

**Pan-European cooperation on Limited Area
Modeling (LAM) – Numerical Weather
Prediction (NWP)**

**The “*why*” and “*how*” of the “*collaboration-
competition*” concept**

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Foreword

- **Not only in Meteorology!**
 - Jacques Delors (former Chairman of the European Commission) about what the EU needs for mastering successfully the economic-financial crisis: « *Competition that stimulates, Cooperation that reinforces and Solidarity that binds* » (18/8/2011).
 - The complexity of brevets' rights pushes more and more competing high-tech corporations to choose joint ventures rather than full-fledged market aggressivity.
- Both examples are not fully relevant to us (our 'solidarity' is more of ethical than of financial type; NWP progress [still?] relies on the 'peer review' control of progress) but the connections are there!

Scope of the talk

- This presentation will try and analyse how science-policy issues and international co-operation structures do influence the way along which national scientific teams in LAM NWP:
 - (i) agree to collaborate at the international level;
 - (ii) structure their methods of work for profiting from the critical mass created by the said collaborations.
- My own experience mainly comes from the ALADIN, RC LACE and HARMONIE frameworks but I shall try to remain as transversal as possible.

Some core epistemology first

- Extract out of ‘The black cloud’, Fred Hoyle, 1957
 - Alexandrov: *‘Bloody bad science; correlations obtained after experiments are done are bloody bad. Only predictions^(*) really count in science.’*
 - Parkinson: *‘I don’t follow.’*
 - Weichart: *‘It is no good doing a lot of experiments first and then discovering a lot of correlations afterwards, not unless they can be used for making new predictions. Otherwise it is like betting on a race after it has been run.’*

(*) NB: the word ‘prediction’ here concerns R&D for improving scientific knowledge. This has nothing to do directly with the ‘P’ of ‘NWP’. And yet ...

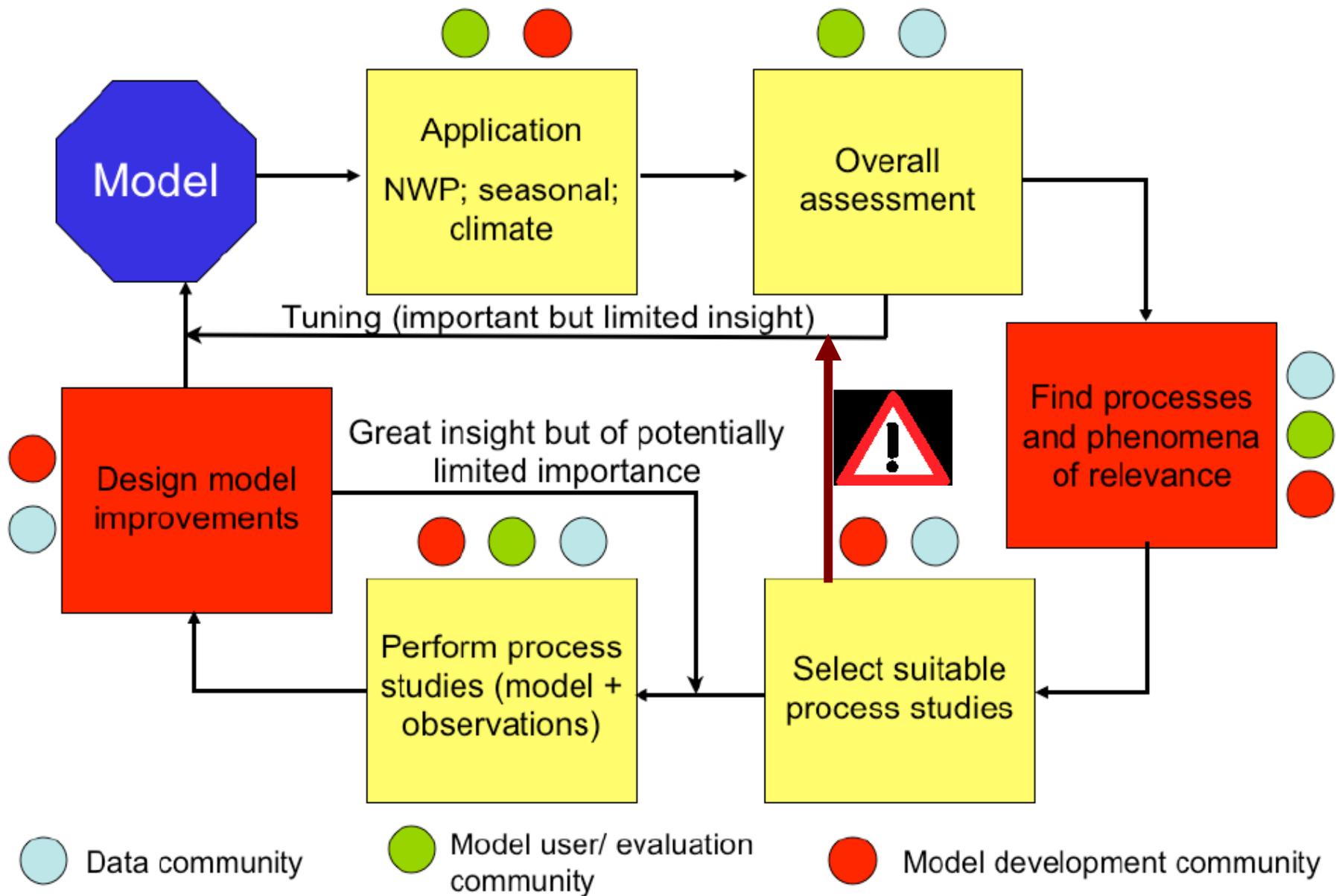
A dangerous (semantic) evolution

- Earlier on we were '*criticising*' NWP models.
- Now we are more and more only '*validating*' them.

For me, this has to do with an evolution that goes against the principle 'only predictions count in science'. The reasons are multiple:

- Model errors and data uncertainties are now comparable;
- Confusion exists about the word 'prediction' (cf. supra);
- Misunderstood aspects of 'Quality' seem pushing for it ...

Nowadays many people start thinking that their own NWP model draws its legitimacy from some built-in 'incomparability' with alternative solutions! What can be done against it? Let us first see it graphically.



A schematic view of the model development process, Christian Jakob, 2009

A good remedy: well-understood 'Collaboration-Competition' (C-C) (1/2)

- The model of LAM-NWP organisation (C-SRNWP) that heuristically emerged in Europe from 1979 to 1998 (and was kept roughly unchanged since) is based on 5 Consortia, which at the same time:
 - Compete for getting the best operational LAM-NWP forecasting tools (in close association with global NWP modelling ventures, including ECMWF);
 - Collaborate by exchanging ideas, software, experiences' outcomes and sometimes common code infrastructures (cf. ALADIN ⇔ RC LACE & HARMONIE).

A good remedy: well-understood 'Collaboration-Competition' (C-C) (2/2)

- Consortia 'C-C', if correctly applied (like people believe it has been up to now), is a good antidote against the above-mentioned (semantic) drift, since:
 - Inter-consortia *competition* (and aggregation of manpower of various origin within each of them) ensures a more diversified input for process studies, able to lead to model improvements (i.e. the part in danger of by-pass in CJ's diagram);
 - Transversal *collaboration* helps avoiding duplication of efforts and pitfalls linked with too much 'creativity'.

Where is the good balance in C-C?

- If one admits that the principle already outlined are correct, the key issue is: with the available manpower in Europe for LAM-NWP and the number of involved Countries, why 5 Consortia and 3 systems, and neither more nor less?
- Even today, I'm not sure about the correct answer to this question around the number '4' (average between 3 and 5) but I got one clue from a remark by F. Quinet: "*ALADIN appears to me as the best example of application of the French Revolution's idea to a scientific international effort*".
- From there, let us go to sociological determinants of history (and to a 2x2 classification).

Characterisation of family types in Europe (after 'L'invention de l'Europe' of E. Todd)

	Shared inheritance: diversity of successions	First born right: protection of possession
Separate parents – adult children dwelling	Nuclear-egalitarian family (Paris area, Italian Piemont, Castilla, ...)	Fully nuclear family (Around the North Sea => merchant areas)
Common parents – adult children dwelling	Communautory family (Eastern Europe, Finland, central Italy & France, ...)	Root Family (Germanic world, including old links)

Cooperation 'topology' of C-SRNWP entities

	Options oriented maintenance	Basic version oriented maintenance
Diversity of development threads	Arp./ALADIN (RC LACE)	HIRLAM
Unicity of development threads	IFS(ECMWF)	COSMO-LM

The diagram shows a box labeled "MO-UM" positioned between the two rows of the table. Two arrows originate from the "MO-UM" box: one points to the "Arp./ALADIN (RC LACE)" cell in the "Diversity of development threads" row, and the other points to the "IFS(ECMWF)" cell in the "Unicity of development threads" row.

A bit of 'further interpretation' (1/2)

- From the previous viewgraph we have a first choice between two paradigms:
 - Maintenance concepts 'frame' the scope of developments;
 - The choice of 'valid' developments dictates maintenance choices.
- On top of that there is the problem of how to articulate upstream research and NWP R&D => next viewgraph.

A bit of 'further interpretation' (2/2)

- Upstream research is about finding **simple** ways to validate apparently **complicated ideas**!
- NWP R&D is about converting **simple ideas** into an enormously **complex** operational machinery!

No wonder it's not easy to handle meaningfully the links between the two!!! => two solutions again: betting clearly on either:

- Unicity of the link;
- Diversity around the link.
- In-between solutions are too ambiguous.
- And $2 \times 2 = 4$! QED ??

EWGLAM => SRNWP => C-SRNWP
=> EUMETNET-forecasting

The '*how*' of the 'collaboration-
competition' concept (after the '*why*')

History of the Consortia and of their grouping

- 1979: First ECMWF operational forecast & first EWGLAM meeting (for LAM NWP)
- 1985: Birth of HIRLAM
- 1988: Birth of COSMO (German-Swiss only at that stage)
- 1991: Birth of ALADIN
- 1993-1994: Launching of SRNWP
- 1994: Official birth of RC LACE
- 1998: EUMETNET takes SRNWP under its umbrella
- 2005: Signing of the HARMONIE agreement



SRNWP Consortia in Europe



ALADIN

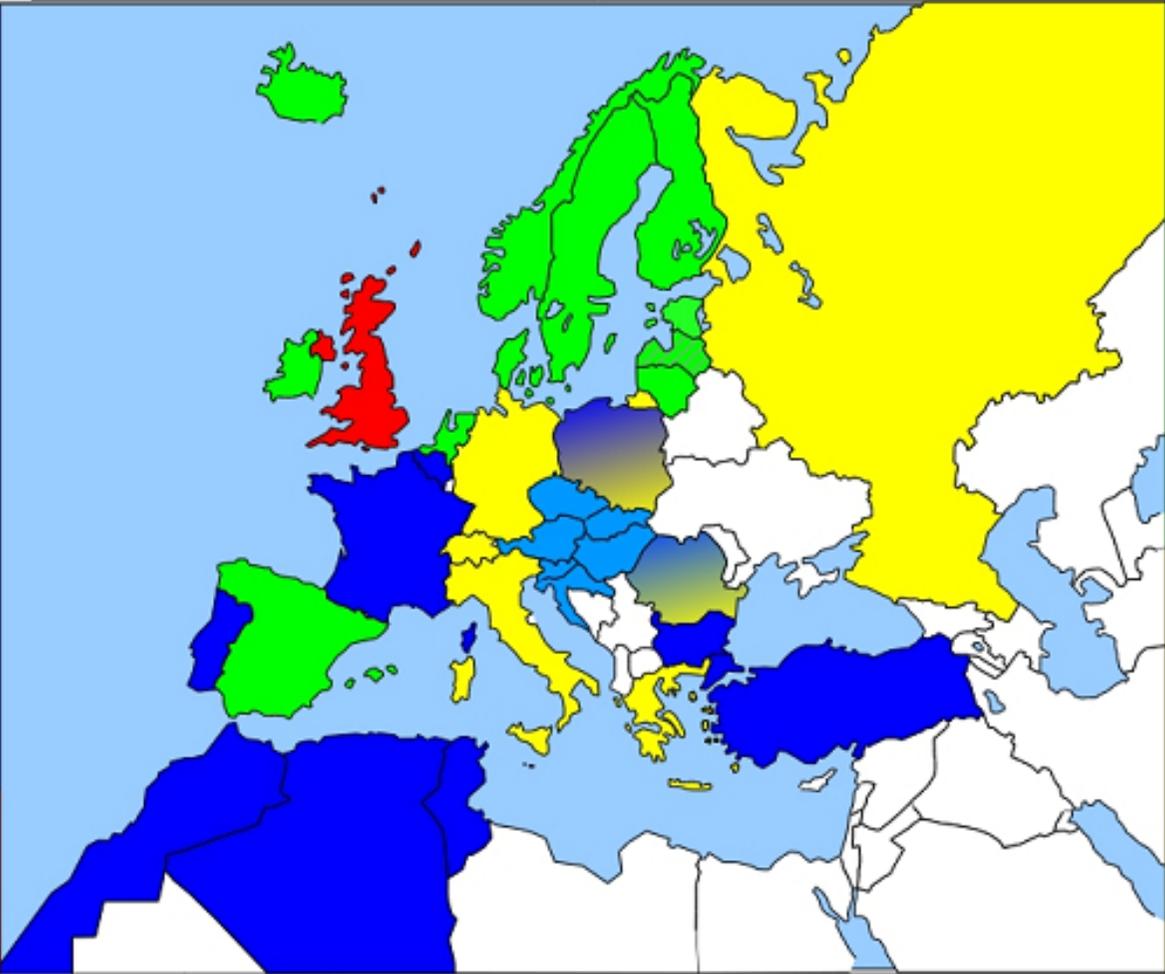
- Algeria
- Belgium
- Bulgaria
- France
- Morocco
- Poland
- Portugal
- Tunisia
- Turkey

- Austria
- Croatia
- Czech Rep.
- Hungary
- Romania
- Slovakia
- Slovenia



UKMO

United Kingdom



HIRLAM

- Denmark
- Estonia
- Finland
- Iceland
- Ireland
- Lithuania
- Netherlands
- Norway
- Spain
- Sweden
- (Latvia)

COSMO

- Germany
- Greece
- Italy
- Poland
- Romania
- Russia
- Switzerland



SRNWP CONSORTIA (5) and MODELS (3-4)

CONSORTIA	MODEL
ALADIN	ALADIN
COSMO	COSMO
HIRLAM	HIRLAM
LACE	ALADIN
MetOffice	Unified Model

Remark: ALADIN (LACE) and HIRLAM are working on code collaboration around the IFS/ARPEGE/ALADIN/ALARO/AROME code

Trans-Consortia 'EXPERT TEAMS'

1. Diagnostics, validation and verification
2. Dynamics and lateral boundary coupling
3. Link with applications
4. Physical parameterisation
5. Predictability and EPS
6. Surface and soil processes
7. System aspects
8. Data assimilation and use of observations

What about 'Solidarity'?

- C-SRNWP was built only as 'C-C', since, in the 80s and 90s, solidarity was inherent to merging (within HIRLAM, COSMO, ALADIN or RC LACE) the efforts of Countries of various size, economic power, NWP tradition and available manpower.
- The last decade (probably under the pressure of wider societal difficulties all leading to 'less european solidarity') saw a decrease of this feature.
- Yet, the C-C model requires a minimum level of solidarity. Otherwise mutual trust between partners disappears and duplication reappears, both between and within Consortia! => *is there a need to explicitly introduce a S-component in 'C-C'?*

Outlook

- All what was said is very specific to LAM NWP and should not be used (or with great care) as a ‘guideline’ for other pan-European endeavours.
- The ‘C-C’ model is robust and the organisation built around it (EUMETNET Programmes, Consortia, Expert Teams, regular scientific meetings, ...) has been heuristically well chosen.
- The dangers come from two (intertwined?) aspects:
 - The loss of ‘solidarity’ (or of ‘*reciprocal trust*’) in front of external pressures;
 - The risks linked with the ‘incomparability syndrome’ in R&D and the associated risk of scientific rigidity (*Prediction*’s value alas limited to operational aspects).

Finally: is all this philosophy or management theory?

Let someone else answer with a higher point of view:

“If you want to build a ship don’t herd people together to collect wood and don’t assign them tasks and work but rather teach them to long for the endless immensity of the sea”

Antoine de Saint-Exupéry