Visual Essay

Virtually unseen: New digital understandings of reclaimed space

Abstract:
With the advent of distributed digital networks, spatial representation has transformed from what was once a singular and idealised view of inhabited space to multiple uncurated spatial fragments now captured by a vast range of portable devices such as webcams and mobile phones. The designer of the future 'envisioned' urban space will need to respond to complex, multi-scaled environments through the application of both quantitative and qualitative modes of visualisation and engagement.

This visual essay describes the interiors of three separate reclaimed public heritage precincts of varying structural scale, materiality and program. Despite their geographical and historical specificity, sites such as Zaha Hadid's MAXXI Museum in Rome, The Museum of Contemporary Art of Rome and Carriageworks, exist as part of an increasingly growing global network of reclaimed post-industrial cultural developments that have been reconceived at new programmatic scales to respond to the emerging and ever-changing demands of social occupation. Produced with the aid of ImageJ technology, a software typically used in biological and medical imaging procedures, both form and spatial depth in captured interior footage from these three projects are completely transformed into new spatial representations recomposed as variations in colour and brightness.

In a radical departure from the precise formal delineation of linear perspective, the new 'atmospheric' perspective seen in this image series not only unveils unseen traces of former modes and histories of the occupation of these interior spaces, but the reassembly of digital image content proposes a profoundly different type of engagement with new experiential and spatial conditions released by the fluidity of the digital array.

A new visual paradigm
Geometric properties associated with the digital image's basic functional unit, the pixel, set digital image-making apart from other processes of pictorial manufacture and presentation. The two-dimensional representation produced in analogue image-making processes such as painting, drawing or photography, is constrained by the spatiotemporal context of the medium. In other words, the medium is physically fixed and does not evolve across a temporal frame.

On the other hand, digital geometries and procedures allow the image's internal structure to be altered or manipulated through the accessibility of its array and the mediation of its technology. This positions digital imaging processes within a mode of pictorial manufacture that profoundly ruptures previous types of finite image content and controlled viewer responses.

To expand this further, the physiological and phenomenological responses of the human visual system to an object's colour and shape are highly inflected towards contextual presentation, while our perception of brightness, unlike colour and shape, is largely dependent on the biological procedures of human optics and differs according to the translating medium (Livingstone 1988). It follows therefore that we rely upon a traditional arrangement of this pictorial data according to the coordinates of a Cartesian grid in order to understand the physical world around us and, more specifically, to understand a scene.

Within a contemporary digital environment, the spatial content of both the single image and video footage is formed according to a digital array in which the pixel is the base unit of image composition and whose arrangement delineates the way the image describes form and spatial depth. While the digital image 'appears' to offer the same representation of reality as does the

analogue image, its geometries are completely different. To exemplify this, there is no digital 'line' as such, but rather an arrangement of individual pixels of identical colour and brightness within the digital array. Furthermore, the digital image's unique mediating technology means that the format of the array, and by extension image content, is easily manipulated and transformed while also retaining an identical quantum of data as the original image. The disruption to, or rearrangement of, the traditionally formatted image data therefore makes this new configuration seemingly incomprehensible to the viewer. Also, the simultaneous removal of the standard viewer/object relationship, by forestalling any prescribed perceptual response, unleashes new qualitative properties associated with the imaged space. It is these new arrangements that describe a new type of atmospheric perspective in which pixel syntax determines spatial delineation through quanta of colour and brightness.

The image series describes the release of the new atmospheric perspective within digitally captured space by using a mechanism traditionally used to track and map the progression or remission of disease: biological and medical imaging software. An open-source version of this software is ImageJ,[1] a Java-script software that allows custom acquisition, analysis and processing plug-ins to be developed using its internal editor and Java compiler. Being public domain open source software, an ImageJ user has the four essential freedoms defined by the Richard Stallman in 1986. "1) The freedom to run the program, for any purpose; 2) The freedom to study how the program works, and change it to make it do what you wish; 3) The freedom to redistribute copies so you can help your neighbor; 4) The freedom to improve the program, and release your improvements to the public, so that the whole community benefits." (Ferreira and Rasband 2012). One of many similar transdisciplinary applications that allow the digital image to be understood within a three-dimensional temporal frame, this software was selected for its ability to assess fine-grain a well as large-scale subjects. Offering a high degree of accuracy, this diagnostic tool has the unique capacity to reconfigure image data completely while simultaneously retaining the finite quantum of data within the image. In other words, the image content is unchanged, but its reconfiguration means that it is no longer recognisable as a traditional scene. ImageJ's adaptation as a design tool therefore calls for a new understanding of what type of information the software might provide.

The specific problem set addressed by medical imaging in its traditional disciplinary role is the analysis and representation of disease progression over time. This function can also correlate to changing spatial conditions associated with the optical properties of colour, brightness or shape in a selected location and the complex atmospheric properties associated with sites that have operated across an historical frame. For the correlation to be understood, the progression of disease now translates as variations in spatial relations along a 'z' or temporal axis of the assembled video stills. In this new scenario, any known forces at play within the imaged physical space are profoundly reversed or inverted. Form is distorted and fluid, colour is amplified and expanded along with the dynamic range of the space's brightness through their extension across the 'z' axis of the image stack. Put simply, the total recalibration of the image fostered by both the digital array and the digital software initiates a new type of atmospheric perspective in which the interplay of physical forces within space demand a correspondingly new type of viewer engagement. This engagement is now defined in terms of pictorial arrangements colour and brightness rather than understood according to predictable linear spatial determinants of the Cartesian grid.

Temporal space

The ImageJ software was used to extract a selected block of 'space-time' from video footage of the interior spaces of the selected sites and to organise the visual data into manageable image stacks. These multiple, spatially and temporally related images or slices can be easily manipulated, rotated and reassembled. Figure 1 shows how the image data is compiled into orthogonally intersecting *x,y* axes that extend the visualization along a 'z' or temporal axis to produce a complete reconfiguration

of the visual content and also, by extension, of the formal spaces represented in the image stack. As one of a series of axial cuts that collectively describe space, the image slice is distinct from other modes of temporal spatial presentation because it takes advantage of the visibility of the three-dimensional axes made available by this mode of representation. As such, visual data, while remaining finite in content, offer very different compositional possibilities from alternative presentation mechanisms, such as montage, when aligned along the different axes of the image stack. Furthermore, the viewer's ability to explore the three-dimensional 'interior' spaces of the image stack through the individual slices means that spatial conditions can be precisely and selectively located and observed within a temporal frame.

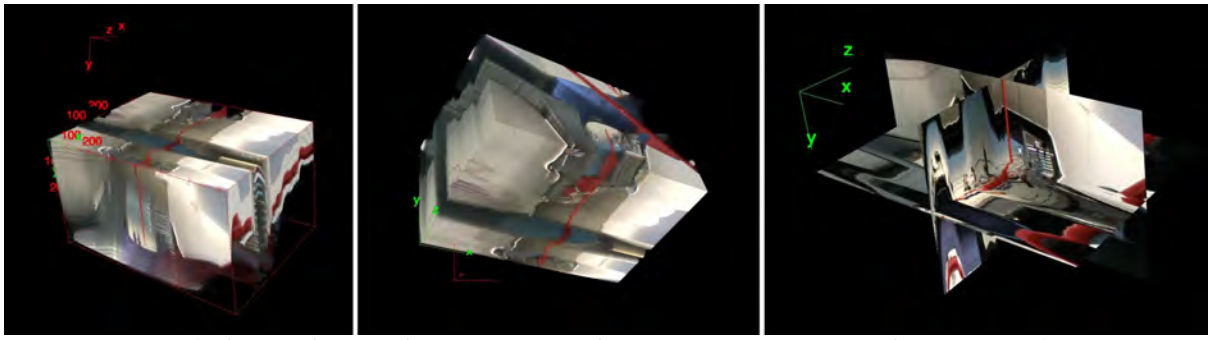

Figure 1: Image stack of interior footage of MAXXI Museum (left and centre); orthogonal slice from image stack showing reconfigured views along different axes (right), 2011

Compiled as a multi-tiered montage in Figures 2 and 3, the recalibrated video footage allows complex spatial conditions to unfold as temporal patterns of colour and brightness and shape which correspond to the various materialities, structures and programs of the individual cultural precincts. The trajectories through different spatial axes are profoundly unique to each individual precinct and previously hidden in non-digital modes of representation.

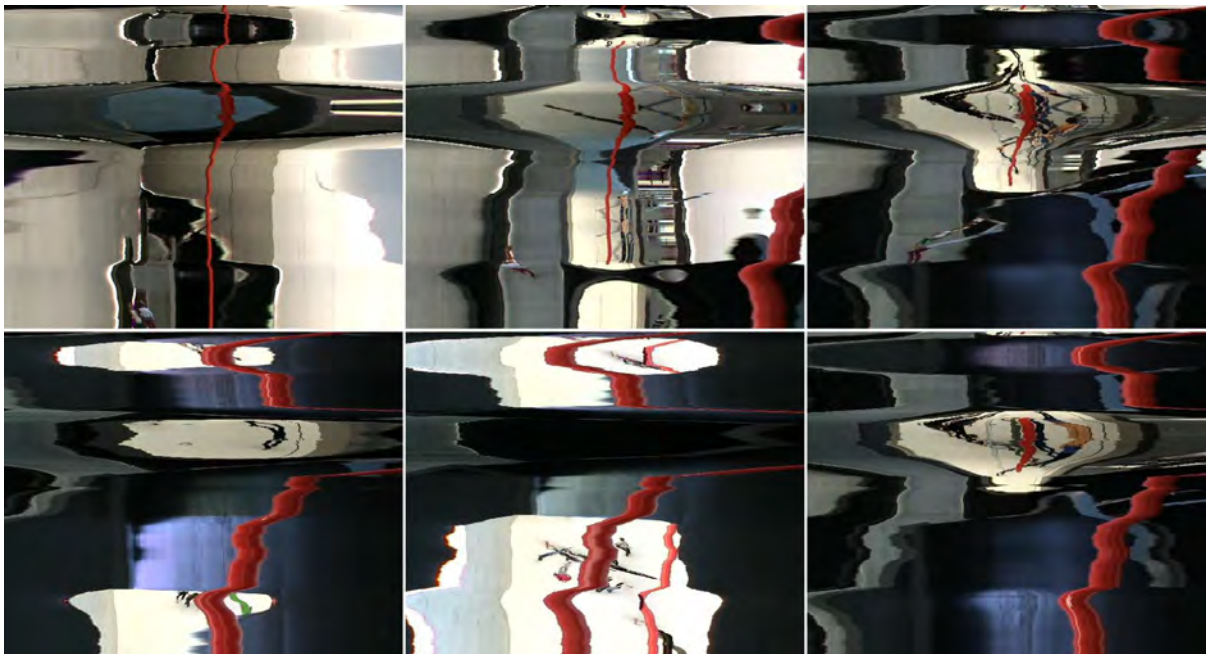
Figure 2: Montage of image slices extracted from XZ axis of image stack from interior footage of MAXXI Museum), 2011

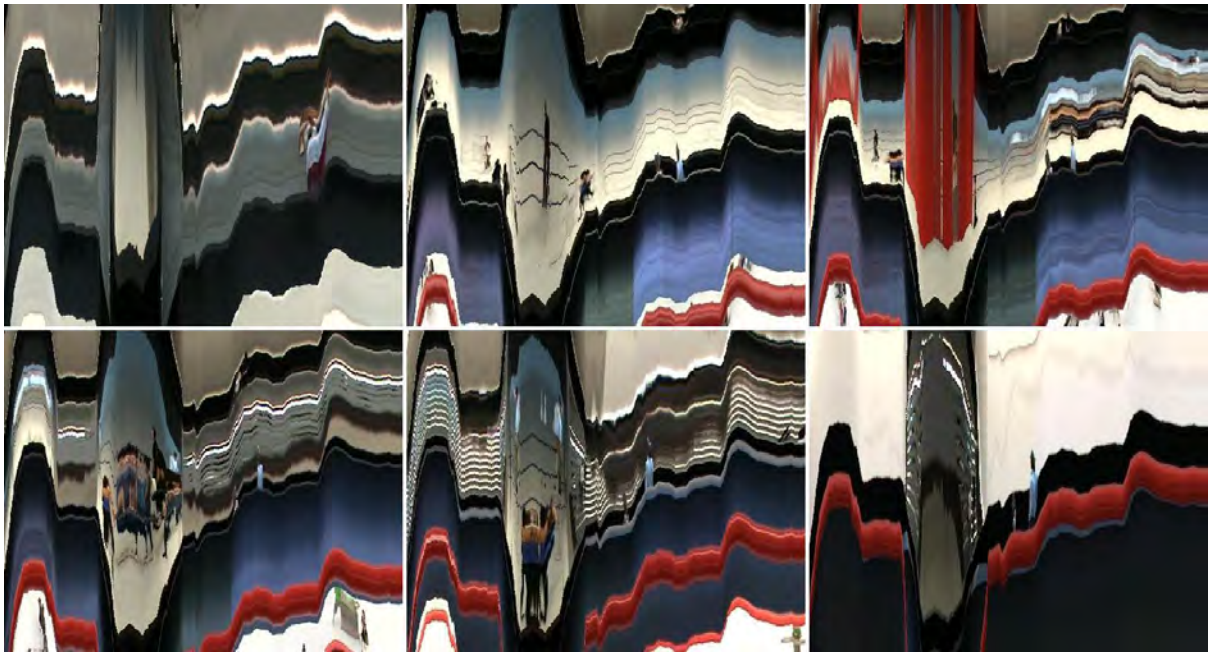

Figure 3: Montage of image slices extracted from ZY axis of image stack from interior footage of MAXXI Museum, 2011

MAXXI

Rome's National Museum of 21st Century Art (in Italian: Museo nazionale delle arti del XXI secolo – MAXXI opened to the public in 2010. It is managed by a foundation created by the Italian ministry of cultural heritage. The late Zaha Hadid won an international competition to design the museum, which was built on the site of a former military barracks, the Caserma Montello, and incorporated parts of it. Construction took over ten years. The site was selected for the unique tension created between the new building and the fragments of the remaining heritage precinct that encircles it. The distinctive materiality of latter (Roman terracotta masonry) infiltrates the interior spaces of the Hadid building, adding another layer of atmospheric data to the captured footage.

The following montage (Figure 4) extracted from video footage is a 'snapshot' of MAXXI's interior network of interwoven, elevated circulation pathways; highly coloured supporting columns; materiality driven by large-scale areas of cast concrete; and minimal use of glass to mediate light from the material fabric of the external world. The images that follow it, (Figures 5-10) completely redefine the spatial properties of the museum's interior space. The recalibration of material features, particularly owing to the translucency of the glass, mediates the colours of the exterior masonry and foliage throughout the precinct interior, while the effect of the concrete is correspondingly diminished. In a similar vein, highly coloured structural elements assume a seemingly exaggerated prominence within the visible order of content in the space in relation to their 'actual' presence, which is minimal. In this newly conceived space, the familiar effects of planetary gravitational forces are removed while polar coordinates are transformed into parametric curvilinear space whose variation progresses according to strong shifts in colour and brightness intensity as the camera moves through the interior space. This disorienting spatial re-presentation now devoid of all locative reassurance, forces the viewer to contemplate and reassess other more prominently featured properties of this space according to different criteria: to strata of colour and their correlation with the actual experience of navigating MAXXI.

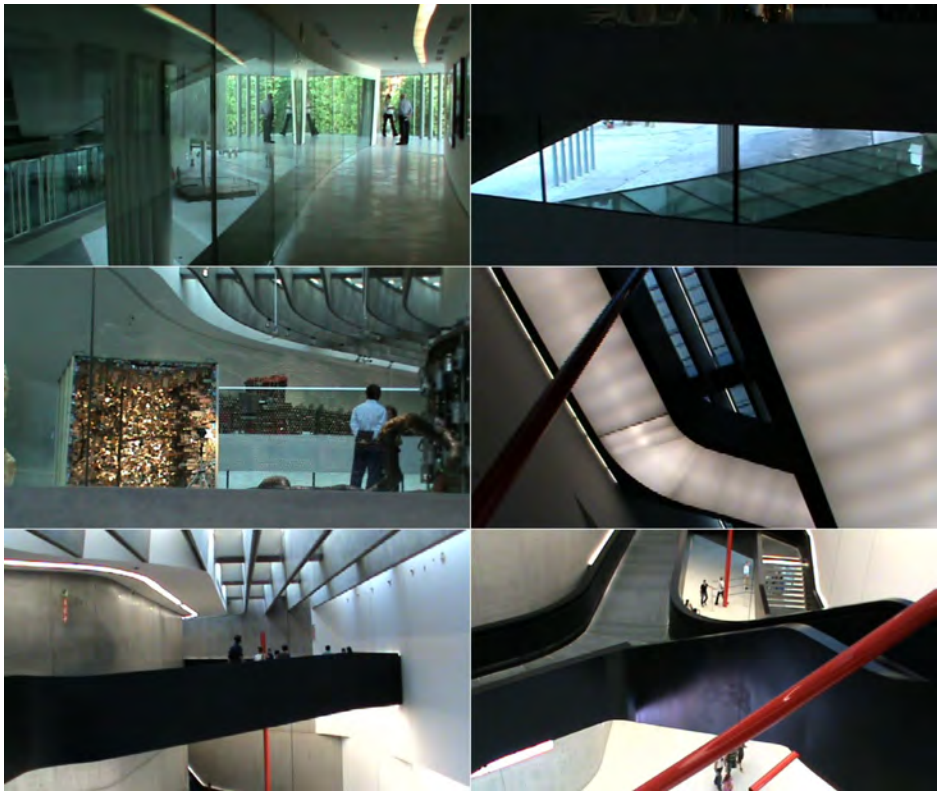

Figure 4: Montage of unprocessed single museum stills extracted from each video in the MAXXI image series, 2011

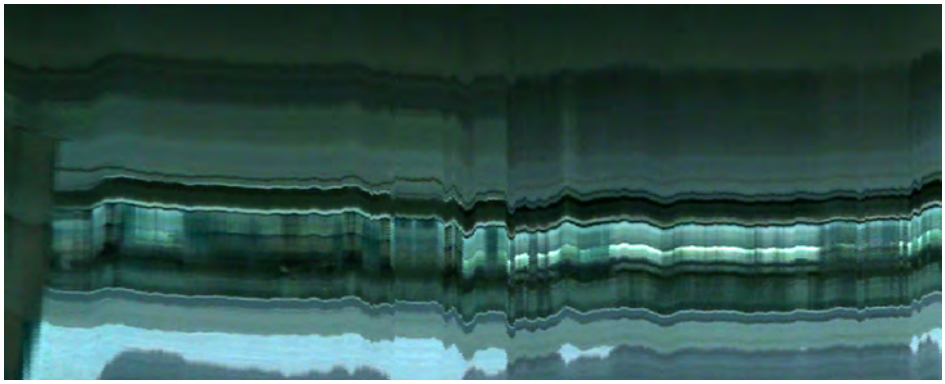

Figure 5: MAXXI 1, 2011

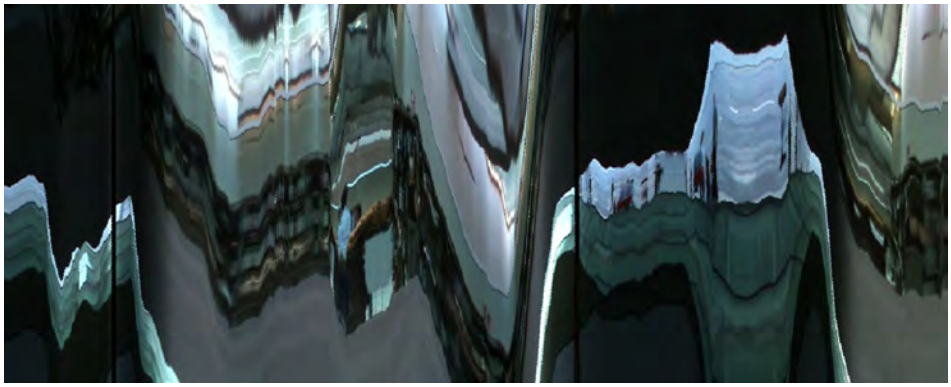

Figure 6: MAXXI 2, 2011

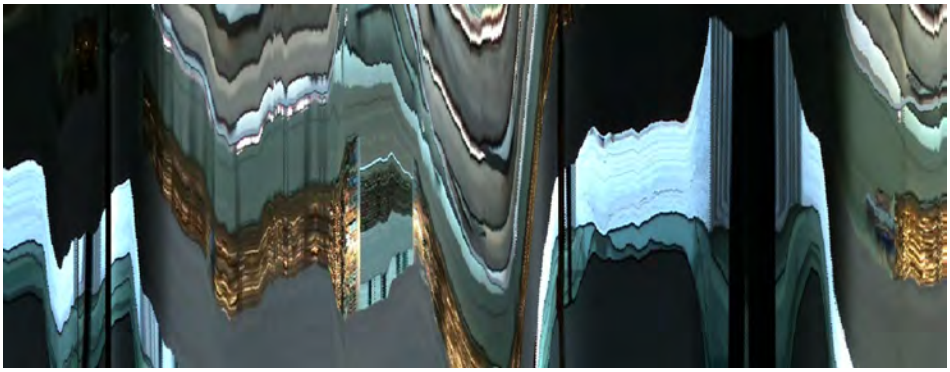

Figure 7: MAXXI 3, 2011

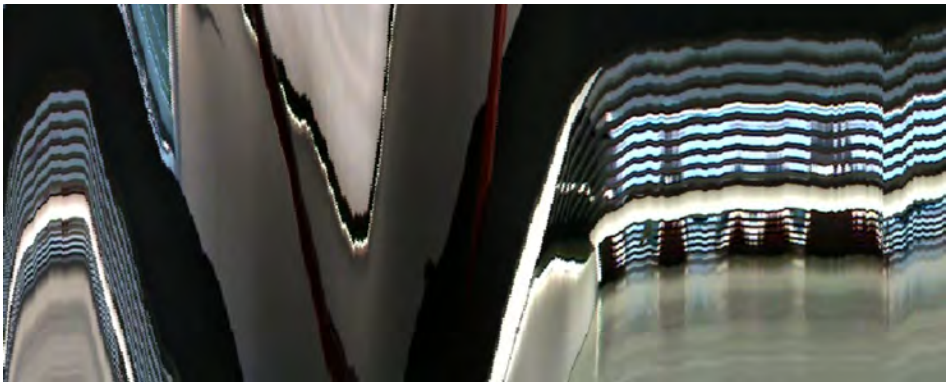

Figure 8: MAXXI 4, 2011

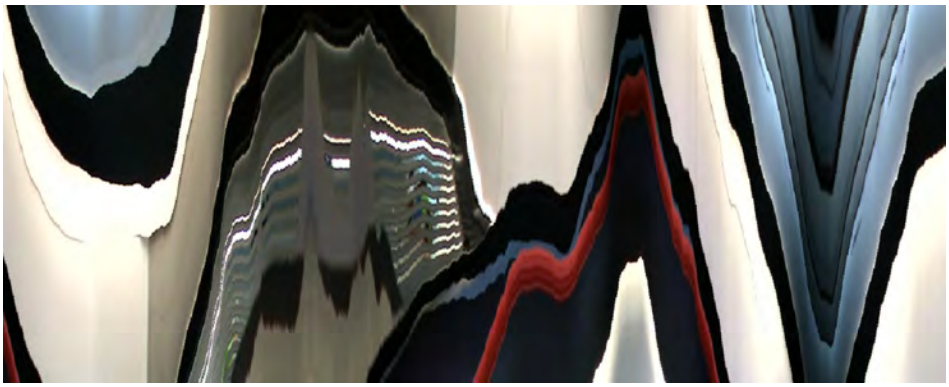

Figure 9: MAXXI 5, 2011

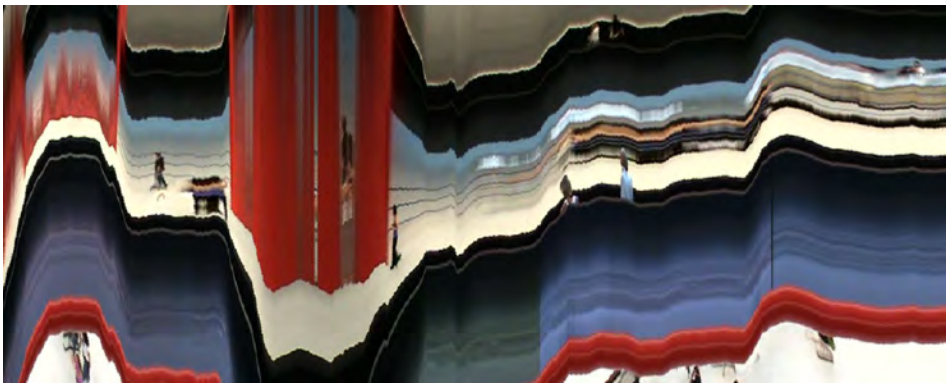

Figure 10: MAXXI 6, 2011

MACRO

The Museum of Contemporary Art of Rome (in Italian: Museo d'Arte Contemporanea di Roma – MACRO) is located on the site of a former brewery in Via Nizza, in the city's Salario quartiere, and a former slaughterhouse in Piazza Orazio Giustiniani, in the Testaccio quartiere. MACRO was officially opened in 2002. This site was selected because the precinct's extremely dense, compacted materiality forces a constrained camera trajectory within the interior space that heightens its claustrophobic effect.

The montage (Figure 11) shows MACRO's adapted interior with its retention of structural features from its former role as an abattoir. Despite the modernisation and revitalisation of the space's program as a marketplace, the images are eerily reminiscent of the less uplifting aspects of this space's former use. The recomposed representations reveal a latent visceral and sinister undercurrent seen in the reworking of the black structural iron framework. This is interspersed with highly coloured red floor covering, again reminiscent of the building's past use as a slaughterhouse. One particularly compelling aspect of these images (Figures 12-17) is the apparent spatial compression that occurs with the multiplication of jagged 'peaks and troughs' in the banding of the recomposed spaces, which is far more exaggerated than in their MAXXI counterparts and is a reflection of the narrower camera axis. This provokes an overwhelmingly suffocating effect, which is only heightened by the intensity of the space's colour palette and the sense of moving at high velocity through a difficult, thorny and impenetrable terrain.

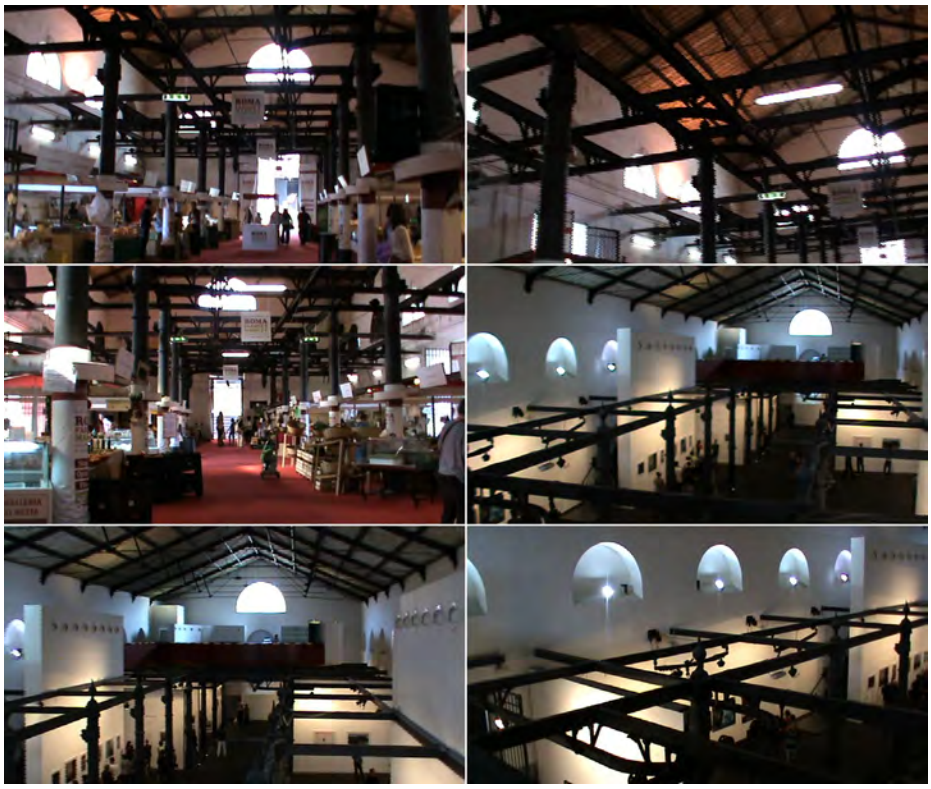

Figure 11: Montage of unprocessed single museum stills extracted from each video in the MACRO image series, 2011

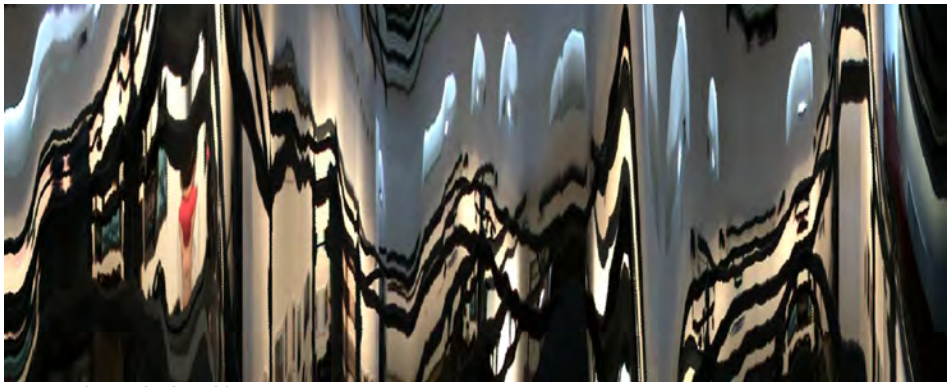

Figure 12: MACRO 1, 2011

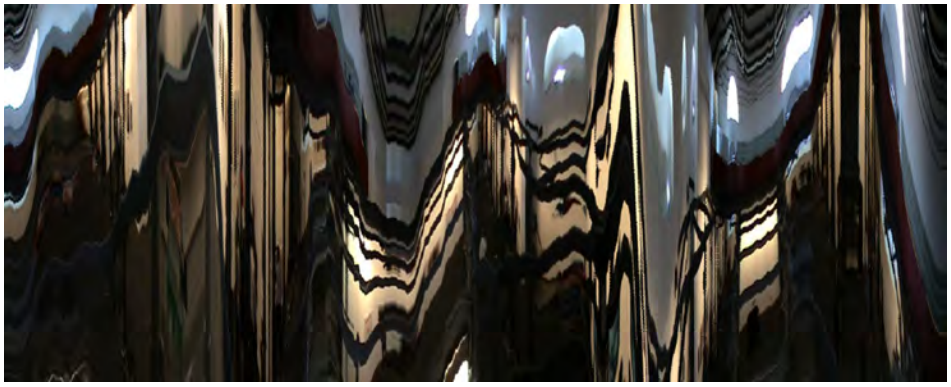

Figure 13: MACRO 2, 2011

Figure 14: MACRO 3, 2011

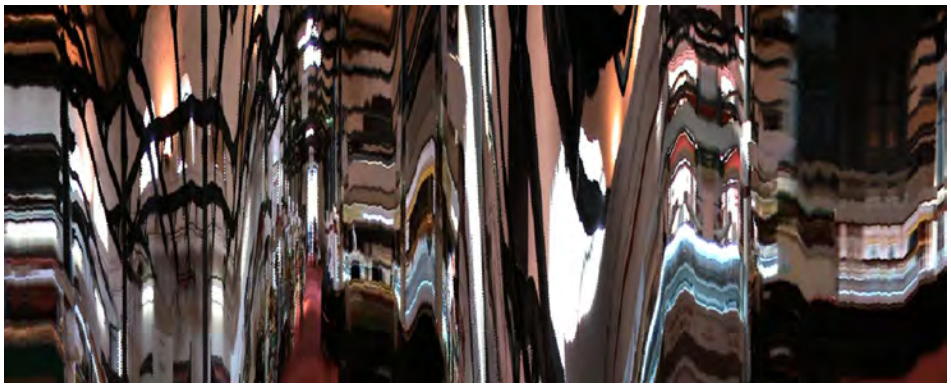

Figure 15: MACRO 4, 2011

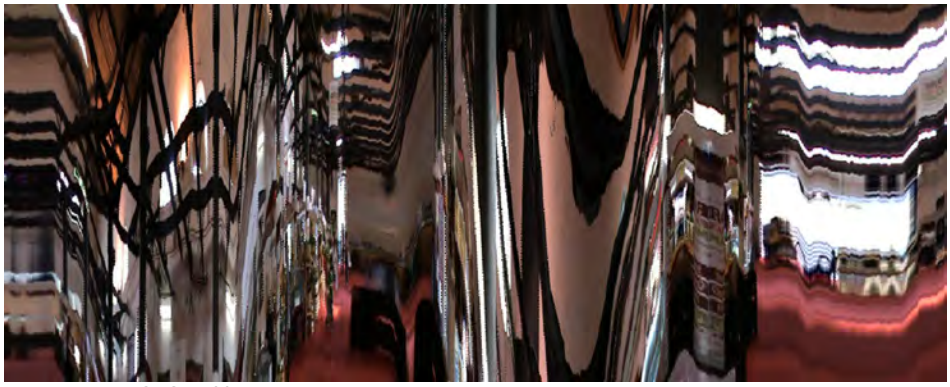

Figure 16: MACRO 5, 2011

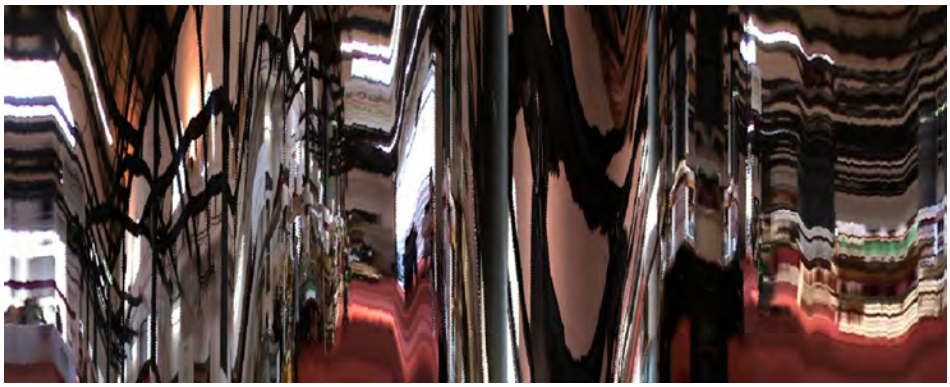

Figure 17: MACRO 6, 2011

Carriageworks

Carriageworks is an artist-led contemporary multi-arts centre in Sydney. It is a cultural facility of the New South Wales (NSW) Government and receives support from Arts NSW and the Australian Government through the Australia Council for the Arts. It occupies part of the site of the 51-hectare Eveleigh Rail Complex Yards, built between 1880 and 1889, which includes the heritage-listed Eveleigh Railway Workshops and the decommissioned Eveleigh Carriage Workshops.

Unlike the its Italian counterparts, the video capture of the Carriageworks precinct was undertaken at the ground plane rather than from an elevated, aerial position (Figure 18). While the recalibration process unveils material and colour-related properties and peculiarities unique to this precinct, it is nevertheless the reworking of the precinct's structural and material properties in this segment of the series (Figures 19-24) by the camera's location at ground plane that delivers the most profound departure from, and interrogation of, traditionally conceived interior space. With the camera set at a perpendicular rather than oblique angle to the captured scene, the interior space of this precinct is successively compressed and expanded, giving each static image the exaggerated three-dimensional effect of folded, curvilinear space. This not only re-presents unique older building features, such as the fenestration, in new and compelling ways, but offers alternative conceptions of how the interior spaces of the heritage typology might be reconceived within the new parameters of digital drawing.

Figure 18: Montage of unprocessed single museum stills extracted from each video in the Carriageworks image series, 2011

Figure 19: Carriageworks 1, 2011

Figure 20: Carriageworks 2, 2011

Figure 21: Carriageworks 3, 2011

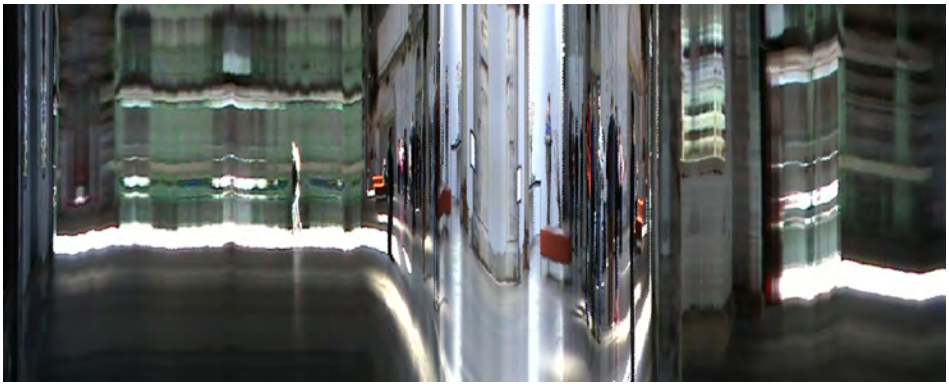

Figure 22: Carriageworks 4, 2011

Figure 23: Carriageworks 5, 2011

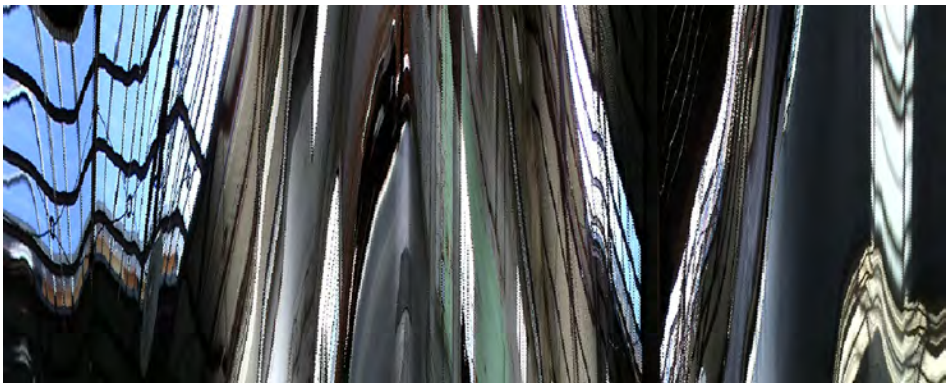

Figure 24: Carriageworks 6, 2011

This series thus introduces a new type of spatial visualisation into the architectural arena. In this new digital visual environment, space is made fluid by the digital array and the pixel ensures that no line is

continuous. It is a world of transformed visual properties in which distance and proximity, north-south coordinates or any palpable or definable force in the physical world can any longer be understood in terms of a rational linear grid but conceived instead as an alternative atmospheric perspective in which colour and contrast are the defining factors.

By tracing different sampled spaces of three cultural precincts, the series reveals the image stack's capacity to release an alternative reading of a space through its axial representations that is unique to each precinct and which expands its spatial identity in these new terms. Furthermore, it also shows that the unique assemblies that comprise each of these representations connect the architect to correspondingly new, unique and enriched types of spatial and material assemblies. With the viewer in a new productive role, these demonstrations of a new visual geometry and technology not only interrogate the more traditional representation of form and materiality but recalibrate it according to the qualitative properties already present within interior space.

NOTES

[1] This software is available at: http://rsb.info.nih.gov/ij/

REFERENCES

Ferreira, T. and W. Rasband. 2012. *ImageJ user guide*. https://imagej.nih.gov/ij/docs/guide/146.html. (accessed November 9, 2019).

Livingstone, M. S. 1988. Art, illusion and the visual system. *Scientific American* 258:78-85.