Face Sheet

OMB No. 3137-0035
CFDA No. 45.312

1. Applicant Organization
Virginia Museum of Natural History, Virginia Polytechnic Institute and State University

2. Institutional Mailing Address
428 North Main Street (0542)

3. City
Blacksburg

4. State
VA

5. Zip Code
24061

6. Web Address http://www.vtmnh.vt.edu

7. Name of Project Director/Principal Investigator ☐ Mr. ☐ Ms. ☑ Dr.
Mike Rosenzweig

8. Business Phone of Project Director
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15. Name and Title of Authorizing Official
Dr. James Blair, Associate Provost for Research

16. Business Phone of Authorizing Official
540-231-5410

17. Sponsoring institution if applicable (e.g., municipality, state, or university)
☑ check if this entity will manage funds if an award is made. Name and address:
Virginia Polytechnic Institute and State University, Office of Sponsored Programs, Blacksburg VA 24061

18. Is the applicant organization university controlled? ☑ yes ☐ no

19. For museum applicants, Non-Federal operating budget for the most recently completed fiscal year $ 215,000

20. Governing control of applicant [1] (turn page for selections) Other, please specify _____

21. Type of organization [4][1] * (turn page for selections) *select only one* * please specify Virginia Tech

22. Employer identification number/tax ID number _____

23. Type of project [3][0] (turn page for selections) *select only one*

24. Project Title Birds of a Feather: A Library/Museum Collaboration to Develop a Replicable Model for Disser

25. AMOUNT REQUESTED $ 350,099

26. Amount of Matching Funds $ 184,823

27. Grant Period (Starting Date) 10 / 01 / 02 — 09 / 30 / 04 (Ending Date)

28. In the space below, include names of any organizations that are official partners of the project.

Nueweb, Inc., of the Virginia Tech Corporate Research Center (http://www.nueweb.com/)

ABSTRACT

Birds of a Feather: A Library-Museum Collaboration to Develop a Replicable Model for Dissemination of 3-D Objects

The Virginia Tech Museum of Natural History (VTMNH) <http://www.vtmnh.vt.edu/> seeks to collaborate with the Virginia Tech Digital Library and Archives (DLA) <http://scholar.lib.vt.edu/> to improve information literacy for universities, museums, libraries, and the public at large through the use of 3D images in on-line exhibitions that are capable of being readily adapted to different learning levels.

The ***Birds of A Feather*** project will partner with Nueweb, Inc.<http://www.nueweb.com/>, a private company located in the Virginia Tech Corporate Research Center, to create a replicable model for the digitization, cataloging, and dissemination of museum and library collections on the Internet. This project will bring together physically separate, but related collections—The Bailey-Law Ornithological specimens (~18,000 skins) and manuscripts they have informed. As a proof of concept, we expect to work with ~1% of the collection, representing most resident or migrant bird species in our area. The model interface will also provide the capacity for diverse audiences to explore these objects and relationships in their own inquiries.

The ***Birds of a Feather*** project will build upon established digitizing and cataloging technology to create a virtual research collection that is fully archival, searchable, and interoperable with related information systems. The collection will adhere to and comply with existing standards: the Open Archives Initiative (OAI), the MARC cataloging record format, Dublin Core, etc. Upon completion, the project team will have:

1) made an adaptable package of hardware and software to capture collection objects;
2) assembled a training manual and on-line program guide for educating staff on the process of digitizing, developing a 3D display, capturing metadata, and publishing onto the Internet;
3) created a model system of equipment and training;
4) modified the VT ImageBase system for use with large 3D TIFF files and programmable metadata mapped using MARC records;
5) tested the approach by digitizing and cataloging part of the Bailey-Law Ornithology Collections; and
6) undergone Outcome-based Evaluation through system performance monitoring by a beta group of K-12 teachers and college-level students, and through on-line survey instruments such as those at <http://lumiere.lib.vt.edu/surveys/>.

To help visualize the image quality this project can achieve, a 3D digitized example can be viewed at <http://www.birdsofafeather.net/>. This is representative of one of the building block elements. The user-friendly tools to be developed for different audiences to examine these 3D images are unique to this project.

Digitizing the Bailey-Law collections will reveal the process of ornithological study from field notes to museum specimen. These research specimens will be available to scholars and birders along with students and teachers. This will "open the collection drawers" to the world and the collections will be available as a cataloged library, as well as a creative, dynamic, interactive, and multidimensional museum exhibit. Further, digitizing the specimens and manuscripts will ensure their preservation. They will be viewable worldwide, while the specimens and documents themselves can remain protected from public handling.

Narrative

Background

This project is a collaboration of collections in a University environment, which will present a model for other college collections, small-to-mid-sized museums, and K-12 schools to use in bringing their physical collections on-line. The Virginia Tech Museum of Natural History (VTMNH) and the Virginia Tech Digital Libraries and Archives (DLA) hold complementary collections; the Bailey-Law Bird Collection (18,000 bird specimens held at VTMNH), and the Bailey-Law Collection Papers (housed at the Virginia Tech Library) will be the initial focus. The specimen collection represents over 85% of bird families found in the world. This project will exhibit on-line 180 bird specimens representing 180 resident or migrant species of our area, many of which are featured in the manuscripts at the library. The opportunity for the Museum to expand this project into other parts of the collection is compelling.

The complete Bailey-Law collection of books, manuscripts, and specimens was given to Virginia Tech's Department of Biology in 1964. In 1982, the Department of Biology transferred the book and manuscript collection to the Library. The specimens were transferred to the Museum of Natural History in 1989. Taken together, the collections inform contemporary ornithologists and students of natural history about birds in North America in the first half of the 20th Century, documenting the professional activities of two ornithologists, Harold H. Bailey (1878-1962) and John Eugene Law (1877-1931). Harold Bailey, son of a noted ornithologist who was one of the founders of the American Ornithological Union, published The Birds of Virginia (Lynchburg: J.P. Bell, 1913) and The Birds of Florida (Baltimore: Privately Printed, 1925), as well as numerous articles on ornithological topics. Birds of Florida is a rare book with few existing copies. The DLA's copy has hand-painted watercolor illustrations of birds. Eugene Law's work in California included participation in the Cooper Ornithological Club, a curatorship at the California Museum of Vertebrate Zoology (Berkeley), and publication of numerous ornithological papers. Uncatalogued and with limited access, the collections are widely known but not widely available for ornithological study in North America.

National Impact

To date, small museums have had limited success in broadening and expanding their research and educational influence by taking advantage of significant advances in digital technology available to create, manipulate, and disseminate 3D information. This project will develop a model for bridging the existing technology gap by digitizing and publishing 3D collections and other information resources; by creating and disseminating a cost-effective, easily implemented model for museum and library staffs to collaborate on to make their artifacts and complementary information resources accessible by the public and their immediate user communities. The system will simultaneously maximize the educational value and availability of these resources to a broad range of educational levels.

Related projects demonstrate the scarcity of on-line research collections using 3D digital technology. The most relevant on-line collection to this project is Cornell University's Division of Rare Books and Manuscripts digital collection: **Louis Agassiz Fuertes** (http://rmc.library.cornell.edu/Birds/). Fuertes, according to their website, is the "nation's most notable ornithological painter since Audubon." The collection is accessible digitally through a database of 2500 of his illustrations, personal papers, and a journal he kept during an expedition.

In this project, our museum's Bailey-Law collection has the actual bird specimens that were drawn and included in published scholarly works. Rather than cataloguing the hand-drawn watercolors, ***Birds of a Feather*** will reproduce the birds in as realistic a way as possible, providing researchers with 3D versions of the actual objects studied by well-known ornithologists.

Adaptability

The model proposed will permit institutions to readily replicate these systems and apply them to other museum and library collections. The model to be developed will include a portable system that builds upon existing technology and standards to significantly improve the ability to open important scholarly collections presently hidden in small to mid-sized museums and libraries. It will be a primary goal of this project to document the process so that other institutions can replicate the model in their facilities..

The technical aspects of this project have been designed to allow for the widest possible variation in size, shape, texture, and weight of different objects to be digitized and incorporated in on-line displays. This will ensure that when this model is applied to other institutions, few modifications, if any, will be required.

The portable system for digitization will be designed so that it is easy to assemble and easy to transport. The digitizing of the Bailey-Law specimens will occur at the Museum of Natural History so that the collection will remain in its secure location. After the digitization project is complete, the system will be housed at the Virginia Tech New Media Center, one of over 100 digital media centers in U.S. universities. The Center will serve as the focal point for housing the physical equipment required to enable this project, and will also serve as a convenient location for centralizing training for others to implement the program being developed. As part of a statewide system of three museums and affiliated programs, The Virginia Museum of Natural History can act as a natural test site for adaptability and portability of the project. During the initial stages of the project, we will use this statewide system to design the interactive model to meet the needs of the users. Current learning standards and pedagogical styles (such as inquiry learning) will be applied through the consultation of an end – user design group.

Design

Background:
Museums are one of a very small number of environments in which students can gain three-dimensional perspective on objects they study. Museums typically house collections that historically have only been accessible to the public through exhibits staged within the museums' facilities. Those exhibits, in turn, usually only allow viewing a small portion of the objects shown (e.g., a few pages out of an illuminated manuscript, or one specimen of a taxonomic group from a series of dozens). On occasion, exhibits travel to other geographic locations, but in general, access to the museum collections requires a physical visit to the facility. Further, the majority of a museum's collections are in storage, leaving only a fraction available to the public as exhibits are rotated in and out of the museum's public display spaces.

Museums have always played an important role in public education. Information housed in museums is typically accessed either by staff-guided or self-guided tours of the physical museum. Students generally have only a few opportunities to visit museums throughout their K-12 education, and these opportunities are often remembered as the highlights of students'

learning experiences. University students may discover museums through courses or through campus exploration, and these discoveries can impact lifestyle choices that are part of a young person's intellectual development during their undergraduate experience. The information retained through a short, on-site visit is limited. Financial, time, and curriculum constraints prohibit repeated class tours of exhibits throughout the year. Students in more remote geographic areas do not have the same level of access to museum resources as students in urban areas do. However, the importance of museums and libraries in a culture of lifelong learning cannot be underestimated.

Libraries, particularly public libraries and those at public institutions of higher education, typically have open stacks where the public is encouraged to browse the catalog as well as the aisles shelving the information resources. Today many libraries have on-line public access catalogs (OPACs) that cover their available information resources. Even Special Collections that house one-of-a-kind manuscripts, rare books, and the like, have made guides to their collections publicly available on the Internet, and sometimes digitized samples from these collections. These collections are very much like museum collections where only a few items are available in public display spaces. The vast majority of their resources are not available to the public on open shelves.

As public school budgets continue to tighten and the availability of buses and time for field trips decrease, the importance of creating "museums without walls" has become more crucial. Today, modern natural history museums are involved with curriculum development, developing state learning standards and models, teacher training, and development of exhibits and learning kits that can travel to the classroom. The Virginia Museum of Natural History at Virginia Tech (VTMNH) (http://www.vtmnh.vt.edu/) is on the forefront of this movement. With its natural history curriculum called Model Inquiries into Nature in the Schoolyard (MINTS) (http://www.vtmnh.vt.edu/mints/mints.html), VTMNH has increased its offerings to thousands of K-12 students who would not otherwise have been exposed to experiential natural history education. The VTMNH developed MINTS to meet state learning standards and is now in the process of expanding MINTS to a national audience. The project proposed here will launch as a synergistic component of MINTS so that professional university-level research can be interpreted and offered to the K-12 learning community. This is the natural progression of education. Information from the academic environment becomes commonplace in the K-12 community as academics continue on to research new questions. It is the charge of natural history museums and libraries to make information available and relevant to society. This project takes the step to do this with previously separate and cloistered natural history and library collections.

Birds of a Feather will take advantage of technology currently available through the Digital Library and Archives (http://scholar.lib.vt.edu/) at Virginia Tech's (http://www.vt.edu/) University Libraries (http://www.lib.vt.edu/) by leveraging the technology base of Nueweb, Inc. (http://www.nueweb.com/), its private-sector partner. Nueweb has unique expertise in the development of digital tools designed to provide Internet users with the ability to view and interact with objects on the web in the same fashion they would view them and interact with them in the physical world. As part of the project, new digital display tools will be developed with the capability of providing multiple levels, addressing both viewing and interactive complexity issues. These levels will be designed to correspond with the various learning levels and needs of the educational settings the project will address. These levels are K-12, college-level, and researcher. Elementary level learners might be presented with a simple 360° view of an object, as well as basic information about the different highlighted parts. Increasing levels of

complexity will be included for higher education settings, from middle and high school to a collegiate level. Similarly, the reference materials presented for or linked to particular objects and features will be on a level relevant to the particular user. The information contained in the displays will be fully searchable and indexed using the VT ImageBase system of the Digital Library and Archives. Virginia Tech has a history of building models in Information Technology that can be replicated worldwide. Virginia Tech projects such as the Blacksburg Electronic Village (http://www.bev.net/) and the Electronic Theses and Dissertations program (http://scholar.lib.vt.edu/theses) are now commonplace in communities and institutions around the country. We anticipate that creating this three-dimensional museum display will likewise be adopted or adapted by institutions nationally and internationally.

Birds of a Feather will provide an entertaining and educational way for students to "carry an exhibit" to their classrooms and ***to their homes***, to access the information they see at the museum for more in-depth study. This engaging teaching tool and methodology also will serve to encourage students to visit museums to see first hand what they have already been able to explore on-line. Further, it will empower students, as well as teaching assistants and instructors, to themselves create and improve on similar interactive representations.

Potential Audiences/Users:
We anticipate three major types of users of this web-based technological environment: K-12 Education & the General Public, College Students, and Researchers. All roles will be accessible to all users, so that there will be no limitation on access for anyone.

K-12 students and teachers as well as the general public who have questions will use the interface to help answer their self-directed interests. This interface will help reveal the key characters used in the identification of organisms as well as the organizing taxonomy. These ways of looking at the specimen and understanding its place in the web of life become internalized for researchers, but can be overwhelming to novices. We hope that having the interface deliberately call up the key characters will help learners know "what to look for" as well as what they are looking at. For K-12 teachers this also includes linking to pertinent sections of the Virginia Standards of Learning.

Lifelong learners in the general public will find many uses for an on-line accessible collection as they explore and discover new interests in the world around them. Likely users include: bird clubs, museum visitors, web visitors, and off-campus users of programs and products. The other branches of the Virginia Museum of Natural History sponsor programs across Virginia. These programs will be enhanced by remote access to collections. We expect that web visitors coming through national museums and collections gateways will be delighted with the quality of the images and the ease of putting archival library information together with specimen data.

Some typical college courses that utilize museum collections are: General Biology, Ornithology, Ecology, Wildlife Biology, Geographic Information Systems, Veterinary Medicine Anatomy, and Taxonomy. Students, teaching assistants, and faculty in these courses have repeatedly indicated the value of being able to review the specimens seen in lab. This project answers that need. In addition, the creation of 3-D, high quality, accessible images may allow courses not normally offered on-line to develop an on-line component with greater availability.

Finally, researchers at Virginia Tech, in the Commonwealth, and around the world will have access to natural history collections data in meaningful ways and will have a useful and intuitive way to explore these relationships. In particular, researchers in scientific fields such as

ornithology and ecology will benefit from the accessibility of the collections on-line, especially given this project's conformity with international data standards. Other research groups that will benefit from this project include technology education, formal and informal science education, and state agencies.

Technical Design:

For the duration of the ***Birds of a Feather*** project, the digitization hardware and software to be developed will be located at the museum. Upon completion of the project the equipment will be housed at the New Media Center (NMC). The NMC will act as the training and learning center throughout and beyond the project. NMC staff will be trained and available to teach University personnel the processes necessary to digitize collections. The NMC also will facilitate the 3D digitization of objects by students and the community at large. However, other museums and libraries will not require a NMC to replicate this model.

The hardware provided through the IMLS grant will consist of a turntable mechanism that will support objects with a variety of sizes and shapes. This turntable will be controlled through software on a computer dedicated to the system, allowing for precise capture of images. A lighting and blue screen setup will be employed which will allow for proper lighting and minimal shadowing of the objects during the image capture portion of the digitization process. Finally, an appropriate resolution digital camera will be supplied that will provide the features necessary for image capture. This configuration will be documented so it can be a model for other sites.

Multiple hardware setups may be used as this project is adapted to future collections at other locations. The typical setup for the digital capture of the collection will take place through the use of a high-resolution digital camera and motorized turntable. However, other technologies may be used for the digitization such as film photography, digital or film based video, and 3D scanning. The required frames for assembling the 3D rotation in the Flash display may be obtained through the use of these mediums. By providing this flexibility, the project hopes to make future replication of the technology as accessible as possible.

Software will consist of custom designed tools to transfer the digitized images into presentation form. Custom tools will be developed to allow information creators to develop presentations easily and efficiently in Macromedia Flash format, a universally available image format, without having to know the programming skills associated with the Flash format. This level of usability is unprecedented.

The grant will provide staffing and equipment for digitization of a portion of the bird collection, with creation of Dublin Core Metadata records for each bird to be stored with 3D images in the VT ImageBase. Original programs will be written that will migrate the metadata to MARC for OCLC, and MARIAN (a local R&D indexing, search, and retrieval system for digital libraries). MARIAN was developed at the Virginia Tech Computing Center for VT Information Systems. Virginia Tech's Digital Library Research Laboratory is conducting continuing development of MARIAN. These cataloging systems are compliant with worldwide standards. The three-dimensional displays will be dynamically linked to bibliographic information about the digital objects. The sources that will serve as the basis for the bibliographic information in this 3D bird encyclopedia include the books published based on research into this collection of birds, unpublished notes and journals that were generated by the ornithologists collection, the bird specimens, and secondary works that will place the collection within the larger context of ornithological scholarship.

The technology to create this model will be open platform and freely published so that it will be replicable and updateable, increasing the potential longevity. Capabilities will be incorporated for the publishing of the content to the VT ImageBase through the Web. Tools and their configuration will be documented so that we develop a replicable model for other sites and image databases.

ImageBase:
The dissemination platform will build on the established ImageBase system of Digital Library Archives (DLA). ImageBase (http://imagebase.lib.vt.edu/) is a browsable, searchable database of 2D images, URN's, and related information. The ImageBase, now in its second generation, is a system built in 1996. The server that houses the images is backed up nightly. Typical of records maintained by DLA, images are persistent (with URNs). The server that houses the scripts and the database dumps are backed up every night, while scripts dump an incremental copy of the database contents twice a day. All images will continue to be archived by storing their TIFF files on compact discs. The ImageBase images are currently available in TIFF, JPEG, and GIF formats. The ImageBase software will be upgraded to include the ability to house the new 3D displays and improved data entry of museum field elements, resulting in a more user-friendly interface for public and staff.

Compliance, Standards, and Cataloging:
The ***Birds of a Feather*** project will build upon established digitizing and cataloging technological developments to create a virtual research collection that is fully searchable and interoperable with related information systems. Where standards for data preservation exist, they will be adopted. Where standards do not yet exist, they will be developed and tested. The collection will adhere to and comply with existing library standards: the Open Archives Initiative, the MARC cataloging record format, Dublin Core, and other relevant standards in museum informatics. The collections will be catalogued according to the MARC standard, supplying metadata compliant with the Open Archives Initiative (OAI.)

ImageBase is compliant with the Open Archives Initiative (OAI). DLA is one of the groups at Virginia Tech that has participated with the Digital Library Research Laboratory (DLRL) (http://www.dlib.vt.edu/) in the Open Archive Initiative. Virginia Tech contributes toward the development of OAI protocols and standards. Professor Edward Fox was one of the original participants in the OAI, and serves on its steering committee. The NDLTD (Networked Digital Library of Theses and Dissertations) project, led by Fox and McMillan, was connected with OAI since 1999. Subsequent to that, the CSTC (Computer Science Teaching Center) and W3C Web Characterization Repository, hosted by Virginia Tech, became two of the first OAI-compliant digital libraries. Virginia Tech also is involved in testing compliance of open archives, defining metadata transport formats, and developing client/server implementations of the protocols. Wherever possible, new and existing projects of the DLRL are being linked to the OAI to provide a proof of concept of the ubiquitous capability of the OAI protocols and specifications.

The OAI "recognizes that archives will use specific metadata sets and formats that suit the need of their communities and the types of data they handle" [OA core document]. In the case where participating archives recognize an existing metadata standard, they are encouraged to provide metadata in both Dublin Core and the existing standard. For a great many library systems, that existing standard is MARC bibliographic records (coded in XML). ***Birds of a Feather*** will adopt the MARC record format for cataloging the collection.

MARC records have their own native transport format, but this format ("MARC communications

format" or among old-timers "tape format") requires specialized parsers and makes use of some fairly arcane conventions. The VT DLRL has undertaken to create an XML Schema to support wider distribution of MARC records within the OAI community. The current schema has been accepted since 2001 so developers won't have to track a moving target.

The system will be designed so that the pieces of the collection are accessible in three different ways: 1) browsing image sub-folios through the collection's table of contents; 2) searching Dublin Core metadata records; and 3) collection-level MARC records stored in the library's on-line catalog. Through the use of standards such as Dublin Core and MARC, this project will become part of other large-scale initiatives to collect and disseminate museum collections globally on-line.

Display:
The displays will be delivered to the end user over the Internet using the Macromedia Flash player, a freely downloadable browser plug-in that is currently installed in 98% of all PCs. This technology will allow educators to easily extract specific objects out of a larger collection for their own lesson plans, labs, and assignments. The main area of the Flash based display will contain a 360° image. Users will be able to rotate the image on a predefined axis and view the object from all sides. The image will be programmed to highlight different areas of the object as it spins. The highlighted area will coincide with another area of the display that will contain the textual information as well as additional, close-up, 2D images.

The project team has determined Macromedia Flash to be the best medium for the creation and display of the collection objects. The Macromedia Flash player has the capability to download smaller portions of the display in a way that allows the user to begin interacting before the entire object has been downloaded. This "streaming" capability will be used extensively throughout the display to ensure that the maximum amount of usability may be obtained in the smallest amount of time. An example of this will be the downloading of the detail views and Features Explorer as the user is viewing the 3D spin. Likewise, the frames will download in 1/3 portions. At first, a modem user will see the object rotate along the x-axis in a somewhat jagged fashion. As more frames are loaded, the rotation will become smoother. A user with a broadband connection will not be aware of these streaming capabilities, as each feature will be loaded quickly. Macromedia has committed to support previous versions of Flash technology with each iteration of its Flash Player. A commitment letter from the Director of Product Management, Macromedia Flash Products is attached in ***Appendix A***.

Before viewing the display, users will be prompted to enter the educational level that they wish to view. The software will then tailor the textual information displayed with the highlighted regions at appropriate educational levels. Users will have the ability to shift to other levels at any time while viewing the display.

A section of the display will provide users with user-friendly information drawn from the Dublin Core record entries. There also will be an "Additional References" section that will provide both on- and off-line reference materials relating to the object the user is viewing. The creator of the display will have the ability to add another section to the display that will allow the user to see through a virtual 3X magnifying glass on pre-selected images. This magnification feature will reveal the finer features and textures of the object.

The Macromedia Flash-based display will be fully compliant with ADA specifications for web-based content. Each section of the display will provide a text description of the associated visual information. In addition, a high-contrast view will be built-in to the display through the use of the

variable color schemes. More information on Flash Accessibility is available at: (http://www.macromedia.com/macromedia/accessibility/).

Training:
Birds of a Feather will develop a wide range of training programs for teaching anyone, highly skilled New Media Center personnel, library and museum personnel, university faculty and students, and members of the general public, on the use and operation of the three-dimensional exhibition system.

The training program will consist of two parts: system support and training, and digitization training. System support and training will provide staff with the knowledge required to use, manage, and maintain the equipment. The training program will consist of a manual and on-line voice narrated tour of the system including the use of the software. This training program also will provide staff with the knowledge to perform periodic maintenance on the hardware. This tutorial will be more technical in nature than the 'digitizer tutorial', to allow for better troubleshooting by the support staff.

The digitizer-training program will consist of an on-line voice narrated tutorial of the steps necessary to digitize and create a three-dimensional exhibition like ***Birds of a Feather***. Video demonstrations will be provided on the proper setup of the object and lighting to allow for the highest quality image capture. Proper handling of the specimens is documented in ***Appendix B.***

Students will be permitted to reproduce (print or download) any bird, provided credit is given and the copies are not intended for sale. Users will be instructed to assign the following credit line for use of the materials available as a result of the IMLS 2002 grant to the Virginia Tech Museum of Natural History and the Digital Library and Archives: "Materials are available for use in research, teaching, and private study. For these purposes, you may reproduce (print or download) materials without prior permission, on the condition that you provide proper attribution of the source in all copies. Contact the Digital Library and Archives, University Libraries, Virginia Polytechnic Institute and State University, with questions."

Proper Attribution will look like:

The Bailey-Law Manuscript Collection (Ms82-002), Special Collections, Digital Library and Archives, University Libraries, Virginia Polytechnic Institute and State University.

(VPI 8002) Virginia Tech Museum of Natural History Ornithological Collections.

Management Plan

The management of ***Birds of a Feather*** will take place through a steering committee. This committee will collectively meet once a month, and as needed, during the course of the grant project. The committee will be made up of, Dr. Mike Rosenzweig and Llyn Sharp, VTMNH, Gail McMillan and Jennifer Gunter, DLA University Libraries, David Catalano, Nueweb, Inc., Ed Schwartz, NMC, Edward Fox, DLRL, Virginia Tech, and an as yet un-named local high school biology teacher.

Dr. Rosenzweig will be responsible for the management and dispersal of the grant monies as well as the auditing of resource allocations to the project.

The project will cover the twenty-four month period October 2002 through September 2004. It

will involve the creation of the hardware/software package, development of the training program, and training of a beta group who will in turn develop a test sample of items from the Bailey-Law Bird collection and library manuscript collection. The project will conclude with a six-month evaluation period where end-users will be monitored and surveyed, and the project will be modified as needed.

Personnel

Attachments include the curricula vitae for the key personnel: the project directors, the project coordinators, and the technical team.

Project Directors: Mike Rosenzweig, Director of Virginia Museum of Natural History and Gail McMillan, Director of Digital Library and Archives

Mike Rosenzweig will devote 30% of his time for the purpose of hiring and training graduate students to coordinate identification and scanning of 180 bird specimens. He will also curate the on-line exhibit produced at the end of the grant. He has a PhD in Biology from Virginia Tech and is an adjunct professor in the Department of Biology. He is the founder/co-founder and organizer of several educational efforts beyond his activities as Director of the museum.

Prof. Gail McMillan will devote 10% of her time for the purpose of ensuring that the policies and procedures established for the project are compatible with departmental, library, university, national and international professional activities and standards. She will work with the University Library's Technical Services to develop programming for mapping metadata to MARC for the specimens. Professor McMillan holds an M.A. in History and an M.L.S. from the University of Maryland.

Project Coordinators: Llyn Sharp, Assistant Director of Museum of Natural History, Jennifer Gunter, Coordinator of Special Collections, Digital Library and Archives.

Llyn. Sharp will devote 30% of her time coordinating the preservation and cataloging of the bird specimens. Ms. Sharp holds and M.A.Ed. and a B.S. in Geology.

Jennifer Gunter will spend 10% of her time for the purpose of hiring and training the graduate students involved with entering the metadata for each specimen. She will work with the University Library's Technical Services to develop procedures for cataloging the specimens and manuscript collection in the MARC format. She will also supervise the archival processing of the Bailey-Law collection and selection of materials for digitization. Ms. Gunter holds an M.A. in History and an M.L.S. from the University of Maryland.

Project Technical Team: Three key individuals at Nueweb will lead the Company's contribution to the project. David Catalano, the CIO of Nueweb, will be the project leader and liaison. Brian Leitten, CEO, will be the overall manager, and David Salvaggio, CTO, will manage the development and design of the display template. To be determined Nueweb personnel fully qualified for the tasks will be assigned to the roles of: Sr. Flash Programmer, Jr. Flash Programmer, ASP Programmer, Photographer, and Editor.

Graduate Student Assistants: positions ***open***
Graduate students from related academic departments, such as the Department of Computer Science, Biology, and Department of History.

Programmer: position ***open***

Project Evaluation

Display and correlated information
During the initial stages of the project, the museum will assemble a consultant end – user design group consisting of education specialists who can assist in how current learning standards and pedagogical styles (such as inquiry learning) will be applied throughout the display interface.

Digital Display:
The ***Birds of a Feather*** grant will conclude with a six month evaluation period monitoring and surveying end-users, modifying the project:

The survey given to the beta testers evaluating the end-user experience will consist of questions addressing:

- Ease of use in locating desired object
- Satisfaction of expectations prior to viewing the collection
- Educational level
- Effectiveness of the materials presented
- Intuitiveness of the display layout and navigation

After the completion of the grant, built-in monitoring and performance measurement systems will continue to collect data. The gateway to the users, VT ImageBase, will trace visitor usage of the collections, including time spent and number of repeat visits. Use of equipment will be monitored by tracking both the number of new images added to the collections and NMC usage. On-line surveys will be designed for completion by museum and library personnel as they complete training, by the general public (i.e., users of the exhibition and ImageBase materials), and specific students and teachers asked to evaluate the ornithology on-line exhibition. Data collected will include:

- Level of the learner (K-12, Undergraduate, Researcher)
- Time spent viewing the display
- Number of repeated views of the same display
- Number of unique displays viewed
- Navigational path through the display

As part of the outcome-based evaluation of this project, the displays will be modified as needed to provide a maximum level of learning across the predefined educational levels.

Training:
For the first six months of the second year, a beta program will be put in place to evaluate the training procedures and software. This evaluation will be survey-based and administered to a select group of testers. Some sample questions that may be included on the training survey will address:

- Amount of time to go through the entire training process
- Practicality of amount of time spent in training
- Comfort level with the technology and the available features of the program
- Quality and usability of output created
- Effectiveness of training materials

Dissemination

Dissemination of the project will take place though the website, conferences and associated

materials such as the Museum's MINTS curriculum. The use of metadata in all of the web pages will allow for improved indexing by the major search engines, allowing for the casual user to find the collections and their contents. Additionally, the Dublin Core records will be added into MARIAN to provide a single point access to all collections digitized throughout the life of this project. This system will allow for the availability, dissemination, and browsing of digitized collections as well as full searching and indexing of the text accompanying the individual displays.

Professional conferences and websites will provide a quick avenue for dissemination of the grant's developments. The VTMNH will seek to promote the grant via the following conferences and publications: Natural Science Collections Alliance (previously known as the Association of Systematics Collections), American Association of Museums, Society for the Preservation of Natural History Collections; and Museums and the Web;Virginia Association of Science Teachers; Virginia Academy of Science; Joint Conference on Digital Libraries, and possibly the Museum Computer Network and the American Ornithological Union. DLA is specifically interested in attending the Association of College and Research Librarians (ACRL) National Conferences: the 10th in 2003 and 11th in 2005, WebWise in 2004, Society of American Archivists Annual Conference, and others.

Specific collections digitized by this project will function as a means of promoting the availability of the system. The ***Birds of a Feather*** website will provide a starting point for other institutions to learn about the project specifics. Throughout the planning, implementation, and evaluation stages of ***Birds of a Feather***, the website will be a central source for project details and usability reports from the beta testers. The website also will allow for access to the training materials and will provide links to other collections digitized through this system.

Sustainability

The Digital Library and Archives' record of sustaining access to innovative digital projects demonstrates the means by which ***Birds of a Feather*** will be maintained. Some nationally prominent digital collections already created and maintained by Digital Library and Archives include: Electronic Journals (http://scholar.lib.vt.edu/ejournals/), since 1991; Electronic Theses and Dissertations (http://scholar.lib.vt.edu/theses/), since 1995; News Reports (http://scholar.lib.vt.edu/NewsOnline/), since 1997; and the ImageBase, since 1996. Adhering to standards for sustainability of information systems and digital objects (MARC, OAI, XML, TIFF, GIF, and JPG) will provide the surest foundation for this project's longevity with a collection preserved in a format that allows for various future uses.

The benefits of this project will span well beyond the two-year grant period. The availability and free use of the hardware and software package in the Virginia Tech New Media Center will promote the digitization of more collections at Virginia Tech, collections belonging to the Museum of Natural History, the University Libraries, and others.

The ease of setup and training demonstrated in this project will allow for replication of the setup in other institutions throughout the country. The cross-pollination of the museum and library collections will allow for increased collaboration between library and museum staff, and the project website will remain the focal point for the dissemination of the training program and other project details.

SCHEDULE OF COMPLETION/PROJECT IMPLEMENTATION AND EVALUATION

Goal: To create and demonstrate an innovative collaborative model utilizing emerging information technologies to open the cabinets of museum collections, library collections, and other information resources into an interactive core learning experience for K-12 and college students and professional researchers.

Objective 1: Organization of project and model system – Months 1-4 **EVALUATION MEASURES**

ACTIVITY	MO	FUND ALLOCATION	PERSONS RESPONSIBLE	FORMATIVE/PROCESS	SUMMATIVE IMPACT MEASURES
Develop project management system	1	%Mike Rosenzweig(M) %Llyn Sharp (M) %Gail McMillan (DLA) %Jen Gunter(DLA)	M.Dir., DLA Dir., Tech. Staff Coor. (Nueweb)	Management system communications developed. Notebook developed.	Notebook entries include system map, minutes of meetings, and participation of personnel.
Purchase Computers	1,2	$2,847 (M,computer) 2,847 (DLA,computuer) $500 (DLA,memory)	M.Dir., DLA Dir.	Equipment list developed by Management team.	Equipment purchased by deadline.
Recruit Staff Develop end-user design consultant team	1,2	Museum: 1 grad.stud., 1 work study DLA: 1 grad.stud., Programmer(payband4)	M.Dir., DLA Dir., Tech. Staff Coor. (Nueweb)	Equipment list developed by Management team.	Equipment purchased by deadline.
Training staff on processes and reporting	2,3	Museum: Grad student, work study, %Mike & Llyn DLA: Grad student, %Gail & Jen	M.Dir., DLA Dir., Tech. Staff Coor. (Nueweb)	Staff put into place, training schedule developed.	Staff checked out on equipment and trained on notebook log, reporting to management team.
Identify Museum collections and Library manuscripts	3,4	Museum: Grad student, work study, %Mike & Llyn DLA: Grad student, %Gail & Jen	Museum and DLA Grad. Students	Identify collections, management and care of collections, linkages between collections, proper set-up for project management.	Museum and Library collections are ready for project data collection, database set-up.

Continued - SCHEDULE OF COMPLETION/PROJECT IMPLEMENTATION AND EVALUATION

Objective 2 Development of the model system – Months 4-12 **EVALUATION MEASURES**

ACTIVITY	MO	FUND ALLOCATION	PERSONS RESPONSIBLE	FORMATIVE/PROCESS	SUMMATIVE IMPACT MEASURES
Flash Template Development	1,2 3,4	$40,916 – Nueweb % Mike % Gail.	M.Dir., DLA Dir., Tech. Staff Coor. (Nueweb)	Develop Flash based template based off of defined component requirements	Programming of template is completed and ready for integration with the Display Creation System
Identifying and Cataloging Bird record information	4,5 6	Museum: Grad student, work study, % Llyn & curator (J. Via)	Museum Project Coordinator	Identifying parameters for cataloging specimens.	Bird specimens are cataloged as per project specifications
Catalog Baily -Law manuscript collection 1 MARC record for MSS, 180 subsequent analytic records (3hrs/bird)	4,5 6	DLA: Grad student, %Gail & Jen, Programmer	DLA Project Coordinator & Programmer	Identifying parameters for cataloging manuscripts.	manuscripts are cataloged as per project specifications
Develop Lighting & Rigging System	4,5	$6,375	Technical staff (Nueweb)	Identify proper lighting setups, create rigging system	Digitization requires no image editing because of proper lighting and rigging
Develop Display Creation System	4,5 6,7 8	$52,207	Technical Staff (Nueweb)	Team designs and implements system that develops displays based on Flash Template	System is created, document, and prepared, then delivered to the digitization team.
Developing the graphic interface and informational linkages	6,7 8,9	Museum: Grad student % Mike&Llyn DLA: Grad student, %Gail & Jen	Technical Staff Coordinator (Nueweb)	Identify information parameters and metrics to be included in graphic interface.	Graphic interface Beta system is created and tested among project team members.
Training technical staff on equipment	9, 10	Museum: Grad student % Mike&Llyn DLA: Grad student, %Gail & Jen	Museum Director, DLA Director, Technical Staff Coordinator	Staff put into place, training schedule developed.	Staff checked out on equipment and trained on notebook log, reporting to management team.
Digitizing Bird Collection	11, 12	$4,860	Tech.Coordinator (Nueweb)	Identifying parameters for digitization.	An image database of the bird specimens is created.
Add birds to ImageBase and link to MARC records	12	~ 90 hrs. grad. student.	DLA Grad. Student	birds digitized birds cataloged	ImageBase linked to online catalog,check test queries

Continued - SCHEDULE OF COMPLETION/PROJECT IMPLEMENTATION AND EVALUATION

Objective 3 Implementation of the model system – Months 13-24 **EVALUATION MEASURES**

ACTIVITY	MO	FUND ALLOCATION	PERSONS RESPONSIBLE	FORMATIVE/PROCESS	SUMMATIVE IMPACT MEASURES
Beta Testing: · scheduling sessions · recruiting subjects · evaluating interface use · evaluating interface transfer	13, 14, 15, 16, 17	Museum: Grad student, Work Study % Mike&Llyn DLA: Grad student, %Gail & Jen	Museum Director, DLA Director, Technical Staff Coordinator (Nueweb)	Graphic interface presented online: · Pre- and post questions related to the interface. · users manual · example learning resources for DLA and museum made available.	Results evaluated by management team. Interface transfer evaluated by another museum director in the Virginia Museum of Natural History system Interface evaluated by Virginia Tech museum studies faculty member.
Editing bugs, adding material and information to displays.	18, 19, 20	Museum: Grad student, Work Study % Mike&Llyn DLA: Grad student, %Gail & Jen	Technical Staff Coordinator (Nueweb)	Information from Beta testing identified for potential and real bugs. Information from Beta testing identified for addition of other material to the interface.	Bugs edited. New information added as per Beta testing.
Scheduling Conferences and Presentations	20, 21, 22, 23, 24	$5,000	Museum Director, DLA Director, Technical Staff Coordinator (Nueweb)	Identification of regional and national audiences.	Scheduling of paper and poster presentations by members of the management team: Museum director DLA director Technical coordinator and staff

Specifications for Projects Involving Digitization

1. Describe types of materials to be digitized (i.e., artifacts, maps, manuscripts, photographs) and number of each:
The collection to be digitized in this project are bird specemins from the Bailey-Law Ornithology collection representing over 85% of all birds found in North America. The collection will also catalog the corresponding papers, books and monographs, and scan selected materials.

2. Identify copyright issues and other potential restrictions:

☑ Public domain ☐ Permissions have been obtained

☐ Permissions to be requested - Plan to address: _____

☐ Privacy concerns - Plan to address: _____

☐ Other - Explain: _____

3. List the equipment, with specifications, whether purchased, leased, or outsourced, that will be used (e.g., camera, scanner, server): Kaidan Turntable Model # TM400 (purchased), Nikon D1 (purchased), Computer System brand TBD (purchased), Lighting & Rigging setups - brand TBD (purchased) Additional memory (purchased) for the server hosting VT ImageBase at Digital Library Archives .

4. Specify each type of file format (e.g., TIFF, JPEG) to be produced and anticipated image quality of each (minimum resolution, depth, tone, pixels) :

☑ Master 2000X1312 24bit color depth TIFF

☑ Access Macromedia Flash version 4

☑ Thumbnail Width-Height TBD - 24bit JPEG

5. Describe the quality control plan: X and Y-axis rotation tests to ensure spin of object is consistent the entire 360 degrees of selected axis; Standarized lighting enviornment for consistent color/texture; Standardized rigging setups ; Standard zoom, shutter, f-stop settings. Professional catalogers will review MARC records

6. Estimate cost per image. Include costs such as scanning, quality control and indexing. Indicate the basis for calculation: Digital Photography & Editing (2 hours at $9/hr = $18) Indexing (0.25 hours at $9/hr = $2.25) Quality Control (0.25 hours at $9/hr = $2.25) TOTAL cost per image = $22.50

7. Explain how you will describe the content through metadata, including which standard you will use (e.g., MARC, EAD, Dublin Core): Museum personnel will enter appropriate descriptive metadata based on Dublin Core standards that will be programmatically mapped to MARC.

8. Describe plans for preservation and maintenance of the digital files after the expiration of the grant period (i.e., storage systems, migration plans, and funding): Policies and procedures are in place ensuring security and archiving of all DLA information resources (including frequent back-ups-housed online and offline on tapes--stored in multiple locations) All policies and procedures apply to the images and to the metadata.

9. If you are producing collection-level records, describe plans for submitting collection-level descriptive records to a bibliographic utility, such as Research Libraries Information Network (RLIN) or Online Computer Library Center (OCLC). State reasons for selecting any alternative approaches:
Following Std procedures, MARC records are entered into OCLC, transferred on-line, and copied to MARIAN. We are willing to contribute our metadata and our MARC records with others resources such as RLIN though it is not a standard procedure. We will continue to adhere to the high quality cataloging typical of Virginia Tech.

10. Describe plans for submitting information about the project to a national level registry of digital resources, such as the Association of Research Libraries' Digital Initiatives Database (http://www.arl.org/did/) or OCLC's Cooperative Online Resource Catalog (http://www.oclc.org/corc). State reasons for selecting any alternative approaches:
ARL's Digital Initiatives Database already includes the Virginia Tech DLA and we will add collection-level records. Virginia Tech, a founding member of OCLC's CORC will add records for Birds of a Feather.

11. Provide URL(s) for applicant's previously-digitized collections: http://scholar.lib.vt.edu, http://spec.lib.vt.edu/ , http://imagebase.lib.vt.edu

Partnership Statement

1. The Applicant Organizations are:
   • The Virginia Museum of Natural History at Virginia Tech
   and
   • The Virginia Tech Digital Libraries and Archives
   along with
   • Nueweb, Inc.

2. Each partner agrees to perform the following activities for this proposed project:

Museum of Natural History	Digital Libraries, Archives	Nueweb, Inc.
- manage grant funds	- develop project management system	- develop project management system
- develop project management system	- purchase necessary equipment	- purchase necessary equipment
- purchase necessary equipment	- recruit and train necessary staff	- recruit and train necessary staff
- recruit and train necessary staff	- prepare manuscript collections	- Flash template development
- prepare collections specimens	- catalog images	- develop lighting and rigging system
- assist with bird cataloging	- assist development of graphic interface and informational linkages	- develop display creation system
- lead development of graphic interface and informational linkages	- co-manage testing, evaluation, and editing	- develop of graphic interface and informational linkages
- co-manage testing, evaluation, and editing	- schedule and present at appropriate conference	- digitize bird collection specimens
- schedule and present at appropriate conference	- work as a team member with other partners	- co-manage testing, evaluation, and editing
- work as a team member with other partners		- schedule and present at appropriate conference
		- work as a team member with other partners

3. We the undersigned institutions, agree to all of the following:
   - We will carry out the activities described above and in the Application Narrative;
   - We will use any funds we receive from IMLS in accordance with applicable Federal laws and regulations; and
   - We assure that our facilities and programs comply with applicable Federal requirements.

	Virginia Museum of Natural History-VT
Signature of Authorizing Official	**Partner Organization (Type or Print)**
Michael S. Rosenzweig	
Name of Authorizing Official (Type or Print)	**Date**
	VT Digital Libraries and Archives
Signature of Authorizing Official	**Partner Organization (Type or Print)**
Gail McMillan	
Name of Authorizing Official (Type or Print)	**Date**
	Nueweb, Inc.
Signature of Authorizing Official	**Partner Organization (Type or Print)**
Brian J. Leitten	
Name of Authorizing Official (Type or Print)	**Date**

Mission of the Virginia Museum of Natural History at Virginia Tech

The mission of the Virginia Tech Museum of Natural History is to be a center and partner for research, education and public outreach in natural history. We are a joint venture between the Virginia Museum of Natural History and Virginia Tech. The Museum's primary audience in education and public outreach are the citizens of southwestern Virginia.

We present exhibits, programs, and field trips for the general public. We also offer teacher training and publications for teachers on natural history sciences, and science kits for classroom use. Our Museum without walls provides the kits, curriculum, and training to inspire science education to our region of the state of Virginia. In 2001, 50,000 individuals experienced our exhibits and programs. Our teacher training and curriculum has impacted countless others in our region and beyond.

Museum History and Information

Dating back to 1887, the museum's natural history collections include over **one million total mammal, bird, and insect, plant, fossil, fungi and mineral specimens**. Researchers, educators, students and professionals utilize the collections and museum resources locally, nationally and worldwide.

The Museum is the regional outreach and training coordinator of the national citizen-monitoring program called Save Our Streams (SOS). The Museum offers support and training for several K-12 teachers programs. The Museum also supports University faculty and graduate students in research projects and several undergraduate courses. The Museum is currently involved with several regional projects including:

- The Stroubles Creek Initiative
  A partnership between the VA Water Center at Virginia Tech, The Virginia Tech Service Learning Center, Seek Education, Explore, DiScover – SEEDS, and the Museum.
- The New River Community Partners
  A North Carolina, Virginia, West Virginia tri-state entity based in NC.
- The Cabell Brand Center
  A Southwestern Virginia – based entity working toward environmentally sustainability through regional planning, partnerships, and student fellowships.
- The Museum also works with the Virginia Tech Internet Technology Innovation Center to make our mission of having a ‘museum without walls’ a worldwide reality.

The Museum’s nationally acclaimed, award-winning MINTS book is a valuable resource for anyone interested in teaching about the natural history in their own schoolyards and backyards. The illustrated book was written by teachers for teachers and includes inquiry-based lesson plans. It is an excellent addition to anyone's library. MINTS workshops for educators are also available through the Museum.

Museum volunteer teachers offer children's (K-3) science and other programs and camps for children through the SEEDS (www.seedsguys.org) organization.

The museum's Educational Resource Center has exciting materials for loan or reference: specimens, videos, textbooks and magazines. Science-to-Go teaching kits are available on a variety of topics related to natural history in Virginia, including birds, bats, dinosaurs, and weather.

Mission Statement of the Digital Library and Archive

The **Digital Library and Archives** (DLA) is the combination of the Virginia Tech's Scholarly Communications Project (begun in 1989) and the University Library's Special Collections Department. DLA preserves, organizes, and makes accessible the historical as well as the timely resources housed in the department. The Special Collections Reading Room provides on-campus library users reference services and access to the unique and primary resources in its rare books, manuscript, and archival collections. These materials are also selectively available on the web as catalog records, finding aids, and digital documents. DLA also works with the university constituency to help them create online resources such as electronic scholarly journals, and to use library services such as electronic reserve with its centralized access to course materials. In addition, Virginia Tech's electronic theses and dissertations and digital images are available on the web through systems designed and maintained by DLA.

The Digital Library and Archives is a department within University Libraries. **Virginia Tech's University Libraries** provide and promote access to information resources for the achievement of the university's objectives in teaching, learning, research, creativity, and community service. The library is dedicated to meeting the university community's information, curricular, and research needs wherever they are located and the library is committed to sharing what humanity has discovered and thought. University Libraries value:

- ***Information***, whose free flow throughout the university provides an accurate basis for its work
- ***Ideas***, the university's defining occupation
- ***Knowledge***, which preserves the progress of past generations
- ***Discovery***, which builds the future
- ***Truth***, which guides our interactions with one another and with our public

The library collaborates with members of the university community to collectively position the university as a top-tier research institution. Wherever they are located, members of the Virginia Tech community will be supported by the library as they engage in research, as they share in quality learning experiences at the undergraduate and graduate levels, and as they work in transferring knowledge and expertise between the university and society.

The University Libraries supports its parent institution, **Virginia Polytechnic Institute and State University,** a public land-grant university serving the Commonwealth of Virginia, the nation, and the world community. The discovery and dissemination of new knowledge are central to the university's mission. Through its focus on teaching and learning, research, and outreach, Virginia Tech creates, conveys, and applies knowledge to expand personal growth and opportunity, advance social and community development, foster economic competitiveness, and improve the quality of life.

Management of ***Birds of a Feather*** will be the responsibility of the Digital Library and Archives, under the supervision of its Director, Gail McMillan, and Coordinator of Special Collections, Jennifer Gunter.

Nueweb, Inc. Organizational Profile

Mission:
To help companies show products, procedures and technologies in the digital medium, in the same way they would in real life.

Background:
Nueweb, Inc. was founded in 1998 with the intention of bridging the gap between the real world shopping experience and that of on-line shopping. Nueweb has built various proprietary tools and technologies, based on the ubiquitous Flash player, to enhance the way products are viewed over the Internet. Over the years Nueweb has expanded from the creation of visual tools to providing other technologies for promoting a manufacturer's products in the digital medium.

Nueweb provides the following technology and services:
- stationary Kiosks on display at trade-shows
- leave-behind CD-ROMs for traveling salespeople
- product tutorials and manuals for inclusion with a new product.

Nueweb provides these services to various industries including:
- Computers and Electronics
- Telecommunications
- Healthcare
- Industrial Equipment
- Retail Goods Manufacturers

Services:
Today, Nueweb provides its services to the following areas:
- Marketing
- Sales
- Service
- Training & Testing
- Information Delivery Management
- Customer Service

Nueweb is an independently owned and operated company located in the Virginia Tech Corporate Research Center in Blacksburg Virginia.

Organizational Structure (as it pertains to the ***Birds of a Feather*** project)

- Brian Leitten, CEO
    - David Catalano, CIO
    - David Salvaggio, CTO

Brian Leitten is the CEO of the company and will have the overall responsibility of the work for the project done by Nueweb. The CIO, David Catalano, will be the project coordinator and will report directly to the CEO. David Salvaggio, the CTO, will manage the production team during the programming of the Display Template and Display Creation System. Mr. Salvaggio will report to the CEO.

Appendix A

David G. Catalano

From: Kirsti Aho [kaho@macromedia.com]
Sent: Wednesday, March 20, 2002 12:48 PM
To: 'David G. Catalano'
Subject: MM Statement on backwards compatibility of Flash

> -----Original Message-----
> From: Eric Wittman <ewittman@macromedia.com>
> Sent: Tuesday, March 19, 2002 10:49 PM
> To: Jeremy Clark <jclark@macromedia.com>; Kirsti Aho <kaho@macromedia.com>
> Cc: Jonathan Gay <jgay@macromedia.com>; Peter Santangeli <psantageli@macromedia.com>; Troy Evans <tevans@macromedia.com>
> Subject: RE: MM Statement on backwards compatibility of Flash
>
> Fundamentally, it is our charter to ensure that we are as compatible as possible with content from all prior Flash file format versions. We take great pains during the development and testing process to ensure the latest Flash Player releases are compatible with existing content. There have been times when we do upgrade functionality, specifically with ActionScript, to ensure that we are more standards compliant with the ECMAScript specification of which ActionScript and JavaScript are based upon. In those cases, we ensure to fully document and provide author-time mechanisms to ensure fast and easy updating of content.
>
> We at Macromedia feel that Flash is going to be one of the first digital media types to retain a long standing presence on the Internet and that future generations of web users will continue to enjoy today> '> s content in tomorrow> '> s future Internet enabled desktops, browsers, devices and anything else that comes out.
>
> Best,
> Eric Wittman
> Director of Product Management, Macromedia Flash Products

Appendix B

Handling Objects: Managing Risks to Humans vs. Risks to Objects

We hold these natural history collections in perpetuity--that means as near as forever as we can--and we do everything we can to minimize risks to them. We also want to protect the people working with collections, so we emphasize safety for people as well as objects.

One of the main causes of deterioration and loss of value in collections is improper handling. Handle all collections objects as if they were important, fragile, and irreplaceable. Everyone who handles an object for whatever purpose is responsible to future users forever. Feel free to coach anyone that you are handing an object to, or giving a loan.

The first rule is: SLOW DOWN and BE GENTLE when you are working with objects or moving in a collections area. There is no excuse for roughness or rushing with objects: you have the right to refuse to be drawn into the frantic mode that makes for "accidents". An undamaged object can be used tomorrow, or in the next decade--a damaged one may never be useful.

ASK FIRST: if you are working with a type of object for the first time, or packing a loan, ask someone knowledgeable for handling tips. Minerals, herbarium sheets, insects, skins, and skeletal materials all have different needs and traditions of handling. For example, herbarium sheets should never be paged through like a book, despite your intuition to do that. ***Seek training rather than forgiveness.***

WEAR GLOVES: even your clean skin has oils and acids which build up on objects over years of touch. Also, some objects may be toxic themselves.

USE TWO HANDS as much as practical to help steady the object and protect it from drops. Push up baggy sleeves that could snag objects.

LOOK CLOSELY AND THINK BEFORE PICKING UP AN OBJECT. We have seen experienced scientists grab fragile specimens with their thumb mashed right on top, destroying the specimen, because they didn't realize which part of the object was important. Try to handle things by the base or body or the most sturdy appearing parts.

HANDLE THE CONTAINER INSTEAD OF THE OBJECT, but still provide adequate support to the container. A lightweight box may collapse under the weight of a skull if pulled out with just one hand.

BE CAREFUL WHERE YOU PUT THINGS: don't leave objects out of eyesight on upper shelves, or on the edges of counters, or near hazards like sinks.

PROTECT INFORMATION: collections objects are valuable because of what we know about them and their ability to be retrieved. Be sure to note where objects came from and where they are going. Keep associated information such as tray labels and copies of loan forms in an organized way.