EXPLORATION OF MALTESE PREHISTORIC TEMPLES THROUGH THE APPLICATION OF MULTIMEDIA TECHNOLOGIES

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ABSTRACT

This paper focuses on the archaeology of the Maltese Megalithic temples and the application of multimedia techniques to create compelling cultural experiences. In 2001, the UNESCO Megalithic temple Mnajdra in southeast Malta, one of the oldest freestanding monuments in the world, suffered a severe vandalism attack that drew attention to the strong need to protect and conserve heritage monuments. Mnajdra is classed by ICOMOS Malta as level 5 (showing intense signs of risk without possible reversibility). In light of the importance of material Megalithic artefacts and the increased pressure of tourism, it is important to find creative solutions to physical visitation that continue to provide meaningful experiences for visitors.

This paper investigates how digital media and screen-based navigation can be utilised to provide engagement with Maltese prehistory. Rather than questions of preservation and conservation, issues of spatial navigation and end-user interaction are addressed. Using methodologies from computer games, the paper addresses how the visitor might interact with Maltese Megalithic temple culture through the construction of scenarios that create cultural and social presence.

Drawing on the work of Maltese archaeologists including Dr John D. Evans and Dr David Trump, the paper proposes that the role of archaeological integrity and research is central to the design of effective cultural heritage experiences. Describing visualisation and forms of user embodiment, the paper outlines the principles of spatial navigation for different social groups and sets of cultural knowledge. This approach enables different communities of end-users, such as cultural historians, archaeologists and tourists, to engage in enhanced social interaction with cultural and heritage spaces.

The approach taken in the paper can be summarised thus:

- Develop new interactive context of Maltese prehistory by applying gameplay and associated multimedia methodology.
- Identify the principles of spatial navigation for creating cultural and social presence.
- Demonstrate how visualisation techniques can be developed for the exploration of temple spaces.
- Investigate the construction of metaphysical or symbolic ritual environments through abstract avatars, performance modes, sonic and spatial models.

Such concerns are formative ones for the crossover between archaeological research and digital media. New knowledge in this area contributes to further understanding of the procedures Maltese and international communities might use to construct new modes of engagement for Megalithic cultural heritage. This research is also applicable to the development of protocols for sharing Maltese heritage material across international archaeological communities, museums and commercial ventures.

KEYWORDS: Navigation, computer games, spatial exploration; aesthetics

INTRODUCTION

In archaeology, secure dating, function, social and political context are important aspects of understanding cultural prehistory. In Megalithic culture, where artefacts are highly vulnerable, digital media play an increasingly important role in conserving material remains. In the last decade, capturing techniques such as laser scanning, photogrammetry and image-based modelling software have become important tools for archiving prehistory. These processes of digitisation produce highly detailed visualisations and historically accurate data sets that have been deployed for a range of archaeologists purposes that can be summarised as:

- Digitally reproducing or simulating the existing artefact or monument. This process archives the monument in a stable form within a digital repository and enables it to be widely distributed and copied. It also preserves the monument from direct visitation. (One recent example is the closure of Stonehenge to the public and the development of a walk-through simulation, *Virtual Stonehenge* (Virtual Presence 2003). In *Virtual Stonehenge*, 3D modelling and close range laser scanning are used to recreate Stonehenge as a detailed simulation that shows high levels of visual detail including small surface features such as fungi, lichen and small cracks in the rocks.)
- Digitally restoring a monument to its original state by re-imaging artefacts back into the original context from which they were removed.
- Reconstructing, from archaeological and historical documentation, a monument that no longer exists.

What these high-end visualisation processes have in common is an attention to high levels of photo-realism and computer simulation. A focus on increasingly detailed images as an end in itself often omits past cultural practices and social activity, and runs the risk of limiting ways of thinking about cultural history. As Gillings points out, 'the object of analysis becomes the building itself as a sterile architectural shell, stripped of people and the bricolage of everyday practice' (Gillings 2000). The question of how the building was constructed and the simulation of architecture on a large scale thus take precedence over why the building was constructed or the context of archaeological knowledge.

The current discussion argues that the application of digital media to archaeology can offer more than high-end visualisation. It can also offer compelling interaction environments that move beyond detailing the monument or artefact as material evidence. Interactive environments that go beyond detailing material evidence introduce a different type of audience - a more knowledgeable and informed visitor with different expectations. Questions regarding cultural practice and the provenance of an object, rather than being lost in the graphic immersion of interactive technologies, can be enhanced by a focus on a dynamic relationship between user and past cultural practice. The computer game is proposed as perhaps the most sophisticated form of interactivity that can be adopted to offer a socially captivating engagement with prehistory. Techniques derived from computer games - techniques of spatial enhancement, user challenges, social agency and the feeling of 'being there' - can offer cultural tourism a different form of site visit and a more complex negotiation of archaeological prehistory.

Aspects of the computer game will be examined through a brief discussion of how games are being woven into an ongoing engaging program of research - the application of multimedia techniques to Maltese prehistoric temple culture. Taking the temple culture as a site for interactive archaeological inquiry emphasises a range of archaeological models and hypotheses, rather than offering a fixed vocabulary of data facts. It enables speculation and creativity by the user groups without precluding the significance of empirical commitment to material remains.

APPLYING GAMEPLAY TO MALTESE PREHISTORY

This research is embedded in a major project centred on the Megalithic temples of Malta, and in particular the southeast temple site Mnajdra (Fig. 1). An intrinsic element is establishing methodologies and protocols for representing the lived history of Maltese prehistoric temple culture. This approach emerges from a game studies perspective that takes questions of user engagement and production methodology as central concerns in the development of a virtual heritage application. Scripting, photographic and video material was collected from site visits to the Megalithic temples of the Maltese archipelago in 1997 and 2003. This preliminary investigative material forms the basis for the application of virtual archaeological techniques such as virtual reality 360º panoramas and computer game-based visualisation models to the production of a working prototype. The completed project is designed to run on a video game platform such as Sony's PlayStation or Microsoft's XBox, or as a computer-based DVD-ROM. The site for investigating the culture history of Maltese Megalithic temples can then be at home, in a library or museum, or close to the Megalithic site (such as the planned Hagar Qim/Mnajdra heritage park). However, rather than a technical case study, this paper addresses digital media and interaction design research questions and outlines a number of strategies that can be deployed to advance heritage interpretation and user engagement.

Primary research at the Megalithic tem-

Fig. 1: Panorama of Mnajdra South temple, c. 3400BC

ples in Malta reveals a complex spatial organisation of openings, enclosures and passageways. The morphological and mythological schema embody the spatial principles of circularity and receptivity. A number of separate zones characterise the temples' layout; in particular the trefoil arrangement of semi-circular or horseshoe-shaped rooms. Mnajdra, the site chosen for the research, is one of the better preserved temple sites and follows a circular, or apse-like, pattern familiar to other Maltese Megalithic temples. Dating from 3600BC to 3100BC, Mnajdra is a three-temple site on an almost circular forecourt (Zammit 1995; Trump 1990). The East temple is the oldest, built as a three-apsed (trefoil) structure from 3600BC (Ggantija period). The South temple, built about 3400BC (early Tarxian period), predates the middle temple built from 3100BC (Tarxian period). Both the South and Middle temples adopt the four-apsed (cinquefoil) structure also found at the Tarxian, Ggantija and Hagar Qim temple sites (Fig. 2). A trajectory through the temple complex permits a perambulation from one concave room to another - from one side niche and altar porthole to another - with connection between the temples via a large open area or forecourt.

Following the archaeological work of Gimbutas (1982), Biaggi (1994) and Evans (1972), the spatial arrangement of the architectural features is interpreted as a part of an overall argument for sacred exchange and activity in which the people of Malta would partake. This is placed within the wider morphological context of the adjacent Megalithic temple of Hajar Qim, the Misqa water tanks (perhaps cut to supply the needs of the temple) and the close proximity of Mnajdra to the Mediterranean and the rocky islet of Filfla (Fig. 3,4).

The element of spatial planning is part of the structures by which Megalithic societies articulated concepts and codes of belief systems. As Pace (1996) argues: 'The patterning of the monuments in geographic space is

Fig. 2: Orthostats of Southeast wall Hagar Qim c.3300-3000BC. Located on a rocky plateau 500 metres uphill of Mnajdra.

Fig. 3: Misqa water tank on plateau above Mnajdra

clearly a reflection of pre-historical cognitive processes rather than random choices of site occupation and settlement.'

Taking this morphology into a games environment creates a spatial setting where local prehistoric cultural activity can be explored.

Fig. 4: View from Mnajdra middle temple to islet of Filfla

Game space is occupied space, and from this a user can investigate what might have happened, how people might have lived in relation to beliefs, activities and prehistoric perspectives. Key archaeological questions concerning what went on in a Maltese temple (Evans 1996) or whether there is any astrological significance to temple orientation (Trump 2002) can be interrogated through the tools of interactive gameplay. Game structures set the rules for how the games might be played and can be designed to include objects and monuments that draw out connections between material culture and archaeological theories. Using the gameplay challenge of spatial exploration, visual comparison, analytical deduction and synthesis, the user can acquire knowledge of cultural artefacts and processes. An object inventory can be embedded in the activities of gameplay and linked to a database of archaeologically rich information.

The architecture of the gamespace is mapped with activities, challenges and affordances (Adams 2003; Flynn 2004). Affordance is the ability of players to interact with objects and entities in the game world based on the probabilities associated with them. One challenge is to explore artefacts for interpretation of possible context and applications. Artefacts such as pottery tools, lobed objects and ex-voto clay figurines with large breasts, abdomen and deeply incised vulvas found in Mnajdra South and now located in the Nation-

al Archaeology Museum of Malta present a number of such affordances (Biaggi 1994). In the game environment, the challenge might be to interact with a prehistoric bowl or pot by locating it in a position suggestive of ceremonial use - for instance, moving it from the rubble on the temple floor to the pillar altar in one of the adjoining rooms of the South temple. In this way, rather than being museum pieces, artefacts become components of ongoing cultural processes.

Tasks for users can be designed for exploring the manner in which the temples have been added to and altered in response to specific needs at different times. A task might be to position curtains or screens between temple levels to initiate particular ritual or ceremonial activities. As a test of skill using observation and logic, users could be required to locate door perforations, cloth or other screen material, and make links between symbolic and ritual patterns of usage (as suggested by Biaggi (1994) and Trump (2002)). In this way, users synthesise material evidence with archaeological information to be able to explore a range of interpretive possibilities. Further information sought from a range of source materials could be represented through the metaphor of lost records - such as 'the book of ceremonial suggestions', 'the book of antiquities' and 'the book of symbols'. These books act as vehicles for showing drawings, diaries and paintings that reveal different stages of archaeological investigation. The Brochtorff watercolours from the 1820s are an example of such illustrations that show the state of the Ggantija temple and the Xaghra hypogeum during early archaeological digs (Fig. 6). Other characters, or 'ghostly presences', can be introduced as guides or vehicles for helping the user solve challenges or tasks.

Games codify and limit computer game space, and these structures set the rules for how the game might be played. In conquest games, play is about claiming territory; in exploratory games, play is often integrated into a quest structure. Significant archaeological fea-

Fig. 5: Biconical bowl with curving volutes ending with fishtails and projecting thorns

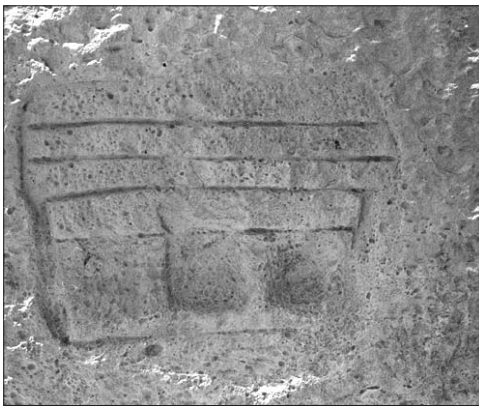Fig. 6: Libation hole at Ggantija, c. 3500BC

Fig. 7: Stone engraving of roofed temple carved into wall of Mnajdra Middle temple

tures such as the figurines, libation holes and door jambs can be used as attractors linked to quest activities.

As Alison McMahan outlines, there are a range of ways that an attractor functions within a game environment. These include:

mystery objects the user may want to examine, such as moving objects that attract attention (such as animation), objects needed for tasks … objects that cause fear, alien objects that indicate the end of a level, sensation objects that attract attention through the nonvisual sense, awesome objects that impress by their size, and dynamically figured objects that relocate in space and time (McMahan 2003) (Fig. 5).

Such attractors tempt the user to do something, elicit the act of looking and bring critical attention to an artefact. Artefacts created as rotatable 3D objects can be analysed, so that the details on the front, back, top and underside of ceremonial bowls or figurines can be viewed. These details might illustrate an important archaeological theory about the artefact and translate into winning points or higher levels of spatial access in the game.

Games offer visitors a strong sense of presence - a strong sense of 'being there'. Presence can be characterised by the players' involvement with the aesthetics of the game world and the challenges and interactive opportunities offered by gameplay. As Brian Massumi (2002) has argued, this presence is as much a function of proprioception and kinaesthetic engagement as it is of vision. Indeed, a significant personal investment of emotion and time is required to engage in the encounters and challenges demanded by computer gameplay. Such investment creates psychological immersion so that, in a successful game, the user suspends disbelief and feels that they are present in the game space - that they are 'right there'. In this way, visitors interact with world Megalithic cultures through a significant sense of agency and emotional engagement.

SPATIAL NAVIGATION

The most outstanding characteristics of the Mnajdra temple structure are the transitions between inner and outer, public and private, emphasised through doorways and portals, alcoves and altars, fire pits and libation holes, central apses and enclosed side cham-

bers (Fig. 7). 'V' perforations and pits in the doorways appear to be designed to hold screens or bars. This means that the visitor would have been barred from seeing the whole of the space at one time. In fact, the temple morphology suggests a space for movement rather than ways of looking. Steps leading from one apse to another - from outer to inner temple space - are raised, indicating an upward movement towards a higher level. These clearly demarcated zones cause a pause - a moment of contemplation in negotiation towards the inner temple. These transition points are further highlighted by the location of significant artefactual elements such as snake engraving , phallic niches or baetyl, and the pitted threshold slab.

In the translation to a game environment, movement through the digital landscape is not linear, as users create their own trajectories of curiosity. This user-driven movement through digital screen space creates an understanding of the space that moves beyond the purely visual. The environment can be considered as a phenomenological playing space that activates the body to negotiate the specifics of the temple structure. In this way, a view through the

orthostats and trilithon entrances of Mnajdra to an inner altar entices the user to move from the outer courtyard into the internal ritual space of the temple (Fig. 8, 9, 10).

The spatial arrangement highlights the sensation of complicated movement as well as evoking a protective intimacy (Biaggi 1994). Spatial obstructions are designed to require users to adopt particular ways of moving or bodily gestures such as crouching, bowing, sitting and dancing. Portholes offer resistance so that the user has to bend down when entering spaces such as the small side chambers or the oracle hole. Paths and obstacles can aid or impede navigation so that the user visits particular parts of the building such as the intermural rooms in a deliberate order or in accordance with a precise purpose.

Space can dynamically update depending on the user's action, skill level and type of individualised response. From the completion of tasks and degree of interaction with digital artefacts, a user description can be generated. Such a description enables different types of users - for instance, cultural historians and interested tourists - to be offered individualised modes of gameplay. A responsive environment

Fig. 8: Looking towards Mnajdra South temple inner chamber

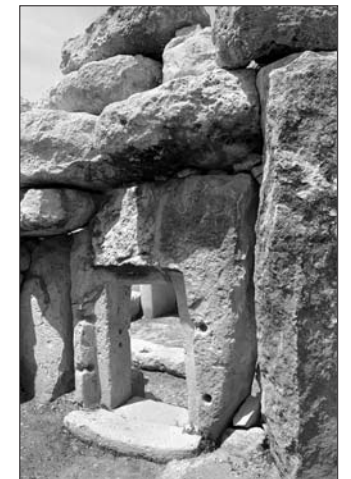Fig. 9: Mnajdra South temple looking towards outer trefoil apse and altar of Inner temple

Fig. 10: Oracular room at Mnajdra South with side bar holes

can also shift between time periods - such as from the present-day Megalithic ruins to a nineteenth century archaeological dig - to a prehistoric reconstruction. A record of interaction history generated by the game engine situates the user within the game space via changes to the on-screen avatar, maps, navigation reminders, inventories of artefacts and clues embedded in the landscape.

Space not only has situational value in relation to visual imagery, but also in relation to architectural acoustic properties. The perspective of sound can provide auditory clues to the shape of the room and the position of the body. In a reconstruction of the temple as a dimly lit or dark space, the sound heard from another chamber but not seen or the deep reverberation from an adjacent inter-mural chamber could create a dynamic impact. As demonstrated by a team from Bristol University who incorporated spatialised sound into a 3D model of the Hal Saflieni hypogeum, aural as well as visual effects were important for temple culture (Pope and Chalmers 2000). At Mnajdra, the evidence of acoustic chambers - 'the oracle holes' - suggests a community focused around singing, chanting or controlling the acoustic properties of the voice for ritual purposes. The oracle holes offered communication between the public part of the temple and the private part of the inner court and apse. Trump (1990) associates this with the possibilities of 'offerings and confessions in one direction, advice, orders, talismans, healing, in the other'. He observes that the oracle chamber in Mnajdra opens into a small inner chamber behind and is specifically designed to produce particular echoes and acoustic phenomena. It is easy to imagine the impact of these reverberations as part of ceremonial gatherings and how these might be reconstructed as an interactive test-bed for exploring archaeological hypothesis.

In constructing a space for movement rather than ways of looking, spatial navigation and acoustic properties take precedence over modes of highly detailed visualisation. A more

phenomenologically informed notion of movement replaces the dramatic fly-throughs and clean geometry of SGI heritage environments. While these environments cannot replace the direct experience of engagement with a heritage monument, they do offer a unique experience that moves towards enabling an active embodied user.

METAPHYSICAL AND SYMBOLIC RITUAL ENVIRONMENTS

In archaeology, the classification and description of recovered material is an important aspect of understanding the function and processes of the past. Archaeology also plays an important part in possible interpretation of non-material aspects such as symbolism, ritual, ceremony, religion and aesthetic considerations and values (Pace 1996). It is these abstract dimensions that can provide a sense of the past that moves beyond prescriptive models of archaeological knowledge to an approach more closely aligned with prehistoric belief systems. Goodrick and Harding (2000) outline a number of these, including: the significance of cyclic events for the Neolithic; the association between supernatural beliefs and temple orientation; and the link between topographic features and a society's symbolic universe.

The Mnajdra site may be described in terms of a sacred space where devotional activity was concentrated, especially in light of the evidence of votive figurines and the use of libation holes, fire and aural effects as indicative of ritual or worship. This places Mnajdra and the Maltese temples broadly within the context of what Gimbutas describes as 'Old Europe'- characterised by a peaceful agricultural and sedentary society focused around the worship of the Goddess as Creatrix (Gimbutus 1982). As Evans (1996), one of the foremost authorities on Maltese temple prehistory, concludes, the temples' 'primary use was for ceremonial and ritual activities directed to the propitiation of supernatural forces and/or beings'.

In considering Mnajdra as a sacred space, I

am arguing that the outer or morphological space of the temple landscape and its features is linked with mythological and ritual space. For instance, as Trump (2002) suggests, the large courtyard of Mnajdra would facilitate ceremonies or large gatherings, with processions, singing, dancing and sermonising only a few of the activities that might have taken place. While the location of Mnajdra next to the Mediterranean Sea remains unchanged from prehistoric times, the experience of being inside the temple would be very different (Fig. 11). Unlike today, where the temples are open to the Mediterranean sky, archaeologists Evans (1959) and Trump (2002) have both argued that the temples were largely roofed with perishable materials such as beams of wood covered with brushwood (Fig. 12). Knowing this, being inside the temple in prehistoric times would be equivalent to being in an underground labyrinth like the Hal Saflieni hypogeum or the underground chambers of the Xaghra stone circle (Fig. 13). The sugges-

tion put forward by Evans, and supported by Trump, is that the temples are modelled on tombs, built above ground instead of being hollowed out into the earth, for ritual rather than for burial use.

The abundant use of red ochre, spirals and the snake relief from Ggantija also suggests a connection with the underworld, chthonic cult of death and rebirth. The curvilinear shape of the temples that echoes the curvilinear shape of the Xemxija tombs and in turn supports the shape of the human body as it rests in a foetal position reinforces this notion (Biaggi 1994). As indicated by similar tomb and hypogea structures across the Mediterranean Neolithic world, shape and function are intrinsically embedded in the culture's pattern of beliefs (Fig. 14).

Micallef (1992) and others have hypothesised astrological significance in the alignment of the temples apparent at the equinox, and the summer and winter solstices. All temples have a southerly orientation, suggest-

Fig. 11: Present-day entrance to Mnajdra South temple by Mediterranean sea

Fig. 12: Present-day interior South temple with oracular chamber set in corbelled walls

Fig. 13: Reconstruction of entrance to oracular chamber South temple
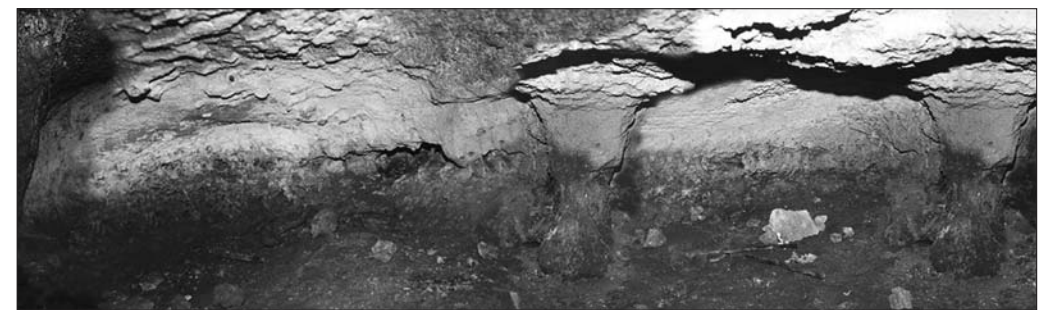

Fig. 14: Xemxija Rock cut tomb number 5 showing lobed chambers and pilasters c. 3,600-3,000BC.

ing that the temples were built in accordance with astrological patterns with Mnajdra South temple representing some kind of solar calendar. A further case for the temple alignment is put forward in relation to the pitted markings on the orthostats of the East temple (Ventura et al. 1993). It is suggested that the patterning of these markings is a tally of events related to the risings of Pheiades and other astral bodies. Some of these mythological associations are still very much alive today. Modern-day pilgrims in the form of cultural tourists continue to visit the courtyard and inner temple during the equinox when light falls directly through the centre of the trilithon entrance of the South temple on to the main altar of the inner chamber.

In considering the application of game design to the creation of meaningful cultural experiences, metaphysical or symbolic ritual elements need to be included. Exploratory computer games work at precisely this level - by creating worlds of enchantment or make-believe that conform to specific patterns of ritual exchange and symbolic representation. For archaeology, the most one can aspire to is to construct paradigms and archetypes (Bonnano 1996). In order to construct Mnajdra as 'lived' prehistory, as a prehistoric form of social organisation, the mythological and ritual as well as morphological aspects of the prehistoric temple space are evoked.

In the case of Megalithic culture, lack of direct knowledge and empirically verifiable claims can actually be considered an advantage in relation to the application of interactive media for archaeological heritage. The questions that can be asked about objects from the past are seemingly endless, and the analysis of these questions opens up a world of critical reflection and historical knowledge that is inaccessible without them. The role of archaeological integrity and research is important for locating these questions within a knowledge base obtained from material culture and to present historically situated cultural perspectives. Such perspectives can be developed within a feedback mechanism to provide potentials and options representing prehistory as an interpretative - that is, an organic and changing - process affected by time, cultural perspective and social relations, rather than a fixed and homogenous account. Whilst retaining archaeological integrity, digital scenarios of probability can be played out or 'performed' by the user in a culturally specific space. The less factual the approach, the more space is left open for user interpretation and personal inquiry. Such an approach, then, is not primarily concerned with data base models of archaeological information and detailed mapping systems, but with scenarios of probability.

As Trump (2002) suggests in relation to Mnajdra: 'We would dearly love to people it with its original worshippers, dancers, processions etc.' With interactive media, we can do just that - and learn about Maltese culture through a dynamic engagement with the past. From our knowledge of the compelling, even addictive, quality of computer games, a game-based environment is a powerful mechanism for creating a sense of engagement and offers a pedagogically sophisticated tool for learning. Task-related activities offer a user-driven model of archaeological investigation for exploring both the setting of temple culture and the context for artefacts, and for interrogating the manner in which the temples were occupied. Rather than focusing only on high-end visualisation and archival issues, the use of games methodology coupled with archaeological rigour can be tailored for different user groups and sets of cultural knowledge. In this way, a process is created by which emergent communities of archaeologists, cultural historians and tourists can contribute to the forms of engagement for cultural heritage. These forms of engagement not only protect world heritage sites such as Mnajdra from over-visitation, but also regenerate the culture through knowledge and understanding spread by interactive computer games.

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