

**THE APT-NATIONAL TRUST FOR CANADA JOINT CONFERENCE 2017:  
OTTAWA, OCTOBER 11-14**

**Session: CS1.5: Digital Documentation**  
**Session Chair: Mario Santana**  
**Saturday, October 14, 2017 – 1:30 pm**

**Session Description**

Recording the physical characteristics of historic places is a cornerstone of preventive maintenance, monitoring and conservation. The information produced by such work guides decision-making by property owners, site managers, public officials, and conservators. Rigorous documentation may also serve a broader purpose: over time, it becomes the primary means by which scholars and the public apprehend a site that has since changed radically or disappeared. This session will showcase the benefits and constraints of specific digital tools in recording sites in Canada and the United States of America. Presenters will show apps for condition mapping, Building Information modeling (BIM), 3D scanning, photogrammetry and Computer-Aided Drawing.

**Learning Outcomes**

At the end of the course, participants will be able to:

1. Understand the relationship between heritage recording and appropriate decision-making in conservation;
2. Understand the benefits and constraints of digital recording, modeling and information systems for conservation projects;
3. Be able to develop collaborative digital tools to assist investigation and documentation of a large scale, multi-year complex restoration project;
4. Be able to understand the use of advanced technology applied in other industries and how they can be integrated in the recording of historic places;
5. Be able to describe how Building Information Modeling (BIM) can be used for recording the fabric historic places;
6. Be able to identify an appropriate approach for digital modeling of cultural landscapes.

**Contributions**

- Digital Documentation and Modelling for the Cultural Landscape by Jon Weller – Doctoral Student, University of Calgary
- The Nebraska State Capitol: A Case Study on the Continued Use of Digital Technology for Information Management and Analysis of an Iconic Historic Structure (Part 1 of 2) by Julie Cawby, RA, NCARB – Historical Architect, BVH Architecture A Capitol “App”:
- Leveraging Open-sourced Technology to Document, Record, and Coordinate Work at the Nebraska State Capitol (Part 2 of 2) - by Zach Soflin, Registered Architect – Associate, BVH Architecture
- Highlighting the Historic: Utilizing Autodesk Revit for Historic Fabric Documentation and Preservation Planning by Kevin Wohlgemuth – Architectural Conservator, Building Conservation Associates, Inc.

**Abstracts**

**Digital Documentation and Modelling for the Cultural Landscape**

Speaker Contact: Jon Weller – Doctoral Student, University of Calgary

Digital heritage, the use of reality capture technologies to digitally recreate historic sites, has become common as a means for both conservation and interpretation. It is an effective method to conduct documentation, monitor

change, and increase accessibility, especially for remote and seldom visited sites. The application of these technologies, however, remains focused on individual historic sites and buildings. With a growing interest in and recognition of the value of landscape-level heritage, an important question that arises is how digital heritage technologies can be adapted to large sites and cultural landscapes. Effective models for such sites offer invaluable information for site managers along with engaging possibilities for raising awareness, creating educational programming, and providing a forum for community participation. Moreover, such large-scale digital modelling offers an opportunity to present information about tangible and intangible heritage significance to land-use decision makers, leading to more informed and ideally respectful planning choices.

Through a discussion of case studies in Alberta, including the Brooks Aqueduct National Historic Site and the upper Red Deer River Basin, this presentation will explore digital heritage insights and technologies, including terrestrial laser scanning, 3D imaging, community and GIS mapping, and interactive storytelling to demonstrate innovative new techniques for documenting and presenting large-scale historic sites and cultural landscapes.

#### Learning Objectives:

- offer a well-articulated vision for the future potential of digital modeling of cultural landscapes.
- learn from insight and commentary offered in response to the presentation by the heritage community present at the conference.
- further refine his ongoing research questions and methodology.
- build a stronger network of engaged practitioners to help guide his ongoing research process, offering insight and skills throughout.

#### Biographical sketch:

Jon Weller is currently a Doctoral Student in the Faculty of Environmental Design at the University of Calgary where he explores the intersection of heritage and landscape management in Alberta. His work is informed by his past experience and study as an environmental historian, film maker, public historian, and community development advocate.

#### **The Nebraska State Capitol: A Case Study on the Continued Use of Digital Technology for Information Management and Analysis of an Iconic Historic Structure (Part 1 of 2)**

Speakers: Julie Cawby, RA, NCARB – Historical Architect, BVH Architecture

The Nebraska State Capitol is the result of a nationwide design competition won by New York Architect Bertram Goodhue in 1920. The building was the nation's first statehouse design to radically depart from the prototypical classical form of the nation's Capitol. Constructed in four phases from 1922-1932, the building was completed just under the \$10 million budget. As many as 100,000 visitors a year climb the monumental north staircase, some drawn there because it is internationally significant as an example of the harmony of art, landscape design and civic architecture.

The building has been carefully preserved and rehabilitated during numerous campaigns. One of the first major projects was the integration of a new HVAC system, modern for its time, during the mid-1960's. This project removed a significant amount of the original building systems and visually impacted many historic spaces.

A second significant project occurred from 1995 through 2012, which focused on the preservation of the exterior masonry and the copper roof replacement. During the investigation and design phases, the team utilized state-of-the-art computer programs that integrated a relational database of the existing masonry components and their conditions with CAD programs. This innovative process and digital technology was the subject of a paper presented at the APT 1996 Winnipeg Conference.

A third major project, currently in the design phase, will preserve the steel windows and rehabilitate the Capitol's interior while integrating new MEP systems. This project will entail removing all of the previous 1960's HVAC systems and replacing them with new systems, that are relevant and energy efficient.

The project is large and complex, covering approximately 600,000 sf of conditioned space. One of the first tasks of the design phase includes field work, investigation and survey of each of the 1,365 rooms and 1,191 windows. The numerous spaces, features and conditions had to be assessed within a limited time, which directed the project team toward innovating another means to complete the survey as efficiently as possible.

A custom designed digital "app" was created to contain the information gathered during the assessment and documentation process of all of the rooms and steel window components and conditions. The app was designed to be adaptable in the field, allowing for parameter additions and revisions in real time. The app links to the BIM model and allows for the parameters housed within each digital tool to be readily accessed.

This presentation will show how the project design team has continued the use of digital technology at an historic iconic building during complex, major rehabilitation and preservation campaigns. The presentation will demonstrate this new type of digital information management system currently being utilized during the assessment of the building's existing and historic fabric.

#### Learning Objectives:

- Learn how innovative digital technology has been used at the Nebraska State Capitol during the current and previous projects.
- Understand how existing condition assessments, of large and small scale projects, can utilize digital technology for data management.
- Learn how an "app" can help to translate field work data into BIM models and be a useful tool to define treatment recommendations.
- Learn how this digital information source can assist a design team with their design work.

#### Biographical sketch:

Julie's expertise in preservation, rehabilitation, restoration and adaptive reuse is made evident by her exceptional work. Her portfolio includes such high-profile projects as the preservation and rehabilitation of the Women's Leadership Fountain, the first fountain in Kansas City, MO built in 1898; and Building 19 of the Dwight D. Eisenhower VA Medical Center campus in Leavenworth, KS. Building 19, a Romanesque Revival structure built in 1886 to serve Civil War veterans, won five industry awards for its adaptive reuse including the National Preservation Honor Award from the National Trust for Historic Preservation and a Palladio Award from Traditional Building. Her current work focuses on rehabilitation of the Nebraska State Capitol, a 15 story National Historic Landmark. Julie is the Project Manager and Historical Architect for the removal and replacement of the buildings HVAC system which covers 600,000 sf of conditioned space within 1,365 rooms, while restoring the historic character defining features. The project also includes preservation and rehabilitation of 1,191 Steel and Bronze windows, integration of new fire alarm systems, sprinklers, enhanced smoke protection, and an off-site geothermal well field. The project is a multiple year design which will be constructed in phases over an 8 year period. Julie is also an APTI member and has served on the APT-Central Plains Board of Directors since the Chapter's' inception in 2009. She has been the Treasurer and head of the Finance Committee since 2010. She was also on the APT 2015 Kansas City Local Conference Committee and also served as the Field Session Chair.

#### **A Capitol "App": Leveraging Open-sourced Technology to Document, Record, and Coordinate Work at the Nebraska State Capitol (part 2 of 2)**

Speakers: Zach Soflin, Registered Architect – Associate, BVH Architecture

The Nebraska State Capitol, designed by Bertram Goodhue, is internationally significant as an example of the harmony of art, landscape design, and civic architecture. The Capitol is undergoing an eight-year phased interior restoration and HVAC improvement project. The effort includes a detailed survey of all 1,365 rooms and 1,191 windows and developing solutions for each, to conserve the historic fabric of the building. The scale and multiplicity of solutions for this project necessitated a different approach to the collection, coordination, and design of solutions.

The process began by looking for solutions within the architectural industry and other industries to meet the needs of the project. While no single product was found to solve the problems at hand, a new approach was taken by looking to the programming and computer science industry and how they work. Open-source software and libraries are at the core of nearly all technology development. These are collections of code that do specific things and are kept inherently general so they can be as adaptable as possible. These libraries are free for anyone to use. They are developed by 10's to sometimes 1000's of people contributing pieces of code to it in an organized manner to improve its purpose. The benefit is instead of recreating the wheel each and every time a new piece of software is built, these libraries can be plugged into a software program, performing their specific task.

The initial problem was solved by leveraging these Open-source libraries and technological advancements in other industries to build a solution in-house. The result is a multi-platform application. Its purpose is to provide the ability to layer contextual data on top of an already detailed BIM model. Specifically, it allows the team to collect information in the field on tablets and immediately tie that information to specific model elements, like rooms, windows, and doors. Information like, materials, images, quantities, notes, dimensions, and more. When working in the BIM model, the team has instant access to all information collected via a dashboard that shows the related information as the user navigates through the model. Not only does this dashboard allow users to view and edit data that was collected, but the team can also add tasks and communicate with messaging in the context of specific elements like rooms, windows, and doors. This makes tracking progress and design of each of these solutions much easier to coordinate.

The presentation will focus on the process of developing this documentation tool, demonstrating its use in historic preservation practice, and discussing how Open-source is not only useful in developing tools like this one, but can become a model for how architects can begin to work and collaborate as an industry.

#### Learning Objectives:

- Develop collaborative digital tools to assist investigation and documentation of a large scale, multi-year complex restoration project.
- Develop and utilize open source software in development of a digital app to help analyze and determine restoration scope of work.
- Understand the process of conducting a comprehensive investigation to determine appropriate restoration treatments.
- Understand the advanced technology that is being used in other industries and how they can be applied and used in architecture.

#### Biographical sketch:

Zach is a licensed architect at BVH Architecture. With six years of experience, he has developed a special interest in computational applied design and research. His work includes projects of various sizes, applying divergent design solutions anchored in research and data-driven analysis. Zach's desire for knowledge and collective exploration has positioned him as a thought leader within BVH, co-leading the BVH.io initiative. Recent Projects: -State of Nebraska Statewide Historic Building Survey -Jefferson National Expansion Memorial, Gateway Arch HSR -Nebraska State Capitol Restoration -Fort Smith National Historic Site HSR -Fort Atkinson State Historical Park Restoration -Thesis on Data Driven Architecture.

#### **Highlighting the Historic: Utilizing Autodesk Revit for Historic Fabric Documentation and Preservation Planning**

Speakers: Kevin Wohlgemuth – Architectural Conservator, Building Conservation Associates, Inc.

For historic buildings, the use of Revit is still in its infancy. Few historic buildings have been recreated in parametric, 3-dimensional models, mostly because it is difficult to accurately create such models of existing structures in Revit. Instead, the standard practice is to create 2-dimensional drawings of historic buildings in AutoCAD. However, while AutoCAD is still the industry standard for digital drawings of existing buildings, it lacks one major component that Revit has, the integrated parametric database.

The integrated database is a fully customizable database within Revit that contains all of the parameters of every building feature in a model. The case study I will present shows how useful these custom parameters can be for defining and presenting the location of historic fabric in a building, ways in which this information can be represented in 2-dimensional and 3-dimensional environments, and how they can be used for both archival and practical purposes.

Between 1987 and 1992, a major renovation campaign was conducted at the Michigan State Capitol. This renovation aimed to return the Capitol, which had been subjected to numerous modifications since its construction in 1872, to as close to its original construction and decoration as possible. This work was thoroughly documented with numerous drawing sets and over 10,000 photographs, all of which remain in the Capitol's archives. Because of the extremely thorough documentation, it was possible to identify many of the building elements that were changed during the renovation as well as those that had been left untouched. Using all of this information, we recorded interior substrates and finishes that date to pre-restoration and those that were modified during the restoration.

The Michigan State Capitol had concurrently commissioned a 3-dimensional Revit model of the building from another firm to use as a record and a tool for a major MEP upgrade campaign planned for 2017. This model would also be used for the historic fabric documentation project, to comprehensively record the changes from the restoration campaign in a single document. It would also become a guide during the MEP upgrade project to protect historic fabric from damage. Essentially, anywhere historic fabric is identified would be off-limits for MEP construction.

The use of Revit for this project allows the information from all of the drawings and photographs to be collected into a central database that is tied to the model of the building. In this way, it can also be represented graphically for extremely easy visualization of the information. Furthermore, the system can easily be updated with additional information for any work, past, present, or future, allowing for a comprehensive record of how the building has changed since it's construction.

#### Learning Objectives:

- Upon completion, participant will be able to describe how Autodesk Revit can be used for historic fabric documentation.
- Upon completion, participant will be able to determine when Autodesk Revit may be appropriate and useful for a project.
- Upon completion, participant will be able to understand the benefits and limitations to using Autodesk Revit for historic fabric documentation.
- Upon completion, participant will be able to understand the differences between Autodesk Revit and AutoCAD.

#### Biographical sketch:

Kevin Wohlgemuth is an Architectural Conservator with Building Conservation Associates in Philadelphia. Mr. Wohlgemuth's responsibilities on projects at BCA include archival research, site recording, laboratory analysis, treatment testing and development of treatment recommendations, preparation of construction documents, and construction administration. Mr. Wohlgemuth is also an experienced archaeologist and archaeological conservator

having spent numerous field seasons excavating and conducting conservation treatments at archaeological sites in Italy, Turkey, and the United States. Mr. Wohlgemuth currently serves on the board of the Association for Preservation Technology Delaware Valley Chapter (APT-DVC) and the Advocacy Committee for the Preservation Alliance for Greater Philadelphia.

### **Session Chair Biographical sketch**

Mario Santana-Quintero, is an associate professor on Architectural Conservation and Sustainability at department of Civil and Environmental Engineering Carleton University. He is also the Director of the NSERC Create program “Engineering Students Supporting Heritage and Sustainability (HERITAGEENGINEERING)” based at the Carleton immersive Media Studio Lab (CIMS). He has an architectural degree, holding a master in conservation of historic buildings and towns and a PhD in Engineering from the R. Lemaire International Centre for Conservation (University of Leuven). He is also a guest professor at the Raymond Lemaire International Centre for Conservation (University of Leuven). These past years he has been teaching also at the Universidad Central de Venezuela, Universidad de Guadalajara (Mexico) and Universidad de Cuenca (Ecuador). In the past, he was a Professor at the University College St Lieven and lecturer at the University of Aachen RWTH and the Historic Preservation Programme at the University of Pennsylvania between 2006 and 2011. Along with his academic activities, he serves as ICOMOS Board member and he is the past president of the ICOMOS Scientific Committee on Heritage Documentation (CIPA). Furthermore, he has collaborated in several international projects in the field of heritage documentation for UNESCO, The Getty Conservation Institute, ICCROM, World Monuments Fund, UNDP, Welfare Association, and the Abu Dhabi Authority for Culture and Heritage.