

# ObjectVR Fashion: The Drexel Digital Museum Project

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## Abstract

*“As cultural institutions continue to disseminate their holdings, now through digital technologies for reproduction, a challenge to humanities collections looking to digital curation and dissemination of their holdings is to make the quality and significance of the virtual representation meet or exceed that of the original object (Martin et al 2016 p.270).” The Drexel Digital Museum (DDM) has been experimenting with new media production for exhibition, preservation and publication of historic fashion since 1999. This presentation traces the successes and challenges of our search to bring the highest quality virtual experience of dress to the largest and most inclusive audience through the evolution, and disappearance, of cutting edge technology.*

## Motivation

In 1999 the DDM was given the charge to create an online archive to promote Drexel University’s Historic Costume Collection (DHCC), now the Fox Historic Costume Collection. Survey of the fashion and historic costume communities revealed the need for an online resource of high quality images of dress, seen from multiple views, with details of construction and embellishment. We selected 150 garments from the DHCC most significant to the evolution of the fashion silhouette, construction and embellishment to create a prototype; and to openly share the panoramic, interactive images online to attract funding for a full time staff to assess and create a database for the full Collection. To insure sustainability of the archive we captured images of design details at the highest resolution possible with technology at the time. Standards for image quality and processing were adopted from the Museum Online Archive California (Rinehart 2003) and for interoperability through metadata exchange from the Open Archive Initiative Protocols for Metadata Harvesting (Arms et al. 2002). Collective Access, a free open source software for managing and publishing museum and archival collections was used to design and implement the database and publish to the web.

The first technology employed to meet the requirements of both the University and the fashion community was Apple’s QuickTime Virtual Reality, a relatively easy to use technology for creating panoramic display. Imaging a garment from 18 views, each with 2-6 linked hotspots, produced results that surpassed the expectations of the communities at the time. We chose hotspots linked to high resolution images of details, rather than any available zoom technologies, now recognized as a wise choice as many of those zoom technologies no longer exist. And then Apple stopped supporting QuickTime, making our QuickTime files inactive.

The image standards of the archival files we created between 2000-2010, as in the gown by the extraordinary designer Charles James in figure 1, still meet the standards of Digital Public Library of America (DPLA), the free and open access hub for digitally formatted heritage of America’s libraries, archives, museums, and other cultural heritage institutions. This allows us to repurpose them with a high amount of fidelity using emergent technologies. In 2008, the

Fox Collection received funding for a full time curator and in 2014 for staff and a new state of the art storage and gallery space. With those management needs professionally met, we are free to experiment with more advanced imaging techniques with the potential to augment display of historic dress both traditionally and online.



Figure 1. Charles James. Evening gown. 1948. Image Collection: Drexel Digital Museum. Object Collection: Fox Historic Costume Collection. 64.35.2. Gift of Mrs. William S. (Babe) Paley.

## Problem

Historic fashion is finite and may only be exhibited for 3-6 months and then must ‘rest’ for 2-4 years. Lighting must be kept low to not fade and age textiles. Proper preparation and mounting of the fashion can take 2-3 days per object. Even with this careful process the fashion design will be stressed by the mounting and the color and luster of fabrics will fade. Shipping a garment on loan to another institution involves expensive insurance and packing and lots of curator time from both loaner and borrower institutions.

Post Walter Benjamin’s observations on the transformation on the aura of the original object by widely distributed reproduction (Benjamin 1936), much has been published on the “cult of the replicant” and the “meaning and the relationships between historical collections and virtual/digital “historical” objects ... and the object centeredness of museum culture”. (Cameron 2007 p.49). Adam Lowe, one of the founders of the high resolution imaging company Factum Arte, argues that “...facsimiles, and especially those relying on complex (digital) techniques, are the most fruitful way to explore the original and even to help re-define what originality actually is.” And that “The digital is just one instance in the life of the original object (Sattin, Lowe 2014). Our goal is to create a model for discovery through best practices standards, high resolution composite photography and carefully curated metadata which combines the object level data of the original fashion item with that of the digital instance.

## Approach

Fashion is designed from elements of silhouette, volume, construction, and the material properties of color, texture, luster and weight. As we moved away from QuickTime display we considered several technologies to capture the highest quality images of our historic fashion

objects. CAD designers and engineers were using industrial scanners for high resolution capture of objects and to render complex geometry and sharp edges of an object. We experimented with a combination of Artek's Eva and Space Spyder 3D scanners to capture complex beaded details of an evening gown inspired by 1930s fashion, designed by Drexel Fashion alumna Jeanne Parente. This technology provided us with distinct detail about the texture and color of the embellishment but no information about the silhouette, volume and construction of the gown, all from multiple views. For those elements we needed a different technology. We chose high resolution composite photography with excellent results [2,3].



Figure 2. Evening coat. Jeanne Parente. 2012.

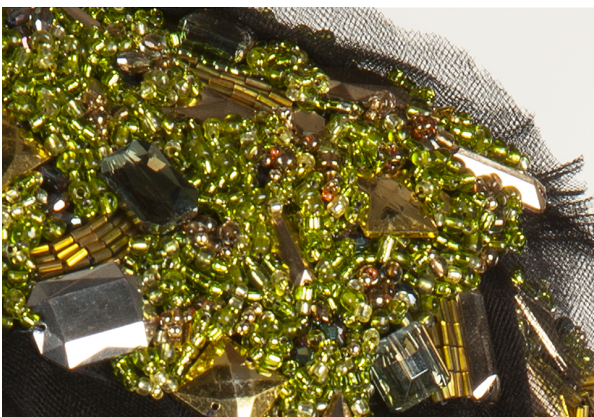


Figure 3. Evening coat. Jeanne Parente. 2012. Beading detail.

Although photogrammetry would capture many more angles (vertically as well as horizontally) for our images and we could then use machine vision tools to generate genuine 3D models of the fashion design, the limits of budget, space and human resources constrain us to shooting flat gigapan images from twenty views and multiple rows and columns. Since fashion is usually viewed from head to toe and not from above and beneath, this process suits our immediate needs. A future goal is to leverage photogrammetry and/or volumetric video techniques to reconstruct 3D representations of the fashion we photograph. We ultimately plan to project our gigapixel resolution image data onto the 3D representations to create high fidelity, exhibit-able virtual interactive objects of the historic fashion.

Our early QuickTime views were captured with a stationary camera and by placing the dressed mannequin on a Kaidon rig, rotating the rig 20 degrees for each of the 18 views. Single frame images, 3024 x 2016 pixels, were captured for each view. The RAW camera files were saved as TIFF to establish the archive. Our current imaging process uses GigaPan technology to create 3D interactive media,

ObjectVR, which can be displayed at up to 3 times life size. Now, instead of imaging 18 single frame views, our camera is positioned on a GigaPan Epic Pro Robotic Camera Mount set to capture 4-6 columns and 10 rows per , 20 views per object [4].

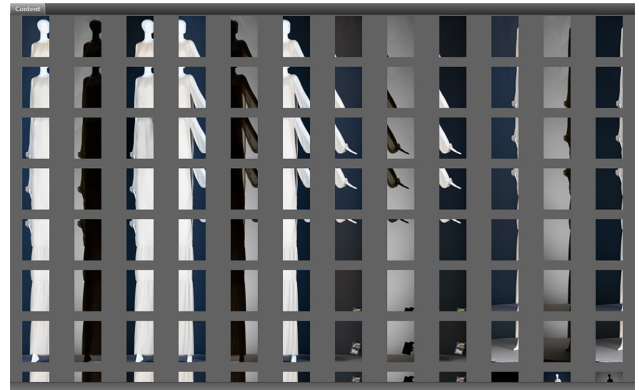


Figure 4. Camera RAW files for view 1, James Galanos. Afternoon dress. Silk chiffon. Fall 1976. Image Collection: Drexel Digital Museum. Object Collection: Fox Historic Costume Collection.



Figure 5. Digimuse studio set up. Left to right: Nick Jushchysyn, Program Director Animation and Special Effects, Fulbright Scholar Daniel Cauffield-Sriklad, Kathi Martin, Director, Drexel Digital Museum, Clare Sauro, Director, Fox Historic Costume Collection.

We currently use a Cannon EOS-1d Mark III camera with a Cannon 300mm F2.8L IS (Image Stabilization) Lens. We have increased the views to 20, creating a total of 800 – 1000 Camera RAW files depending on the width of the object [4]. The files are converted to TIF and stitched together using PTGui software. Garden Gnome Object2VR Software is then used to generate ObjectVRs in HTML5 output format, turning the TIF files into an interactive ObjectVR which can be rotated, panned and zoomed in to high resolution details.

A full archival data set for an ObjectVR includes all the RAW files, the stitched TIF and the HTML5 output files. Storage requirements for one data set can run to 112+ GB. Because of our interest in open access to and the ability for other researchers to duplicate our research, our data sets include all the files involved in the creation process and a Read Me file outlining the work flow, a file directory, hardware and software requirements, and the roles of the creator/researchers. We recently acquired University cloud storage and are working with the Drexel University Libraries (DUL) group to prepare our files for migration to iDEA, a repository for faculty research. To provide a framework for this, DUL has worked with the DDM team to map metadata from the customized fields in the DDM database to a

Metadata Object Description Schema (MODS).

We eventually want to be able to insert the ObjectVR into a variety of modeled and gigapixel exhibition environments and combine them with other digital artifacts, inviting new interpretations of the fashion object. To achieve this, the background must be selected and removed from the object in the foreground. As fashion objects often combine a variety of materials and textures, defining and selecting the object edge without erosion of fidelity is an arduous process [6]. We are experimenting with multiple lighting and masking solutions that could be automated to make the virtual edges authentic to those of the physical object.

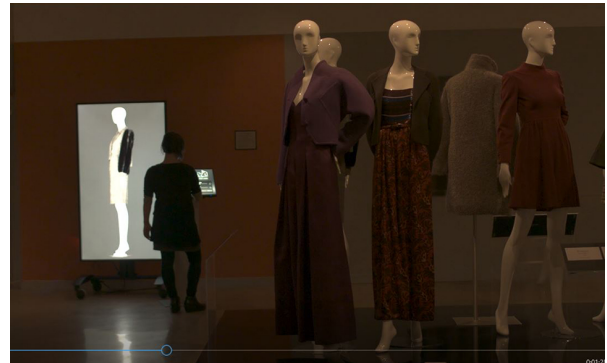


**Figure 6.** Edge detail fur and wool. James Galanos. Wool Evening Suit. 1984. Image Collection: Drexel Digital Museum. Object Collection: Fox Historic Costume Collection..

All files used in the creation of the ObjectVR are saved as TIF and should be able to be accessed in the future if repurposing becomes necessary. HTML5 is the latest version of Hypertext Markup Language, the standard used for structuring and presenting content on the World Wide Web and recommended by the World Wide Web Consortium. As with our initial imaging process, we continue to archive all the Camera RAW files used in our process, safeguarding against a worst case scenario where support for HTML 5 is withdrawn.

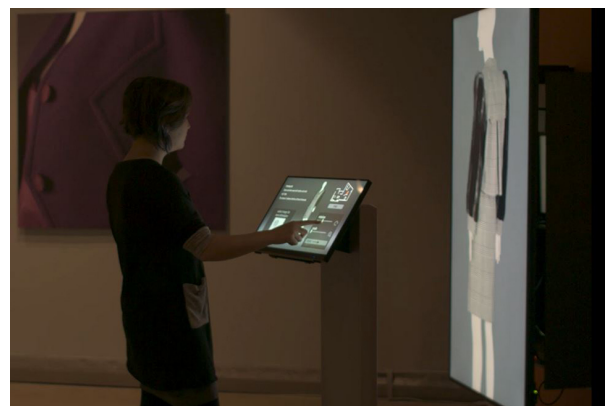
## Results

In spring of 2018 the 800 piece personal archive of renowned American fashion designer James Galanos was donated to the Fox Historic Costume Collection. For the inaugural exhibition of this archive, *James Galanos: Design Integrity* (October 19-December 8, January 8-27, 2019 in the Leonard Pearlstein Gallery, Drexel University), we created ObjectVRs for three of Galanos' fashion designs. We displayed these 3D interactives on a high definition 65 inch OLED monitor next to 60 physical gowns from the archive. Viewers were able to interact with the ObjectVR via an iPad interface designed by students from the Animation program and compare the virtual experience to the physical object[7,8].



**Figure 7:** DDM ObjectVR installation. James Galanos: *Design Integrity* (October 19-December 8, January 8-27, 2019) in the Leonard Pearlstein Gallery, Drexel University.

Note the low lighting necessary in traditional exhibition in figures 7 and 8.



**Figure 8:** Interactive interface. DDM ObjectVR installation. James Galanos: *Design Integrity* (October 19-December 8, January 8-27, 2019) in the Leonard Pearlstein Gallery, Drexel University.

The significance of our research was underlined when, after closer examination, the gown in figure 9 was deemed too fragile to display [9,10]. After our imaging, the gown was packed in archival storage and is now unavailable for viewing. The virtual instance of this fashion design will be the only way scholars, students and aficionados will be able to experience this particular example of Galanos' work.



**Figure 9.** Four views James Galanos. Afternoon dress. Silk chiffon. Fall 1976. Image Collection: Drexel Digital Museum. Object Collection: Fox Historic Costume Collection.



**Figure 10.** James Galanos. Afternoon dress. Silk chiffon. Fall 1976. Image Collection: Drexel Digital Museum. Object Collection: Fox Historic Costume Collection. Displayed on the DDM website <http://digimuse.westphal.drexel.edu/ddm/>

View ObjectVR for this gown at: <http://digimuse.westphal.drexel.edu/ddm/index.php/digital-fashion-collection/james-galanos-afternoon-dress-fall-1976/>

Reaction to the exhibition was enthusiastic. We are seeking funding to create ObjectVR for other significant fashions in distress from the Fox Collection to preserve, to be used in future exhibition, and to become part of the DDM online archive. We will also be investigating the photogrammetry process to capture many more angles (vertically as well as horizontally) for our images and to use machine vision tools to generate genuine 3D models of the fashions that can then be manipulated and examined much more interactively than our current images.

## Conclusion

Institutions are testing new technologies to provide a captivating museum experience (Debo 2019). Integrating high resolution, life size, interactive fashion ObjectVRs into traditional fashion exhibition can provide an intimate visitor controlled interaction and understanding of fashion design. From an iPad interface, the audience can rotate the garment to all sides, zoom in on details, view related ephemera and, eventually, access linked open data from other participating collections. The virtual museum objects can be loaded onto a hard drive and shipped around the world, scaled up for exhibition on 12 foot monitors or scaled down for 24 inch monitors. The ObjectVRs can be combined with digital artifacts and placed in various virtual panoramas to create additional perspectives and new interpretations of our collective cultural heritage.

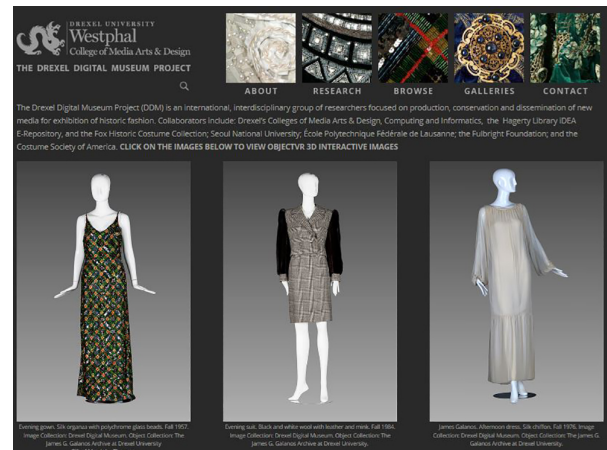
Our image standards are among the highest in current institutional adoption and surpass those of the Digital Public Library of America (DPLA). Our ultimate aim is to have our data fully mapped to the DPLA standards and have our metadata harvested from a trusted digital repository, ensuring persistent and broad discovery of our research. Collection-level description can then be compiled at the hub (aggregator) level, increasing discovery of our objects.

McAllister reminds us that collaboration in and of itself is not interesting as an objective. Successful collaborations involve “a high level of openness in the system, authoritative advocates and demonstrable leadership among them at least on a part-time basis, repeatability when successes appear and efficient ways to share learnings, and strong signals to participate spreading far and wide” (2012). Historic accuracy is a prime driver of our project. We aim to create a best

practices model throughout the process.

Carefully curated metadata combining the object level data of the original fashion item with that of the digital instance should create a model for discovery and help establish our authority as disseminators of fashion heritage. Although our concentration is historic fashion and textiles, the best practices cultivated in the process can be applied across research in digital curation of cultural heritage. For the most egalitarian dissemination, our digital artifacts are being repurposed as HTML 5 files for the internet, where they can be freely and inexpensively shared, numerous times, with a varied audience, singularly or in concert with friends and/or strangers, without harm to the original object [11].

Heritage artifacts carry historic knowledge. Our interactive images can be placed into a variety of modeled and gigapixel exhibition environments and combined with other digital artifacts, inviting new interpretations of the fashion object. This collaborative recontextualization of the digital instance of the heritage artifact invites additional perspectives to our shared cultural heritage and enhances the historic knowledge body



**Figure 11.** The Drexel Digital Museum website. <http://digimuse.westphal.drexel.edu/ddm/>

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## Author Biographies

*Kathi Martin, BFA, MSIS, directs the Drexel Digital Museum. She is a Professor in the Department of Design, Drexel University, and Associate Director of the Graduate Fashion Program. Before coming to Drexel she was owner/designer of a high end fashion company for 20+ years. She researches production, preservation and dissemination of new media for exhibition of historic dress and has over 40 publications for the communities of digital cultural heritage and fashion studies.*

*Nick Jushchyshyn, BS, MFA, is Director of the Animation, Visual Effects, and Immersive Media Program, and the Animation & Special Effects Lab, Drexel University. He has worked on special effects for award winning Hollywood films and for studios such as Visual Domain and Dive Visual Effects. Nick's research centers on development and application of production pipelines for VR/AR and other immersive media formats in the areas of: education, cultural heritage, medicine and narrative experience.*

*Claire King, BSIE, MSIS, is a graduate student in the Design Research program at the Drexel University Westphal College of Media Arts and Design and Research Assistant to the Drexel Digital Museum. Her research focuses on the migration of the museum's website to a new platform and integrating HTML5 Object VR and Collective Access. She is also an industrial engineer with 17 years of experience in process design and workflow management in the Apparel Industry.*