

**Invitation for Expression of Interest (EOI) for creation of authentic high–end computer generated 3D graphics for delivery of Augmented Reality, Virtual Reality, and similar other immersive experiences of archaeological sites of India.**

Expression of interest are invited from State / Central Government Institutes, Autonomous Bodies, Educational Institutes of high repute (such as IITs, IIITs, NITs, NIDs, Universities etc.), eminent academic institutes, research centers, reputed and experienced organizations/business entities having expertise in development of very high quality Virtual Reality and Augmented Reality content and delivering the same in different modes/platforms to create visualization and immersive experience of historical sites/monuments.

Important milestones of the EOI are as given below:

Published Date	08-03-2019
EOI Document Download Start Date	11-03-2019
EOI Document Download End Date	25-03-2019
Last date for clarifications, if any	25-03-2019
EOI Submission End Date	29-03-2019 up to 3.00 PM
Date of Opening EOI	01-04-2019 at 4.30 PM
Date of Presentation before Expert Committee	To be communicated later

**Objective:**

Archaeological monuments have different shapes, sizes, compositions and textures, and they appear at different locations. These characters vary from one location to another, and sometimes this variation has some appearance of continuity, which ought to be understood as variation between social actions due to neighborhood relationships. In order to give information and memorable experience to the visitors to ASI sites about the site/monument etc. in its original perspective and to help them to understand the past glory and achievements through authentic reconstructions, it is proposed to capture and/or reconstruct the past glory in real-time 3D graphics in digital form for delivering them in user-friendly virtual reality and / or augmented reality and in other high-end immersive digital modes for both indoor and outdoor presentations.

**Target Audience:**

The audience to the sites and museums are Indian as well as International tourists of all ages, students and researchers.

**Sites proposed to be taken up:**

The Ministry of Culture proposes to create this AR and VR content for several archaeological sites, an indicative list of which is given below:

1. Dholavira, Gujarat
2. Lothal, Gujarat
3. Bet Dwarka, Gujarat
4. Hampi, Karnataka
5. Konark, Odisha
6. Sarnath, Uttar Pradesh
7. Nalanda, Bihar
8. Sanghol, Punjab
9. Rakhigarhi, Haryana
10. Kalibangan, Rajasthan
11. Ellora, Maharashtra
12. Purana Quila (Indraprastha), New Delhi

In addition, there are around 3650 ASI sites, 7 National Museums, National Archives, National Libraries, other museums and Art Galleries which are planned to be covered under this project subsequently.

#### **Time of completion of Project**

6-9 months per site from the date of issue of letter of intent.

#### **Specifications & Scope of work**

The agency/organization/institute may note the following specifications and the quantum of work involved while preparing their plans and proposals. The agency/organization/institute/business entities shall be responsible for:

1. Scanning of the sites and objects will have to be done using some or all of the scanning technologies such as 3D LIDAR, 3D Drone shoot, 360<sup>0</sup> shoot, Photogrammetry, ultrasound and electromagnetic depending upon the requirement to be captured to get maximum details of object such as textures, colours, structural density of materials, details of foundations etc. These should be usable not only in digitizing the monument but also help in proper restoration.
2. Ensuring that the native resolution of scan will be in 16K or higher to be at par with the best possible resolution available anywhere in the world as on date.
3. Creating textures in at least 5 different categories depending on the requirement of the object scanned (after the scanning is done) to create the required surface finish of the objects.
4. 3D model creation from the scanned cloud points and model optimization. Digital reconstruction of the sites and objects.
5. Developing an Augmented Reality App (AR App) with interactive modules to enhance various features or USPs of the archaeological site and show the digital reconstruction.
6. Developing software to provide layered information and scanned 3D images about the objects excavated from that site which can be maneuvered or zoomed-into and viewed in different

lighting conditions, super-imposition of texts, graphics to supplement the object information etc.

7. Making necessary 3D reconstructions of archaeological remains to depict past glory in correct perspective based on the references provided by ASI/owner organization and inputs from reputed historians and archaeologists (to be engaged by ASI). This would involve engagement of very high quality artists to translate the references and inputs provided by experts and ASI into graphic / visual references before creating the 3D reconstructions. These graphics/visuals created must be got approved by ASI before translating them into 3D reconstructions. The 3D renderings are to be done by incorporating the shapes, textures and the colours exactly resembling the remains available at site/collections available with ASI. The approval of ASI /owner organization / Specialists identified (as the case may be) by MoC regarding the reconstructions made and authenticity of content created is mandatory. All suggestions made by such experts are required to be implemented to achieve the authenticity of all 3D generated graphics.
8. Creating Virtual reality based applications with interactive walkthrough of 3D model.
9. The content generated must be done keeping in view the possible technology developments and should be upgradable to new platforms.
10. Designing the required equipment and infrastructure required for storing, delivering/streaming the content to the end users in through different experience enhancing modes (both indoor and outdoor) in a user-friendly manner.

It may please be noted that the technologies mentioned here are indicative and may be extended further.

### **Expected Deliverables under this EOI:**

The Ministry of Culture, Government of India plans to get the works of digitization of several identified important locations in the archaeological sites in very high resolution (16 K) or higher, at par with the international best standards done on the archaeological sites for public dissemination of information/knowledge and to enhance the experience of visitors visiting these archaeological sites/monuments:

1. Digitization of the identified important locations in the archaeological sites in very high resolution (16 K) or higher, at par with the international best standards.
2. Digitization of the identified excavated/collected objects, sculptures etc. by 3D scanning in very high resolution (16K) and providing the content to visitors through dedicated software to explore them by maneuvering/zooming, viewing in different lighting conditions, viewing sectional details, etc. in both online and offline stand-alone platforms.
3. Creation of high polygon and high resolution authentic 3D digital reconstructions/ recreations of archaeological sites and/or monuments to visualize the past glory with necessary properties

such as texturing, material properties, colours etc. based on the references, guidance, research findings etc. provided and approved by ASI/owner organization/specialists engaged by MoC.

4. Creation of interactive 3D virtual walkthrough of the archaeological site for viewing and experiencing the history of the site using various output displays such as (a) Head Mount Devices (HMDs) by 15 or more visitors simultaneously; (b) 360 degree immersive projections in proper world of virtual reality whose key feature shall be real-time interaction. Here real-time means that the computer is able to detect input and modify the virtual world instantaneously at user commands in real-time; (c) projection on hemispherical projection screens/domes in atleast 8K resolution; (d) viewing in tabs and mobiles across all platforms etc. (e) holographic projections; (f) projection in outdoor condition on surfaces such as water screens, fountains etc. using laser projection systems and the like.
5. Creation of interactive 3D walkthrough of archaeological site, in as is where is basis /condition, for projection on large size screens to create immersive cube to provide virtual immersive experience of visiting the site to the visitors.
6. Creation of augmented reality app with rich content for providing location-based enhanced experience to the visitors on-site. This content should have interaction such as zooming in, maneuvering, rotation to see all sides of the object/monument etc.
7. Creation of 8K, 4K and 2K and other resolution 2D and 3D films of duration varying from 5 min to 15 minutes with necessary storyline to depict the unique features of the site and its connectivity to the history of civilization and the USPs of each site for screening onsite as well as online.
8. Creation of the scaled-down layout model of the site using 3D printing and creating projection mapped show on the model.
9. Multi-dimensional simulator ride based presentations using 3D content for experiencing the site.
10. Creating a library of contents generated for the above applications / delivery modes and providing the content generated in any other formats that may be required for applications such as projection mapping show etc.

#### **Submission of Expression of Interest:**

Interested organizations/institutes/business entities who are confident of their capability to execute the work and having sound technical knowledge and capable to deliver the commitment within stipulated timeframe may submit their Expression of Interest online in prescribed format to Director, National Science Centre, Delhi in single cover system.

The proposals submitted will be scrutinized by a duly constituted committee. Selected organizations /business entities will be communicated by email (official email address of the responding organizations /business entities mentioned in their EOI) for making a presentation at National Science Centre, Near Gate No.2, Pragati Maidan, New Delhi – 110 001.

### **Expectations from Presentation**

The presentation by the organization/institute/business entities should clearly bring out the technologies proposed to be used, methodology and strategies to be followed, experts to be engaged by them for various aspects of the project, their in-house capabilities, collaborators, technical partners, etc. in delivering the project under the scope of this EOI. It is expected that the organizations/business entities will bring out suitability of various AR/VR technologies for both indoor and outdoor applications targeted at the specific features of the sites. They should also provide information about the similar projects executed and delivered by them earlier in past 5 years along with the project costs, Project head for the current project under this EOI and his/her expertise domain for executing such projects.

### **Clarifications about the EOI:**

Any clarifications required with regard to submission of EOI may be had from National Science Centre, Delhi up to the date as mentioned in the EOI document. (May be reached by email on [ar.vr.nscd@gmail.com](mailto:ar.vr.nscd@gmail.com))

### **Check List to be filled by the applying organization / institute**

The following documents are required to be submitted by the agency/organization / institute which are willing to participate in this Expression of Interest:

1. Profile and details of the organization, project leader etc. issued on the official letter head of the organization as per Annexure - 1.
2. No objection certificate issued by the organization to take up the project/s by the proposing project head/team leader.
3. Proposed plan of the organization to execute the project as per the expected deliverables and the scope of work mentioned in the EOI.
4. Technical details of the procedure and matching deliverables that can be achieved by the organization.
5. Details of technical partners / historians / content experts / graphic artists etc. to be engaged by the organization to supplement / complement the existing expertise of the organization. The credentials and samples of the works/achievements of such experts to be clearly brought out in the technical presentation.
6. Details of previous and current projects handled/ being handled as per Annexure – 2.
7. Non-Relation certificate.
8. Willingness to participate in the financial bid.

**Format for Submission of Organizational Details**

(To be issued on the official letter head of the organization)

Name of the Organization/Institute	
Address for correspondence:	
Contact E-mail Address:	
Contact Phone numbers of Project leader & lead team members	
Details of technical partners/ consortium / Professionals engaged by them for this project:	
Experience and expertise of the project head/Organization in similar projects:	
Details of similar projects on which the project leader is currently engaged and likely date of completion of the current project.	
Name and designation of the authority who is authorized to sign agreement/MoU on behalf of the organization/institute.	
No Objection Certificate issued by the Head of Institute/organization for taking up of this project.	
Non Relation Certificate issued by the lead project head nominated by the organization.	

It is certified that the information given above is correct to the best of my knowledge.

( \_\_\_\_\_ )

Authorized Signatory

Place: \_\_\_\_\_

Date: \_\_\_\_\_

**Details of the similar works/projects undertaken and delivered by the applying institute/organization (including the on-going projects):**

Sl. No.	Name of the Project	Name of the Customer	Scope of work	Duration of Project		Project cost (Rs. Cr)	Remarks
				Start date	Completion date		
1							
2							
3							
4							
5							