 2010





Grand Challenges for Earth System Science

Forecasting Observing Confining Responding **Innovating**

Innovating—Encourage innovation (coupled with sound mechanisms for evaluation) in developing technological, policy and social responses to achieve global sustainability.

International Council for Science Press Release, 11 Nov 2010





Grand Challenges for Earth System Science

Forecasting Observing Confining Responding Innovating

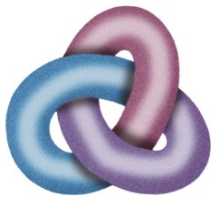
Addressing these challenges will require new research capacity, ... , and a balanced mix of disciplinary and interdisciplinary research.

Dr Walt Reid, Task Team Chair

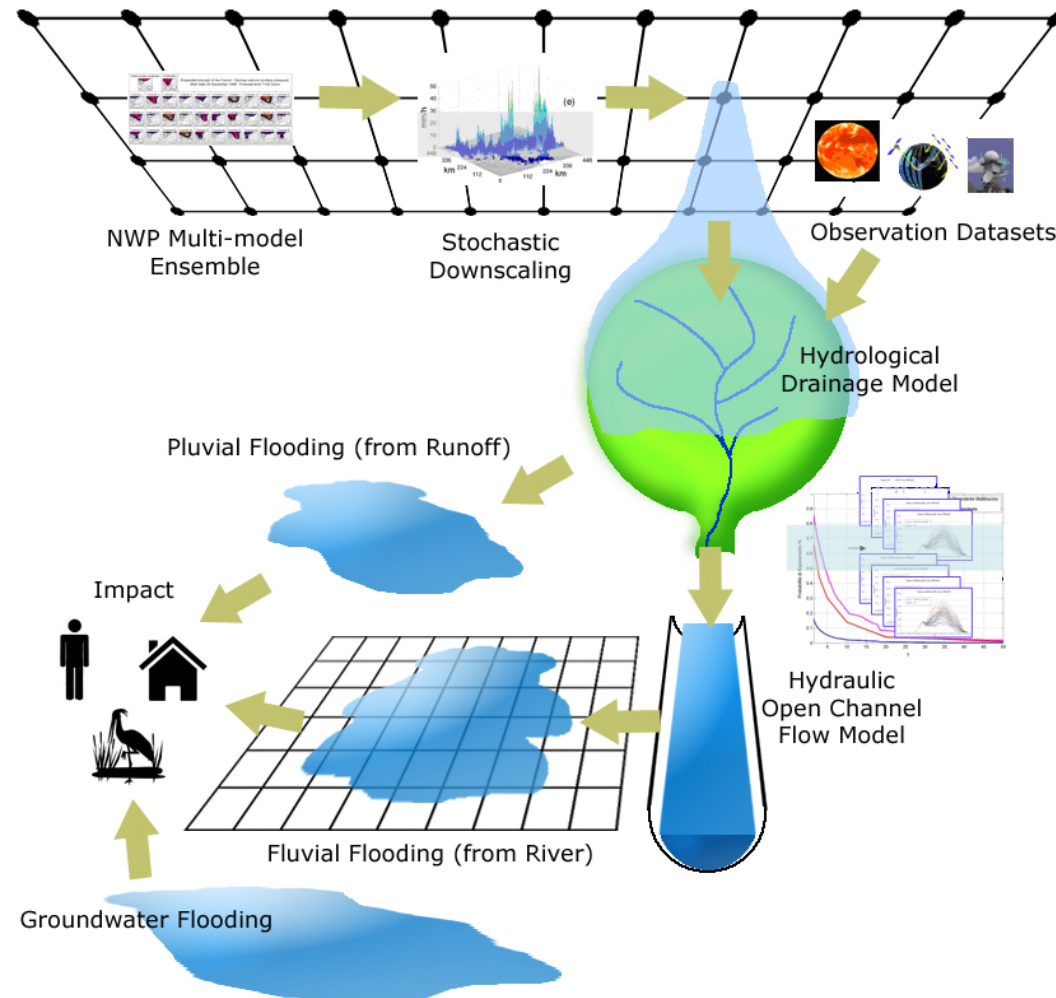
The importance of understanding **the world** and all the events and activities within it as a set of interconnected, **interacting processes** is now widely recognised.

Roger Moore, Former Chair, OpenMI Association





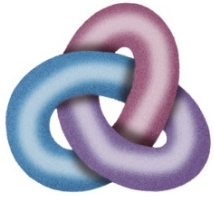
Studying Flooding with DRIHM



Experiment Suite 1
Rainfall

Experiment Suite 2
Discharge

Experiment Suite 3
Water Level,
Flow & Impact



DRIHM FAQs

What has been done to numerical models to enable them to run on the DRIHM eInfrastructure and exchange data?

What do I need to do to my model to get it on the DRIHM eInfrastructure?

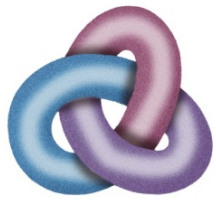


DRIHM Model MAP

Metadata, Documentation and Licence

Adaptors to common interface standards
for I/O using controlled vocabularies

Portability of model components



Metadata, Documentation and Licence

Metadata File

- 🌀 Title, abstract, keywords;
- 🌀 Responsible person;
- 🌀 Rectangular geographic bounding box;
- 🌀 Technical details (language, processors, OS, OpenMI status, run time);
- 🌀 URLs to code, executables, documentation;
- 🌀 Inputs and Outputs (parameter, temporal, spatial, type, feature type).



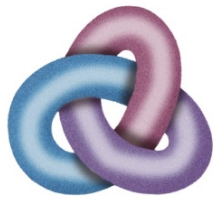
Metadata, Documentation and Licence

Documentation

- 🔗 General description;
- 🔗 How to install;
- 🔗 How to use;
- 🔗 Full manual;
- 🔗 Technical changes made for DRIHM.

Licence

- 🔗 To use;
- 🔗 Open Source.



Metadata, Documentation and Licence



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FIND INTERACTIVE MAPS, GIS DATASETS, SATELLITE IMAGERY AND RELATED APPLICATIONS

GEONETWORK'S PURPOSE IS:

- To improve access to and integrated use of spatial data and information
- To support decision making
- To promote multidisciplinary approaches to sustainable development
- To enhance understanding of the benefits of geographic information

GeoNetwork opensource allows to easily share geographically referenced thematic information between different organizations. For more information please contact



Adaptors and Controlled Vocabularies

lwe_thickness_of_precipitation_amount

Canonical Unit: m

"lwe" means liquid water equivalent. "Amount" means mass per unit area. The construction lwe_thickness_of_X_amount or _content means the vertical extent of a layer of liquid water having the same mass per unit area.





Adaptors and Controlled Vocabularies



Standard Parameter (from CF Standard Names)	level	Unit
lwe_thickness_of_precipitation_amount	surface	m
lwe_thickness_of_stratiform_precipitation_amount;	surface	m
lwe_thickness_of_convective_precipitation_amount;	surface	m
air_temperature;	2m	K
specific_humidity;	2m	1
surface_net_downward_longwave_flux;	surface	W m ⁻²
eastward_wind;	10m	ms ⁻¹
northward_wind;	10m	ms ⁻¹
surface_air_pressure;	surface	Pa

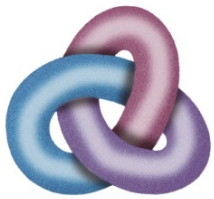


Adaptors and Controlled Vocabularies

File-based interface standards:

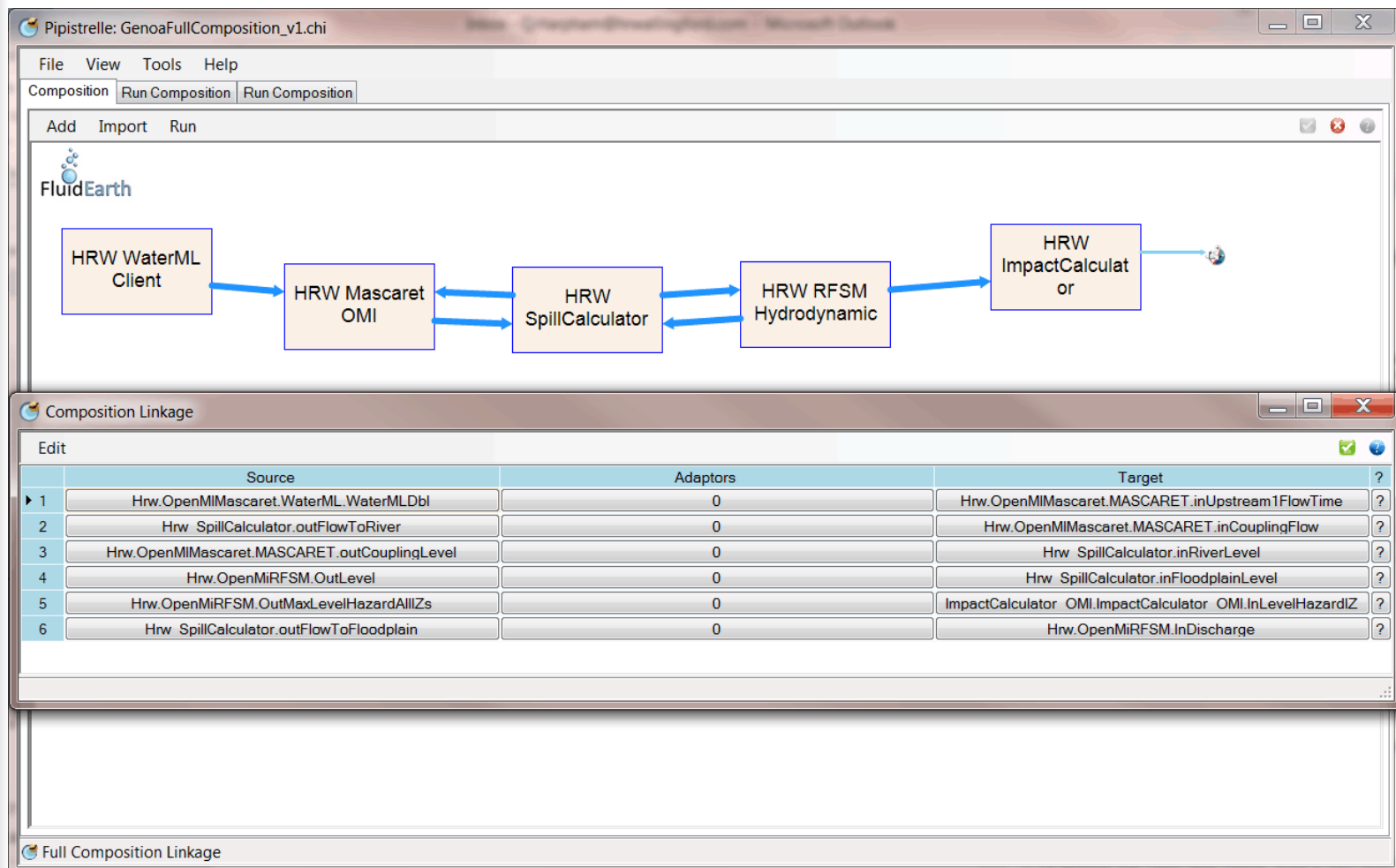
1. WaterML 2.0 for Point Series data, using standard parameter names.
2. NetCDF-CF1.6 for Grid and Grid Series data, using standard parameter names.

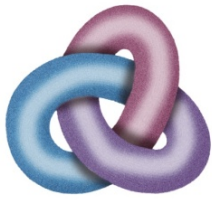




Adaptors and Controlled Vocabularies

Memory-based interfaces with OpenMI 2.0

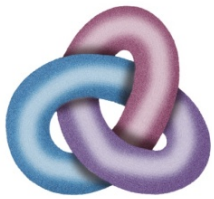




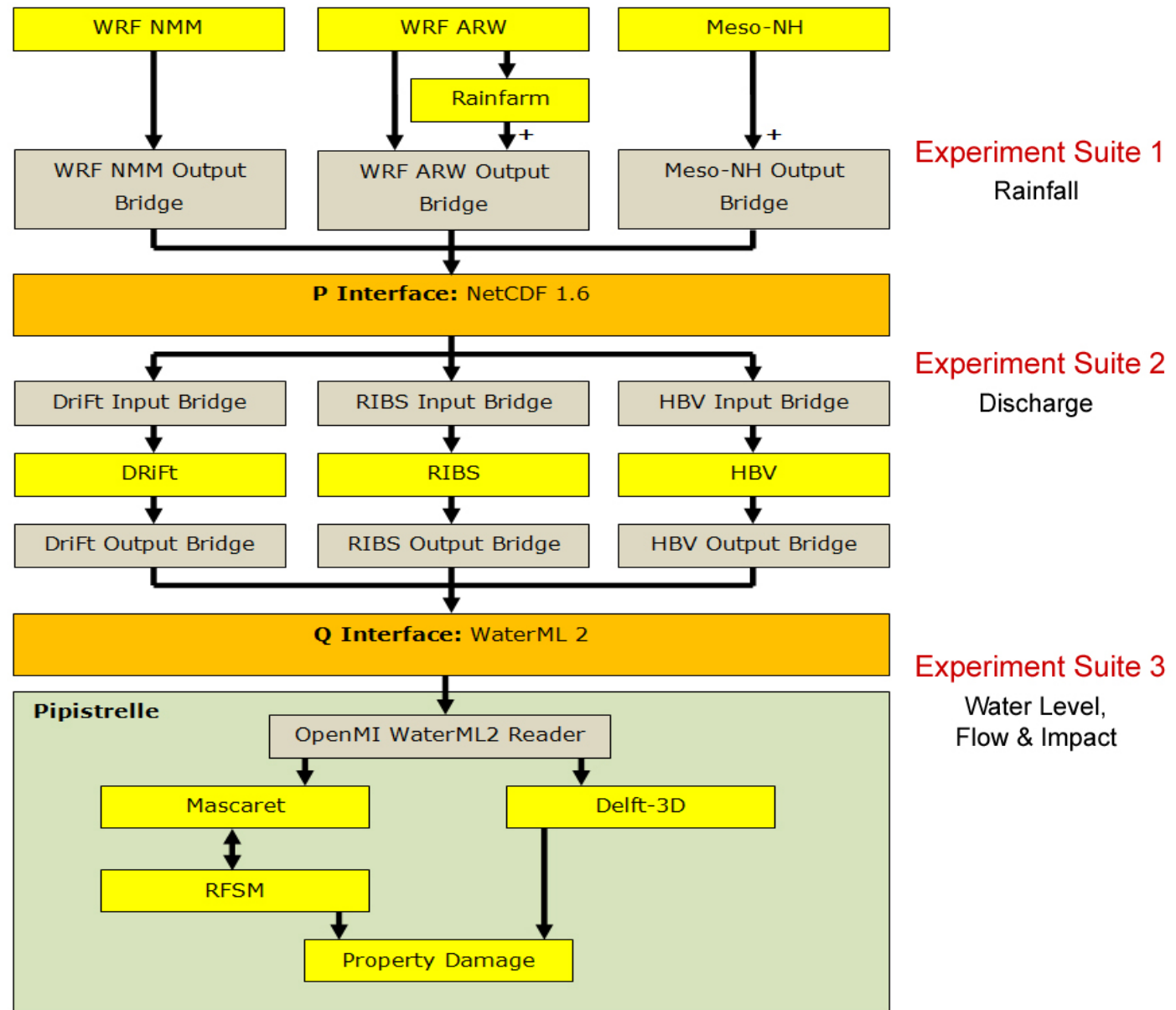
Portability of Model Components

1. The component requires only **standard installations** of its supporting system software.
2. The component provides **all binaries and libraries** on which it depends.
3. The component makes **no assumptions** about **absolute directory** structure.





The DRIHM Model Suite

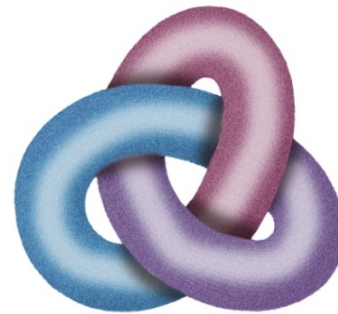
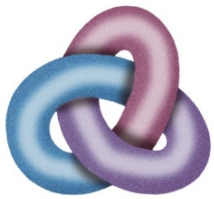




Focus on the Science



Courtesy of Alexey
Voinov



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<http://www.drihm.eu/>



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