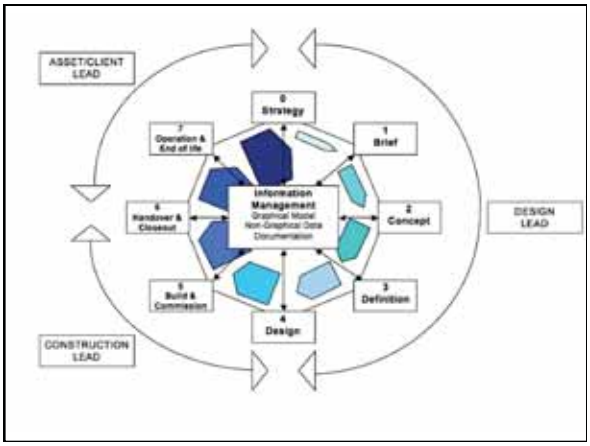
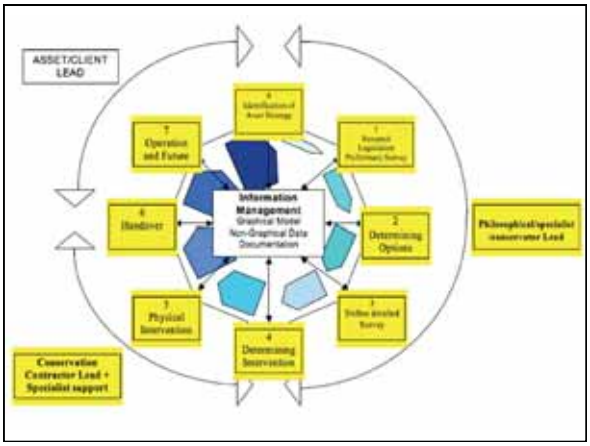
The government strategy paper published in March 2011 defined four maturity levels of BIM, based not only on the level of technology used to design a building, but the level of collaboration within the process. These are:

- *Level 0 Unmanaged 2D CAD, with data exchanged in paper or electronic paper form.*
- *Level 1 Managed CAD in 2D or 3D format, with data shared via a collaborative tool to provide a common data environment (CDE) with a standardised approach to data structure and format. No integration of commercial data.*
- Level 2 Managed 3D environment where each discipline creates its own model, with information electronically shared in a CDE. Commercial data is integrated into BIM by proprietary interface or bespoke software. Level 2 BIM may use 4D construction sequencing and/or 5D cost information. **This level of BIM is the target for 2016**.
- *Level 3 Fully integrated, collaborative process with models shared between the project team on a web-enabled BIM hub.*

By 2016 it will be compulsory for fully collaborative BIM processes to be used on all government projects greater than £5m in value. The wider industry is adopting BIM as a way to more accurately predict and ensure performance throughout the life of a building. **However, to date, the approach has been new build orientated.**





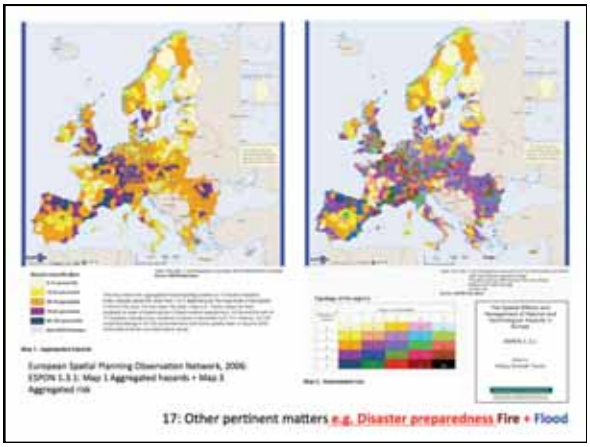
The crucial difference between traditional 3D modelling and level 2 BIM is data.
BIM software can differentiate between different types of element and store a great deal of information about their real-world properties and behaviour. The key to BIM is therefore not the visual model, but the database of information that sits behind it.

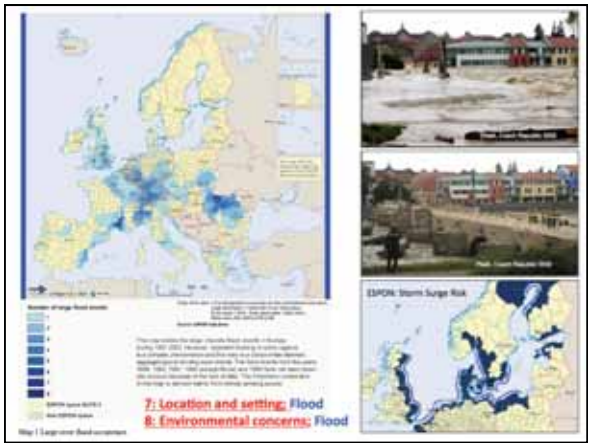
One type of data input into the building information model concerns the products, materials and assemblies that will form part of the finished building. It is essential that the library of product information within the model is appropriate, accurate and up-to-date. However, it is vital that the data fed into the model is itself accurate and consistent, if the full potential of BIM is to be realised.

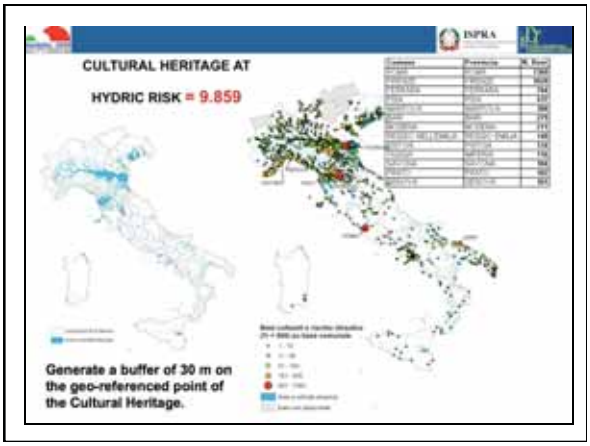
HBIM Approach Key Elements (COTAC: April 2014 Report)

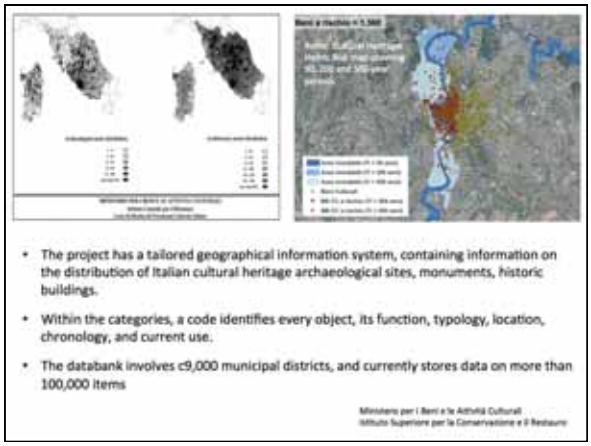
Within an HBIM approach, in addition to holding surveyed material, data management systems for historic and traditionally built structures might include information on key elements such as:

1. Significance and Value;
2. Legislative parameters;
3. Existing archival records;
4. Historic evolution and developments;
5. Researched findings;
6. Architectural styles and structural details;
7. Location and setting; Flood
8. Environmental concerns; Flood
9. Functional uses; Fire
10. Material performance criteria and degradation details; Fire + Flood
11. Material sources and supplies; Fire + Flood
12. Vocational skill requirements;
13. Specialist requirements; Fire + Flood
14. Maintenance records;
15. Servicing requirements;
16. Ownership;
17. Other pertinent matters e.g. Disaster preparedness Fire + Flood

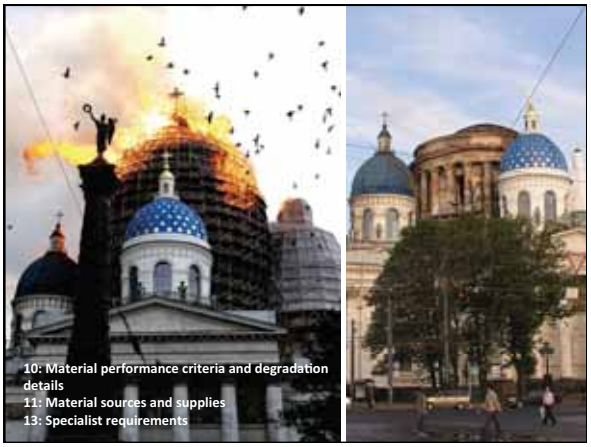

European Spatial Planning Observation Network, 2006
ESPON 1.3.1: Map 1 Aggregated hazards + Map 3 Aggregated risk
17: Other pertinent matters e.g. Disaster preparedness Fire + Flood


ESPON: Storm Surge Risk
7: Location and setting: Flood
8: Environmental concerns: Flood


CULTURAL HERITAGE AT
HYDRIC RISK = 9.859
Generate a buffer of 30 m on the geo-referenced point of the Cultural Heritage.


• The project has a tailored geographical information system, containing information on the distribution of Italian cultural heritage archaeological sites, monuments, historic buildings.
• Within the categories, a code identifies every object, its function, typology, location, chronology, and current use.
• The databank involves c9,000 municipal districts, and currently stores data on more than 100,000 items

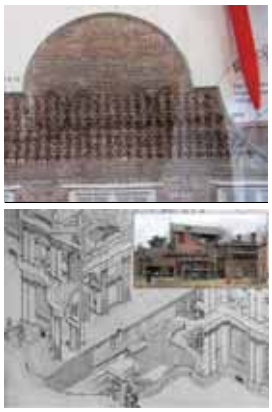

10: Material performance criteria and degradation details
11: Material sources and supplies
13: Specialist requirements

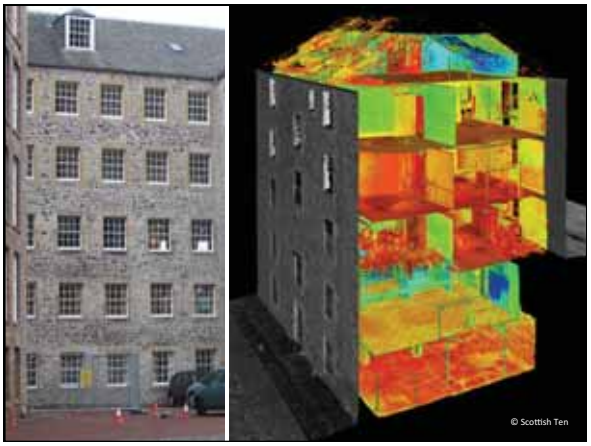


Informing Conservation

The practical requirement of undertaking effective and appropriate conservation work in the CRM sector requires detailed information on:

- Accurate survey material
- Understanding the construction
- Condition monitoring
- Deviation mapping
- Integrated approach to :
  - Structural movement
  - Voids and surface disruption
  - Water penetration
  - Mechanical and Electrical malfunctions
- Risk Monitoring
- Post-disaster recording
- Physical replication





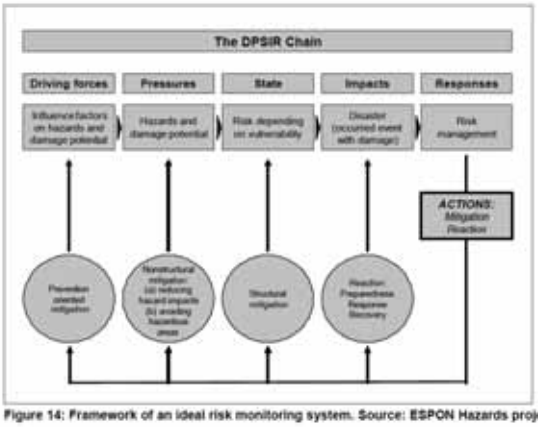


Figure 14: Framework of an ideal risk monitoring system. Source: ESPON Hazards project

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Unique Project Challenges: Flood

Location and Setting: **Contextual Geospatial data**

Environmental Concerns

- Aggregated hazard identification
- Vulnerability assessment
- Determine risk levels and potential/frequency of threats
- Historic incident data
- Preparedness **Building specific data**
- Immediate mitigation
- Response and recovery

Salisbury Cathedral aftermath of 1915 flood

Unique Project Challenges: Fire

Material performance criteria and degradation

Material sources and supplies

Specialist requirements: **Building specific data**

- Materials and source identification
- Function vulnerability assessment
- Determine risks and potential threats
- Retrofitting services
- Management preparedness
- Post-incident mitigation support