World Heritage in the Digital Age

An Interdisciplinary Approach

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ABSTRACT

More than ever – whenever and wherever we enter the Digital Age – the task in terms of World Heritage will remain:

commonly working on the human capacity to form communities, enhance life and continuously appeal for a natural and cultural balanced world.

Therefore World Heritage might fulfill an essential function in:

- clearly stating the sustainable principle, fostering participation among the human community on this globe

- offering, protecting, presenting and developing natural and cultural carriers of meaning

- supporting the share each human being has in keeping up a human environment on natural and cultural grounds.

Whatever marvels future "world-constructions" in combined virtual and real layers will create, we should not forget about using these techniques to develop methods and means to manage risks and to help reestablish sense and identity when needed.

Furthermore we may acknowledge the capacity of the digital means in visualizing, documenting, reconstructing, presenting and thus protecting our common heritage as 'world heritage of the people, by the people and for the people'.

Keywords:

world heritage, natural and cultural balance, human grounds, local-global community, integrity and authenticity, documentation, digitalization, communication, transformation

1. INTRODUCTION

Without relation or reference to our real human world – its integrity and authenticity - world heritage in the digital age might end in an illusionary state of mind as 'l'art pour l'art', disconnected and absent-minded.

Keeping our main principles at heart we may take a close look, enter illusionary spaces, sense our world anew by carefully perceiving and creatively shaping it. Taking a look at the manifold opportunities current media, explicitedly the internet already offer, we may acknowledge digitalization as one basic means of communication in our world. Keeping close contact with our human grounds we should nevertheless take into account the support the digital means may provide in terms of sensing and managing our environment, namely the:

- creation of extendable tools for the monitoring of complex natural and cultural processes towards counterbalancing harming or disturbing influences, e.g the simulation of multiple scenarios, past and future developments taking into account potentials, indicators and existing tendencies

- development of a set of tools for continuous documentation and visualization of heritage in context e.g. showing transformation over time via digitalization of historical maps, archaeological evidence, paintings, sculptures and timely animated landscape models based on aerial and satellite images

2. TOOL SKETCHES

In a multispectral view we will sketch a combination of creative approaches for 'world heritage in the digital age', as 'world heritage of the people, by the people and for the people'

This process will be outlined by a set tools for:

monitoring with a Spatial Information System in the Central European Space (documenting and managing transformations, GIS, satellite images, landscape modeling, transnational cooperation)

education and information, initiating the world heritage nomination process– with an example of a Gardening Network towards the complexity of a natural and cultural landscape, (collection, interpretation, identification of natural and cultural carriers of meaning in the Gardening Network Hessen-Kassel, building up information systems, developing interactive guides, offering dif-

ferent portals of information access, respecting individual preferences)

participation – with the introduction into the information system "APIS" Architectural Photogrammetric Information System which enables non-professionals to prepare a photogrammetric useable recording on one hand and provides a tool for the collection of textual and digital documents about objects of the architectural cultural heritage.

2.1 Spatial Information Systems for Monitoring Natural Heritage

Demonstrated on an example in the Central European Space (CES) - Concepts for Supporting Risk Management of Protected Regions.

Spatial information systems are of striking importance for analyzing and managing the dynamics of regional land cover and land use change. Protected regions have an important ecological value for preservation of biodiversity in environments dominated by different forms of human impact. Various national park regions have been promoted during the last decades in the Central European Space (CES). On the one hand the official status of the corresponding national parks is very different and only few of them meet the IUCN criteria. On the other hand the specific national park regions differ in terms of geographical space and have to face different forms of impact caused by different parameters of pressure on the land. A lot of varieties of criteria, e.g. specific impact patterns, organizational constraints and methods of monitoring, managing and planning, have to be documented, analyzed and harmonized.

The first step of this initiative focuses on the development and implementation of spatial information systems for selected national park regions in order to analyze the socio-ecological and socio-economic status of the regions, to investigate on specific mosaics of impact patterns on a local and regional level, to improve national park management issues and finally to build networks of both cross border and transnational cooperation.

The establishment of a representative data base both in terms of spatial as well as thematic qualities is supported by the interdisciplinary application of technologies such as remote sensing, supporting land use and land cover change detection (LUCC) as well as landscape structural analysis, airborne laser altimetry for generating highest-resolution digital terrain and vegetation cover models and topographic information systems, which allow for the calculation, maintenance, interpretation and presentation of digital terrain models (DTM), e.g. slope gradient models, slope aspect models and perspective views as well morphometric parameters [Csaplovics and Senftner 1991, Csaplovics et al. 1994, Csaplovics et al. 1996, Csaplovics and Wagenknecht 2000].

The topo-chronological analysis of maps and plans for highlighting map-relevant aspects of landscape transition in a retrospective time scale beginning with the 18th century (regional maps) provides knowledge about the historical dimensions of land cover change[Csaplovics 1995, Csaplovics and Herbig 2001].

(Digital) cadastral maps support the large-scale level of investigations by allowing the synthesis of parameters of land use and protection status with information on ownership. Advanced methods of terrain analysis like vegetation mapping, socio-economic and socio-ecological inventories have to establish a network of reference information.

GISs are used for the integration of the whole bunch of heterogeneous hybrid data (remote sensing, maps, statistics, DTMs, sampling), for the homogenization and maintenance, the analysis (multi-thematic analysis, e.g. for determining landscape structural parameters) and the presentation of data, as well as for multimedia data handling (virtual walks, integration of maps, videos and text).

Applying informatics helps to establish internet links between the national park information systems, to provide data transfer and exchange as well as networking, and to build facilities for storage of data and data products (e.g. CD-ROM)

In the frame of an EC-INTERREG project, two specific regions have been selected for establishing a set of case studies. These regions are characterized by landscape units representative for the Central European Space. The cross border National Park Region Saechsisch-Boehmische Schweiz (Czech Republic, Germany) covers a region of about 750km². Vegetation cover of the two National Parks (97km² + 93km²) is dominated by woody layers (93%) over hilltops and hillsides of basalt and granite and by the steep sandstone cliffs and gorges of the Cretaceous period.

The National Park Neusiedler See - Seewinkel extends over an area of 69km² of the shallow steppe-lake Neusiedler See, its reed belt and areas east of the lake characterized by grasslands (puszta) and small shallow lakes with typical halophytic flora and fauna over quaternary sediments . The National Park Region is identical with a large landscape-protected area covering the whole region of the Neusiedler See-Seewinkel. The Hungarian National Park Fertö Tó - Hanság covers 125km² of the Hungarian part of the lake, the reed belt and the former lowland moor of the Hanság.

By selecting these two regions we intend to collect a maximum of heterogeneous spatial data representative for national park regions within the Central European Space (CES), a subspace of CAD-SES. This gives us the opportunity to utilize the heterogeneity of the spatial data base to develop a highly efficient method of building and networking national park GISs in the CES.

Spatial planning in and around protected regions needs spatial information systems capable to handle large data bases both geometrically and thematically. Issues for managing interaction between primary and secondary zones as well as surrounding areas of protected or non-protected landscapes have to be supported by GISs.

Multi-scale approaches to regionalization in landscape ecology have to take into account micro-scale, meso-scale and macro-scale investigations. Like biotope networks in agricultural landscapes and networks of more or less protected areas at a regional scale the importance of transnational networks of national parks is increasingly recognized by national authorities [Csaplovics 1998].

Though EU agriculture policies partly are orientated towards a new perspective of intensive/extensive land use strategies, the diversity of landscapes is still diminished by measures of land transformation which are driven by efforts to maximize productivity.

Especially the non-member CES-countries have to face these impacts and have thus to be supported in protecting already categorized regions or selecting regions which should be protected as

soon as possible. Short-term acting and re-acting needs a high value of information support.

Actually national park administrations are building concepts for GIS-based spatial management in very different ways, with different motivations and with different progress. Monolithic approaches are common and thus only related to specific national parks. Bilateral concepts in the sense of connecting attempts to harmonize and standardize GISs on a cross border level are rare. The Czech-German and Hungarian-Austrian cross border links are thus of great importance and can serve as key initiatives for transnational cooperation in the CES. The chance to compare and harmonize two GIS concepts in a second degree level of transnational cooperation is created by the N-S-transversal German-Czech - Austrian-Hungarian link. (see Figure 1)
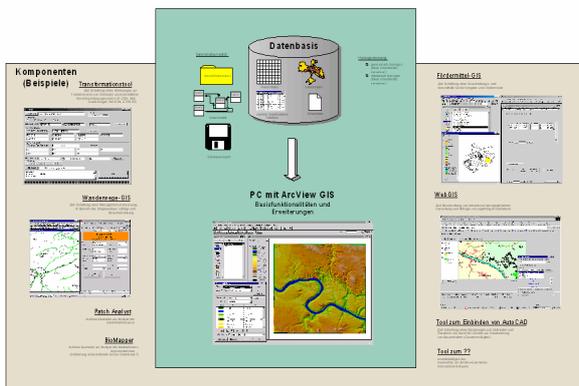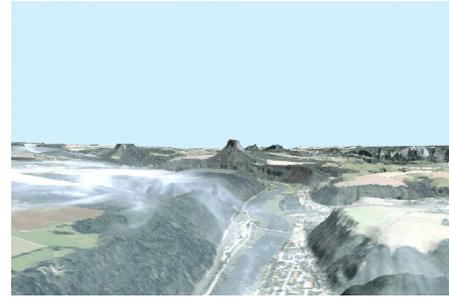

Figure : National Park Information System NPIS, structural model

We thus focus on the completion of inventories of national parks and national park regions based on the different status of the two selected National Park GISs. By choosing the National Park Region Saechsisch-Boehmische Schweiz and the National Park Region Neusiedler See – Fertö To we meet several requirements of implementing GIS into spatial development strategies in and around protected regions via transnational cooperation in the Central European Space. On the one hand both parks are connected with similar protected regions in the non-member CES-countries Czech Republic and Hungary, on the other the two cross border regions cover an enormous variety of landscape units. Fortunately we can therefore handle a large heterogeneous spatial data base when building and harmonizing GIS-based spatial development strategies for regional planning in and around national parks in Central Europe As shown in Figure 2 with in virtual landscape of the Elbe river valley north of Bad Schandau (Germany) resulted of the fusion of airborne laser scanner data and IKONOS true color satellite imagery.

2. virtual Elbe river valley

National and transnational cross border research on national park information systems is highly correlated to the tasks of the INTERREG program. Interaction between activities at local and regional levels and the two fold transnational concept will highly increase the efficiency of building and linking spatial information systems.

Socio-economic and socio-ecological conditions are still different in member and non-member countries of CES. Protection of the environment in general and of national parks in particular is a common task with strong transnational components. The transnational cooperation opens a new dimension for operationalization of cross border spatial information systems of national parks. Existing transnational networks can thus be strengthened and established in terms of sustainable profit for both member and non-member partners. Category-1-classified border regions of member countries are additionally supported to protect and manage their regions of natural beauty and to increase the ecological but also economic (touristic) value of the regions when connecting cross border national parks by homogenizing management and planning strategies.

Innovation is achieved by linking cross border national park management and planning issues by means of standardized spatial information systems. Recent communication technologies allow high-level data exchange of vector- and/or raster based map and image data. Especially actual developments in facilitating GIS-data exchange, explicitly known under the terms OpenGIS and Interoperability, will be integrated. This gives way to a new quality of transnational on-line information support, which meets the requirements both driven by ecological aspects as well as by guidelines of regional and transnational planning. On the one hand scientific and management demands can be supported efficiently, on the other hand data can be treated for presentation and thus for raising of people's awareness by supporting multi-media tools for thematic and topographic 4D-visualization of national park landscapes. People, who are more or less concerned, can thus be motivated to familiarize with problems, constraints and ecological and economic advantages of living in and around national parks and national park regions respectively. People on both sides of the borderlines can be motivated to meet, discuss and get used to re-define the regional identity, which has been spilled by the political transitions in the CES during the 20th century

As a result spatial information systems, which are - in the presented case - particularly developed for national park issues, can also serve as key systems for building transnational environmental information systems in the CES, later in the CADSES and the European Space. The two fold approach additionally serves as a

guideline for not only managing connected transnational regions but also for linking the mosaic of CES-National Parks. The status quo of and the needs for the development of protection strategies can for the first time be evaluated in an objective sense both in terms of multi-thematic as well as spatial topographic (geometric) accuracies. Policies of west-east transnational spatial development strategies can thus be supported in a long-term sense.

It is evident, that spatial planning in local, regional and continental scales has to integrate environmental protection of spatially and thematically well-defined regions. In addition the quality (IUCN-criteria) and quantity (number) of protected areas is evidently not satisfying the minimum multi-scale standard of ecological demands. Thus homogenized networks of spatial information systems covering national park regions as well as regions of other protected areas will be of highest value for codifying protection of additional areas on an European level of decision finding.

Following the criteria of the IUCN, national park administrations are obliged to provide local and regional multilevel management plans. The projects will provide standardized levels of management plans for the specific national parks and national park regions, for their cross border relatives and will thus establish a new perspective of adjusting and homogenizing management of CES-National Park Regions in perfect correspondence with the transnational guidelines of the INTERREG program.

Spatial information systems of national park regions (NPIS) and their networks are furthermore based on a transsectoral approach both in terms of the collection, integration, maintenance and analysis of multi thematic data as well as in terms of supporting multipurpose planning for a well-balanced and sustainable ecological and economic spatial development of transnational cross border regions of outstanding natural and cultural value [Csaplovics and Walz 2001].

2.2. World Heritage as Living Memory

Considering World heritage as 'living memory' may encourage us to become our own storytellers of past present and future.
In this creative and constructive process we are inextricably linked to our way of perception as process in time and space. We establish a 'murmuring dialogue' with those different voices, faces, atmospheres, of our ancestors.

Former (human) world (re-)constructions such as history, reflect message, spirit and a multitude of constituent factors. Sensing traces and bits of these construction 'events' in former times (e.g. in documents, remaining buildings, plants or stories) we evaluate some of these traces as authentic pieces, as material or immaterial evidence. From these we start our interpretations, aiming at reconstructing the original context. Thus we construct a continuous story, recreate an unknown integrity.

A general human principle in establishing life and orientation and meaning in our human limited time span is develops along the questions: 'who are we?', 'where do we come from?', 'where are we right now?' 'and 'where are we going?'

In world heritage as 'living memory' we may keep up a vivid potential of natural and cultural singles, ensembles and sites, in order to develop future perspectives and strategies in terms of a universal dialogue along similar principles

By realizing our active share within our 'living memory' as a laboratory of world perception and world construction we may use this creative capacity and become aware of our individual and common human potential.

Thus we would establish world heritage as a connection between our own sphere and other spheres, as natural and cultural dialogue toward a living heritage.
The world heritage list would thus become our own vital archive: complex, labyrinthine an organism or an interwoven fabric through which we establish sense, world and identity.

2.2.1. GARDENING NETWORKS

In a garden, body and mind can be involved in a natural cultural dialogue, in re- or de-constructing reality, e.g. by realizing the structural elements that form the integral composition, while we walk along.
This dialogue may be understood as a simple model within a person as well as in the environment, comparing inner and outer patterns as pre-perceptions and in conscious analysis, referring to different realities but actively enlarging the conscious perception of this environment, weaving it to a 'complex colorful carpet' and integrating it as a part of one's own personality.
Combining gardens and the action of gardening of our own and common grounds to Gardening-Networks would mean to activate existing lifecycles and build up our 'living memory' in a natural and cultural dialogue. By this cognitive and conscious actions we would attach meaning and significance to our natural and cultural environment (considering human beings as part of it), thus experiencing our own integrity and authenticity in the mirror of these small worlds.
Gardening Networks contribute towards understanding a natural and cultural landscape as a whole. In this identity forming process a certain congruence between one's own perception and one's environment is established. Reference is made to the main constituent structural elements of the 'woven fabric' (knots as identificatory nuclei, connecting threads establishing relations, in-between areas as spaces of opportunities). Thus we define places of meaning, individual and common symbolic natural and cultural places. These knots or nodes form the core areas ('gardens'), the links or relations between them will be the main relational threads and will be combined with the in-between areas to an environmental network.

2.2.2. GARDEN NETWORKING

The draft for a brochure or computer animation named 'Gardening-Network Hessen-Kassel', offers a tool with different functions in favor of garden-networking at a larger scale.
It attempts to create a kind of blurred image or transformative picture of what a future world heritage site might be and furthermore to initiate a comprehensive collecting, documenting, evaluation effort, encouraging active participation of the people.
Thus a mix of information is offered: illustrations and associations; a proposal of a set of nomination criteria; places are named and highlighted; objects, events and personalities are cited.
Treasure boxes of meaningful objects should be opened up, (re)inserted into the lifecycle (from cultural treasure to natural source).
We as the people who look at this collection of text boxes, maps and pictures, as bricks or 'bricolage' sets, should be encouraged to learn more, add, comment, in other words, to create our own ideas of the 'Gardening-Network Hessen-Kassel', and thus get involved

in the process of 'future world heritage creation' by taking part and becoming part of it.

The rich diversity of an ongoing natural and cultural dialogue in this region will be revealed, bearing evidence of changing actors in the garden network, past and present gardening activities. Thus In sharing individual and common experience, carriers of meaning can be defined and newly combined.

2.2.3. VIRTUAL GARDENS

Walking through this fragmentary virtual landscape garden, the spectator's attention and perceptive response may create a changeable mosaic, as if 'diving' into a picture of high resolution, or comparable to a game where the rectangular parts may be moved, creating a comprehensive image. Areas of change and flexible extensions would be part of the framework of the 'Gardening-Network Hessen-Kassel.

The basic framework and possible guiding structure is proposed in a creative dialogue principle along the questions:

-        'Where do we come from?'

Garden Grounds and Garden Stories, taking care of the organically evolved (the deep ground layer of the Gardening-Network Hessen-Kassel),of special phases of interactive natural and cultural creation (gardens, architectural and natural expression, events, stories);

'-   Where are we right now?

Garden Creation, taking care of the creative gardening forces (art and nature, biodiversity) or those nature-culture crystallisations which may be re-created, revitalised (from museums) and

-        Where do we go to?

Garden Networking, Future Gardens, own experience and visions helping to define parts and bits and offer a strategy for inclusion of future sites, (re)-considering the changes, leaving open spaces for future developments - a network in the true sense of the word.

A computer animation would be structured along the same lines, but offering the spectator a choice to enter the Gardening-Network Hessen-Kassel through different portals:

A short introductory text and a regional activity map related to ongoing events would invite the spectator to step in.

Translucent headlines in different colours would run across the introductory page from time to time, e.g.:

Garden Grounds (blue),

Garden Stories (green),

Garden Creation (red)

Future Gardens (orange)

Garden Networking (yellow)

The visitor of the virtual Garden-Network Hessen-Kassel would make a personal choice, to 'dive' into one of these dynamic 'pools': As the choice is made, a first overview will open up like the design of a double page in the brochure:

On the left hand in a slow changing mode e.g. different stages of development in landscape garden transformations will be visualized, to be explored in more depth when clicked.

On the right hand a flickering impression of different pictures and texts will offer a broad variety of significant natural and cultural 'dialogues', related interactions, to be looked at more closely, one by one when clicking on them.

At the bottom of this page, associative pictures will be 'running along' virtually connecting the different pools (chapters), which

slow down when approached, providing information on these fields.

Touching the outer framework areas of these pools, different keywords, related to the nomination procedure, natural and cultural landscape criteria, laws, definitions and initiatives will show up, offering to open up a reference frame for individual questions and keyword related search. (see Figure3)
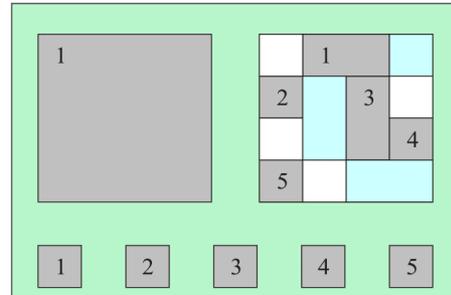

Figure 3:Gardening Network Interface

'Garden Grounds' will provide aspects of how the physical basis has evolved, the deep natural and cultural landscape formed in millions of years.

'Garden Stories' will refer to the different stages of significant places of natural and cultural interaction with major activities within a descriptive timeframe.

'Garden Creation' will demonstrate creative energies at work, ongoing processes, the continuing natural and cultural landscapes up to our times.

'Future Gardens' are the places of contemporary gardening: with a 'free collection pool' connected to the 'garden networking' pool as an experimental and documentary space.

Inhabitants and visitors are invited to take part, to tell their own stories offering opportunities for illustration in 'Common Perspectives' or in 'Life in the Garden Network'.

The 'documenta 11', an important contemporary garden itself, might offer an interesting platform to activate this discussion of world heritage, as an experimental field to make design proposals for a world heritage on a principle of dialogue .

2.2.4   DIALOGUES

However, the virtual, partly computer-animated layers of the information system including garden stories, individuals, paintings, films, music, language, experimental media art, etc., should not lose contact with 'real time and space'. It would be a challenge to link both networks in the future, a virtual one accessible on a global level, and a 'real' one of local places. Possibly, interactive screens in various public areas could serve as transmitters of information, help to build associations and enrich the activities taking place in museums, cafes, public places, gardens etc. These might be complemented by 'self-updating' cosmopolitan visitor guides, in a combination of walkman, notebook, mobile phones linked to the local system and feeding any possible input from outside into the current information system. They would be linked to an accurate geographical location system indicating current position and offering points of interest in the direct environment. These tour guides could chat along as informative companions, relate to interesting areas, sites and single entities and display visual explanations. According to personal preferences they could be e.g. programmed more in the entertaining, story-telling mode or the short, basic information mode. These systems would be

able to relate to specific questions and recommend real dialogue partners in the habitat. They would provide information on exhibitions, events, theatres, cinemas, hotels, restaurants etc.

2.2.5 MULTIPLES

These combined networks could help to open up some local treasure boxes and turn them into valuable sources of information and personal association.

They should establish links between stories and events by relating to stories, events, fairy tales, museum objects, to natural and cultural places, making these dialogues and interactions intelligible to the visitor, referring to art and science, possibly creating a new kind of 'multiple' to re-establish intuition in Beuys' sense, which by 'pointing in the same direction' could be creative individual and collective places of subjective and objective description balance.

In this process we refer to André Malraux 'musée imaginaire' as an individual collection of images, interacting on different levels of reality and virtual reality. In this tradition and with Beuys 'social sculpture' and his extended concept of art in mind we may consider ourselves as curators of our own worldwide exhibition. An experimental collection and a favorite set of creative expressions of humankind throughout time and space will form a new kind of atmospheric museum with complex reference points. This then becomes a basis for creating our own identity, following Ibn Khalduns wisely stated human community-building force, with a better understanding of the space we live in, as our environment, interlinking local-global spheres.

2.3. APIS – Architectural Photogrammetric Information System

The idea behind APIS is to mobilize the manpower of people interested in cultural heritage and willing to participate in the work to keep the visible remains of the past. The integration of the public in the agendas concerning the cultural heritage is based on two columns. First it is important to raise the awareness for the meaning of tradition and its remains. The second consists of tools which can be used for everyone so that they can provide useful material and information about objects. In that way a bridge can be built between experts and public for a joint effort to keep the remainings of the past alive, in real, in virtual reality and in the mind of people.

APIS has been developed to provide a tool which enables everyone interested to make a useful photographic recording of an object which can be used for photogrammetric processing. The system is based on an internet platform to make the guidelines available all over the world. Within an internet database the information about the records can be collected and managed and it provides also the possibility to collect further information.

This part of the paper will explain basic parts of the system, its use and future perspectives.

2.1.1 Photogrammetry

Within the conservation field the use of photographs in the beginning was focused on the image as a tool for the representation of the real world, as means for representing analogously the documented real world, and as vehicles of information. But the demand for measurable information in pictures stated with the development of the technique of Photogrammetry in the middle of the 19th century. Nowadays modern computer technologies enable

the use of photographs in manifold ways. To provide classical two dimensional pictures of objects leading to the animated presentation of real sites in a virtual model. [Lagerqvist 1996] Digital photography and laser scanning change the methods of measurement and processing of Photogrammetry, although the algorithms behind it are still based on the same ideas from the beginning.

Besides all these attempts to develop very accurate and fast recording and processing tools and the fantastic and eye-catching results, we have to consider that still only a very small percentage of the worlds cultural heritage is documented in a way that enables a real or virtual renovation or reconstruction. Keeping in mind that the number of objects which are damaged or destroyed without having even the chance to provide something to keep it alive is growing every year. [Hadjiev 1989]

One reason is that the photogrammetric recording is mainly done by experts using expert systems, which are often very costly and thus very limited. There is a demand to open this technique for the wide public interested to participate in the preservation and conservation work.

The definition of the "3 x 3 Minimum Rules for Architectural-Photogrammetry" [Brunner 1988] allows anyone interested in the preservation of cultural heritage to do his part for the recording of architecture. International tests have proven the photogrammetric usability of photographs taken even by non-metric small-format cameras by considering these guidelines. [Waldhäusl and Brunner 1988, Waldhäusl and Ogleby 1994, Almagro et al 1996]

In that way the base for upcoming tasks to create a fundamental collection of metric recordings about objects of the architectural cultural heritage with the help of everyone interested in the preserving of cultural heritage was laid.

2.1.2 3 x 3 Minimum Rules for Architectural Photogrammetry

As modern computer technology enables the photogrammetric processing of non-metric small-format photographs the results of international test showed their usability if enough (minimum)control, proper pre - calibration or careful self - calibration are considered.

To ensure these suppositions concerning the taking of the photograph a guideline has to be defined which enables even a photogrammetric lay-person to create a photogrammetric usable recording.

The rules have been written down in 3 chapters with 3 subchapters each, therefore called "3 x 3 Minimum Rules for Architectural Photogrammetry".

- **3 geometrical rules**

Describing how to prepare control information on the object and how to plan the taking of the pictures for single and stereo coverage of the object.

- **3 photographical rules**

Explain how to chose the most suitable camera, how to handle the camera and when to take the pictures.

- **3 organizational rules**

Describe how to prepare proper and useful sketches, which additional information has to be prepared for the photogrammetric operator and finally how to archive the material.

The rules as they have been defined in the beginning were simple in terms of people working with photogrammetry or related disciplines. In cooperation with different groups of people who are interested to work in the field of architecture, photography, anthropology or history in their spare time the rules have been practically applied on very different objects under various circumstances. Same with high school students. These case studies have been used to redefine the rules in cooperation with those people who will use them in future, so that everyone can understand them and apply them on objects which are of special importance for himself, the community or the region he is living in. [Herbig 1997]

With the "3 x 3 Minimum Rules for Architectural Photogrammetry" as a guideline for the preparation of a useful recording the base for the development of a system to build up a comprehensive collection of recordings of objects of the cultural heritage was laid.

2.1.3 Information - System and data base

2.1.3.1 Main tasks

The aim for the information system was to provide a platform which can be used to spread the information about how to create a useful recording and to collect and administer the on falling material and data. Further more it has to try to bridge the gap between those people who are in charge to preserve and maintain the goods of cultural heritage – e.g. scientists, architects, restaurateurs,… –, those who are planning for the future – e.g. urban planners, politicians, … – and those who live with or within parts of the cultural heritage – the public. This bridge is needed to raise the awareness for the importance and the meaning of the cultural heritage, to show politicians and planners how far people are interested in their built environment and finally to support those who are work on sites and objects. [Herbig1999]

With this suppositions APIS has been developed in form of an internet platform which provides information about how to create useful recordings of objects, the possibility to collect, manage and access material and information in form of records about photogrammetric usable photographic recordings or the textual collection of information about the building process or social history of an object. Finally APIS provides a forum where the public interested in the field can meet experts and planners to work together on the future of the cultural heritage.

2.1.3.2 Content of APIS

APIS provides a service for those who want to make a useful documentation.

People interested can

- o copy the instruction for a proper documentation,
- o ask for help,
- o join the discussion about the conservation work,
- o find photogrammetrists who can handle their pictures,
- o read more about photogrammetry and conservation of cultural heritage,
- o find links to related internet-sites,
- o see examples of already used photogrammetric documentations,

- o provide others with the information collected by data input into the database. The latter is nothing but a systematic filling in of data sheets.

But APIS also provides facts for people who need material about objects.

They can

- o search the database for a special object,
- o get historical and other background information,
- o find people who archive recording material,
- o find the archive which administers the needed photogrammetric documentation and
- o people who can handle them.

The most important part of the information-system is the database which administers the information about the objects, documentations, plans, the archives and the photogrammetric institutes and offices [Herbig1999 , Herbig2001]. (see Figure 4)
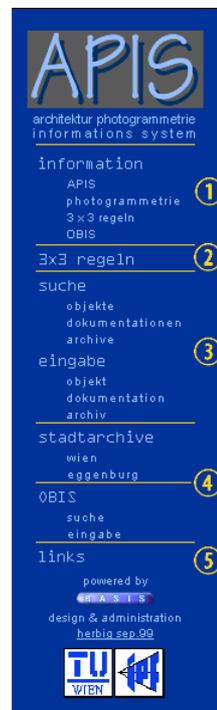
1) Information pages about the features provided in the system

2) 3 x 3 Minimum Rules for Architectural Photogrammetry in detail

3) access pages to the data base for single object documentation;

first part: for the search for objects, Records or archives,

second part for the input of objects, records or archives

4) access pages to the database for ensemble documentation;

first part: access pages for a community-administrator for the management of data belonging to a special community, in this case Vienna

second part: open access for search or input of records concerning ensembles

5) Links to discussion forums, to homepages of experts and universities and to pages showing examples of already used recordings

Figure 4: APIS Navigator

2.1.3.3 Content of the database

The database is administered by "Basis" a software product by Open Text Corporation, Waterloo, Ontario, Canada specially designed and used for text and digital document management. It is used also by the „Canadian Heritage Administration". Most of the information provided by APIS is in form of text or digital documents. Due to the still very slow data transfer possibilities it is not practicable yet to save the scanned or digital pictures of all photogrammetric documentations themselves. But with the increasing power of internet-connections this might be changed. Nonetheless it is possible to insert other digital information about an object into the database like video or music documents.

Within the database the information of single objects and ensembles are managed. Major data sets contain records of object – object list –, records of photogrammetric usable recordings – protocol list –, records about archives – archives list – and records about available plans – plan list. [Herbig et al 1999]

The **Object list** address or geo-reference are collected, the names of persons to contact if necessary, and all historically relevant information like the year of construction, the style, involved artists and any stories which concern the object and it's surroundings. This information can be enlarged by either available digital documents or links to other internet sites which are of interest in relation to the object. It also provides links to other databases which could contain relevant information. Finally the object list contains information on the number of documents, photographs, plans already available, and each document leads to the protocol lists which contain detailed data about available photographic recordings.

The **protocol list** contains information on the photogrammetric usable documentation. Each documentation is described by the date of the shooting, the information about the camera and the films used, the description of the place where from the photo has been taken and, most important, the name of the archives where the pictures and sketches are being kept.

Detailed information on the actual photo-archives are collected in the **archives list.** It contains the address of the archives and who has to be contacted and which conditions have to be fulfilled to get copies or pictures. Special features, like periodically automatic checks of the addresses will ensure the actuality of the contact data.

Similarly the **plan list** contains details about existing plans, maps, etc. and the name of the respective archives where plans are available. The plan list also shows the relevant addresses and the conditions under which the plans or copies thereof can be received.

2.1.3.4 Administration of APIS
It is not intended to establish a central archive for photogrammetric documentation. So the main task of APIS is to co-ordinate many local archives which are situated in schools, in communities or other places where societies or people are interested to participate in this preservation project.

Everyone who does a documentation should feed the system with the information about it. This can be done via internet from all over the world. It can be done in school projects, during a journey of special groups or simply by someone interested in keeping an object alive, even if it will be just digitally in a virtual model one day.

All incoming material will be first checked automatically by the data management system. Results of this check have to be revised by a system administrator who is also responsible for the update of the homepage and all information APIS provides beside the database.

A special archive – e.g. of a community or a scientific group – can have it's own authority. The archive administrator gets a key word which enables him to maintain the part of the data which concerns his archive. (see Figure 5)
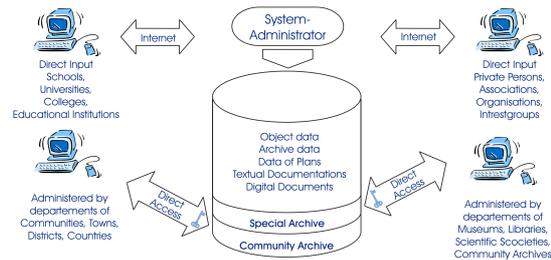

Figure 5: Administration of APIS-database

2.1.4 Future Perspectives of APIS
The development of APIS reached the stadium of a stable and usable pilot system which can be adopted to particular needs of a community, society or company who wants to run it in future. Presently various projects in collaboration with the city of Vienna – such as an enlargement of the municipal GIS – and a regional management project with the Austrian state of Burgenland are in a planning stadium. Both programs would start with projects in schools. The idea is to reach the youth, which can easily handle internet tools and provide photographic recordings and bring them together with the elder generation who often have a deep knowledge about the history of the cultural heritage. In that way the awareness of the importance will be raised and it is possible to build up useful and exiting generation spanning projects for the preservation and conservation of the cultural heritage for future generations.

3. CONCLUSION
The previous examples offer a variety of approaches towards development of a 4D tool for the protection, presentation and documentation of world heritage.

It will be a challenge to combine these tools to a multiscale monitoring instrument. By further applications and research in various local-global contexts this instrument can be interactively refined and shaped according to the needs of the 'craftsmen', the inhabitants of a specific environment. It will support the collection and administration of records, documentation and distribution of information, education and accessibility of data.

Interdisciplinary transnational teams could accompany this process, offering a suitable, adaptable set of tools. These activities may in the long run lead to a development of best practices, basic documentation guidelines integrating a wide range of documentation and communication skills (also non digital).

World heritage in the digital age will still rely on a principle of natural and cultural dialogue, addressing us as human beings and activating our living memory. The active participation of all members of the local-global communities is of vital importance to keep it up. Tell stories and sense them, creatively use of techniques available, transfer our message to future generations, will bring us one step closer to 'world heritage of the people, by the people and for the people'.

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