

# Virtual Reality ... ... A New Tool for Sustainable Tourism and Cultural Heritage Sites Management

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**Key Words:** World Heritage sites, Virtual Reality, Virtual Tourism, Visualisation, Interpretation, Presentation, Endangered Sites, Extended Carrying Capacity, 3D Modelling, 3D Laser Scanning

## Abstract

This paper briefly describes one of the 'Virtual Tourism' concepts that is being proposed by the Heritage VR Group to UNESCO, ICOMOS, ICOM and Tourism Organisations. It focuses on Luang Prabang a world heritage site located in Lao People's Democratic Republic but could apply to any heritage site where sustainable tourism practices are being applied.

The presentation also introduces new concepts of 'high resolution' virtual reality that are being developed and considered by heritage conservation and tourism experts internationally. It provides an understanding of the main recording technologies currently being applied for the creation of virtual environments. Finally it refers to technical transfer of Virtual Tourism technologies to countries and/or local communities interested in developing Virtual and Sustainable Tourism solutions.

## 1. International Concerns

Statistics indicate that tourism will be increasing considerably over the next decade. Conservationists responsible for the management and protection of heritage sites are concerned by the increasing number of visitors at heritage sites. They fear that this may have a negative impact on cultural resources. On the other hand, tourist bureaus would like to make use of heritage sites to attract and increase visitation. Tourism and conservation specialists are seeking means to satisfy these concerns.

## 2. Virtual Tourism (VT)

Five years ago some of us became familiar with the term 'virtual reality' by reading in computer magazines that soon one will be able to visit cultural heritage sites using a computer. Two years ago, the Internet demonstrated that it was possible for anyone with a personal computer to access images of heritage sites that have been displayed on the Internet. Today, some of these websites display three dimensional (3D) models of objects, buildings and sites so that one can visualise these models from any angle by rotating them on the computer screen. This visualisation is improving and will soon allow the 'virtual visit' of a site, of heritage buildings and of objects surrounding them. This improvement has introduced the term 'virtual tourism' thus providing new tools for heritage site interpretation and presentation, and for sustainable tourism.

## 3. Content for creating virtual sites

To create a virtual site, one must accurately record in three dimensions the entire site. Over the past twenty years, special recording tools have been developed for conservation studies and preservation activities. These tools range from photography to architectural stereo-photogrammetry, and more recently to digital tools such as computer 3D modelling and high resolution 3D laser scanners. The integration of these technologies can now result into solutions that address some of the above concerns.

## 4. Luang Prabang - A Potential Virtual Tourism (VT) Project

### 4.1 Purpose

This potential project would allow to test and evaluate the uses of Virtual Tourism as a means to give tourists access to remote, inaccessible, fragile or closed cultural and natural heritage sites, thus protecting these sites but giving visitors access to them.

This project would also allow to explore the uses of Virtual Reality to improve the presentation and interpretation of cultural sites and to extend the carrying capacity of heavily visited sites.

## 4.2 Luang Prabang

Luang Prabang was inscribed to the UNESCO's 'World Heritage list' in 1995 based on the World Heritage Centre's selection criteria ii, iv and v. This city reflects the exceptional fusion of traditional architecture and urban structures built by 19th and 20th century European colonial rulers. Its unique township is remarkably well preserved, illustrating a key stage in the blending of these two distinct cultural traditions.

Although visitation at this World Heritage Site is currently fairly low, it is increasing significantly every year, and in fact has doubled since 1997's survey. Luang Prabang could be considered as somewhat untouched in that only minor changes have occurred to its 'original fabric' over the past years. This VT project should, in some way, verify how well Virtual Reality technologies could be used to give virtual access to endangered heritage sites and regulate visitation to an acceptable level, and still satisfy tourists and tourism needs.

## 4.3 Proposal Outline

The proposed VT project would focus on six 'Virtual Modules'. Five of these represent key features within the city of Luang Prabang, and one remote Module, consisting of caves which are located at 2 hours by motor boat from Luang Prabang. Obviously, other modules could eventually be added to this list as required by visitors, site managers, heritage conservationists, the Department of Tourism, planners, and others.

By integrating these six proposed Modules into a site visit scenario that would be presented on a large screen in a 3D high resolution Virtual Reality Room, visitors would be introduced to the beauties, the values but also the vulnerability of Luang Prabang (...one must imagine here 25 people sitting in a closed air-conditioned VR room wearing stereo-glasses and being immersed into a 3D model of the site ...). This Virtual Reality Room could also be used to sensitise visitors to the culture and traditions of this region of the world, thus hopefully reducing the impact that tourism is currently having on the people living in Luang Prabang.

Additionally, this VT project would provide tourists with 'virtual access' to Pak Ou Caves, a remote site that is not easily accessible, not well protected and consequently endangered by a growing number of visitors (ref. Benita Johnson, conservation team, AusAID). Visitors with health problems or pressed by time could enjoy this 'virtual trip' as an alternative way of seeing the caves with their many Buddhas, and this, without leaving Luang Prabang. In fact, this Module could become the main focus of this Virtual Tourism project as it addresses one of the prime purposes of this VT experience.

In summary, the six proposed Modules for Luang Prabang

would be:

**Module 1** - the Royal Palace which is currently used as a Museum;

**Module 2** - the Vat That Chom Si (located at the top of a hill);

**Module 3** - the 'main street' section between the Royal Palace and Vat Xieng Thong;

**Module 4** - the Vat Xieng Thong itself;

**Module 5** - the historic hospital that is in the process of being renovated;

... and then a 'virtual trip' to ...

**Module 6** - the Pak Ou Caves.

\*\*\* (each of the above Modules are briefly described in appendix A to illustrate in more detail the various applications of Virtual Tourism) \*\*\*

Consequently, Luang Prabang could become a test site where various levels of 'virtual tourism' would be explored. The six Modules proposed above, each representing a different application of Virtual Tourism (see appendix A), would allow to experiment with three state-of-the-art Virtual Reality technologies introduced above (namely: stereo-photogrammetry, 3D laser scanners and interactive 3D navigating software).

## 5. Empowering local Organisations and/or Groups by Technology Transfer and Training

In 1998, the Heritage VR Group (... specialised in applying these integrated technologies) was invited by the Asian Institute of Technology (AIT) to deliver a series of brief seminars on the subjects of 'virtual reality' and 'sustainable tourism'. The first seminars were delivered in early 1999 and were well received by participants. The growing interest in this new field resulted in the planning for additional Virtual Reality transfer and training in Asia in the near future.

Much emphasis will be put on the technical transfer of VT technology developed by the National Research Council of Canada. This technology is currently being re-designed for museums, archaeological and architectural conservation applications. The 3D scanning equipment will be made lighter and easily portable to any remote location.

The intention is to share this technology with organisations and/or private firms interested in high resolution 3D heritage documentation and in 'virtual tourism' applications. When combined with stereo-photogrammetry and interactive navigating software, the 3D scanning technology will open a new world pertaining to the interpretation and the visiting of heritage sites and museums.

These new Virtual Tourism tools will most likely be used to give tourists an alternative way to visit remote, inaccessible, fragile or closed cultural heritage sites. These tools will also be used to enhance the presentation and to extend the carrying capacity of heavily visited sites.

For more information on these technologies, their applications to VT and related technical transfer, you are invited to write to: Letellier.R@IBM.Net

## **Appendix A**

### **Context for each of the above proposed Modules**

Each of the 6 Modules listed above are briefly described hereafter to somewhat illustrate specific applications of Virtual Tourism.

#### **Module 1 - Royal Palace Museum ... a Museum without walls**

The Royal Palace Museum module would allow people that cannot afford to travel to Laos, to visit and understand its architecture. It would also allow to demonstrate the concept of the Canadian experience with the AMUSE Virtual Museum project undertaken last year at the Canadian Museum of Civilisations. Consequently, the Royal Palace Museum could become a 'Museum without walls' in that its treasures would be scanned at high resolution (to produce 3D images) and made available on the Internet, or distributed on CD, or presented in a Virtual Reality display in Luang Prabang or anywhere in the world.

#### **Module 2 - Vat That Chom Si ... a site that is inaccessible to impaired visitors**

Vat That Chom Si is attractive and well visited because of its location at the top of the highest hill within Luang Prabang. This site provides visitors with a 360-degree view of the city and vicinity, including sunsets on the Mekong River and background hills and mountains. However, its access to the top requires using a long steep stairway which discourages many unfit or impaired visitors.

#### **Module 3 - Luang Prabang's Main street ... an architectural experience**

The main street section between the Royal Palace and Vat Sibounhuang (approximately 1 km), and then the side streets to Vat Xieng Thong would allow visitors to see much of the traditional architecture and urban structures built by 19th and 20th century European colonial rulers. This Module could include a few side streets that would show more of its traditional architecture. Visiting the inside

of traditional homes virtually would be a unique experience in itself.

#### **Module 4 - Vat Xieng Thong ... perhaps the most visited Buddhist temple of Luang Prabang**

The Vat Xieng Thong, which was once the Royal Pagoda, could be chosen to provide visitors with an introduction to/interpretation of a Buddhist temple. It would be an ideal site to apply the 3D laser technology to display high resolution 3D images of Buddha, of beautifully decorated objects, and of architectural details. This Module could be educationally slanted towards tourists that are not familiar with Buddhism.

#### **Module 5 - Old Hospital ... a proposed renovation project within a world heritage site**

Currently, the hospital in Luang Prabang is being considered for renovation. Should this plan materialise, the architectural firm proposing this renovation is planning to provide a 3D model of the hospital site for visualisation and educational purposes. This model could easily be digitally linked to the Virtual Tourism project as an example of a renovation project within a world heritage site setting. This Module could become an example of co-operation and planning between different Laos governmental agencies involved in development activities within a protected environment.

... and then, the 'virtual tourists' would be invited to travel to a remote location ... i.e.

#### **Module 6 - Pak Ou Caves ... a fragile and vulnerable site**

Pak Ou Caves which is accessible by the Mekong river, could be the module that introduces a delicate and unprotected site that conservationists would like to see well controlled in terms of low visitation and environmental stability (e.g, moisture, bats, insects, etc.). The other problem at Pak Ou is darkness in some parts of the caves which makes the visit somewhat difficult, unsafe and disappointing as little can be seen.

#### **Options for impaired visitors**

Most of the above modules would demonstrate that visitors with health problems or with difficulties to cope with high temperatures/humidity such as that experienced in Laos, may prefer to begin their Luang Prabang visit by a Virtual tour. This tour would introduce them to what there is to know about, and see in Luang Prabang, and at one of its remote sites. Consequently it would provide visitors with an understanding that should help in planning their visit

more effectively with, hopefully, a higher level of satisfaction.

### **Other proposed World Heritage Sites**

There are other sites to choose from to test and apply Virtual Tourism solutions. Clients/managers must well define their intentions/needs so that the 'Virtual Reality Project Team' develop and propose scenarios that address specific conservation and tourism needs.