EMERGENCY

Workshop su “Architettura e museografia per l'archeologica di emergenza”
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Sistemi avanzati per la documentazione dello scavo archeologico

Gabriele Bitelli
DICAM – Dipartimento di Ingegneria Civile, Chimica, Ambientale dei Materiali

Outline of the presentation

- Cultural Heritage Surveying, Documentation & Information Management
- The role of Geomatics Engineering
- Specificity of Cultural Heritage surveying
- Integration and complementarity
- Trends in multiscale multi-technique surveys
- Discussion by case studies

What? Why? When?

Immovable and moveable Cultural Heritage:

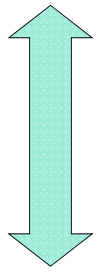
- Conservation, maintenance, restoration
- Decision making, planning
- Emergency works

requiring appropriate tools and methods for:

- Documentation
- Recording / Surveying / Monitoring (fast and rigorous)
- Information Management (data & metadata)

The subject(s)

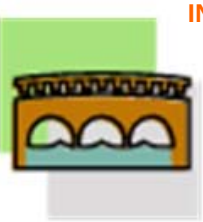
- Cultural landscapes and territories
- Sites
- Groups of buildings
- Single monuments
- Single objects



Different size, different accuracy requirements, different constraints, different approaches, different studies, …

Data acquisition for Heritage documentation

- **Multidisciplinary** work to bridge the gap between **information users** and **information providers**

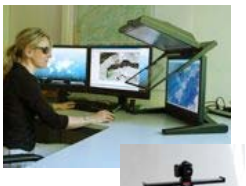
INFORMATION USERS		INFORMATION PROVIDERS
archaeologists, conservation specialists, project managers, planners etc…		geomatics engineers, surveyors, …

- The fascinating challenge in this field is to integrate specific different competences
  ⇒ Networking

- The role for **Geomatics Engineers**?

- Geomatics engineers have a specific expertise to choose the best techniques, technologies and instruments among:
  - **Geodetic engineering** (e.g. monitoring of structures with very high accuracy)
  - **Geodetic space positioning** (GNSS = GPS+Glonass+Galileo+…)
  - **Photogrammetry** (aerial / close-range, analytical and digital)
  - **Laserscanning / Lidar** (aerial / terrestrial)
  - **Satellite Remote Sensing** (optical / radar)
  - **Digital Terrain Models** (DTM) / **Digital Surface Models** (DSM)
  - **Digital Cartographic processing** (new maps / reuse-integration of existing / historical maps)
  - **Integration with other sensors** (positioning of geophysical surveys, signal data processing, etc…)
  - **GIS** establishment and **database management** (inventory and data/metadata organization, environmental aspects)

assessing the results by rigorous quality indicators…

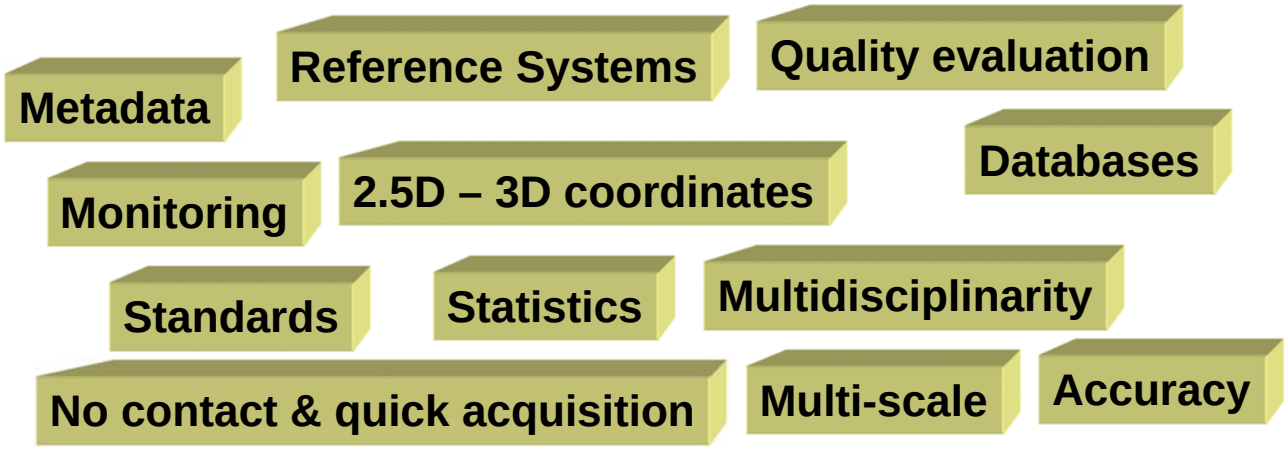
Specificity of Cultural Heritage surveying (I)

- Need of integrating **different techniques and data** acquired with **different accuracy/scale** and **different reference systems** (*crucial point*)
- 2D, 2.5D or frequently **3D**
- **Fast data acquisitions methods** are preferred (reducing at the minimum the interference with the object)
- **Remote surveys** are generally preferred → no contact (sometimes it's *not possible* to have a contact with object)
- **Logistic constraints** require specific local solutions (*sometimes not-optimal from a rigorous point of view!*): absence of electrical power, very short distances, elevation systems, light conditions, problems for high technology import in some countries, etc…

Specificity of Cultural Heritage surveying (II)

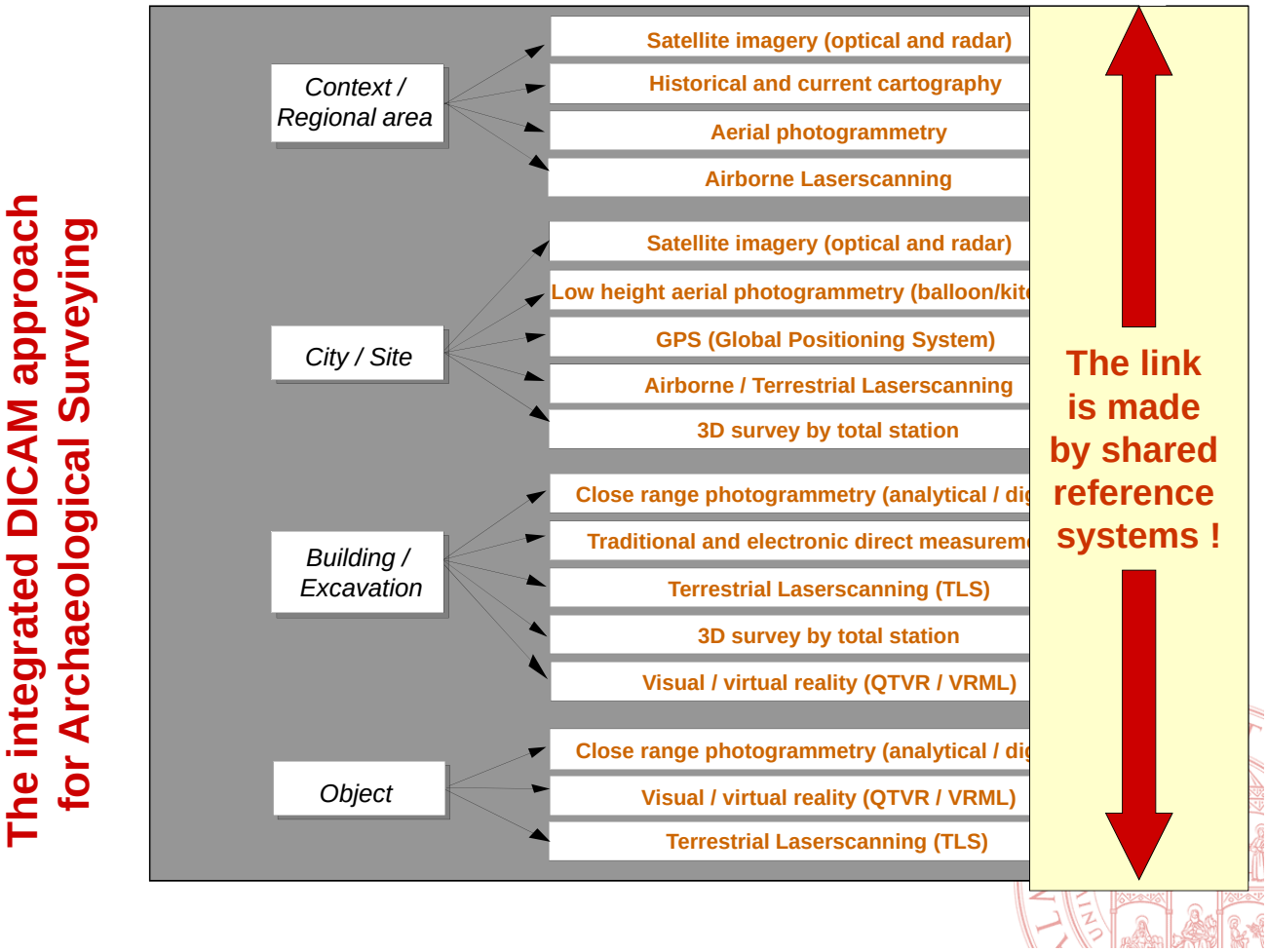
- **Geometric surveying must be related to other information** (colour, multispectral, text, in-situ diagnostic instruments, …) → *data fusion*
- **Link with databases** and specialised spatial-based information systems
- **Accuracy requirements less standardized** in respect with other surveying applications (e.g. mapping):
  - sometimes less strict (first documentation stages)
  - sometimes very high (e.g. deformation monitoring of structures, reproduction of findings or arts by numerical control machine, etc.)
  - sometimes *not clearly defined* by the users…
- **Costs hardly quantifiable** using standard criteria
- **Lack of regulations/standards** for operations, instruments, products (→ connate to the above characteristics?)

Specificity of Cultural Heritage surveying (III)



The surveyor is required to have a **great adaptability**

Each case is different from the others and can require each time new specific procedures for data acquisition, data processing or data representation



Good news [Technology]

- Data acquisition and processing almost always **digital**
- **Easier interfaces** (e.g. surveying instruments)
- **Earth viewers and WebGIS** → sharing data and information, on line data access for researchers, museums…
- Growing **availability of base maps** (e.g. satellite imagery)
- Advanced procedures for **3D modelling** (but general purpose programs not always are suitable for archaeological applications!)
- **GIS functionalities** (space-time analysis, geostatistical computations, 3D support, …)
- New and cheap **high resolution sensors** (e.g. for imaging)
- More flexible and accessible procedures for **instrument calibration**
- **Lower price** for storage media, display, instruments, …
- …

Review of examples and case studies
(DICAM group)

Italia (Pompei, Ercolano, Castelleone di Suasa, Misa, …), Egitto (Bakchias, Soknopaiou Nesos), Turchia (Tilmen Hoyuk, Tasli Gecit Hoyuk, Karkemish), Albania (Phoinike), Siria (Ebla), Malta, Uzbekistan (Valle dello Zeravshan), Tajikistan (Sarazm), …

Conclusions

- Recording and Documentation of Cultural Heritage benefits today from new powerful digital systems and sensors
- In case of emergency different solutions are now available for fast and rigorous surveys
- A careful adoption/integration of multiple techniques can produce the best results
- Is a matter of integration:
  - Between surveying or representation techniques
  - Between the data already available
  - Between disciplines **and** people:
    geomatics engineers, archaeologists, historians, conservation experts, restorers, structural engineers, geophysicists, …

Chiesa di Santa Croce

esperienza di rilievo ed elaborazione dati con laser a scansione terrestre