SOPRANO, a service oriented production system

Yann Genin, Matteo Dell'Acqua

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Agenda

- Soprano project aims
- Soprano concepts
- Upstream production
- Products generation
- Producible data service
- Services offered by Soprano
- Services used by Soprano
- Status and plan

Introduction – Why a new production system?

- The organization of the central production system lacks flexibility
- No separation between central production and products generation
  - generates incoherencies
- Different production systems developed over the years to fulfil punctual requirements
  - Central production
  - Regional production
- Difficulties to quickly answer to new requests
- The production system could not cope with the increased production
- Functionalities are missing in the central production system
- The dissemination system could not cope with the increased amount of data to deliver and new delivering methods

SOPRANO - aims

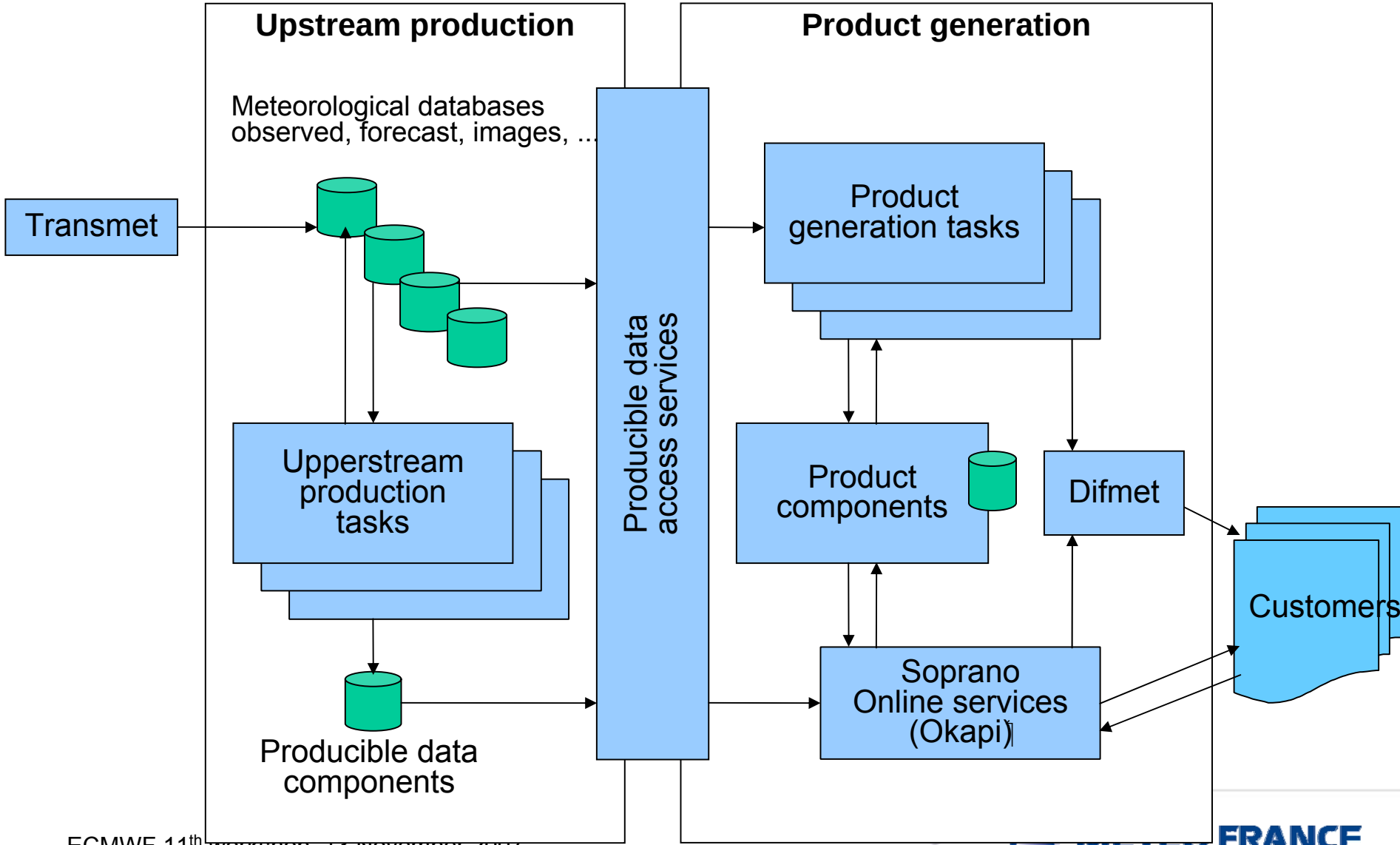
- Review Meteo-France supply chain
- Build a new central production system to support new requirements for production and allowing Meteo-France to:
  - satisfy its meteorological data production needs
  - better manage global production and associated costs
  - better serve its customers
  - have a system that fulfil the needs of production actors
- Reuse and federate existing tools
  - DIAPASON (former central production system)
  - OKAPI, the climatological production system, extended to provide non-climatological products
  - Meteonet (web server www.meteo.fr and production system)
  - various central production systems/applications
- Standardise the production

Soprano - concepts

- To split upstream production from products generation and introduce the concept of “producible data services “

- Upstream production
  - feeding meteorological databases
  - production of meteorological data via automatic processing or human expertise
- products generation
  - production of final products
  - presentation of the meteorological data
  - dissemination of the products to the customers
- producible data services and producible data components
  - selection of meteorological data as a reference for product generation systems
  - producible data components are designed to provide a clear separation between upstream production and product generation systems
  - enable scalability of product generation systems without interfering with upstream production system

Soprano - concepts



Upstream production system

- Based on existing upstream production system : DIAPASON
  - operational since 1995
  - reliable (10 years of continuous service)
- but...
  - running on HPUX/HPPA platform
  - obsolescent technologies/software (DCE, Oracle v7.3/Oracle 8.0, Oracle*Forms,...)
  - lack of administration functionalities
  - new applications are developed on linux platform

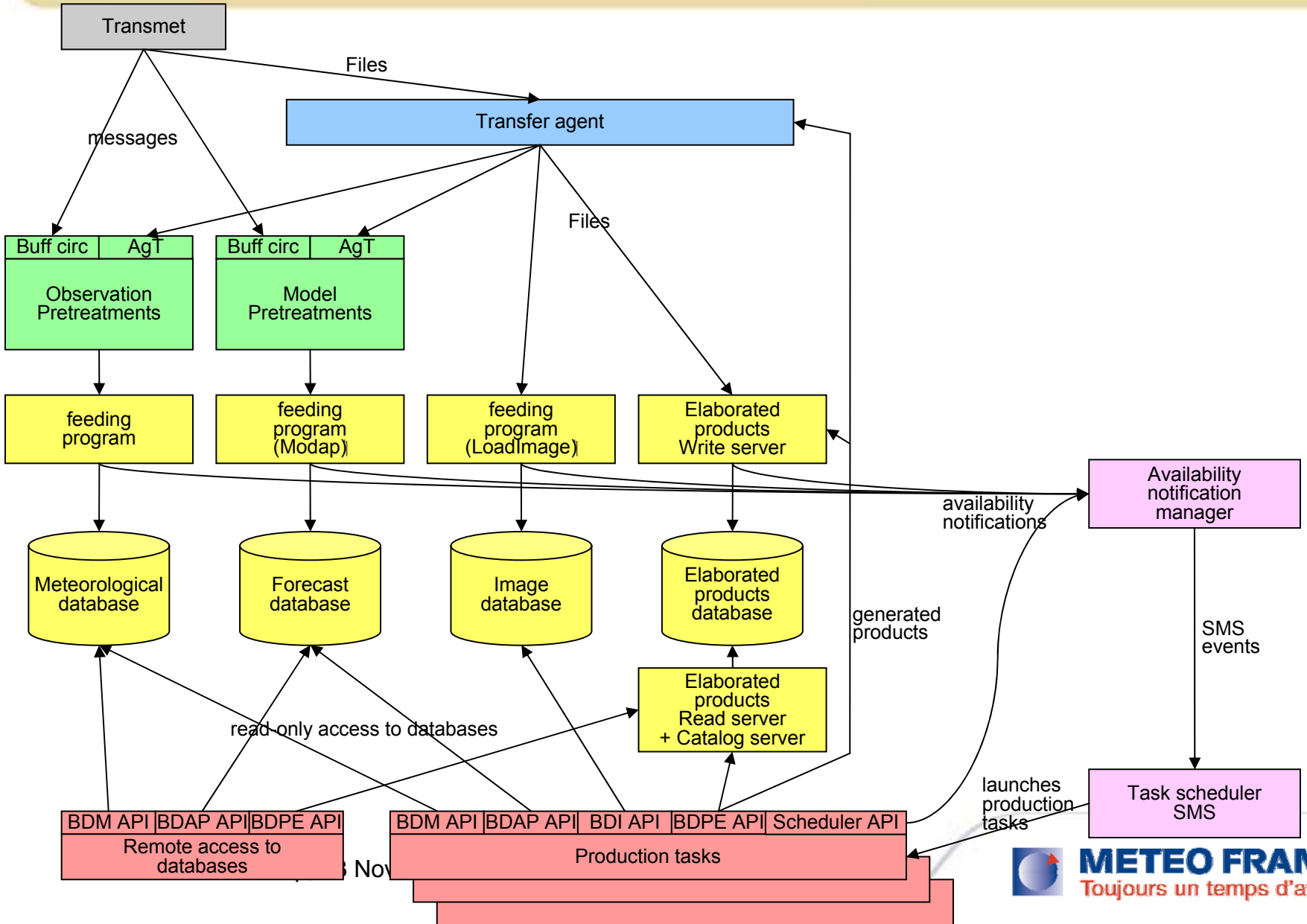
- Soprano reuses components of the DIAPASON system, and:
  - is built to run on clusters of linux PCs
  - defines new administration tools
  - replaces DIAPASON's task scheduler with SMS
  - initiates the migration process from Oracle to open-source RDBMS

Upstream production system

- Phase 1 : provide more computing capability and more storage than DIAPASON in order to support
  - new satellite data
  - new numerical model AROME
  - increased spatial resolution of ARPEGE

- Phase 2 : Introduce new services in the system in order to support:
  - evolution of data formats
  - integration of climatological database
  - integration of meteorological object database (immediate forecasting, fine-grained local forecasting, severe weather warning...)

Upstream production system



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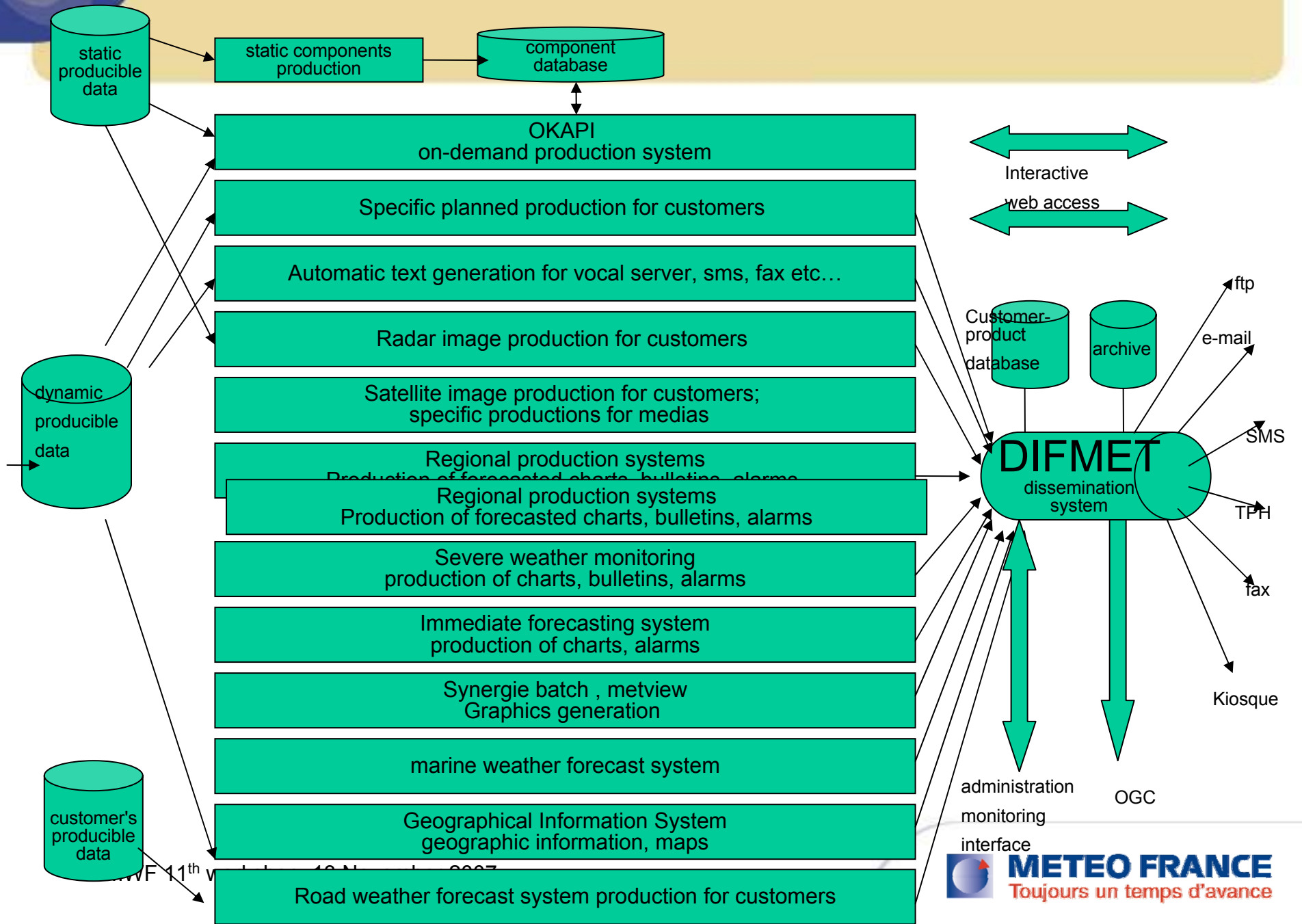
Products generation systems

- many operational central production systems to maintain
  - different operating systems / programming languages
  - different hardware
  - all the production systems can not be monitored with the same service level
  - risk for duplicate productions, incoherent productions
  - high administration cost
- strong need for homogenization and urbanization
  - define a framework and rules for products generation
  - provide a platform able to host various products generation systems
- need for greater reactivity
  - rapid development,
  - short time before operational production

product generation systems



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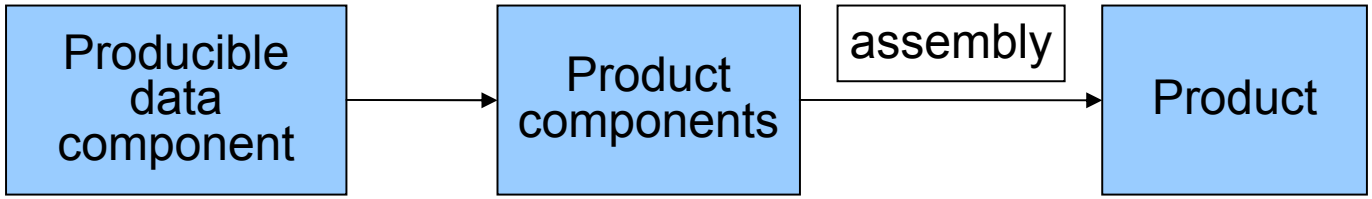
Products generation systems

- Mass production system: based on upstream production system
  - production of large amounts of data required by selected customers and provision through web servers
    - Some of these product generation tasks are already running on Diapason
  - production of products needing additional computing resources
    - image processing, video...
- On-demand products generation system: OKAPI
  - extensible
  - Customer can select and configure products through a web interface
- Excellent operational service level

Products generation systems - model

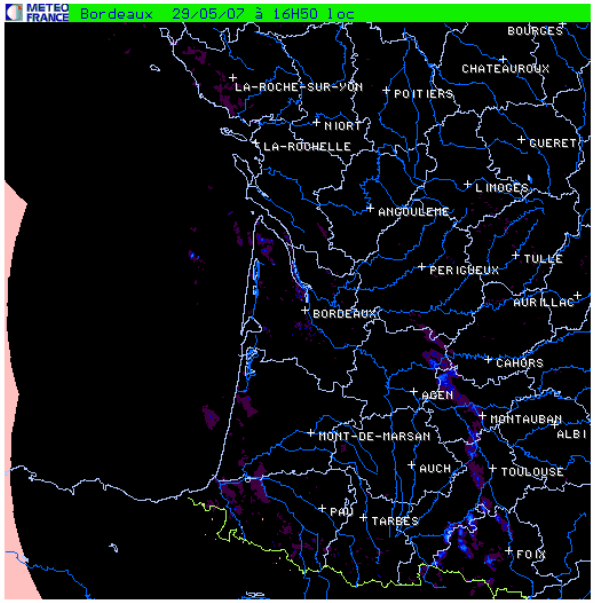


Example of final product

Accès aux produits : > Animation Radar > Cumuls horaires des précipitations > Bulletin Précipitations (BP)

Réactualiser

Animation radar



Fleuve Autoroute TGV
ville aucun

Controle Animation

Lecture : Boucle

Image num = 1

< Image -1
<< Lecture arrière
STOP Arrêt
>> Lecture avant
> Image +1

Début (1) Fin (7)

+ lent VITESSE + vite

Zoom
Choix du coefficient puis clic sur l'image
x 2
x 3
x 4

GUIDE Radar Chargement 1' à 56 kb/s

Cumuls horaires des précipitations (mm)

Date de mise à jour 29/05/2007 à 17h00

Indicatif station	Nom station	Alt(m)	28/5/2007 18h	19h	20h	21h	22h	23h	0h	29/5/2007 1h	2h	3h	4h	5h	6h	7h	8h	9h	10h	11h	12h	13h	14h	15h	16h	17h
7500	LEGE-CAP-FERRET	9	0	0	0.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7502	CAZAUX	23	0	0	0	0.2	0	0	0	0	0	0	0	0	0.2	0	0	0	0	0	0	0	0	0	0	0
7503	BISCARROSSE	33	0	0.2	0.2	0	0	0	0	0	0	0	0	0	0.4	0.4	0	0	0	0	0	0	0	0.2	0	0
7510	BORDEAUX-MERIGNAC	47	0	0	0.8	0	0.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16279001	RIOUX MARTIN	81	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16360001	SALLES DE BARB	71	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17339002	ST-GERMAIN	75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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Producible Data Services/Components

- Leading idea: to determine which data is available for product generation and ensure that all products generated use the same referential
  - all products must be created from Producible Data
  - no other data is allowed for the generation of products
  - clarifies production rules
- The Producible Data Services define a clear separation between Upstream Production and Products Generation
- Producible Data Services and Components must be stable
  - documented
  - no format change
  - no signification change
  - allow Products Generation to rely on stable data sources

Examples of Producible Data Components

- Forecasts
  - MPZH/MPZQ: best available short term forecast by place. Hourly and daily data
  - Road forecast France : file BDPE 6962 : Road surface temperature forecast on Symposium forecast area
  - ECMWF forecast world : file BDPE 5837 : Tri-hours forecast for1600 world cities (outside Europe), J-J+3
  - ECMWF forecast Europe: file BDPE 5835 : Tri-hours forecast for 840 European cities (outside France), J-J+3
- Satellite imagery
  - coloured composition 0° full resolution globe image
  - IR composite 5 satellites world image
  - SST world image
- Radar imagery
  - European radars composition

Services offered by Soprano

- Services offered by DIAPASON
  - IAA: remote access to meteorological databases
  - 2 interfaces: CORBA and FTP
- Services offered by OKAPI
  - access to various product components, used by regional production systems (MENHIR)
  - Interface: Web Services
- Services offered by DIFMET
  - dissemination of products to end-users/customers
  - Interface: Web Services

Soprano services - IAA

- Remote access to meteorological databases
  - oldest service provided since 1995
- Very simple to use
- No access to image database
- 2 versions:
  - FTP: most widely used in scripts or in interactive sessions
  - CORBA: used by some production systems
- Widely used by end-users
  - within MF by developers and researchers
  - outside MF by researchers and customers
- Future plans:
  - implement this service as a web service
  - extend access to image database

SOPRANO services - OKAPI

- Production of products components
- On-demand product generation system
- used by regional production systems (MENHIR)
  - mainly used to access to climatological products
  - replaces regional production with central homogeneous production
- Interface: Web Services
  - communication between a Java application (Okapi) and a MS C++/C#/VB application (Menhir)

Soprano services - DIFMET

- New Meteo-France dissemination system
  - part of Soprano project
  - targeted to disseminate products to end users
  - offers functions to send high volume of products through new protocols such as SMS, e-mail, Voices messages…
  - offers the producer options to set up its own dissemination
- Provides a web service interface to the central dissemination service
  - will be used by regional production services (Menhir)
  - will be used by the central production system
- Provides administration services

Soprano - other services

- Synergie
  - used to produce complex graphics
    - aeronautical products
  - on-demand graphic production provided via web services

- Accounting service
  - part of MF web server
  - provides authorisation information and e-payment functionality for Meteo-France applications:
    - User profile
    - payment and follow-up of consumption
  - offered via web services
  - used by Okapi

Soprano internal services

- leading idea: to open the central production system to other production systems

- Administration services
  - administration tools are being rewritten
  - decoupling between GUI and backend services
  - backend services could be used by other production systems
    - to invoke Soprano modules from other production systems and start automated production tasks

- Evolution of IAA service in order to replace current databases access APIs
  - to offer the same interface to any user, internal or external
  - to reduce the coupling between databases and production tasks
  - to ease administration of development platforms
  - to improve security by using non proprietary protocols (HTTP vs SQLNET) and reinforced controls on database access tier

Towards a Service Oriented Architecture

- SOA make it possible to treat each component separately
  - the interface is defined : contract between components
  - few technical requirement for implementation
  - evolution of a component is possible without changing the whole system
- Need for standardization of the interfaces
  - challenge: there is no perfect solution
  - Web services, still some questions to answer
    - REST or SOAP web services?
    - security features?
    - convention for interfaces naming? method naming?...
  - existing standards
    - WMS, WFS, WCS
    - are they best suited for our needs?
  - provide a directory of these services
    - urbanization of the system
- On-going work for SOPRANO project

Timeline

- Project started in February 2005
- First operational phase expected by June 2008
  - set up of the infrastructure based on Linux clusters
  - migration of databases and production tasks
  - introduction of SMS
  - introduction of new administration tools
  - extension of OKAPI to non-climatological productions
- Second release expected by end 2009
  - architectural changes
    - provide producible data services as web services
    - Replace IAA by web services
  - evolutions of upstream production system
    - integration of the meteorological objects database and climatological database
    - support for new data formats (like GRIB ed. 2)
  - evolution of product generation system
    - integration/replacement of other production systems