



Smithsonian

DIGITIZATION PROGRAM OFFICE

ANNUAL REPORT



2018

FROM THE DIRECTOR



Smithsonian Gardens: Orchids Digitization - Dendrobium hercoglossum

What do orchids, a 3D viewer, artificial intelligence, and audiovisual digitization have in common?

They are clues to exciting work that took place this past year in the Digitization Program Office (DPO).

Some highlights from 2018....

We started an initiative to explore ways to use artificial intelligence with Smithsonian collections; reached major milestones in the development of our new 3D pipeline (including the development of a 3D repository, post-processor, a 3D data hub, and an online explorer for 3D models); mass digitized our three-millionth object; won second place in an international biodiversity software competition; began planning our first audiovisual mass digitization pilot project; and co-sponsored an international standards meeting ("IIIF") with the Library of Congress and the Folger Library.

We also hosted over 120 visitors to our offices and scanning/digitizing sites, gave two dozen professional papers/presentations, attended 15 professional conferences, and co-authored another scientific publication with colleagues in academia.

As our programmatic work grew over the year, we welcomed new staff and reorganized existing program management for more efficient operations. Our four programs – 3D Digitization, Mass Digitization, Policy and Analysis, and Digitization Impact – continue their work, but with some new faces and new roles (see Staff News).

An annual report is an opportunity to reflect, celebrate, share the highlights of a year's work, and take stock. Our motto, "discovery through digitization," is also our pledge – to help engage greater audiences through a "digital first" strategy, as articulated in the Smithsonian's strategic plan. We look forward to working with you in 2019 to make this possible.

Diane Zorich
Director
Digitization Program Office, OCIO

3D

The 3D program made significant progress this year developing a suite of tools to support the production, preservation, and delivery of Smithsonian 3D assets; all of which will be made fully open source and released to the galleries, libraries, archives, and museums (GLAM) community in 2019. The development project includes:

- A 3D data repository and content management system, which are underpinned by the Smithsonian 3D metadata model to ensure the longevity of our 3D digitized assets.
- An automated data processing service, nicknamed "The Cook," is our first tool released on GitHub as open source.
- An API for 3D content delivery, the "Smithsonian 3D Data Hub," is a web-based API which will allow us to meet our audience where they are, delivering Smithsonian 3D content on any platform which leverages 3D data.
- A new Smithsonian 3D viewing platform and content authoring tool, "Voyager," specifically developed for museums and educators. Voyager will be the first client of our 3D data hub.

Along with this development work, the 3D program released a public draft of the [Smithsonian 3D Metadata Model](#), the product of a year of work by a pan-institutional working group. The model aims to increase transparency and usability of the datasets and 3D models we produce and publish.

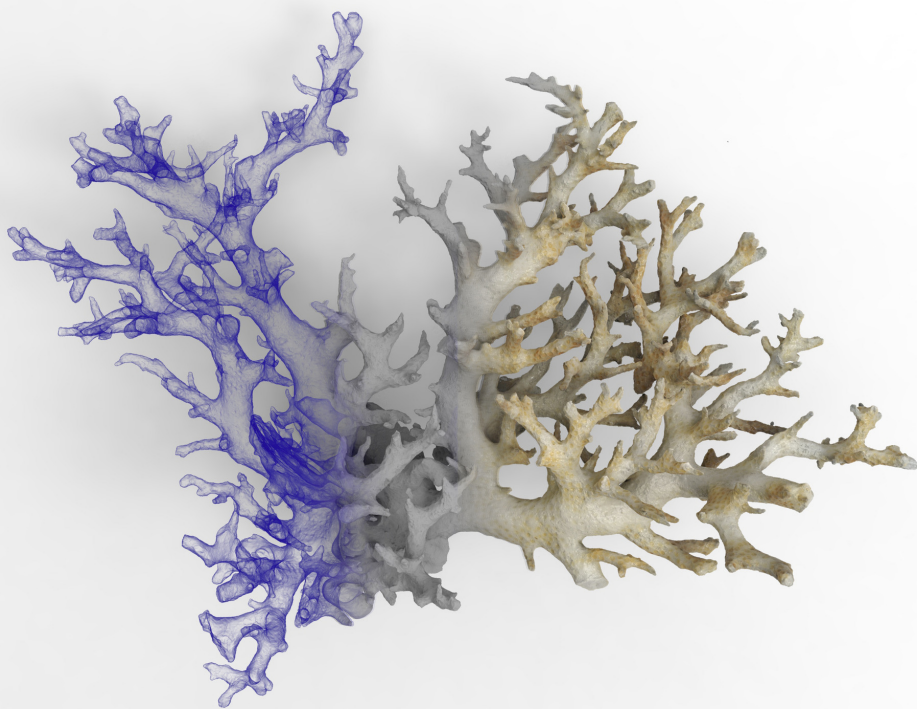
3D Program project highlights from 2018 include:

- Scanning Neil Armstrong's Spacesuit for NASM to support conservation work and public access.
- Capturing 100 coral type specimens from the National Museum of Natural History (NMNH). Conducted in partnership with the non-profit The Hydrous and NMNH, this project tested new approaches to automated 3D capture and delivery.
- Capturing 80 coins from the Smithsonian's National Numismatic Collection via photogrammetry and structured light scanning. With coins as small as 3 cm, these are some of the smallest objects the DPO has attempted to scan.
- Publishing [scans captured in 2010](#) from an early human footprint site in Tanzania to support a research paper we co-authored in *Quaternary Science Review*; "Using differential structure-from-motion photogrammetry to quantify erosion at the Engare Sero footprint site, Tanzania".

By making content freely available for download, we continued to see inspiring and unexpected uses of 3D data:

- Teraoka Gensyou, a toy designer and comic artist from Japan downloaded the woolly mammoth scan, created a poseable version, shared the data back to the Smithsonian, and created a [manga comic](#) about the entire process.
- Stuart Richardson, a Colorado high school student, downloaded Presidential busts from the National Portrait Gallery and created a virtual reality exhibit for his class.

The 3D Program team continues to serve as a hub of expertise by launching online 3D models, loaning equipment and software, and providing training to over 10 units in 2018.



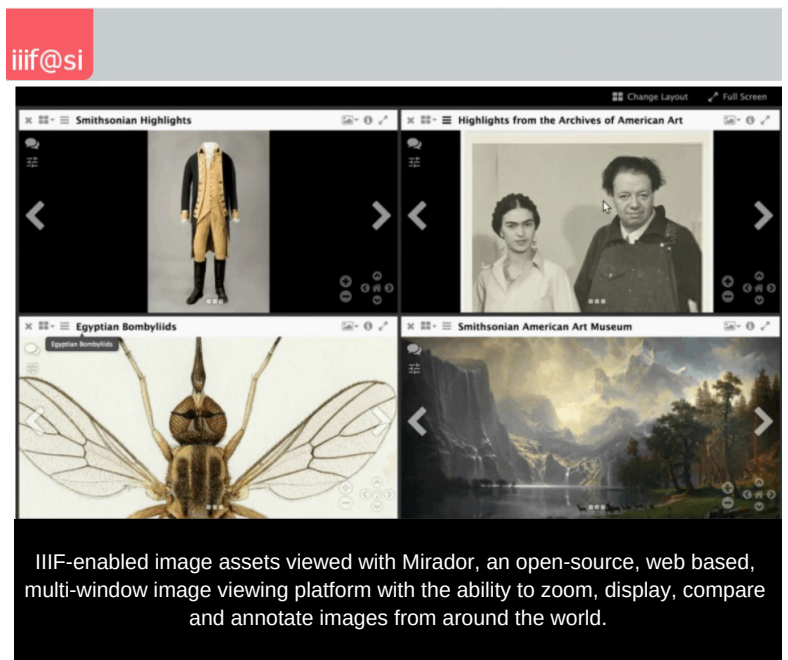
3D render of Pocillopora damicornis, captured during the coral digitization pilot at the National Museum of Natural History



3D render of articulated T. rex and Triceratops, from the National Museum of Natural History's Deep Time Hall of Fossils, opening June of 2019

DIGITIZATION IMPACT

This inaugural year for the Digitization Impact program yielded two major accomplishments. Our first was the implementation of IIIF (International Image Interoperability Framework), which is now available for adoption across Smithsonian collections and websites. You can find an initial offering of over 800,000 IIIF-enabled images available on the Collections Search Center. This effort, undertaken in collaboration with OCIO technical staff and several Smithsonian curators and staff who volunteered as "early adopters," was officially announced at the annual IIIF meeting (held in Washington, DC) to great acclaim. In adopting this standard, the Smithsonian's digital images are now available to scholars and the public in ways that make them easier to use and compare with other IIIF-enabled platforms and collections on the Web. The Smithsonian's IIIF web site offers an explanation of the standard and includes examples of how IIIF enables greater use of Smithsonian collections online (see: <https://iiif.si.edu/>).



The second major initiative of the year was an expansion of our 2017 experimentation with artificial intelligence (AI) and its value in botany research and collections care. This early work demonstrated the successful introduction and application of AI at the Smithsonian and represented a potential method to similarly equip experts from across the institution. With this in mind, the DPO, in collaboration with OCIO's Data Science Lab and The Lab at Google Arts & Culture, developed a staff webcast lecture and two-day "AI at SI" workshop. With 44 participants representing 22 Smithsonian museums and research centers, we enjoyed a rarely seen mix of coders, curators, data scientists, educators, junior staff, and decision makers. Teams were established to investigate discipline-specific applications in science, history, art, and culture, while other groups investigated shared ambitions surrounding search & discovery, accessibility, information & metadata enhancement, and American women's history. With an array of project concepts primed for further development, the Digitization Impact program is kicking off 2019 by synthesizing the results of the workshop and exploring next steps to turn a flood of enthusiasm and exciting ideas into projects that have real world impact.



MASS DIGITIZATION

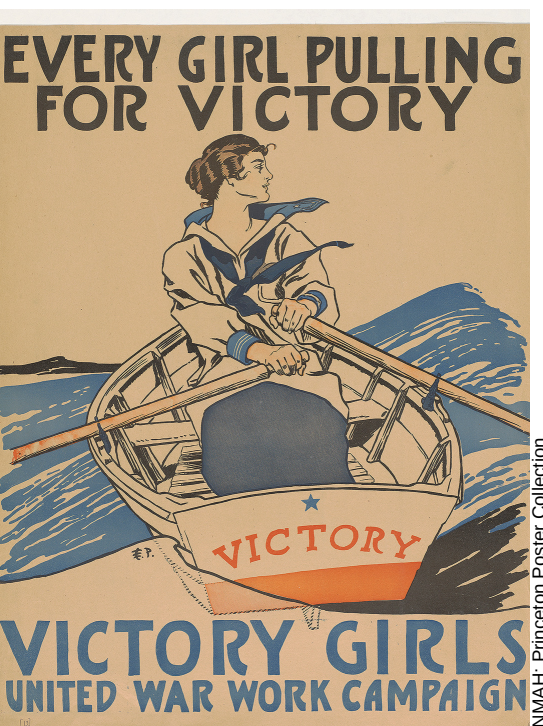
In 2018, the theme for the Mass Digitization Program was one of growth. While we continued to build upon our digitization successes, we spent the first part of the year adding new talent, expanding the team to include Luis Villanueva from Yale University and Jeanine Nault from Library of Congress (*see staff updates section for more information*).

As the team has grown, so too has the scope of Mass Digitization's efforts. In 2018 we launched our long-awaited informatics initiative to support the enrichment and creation of digital records across the Smithsonian. To that end we bolstered OCIO's informatics infrastructure by deploying the Smithsonian's first R/Shiny server, as well as OCIO's first PostGIS Spatial server. We also created utilities that efficiently resolved ambiguities for tens of thousands of records for our partners at the National Museum of Natural History (NMNH). We started work on a similar utility for our partners at the National Museum of American History (NMAH) utilizing the Getty Research Institute's widely used Art and Architecture Thesaurus. The capstone to our year was our 2nd Place award in the international "GBIF 2018 Ebbe Nielsen Challenge," an international biodiversity competition, with our submission of the "GBIF Issues Explorer" utility.

The theme of growth is relevant to our established work as well, as we far surpassed our previous digitization volumes. For the first time, the Mass Digitization Program digitized over one million collection objects and specimens in one calendar year! A great variety of digitization projects across the Institution led to this milestone, including:

- Completion of the Smithsonian Gardens orchid collection, the first "live" collection the DPO has ever digitized; as well as the Garden's Furnishing & Horticultural Artifact and Archive of American Gardens collections.
- Digitization of the National Portrait Gallery's (NPG) Meserve Collection, a one-of-a-kind collection of Civil War era Matthew Brady glass plate negatives.
- Continuation of the Department of Botany's herbarium digitization project at NMNH, which this year included the two millionth image taken and three millionth database record created, bringing us to the halfway point of this long-running project.
- Digitization of the Smithsonian Castle's chair collection where DPO, in collaboration with OCIO's Collections Systems Support Branch, was instrumental in migrating the Castle from Past Perfect to The Museum System (TMS).
- Initiation of the NMAH Princeton poster digitization project (18,000 posters), a first of its kind mass digitization collaboration with our new partners at the Google Cultural Institute.
- Completion of almost a half million NMNH Department of Paleobiology fossils.

These projects have brought the total collections digitized by the Mass Digitization Program to **3 million** since the program's inception in 2014.



NMAH: Princeton Poster Collection



Smithsonian Castle Collection: Victorian Chairs



John Sartain, 1861 - National Portrait Gallery

POLICY & ANALYSIS

2018 was a year of reflection for the Policy & Analysis Program. We engaged the Smithsonian Organization and Audience Research Office (SOAR) in a comprehensive review of the data collection instruments we use to compile measurements on progress, needs, and plans for digitizing collections within Smithsonian museums and collecting units. SOAR staff conducted one-on-one interviews with staff from these units and held listening sessions with diverse pan-institutional groups of stakeholders, data compilers, and decision-makers. Several of their recommendations are being incorporated into our methodologies for the annual survey of collections as reported by units in the Collections and Digitization Reporting System (CDRS), as well as in the Unit Digitization Plans (UDPs) that Smithsonian museums and collecting units use to plan their digitization strategies over a three-year period.

The Smithsonian's SD 600 collecting units continue to report great progress in the annual Digitization Assessment. In FY 2017, the museum, archive, and library units together created a total of 1.2M standard digital descriptions (+14% over FY16) and 1.7M standard digital surrogates (+26% over FY16) which describe and represent our 155M museum object/specimen collections, 162K cubic feet of archives, and 2.1M library volumes that have been prioritized for digitization. To learn more you can visit the SI Dashboard (<https://www.si.edu/dashboard/national-collections#collections-digitization>).

The program continued to shepherd the DPAC Audiovisual (AV) Mass Digitization Subcommittee, a group working with DPO to advise on audiovisual digitization issues in general, and on DPO's inaugural AV mass digitization pilot in particular. Preliminary groundwork for the inaugural pilot project was laid in 2018, with the identification of two candidate collections: 1/4" analog sound tape reels of radio interviews from the Archives of American Art's "Art and Artists" interviews (1965-1966) and the Smithsonian Institution Archives' "Adventures in Science" interviews from the Science Service. Digitization vendors were identified and surveyed about their interest and suitability to take on the digitization of this material, which should begin in the second quarter of 2019.

The Policy and Analysis Program also led, with the assistance of a communications consultant, the development of a new DPO Communications Plan. This plan guides all DPO programs in using a unified "voice" for communicating individual program activities in the context of DPO's greater mission. The plan also will help DPO be more strategic in how it advocates for resources and support, attracts technology partners, and communicates in online and traditional media.

Finally, the Program began planning for the biennial Digitization Conference, to take place in October of 2019. We have secured space and are now developing the program and identifying speakers and sponsors that will make this event one of the highlights of the next year for DPO, our colleagues around the Smithsonian, and the larger cultural heritage community.

FISCAL YEAR 2017

29M

Objects & Specimens
with Digital Records

125K

Archival Cubic Feet
with Digital Records

1.5M

Library Volumes
with Digital Records

3.8M

Objects & Specimens
with Digital Images

29.0K

Archival Cubic Feet
with Digital Images

56.9K

Library Volumes
with Digital Images



DEVELOPMENT

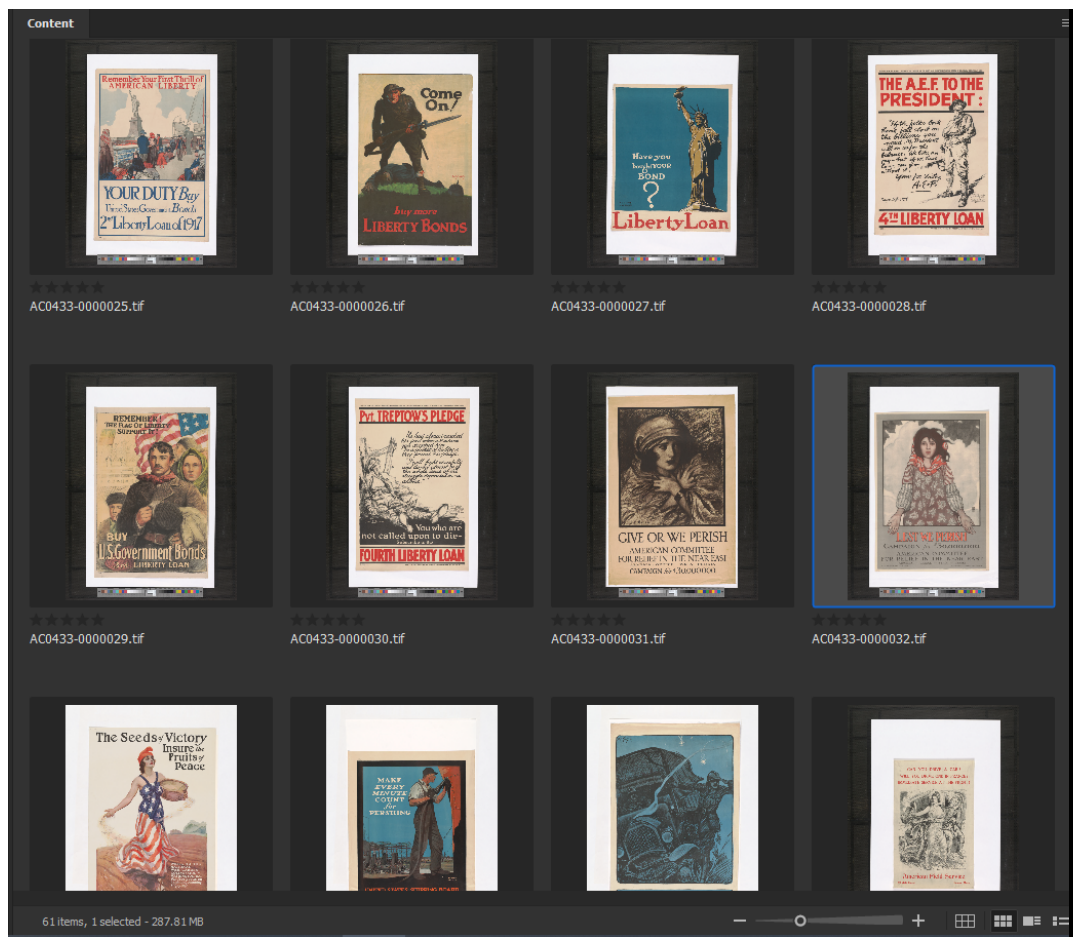
In 2018 we continued to receive generous support from design and engineering software maker Autodesk and 3D laser scanning technology company FARO, who have been supporting the DPO since 2012, as well as from Bob and Judy Huret. Hasselblad and Digital Transitions continued to support professionals in the wider Institution with training programs as part of DPO's Quality Digitization Training Series (QDTS).

DPO's entrepreneurial spirit and agility is a good fit for often like-minded technology companies. For example, Google Arts and Culture is helping us conduct a mass digitization project at the National Museum of American History. We also organized a two-day artificial intelligence workshop for Smithsonian staff with Google Labs that we hope will lead to exciting new collaborative projects in this field. In the area of mixed reality we started working with a new collaborator, Magic Leap. We also continued to explore collaborations with strategic partners for the DPO program, and started conversations with new potential partners. To raise funds for the botany mass digitization project we followed a more traditional path, requesting funding from a number of foundations that support work in environmental and nature conservation.

We also explored development partnerships that include other Smithsonian programs and units: the Arts and Industries Building, The Cooper Hewitt Smithsonian Design Museum, The Freer Sackler Gallery of Art, the National Air and Space Museum, the National Collections Program, the National Museum of Natural History, the National Museum of American History, the National Postal Museum, The Smithsonian Center for Learning and Digital Access, Smithsonian Libraries, and the Smithsonian Science Education Center. We strive to work closely with everyone at the Smithsonian to make sure we manage the relationships with our partners holistically. DPO also assisted other units with getting donations from technology companies, such as robots ("Pepper") from SoftBank, and increasingly serves as a resource for collaborating with corporate partners for the Institution.



Faro continues to support DPO by loaning its scanning equipment for projects across the Smithsonian Institution



TRAINING

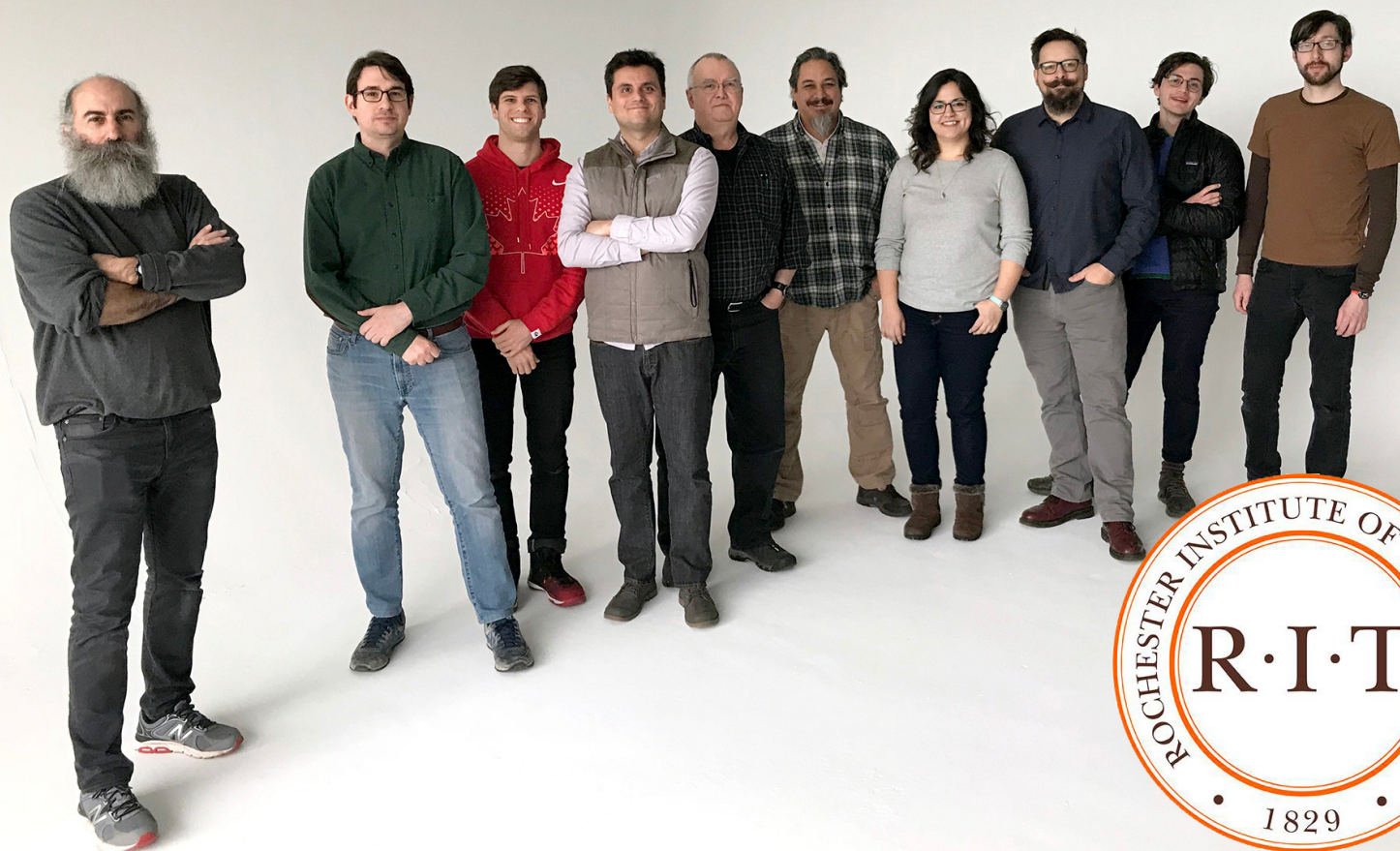
DPO staff train themselves and others on the digital platforms, technologies, and processes that let us create and share Smithsonian digital collections. This year our entire 3D and Mass Digitization program staff attended a DPO-planned continuing education program on image processing and color theory. The program was taught by expert faculty at the Rochester Institute of Technology.

The Mass Digitization Program also hosted the sixth workshop in its Quality Digitization Training Series (QDTS), training sixteen staff from around the Smithsonian on digital capture using Hasselblad technologies and processes.

Our 3D Program continues to train interested Smithsonian staff on the use of 3D capture technologies for use with Smithsonian collections or related field research projects. A Moodle training module on best practices for 3D capture and file naming conventions is under development.



QDTS: Hasselblad Training



DPO staff & Smithsonian museum photographers attend RIT training

STAFF UPDATES

New Staff



Luis Villaneuva Rivera, Informatics Program Officer

Luis joined the DPO in April 2018 to help enrich item-level records across all units of the Smithsonian. During his academic career, which included searching for tropical frogs in Puerto Rico and listening to temperate and tropical soundscapes, he studied the way data and databases are used to analyze biological systems. Luis developed software packages that helped researchers analyze audio files as part of his PhD work at Purdue. From there, he managed and expanded a large spatial database of biodiversity information at Yale that was built from a variety of sources. At DPO, Luis is expanding the tools and resources available in order to improve collections data on a massive scale.



Jeanine Nault, Mass Digitization Program Officer

Jeanine's career in cultural heritage digitization started serendipitously when her work-study job in college had her scanning barcodes and packing boxes in the Digital Conversion Unit at the University of Michigan libraries. While there, she received her undergraduate degrees in Anthropology and English literature, and went on to receive a graduate degree in Museum Studies at George Washington University. Since then, she has worked in and managed the digitization program at the National Anthropological Archives (NMAH), as well as the Veterans History Project at the Library of Congress. Jeanine believes that increased access to collections allows for richer and more fully realized representations of cultures and ecologies around the world.

Staff Moves



Ken Rahaim, Branch Manager for Mass Digitization

Ken assumed the role of branch manager for DPO's Mass Digitization Program, where he supervises a staff of three, plus an array of vendors, consultants, and volunteers. Ken's work history in cultural heritage photography, enterprise digital asset management, and enterprise level IT solutions intersect perfectly for this new role. He works to increase the quality and quantity of Smithsonian digital assets by supporting digitization projects, providing technical expertise to the units, leveraging internal and external collaborations, and promoting expertise in mass digitization and workflows.

Interns, Fellows, Mentees



Xiyue Yang, Lycoming College

Xiyue Yang came to the DPO from Lycoming College with an expertise in graphics and web design. In her short month with us, Xiyue created design comps to update the DPO website with a modern theme and structure.



Taylor Houlihan, University of Michigan

Taylor spent three months with the DPO. Her time involved learning the DPO's 3D practices and participating in three on-site capture projects.



Asiel Sepulveda, Southern Methodist University

Asiel Sepulveda came to the DPO through the Smithsonian Latino Center's Latino Museum Studies Program. Over the span of a month, he was able to observe two on-site 3D capture projects and learn how to process photogrammetry data into a web-viewable 3D model.



Julia L. Murphy, Hirshhorn Museum

Julia followed DPO's activities as a participant in the Office of Human Resources Foundations of Professional Development employee mentoring program.

COMMITTEES AND SUBCOMMITTEES

Digitization Program Office Advisory Committee (DPAC)

Members advise the DPO about its programs and plans. Members serve a three-year term and are drawn from across the Smithsonian, representing all units and every type of profession that exists across the institution.

In 2018 we said goodbye and thanked the following members who completed their terms:

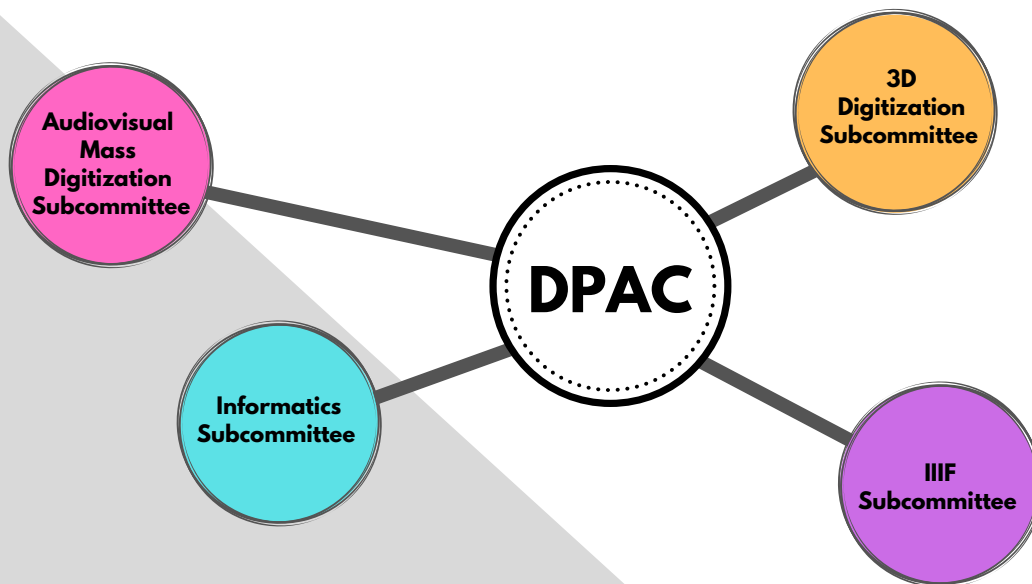
- **Sarah Stauderman, HMSG**
- **Keri Thompson, SIL** (now with OCIO's Research Computing Office)

We also welcomed the following new members, who will serve until 2021:

- **Stephanie Norby, SCLDA**
- **Carolyn Royston, CHSDM**
- **Keith Wilson, FSG**

DPAC also is home to a number of special interest subcommittees, led by DPO staff or DPAC members.

These subcommittees operate as working groups to help us explore topics or take part in projects that require specialist knowledge. In 2018, the following subcommittees were in place:



In 2018, DPO staff served on several Smithsonian committees, bringing our insight, expertise, and support to bear in the following groups:

American Women's History Initiative Digital Advisory Board (AWHI Digi)

Audiovisual Archives Advisory Group (AVAIL)

Collections Information Management Committee (CIMC)

Collections Information System IRM Pool Fund Allocation Committee

EDAN API, Content, and Taxonomy Working Groups

GUID (Globally Unique Identifier) Working Group

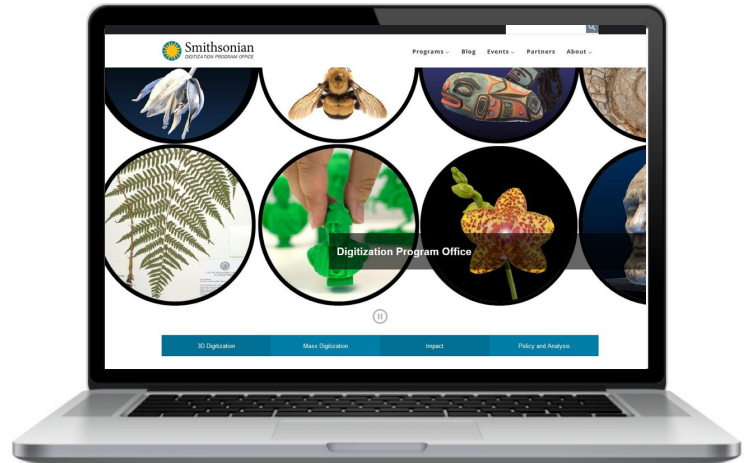
Smithsonian Institution Archives & Special Collections Council (SIASC)

Smithsonian Strategic Plan Implementation Team 3 ("Reach a Billion People through a Digital First Strategy")

VISITORS

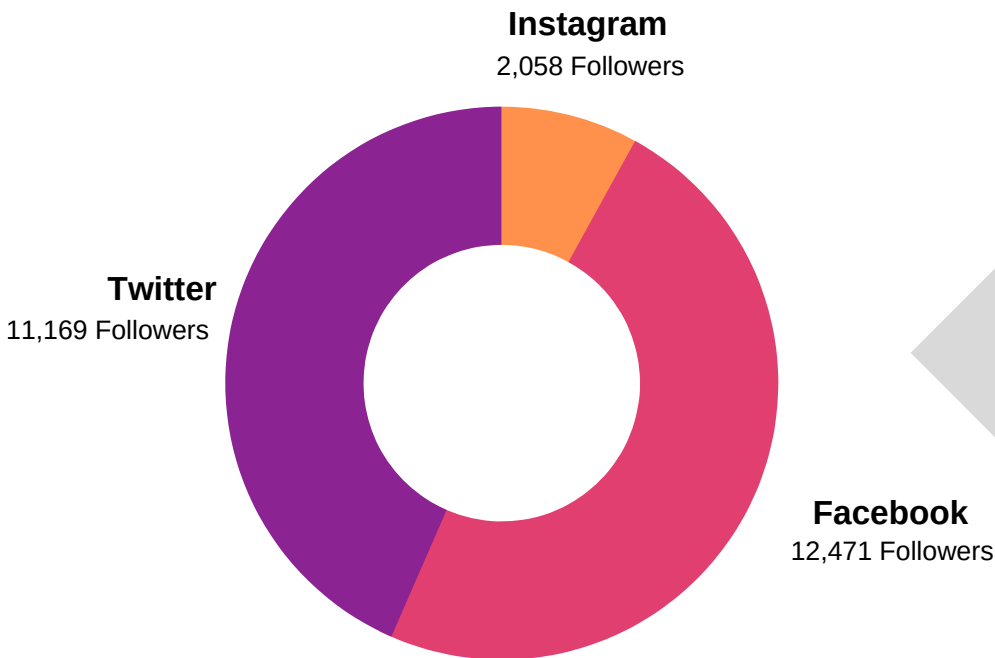
DPO welcomed over 120 visitors from across the US and further afield (Egypt, England, Germany, Greenland, Russia, Saudi Arabia, and Scotland), arranging site visits to talk to DPO staff about their work and processes, and to tour our lab and digitization sites. We also hosted colleagues from around the Institution, from Smithsonian Affiliates sites, and from other federal agencies (such as the Department of Defense, the State Department, and the National Archives and Records Administration).

NEW WEBSITE LAUNCHED



<https://dpo.si.edu/>

OUTREACH - SOCIAL MEDIA



MOST POPULAR TWEET

10,724 impressions
188 engagements



504,823

Total Sessions Via Our Websites
dpo.si.edu & 3d.si.edu

327,920

YouTube Views
115 Videos, 872 Subscribers

OUTREACH, PRESENTATIONS/PUBLICATIONS, EVENTS

DPO staff presented their work at over two dozen conferences, workshops, and classroom venues during the course of the year. Some of these opportunities were Smithsonian-based, such as the National Collections Program's ShareFair, but many were at professional conferences further afield such as the Society for the Preservation of Natural History Collections in New Zealand and the European Mediterranean Conference on Digital Cultural Heritage ("Euromed") in Cyprus.



DPO Director, Diane Zorich @ Euromed 2018



DPO Staff, Vince Rossi @ The Engine Shed, Scotland
Image © Historic Environment Scotland

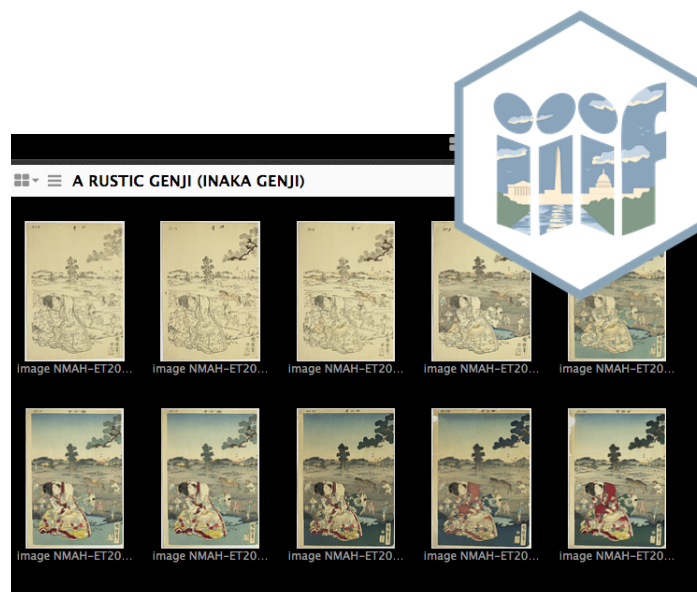


DPO Staff, Nathan Anderson @ NCP Sharefair



IIIF (International Image Interoperability Framework) Annual Conference

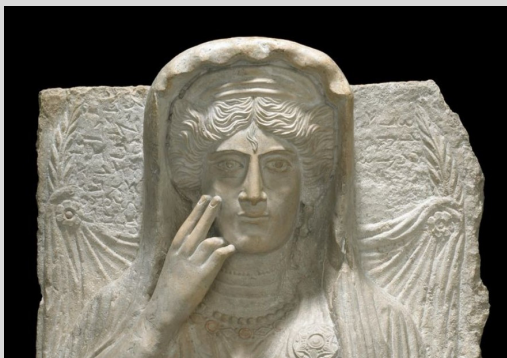
In May of 2018, the DPO and OCIO co-sponsored, with the Library of Congress, the Folger Shakespeare Library, and the IIIF Consortium, the annual conference of the IIIF imaging standards community here in Washington, DC. The DPO hosted pre-conference workshops and an evening reception, and DPO and OCIO staffers Adam Metallo and Andrew Gunther gave presentations on the challenges and opportunities faced in implementing this standard across the Smithsonian.



An example of using IIIF-enabled assets to compare Japanese woodblock printmaking techniques. Images courtesy NMAH.

DPO IN THE NEWS

The work of the DPO, both projects and programs, received external news coverage...



Two Sculptures of Ancient Women Give Voice to the Protection of Antiquities in War Zones

The Smithsonian's elegant Haliphat of Palmyra and the blue-eyed Miriam from Yemen raise awareness of the illegal trade in and destruction of antiquities

Smithsonianmag.com



3D Scanning the Past at the Smithsonian

3D scanning poses unique challenges to those in the GLAM community. One is a problem faced by all who 3D scan—certain materials scan better than others, and there's a lot of diversity in the 155 million objects at the Smithsonian...

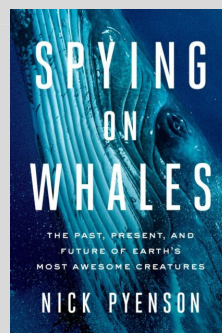
engineering.com



'Digital museum' brings millions of fossils out of the dark

The bid to create a "global digital museum" has been welcomed by scientists, who say it will enable them to study valuable specimens that are currently "hidden" in museum drawers

bbc.com



DPO's work was also featured in two books:

Spying on Whales by Nicholas Pyenson
&

Copy Culture: Sharing in the Age of Digital Reproduction by Brendan Cormier

A SPECIAL NOTE TO OUR OCIO PARTNERS

The DPO is part of the Smithsonian's Office of the Chief Information Officer. Our colleagues in OCIO assisted us in unheralded ways throughout 2018, as they do every year.

We are particularly grateful to the following divisions and branches:

Network and Voice Services, Network Security, Desktop Services, DAMS Support, Help Desk, Research Computing, System Architecture and Product Assurance, Collections System Support, and Libraries and Archives System Support.

Special thanks to the Technical Plans, Policies, and Project Management branch, who ease our way through Federal policies and procedures, particularly to Vickie Cattaneo and her team, who keeps us on the straight and narrow.



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