From Synergie and Oppidum to Synopsis

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EGOWS Meeting

ECMWF, June 2010

METEO FRANCE
Toujours un temps d'avance

Overview

- Synergie and Oppidum : Two operational tools for forecasting at Meteo-France (and web serveurs fed mainly by Synergie batch)

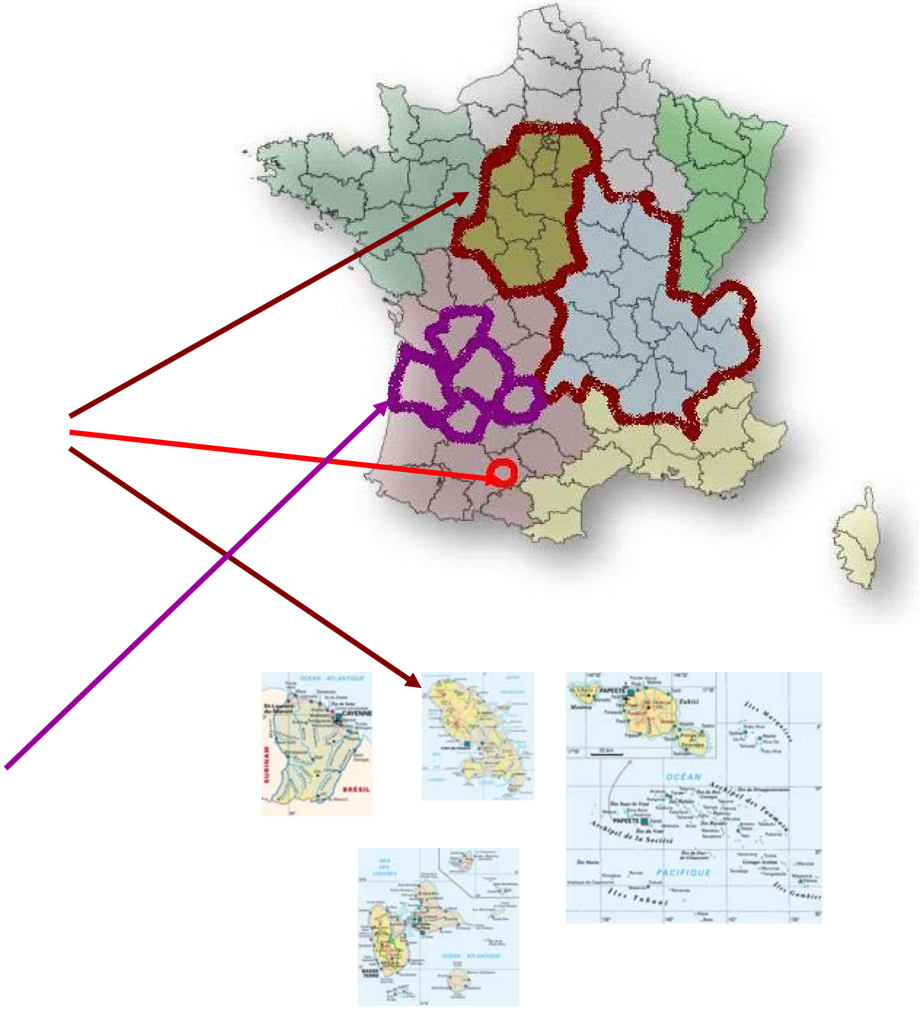
- Synopsis : SOA OGC Project

Operational tools at Meteo-France

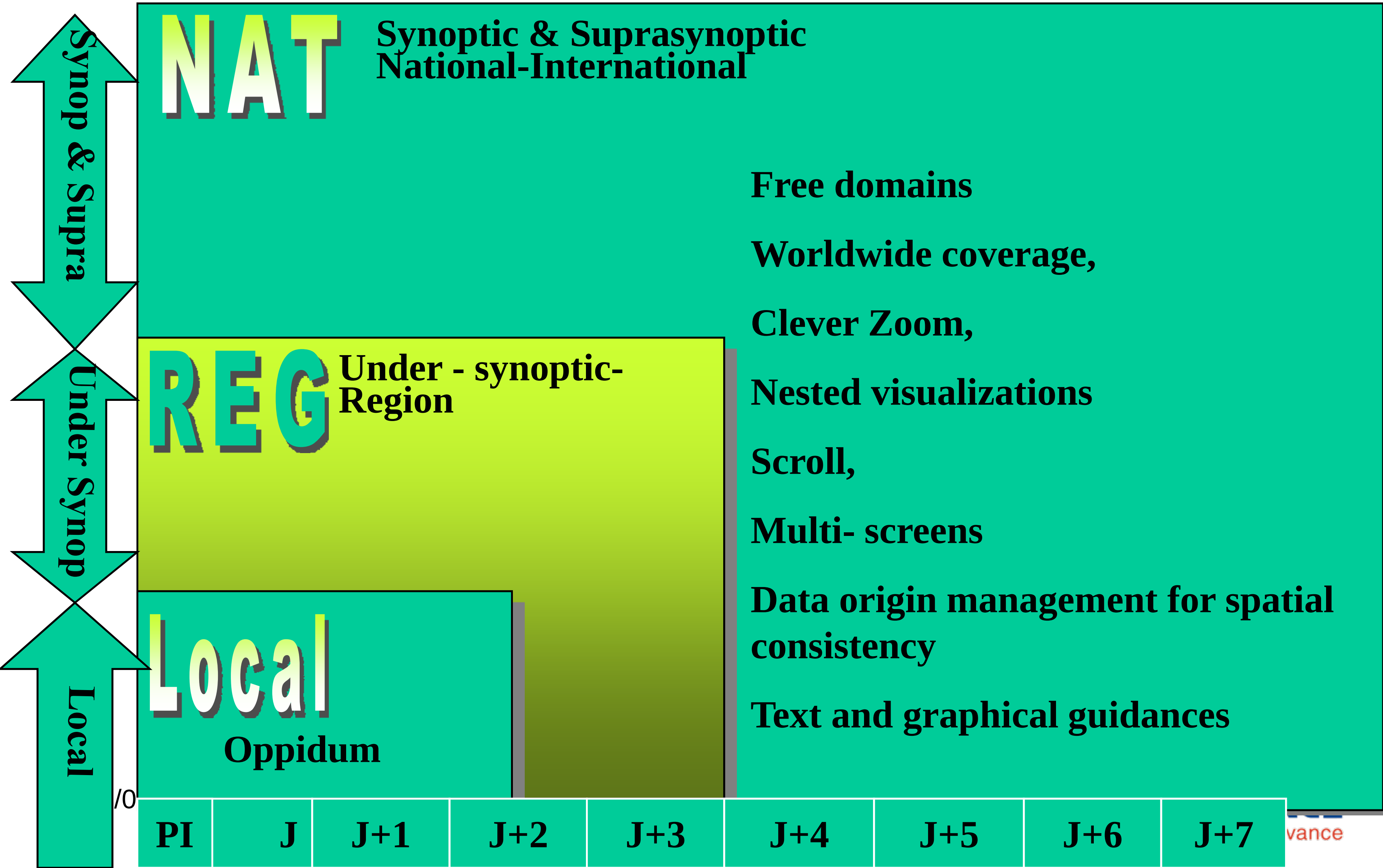
- At the present time, two systems for three levels of forecast

- **SYNERGIE**
  - **National and regional** forecasting (metropolitan and overseas)
  - Worldwide usage outside of Meteo-France

- **OPPIDUM**
  - **Local departmental** forecasting (“Prévi-Surveillance” application)
  - Outside of Meteo-France. (“Meteo+” application)



All domains and time range configurability



Synop & Supra

Under Synop

Local

NAT

Synoptic & Suprasynoptic
National-International

REG

Under - synoptic-
Region

Local

Oppidum

PI | J | J+1 | J+2 | J+3 | J+4 | J+5 | J+6 | J+7

Free domains

Worldwide coverage,

Clever Zoom,

Nested visualizations

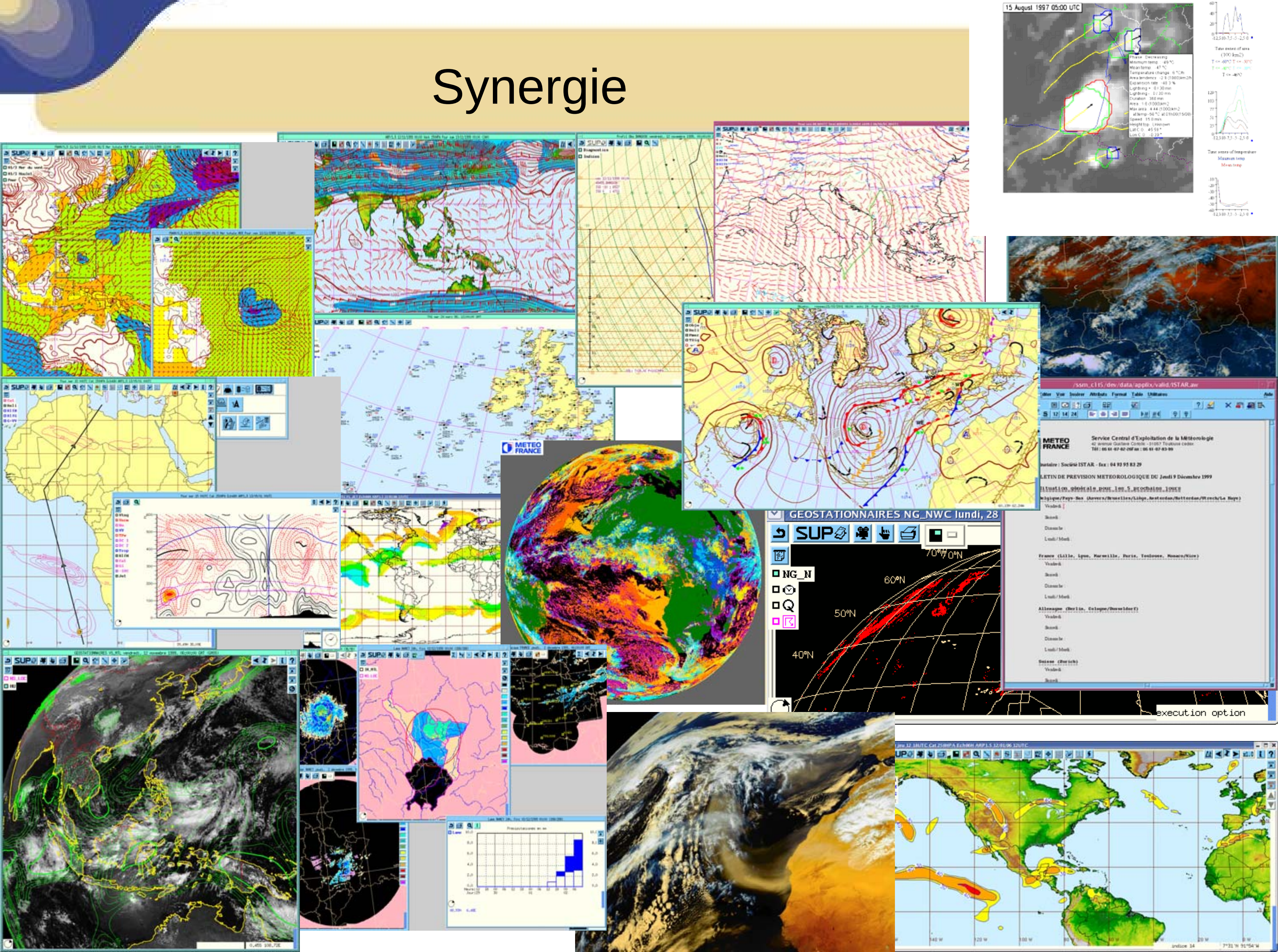
Scroll,

Multi- screens

Data origin management for spatial consistency

Text and graphical guidances

Synergie



METEO FRANCE

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LETIN DE PREVISION METEOROLOGIQUE DU Jeudi 9 Décembre 1999

Situation générale pour les 5 prochains jours

elgique/Pays-Bas (Anvers/Bruxelles/Liège, Amsterdam/Rotterdam/Utrech/La Haye)

Vendredi :

Samedi :

Dimanche :

Lundi / Mardi :

France (Lille, Lyon, Marseille, Paris, Toulouse, Monaco/Nice)

Vendredi :

Samedi :

Dimanche :

Lundi / Mardi :

Allemagne (Berlin, Cologne/Dusseldorf)

Vendredi :

Samedi :

Dimanche :

Lundi / Mardi :

Suisse (Zurich)

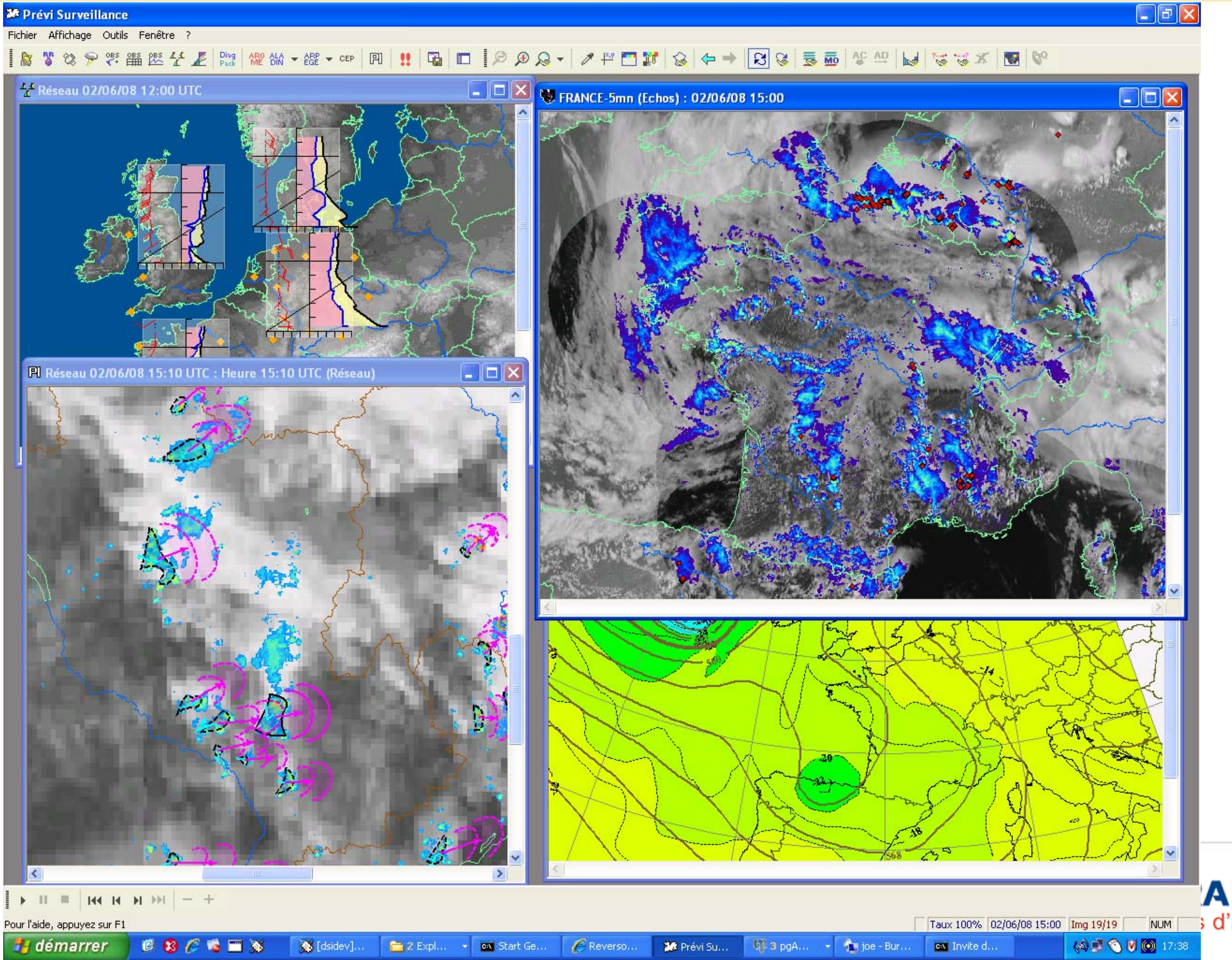
Vendredi :

Samedi :

Synergie : A little background

- First stages of Synergie development started in 1989
- First operational release in 1993
- More than 17 operational versions since then
- Several Operating System changes
- Today :
  - Linux only
  - More than 1,5 million lines of code (C, C++, fortran…)
  - A sum of 180 man-year of development
  - A software patchwork of the best tools and libraries of Météo-France and ECMWF
  - More than 120 operational clients at Météo-France (312 for all uses)
  - 60 servers
  - More than 70 operational systems in 25 other countries

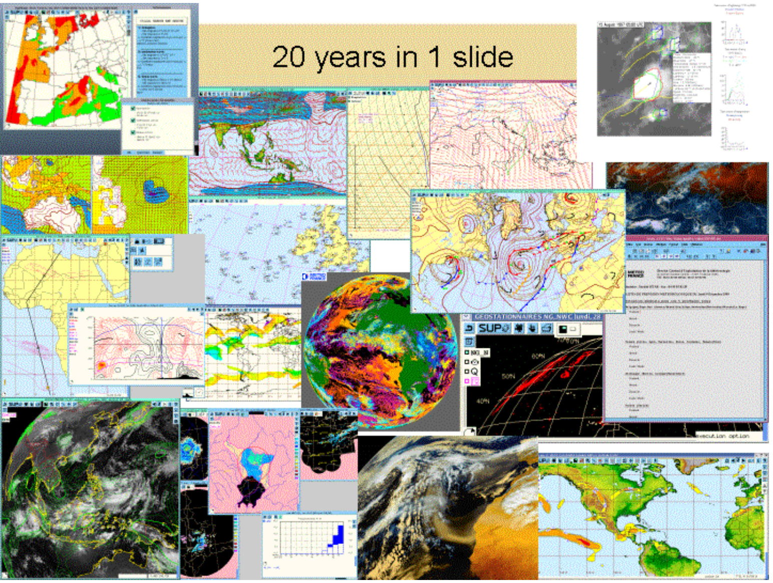
Oppidum


Prévi Surveillance
Fichier Affichage Outils Fenêtre ?
Réseau 02/06/08 12:00 UTC
FRANCE-5mn (Echos) : 02/06/08 15:00
Réseau 02/06/08 15:10 UTC : Heure 15:10 UTC (Réseau)
Pour l'aide, appuyez sur F1
Taux 100%
02/06/08 15:00
Img 19/19
NUM
démarrer
[dsidev]...
2 Expl...
Start Ge...
Reverso...
Prévi Su...
3 pgA...
joe - Bur...
Invite d...
17:38

Oppidum : A little Background

- Developments started in 1996
- First operational release in 2001
- More than 7 operational releases since then
- Today :
  - Windows only (XP, 2003 Server)
  - A sum of 45 man-year of development
  - More than 120 operational systems in Météo-France
  - More than 200 operational systems in other companies
- Applications (GUI) are sharing the same technical components :
  - Previ-Surveillance : The forecasting tool in Departmental Offices
  - Meteoplus : system for external usage
  - Meteofac : Pre-flight documentation (including automatic generation)
  - Aspoc+ : providing ATC with thunderstorm diagnostics
- C++, C#, MFC, ILOG views, RogueWave

To sum up

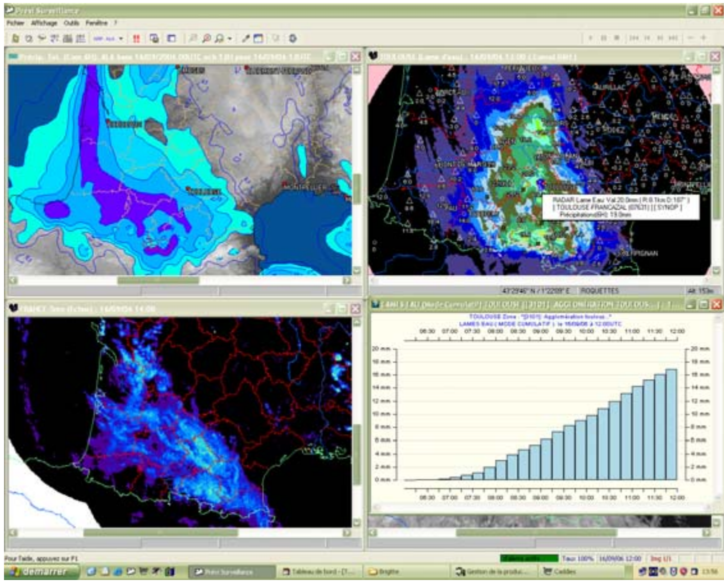


SYNERGIE

Linux

370 systems in MF

70 out of MF



OPPIDUM

Windows

120 systems in MF

200 out of MF

Towards a unique tool

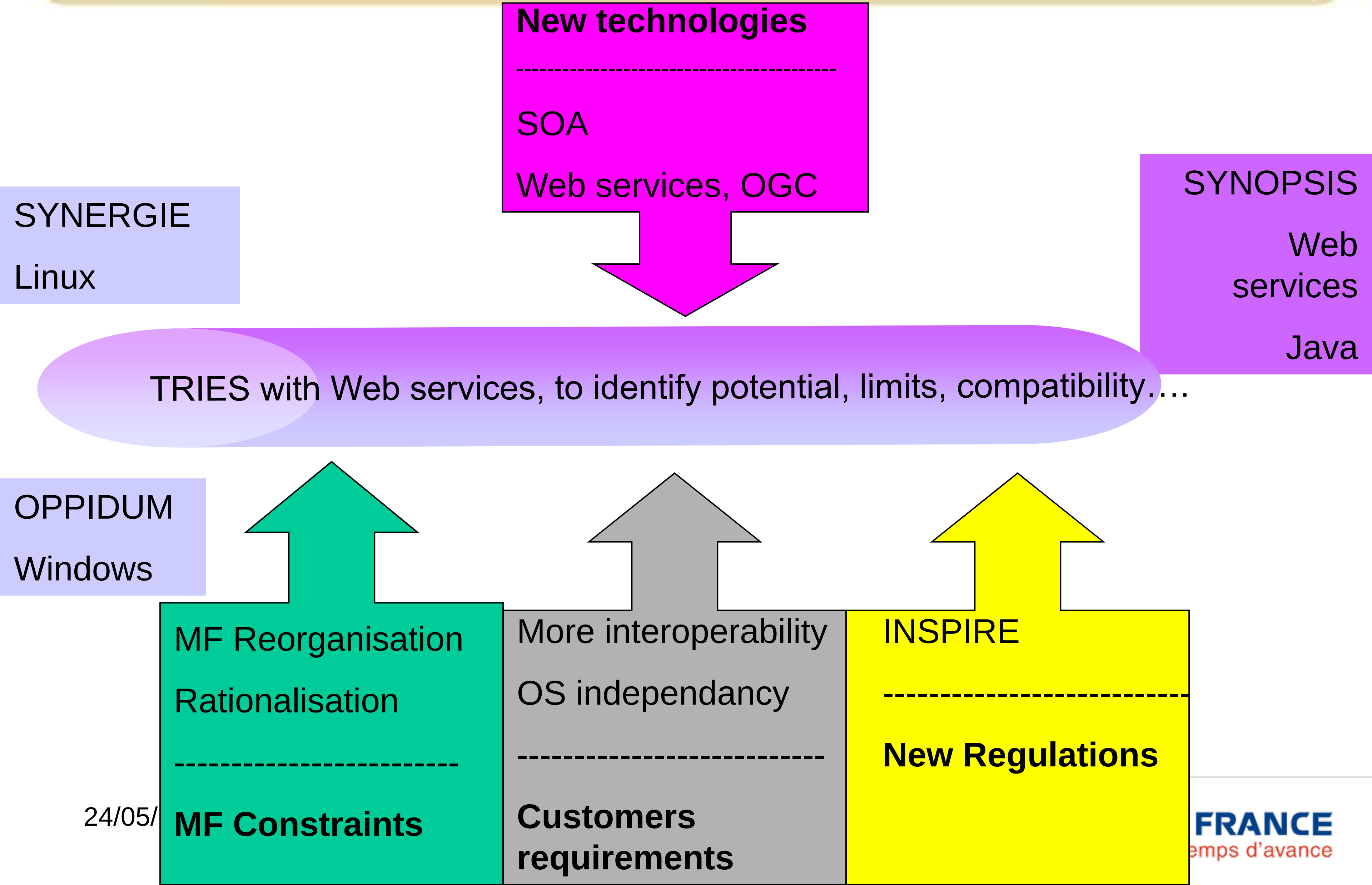
Synopsis

Towards a unique workstation

- Two systems, two platforms (Linux , Windows)
- Meet the needs of 3 levels of forecast (national, regional, local)
- They have been developed and configured for that .

But

- Features have to be implemented on both.
- Strong requirement to optimize development resources at Meteo-France
- Potential reorganization : cut down from 108 to 55 offices



New technologies

SOA

Web services, OGC

SYNERGIE

Linux

SYNOPSIS

Web services

Java

TRIES with Web services, to identify potential, limits, compatibility….

OPPIDUM

Windows

MF Reorganisation

Rationalisation

MF Constraints

More interoperability

OS independancy

Customers requirements

INSPIRE

New Regulations

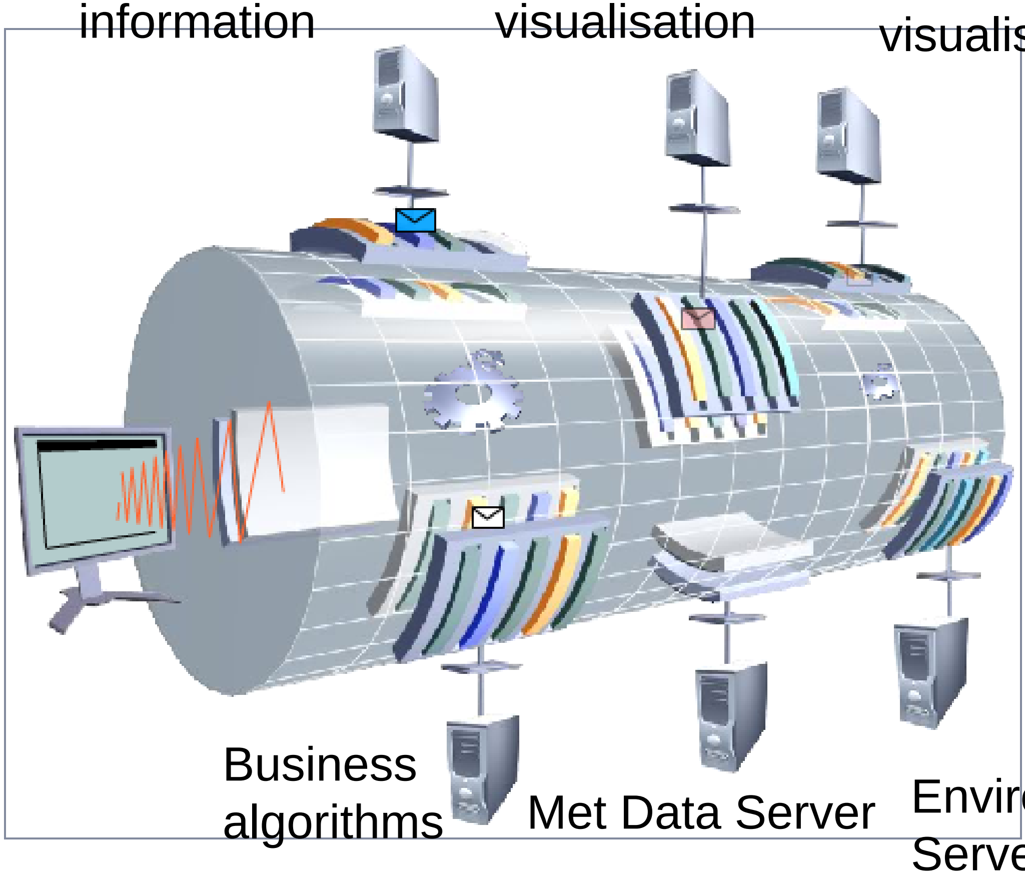
Pilot project SOA-OGC

- Goals :
  - Improve our expertise on OGC standards and evaluate technologies to implement them,
  - Not only on the IT point of vue but also on the production one
  - Primary work before main projects
    - Re-Architecture of the finalized production system
    - Web-Based workstation
  - Better cooperation within meteorological community

- 3 subprojects :
  - Service Oriented Architecture
  - OGC Web Services
  - Web-Based Workstation

Service Oriented Architecture

WMS



Geographical information

Met visualisation

Other environmemt visualisation

Light Web application

ESB PETALS

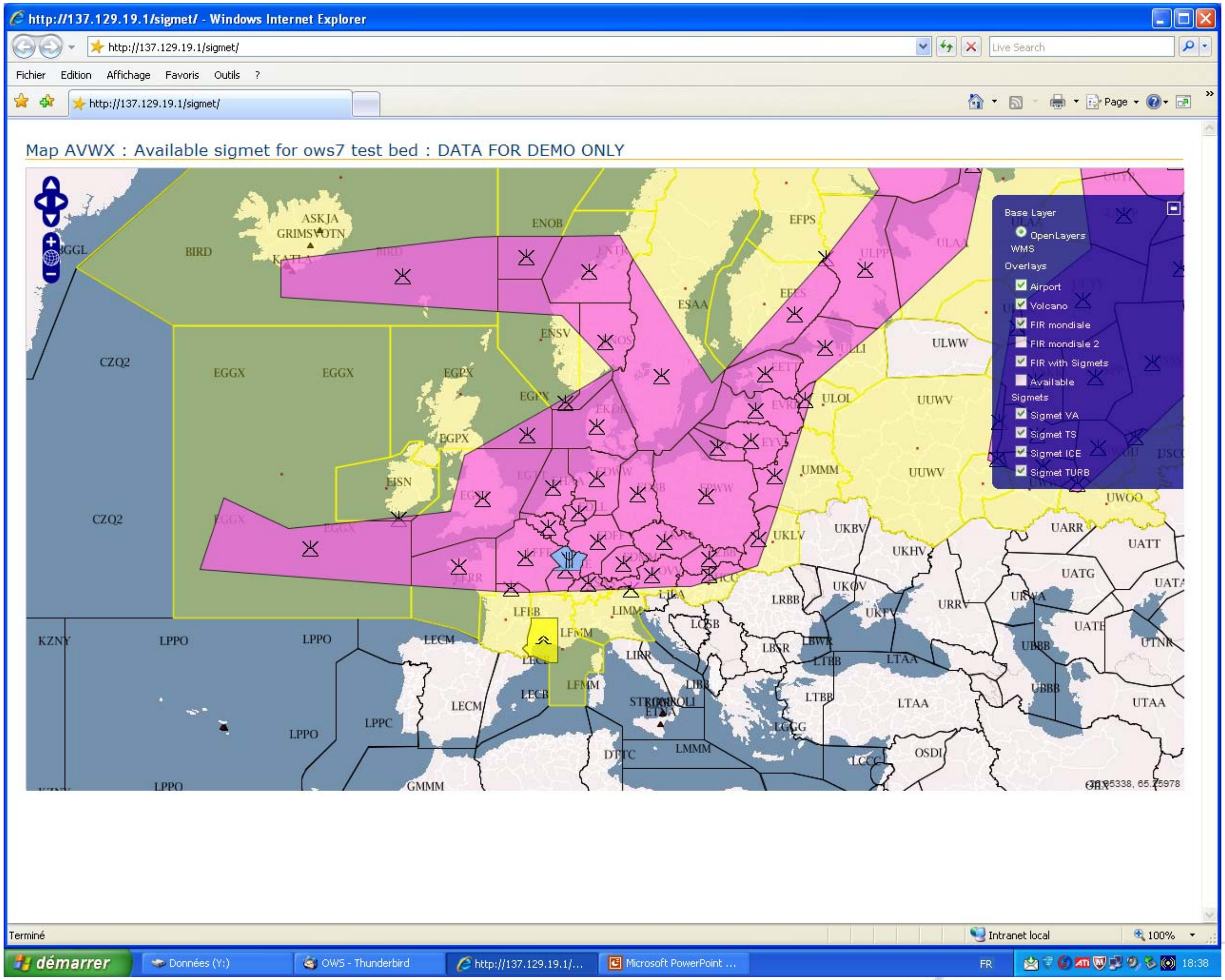
Business algorithms

Met Data Server

Environment Data Server

WCS or WFS

OGC OWS 7 tests



http://137.129.19.1/sigmet/ - Windows Internet Explorer

http://137.129.19.1/sigmet/

Fichier Edition Affichage Favoris Outils ?

Map AVWX : Available sigmet for ows7 test bed : DATA FOR DEMO ONLY

Base Layer

● OpenLayers WMS

Overlays

☑ Airport
☑ Volcano
☑ FIR mondiale
□ FIR mondiale 2
☑ FIR with Sigmets
□ Available Sigmets
☑ Sigmet VA
☑ Sigmet TS
☑ Sigmet ICE
☑ Sigmet TURB

Terminé

24/05/10

METEO FRANCE
Toujours un temps d'avance

Towards a unique workstation (future)

18 months Pilot project from late 2008: OGC and SOA

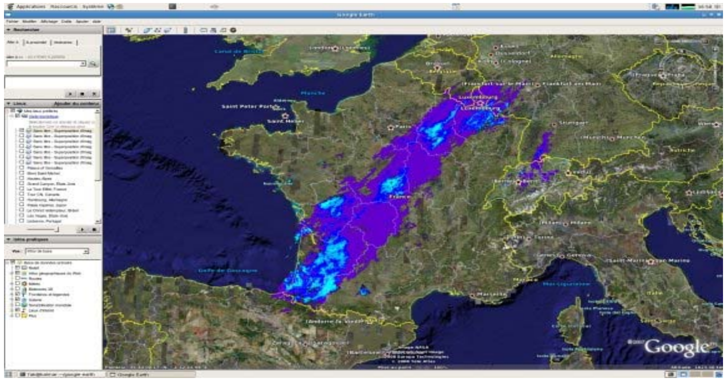
Direction has decided to go towards :

- A single workstation for “advanced forecasting” , OS independent
- A “light” workstation (Web-Based) for other needs
- Sharing the same business server components …

No changes or slight ones for end-users

Requirements

- As well at least as the current tools
- Enrich with some new ideas seen elsewhere
- Google Earth like



- Multi platform and deployable automatically
- Able to run on large centralized clusters as well as on standalones without network
- Supporting high availability and scalability
- Supporting cascading servers
- Designed with a SOA architecture

Technical choices (client side)

- Not one but two technical choices
- HTML / Javascript / OpenLayers for commercial websites
  - Quick to develop
  - Universal (just a browser !)
  - Only basic features (zooming, panning, overlays...)
- Java Web Start for our internal needs
  - Seamless deployment
  - Full Access to computer ressources
  - Almost universal (a browser and the Java plugin)
  - Basic and advanced features

Technical choices (server side)

- Linux 64-bit only
- Free softwares
- A modular architecture

Technical choices (server side)

- Programming languages :
  - Modern C (+ librairies from the Gnome project)
    - Fast binaries and utilities, core libraries
    - No daemon, no threads
    - Each core library has a Python and Java binding
  - Java
    - Multi-threaded daemons
    - Some particular servlets
  - Python
    - Glue around Mapserver, GDAL
    - Scripts and web things

Technical choices (server side)

- High Availability + Scallability = Software Bus
- Three main possibilities :
  - Use a huge thing like an Enterprise Service Bus (ESB)
  - Use a light custom developpement
  - Use a « off the shelf » medium thing

Technical choices (server side)

- Our choosen software bus : Apache ActiveMQ
- This is a JMS message broker
- So something from the Java world but...
- ... open to other languages throw a protocol called STOMP

ActiveMQ

Technical choices (server side)

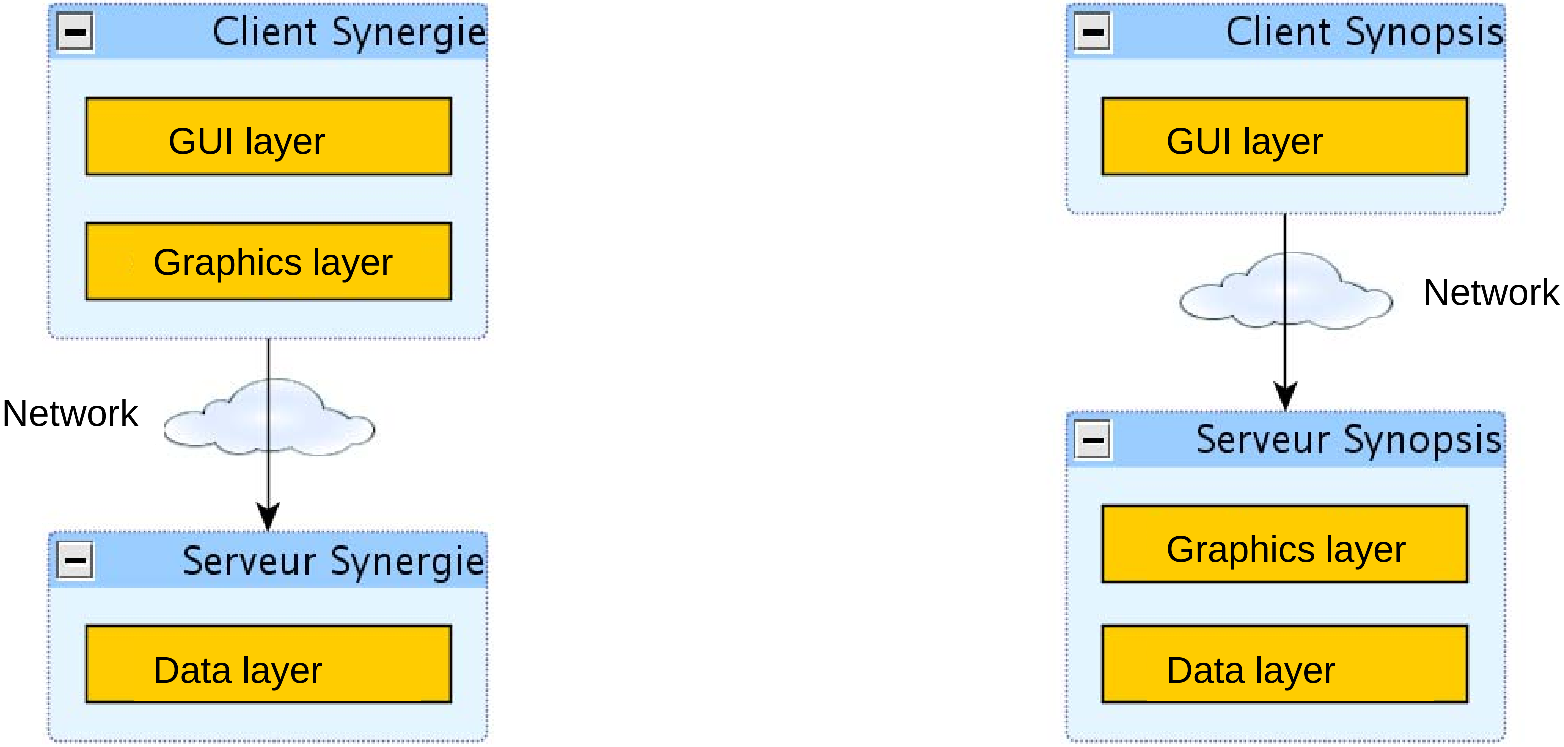
- On the « data » side, we used :
  - PostgreSQL + PostGIS for
    - Vectors (roads, borders, rivers, nowcasting objects...)
    - Points (cities, lightning datas...)
    - Spatial indexes on satellite, radar coverages
    - But not for binary files (BLOB)
  - WEBDAV (Apache)
    - Big files (satellite, radar...)
    - WEBDAV path is given by the database

Technical choices (server side)

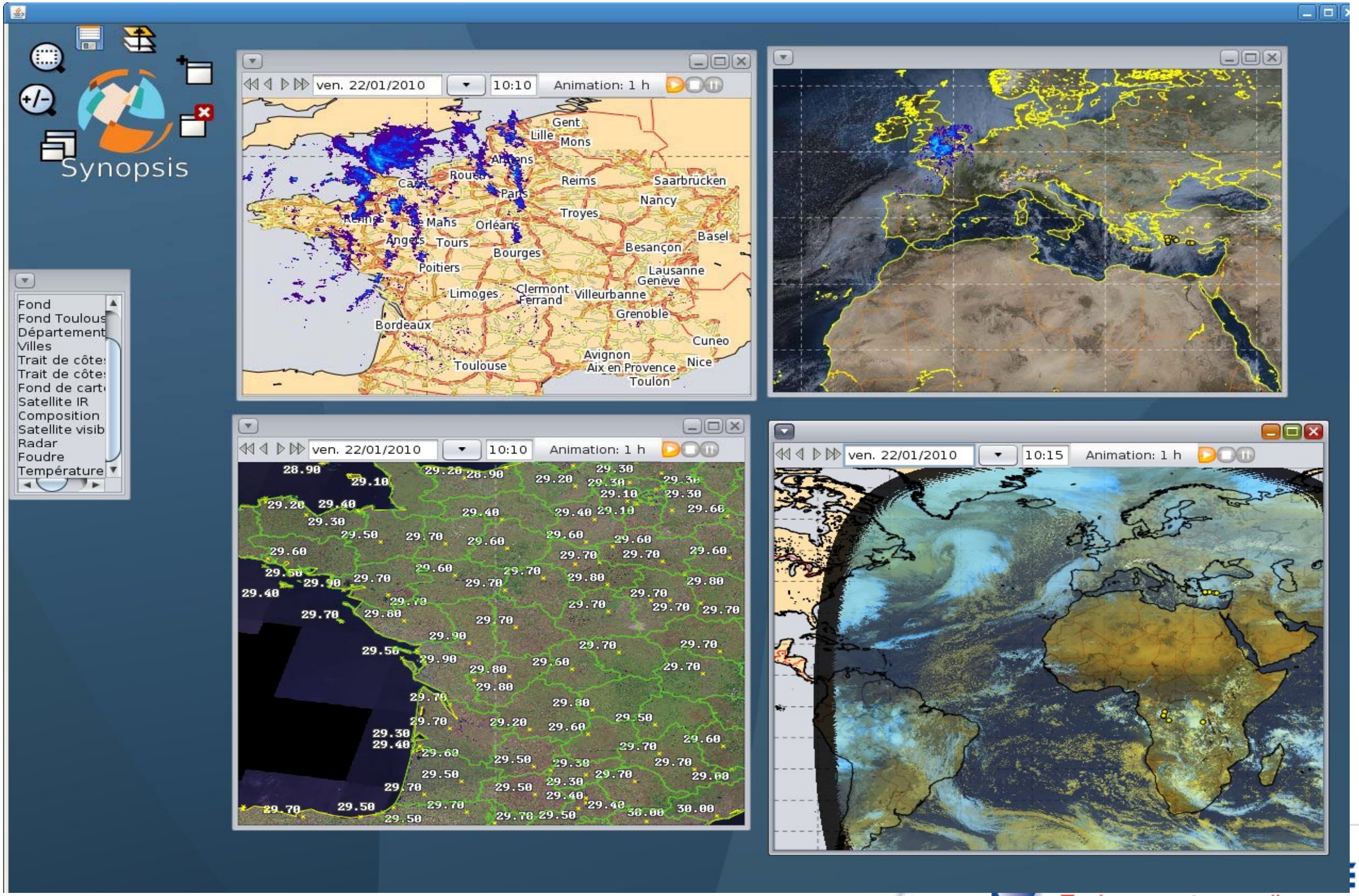
- On the « services » side, we used :
  - Mapserver for :
    - OGC services
    - A lot of charts
  - GDAL/PROJ4 for :
    - Image reprojection
    - Image Sampling
  - Magics++ for :
    - Coastline
    - Model charts (just a test)

Results of pilot project

- Modification of technical architecture from Synergie to Synopsis



Results of pilot project : Independant Java web start client

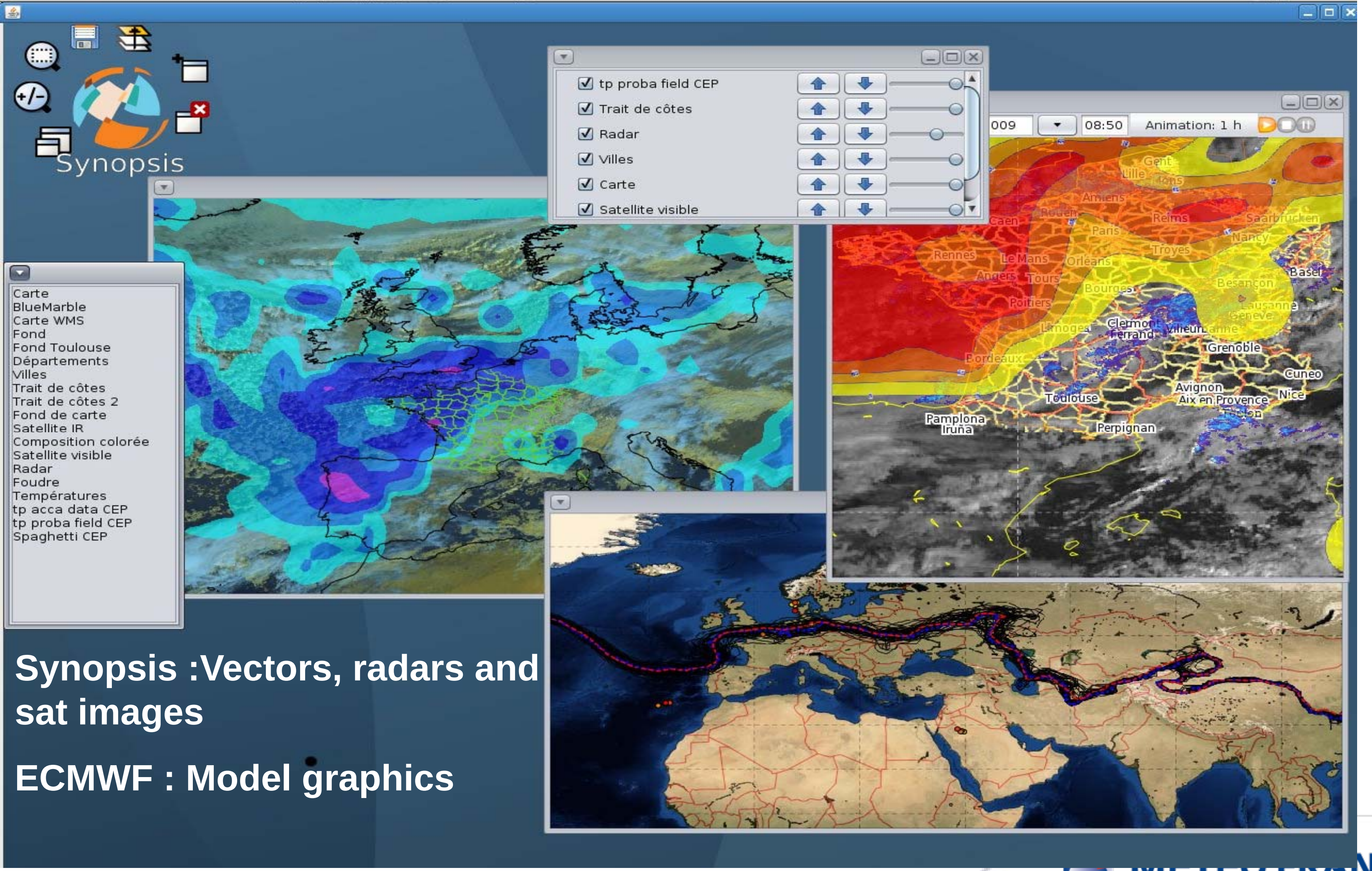


ven. 22/01/2010 10:10 Animation: 1 h

ven. 22/01/2010 10:10 Animation: 1 h

ven. 22/01/2010 10:15 Animation: 1 h

Results of pilot project
Extended Java Web start client



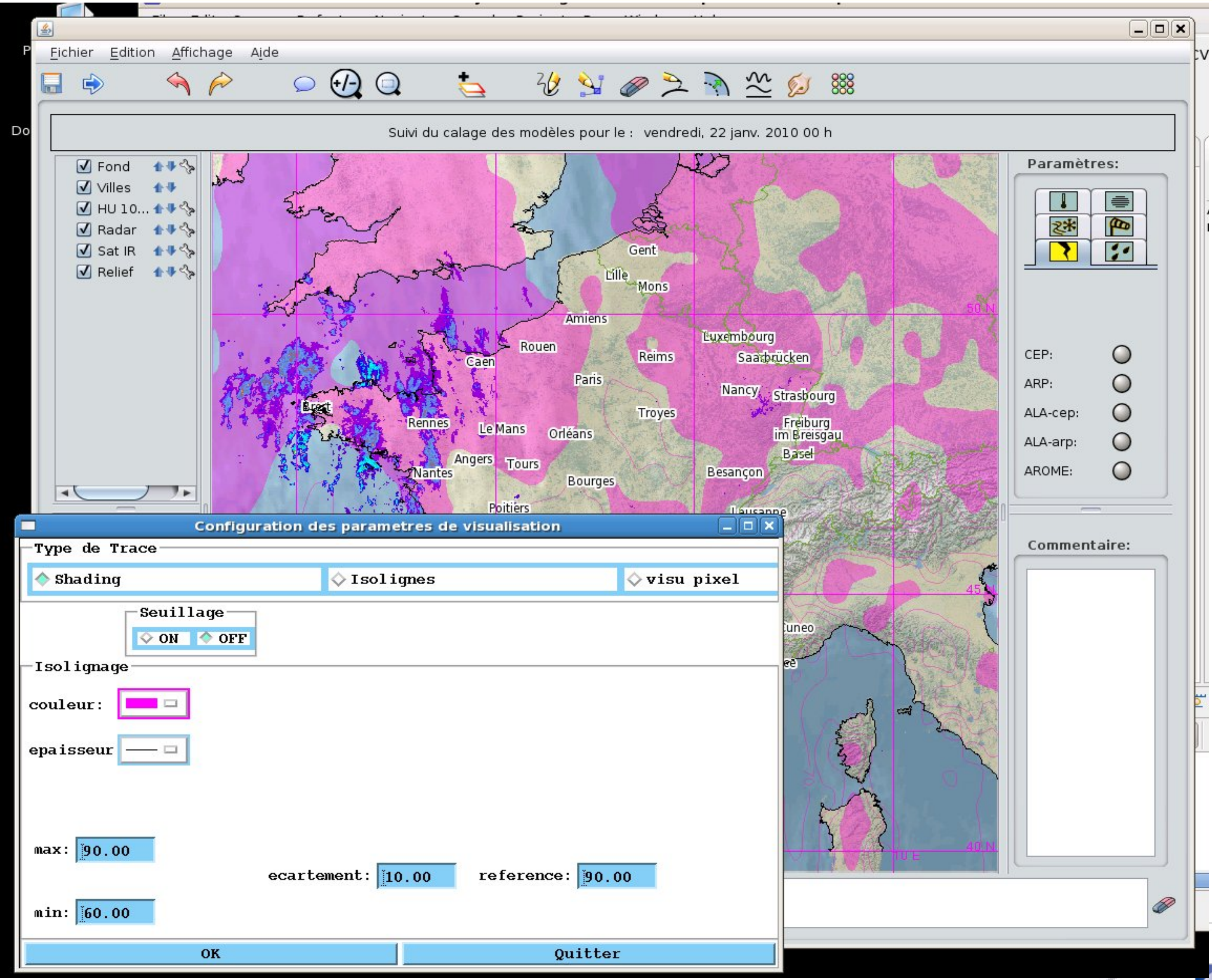
- ☑ tp proba field CEP
- ☑ Trait de côtes
- ☑ Radar
- ☑ Villes
- ☑ Carte
- ☑ Satellite visible

Carte
BlueMarble
Carte WMS
Fond
Fond Toulouse
Départements
Villes
Trait de côtes
Trait de côtes 2
Fond de carte
Satellite IR
Composition colorée
Satellite visible
Radar
Foudre
Températures
tp acca data CEP
tp proba field CEP
Spaghetti CEP

Synopsis :Vectors, radars and sat images

ECMWF : Model graphics

Results of pilot project
Extended Java Web start client



Suivi du calage des modèles pour le : vendredi, 22 janv. 2010 00 h

☑ Fond
☑ Villes
☑ HU 10...
☑ Radar
☑ Sat IR
☑ Relief

CEP: ○
ARP: ○
ALA-cep: ○
ALA-arp: ○
AROME: ○

Configuration des parametres de visualisation

Type de Trace: ◆ Shading ◇ Isolignes ◇ visu pixel

Seuillage: ◇ ON ◆ OFF

Isolignage

couleur: 🟪

epaisseur: ——

max: 90.00

ecartement: 10.00

reference: 90.00

min: 60.00

Synopsis:

-Raster background

-Cities locations

Synergie :

-Vector coastline,

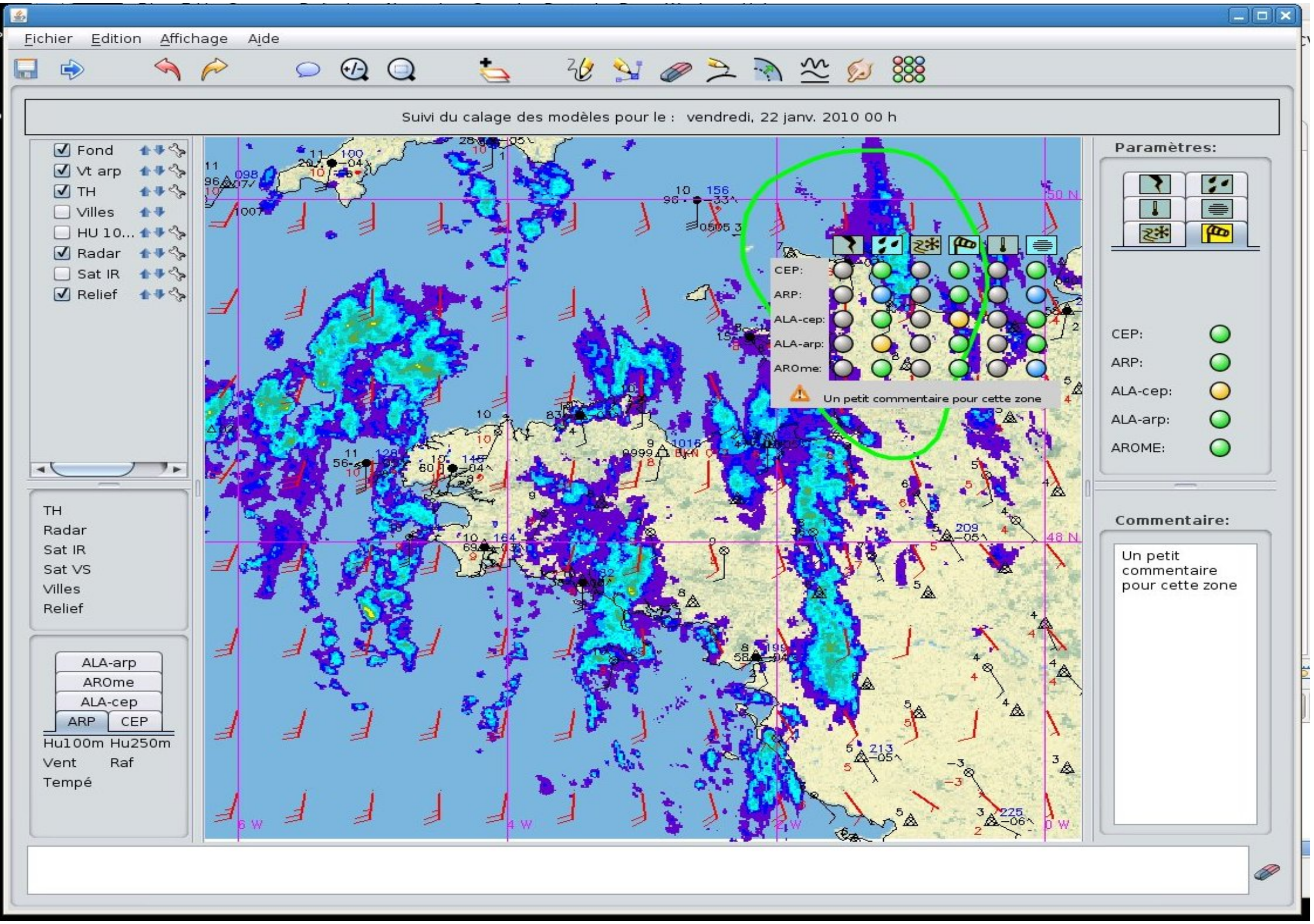
-Radar

-Model output (transparency handled via java)

The mixture of GUIs shows the level of integration

Possibility to zoom move...

Results of pilot project
Extended Java Web start client



Suivi du calage des modèles pour le : vendredi, 22 janv. 2010 00 h

☑ Fond
☑ Vt arp
☑ TH
□ Villes
□ HU 10...
☑ Radar
□ Sat IR
☑ Relief

Paramètres:

CEP:	🟢
ARP:	🟢
ALA-cep:	🟡
ALA-arp:	🟢
AROME:	🟢

Commentaire:

Un petit commentaire pour cette zone

Synopsis:

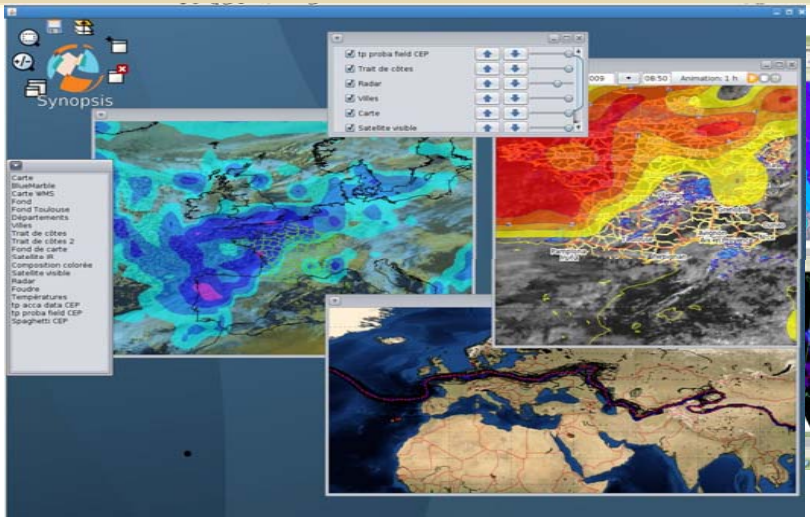
-GUIs

Synergie :

-Obs,

-Winds model outputs

To sum up



☑ tp proba field CEP
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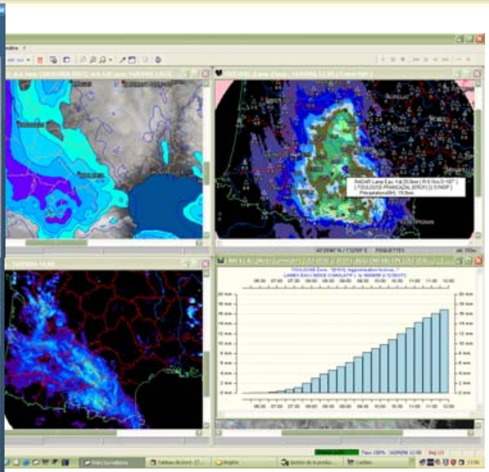


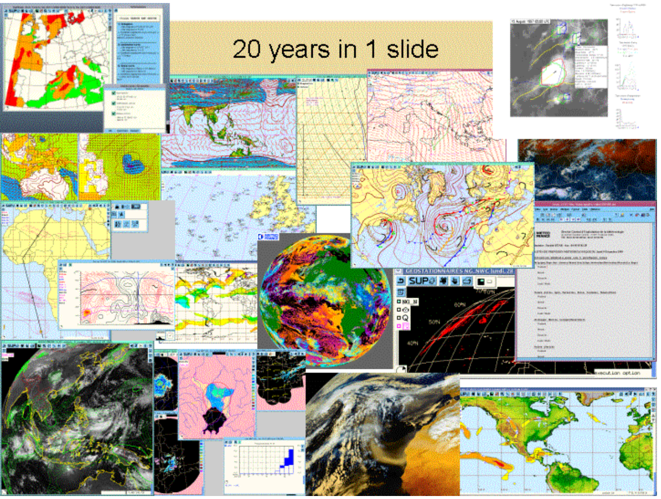
OPPIDUM

SYNOPSIS

SYNERGIE

??

WREP ?



SYNOPSIS Project or SYNERGIE-NEXT

The pilot project has been very successful and is closed

The directors have decided to do the project

The feasability of a smooth transition has been demonstrated.

A roadmap based on annual releases is been defined

The team is also been defined. It will involve people from

- the production system management departement (Project manager)
- the IT direction (Technical manager, developpers) ,
- the forecast direction (users, developpers),
- probably regions

Interoperability is the key

The aim is not to do with a new fashion technology what we have done before and works already fine

It is not to say « we also use OGC standards ! »

We want to reach interoperability

=>

A lot of cooperative work has to be made on the OGC standards!!!

Thank You