

**SUPSI**

## ProtectMe:

Web service for protection work catalogue

*Enhancing the risk management*

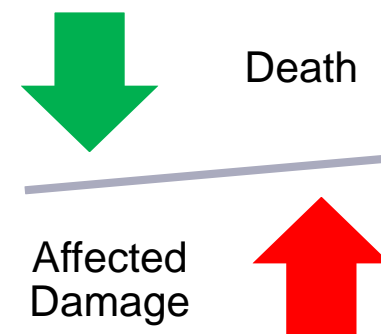
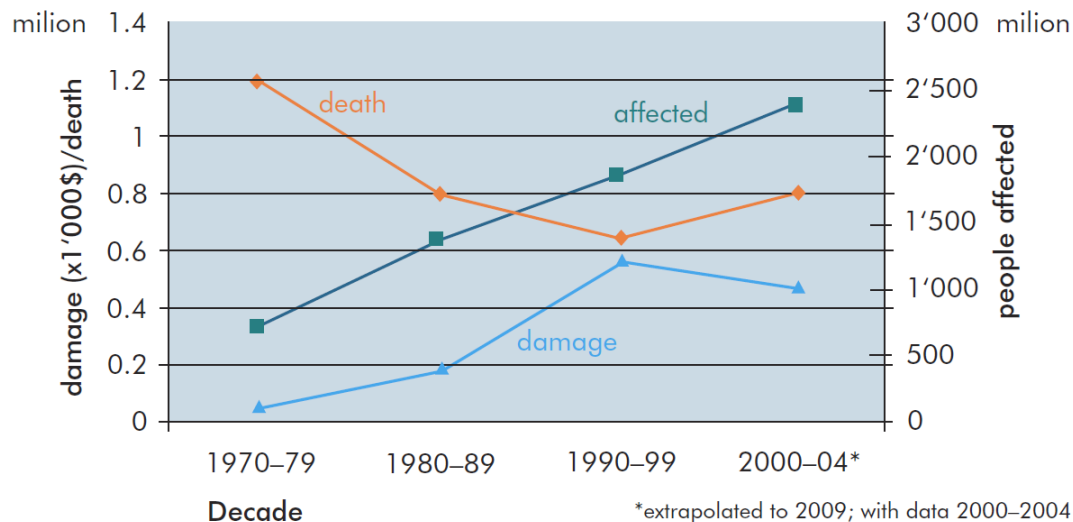
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## Natural hazards effects

- **Increased awareness** of natural hazards leads 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.

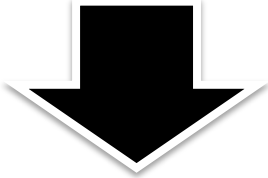


## From risk reduction to risk management

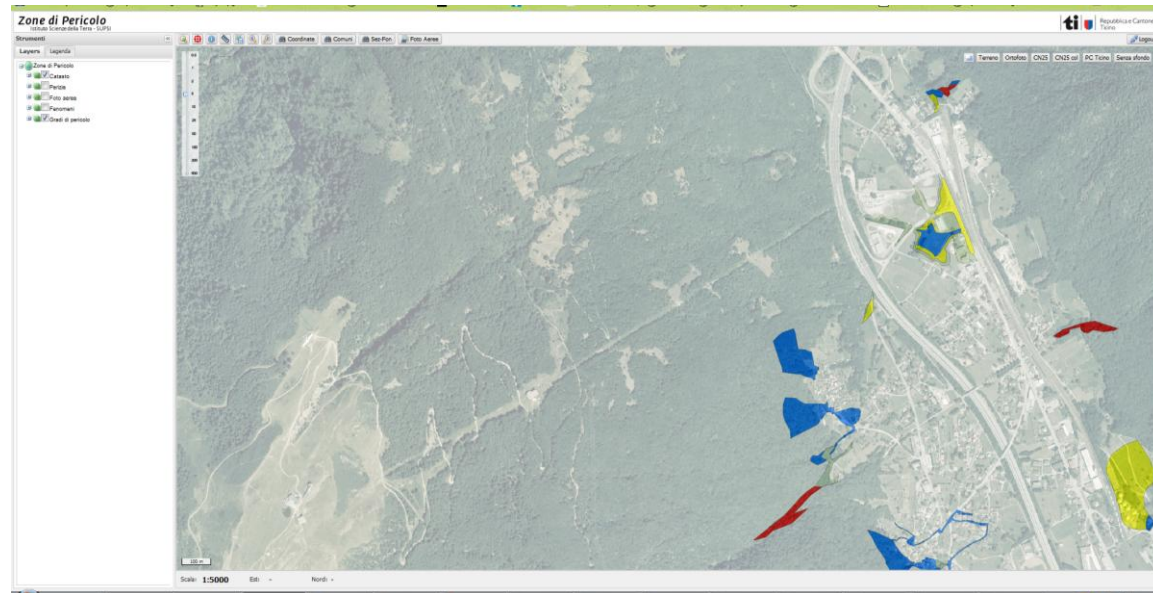
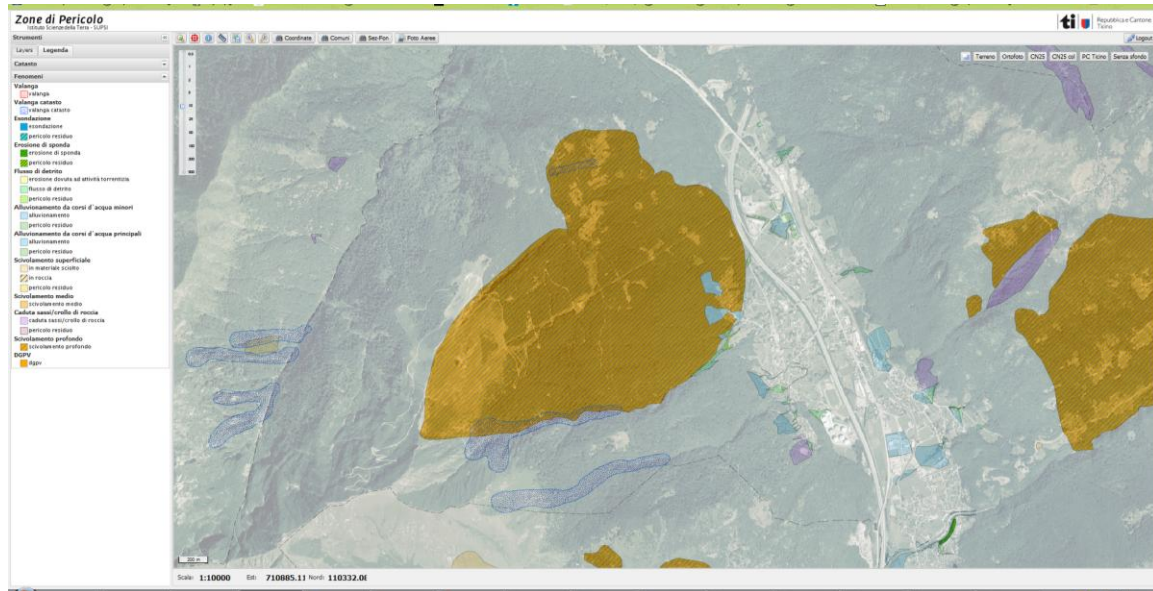
- Risk management: “The **systematic process** of using **administrative decisions**, organization, operational skills and capacities **to implement policies, strategies** and coping capacities of the society and communities **to lessen the impacts of natural hazards** and related environmental and technological 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



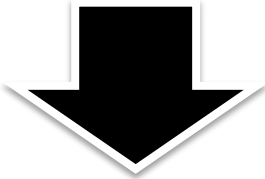
- Enables conscious land planning
- Identify critical locations



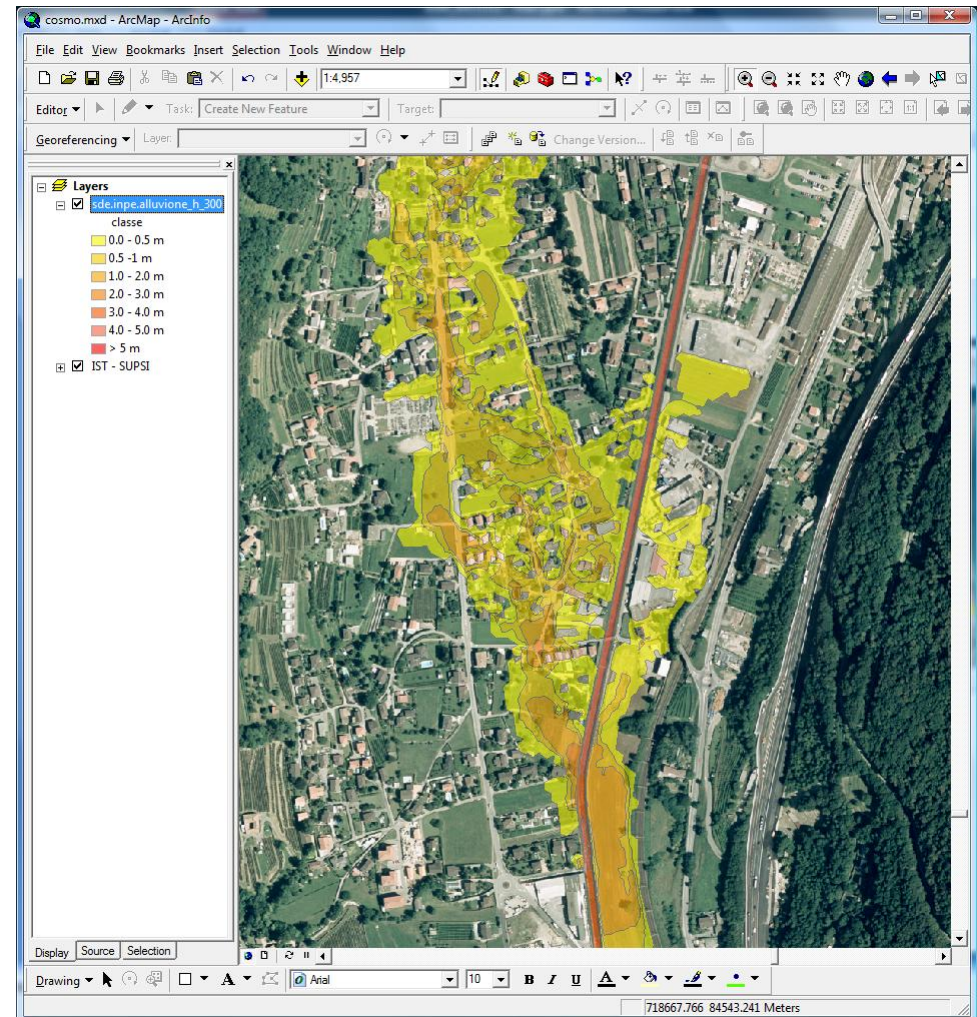


## Geographical data for risk management

1. **Hazard maps:** since 1995 development of natural hazards maps
2. **Intensity maps:** since 2011 definition of federal model for intensity maps

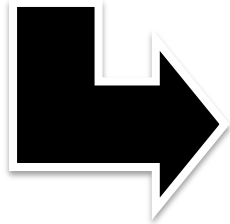


- Enables risk assessment
- Enables design of mitigation infrastructures



## 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)



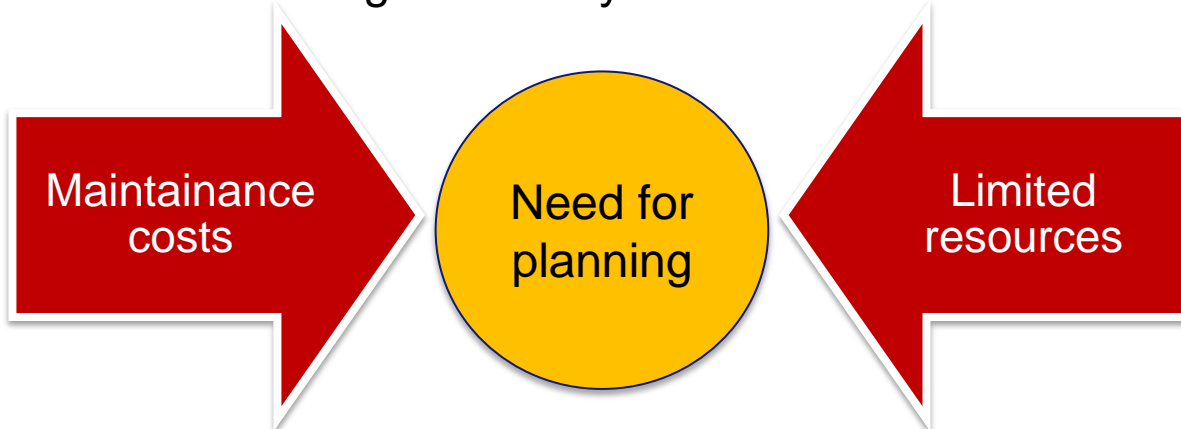
Enables management of mitigation infrastructures





## Inefficient mitigation infrastructures lead to high risk

- The false feeling of security....





## 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.

Understanding what exist where

Dynamic cost / benefit analysis

Optimal policy planning

Optimal management planning

## Capture and Formalize knowledge

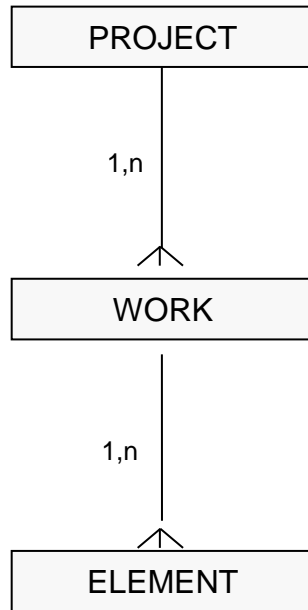
- Capture and formalize knowledge ...
  - many defense infrastructures known only by personnel
  - only paper catalogues... or not even...
  - decision taken subjectively...

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.

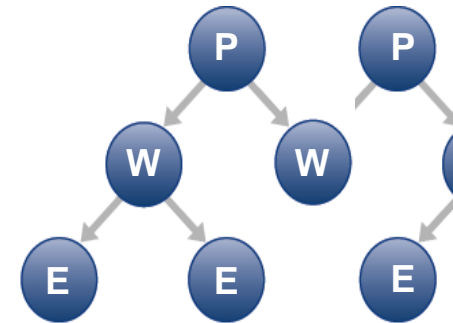
# ProtectMe - data model main structure (Federal Office of Environment)



Information relative to projects

Generic informations relative to protection works

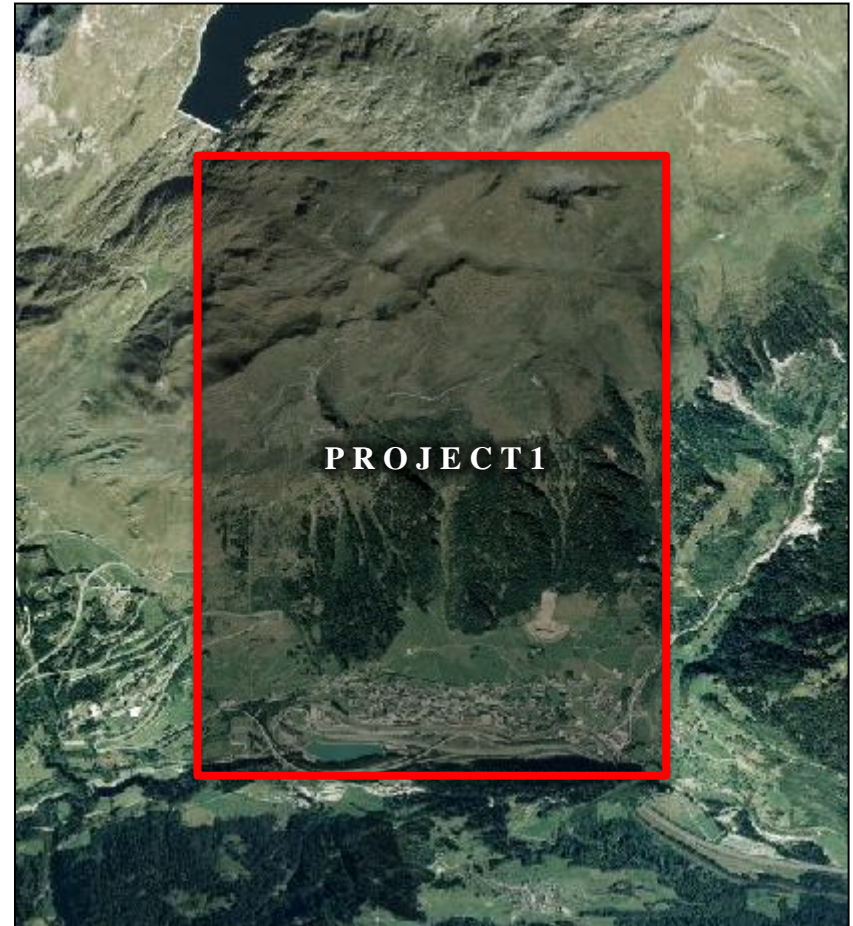
Informations relative to the elements that are composing the protection work



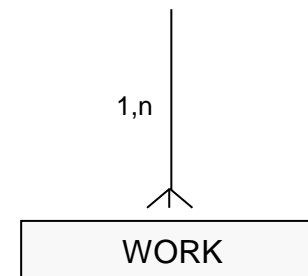
## PmTi - The **project** entity

### Attributes:

- code / name
- comments
- status
- type
- **BBOX** \*
- deadlines
- documents



\* **BBOX** is calculated starting from protection areas and work areas



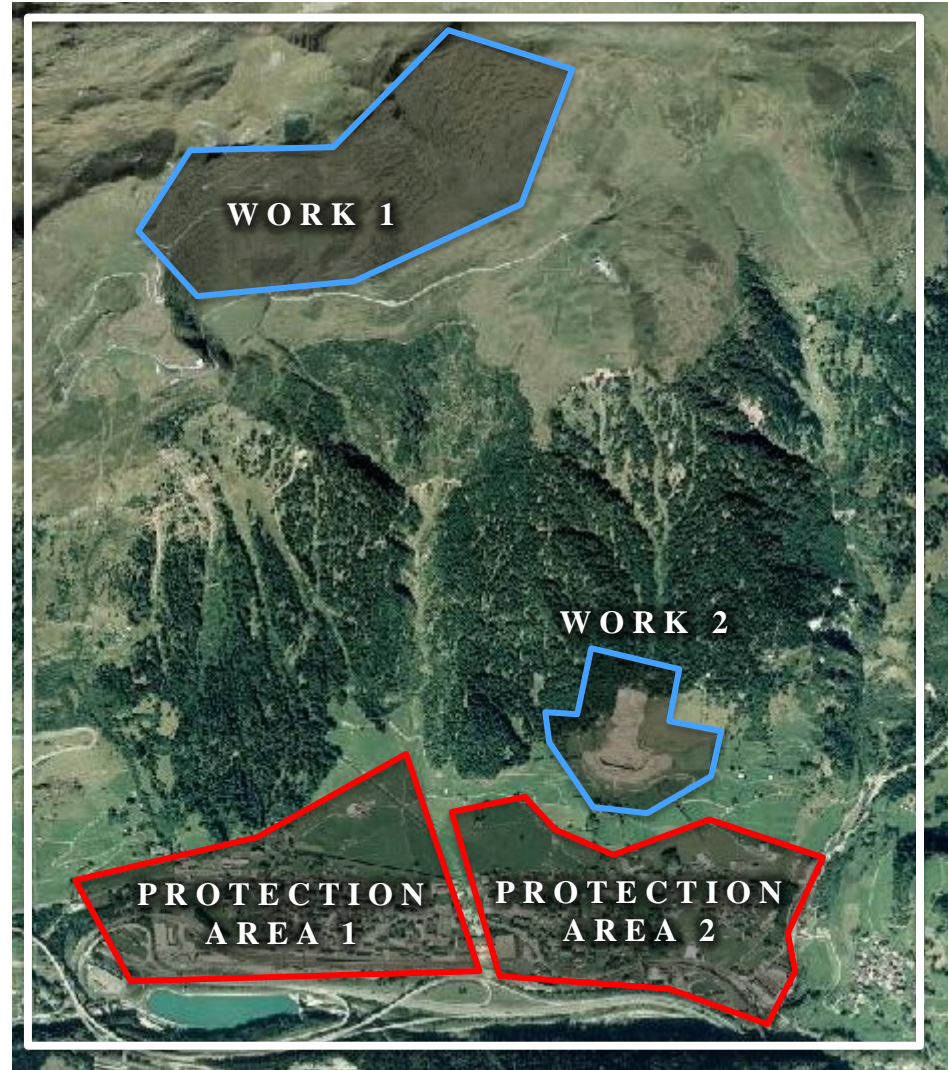


## PmTi - The **work** entity

### Attributes:

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

\* **work area** is calculated starting from protection elements geometries



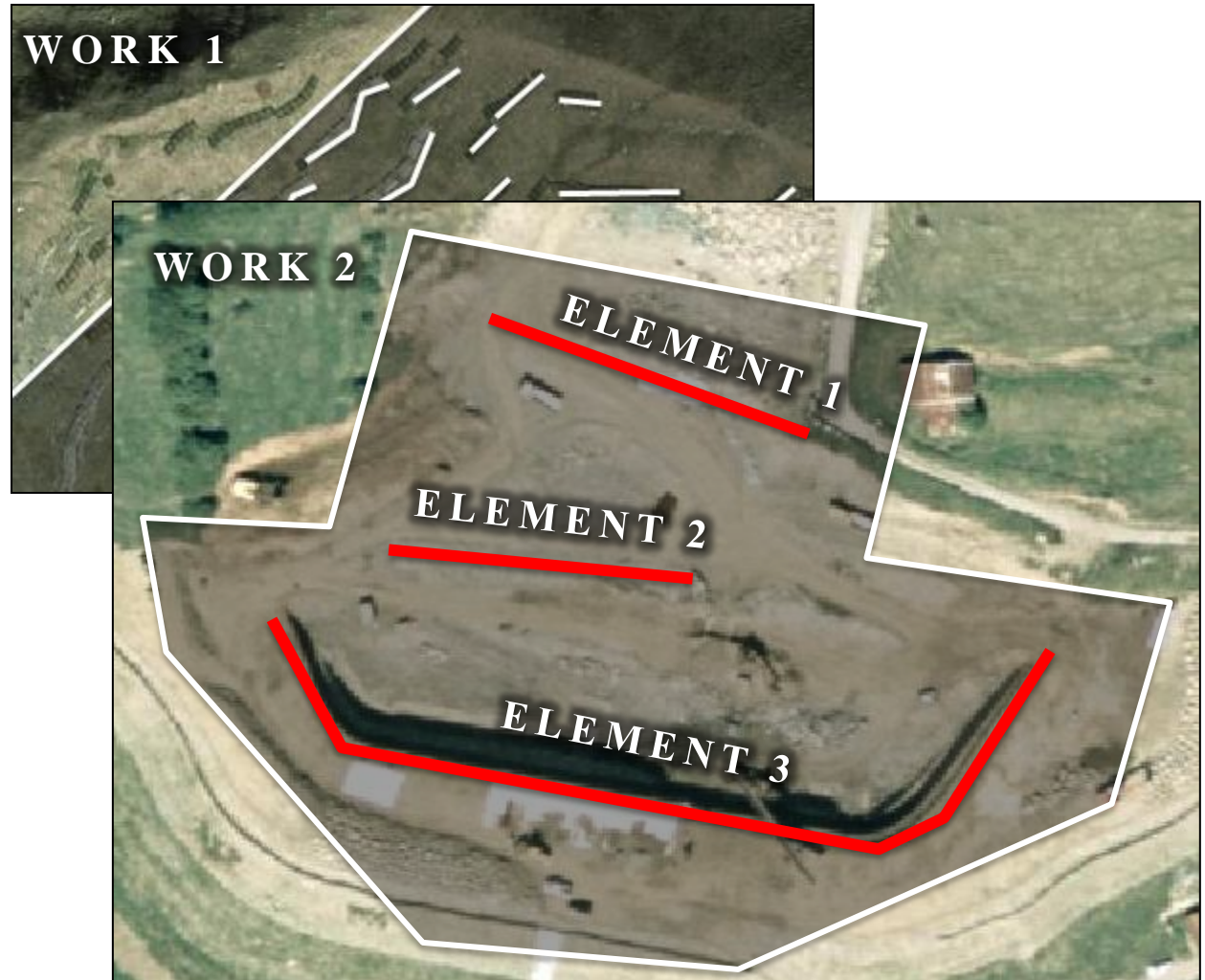
1,n

ELEMENT

## PmTi - The element entity

### Attributes:

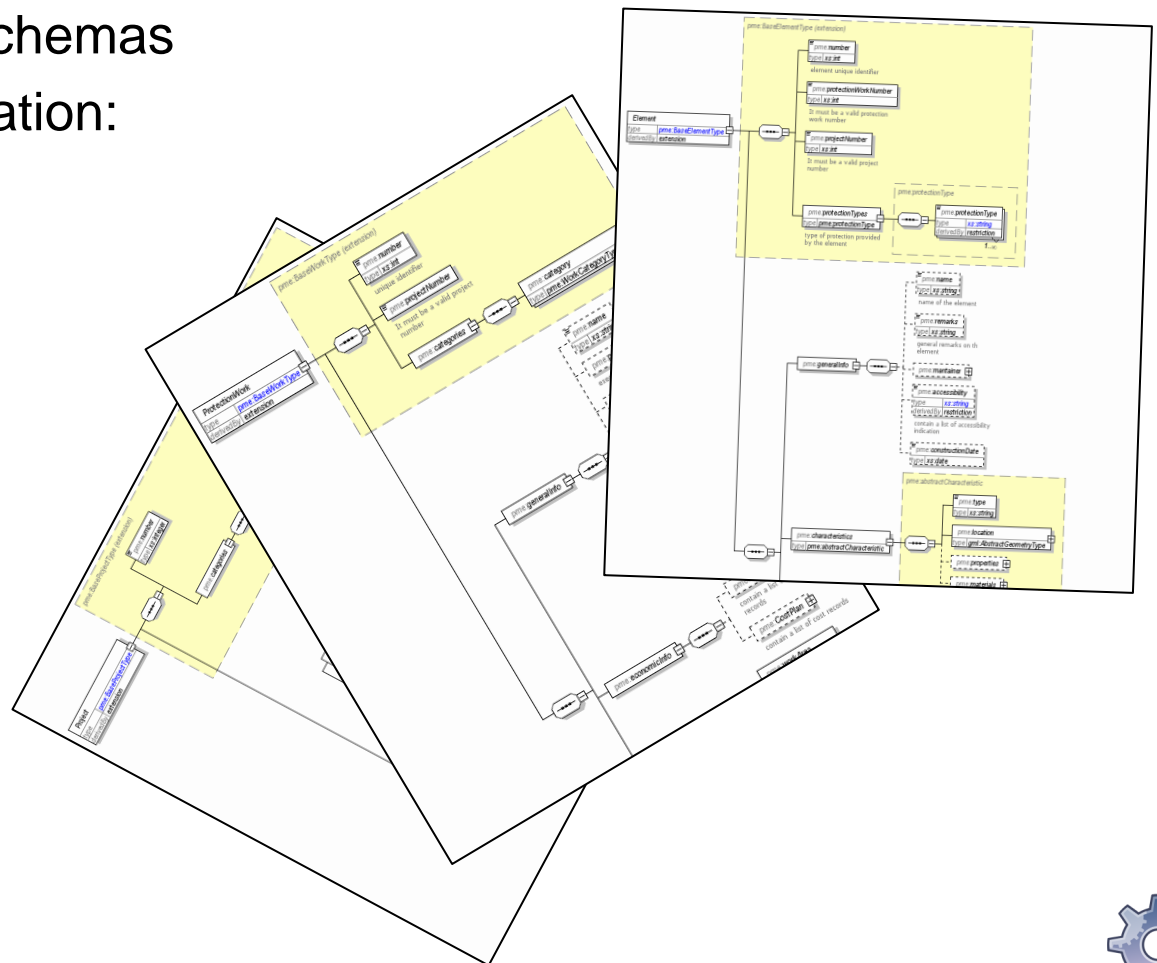
- code / name
- accessibility
- typology
- building date
- status
- comments
- person in charge
- protections type
- materials
- documentations
- **geometry**
- dimensions

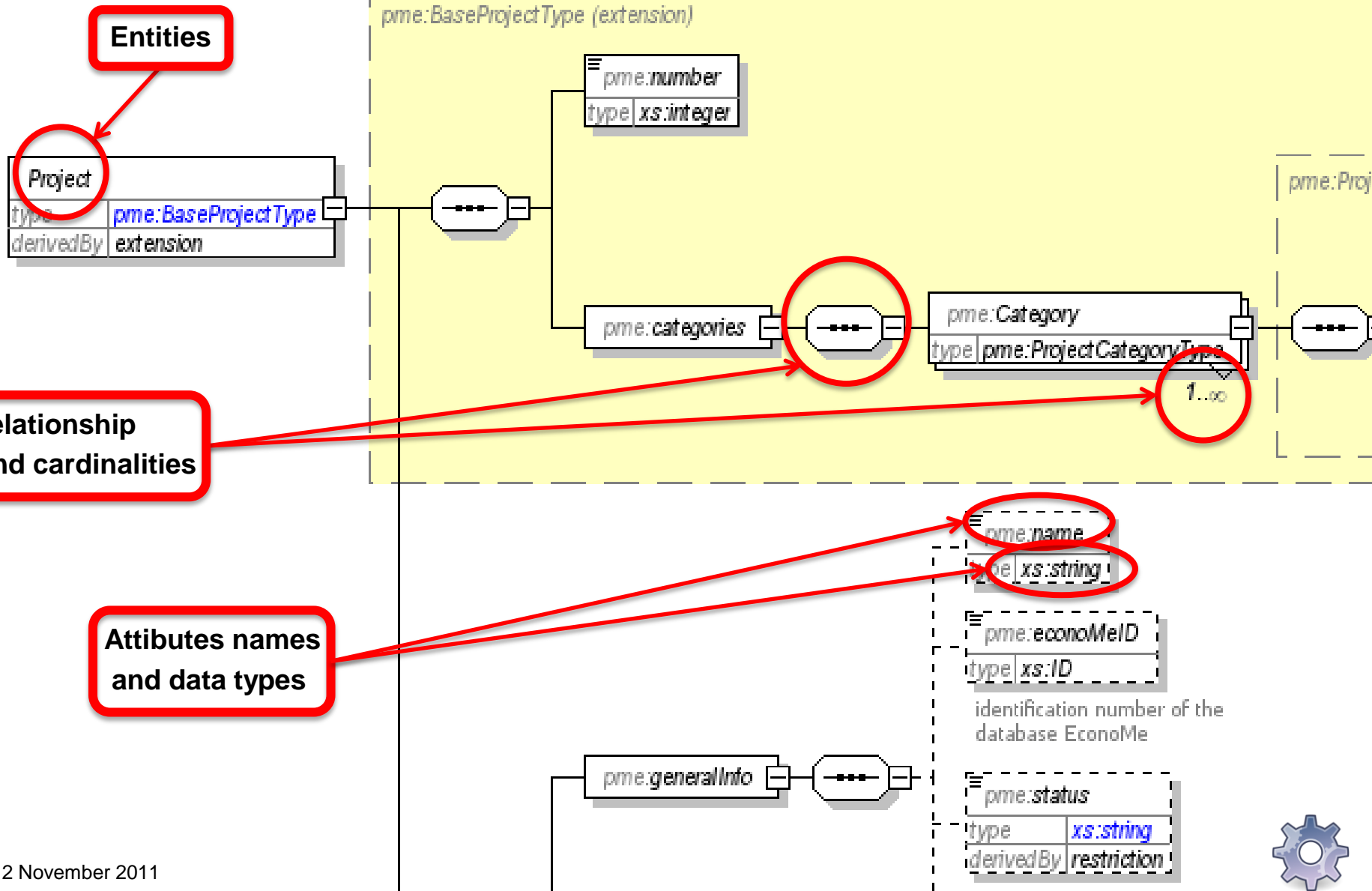


## PmTi - Data model standardization with XML Schemas

Advantages of an XML schemas  
data definition documentation:

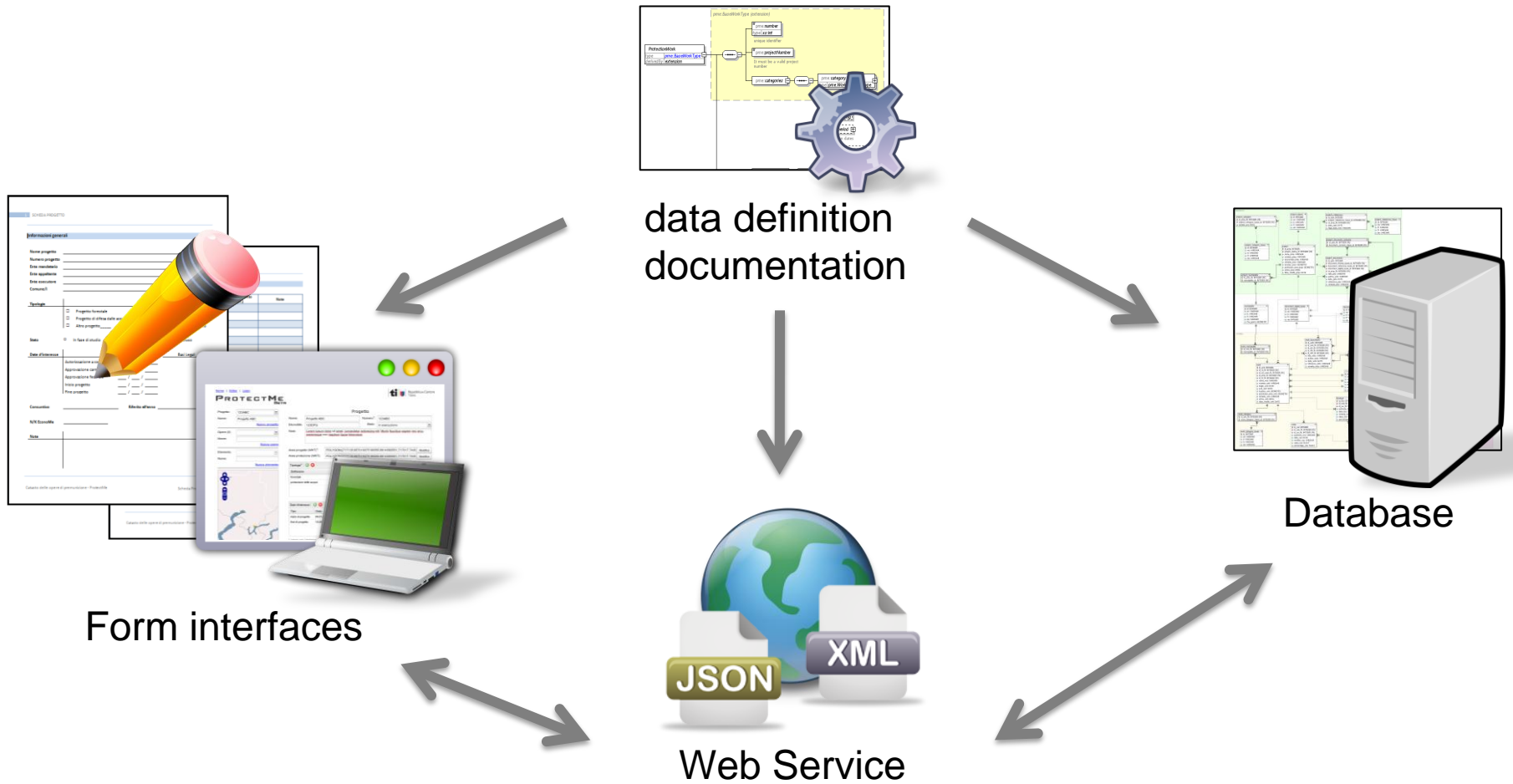
- + Interoperability
- + Integration
- + Compatibility
- + Collaboration







# Implementing the data specification



## 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

```
{  "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:

- Manipolation
- Visulization
- Search

### Geo data:

- Visualization
- Manipolation

Home page

The screenshot shows the 'ProtectMe' web interface. At the top, there is a navigation bar with links for 'Home', 'Admin', and 'Segnalazioni', along with a search box labeled 'Cerca per numero...'. Below this, a search bar is labeled 'Ricerca progetto esistente:'. The main content area is divided into two sections. On the left, there is a map titled 'Geographic visualization' showing a geographical area with a blue river and yellow markers. On the right, there is a table titled 'Ultimi aggiornamenti' (Latest updates) with columns for 'Oggetto', 'Categoria', 'Autore', and 'Data'. The table contains several rows of data, including project IDs like '431.1-TI-0083/0003' and '1120.5.3', categories like 'work' and 'element', and authors like 'Marco Franzi' and 'IST Administrator'. A callout box labeled 'GeoRSS latest activities' points to the table. Another callout box labeled 'Search Projects' points to the search bar. A third callout box labeled 'Search Projects' points to the search bar. A red arrow points to the search bar.

**Search Projects**

**Search Projects**

**Search Projects**

**Geographic visualization**

**GeoRSS latest activities**

| Oggetto                            | Categoria | Autore            | Data                |
|------------------------------------|-----------|-------------------|---------------------|
| <a href="#">431.1-TI-0083/0003</a> | work      | Marco Franzi      | 04-08-2011 11:40:53 |
| <a href="#">431.1-TI-0083/0003</a> | work      | IST Administrator | 04-08-2011 11:17:32 |
| <a href="#">eeeeee</a>             | None      | IST Administrator | 04-08-2011 11:30:42 |
| <a href="#">test</a>               | element   | IST Administrator | 22-06-2011 11:59:34 |
| <a href="#">1120.5.3</a>           | element   | IST Administrator | 22-06-2011 11:58:25 |
| <a href="#">1120.5.2</a>           | work      | IST Administrator | 21-06-2011 10:44:55 |

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DEMO

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Thank you

**PROTECTME**

Institute of Earth science

<http://www.ist.supsi.ch>

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