



ARCHIVO DEL LABORATORIO DE DOCUMENTACIÓN GEOMÉTRICA DEL PATRIMONIO

LABORATORY FOR THE GEOMETRIC DOCUMENTATION OF
HERITAGE'S ARCHIVE

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| TÍTULO: | Design of tailored strategies for preservation and re-use of information about heritage | :TITLE |
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| Resumen | |
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| TITULO: | Diseño de estrategias adaptadas para la preservación y la reutilización de la información patrimonial |
| RESUMEN: | La preservación de la información es uno de los principales retos que cualquier tipo de patrimonio (cultural, natural, virtual, etc.) afronta en la actualidad. En el presente texto, este problema se afronta mediante la definición de un sistema de gestión de la información. La solución se adaptará a las características de una organización que posea información sobre elementos patrimoniales y que desea utilizarla de forma apropiada para la consecución de sus objetivos tanto en el mercado como en la sociedad. |
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| Abstract | |
|----------------------|--|
| TITLE: | Design of tailored strategies for preservation and re-use of information about heritage |
| ABSTRACT: | Data preservation is one of the main challenges that any kind of heritage (cultural heritage, natural heritage, virtual heritage, etc.) faces at present. In this paper, the issue is addressed by defining a data management system. The solution will be adapted to the characteristics of an organization that possesses this sort of information and wants to make use of it in order to attain its objectives in both the market and society. |
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Design of tailored strategies for preservation and re-use of information about heritage

Álvaro Rodríguez Miranda¹, José Manuel Valle Melón¹, María Cruz Porcal-Gonzalo²

¹ Laboratorio de Documentación Geométrica del Patrimonio – Grupo de Investigación en Patrimonio Construido (University of the Basque Country UPV/EHU)
Nieves Cano 33, 01006 Vitoria-Gasteiz, Spain – ldgp@ehu.es

² Dept. of Geography, Prehistory and Archaeology – Grupo de Investigación en Patrimonio y Paisajes Culturales (University of the Basque Country UPV/EHU)
Francisco Tomás y Valiente s/n, 01006 Vitoria-Gasteiz, Spain – mariacruz.porcal@ehu.es

Abstract. Data preservation is one of the main challenges that any kind of heritage (cultural heritage, natural heritage, virtual heritage, etc.) faces at present. In this paper, the issue is addressed by defining a data management system. The solution will be adapted to the characteristics of an organization that possesses this sort of information and wants to make use of it in order to attain its objectives in both the market and society.

Keywords: data preservation, re-use, heritage, OAIS, ISO 30300.

1 Introduction

Elements of heritage cannot be understood without the information that describes them. As a consequence, the “use of the information” implicitly means the “use of the element of heritage” and, therefore, the preservation of the information should be considered as a part of the preservation of the heritage on the whole.

Up to recently, data preservation has been considered an extra load for the organizations which had to cope with it. However, thanks to the *Information Management Systems* -such as the ones described in the ISO 30300 standard-, it has been shown that the preservation can fit in the organization's daily workflow, providing meaningful improvements for their performance and efficiency. In addition, recently driven legislative initiatives (such as the *Directive 2003/98/EC on the re-use of public sector information*, which has been recently amended in *Directive 2013/37/EU*), aware of the need to make the organizations more competitive and enhance user satisfaction, are progressing towards the valuation of information and highlighting the necessity of its preservation.

Nevertheless, it is worth mentioning that there is almost no practical methodology available suited to the characteristics of the elements of heritage that any organization

can adopt in order to set up an adapted strategy for the preservation and continuous use of their datasets over time.

To begin with, let us introduce that any approach could not be limited to the definition of an archival system but must encompass steps before the generation of information -such as the detection of needs and their evaluation- and must reach up to the use of information and the subsequent analysis of feedback so as to check that the organization's objectives are being met.

For the proposal presented in this paper, the following components have been merged:

1. An operational model (agent's relationships) which shows the processes of generation, archive and use of information. It also permits knowing the traceability of information and, hence, identifying the intellectual rights.
2. A main unit for information: the *project*, which defines the context and the characteristics of information.
3. A conceptual model for archives (OAIS).
4. A procedure to set up an information management system (ISO 15489).
5. The orientation towards the continuous improvement (PDCA cycle).
6. The possibility to certificate the system by means of quality criteria (ISO 9000, ISO 30301, ISO 27001, ISO 16363, etc.).

Obviously, each one of the key points above should be changed by an alternative model, standard, etc. This is one possible way to build the proposal up in the future. At any rate, it is important to underline that these pieces were not assembled at random but employing as guiding thread the heritage itself and its use by means of information.

In essence, the proposal introduces the management system into a cycle of continuous improvement. The system itself works in the agent's scheme and the cycle evaluates the performance and modifies the functioning in order to ensure that it fits for the organization's characteristics and for the circumstances of the environment.

2 Description of the components

Information is created so as to cater to a need and it is produced in a specific context, both *-need* and *context-* will determine the characteristics of information and are compulsory to its understanding. It seems therefore useful to gather information within the project which generated it. Moreover, resorting to the project as the main aggregation unit provides the following benefits:

1. Projects are finite units, limited in time and resources. The results have been previously established, the necessary tasks have been defined and, in addition, there is an organic structure with responsibilities to manage and carry the work out.
2. Inside the project, the results are linked through processes and form a flowchart [1]. This one is a key tool for re-use since it allows delving into the steps, making it possible to recover not only the outcomes but also raw and partially processed data.

3. A project is the consequence of an order. Such an order will define the intellectual rights associated to information.

At the same time, a project can be considered as the interaction among three agents: firstly, the user who has the need of some kind of information, secondly, the promoter who is in charge of the element of heritage to which this information is related and has both the resources to fund the assignment and the ability to assess the results and, finally, the provider who has the technical expertise necessary to generate information.

All three are connected by means of the following six-step diagram [1] in which the needs are channelled from the user to the provider and information is generated from the element of heritage and delivered to the user.

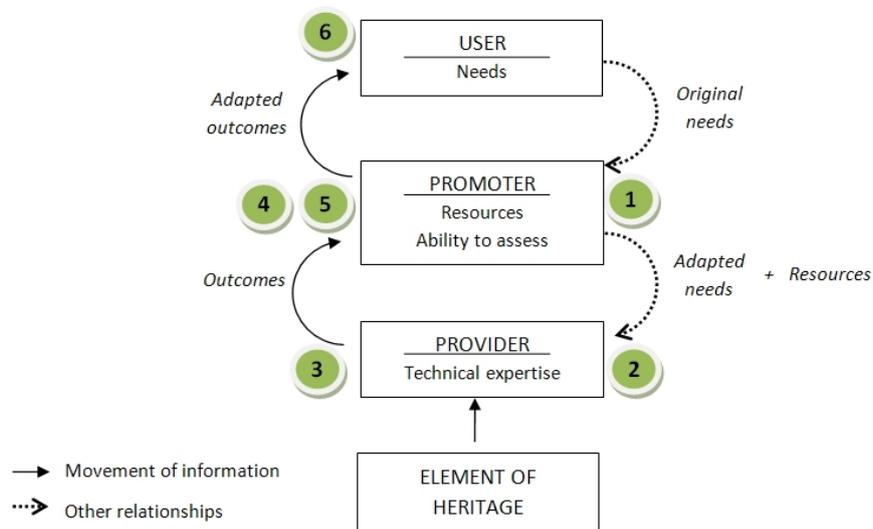


Fig. 1. Relationships, inputs to the process and flows among agents, adapted from [1]. The inputs of each agent are written below their names.

According to the diagram, the original needs are analysed by the promoter (step 1). After this evaluation -which will take into account not only the current users but also the ones that might be interested in this information in the future- the promoter will request the provider the generation of information and will allocate the necessary funds for it. Then, the provider will select among the technical alternatives (step 2) and will produce the results (step 3).

As it is depicted in the drawing the provider is the agent who accesses the element of heritage in order to generate information (the chart represents this fact by means of an arrow showing the movement of information from the element of heritage to the provider).

Next, the information is archived (step 5) but not until the promoter has assessed that the outcomes meet the characteristics of the order (step 4). The last step is the

delivery of information adapted to the user's needs and, of course, the use of this information (step 6). Given that the information has been archived, it can be tailored and delivered to new users so as to achieve new goals (6b, 6c, 6d...).

The time frame in which information has to be available is called *validity* and the possible reasons to keep it are two: giving evidence of the fact that information does exist (for accountability, legal liability, etc.) and allowing its re-use.

We can elaborate on steps 4 to 6 in the diagram above by resorting to a conceptual model for archives like the *Open Archival Information System* (OAIS) [2] [3]. In this way, all the theoretical basis, standard vocabulary and concepts, components, responsibilities, relationships and so on that are already defined in the OAIS model can be directly applied to our agents' diagram.

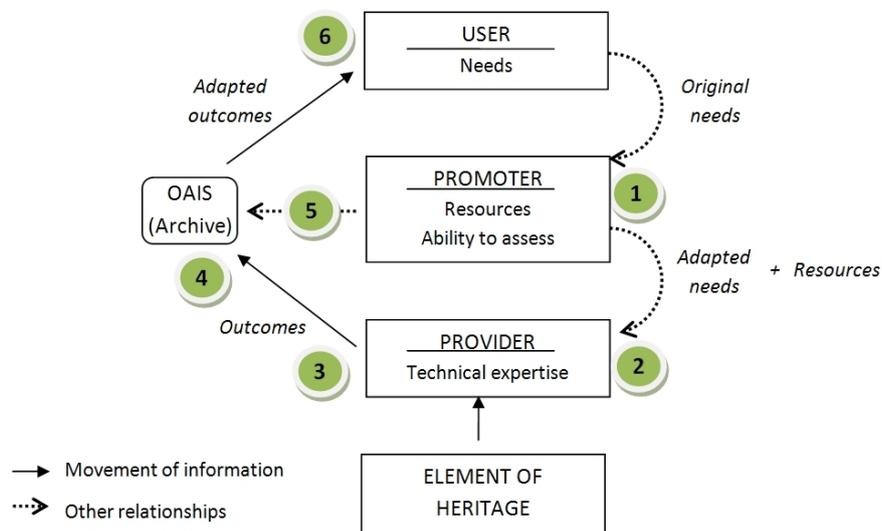


Fig. 2. OAIS environment embedded within the agents' diagram.

For instance, the OAIS model defines a series of services that the repository has to supply (*ingest, data management, access...*). It also discerns three ways in which information is packed in different moments: the *submission information package* (SIP), the *archival information package* (AIP) and the *dissemination information package* (DIP).

The OAIS model seems a sound foundation on which we can start planning our proposal for the preservation of information; nevertheless, there is a contradiction between this model and the aforementioned *Directive on the re-use of information*. Indeed, the former works on the assumption that the final user defines the characteristics of the repository while the latter considers that the administrations should make their information available as it is and, consequently, that users need to adapt themselves to the repository.

These two contradictory standpoints can be reconciled if information is not just archived thinking of future re-use but also generated bearing in mind that there might

be more users than the original ones and that they will have special needs. This idea is clearer if we come back to the agents' diagram: an archive by itself will not be enough since the OAIS model only encompasses steps 4 to 6, however, by then the users has been already defined -during the needs assessment that was done in step 1-.

Therefore, the proposal for the preservation and use of digital information has to go further than the limits of the repository and reach up to the first stages of the generation of information, even up to those when the promoter is just envisaging its generation. In short, the proposal has to be an *information management system* (which, actually, might include a repository in accordance with the OAIS model).

Information management is standardized by the ISO 15489 *Information and documentation -- Records management* (recently and together with a series of related standards, the ISO 15489 is being integrated within the family ISO 30300 *Information and documentation -- Management systems for records*). The set of stages for its design and implementation are depicted in the following chart.

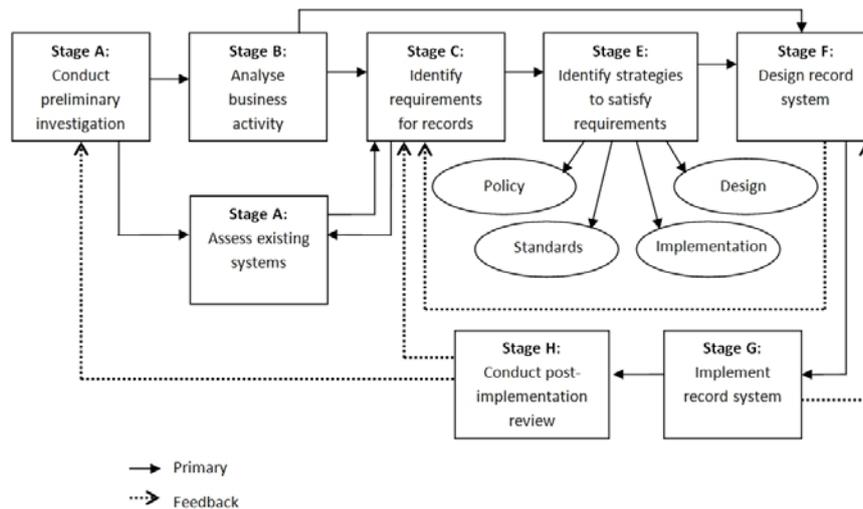


Fig. 3. Design and implementation of Record Systems [4].

The ultimate goal of an information management system is to ensure that the available information is used effectively in order to attain the organization's objectives. For this reason, before starting the design of such a system it is necessary to study the organization itself and to establish its legal status, its objectives and the means it has to achieve them.

Setting up a legal entity involves having a name and an existence established by a legal act, ordinance, registration, etc. [5]. This is a prerequisite for the development of any archival fond as well as for being able to sign the contracts which will define the intellectual rights attached to information.

The first step is that the organization's management makes a statement with its objectives. As part of this announcement, the preservation policy seeks to create a

strategic vision, defines criteria and makes them known. On the other hand, the policy should be consistent with the actual situation of the organization and with its expectations for the future [6] [7]; hence, it is necessary to analyse not only what is desired but also the limitations of both the organization itself and the environment.

The policy should be clear as well as flexible to enable it to adapt at the new arising needs and opportunities [8] [9].

The management systems should work following a set of criteria for the selection, processing and dissemination of information. It is also necessary to evaluate it so as to verify that the initial expectations are met and, additionally, it can be certified under different standards (such as ISO 16363 for repositories, ISO 27001 for security management, ISO 30301 for the management system as a whole and so on).

The arrangement of the repository will depend on the kind of contained information; it should also reflect the organization's structure (that is to say, its departments, hierarchy, etc.). Besides, this structure needs to be stable over time, objective and able to recreate the procedures by means of which information was generated; it will establish links between the documents and, thus, it will provide a fundamental context to understand information [5] [10].

Information has to be adapted to every user's level of knowledge and to the equipment they have at their disposal to process it, therefore, these users must have been previously identified [2].

Management systems favour progressive implementation, that is to say, they start in an initial form and upgrade over time following a cycle of continuous improvement (PDCA, *Plan-Do-Check-Act*). This approach provides some advantages:

1. It means a less traumatic change for the organization. Progressive implementation can convince the stakeholders gradually, as the management system grows.
2. Sufficient resources are not always available to set up the management system at once and, thus, it is often more realistic to stagger the implementation over time.
3. Finally, the changing environment must also be taken into account (new legislative acts, users' expectations, technologies and so on). Management systems need to be adapted to this continuously evolving situation, which is why their implementation can never be regarded as concluded.

As the initiatives get bigger, collaboration with other organizations takes on further prominence: funding strategies, data generation, access and maintenance are progressively more dependent on cooperation agreements. Moreover, we should keep in touch with related works in order to join forces and permit users to place each organization's data within the context of the others [11]. Management systems can be envisaged for limited or unlimited time frames; in the former case, a convenient exit strategy must be contemplated.

3 Assembling the components for the strategy

In the paragraphs above an agents' diagram was presented which shows the relationships between the *promoter*, the *provider* and the *user*. This diagram is an

operating model which describes -with six steps- how information is generated and reaches the user after having been stored in a repository. It was also seen that the repository might follow the specifications of the OAIS model.

Each one of these six steps will be composed by tasks which must be defined. In order to do so, it is possible to resort to the stages of the ISO 15489 for the implementation of an *information management system*. Nevertheless, the system will never be concluded; therefore, it is also advisable to embed the implementation in a cycle of continuous improvement (PDCA, *Plan-Do-Check-Act*).

The proposal starts rearranging the stages of the ISO 15489. A main path is selected to go through the stages (with an additional cycle between stages -C- and -D-), feedbacks are no longer considered since a cyclic chart resumes from the beginning after the last stage, as a consequence, it is not necessary to go backwards.

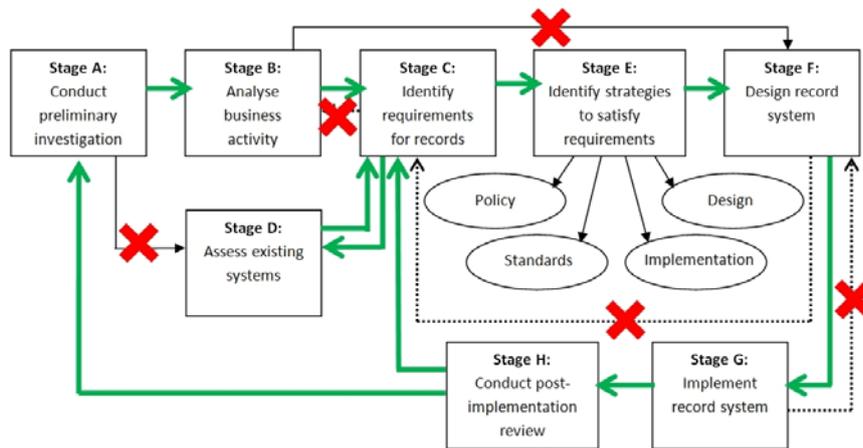


Fig. 4. Rearrangement of the ISO 15489 implementation chart in order to adapt it to a cycle of continuous improvement.

Then, each stage is allocated to its corresponding phase of the cycle PDCA. As can be seen (fig. 5), stage -H- has to be split into two, generating a new stage -I-. The operating model (agents' diagram) takes its place too.

To begin with, the planning phase (PLAN) should start understanding the organization itself. Knowing the organization's objectives is mandatory and also the appraisal of the ability to achieve them. The goal of this first analysis is ensuring that the organization is well defined and, hence, that it can work properly; for this purpose, the environment -in which the organization acts (legislation, other organizations, technologies and so on)- has to be taken into account as well.

These analyses can be carried out by means of a set of tables and checklists which allow detecting whether the organization and its objectives are coherent with the available resources and surrounding environment. Obviously, the study must be particularized to the objectives linked to the preservation and re-use of information,

hence, the topics to tackle are, for instance, profiling the users and their expectations, identifying requirements of interoperability, clarifying copyright issues, etc.

Thereafter, we need to focus on the agent's diagram in order to see which of the roles (*provider, promoter* and/or *user*) the organization performs. Once the organization's area of activity is marked off, it will be clear with which of the six steps of this diagram the management system should deal (1.- *analysis of the original needs*, 2.- *technical alternatives*, 3.- *generation of information*, 4.- *quality control*, 5.- *archive*, 6.- *delivery and use*).

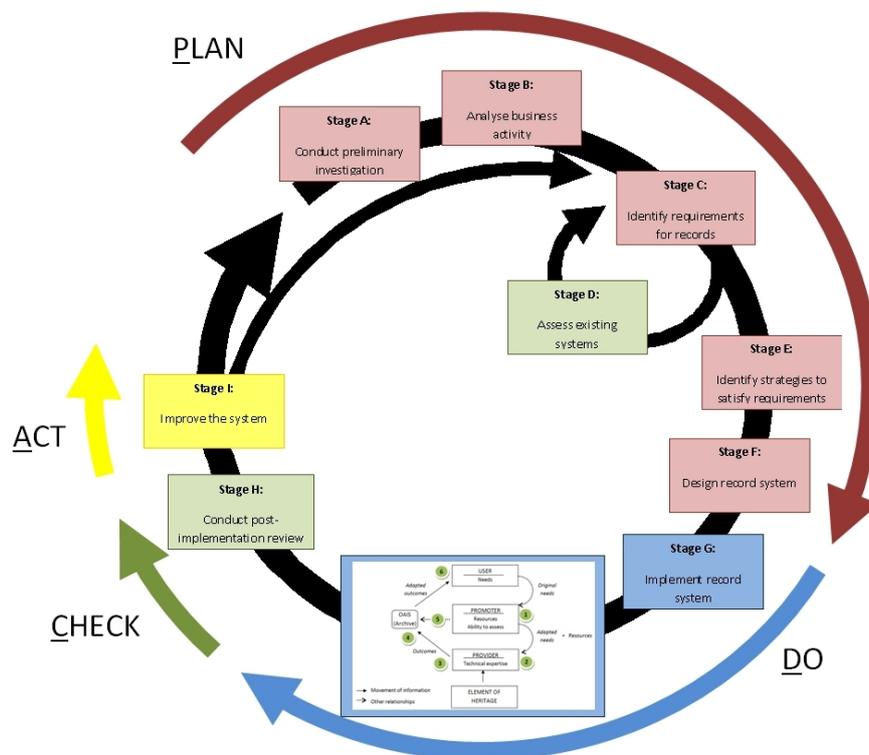


Fig. 5. Implementation of the management system (according to ISO 15489) which generates information flow among agents. Everything within a continuous improvement cycle (PDCA).

Each of the included steps will consist of a series of tasks which are, after all, what the management system has to devise -during the second phase (DO)- and tune -third and fourth phases (CHECK and ACT)-, always according to the specifications of each organization. Of course, their accomplishment requires an adaptive schedule (*implementation calendar*) and specific plans to obtain the funds and the capabilities demanded by the tasks.

The content of information packages (SIP, AIP and DIP) has to be examined in detail with the aim of ensuring that they can provide the desired functionalities to the

information, that is to say, that the packages allow managing the information inside the system, being accessed by the users and performing all the expected re-uses.

Use should be monitored and provide feedback information so as to check whether the system yields suitable results and helps to attain the organization's objectives.

The system might not work as expected due to a combination of the following reasons:

1. As the management system is built up gradually, it is possible that the malfunction is caused by the lack of some parts not yet in place. In this case, the checking will suggest the rearrangement of the implementation calendar.
2. On the other hand, in case the system works as planned but still the functioning is defective, the checking will point out the advisability of redesigning it. Although this may seem a traumatic situation, the real fact is that it is fully considered in the proposal. As can be seen in the rearrangement of the stages of ISO 15489 along a cycle of continuous improvement (fig. 5), after the stage -I- (*"improvement of the system"*) there are two ways of resuming the cycle: either skipping to stage -C- (*"identify requirements for records"*) in case only minor changes need to be added or, alternatively, restarting from stage -A- (*"conduct preliminary investigation"*). At any rate, we should bear in mind that even when the system needs to go as far back as stage -A- the majority of the work already done will remain valid. In short, the redesign of the system should be viewed as a normal situation which will arise from time to time.

Of course, this assessment will not only look for the flaws of the system, but will also locate its achievements. It is fundamental to disseminate the value of the system inside the organization -in order to boost the integration of the management system within the organization's work flow- as well as outward.

It is unrealistic to think that a management system will ever reach a perfect and stable configuration. Organizations are immersed in an ever-changing environment which is influenced by technological progress, the changes in users' expectations, commercial competition, legislation and even the shift in what society considers its heritage. As a consequence, management systems become obsolete as time goes by unless they are constantly updated.

4 Conclusions

The management system and its functionality should not be part of the organization's backstage, on the contrary, it is essential to make them known since it increases users' acceptance and it helps to enhance the organization's image externally.

Another relevant topic is that the management system should be prepared to work with some degree of indeterminacy generated by some reasons such as the fact that the system is never complete, the difficulties in measuring user satisfaction or that the monitoring cannot grasp the whole reality of the changing environment.

Looking ahead, we are firmly persuaded that the availability of information related with heritage will permit cost saving by avoiding duplication of documentation work.

Moreover, a new asset -based on information- will be at our disposal, enabling new business models, increasing the capitalization of heritage and preventing the social loss that occurs when elements of heritage disappear.

Meanwhile, organizations have much to do when it comes to meeting the recommendations and best practices, meaning that their information systems have to be adapted continuously. Nevertheless, it is essential to bear in mind that these same organizations are those which modify the environment and, hence, that the evolution will depend on the sum of their individual contributions. After all, they are the ones which generate and manage information and, consequently, the foundations of every strategy for data preservation and use.

In any case, we might resort to a few guidelines in order to keep focused regardless of the ups and downs: the social impact of heritage, the usefulness of the handled information, user satisfaction, the proper functioning of the organization... are the predominant factors which will always condition any management system.

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LABORATORIO DE DOCUMENTACIÓN GEOMÉTRICA DEL PATRIMONIO

Grupo de Investigación en Patrimonio Construido (UPV-EHU)

Aulario de las Nieves, edificio de Institutos Universitarios
C/ Nieves Cano 33, 01006 Vitoria-Gasteiz (España-Spain).
Tfno: +34 945 013222 / 013264
e-mail: ldgp@ehu.es web: <http://www.ldgp.es>



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