A Theory of Artistry for 3D Data Fusion

The element of craft in digital reconstruction

Michael Jemtrud, Philam Nguyen, James Hayes, Grant Oikawa, Ryan McLennan
Carleton University, School of Architecture, Carleton Immersive Media Studio, Canada
http://www.cims.carleton.ca

The following paper will articulate through an urban renewal proposal project for an area in Montréal, Canada that uses a "3D imaging and modeling protocol" and that accounts for the interaction between mediation and making in digitizing and constructing existing conditions digital artifacts. The protocol incorporates multi-sensor technologies with modeling and rendering techniques through a process of interpolation between a heterogeneous set of existing photographic, physical, and 2D documentation. The mode of operation implemented is a multi-layered and hybrid approach that recognizes the interplay between human scale and perception, visualization and abstraction of data and geometric accuracy, space and time.

Keywords: *3D modeling; digital reconstruction; craft; urban re-development*

Introduction

There is no singular approach to the 3D digitization of existing urban and architectural conditions. This is not to say, however, that there exists a diverse precedent in this realm of work. Current approaches privilege efficiency over quality or photo-realism over accuracy and seldom is there a proclivity to capture multiple and simultaneous qualities. In order to transform an amassed archive of assets that have the potential to render artifacts that are richer than the value of their individual parts, the integration and splicing of diverse data sets must be approached with the innate understanding of the biases of the various modes employed *and* with a theoretical stance on representation. Therefore, in spite of (and because of) the high degree of technological mediation involved in the process, a distinctive ability *to craft* the digital artifact is up for grabs and required.

The integration of technologies, such as 3D modeling, the compositing of high-resolution textures, photogrammatic modeling and acquisition of laser scan point cloud data, in diverse deployment schemas produces a robust digital artifact whose precision and quality can be re-mediated for differing output, ranging from high-definition video to the WWW.

Urban projections

The opportunity presented as a result of a balancing of "a theoretical stance on representation intertwined with a practical understanding of the biases of the various modes employed" with the technological requirements of the "3D imaging and modeling protocol" is one that allows for the artful crafting of the artifact and its critical positioning. This approach is predicated on the simultaneous, but not equally

represented, re-construction of a past, topological survey of the present and projection of a future. The congruence between the integration and fusion of the technological modes that constitute the artifact and the theoretical conflation of times, spaces and experiences is not pure coincidence but is essentially the recognition of the element of craft and techniques used for data fusion vis-à-vis the representational intentions of the project itself.

The content-based project that allows for the applied research and development of this approach is the creation of an interactive, immersive-virtual experience of an area currently under significant speculation in Montréal, Canada. Through a well-defined creative approach and methodology, the aim of this project is to re-present and investigate the complexity of this historical and urban situation. The 3D environment will include a multilayered virtual space (interactive, informational), to create a 3D augmented reality with media files from sound, text, video, and still images input from a variety of existing and potential sources. Beyond the actual creation of the digital content, a key component of this research is the varied and public interaction with the artifacts through intensive deployment strategies utilizing immersive and projection technologies in combination with high-performance visualization and broadband network capabilities. This will find expression in a public urban event that will include venue installations and site interventions as well as in the form of rich media and WWW. The artifacts produced in the form of aesthetic and informational experiences, in varied and diverse formats, will be of value in their own right. They intend to contribute to the cultural understandings and inform public decision making processes related to the future of the site in question in addition to serving as supreme demonstrations of the applied research.

The hybrid approach taken in this project, as it applies to the re-imagining of an urban area, significantly alters the way architects and designers think about and project future visions of a given site. This ability, as conveyed by Donald Kunze (1994), is es-

sentially art's capacity to destabilize presumptions of space, to exist within the gap between the unconceivable and that which is not yet conceived of. "In architecture as well as art, the future is a special form of the subjunctive tense. It is an "isn't" that acquires a momentary glimmer of life that, within art's prism, becomes more real than the dismembered past and fleeting present. Within projection the miracle of clarity becomes possible." Furthermore, instead of privileging an instrumental procedure of analysis and formulaic constructions, the process of mining an urban area for its history, textures, narratives and myths, and integrating artifacts that challenge the limits of their own creation, engenders a sensory and physical *encounter with* a site instead of a mere document of its existence or planned schema. "A city must remain open to knowing that it does not yet know what it will be. It is necessary to inscribe, and to thematize, the respect for this *non-knowledge* in architectural and urbanistic science and know-how. Otherwise, what would one do, other than apply programs, totalize, saturate, suture, asphyxiate?" (Derrida, 1998) Essentially, an *accounting* of/for this type of future vision is only achievable when the means do not point to an end but to an "isn't" or to a "non-knowledge" that is reflective of the nature of a city – one that is richly layered, in constant fluctuation and deeply rooted in memory.

A theory of artistry

This *accounting* of a site is more of a re-counting that exists as a *theory of artistry*. When articulated in its specificity, a description of "the creative act itself" takes the form of a theory of artistry that is "not simply a theoretical investigation of the arts. It differs from our modern day literary and artistic critiques in that it represents a performer's or artist's attempts to describe his or her own experience of production or composition so as to pass this knowledge down to future generations of artists. Obviously, such an approach is still a theoretical investigation of the arts, but it is a theory formulated only in light of the prac-

tice of artistic creation" (Yasuo, 1987). While impossible to prescribe or explain in fact, the aesthetic-creative experience requires varied and descriptive modalities capable of accounting for the richness and polysemic character of the wild event/advent itself. The character of the "theory" sought for here is that of a diegetic account that describes a journey taken. The relationship between theory and practice here is not one of two distinct realms of cause and effect, abstract and concrete, subject and object, or any of the familiar dichotomies. Theory, in this sense, is not applied, predictive and prescriptive but descriptive and after-the-fact as a sort of mythic rendering or testimony like a recounting of a journey, voyage, or hunting expedition.

CIMSp: Modeling and Imaging Protocol

Through the project *Digital Architectural Reconstruction Program 1.0*, a unique protocol has been developed that integrates multi-sensor 3D non-contact imaging technologies (laser scanning and photogrammetry) with user-dependent modeling, animation, compositing and rendering with various modes and fidelities of output, from interactive WWW deployment to high-resolution immersive and collaborative work environments. The working, flexible protocol (as the small "p" in its title suggests) forms the core of the research agenda and is a mode of creation and production that aims to transform the technologies and their interrelation, thus dramatically impacting the creative process and intended content. Seen as a template of possibilities, the objective of CIMSp (El-Hakim, 2005; Jemtrud, 2005) is to further establish and develop a comprehensive, globally-applicable, scalable production protocol for the three-dimensional digitization of the built environment that allows for the fusion of heterogeneous 3D data at each stage of the acquisition/creation/deployment process.

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tage, is currently mid-way in a two-year funding period, at the time this paper was written.

Boulevard St. Laurent

Within this research project, CIMSp is the mechanism that gathers all applied research initiatives and guides and propels the content creation component of work, this being the "Boulevard St. Laurent" project (BSL). This project component provides the physical and conceptual terrain in which CIMSp is interrogated, extended and deployed. The area in question is the southern extent of a historical street in Montréal. This famed throughway has deeply rooted economic, as well as symbolic, importance in the history and morphology of the city. The specific area of focus, however, has been traditionally one associated with crime, illicit activity and urban blight and has not taken to change as gracefully as its northern segment. Currently, numerous initiatives are underway to transform the area by way of branding schemes, property speculation and invested interest from various stakeholders.

The acquisition stage of the BSL project involved the gathering of an archive of assets that includes historical information, archival images, articles, city plans, aerial photography, laserscanned point cloud data, HD video and thousands of digital photographs. These varied assets each play a role in the creation of the digital artefact itself as well as the shaping of the theoretical framework that forms the stage upon which the final artefacts will be given life.

Fundamental in the process of creation is the understanding of the biases of the various modes employed in the process of digitizing an existing urban area. Each application, whether it is photogrammetry, user-dependent modeling or 3D compositing, is regarded to possess its own idiosyncratic character and disposition. For example, a photogrammetric application such as Shapecapture©, which requires labour-intensive, user-dependent modeling that yields highly accurate, planar models is employed in a way that coincides with a theoretical stance that is inherently reflective of this bias. Additionally, el-

ements that are chosen to be rendered through photogrammetry, are chosen, at times, because they possess some inherent quality that either resembles the natural tendencies of the model or, more often in the case of this project, chosen because they explicitly challenge the limits of the application's representational capacity – essentially employing the artistic ability to deform, make alter and uncanny.

The re-presenting of the collection of crafted artifacts will find expression in an urban event that will include in-situ venue installations, the use of immersive environments and large-scale projections that employ lens-correcting and image-stitching technology. Through the planning of this event, the artefacts are again scrutinized. The temporal aspects of the artefacts are layered against the temporal nature of the event itself and considered carefully is the way the animations, projected/still images, video and sound will be deployed and made present. Audience and viewer participation will factor largely in the staging of the event as will the incorporation of proposals for redevelopment of the site from students and city planners. This varied and heterogeneous approach offers a sensory and physical encounter with the site proper, in its entirety, and incorporates the city as part of the spectacle itself. Finally, the amassed artefacts are re-packaged in rich media format and made accessible on the web.

Conclusion

The value of approaching the crafting of the artefact embodies a disciplined yet sufficiently contingent "best practices" process that channels information and resolves procedural and technical hurdles in situations where integration of 3D non-contact imaging and user-dependent 3D modelling of non-extant (proposed or lost) architectural conditions is desired. Within this process, the artificial or "artifactual" character of the work must be recognized in its specificity. The goal of this type of accounting is to avoid nostalgic interpretations and to make room for a process of digital creation whose goal goes be-

yond the literal representation of space. Therefore, the significance of adopting a theory of artistry as it relates to the heterogeneous and hybrid approach of fusing diverse data sets is one that enables a process that engages the material imagination within the realm of the digital.

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