ProtectMe:

Web service for protection work catalogue

Enhancing the risk management

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Natural hazards effects

- **Increased awareness** of natural hazards led to integrate into national policies the strategies for risk reduction (UN / ISDR, 2008).
- The results of these policies are generally **satisfactory**, as they have helped to **reduce** the most dramatic consequence of a destructive natural event: the **loss of human lives** (PLANAT, 2005a). More generally, however, we can see that there is **no significant decrease** in the reduction of **material damage**.
An open struggle

- This behavior, evidenced by historical data (PLANAT, 2005b), is most likely due to the fact that the high rate of development has resulted in exposing more elements compared to the past, moreover, is necessary to consider that the value of property over the years has grown exponentially leading to a rise of costs caused by the same event. Finally, we must not forget that the climate changes that led to observe natural hazard events of increasing intensity.
From risk reduction to risk management

- Risk management: “The **systematic process** of using **administrative decisions**, organization, operational skills and capacities **to implement policies, strategies** and coping capacities of the society and communities **to lessen the impacts of natural hazards** and related environmental and technological disasters. This comprises all forms of activities, including structural and non-structural measures to avoid (prevention) or to limit (mitigation and preparedness) adverse effects of hazards.” (source: PLANAT).

- For decision (management) we need information!
  - **What can happen** (avalanche, flood, rockfall) and where will it happen? *(identification of hazards)*
  - **How often and how intense will it happen, how big is the expected damage?** *(analysis of hazards and vulnerabilities and risk)*
  - **What are the most efficient ways to protect people and assets?** *(planning of measures)*
Geographical data for risk management

1. **Hazard maps**: since 1995 development of natural hazards maps

- Enables conscious land planning
- Identify critical locations
Geographical data for risk management

1. **Hazard maps**: since 1995 development of natural hazards maps

2. **Intensity maps**: since 2011 definition of federal model for intensity maps

- Enables risk assessment
- Enables design of mitigation infrastructures
Geographical data for risk management

1. **Hazard maps**: since 1995
development of natural hazards maps

2. **Intensity maps**: since 2011
definition of federal model for intensity maps

3. **Protection works**: in next future definition of defense measure catalogue (first draft in 2006)

Enables management of mitigation infrastructures

Where are they?
What’s their protection state?
How much does it cost per year?
What is the risk reduction?
Inefficient mitigation infrastructures lead to high risk

- The false feeling of security…

[Diagram showing arrows from 'Maintenance costs' to 'Need for planning' to 'Limited resources']

Katrina 2009

Genova 2011
ProtectMe

- With the purpose to improve the management of risk reduction initiatives, the Swiss Federal Office for the Environment (FOEN) launched the ‘Protect-Me’ project, an initiative of the Swiss Confederation to standardize and capture data related to natural hazard control/mitigation infrastructure.
Capture and Formalize knowledge

- Capture and formalize knowledge …
  - many defense infrastructures known only by personnel
  - only paper catalogues… or not even…
  - decision taken subjectively…

American Society of Engineers (ASCE) 2009 Report Card on Infrastructure:

**LEVEES  D-**

More than 85% of the nation's estimated 100,000 miles of levees are locally owned and maintained. The reliability of many of these levees is unknown. Many are over 50 years old and were originally built to protect crops from flooding. With an increase in development behind these levees, the risk to public health and safety from failure has increased. Rough estimates put the cost at more than $100 billion to repair and rehabilitate the nation's levees.
ProtectMe - data model main structure
(Federal Office of Environment)

![Diagram of data model]

- **PROJECT**: Information relative to projects
- **WORK**: Generic informations relative to protection works
- **ELEMENT**: Informations relative to the elements that are composing the protection work
PmTi - The project entity

Attributes:
- code / name
- comments
- status
- type
- BBOX *
- deadlines
- documents

* BBOX is calculated starting from protection areas and work areas
PmTi - The **work** entity

Attributes:
- code / name
- start/end dates
- comments
- contract executor
- project designer
- maintainance manager
- **work area** *
- **protection area**
- financing / costs
- protection cathegory
- documents

* **work area** is calculated starting from protection elements geometries
PmTi - The element entity

Attributes:
• code / name
• accessibility
• typology
• building date
• status
• comments
• person in charge
• protections type
• materials
• documentations
• geometry
• dimensions
PmTi - Data model standardization with XML Schemas

Advantages of an XML schemas data definition documentation:

+ Interoperability
+ Integration
+ Compatibility
+ Collaboration
Implementing the data specification

Form interfaces → data definition documentation → Web Service → Database

JSON XML
PmTi - implementation modules

- **Web Service**: a server side software running on an application server which deals with data distribution and manipulation over Internet:
  - Environment: Apache Web Server
  - WSGI Python runtime (mod_wsgi)
  - PostgreSQL/PostGIS database

- **Web Application**: a JavaScript software running in Web browsers:
  - OpenSource library (ExtJS, OpenLayers)
The Web service

- Using the standardized **HTTP messages**, the software is able to connect two or more electronic devices over a network, for instance:
  - Server - Server (data propagation)
  - Client - Server (data visualization and manipulation)

- The HTTP messages are based on the **PmTi - data definition schema**

- The definition schema is used to define HTTP **application/json** messages for:
  - Object description
  - Remote operation request and response
Web service’s operations request

There is a set of operation that can be requested to the server:

- **GetCapabilities**: returns metadata about the service (identification, maintainer, operation supported, project list)
- **Register**: insert a new entity (project | work | element)
- **Update**: apply modification to an entity
- **Delete**: remove an entity
- **Describe**: return a full description of an entity
- **Get**: return compact lists of entities filtered with SQL conditions
- **GetDomain**: return various list of entity domains
Register element (simplified) example

```json
{
    "service": "PME",
    "version": "1.0.0",
    "request": "register",
    "typename": "element",
    "lang": "EN", << Multilingual support
    "data": {
        "number": "2011.03",
        "workOid": 30,
        "projectOid": 1,
        "protectionType": ["avalanche","rock fall"],
        "generalInfo": {...},
        "characteristics": {...},
        "documents": [...],
        "metadata": {
            "user": "david.smith@protectme.ch"
        }
    }
}
```
The web interface

Secure:
- Password protection
- SSL encryption

WEB 2.0:
- Ajax request/response
- Communication with JSON

Data management:
- Manipulation
- Visualization
- Search

Geo data:
- Visualization
- Manipulation
DEMO
Thank you

ProtectMe

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