Virtual Environments of Contested Urban Space: Mapping the Spatial Experience of Heritage in Divided Historic Cities

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THE CHALLENGED COHESION OF DIVIDED HISTORIC CITIES

Since 2010 and for the first time in the history of humankind, more people are living in urban environments than in rural areas. It is forecasted that 75% of the global population will be living in cities by 2050. It is also expected that this raft trans-regional movement from the countryside to urban centers will further fragment large metropolitan areas with contemporary or historic territorial, social and cultural divisions thus resulting to further gentrification and decomposition of their territorial cohesion. The current state of global economic crisis is certainly intensifying these differences.

In this context, historic cities facing cohesion challenges due to physical, sociopolitical and/or cultural division offer a particularly intriguing framework to analyze and map the relation between identity, collective memory and spatial experience. Historic divided cities like Jerusalem, Mostar, Berlin, Belfast and Nicosia, to name some key examples, provide complex layered canvases where heritage retains a key role in the spatial experience of their urban environments.¹ The aforementioned changing demographics of these cities present new and important challenges that call for a plan of action that will strengthen territorial² and social cohesion. Monuments of cultural heritage can be a catalyst in redefining the spatial experience of historic cities for citizens and outsiders alike. Although this relation has been addressed in scholarship, advanced technologies can offer vast new possibilities for interdisciplinary research that effectively responds to the challenged cohesion of contemporary urban societies.

This paper presents the concepts, challenges and constraints of an interdisciplinary project that aims to the critical understanding of the role of heritage monuments in mapping the experience and social memory of the spatially distributed multiplicity of public space (involving architects, historians, archaeologists, computer engineers, visualization specialists, etc.). The historic city of Nicosia,³ which remains physically divided today separating Greek and Turkish Cypriots, is the project's primary case study – a complex historic space where, under the typical multiplicities of contemporary urban landscape, lie both the political issue of the division and the memory of a shared past.⁴ The overarching goal of this work-in-progress is the development of a virtual laboratory of urban exploration that will test how the interaction with, and use of, cultural heritage monuments can affect the perception, appropriation and manipulation of social and cultural identity. In the long term, this research project will contribute, through the analysis of the data collected, insights and tacit knowledge regarding possible planning strategies and the impact of potential interventions in the future urban-scape of historic city centers. In the case of the Walled Nicosia, it is a reality that is not only divided but also fragmented in its preservation and development over the last forty years. Different from studies that focus on the politics of division, this research starts with the impact this enforced separation of the urban terrain has had on the experience and understanding of the city.
The concept of this research revolves around the dynamic relations between historic urban environments and the complex interactions between users, identities, communities and memories associated to particular areas of the city (Sack, 1986). The complexity of contemporary cities (even more so in historically layered cities) has grown to unprecedented degree in their history, (cf. Burdett and Sudjic 2011; Hall, 2012; Browning, 2000), and it is understood that there are different ways of studying and approaching their challenges, (cf. Cilliers, 1998; Pavard and Dugdale, 2000; Mitleton, 2006). Common resources, shared space in multicultural environments and public space, are acknowledged by this research as some of the constituting parts of the archipelagos of spaces in the contemporary city. In these complex urban realities monuments of cultural heritage can play the role of “cultural lighthouses” – condensers that punctuate flows of movement and trigger social interaction, exchange of information and engagement with history, that ultimately shape the character of the city. Chapters in the long, layered history of these monuments can be used as stages of the ever-transforming urban territory that unhide critical moments in the palimpsest of the city’s history.

THE FRAGMENTED EXPERIENCE OF NICOSIA’S HERITAGE

In the case of the Cypriot capital Nicosia (cf. Michaelides, 2012), whose historic core remains enclosed behind the iconic 16th century Venetian fortifications, the historical transformations of the medieval Paphos gate demonstrate important spatial complexity (Figure 1).

As part of the city’s medieval fortifications, which for centuries defined the experience of urban space, the Paphos gate was one of the city’s “thresholds” separating urban from rural, outside from inside, safe from hostile, known from unknown and so on. The gate also served as barracks for the Ottoman and the British rulers of the island aiming at the control of this sensitive entryway. In the beginning of the 20th century part of the walls adjacent to the gate was demolished to effectively free the city and allow its development beyond its fortified limits. Since the 1974 war and the physical separation of the Nicosia, the Paphos gate has become an iconic symbol of division as it is virtually located on the infamous “Green Line” that divides the two parts of the city (Figure 2).
The virtual re-staging of the spatial experience of the gate’s different historical phases (Figure 3) can help to unlock its condensed meaning in collective memory and thus utilize this knowledge to mend Nicosia’s threatened cultural cohesion.
Historical actions like accumulative building of auxiliary structures, change of use, transformation enforced by cultural, political or religious reasons, renovation, rehabilitation, or partial demolition of cultural monuments and parts of a historic city, produce a different, unplanned image – and therefore cognition - of space. These transformations of the built environment provoke changes in the perception of social and cultural identity. Going beyond the typical challenges of the social space of a city, this research attempts to associate the social and cultural characteristics of the communities that use important places of heritage, with the functional (e.g., circulation and infrastructure) and geometric (e.g., street section) characteristics of Nicosia’s public spaces. It is acknowledged that monuments of cultural heritage can be approached not as built artefacts that state the presence of the “other” community but rather as reminders of a shared past that can facilitate building a common future. Distinct from the socio-political discussion of the destruction of landmarks and monuments for retaliation and erasure of the “other’s” presence from a place, this research focuses on the recognition of heritage by the inhabitants of the place, through everyday use, and the relations they establish with them – or not. In this context, choosing, or learning to ignore, particular sites is a political act that forms a selective understanding of shared histories and identities.

The case of Nicosia offers an instructive example of this selective process. Following the 1960’s hostilities between Greek and Turkish Cypriots and the consolidation of the physical division of the city of Nicosia after the 1974 war, the once shared urban landscape of the historic core of the city...
became a contested frontline between two polarized communities. This divided reality filtered the daily experience of the city directly influencing the ways heritage was perceived and interpreted. This dividing was especially true in regards to monuments and sites associated with the community that now lived on the other side of the infamous Green Line. Churches, monasteries, mosques, Ottoman public fountains were abandoned while streets and neighbourhoods changed names in an effort to rewrite the city’s history and topography. Among other examples of this phenomenon were the Armenian monastery, originally the medieval Benedictine Abbey of Our Lady of Tyre, and the church of St. Luke on the north side of the Green Line and the Tantakake mosque and the Tophane mescidi in the southern half of the walled city. At the site of the Paphos Gate the monumental Venetian structure became one with the actual dividing line.

Responding to this problem, bi-communal initiatives like the Nicosia Master Plan (Demetriades, 1998) and trust-building efforts sponsored by the international community invested in the restoration and preservation of shared heritage. Both the Armenian monastery and the Tantakake mosque, as well as other historic buildings, were restored thus highlighting their cultural and historical importance. However, these efforts have not produced the expected results in the context of Cyprus’ layered histories and identities. Most restored buildings remain in an awkward historical limbo being sporadically used for cultural events but having in effect lost their role and position in Nicosia’s traumatized civic identity. Studying how and what users of Nicosia choose to neglect will enable our research methodology to develop and test spatial strategies that can study and contribute to the re-association of these built historical sites with the everyday lives and habits of its inhabitants.

This reconstruction of the various phases the Paphos gate went through will be contextualized via the digitization of the moat of the Venetian fortifications of the city, the laser-scanning and 3d modeling of which constitutes the first stage of the project. This case demonstrates how the research presented can contribute to the study of the physical space of the city via the use of a hybrid interactive environment - as the moat is currently an empty, open-air zone around both parts of the divided capital. Simulating possible scenarios of intervention (e.g., presenting the under discussion by the Municipality of the Greek-Cypriot part implementation of landscape design proposals involving cycling routes and linear parks) may offer a test bed and a starting point for collaboration between the two parts towards the transformation of the moat into a belt of events that unites the two divided sides of the historic city. The presence of the moat is considered as an asset of the city and part of its identity, but its current state is problematic - as after the division it has been treated as a discontinuous leftover space servicing the walled city (hosting parking spaces, ephemeral sports amenities, etc.). Distinct from other studies that focus on the representational power of the Venetian Walls as a symbol of the city – and the way this was used by both communities as a cognitive mechanism of memory, the present research is occupied with the moat as an “interface,” a shared resource of the city and studies monuments of cultural heritage as part of a strategy of compliance that benefits the lived experience of using public space/walking in the city.

The digital techniques used to simulate these virtual environments will, hopefully, enable us to understand how the position, scale, organization, form, proportions (of openings) and experiential aspects (i.e., light, material textures, etc.) of space, transfigured in time, impact the bodily movement of users of the particular space (e.g., walking pace, direction, points of stasis, points of interest, etc.) and thus the operation, use and occupation of this place. Through the production of a virtual space, which is also populated by ambiguous constructions (e.g., found objects, remains and left-overs of buildings demolished, and historical artefacts) that invite users to explore, get involved, and therefore engage with the digitally simulated environment in order to understand and learn, we envision the creation of a platform that can contribute not only to the study of the past but also to serve as a test-bed for projective interventions. When the project progresses to its second phase as planned, and the interactive environment not only hosts reconstructions of historical buildings but also presents future interventions that are at the stage of procurement, or under public discussion, then it will hopefully
provide insights for the degree of integration that the planned works may have with the rest of the existing urban space— as well as information regarding its acceptance by the locals and visitors.

Societies develop identities and reproduce, among other processes, memories via inscriptions onto cultural artefacts (monuments, books, etc.) and participatory rituals that engage members of each community in social activities and bodily experiences, (cf. Connerton, 1989; Sorkin, 1992). By incorporating digital media techniques with bodily movement, this interdisciplinary methodology aspires the generation of a collaboration “stage” capable of sustaining interaction, mapping and representing social memory and its relation to cultural heritage.

DIGITAL METHODS OF ANALYZING THE EXPERIENCE OF HERITAGE SPACE

The on-going research presented in this paper is developed in the context of the Cyprus Institute’s collaborations with the National Super Computing Applications Center at the University of Illinois-Urbana Champaign, the Cyprus Department of Antiquities and the Nicosia Master Plan group of the Municipality of Nicosia. The project is based on interdisciplinary collaborations between heritage, archaeology, architecture, urban studies, simulated environments and computer science and focuses on knowledge sharing and communicating experience. It suggests a new experience-centred method of cultural heritage site explorations that can facilitate data collection of mis-appropriated territories and challenged historical sites. The presented methodology (Figure 4) facilitates the emergence of a new narrative flow between the new (projected future interventions in the urban-scape), the old and the “absent” (unbuilt, demolished or transformed) as the techniques presented hereafter offer a parallel understanding of alternative urban conditions and capture uncertainties in spatial experience (in movement, in choice, in stasis, etc.).

Collaborating participants, visiting the virtual environment as expert users, will be able explore the territory of the monument, learn about its history and inquire about issues of accessibility (ease of access and expected/anticipated behaviour). Immersed in this environment the visitors will act as agents that explore and interact with each other on the virtual stage. The purpose of this journey is...
two-fold: while users educate themselves about the history of the monument, operators of the environment will be able to collect data of movement and spatial behaviour (points of stasis, walking pace, orientation, points of interest, gaze, etc.). Through the analysis of this metadata, the proposed platform will empower the researchers engaged to further understand the capacity of the simulated common ground in staging the public life of different communities, but also to value the role of the monument studied in the lived experience of the particular area of the city. We envision that this user-interface (Figure 7) will enable people’s intuition to be communicated creatively via sophisticated data techniques, and potentially enable researchers to test and evaluate hypotheses regarding the historical transformations of the urban fabric studied.

The challenges of this interdisciplinary study lie in: a) the degree of realism that the virtual construction of the simulated spaces exhibits, and b) the implementation of a natural and intuitive user interface that will enable the immersion of the users in the virtual environment. In terms of optical and sonic representation, the experience of visiting the real-time 3D virtual environment depends on the level of detail of the geometry (3D models), image size and resolution, image colour depth, lighting simulation, rendering method, quality of textures used in the 3D models, refresh rate of the image, physics, sound-scape, etc. Significantly, irrespective of the level of image quality, the experience can only become engaging via the employment of a ‘good enough’ interaction device for the user-interface (UI) that needs to be ubiquitous and non-obtrusive, (cf. Artopoulos and Condorcet, 2008). We hope that the incorporation of the stereoscopic vision of the Oculus Rift™ goggles and the Virtuix Omni walking device (treadmill) will allow the collection of metadata of circulation and bodily movement in the virtual space that is more descriptive of the users’ spatial behaviour than data collected through typical controlling devices in virtual worlds (e.g., keyboard, mouse, joystick, SpacePilot™, hand-gestures) since the former interface “feels” more natural than the latter. Incorporating the interface in a full body interaction device with the RT3dVE (e.g., Rift and Omni presented above) assists in minimizing the impact of the UI on the decision making process of the user during the virtual visit of the environment and the less-than-typical mediated response to optical signals. We hope that this instrumentation of the immersive environment will facilitate the observation, the minimally obstructed by technological mechanisms interaction and consequently will allow for more direct expression of bodily responses to external stimuli.

This “unmediated” (to the degree that is possible) interaction of the visitor with the environment is of paramount importance in order to achieve the level of immersion that is required for the analysis of the metadata of the users’ spatial behaviour. In the second step of the first phase of the project, the user base will be expanded to include also non-expert users, i.e., locals and tourists. Choosing routes inside, over and around the reconstructed monument (in different phases of its long history), paths to approach it from the neighbourhood, points of stasis to gaze over the other side of the wall (to the Turkish-Cypriot part of Nicosia) and to possibly examine the various spolia, reliefs, inscriptions and other artefacts that were found embedded in the façades of the monument, will allow researchers a more informed study of how members of different communities perceive and think of the particular monument and use the public space that hosts it. Overlaying circulation paths, as well as mapping the characteristics of the users’ visit, will benefit the visualization and in-depth survey of the way people make sense of the spatially distributed complexity of historic cities.

In the second phase of the project, the virtual stage will be expanded to include larger parts of the city. This development will assist forming detailed research inquiries about the symbiotic, and complementary, participation of old and new interventions in the development of the city, and the impact that political and cultural changes have on the everyday use of transitional spaces by different communities and groups.13 In regards to the specific example of the Paphos gate, the production of the presented methodology involves the following stages:

1. Modeling of the current state of the gate, its surrounding built environment and a large part of the moat (current state of the research presented).
2. Production of a thorough structural analysis of these spaces identifying building phases, restorations, etc.
3. Capturing and collection of data of visitors’ walking patterns in the virtual space of the digital reconstruction.

The constraints of this research include the necessity for the reconstruction of large enough areas of the terrain of a city so that the experience of visiting the virtual stage is convincing at the architectural scale – as opposed to the requirements of representing artefacts in museums. Capturing the multiplicity that a historic city exhibits is of paramount importance for the performativity of the staged public space. Also, important role plays the number of users - higher number of players will cover a broader spectrum of unique behaviours and therefore will offer a more representative and clear understanding of people’s preferences. Producing metadata of visits by users of different age, education, sex, class, cultural background and ethnic origin can offer a broader spectrum of responses which can further our understanding of the qualitative variances of their walking experience.

Also it is significant that a lack of historic data for the accurate development of the simulated terrain by means of maps, drawings, textual descriptions, etc. would severely restrain the faithful representation of the complexity of the reconstructed space. The more articulated the reconstruction of the space, the more accurate would be the understanding of how and why people behave the way they do in the virtual environment. Information from historical sources and archaeological research regarding the simulated spaces’ articulation, material, dimensions, usage (e.g., the ephemeral operations that take place in the moat), social habits of the inhabitants of the area in the timeframe of the study, as well as of the topography and organization of the urban-scape, are important for the recreation of the structure and social qualities of public open space, (cf. Wu and Plantinga, 2003). The application of this methodology to other historical cities will enable the creation of a network of nodes of “staged” virtual public space that can facilitate the collection of metadata and exchange of information between the areas studied. The visualization of this metadata will highlight patterns of occupation along with a map of the different kinds of complexity that segregated areas of the cities studied exhibit.

Figure 5. Laser scanning the inside of the walls part of the Paphos gate.

Figure 6. First on-screen preview of the point cloud captured by the laser scanner.
CONCLUSIONS

It is recognized that “social conflict has spatial expression, and that spatial form in turn helps shape the conflict” (Gaffikin, Mceldowney and Sterrett, 2010). Preliminary studies in Nicosia show that the identification of heritage monuments in the daily spatial experience of refugee families remains partial and selective. Buildings and public spaces originally created with the purpose of becoming urban condensers and vessels of social life are no more recognized as such and are left in decay - them being associated with the Greek- or the Turkish-Cypriot community respectively. However, the historic context of urban environments, like Nicosia’s, offers a higher level of complexity beyond simple reduction to dipoles and oppositions. This intricate framework is generated by layered symbiosis, the centuries-long co-existence and interactions of communities, the impact of conquerors, colonisers, of the new with the old. This social, procedural organization is an essential characteristic of the very structure of public space (Massey, 2005). Being able to study in depth this process with digital tools can potentially provide the means to stitch the hard borders of contested space in segregated cities back.

The synergy of virtual environments techniques with urban studies and architectural history can contribute to the development of cross-disciplinary projects that will enable holistic studies of
contested urban space, and in particular historic cities and their future. Distinct from practices that work at a “bird’s eye view” of urban dynamics, the methodology presented focuses on the micro-scale of the moving body on the performative stage of public space. Building on previous research on performative spaces for presentation and collaboration purposes (M. Nitsche & P. Richens; M. Nitsche & S. Roudavski; G. Artopoulos & S. Roudavski; and, G. Artopoulos & E. Condorcet), this project aims at the progressive development of: a) data visualization techniques (a factor which involves vision and therefore brings to the fore issues of representation and aesthetics - a qualitative parameter); b) the level of interaction (elaborated programming skills - a quantitative parameter); and, c) the dynamic associations between the kinetic aspects of the human-computer interface and the architectonic qualities of projected space (both involving articulated cognitive and kinaesthetic parameters). The project’s field of operation is understood as a quasi-physical environment, a performative stage that is suspended between the real-world materiality of the city and the virtuality (i.e., the possibilities) of the digitally simulated terrain of historical and projective stages of the city. The users of this simulated environment are taking cues from the spatial organization and geometry of the physical space, as this is projected in the digital one. This “digitally staged” stimuli in turn motivates the spatial behaviour of the visitors and triggers their response by means of bodily movement, which is both physical (via the use of the Oculus Rift™ kit) and projected in the simulated terrain of the city studied.

In conclusion, mapping the spatial experience of historically layered monuments and spaces can provide a model methodology for interdisciplinary approaches that inform the discourse between digital heritage and more traditional humanities research. For contested urban environments such efforts offer a neutral virtual canvas upon which researchers can engage urban planners and policy makers towards a better understanding of the past, a closer analysis of contemporary challenges and, informed planning for the future.

**ENDNOTES**

1 The study of divided and contested cities has been receiving the attention of scholars over the past couple of decades. Works like, Fainstein, Gordon and Harloe, (1992); Boillens, (1999); Calame and Charlesworth, (2009); Pullan and Gwiazda, (2009), Gaffikin and Morrisey, (2011), address the complexity of these urban environments approaching them from various methodological and disciplinary perspectives.

2 Territorialization refers to the process of the transformation of a (public) space to a place demarcated by a specific group of people with regards to patterns of occupation and usage.

3 For the most complete overview of the city's history and archaeology, cf. Michaelides, (2012).

4 Tackling issues of memory, place and conflict in the historic city of Nicosia, cf. Bakshi, (2011), and (2012), where the author attempts to locate reality and memory in the contested landscape of the Cypriot capital.

5 For a discussion of the ways fortifications were experienced and perceived in the medieval period in Byzantium, cf. Bakirtzis (2010).

6 “All boundaries, whether national, global or simply street names on a road map are socially constructed. They are as much the products of society as are other social relations that mark the landscape. For this reason, boundaries matter. They construct our sense of identity in the places we inhabit and they organize our social space through geographies of power [...] exclusionary practices and moral censure have been the basis for much of our territory and boundary making in the development of cities. The walled communities and villages of the past served to keep citizens safe and intruders out.” Cf. Malone, (2002).

7 An important distinction needs to be drawn between cities contested around standard issues of pluralism— disputes about social reproduction around differentials in class, ethnicity, power and status—and those contested around both pluralism and sovereignty—the latter concerning issues of state legitimacy and rival claims of national belonging [...] such cities have not been immune from the main urban narratives over recent decades, e.g. the extent to which the commercialization and privatization of social life has crowded out the communal public realm and promoted partitioned social space; the extent to which “fake” anaesthetized public space is replacing the more authentic, if messy, “real” urban spaces” (Gaffikin, McEldowney and Sterrett, 2010: 494).


9 Besides Nicosia, other Cypriot cities, towns and villages once shared between Greek and Turkish Cypriots offer examples and comparisons of this selective process.

10 Papadakis (2006), addresses the spatial experience of Nicosia along the line of division between Greek and Turkish Cypriots.
Virtuality here refers to the potential of each version of the represented space to host spatially distributed events and to be occupied by specific users, and therefore it characterizes the possibility of every computationally simulated space to provoke particular activities by its users.

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