

Role of Technology in Post-Crisis Heritage Conservation

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Cultural Heritage is treasure which we have inherited from our ancestors. These are our links to the past and ideally should be conserved, to be transmitted to the future generations. Over the years, cultural heritage, more visibility, the tangible heritage has been damaged by multiple factors. The most common occurrence has been devastation caused by severe earthquakes and fire episodes, wherein the loss happens suddenly. The Bam Citadel of Iran, the oldest adobe structure in the World, was reduced to rubble in the devastating Bam Earthquake of 2003. The Notre Dame Chapel of Paris suffered a significant damage caused by the fire in 2019. In these cases, the heritage was structure/townscape was affected suddenly and rapidly in a small fragment of time. But there are several other hazards, the effects of which are slow and gradual, such as over-tourism, haphazard development etc. Venice and Dubrovnik are examples of cities adversely affected by tourism.

These threats affecting the tangible cultural heritage can be primarily classified into two categories, namely, natural hazards and human-induced hazards. A list of these hazards has been prepared and issued by the National Disaster Management Authority (NDMA) in National Disaster Management Plan (NDMP) and all the policies. Floods, Earthquakes, Landslides, Volcanic Eruptions, Cyclones, and Lightning are some natural hazards that have incurred significant damages to the heritage over the years. Further, the natural hazards can be intensified by human actions, which makes the sites especially more vulnerable to the hazards. Some noteworthy examples are Statue of Liberty, the tower of London, Sydney Opera House, which are threatened by rising sea levels caused by Climate Change.

The human-induced hazards can be either accidental or deliberate, or both. Terrorism, Conflicts, and violence are examples of such deliberate malevolent acts. In the areas of conflict, the heritage is damaged or destroyed either purposefully, accidentally, or as collateral damage. The wilful destruction of heritage was always a common practice, seen frequently in the Second World War, in which numerous historic towns, cities, villages, settlements, monuments etc., were targeted and completely flattened out by bombings through air-raids. The looting of artefacts, painting and other objects of cultural significance was also a recurring activity. From not-so-distant past, the memory of destruction of rock cut Buddhas in the Bamiyan Valley of Afghanistan is still fresh in people's mind. In the past few years, countless monuments, sites, museums etc were destroyed and looted in Syria.

But regardless of the reason for damages, the losses incurred in the past were a collective loss for the entire humanity, which makes the process of heritage conservation a crucial element in

the process of recovery and rehabilitation, especially after a conflict in which the damages are large and widespread. In the process of rehabilitation in the aftermath of a large-scale crisis, the limited resources are diverted to achieve speedy economic recovery and other such pressing issues, and the cause of heritage conservation faces dearth of resources. Moreover, due to widespread damages and limited resources, not all the destroyed heritage sites, precincts etc are deemed worthy of conservation, but only those that are relatively more significant than the others.

In these situations, technological advancements can certainly play a more prominent role in the conservation process. Firstly, these advancements are helping in replacing time consuming and labour extensive old processes, and technologies such as drones, 3-D scanning, GPS, Satellite imagery, Ground Penetrating Radar, LIDAR are enabling rapid and precise documentation. The ability to obtain and collate large amount of data is allowing documentation, analysis, and ultimately preservation of cultural heritage. These tools can help in taking stock of the state of conservation and in documenting, analysing, and assessing the condition of the damaged structures and its structural configuration to understand its behaviour and determine the extent of damages. The extensive data collected can be used to inform and guide the possible future strategies for conservation.

The data documented can also be reinterpreted through the digital mediums of Augmented Reality (AR) and Virtual Reality (VR). These mediums are being currently explored as part of the existing museums 'to enhance the museum experience'. Prominent museums around the world namely, Victoria & Albert Museum, London; Louvre, Paris; Peterson Automotive Museum, Los Angeles; The National Museum of Finland, Helsinki; The Smithsonian, Washington, D.C; The Tate Modern, London; The National Museum of Natural History, Paris; Natural History Museum, London are few such names that have experimented with the VR to enhance the storytelling potential. It enhances the museum experience by allowing a first-person perspective by closer and to scale view of the artefact and immersing the visitor in the surroundings virtually.

Perhaps, these digital mediums can altogether mitigate the need of physical conservation of those cultural heritages which are of relatively lesser significance and hence deemed not worthy of conservation or those that are damaged beyond repair and the physical reconstruction of those is not feasible, as is the case with Bamiyan Buddhas. It can also help in showcasing and visualizing important events associated with a place or showcasing a place in entirety with its original fabric, thus enriching the narration and experience of that place. The medium can also be explored to showcase the intangible practices. The digital conservation can be further used as visualization tool for assisting the physical conservation.

These examples show the potential of these technologies in the field of conservation, data interpretation and sharing. But these technologies come with their own challenges, mostly involving high equipment costs, specialized programmes and software for data processing and lack of technical expertise. In AR and VR technology one such limiting factor is the high installation

and maintenance cost. Regardless of the setbacks, possibilities of these technologies are endless, and are worth exploring to pass on the knowledge of the past to the future generations.
