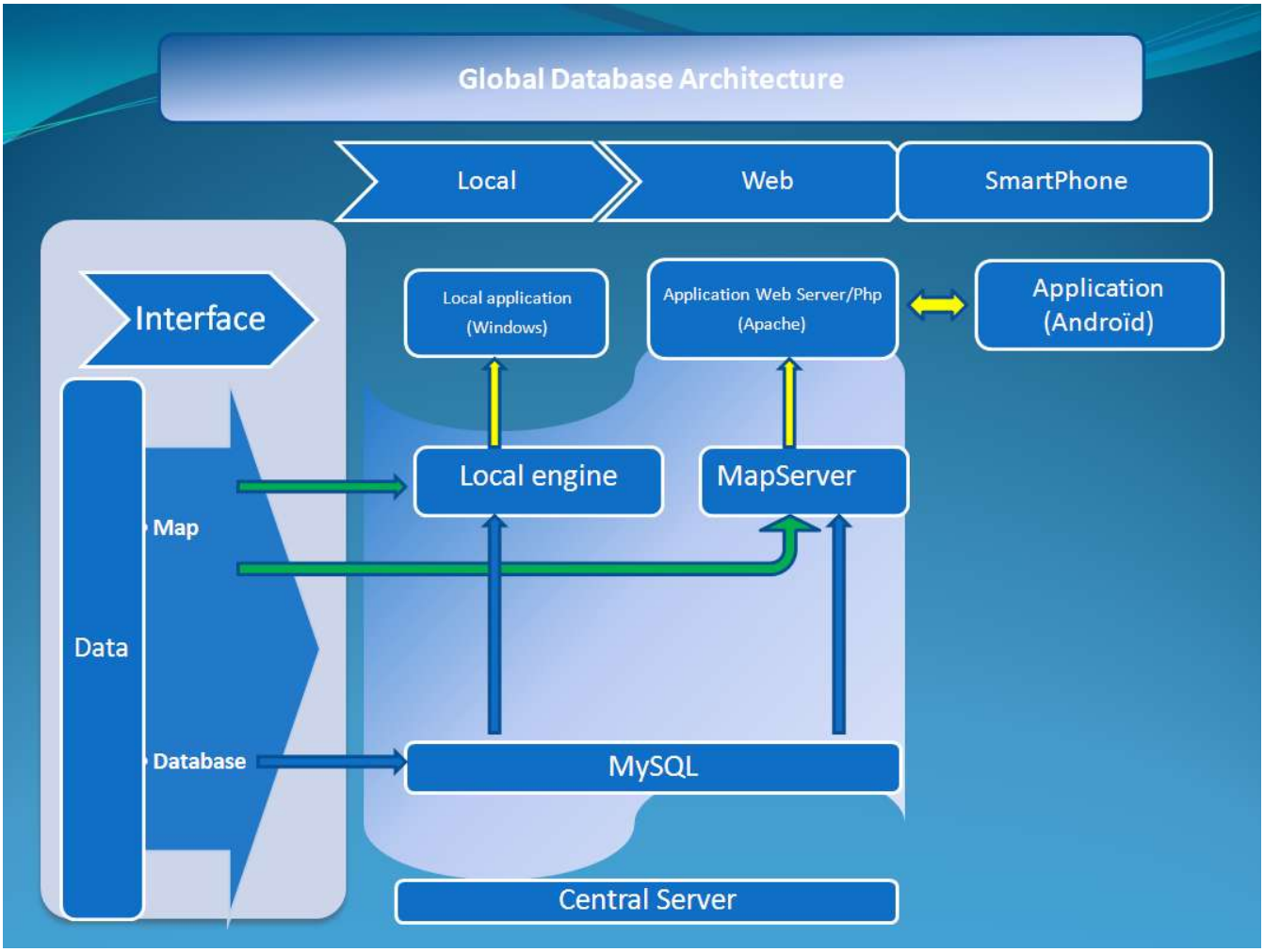
Information system for observation network to natural disaster and risk reduction:

Database architecture

Those have been elaborated in framework development of an observant network for the disaster and risk reduction. The goal is to elaborate architecture of information system including local and mobile system allowing collecting, analyze and visualize necessary information for actors in managing natural risk and disaster

Hereunder the schema we proposed.



As it's indicated by the above schema the database is articulates between three entities:

- Local level (Administrator)
- Web interface
- Mobil unity (smartphone)

Mapping

The cartographic engines for the internal operations and of the web interface are separated. This separation is dictated by the care of security and tasks optimization. In fact, the internal cartographic engine is done for the local administrator, dedicated to the management of internal map information who are generally voluminous and in the future will ensure the geostatistical computation and elaborate the thematic associated map, more light and easy for displaying on the web. This module has total access to all mapping database levels (cartographic and associated database)

In the web side, the map information rendering is insured by "MapServer" engine. His principal task is to respond web client request. For rendering fluidity, it's preferable that input cartographic layers are lighter. MapServer's access to map database is not total. This limitation is defined by the local administrator by configuring web application.

Database management

The management of the associated cartographic database, who are relatively light relative to cartographic information, is assigned to "MySQL" engine. This module ensures both local administrator and web side database operations.

Notice:

"MapServer" and "MySQL" engine are all "open source" (see reference hereunder).

The choice of these two engines is done after comparisons (available functions, executive speed…) with other available engine:

- MySQL : PostgreSQL, Oracle.
  (MySQL is also selected by his well-matched with web application server PHP)
- MapServer : GeoServer, GeoTools.Net, GIServer, PostGIS, CartoWeb3 (not compatible with php4).

Local application

The local application which control and synchronize the operation of the local cartographic engine and the database engine (MySQL) is developed under C++ (Microsoft Visual Studio/MFC : Microsoft Fundation Class)

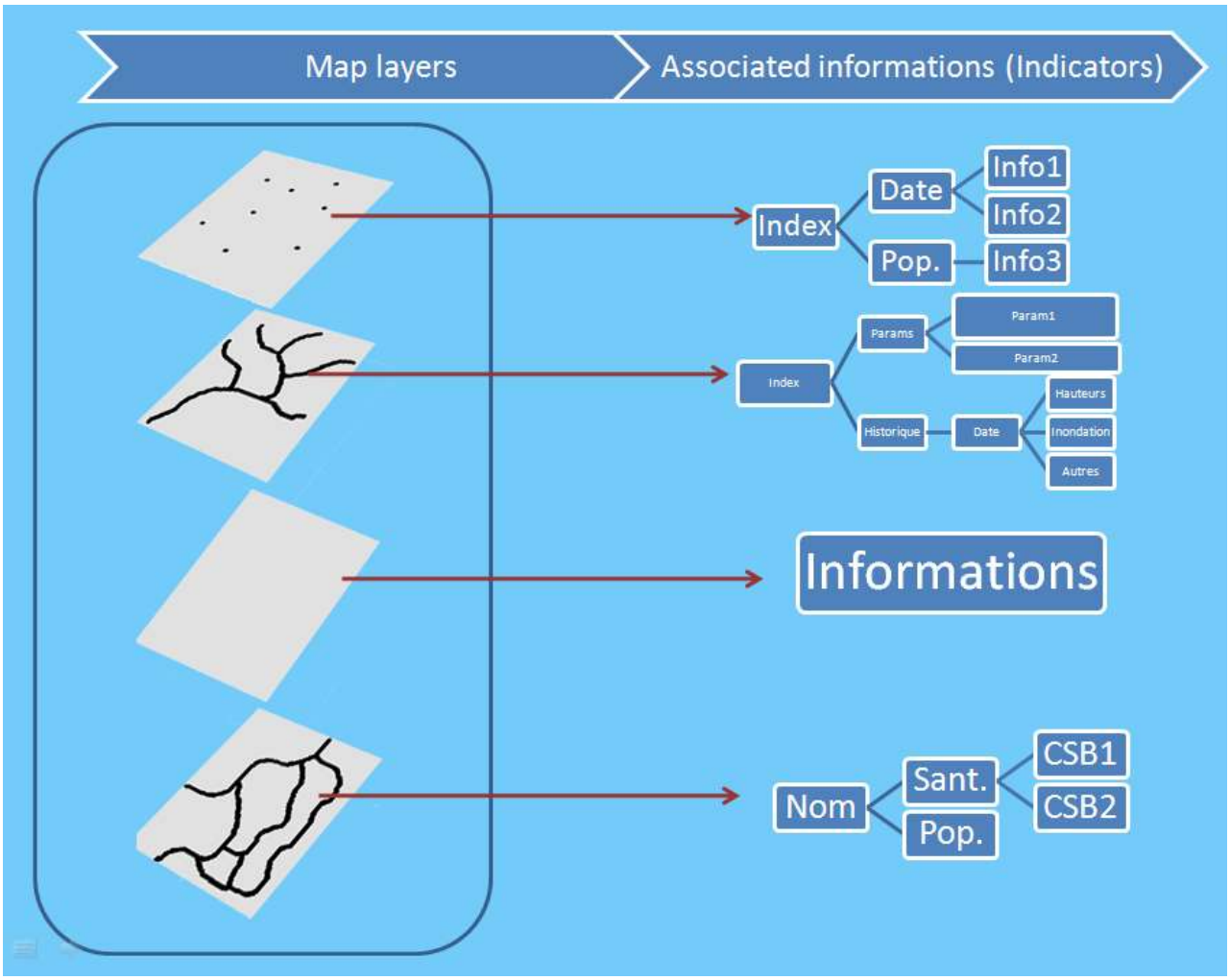
Web application

The Web application is based on the Web application server PHP (Apache)

Mobile application (Smartphone)

It's an embarked application allowing "ground observers" to consult the central database and to bring information there coming from measurements and observations via the web interface. This application can be developed under Eclipse environment and run on Android system. We propose the Android system because it's an open system (Open Source) : more transparent and offers less restriction.

Cartographic layers



These cartographic layers and its associated information remain at the stage of proposal. Its final structure will be decided with the partners.

Here the cartographic layers proposed:

- "Districts" limits
- "Communes" limits
- Cities and villages
- Roads and paths
- Catchment area (hydromorphometric zoning)
- Limnimetric points of observation

Hovewer, we can already proposed, for the layer "Cites and villages", the following indicators :

Population	Population number / Date	Children less than 5 years
		Children between 5 and 12 years
Formation	Training in epidemiologic risk	Number / Date
	Formation with the management of natural risk (Flood…)	Number / Date
Infrastructure	Shelters infrastructure / Date	Capacity
	Protection against natural risks (channel…)	
Organization intervening in the DRR	Domain of intervention (health…)	

Mode and operation of database

As we noted, our database is composed of two type of information dependent:

- Mapping layer
- Database

In processing data, each type can be schematized in two levels:

- Raw data
- Synthesized data

Example:

	Mapping	Database
Raw data	- Fokontany Mapping - DEM (Digital elevation Model)	- Population number - Altitude
Synthesized information (Report)	- Zoning of Hydrometric situation	- Statistics of the population affected by the inundation.

The implementation of this database is done in close cooperation with the NGO operative in the field of DRR.

Two ONG are most advanced in the structuring of their database:

- Medair, interested by the follow-up and management of the flood risk ;
- “Médecin du monde” in the field of health and epidemiologic management;

Currently, in addition to elaborate the raw database structure, our work is mainly focused in implementation of flood risk management.

Taking the example of the above table. The NGO working in inundation and flood management, basing on information collected from the site where it works and using the thematic map (Synthesized information), can extrapolate the situation of the surrounding Fonkontany. As we see, this database allows NGO to have a global vision on the whole of the area where it works.

Of course, we intend to extend this work in the medical management of risk

To conclude, let us note that the structures of information, as much at the global structure that on each cartographic layers (and associated database structure) remains still objet of a modification. The first, to harmonize framework of each entity implied with the development of this alarm system. The second must answer, in his structure, the needs for the partners concerned with this project.

Reference:

MySQL : http://www.mysql.org/

MapServer : http://mapserver.org/

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