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Managing Heritage through Facilities Data Management Heritage Information System

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Abstract

For the conservation of cultural Heritage projects to succeed, charters and international conferences called for organizing an order between the stakeholders to manage the implementation of these projects, and so conserving the cultural heritage sites properly.

Heritage Management is a wide range field needed urgently for the conservation of Heritage, and respectively needs a wide base of data; an inventory or archive that facilitates sharing data to expand awareness and understanding of Heritage sites, using facilities management information system will establish an archive that provides the conservation professionals with the data needed in restoring — reuse and maintaining the historical sites, as well as allowing users to easy access of detailed, accurate, controllable and adequate historical information about these sites.

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Keywords

CH (cultural Heritage) sites; Facilities data management; Archive; Historical data.

1. Introduction

In Archeology, sustainable survival of historical sites depends mainly on the amount, quality, and management of the site's data which if recorded, documented and collected properly will help to acquire a precise inventory for the heritage site's information.

This data center must be updated to identify the current situation, schedule monitoring, priorities, funds, conservation needs, and development policies.

Heritage information system is required to permit what is called informed management of Historical buildings and sites, understanding meanings and heritage values, encourages interest, public, involving and insures long term maintenance, renovation, renovation, and restoration of the heritage sites.

When critical management decisions are made it is a must acquiring a detailed information system of the heritage facility: in advance, at the time or following any conservation project or other type of work or change, keeping the heritage records for the next generations, helps in taking decisions in the conservation process where it is urgent to determine which site has the priority for interfering and which process in conservation is needed (renovation — restoration — maintaining — reusing).

2. Paper objective

To highlight:

- 1- The significance of Heritage Data Management in the process of Cultural Heritage Management.
- 2- A list of Information Communication Technology (ICT) soft wares, technological tools for Heritage Data that is in the reach of professionals.

3. Methodology:

This paper is based on Descriptive method as it describes a group of various soft wares and applications used in collecting and managing data, introducing, introducing data life cycle (from the tools compiling data in documentation process to the use of this data in presenting and preserving historical sites)

4. Research problem:

In order to successfully manage conservation projects, specialists have to overcome some clear obstacles:

1. Insufficiency of reliable data.
2. Lack of the data flow between stakeholders (specially governmental agencies).
3. Unavailability of monitoring and recording of data after the conservation project.

5. Definitions:

5.1. Cultural Heritage

Cultural Heritage regards to monuments, number of sites and buildings of heritage value, composed of the historic or built environment. (Icomos, 1996)

5.2. Cultural Heritage Management (CHM)

CHM has usually been interested in the “Identification, interpretation, maintenance, and preservation of significant cultural sites and physical heritage assets, although intangible aspects of heritage, such as traditional skills, cultures and languages are also considered. The subject typically receives most attention, and resources, in the face of threat, where the focus is often upon rescue or salvage archaeology. Possible threats include urban development, large-scale agriculture, mining activity, looting, erosion or unsustainable visitor numbers.” (Hajilikhani, 2007)

5.3. Recording

Is gathering information which define the physical formation, condition, and rehabilitation of monuments, at a defined stage and time, and it is a critical part of the conservation project. (Icomos, 1996)

5.4. Digital archive (inventories)

It is a library or museum of digitized information about the elements of historical importance and is a merge of resources with different forms, including people supporting and useful services. (Nair, 2004)

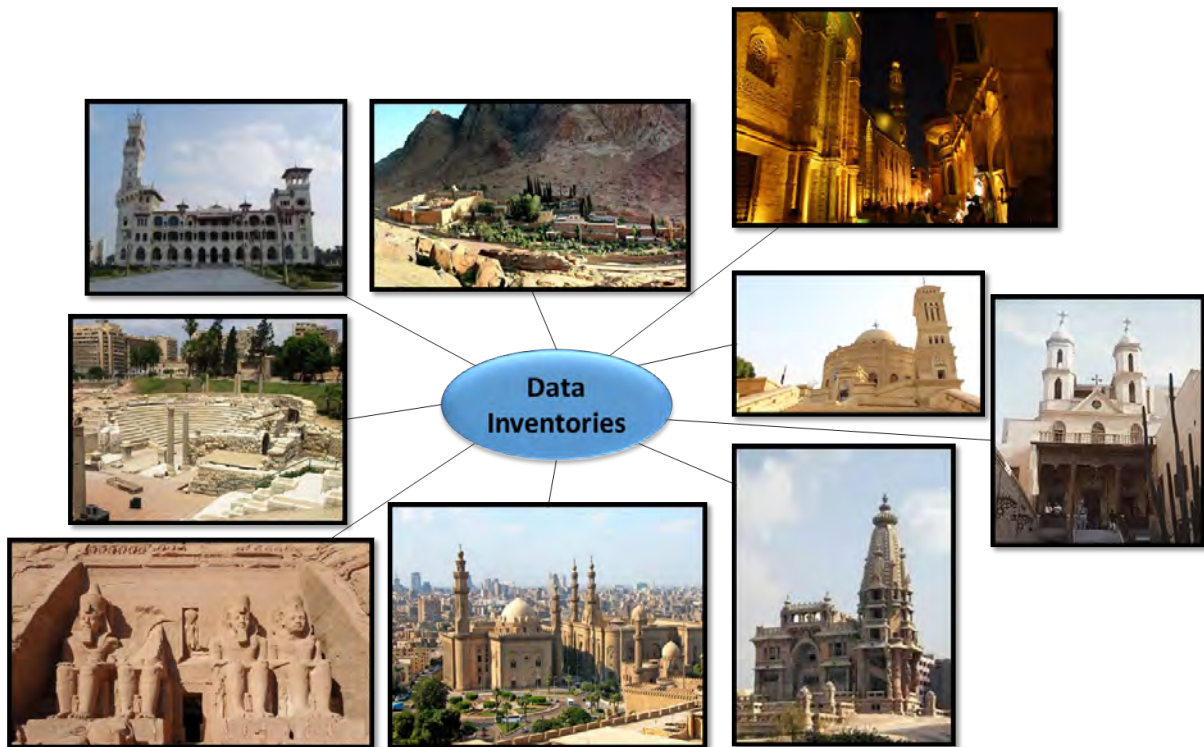


Figure 1. Concept of data inventory

5.5. Heritage information system (Mphil, 2012)

The management of cultural heritage is the key for ensuring the sustainable conservation of historical buildings and sites and as any other management it needs the availability and quick easy access to the data required for this management which concerning heritage management will be:

1. Detailed documentation of the building (text, photos, drawings, maps)
2. Evaluation of the building condition (to determine the order of prior sites in conservation plan)
3. Checklists of the assigned tasks for the preventive maintenance.
4. Interfering scope of every involved member (stakeholders) and they are:
 - Governmental organizations
 - Privet sector — private funders
 - Intergovernmental organizations (UN)
 - Users (occupants — amateur — researchers- employees- tourists)
 - Professionals (archeologist — architects- contractors- vendors- managers)

5.6. Facilities management

International facilities management association (IFMA) definition: “A profession that encompasses multiple disciplines to ensure the functionality of the built environment by integrating people places, processes, and technology”. (Roper & Payant, 2014)



Figure 2. Data flow in the heritage information system

5.7. Facilities data Management

“It is a variety of techniques which facilitate and ensure data control and flow from creation to processing, utilization and deletion. Data management is implemented through a cohesive infrastructure of technological resources and a governing framework that define the administrative processes used throughout the life cycle of data”.

This Data collected as an inventory must be developed and managed by one official source which will be the only sector that is authorized to manage and modify the data.

Recording is the responsibility of managers to assess and analyze and cataloging the quality of the gathered data during the different stages of the conservation process and be combined into the project. (McKeague & Thomas, 2016)

6. Deficiencies in CHM (Cultural Heritage Management) occur due to:

- Available information is insufficient (documentation and monitoring). Lack of quality of Data (reliable accurate information).
- Absence of co-operation between parties concerned (stakeholders).
- Conditions assessments may not be up-to-date. (Current situation assessments)

Nowadays, the ICT and computerized technologies permit reaching the level of digitizing the data and make it easier to access and spare time for accurate decisions. Furthermore, digitizing this information allows managing of large, complicated and detailed categories such as development of historical sites, reuse, status and previous restorations. (Ringbeck, 2008)

7. Data recording and accessibility

The environment of heritage sites and buildings is in a continuous change, whether due to man-made or natural factors.

New data periodically pops up and heritage sites are newly exposed occasionally whether through monitoring or by coincidence.

For data inventories to be effective tools in Heritage management all information included within must be kept up-to-date, to the extent that it might be renewed on a daily basis or even several times per day. (IFMA, 2009)

7.1. Characteristics of reliable inventories

For heritage inventories to be reliable in Heritage Management the data included must have the following characteristics:

1. Accurate.
2. Comprehensive. (fulfilling all the gaps)
3. Current. (up-to date)
4. Authoritative.
5. Controlled accessibility

7.2. Types of data acquisition (McGill, 2012)

Data collection activities

It is the recording and input of data through data collecting activities such as: ICT tools (BIM building information modeling — GIS (geographical information system) — thermo cameras- 3d laser scanners — photogrammetry-time scope kiosk)



Figure 3. **HBIM Historic building information modeling** Library of parametric models

Mapping systems

Laser survey data

Represents the geometry and fabric of historical buildings and sites. (Murphy, 2019)

7.3. Reasons for Recording

1. To gain knowledge to ensure the awareness of cultural heritage, its significance and its development.
2. To improve involvement of people in the conservation of heritage through the broadcast of documented information.

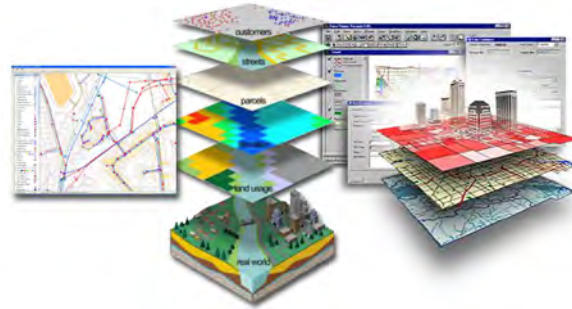


Figure 4. **Geographic information system** Capture, analyses, and store, spatial data, edit data on maps.
Uses digital information with imagery from satellites and tracing geographic data of the sites



Figure 5. **THERMAL CAMERAS** Examine non destructively the hidden historical elements in the building's fabric.
Detect various threats
Differentiate building materials. (Brooke, 2018) (Hendriks, 2019)

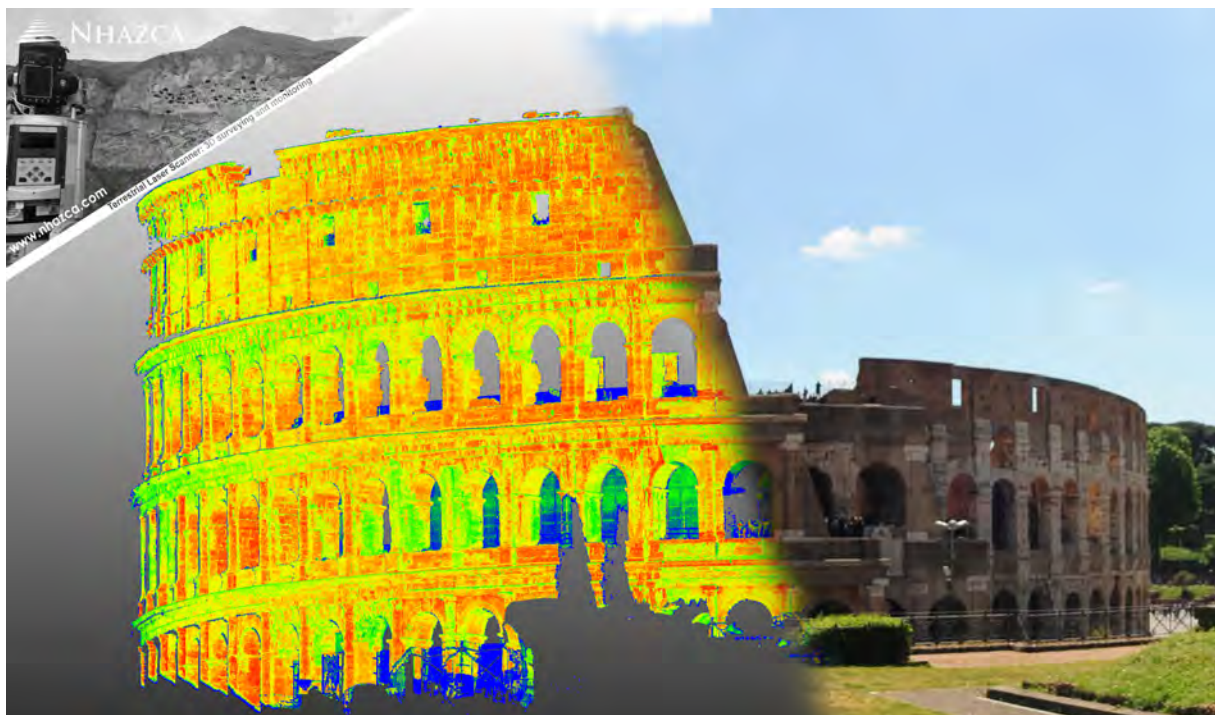


Figure 6. **LASER SCANNING** An automated survey tools.
Uses laser light to measure surfaces and represent them into point cloud (3d points).
Millions Of points can be detected, recorded and processed.
It is often combined with photogrammetry to produce realistic 3d models. (Baxter et al., 2007) (Control & scanner, 2019)



Figure 7. **PHOTOGRAMMETRY** It is a series of overlapping images taken for the object and then several possibilities exist for the outputs, including ortho-images, and textured meshes. (photogrammetry — photography & architectural photogrammetry, 2019)

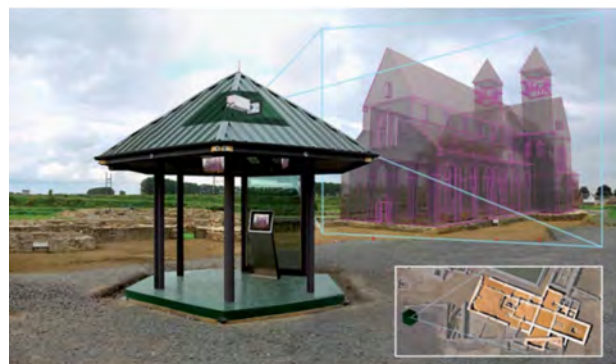


Figure 8. **TIME SCOPE KIOSK** It digitally modifies the local view by recreating virtually documented accurate images of what the subject was in the past, contents are documented using archived maps, photos, and drawings for the historical accuracy.

Tamara Brizard, Willem Derde, Neil Silberman, The Interactive Institute AB, Stockholm, Sweden

3. To ensure that the maintenance and preservation of the site is accurate and convenient to its physical shape and value.
4. Provide a continuing record of all heritable regions, groups of buildings and sites that are endangered, or at risk natural or human risks.

Data collection processes can build information systems that can be in sited within inventories that is why there must be coordination between those responsible for planning data collecting procedures, those in charge of inventories and users. (Hasbollah, 2015)

8. Sequence of the Heritage Information system

In order to manage a structured relation between the information providers and information users there is a wide range of soft wares.

8.1. FaciliCad web manager Soft wares

Web based applications installed as an unlimited-user browser-based and can be shared with as many parties, may be viewed on smart phones, tablets, iPods and netbooks, as well as, PC.

Moreover, these apps can combine textual data with graphic information from AutoCAD drawings, and can extract,

report hard and digital outputs and display live data during a meeting.



Figure 9. Facility Management Software & Solutions (FaciliCAD) (Software, 2019)

8.2. Maintenance Connections

It is web based software for maintenance management which tracks and manages maintenance costs, and can be hosted online and can serve facilities from as few as 10 users to as many as 10000. It acts as a matrix to organize work order information¹

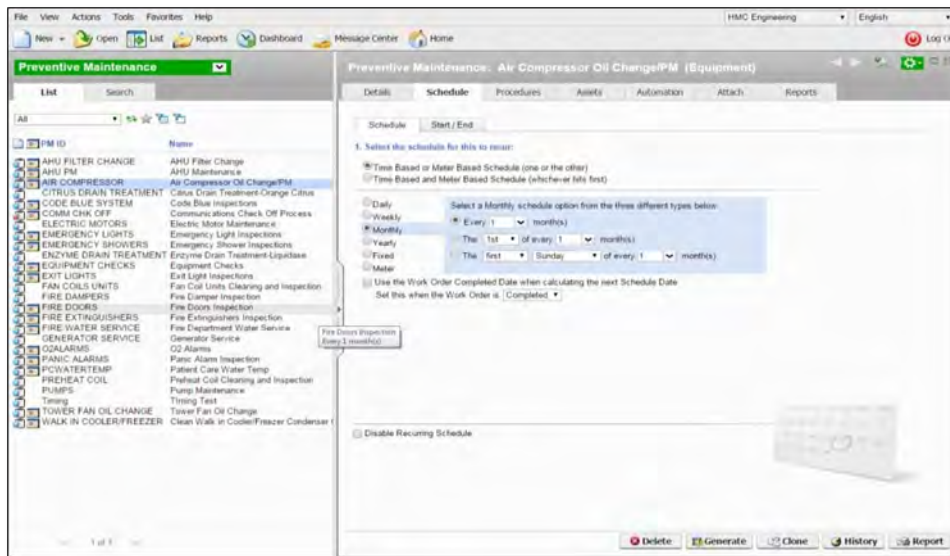


Figure 10. Using Maintenance connection software in scheduling checklists for the tasks and work orders

8.3. DCIM soft wares (Data Center Infrastructure Management)

Worldwide requirement for more efficient IT-based software, has led to a big amplification of data centers in both size and density.

Address the major topics of facility management, system supplying, pace and capabilities utilization and forthcoming capacity planning. Mostly, it provides an effective link to support the operational responsibilities between

¹[http://www.mapcon.com/us-en/maintenance-manageme t-software](http://www.mapcon.com/us-en/maintenance-manageme-t-software)

facilities managers and IT manager.

DCIM is a procedure and group of solutions to track, and operate the data and efficient utilization of all IT linked assets to the data center.²

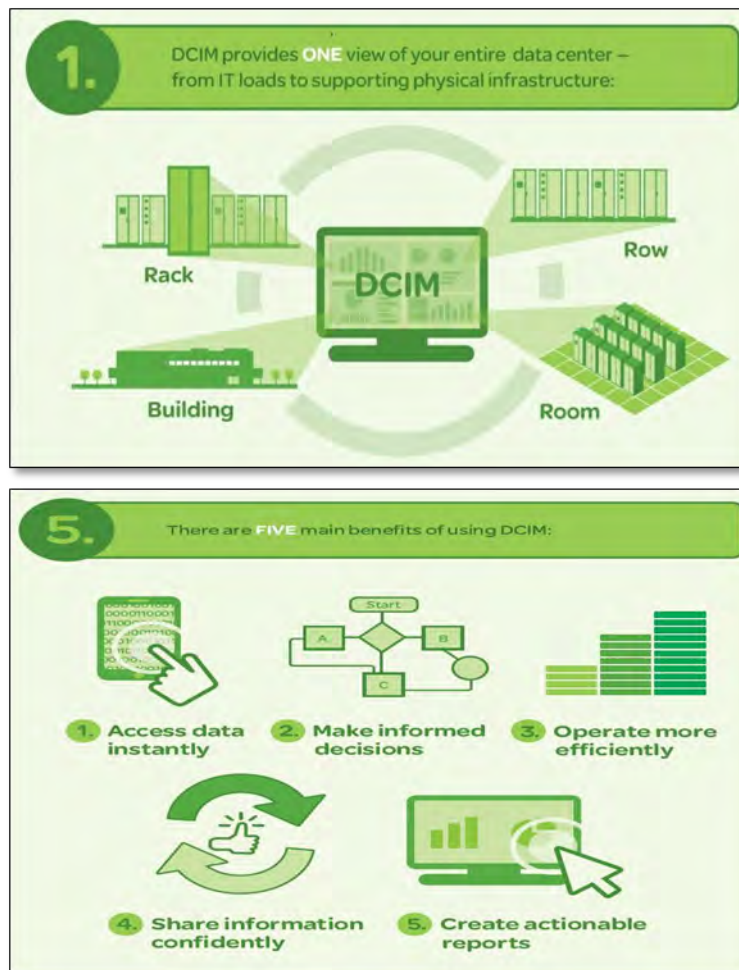


Figure 11. DCIM applications are the link between data providers and data users

9. Case study

9.1. HIAS (Heritage Information Access Strategy)

It is a system of work planned to ensure a developed and more cost effective application handle digital historic environment data by Historic England (Historic Buildings and Monuments Commission for England). The vision for the strategy is to create a single, accurate, and hared digital national heritage record. (May, 2012)

9.1.1. Objectives of HIAS

1. The process goals to resolve long-term i sues of entanglement and duplication of effort in the management and easily get access to documented heritage data nationally. The goal is to improve the utility and attractiveness of the information to users and provide backing for the planning process.
2. It also aims to integrate research and analysis of built heritage with its landscape, buried and submerged archaeology to make sure that the archive represents the total historic environment.

²Next generation Data center management, report excerpt, 451resarch, DCTdata center technologies, 2014

3. It helps consultants, contractors, Grey literature reports, museums, agencies involved and users of the historical sites to access feedback data of the sites.

This shared national archive will define clearer roles for data suppliers, local authority Historic Environment Records (HERs) and Historic England, and formalize agreements which will share the joint responsibility and potentially huge benefits of a fully integrated approach.³



Figure 12. HIAS project

The data archive can be accessed through Heritage Gateway which is a collaborative project between local agencies responsible for Heritage in England such as Historic England, Institute of local Government Archaeologists (ALGAO), Institute of Historic Buildings (IHBC) and Historic England to make a single online passage to the data required about heritage environment and sites in England.

While the Association ALGAO provides a forum introducing the senior professional archaeologists who work for local agencies and authorities in England to provide archaeological advice on conservation and management, and this includes all historical aspects in England (monuments, heritage sites and landscapes).

It also represents members with a wide range of interests, and provides data recorded and documented easily for all.

9.1.2. Historic Environment Records (HERs) (Trevor, Franci, & Littlewood, 2010)

It is a data service providing easy access to reliable and comprehensive resources about Heritage in a specific geographic Historical site that possess public benefits and use.

Each local authority is charged with managing or having access to HER for use in assessing the effect of planning applications on the cultural heritage sites in their area, and in integrating communities in valuing and caring for their local heritage.

The strategy will be implemented through a program of integrated stakeholders from across the heritage and planning sectors. It aims to resolve long-term issues of complex and duplicated efforts in managing and access heritage data on a national base and in doing so, to improve the effectiveness of the information to all user.

³<http://www.historicengland.org.uk/research/support-and-collaboration/heritage-information-access-strategy>



Figure 13. HIAS home page

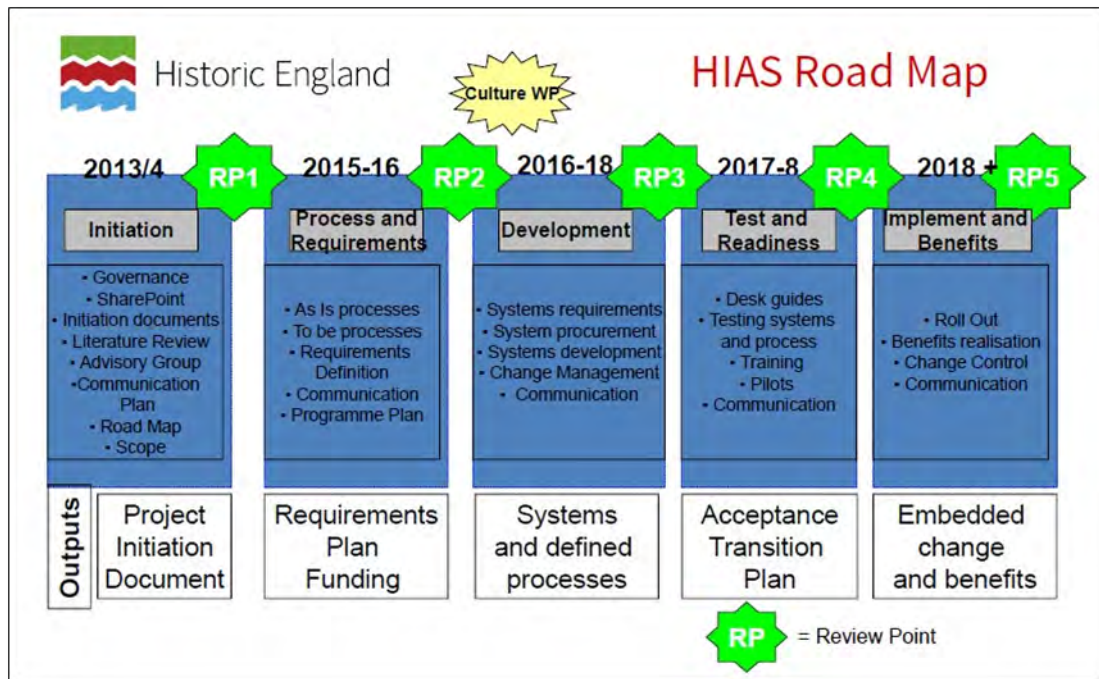


Figure 14. HIAS strategic plan England (2019)

9.1.3. Principals of the HIAS program⁴

This shared record will define roles for heritage managers and will formalize fully integrated approach for the management of heritage sites, the HIAS program introduce Advisory board, literature review, and business mapping of current data recording and exchanging.

Principle 1: Local Authority HERs should be the first point of call for and primary trusted source of investigative research data and knowledge

Figure 15. To ensure the concept of (one authenticated source of data), for the reliability and transparency of the shared data.

Principle 2: Historic England should be the first point of call for and primary trusted source of national datasets such as the National Maritime Record

Figure 16. A series of workshops are held between national and local data holders with stakeholders

Principle 3: Historic England should continue to champion the development, maintenance and implementation of standards for the creation, management and storage of digital historic environment data

Figure 17. Establishing a collaboration between HistoricEngland, HER community, software providers and heritage managers to ensure that the data is employed effectively to facilitate sharing it under the supervision of Historic England

Principle 4: Investigative research data or knowledge should be readily uploaded, validated and accessed online

Figure 18. HIAS is the data center for investigative research with available outputs for agencies, managers and users.

Principle 5: The national overview should be delivered online through the Heritage Gateway

Figure 19. Heritage Gateway is a local website managed by Historic England to provide access to the historical data recorded on the HIAS

⁴<http://www.historicengland.org.uk/research/support-and-collaboration/heritage-information-access-strategy>

Principle 6: Such data or knowledge should not be at risk of loss, fragmentation, inundation (in data), or system obsolescence

Figure 20. HIAS is cautious about data sharing and data access, in an up-to-date processing.

Principle 7: Historic England should, on behalf of the nation, ensure that a security copy of all such data exists in accordance with Principles 3 and 6

Figure 21. For quality control purpose following the feed back of the stakeholders it is proposed that a kind of” test response scenario “to check responsiveness and backup.

Principle 8: Digital data should be supported by material archives in safe repositories accessible to the public.

Figure 22. Archives will be shared more effectively and control the level of shared data or the public or managers or contractors or museums and other stakeholders.

10. Conclusion

Information management is among the central activities of the decision-making process for heritage conservation projects and a fully integrated part of research, investigation, and treatment. As a source of reliable information regarding the multiple aspects of a heritage, the conservation process is the target but always a service to something or someone.

Conservation is an ongoing activity, for having sustainable conservation, it must be a cyclic process e.g. (restoration — reuse- maintenance), with heritage information being the knowledge base, everyone deals with the heritage contributes and participate in the life cycle of the historical site. But without such data base, the conservation process is without reference, and this causes inaccurate restoration and unneeded interference that can change and distort values and significance of the historical site.

11. Recommendations

Egypt possesses more than one third of world’s heritage monuments and to benefit from this advantage properly Egypt has to implement heritage management strategic plans with the assistance and usage of the digital documentation data managing systems and this can be applied through:

1. Considering heritage management as a fact a d solution for having a successful continuous conservation plan.
2. Applying digital Archive that can be easily accessed.
3. Integrating this archive with maintenance checklists plans of reusing the site and other needed data for an accurate decision-making of the heritage management.
4. Applying digital link between all responsible stakeholders of the sites.
5. Improving the coordination between the governmental organizations and the conservation professionals.

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