

## **RESEARCH & INFORMATICS (R&I) DIVISION**

### UNIVERSITY LIBRARIES

2015–2016 Annual Report

(prepared by Julie Speer with input from Amanda French, Gail McMillan, Andi Ogier, Peter Potter, and Zhiwu Xie)

### **Introduction**

The Research and Informatics (R&I) division met several strategic goals in both the current and previous 18-month implementation planning periods (see Appendix B and C). Our division-wide strategic goals continue to align with the Libraries' four major thrusts, as outlined in the 2012-2018 [Strategic Plan](#), with current activities focused on increasing the university's engagement in new scholarly communication practices and advancing the university's global and interdisciplinary research impact.

### **Personnel, Organizational, and Infrastructural Changes**

Created in June 2014, the R&I division is comprised of four units: Scholarly Communication, Data Services, Digital Library Development, and Digital Research Services. Data Services is the new name for Data Curation. We changed the name during the reporting period to better reflect the range of data curation, consulting, and educational services carried out by the unit. Likewise, Digital Library Development was formerly called Technology Development. The new name better reflects the focus on digital library-specific technology development. We created a new unit - Digital Research Services - to manage digital humanities programming, campus and regional digitization services, digital preservation coordination, and the university's institutional repository service, [VTechWorks](#). Four new faculty and staff joined the division. Infrastructural changes included a partnership with IT Services on a large-scale project to sunset 12 digital library servers and to prepare legacy DLA content for migration to IT Services' final storage destination.

### **R&I Sponsored Research Innovations**

We succeeded in securing \$30,000 in internal Virginia Tech (VT) research investments and \$353,875 in external funding to support library research and innovation in digital preservation, digital resource development, and repository software development.

- “Developing Library Cyberinfrastructure Strategy for Big Data Sharing and Reuse.” (IMLS National Leadership Grant, \$308,175) 2016-2018. Principal Investigator, Zhiwu Xie. LG-71-16-0037.
- “VArtWorks,” (IMLS Spark! Innovation Grant, \$25,000) 2015-2015. Principal Investigator, Andi Ogier, Co-Principal Investigator, Bob Leonard. SP-02-15-0034-15.
- “VArtWorks.” (ICAT SEAD Grant, \$30,000) 2015–2016. Principal Investigator, Bob Leonard. Co-Principal Investigator, Andi Ogier.

- “Montgomery County Memory.” (NEH, \$12,000) 2015–2016. Principal Investigator, Samantha Parish. \$700 allocation to University Libraries.
- “VA Tech-Sharing Smart Infrastructure Big Data for Explorative and Multidisciplinary Reuse.” Amazon AWS Research Grant. (Amazon Web Services usage credit, \$20,000) 2015-2017. Principal Investigator, Zhiwu Xie.
- Zhiwu Xie secured resources in the form of storage allocations for digital library development through an XSEDE grant in support of “Virginia Tech Goodwin Hall Live Lab” TG-ENG150014 and NSF Chameleon Startup Grant “Sharing Smart Infrastructure Big Data for Explorative and Multidisciplinary Reuse” CH-816963.
- Several members of the division were involved in the pursuit of external funding for collaborative research projects as principal investigator, co-investigator, senior investigator, advisor, or key staff/personnel. We developed or contributed to grant proposals submitted to CLIR Digitization Hidden Collections (pending), NEH Museums, Libraries, and Cultural Heritage Planning (pending), Knight News Challenge (not funded), NEH Humanities Collections and Reference Resources (pending), Doris Duke Foundation (awarded, pending announcement), and NEH Digital Projects for the Public (pending).

## **Increasing University Engagement in New Scholarly Communication Practices**

### Open Access (OA) and Open Knowledge

With support from the Office of the Senior Vice President and Provost and the Libraries’ Collections and Technical Services department, we were able to fund nearly \$86,000 in article processing fees through our [Open Access Subvention Fund](#) (OASF) service for articles published by faculty, staff, and students in scholarly peer-reviewed open access journals. We received 83 funding requests, funded 63 articles, and supported 172 unique VT authors in College of Agriculture and Life Sciences, College of Engineering, College of Science, College of Liberal Arts and Human Sciences, College of Natural Resources and Environment (CNRE), College of Veterinary Medicine, and Virginia Tech Carillion Research Institute. Sixty-four articles supported by the OASF are now available in VTechWorks. We also celebrated OASF recipients during VT Authors Day and contributed to funding decisions in support of OA initiatives such as Knowledge Unlatched.

We offered programs on open knowledge topics, including Open Access (OA), open education, and open data, to increase understanding at Virginia Tech of the benefits of creating, sharing, and using openly accessible digital research and scholarship materials. In addition to the following events, we supported a graduate student travel scholarship to [OpenCon 2015](#) and promoted open knowledge through our various social media channels: [Open@VT](#) blog (5,000 views), [@openatvt](#) Twitter account (3,000 tweets, 425 new followers), and the OpenVT listserv.

Our celebration of [Open Access Week](#) included a faculty and graduate student panel session, three presentations on open access, and a keynote presentation by Victoria Stodden, “Scholarly Communication in an Era of Big Data and Computation,” co-sponsored by Computational Modeling and Data Analytics, the Department of Computer Science, the Department of Statistics, the Laboratory for Interdisciplinary Statistical Analysis (LISA), and the Biocomplexity Institute.

Our celebration of [Open Data Week](#) included six unique sessions on data anonymization, Freedom of Information Act, open data, web scraping, Application Programming Interfaces (APIs), and library data services. We also partnered with Code for NRV to offer sessions related to discovery and use of openly accessible data.

Our celebration of [Open Education Week](#) included five sessions: approaches to sharing learning materials, textbook costs, defining open education, and a keynote presentation by Robert Biswas-Diener. The program also included a presentation on our study of VT student perceptions of open educational resources and rising textbook costs.

Our celebration of [Fair Use Week](#) marked the beginning of our participation in the annual national event dedicated to raising awareness of fair use doctrines. Events included an interactive exhibit, a presentation on rights statements, and several sessions walking users through steps in making a fair use determination.

### Digital Research and Scholarship Consulting and Education

We expanded the volume, themes, and delivery modes of our digital research and scholarship educational opportunities (see details in Appendix A). Through the Networked Learning Institute (NLI) we delivered 32 educational sessions about data, scholarly communication, digital libraries, and digital humanities to over 260 faculty, staff, and students; topics complement primarily data-, health-, intelligent infrastructure-, and earth- themed destination areas. We covered a range of topics (from library research skills to understanding data and altmetrics) in 72 one-shot and scaffolded course-embedded instructional sessions given to over 1,900 undergraduate and graduate students. We led 15 workshop sessions attended by over 200 faculty, staff, and students on topics such as book publishing, data publishing, and digital humanities tools. And over 460 faculty, staff, and students attended 10 campus-wide public programs covering topics such as open education, fair use, open access, digital humanities, and data management.

We coordinated a data management boot camp in January 2016 open to all members of the Virginia Tech community and participated as a mirror site in the 4<sup>th</sup> annual [Data Management Boot Camp](#) in March 2016 in partnership with the University of Virginia, Old Dominion University, James Madison University, George Mason University, Virginia Commonwealth University, and the College of William and Mary. Participants in the January session joined sessions on writing a data management plan, data documentation, and data storage and archiving; participants in the March session joined discussions about data management, data

ownership, finding data, documentation and metadata, and organizing files. We also coordinated a mini VT data management boot camp in March 2016 for previous attendees of VA boot camps to allow for more in-depth discussion of data management topics and information sharing about relevant data services at the university.

We authored 12 new digital learning guides and resources to augment digital literacy efforts:

- [BIOL 4404](#) (Pannabecker) (316 views)
- [BIOL 5174](#) (Pannabecker) (117 views)
- [Data Visualization](#) (Ogier)
- [Economics](#) (Walz)
- [Finding Data](#) (Pannabecker) (74 views)
- [Health Sciences @ VT](#) (Pannabecker, DeBose, Haugen) (174 views)
- [HIST 5964: Copyright, Public Domain and Creative Commons for Multimedia ReUse](#) (Walz) (44 views)
- [Neuroscience](#) (Pannabecker) (54 views)
- [Open Access](#) (Young) (440 views)
- [PSYC 4284](#) (Pannabecker) (198 views)
- [Research Data Management Online Modules](#) (Introduction to Data Management, Storage and Backup, Writing a Data Management Plan, Research Data Services at Virginia Tech). (Nicholls)
- [Research Methods Guide: Data Analysis](#) (Nicholls) (393 views)

Usage statistics for existing libguides suggest increased interest and demand for information about digital literacy-related topics—e.g. 2,582 views of our Open Educational Resources guide. At the request of Technology-enhanced Learning and Online Strategies' Learning Experience Design (TeLOS) group, we created a new online learning module, "Can I Use It?: An Introduction to Copyright", to facilitate adoption by instructors in digital learning environments. We also created and openly shared our educational resources for a [Psychology course](#) and events during [Fair Use Week](#) to demonstrate, through our practice as educators, how instructors can support reuse of their teaching materials. We also contributed this year to infrastructure planning for D-Hub, the library's digital humanities literacy studio, in partnership with the College of Liberal Arts and Human Sciences and the Libraries' Learning Division.

In summary, over 2,900 members of the university community participated as learners in 134 digital literacy instructional sessions and educational programs offered by research and informatics faculty and staff. Digital humanities, data analysis and visualization, researcher identifiers, and altmetrics were integrated as new topics into R&I curricular activities, demonstrating progress in implementation of recently developed curricula in data and scholarly communication. We developed 12 new web guides, two new online learning modules on copyright and data management topics, and led program planning for a digital humanities research-education facility. Our NLI workshops increased by 58%, our course-embedded sessions increased by 17%, and our public programs and workshops increased by over 56%.

In data consulting services, we spent over 338 hours supporting 218 consultation requests on data management and curation topics, including consults in geospatial data, metadata, bibliometrics, data publishing, writing data management plans (22), qualitative data analysis, and informatics. This demonstrates a 40% increase in data consultations. We began searches for two new data and informatics consultant positions: Data and Informatics Consultant for Sciences (hired June 2016) and Data Visualization Designer and Consultant for the Arts (in process). We also began searching for an Informatics Project Coordinator to help manage technical projects and coordinate collaborative software development among the team of consultants. In scholarly communication consulting services, we offered eight in-depth consultations on scholarly communication topics that include open access journal conversion, archiving of digital humanities projects, agriculture data and scholarly communication issues, and open educational resources. Our health sciences liaison librarian also assumed increased responsibility in overall health sciences research support coordination in response to the announcement of the university's new Health Sciences and Technology Innovation District in Roanoke. Many of our educational sessions, consultations, and related activities led to digital curation project collaborations, which are described in greater detail in the sections below.

## **Enhancing the University's Global and Interdisciplinary Research Impact**

### Digital Repositories

This year we continued to increase access to the university's digital research and scholarship through open repository services. We designed, developed, and launched a new research data repository service, [VTechData](#), which is based on the open source repository interface software Sufia/Hydra and repository data store software Fedora. We solicited and finalized stakeholder requirements, held prototyping sprints and demonstrations, and launched the repository in April 2016. Our customizations to the software include additions of over 9,000 lines of code to the original Sufia code base. The main features of the new repository include integrations with VT CAS, EZID, DataCite, ORCID, CrossRef, and VT People Search. Project documentation is available in Jira, Confluence, and [GitHub](#). Related data curation activities include 52 dataset deposits, planning for template creation to facilitate deposit, and development and publication of policies and deposit advice in the [VTechData Help Guide](#). Members of R&I participated in functional requirements gathering and technology selection for the VTArchive scientific data archival storage environment through a partnership with Advanced Research Computing and other units in the Division of Information Technology. In addition to integration with VTArchive, our plans are to integrate VTechData with the Open Science Framework, CollabVT (Virginia Tech's VIVO), and the university's Electronic Faculty Activity Reporting System (EFARS). We also developed a geospatial data workflow in partnership with the Office of GIS and Remote Sensing Research and the Center for Geospatial Information Technology, refined the prototype for a new geospatial data discovery tool, and prepared 337 geospatial datasets for deposit.

For VTechWorks we created [policy](#) and [help](#) pages, added an altmetrics badge feature, upgraded DSpace software to version 5.5, and added information about Creative Commons licenses to deposit submission forms. Repository collections increased by 30% with 12,845 new

deposits. Significant new collections include Virginia Tech Transportation Institute publications, SANREM database records, Virginia Tech News archive (2005-2010), [Open Education Events collection](#), and the [Fair Use Week Toolkit](#). We responded to 940 user requests for restricted-access theses and dissertations, releasing 130 to the public with author permission. In 2015–2016, we received an average of 427,975 item views per month (roughly 5,135,700 total) and an average of 790,139 bitstream downloads per month (roughly 9,481,668 total). Overall, VTechWorks statistics indicate an increase in repository usage: 43% increase in new visitors each month; 45% increase in average site visits per month; 54% increase in file downloads per month; 108% increase in item views per month; and 6% increase in user logins per month. VTechWorks development is documented in [GitHub](#).

### Digital Humanities

The year we supported the long term preservation of new and existing digital humanities projects. During THATCamp Virginia 2015, we created a WordPress site for the [Virginia Digital Humanities Consortium](#). We migrated the Center for Digital Discourse and Culture [April 16 Digital Archive](#) and the Center for Advanced Technologies in the Humanities (CATH) [Gravell Watermark Archive](#) to the Libraries' Site5 web hosting environment. We coordinated the migration of the library-hosted [Lord Byron and His Times](#) to a hosted Digital Ocean environment. We set up an instance of Omeka for [The John Murray Transcription Archive](#), an instance of WordPress for the NEH-funded [Virginians in World War One](#) project, and set up an instance of Omeka for the [Roanoke Valley Great War](#) project. We served as partner in the NEH-funded [Montgomery County Memory](#) project, hosting an instance of Omeka, offering consultative sessions with archivists in Special Collections, and providing digitization and archiving support. Outcomes of the project include development of an archive of digitized photographs and historical documents that is now maintained by staff at the Montgomery Museum. The project was documented in [VT News](#) and [WVTF Public Radio](#). We also prepared a report for the Dean of Libraries on current digitization practices in Collections and Technical Services and R&I with recommendations for future growth of related imaging services. Outcomes include creation of two new imaging services: a regional digitization service aimed at developing partnerships with cultural heritage institutions and a campus digitization service for conversion of materials for teaching and research purposes. We created a new position, Digital Projects Coordinator, to manage digital imaging projects and scanning operations (search in process). Digital library development goals include plans to design and develop a prototype Hydra and Fedora repository for special collections based on the International Archive of Women in Architecture (IAWA) use case.

### Digital Preservation

Our preservation service activities include a system review for the dark archive. Prior to launch of the non-public access master file digital archive, we reviewed various digital preservation systems to identify the preferred platform. Recommendations were submitted to the Cyberinfrastructure Group and to the Dean, after which a decision was made to implement Archivematica. Recent digital preservation activities include: developing a script to convert

DSpace metadata into an Archivematica-accepted format, adding 12 Archival Units (69 GB of data) to the MetaArchive, authoring a collection policy for web archiving, and archiving university websites using Internet Archive's Archive It Service.

### Digital Library Development

Our digital library and technology development efforts included development of VTechData, prototype refinement for the geospatial data digital library, development of a new open source software preservation mobile application, completion of deliverables for two sponsored research projects, and requirements gathering for a digital collections repository prototype. Through our digital library collaborations with the Virginia Tech Smart Infrastructure Laboratory, we were able to plan for expansion of our data repository infrastructure to better support big data processing, which has also facilitated unique student experiential learning opportunities. Our digital library development team leader was invited to serve as an Associate Director in the lab and member of three MS theses committees. We continue to stay deeply involved in Fedora and Hydra open source software development communities, as demonstrated by our popular [Fedora 4 docker project](#) (300 downloads) and highly ranked participation in the Hydra/Sufia Portland Common Data Model sprint (ranked 1st among all 10 participating institutions). We met deliverables for the following digital library sponsored research projects: Columbia University/Mellon-funded "Archiving Transactions Towards Uninterruptible Web Service" project (software was released on [GitHub](#)) and the Institute of Museum and Library Services-funded "ETDPlus Curation Workbench" sub-contract project (documentation in [GitHub](#)). We also continue to contribute to other digital library projects through our participation in regular Department of Computer Science Digital Library Research Laboratory meetings.

### Research Environmental Assessment

Our research environmental assessment efforts included further analysis of data management and sharing practices within specific interdisciplinary research teams at Virginia Tech and planning for a campus-wide publishing needs assessment project. We completed the 2014–2015 Virginia Tech Research Data Assessment and Landscape Study, which resulted in 652 survey responses. We conducted eight follow-up interviews with interdisciplinary research team members in CNRE's Center for Natural Resources Assessment and Decision Support. Technical briefings on [data curation](#) and [data preservation and repositories](#) were deposited in VTechWorks. Insights gained from both assessments led to identification of consulting service needs and new features for the Libraries' VTechData repository development. Building upon the [CNRE Data Services Pilot Project](#), we also interviewed eight faculty in ECE, ME, EE, MM, and CS departments in the College of Engineering to learn more about their data management needs and to better serve engineering researchers. In parallel, we began the process of developing a plan for a publishing needs assessment project. Future directions of our publishing services will be guided by outcomes of the project.

### Publishing Services

This year we continued to support the creation and publication of digital scholarship. Our publishing service activities included support for a faculty-developed WordPress-based open textbook [Thermodynamics](#), support for an open textbook revision [Fundamentals of Business](#) (MGT1984), and creation of a Publishing Services [FAQ page](#). We transitioned 5 of our journals to the Open Journal Systems (OJS) platform: *The Virginia Tech Undergraduate Historical Review*, *Journal of Career and Technical Education*, *Virginia Libraries*, *Philologia*, and *Journal of Research in Music Performance*, published a total of 55 articles and 1,189 files, and assigned 2,614 journal article DOIs. We improved publishing workflows, developed scripts to migrate content to OJS, and made OJS DOIs available to CrossRef. We also supported the 2016 [ASPECT graduate conference](#), which used the Open Conference Systems (OCS) platform.

### Research Information Management Network

We continued partnerships with OVPRI, Provost Office, and IT to develop university infrastructure to support a networked research information environment. We initiated and completed VTechWorks integration with the new Elements [Electronic Faculty Activity Reporting System](#) (EFARS) reducing barriers to faculty self-deposit. We continued to manage the Elements application and HR, teaching, grants, and professional activities data feeds and assumed management of the sub-project to move from locally-hosted to vendor-hosted server environment. Testing of our researcher profile system, CollabVT (previously known as VT VIVO), involved creation of over 3,000 profiles and over 11 million linked data triples. Through our involvement in the SURA-led research capabilities database project, we made accessible over 3,200 VT grant records (provided by the office of sponsored programs) in the SURASearch research expertise discovery layer. Plans include a phased launch of CollabVT in Fall 2016/Spring 2017, addition of VTechWorks as an EFARS data source, and EFARS integration with VTechData.

### **Conclusion**

Overall, we achieved the majority of our 2014–2015 goals and have made very good progress towards our 2015–2016 goals. As expected, our increased educational activities have led to increased usage of our consulting and digital curation services. The research and informatics web presence continues to be a priority. Plans are to launch a new website this year. Summarized below are a few noteworthy achievements:

- [Curation Services](#): We are mapping our services to VT's research infrastructure. We reached our target of 50,000 VTechWorks items by Dec. 2015. Item views and file downloads increased on average by about 80% and deposits increased 7%. VTechWorks is now connected to EFARS, which suggests we will reach our target of 50 EFARS-originated VTechWorks deposits by Jun. 2017. In VTechData, we reached 10% of our Jun. 2017 target of 500 dataset deposits; policies are now available online. The number of open access articles published by our publishing services team increased by 38 percent. We should reach our target of campus-wide engagement in gathering requirements for further refinement of publishing services. In digital library development,

we involved faculty stakeholders in the launch of VTechData and gathered Geoblacklight stakeholder requirements. Targets for VIVO should be met with soft launch of CollabVT. VT grants were successfully indexed by SURASearch. Github indicators point to positive impact of repository software contributions among the developer community. For future reporting, managers of digital collections, repositories, and code repositories will begin to document deposits by VT department and downloads and views by country and continent.

- Education and Consulting. We are mapping our expertise and resources to VT's research environments. We are halfway to our Jan. 2016–July 2017 target in education, teaching over 50 courses in spring and summer semesters. Achievements in new educational content include sessions in researcher identifiers, researcher profiles, and impact metrics. The Data Literacy and Consulting Working Group developed a proposal for a graduate level credit-bearing data management skills source for governance review. Data management plan requests increased by 50% and our overall data consults increased by 40%. We will begin to better document ways in which our education and consults align with Pathways and destination areas as those evolving research-education initiatives become more clearly connected to the data and information services requested by the colleges. Publication of new guides this spring suggest that we will meet our 2017 learning resources target. New ETD, researcher identifier, public access policy, and computational tools guides are in the planning stages. Data curation templates are in development and will be made available to researchers through the Open Science Framework. Data and OER modules demonstrate progress towards reaching our target of five new modules by 2017. Libguides usage data collected for 2015–2016 will provide us with data for comparative analysis in 2017.
- New Initiatives. We are developing new programs that align with university priorities in the five major destination areas, as well as digital literacy, data analytics, and learning content development. Activities this year reinforce infrastructures for services we hope to launch by June 2017: imaging services, informatics lab, health sciences research support coordination, and D-Hub. Hiring is, or is nearly, underway in each area. Our open educational resource projects have led to promising opportunities for strategic growth of our digital publishing services; we expect to develop the open educational resources grant program in fall 2016.

## Appendix A

### Selected Data and Scholarly Communication Educational Activities

32 sessions to 269 faculty, staff, and students through Networked Learning Initiatives (NLI):

- Intro to Canvas Commons & Creative Commons (NLI): Walz. 2015.
- Can I Use It? A Copyright Primer (NLI): Walz. (face to face and online). 2015.
- One Health (NLI): Discussion Online Session (4) and Face to Face Session (3). Haugen, Pannabecker, DeBose. Fall 2015. (7)
- National Science Foundation (NSF) Data Management Plan Workshop (NLI): Ogier, Nicholls. Sept. 2015. (23)
- Cloud Computing Demystified (NLI): Xie. Oct. 2015.
- Trends in Scholarly Publishing (NLI): Young. Oct. 2015. (3)
- Is It a Fair Use? A Hands-On Discussion (NLI): Pannabecker, Walz. Nov. 2015. (8)
- Exploring Electronic Lab Notebooks (NLI): Pannabecker. Nov. 2015. (6)
- Writing a Lit Review: Unpacking the Process (NLI): Pannabecker, DeBose, Haugen. 3 sessions. Sept.-Nov. 2015. (29)
- Data Visualization (NLI): Ogier, C. Miller. Jan. 2016. (25)
- Omeka Playdate (NLI): French, Patrick-John. Jan. 2016.
- Writing and Monitoring Data Management Plans (NLI): Ogier, Nicholls. Feb. 2016. (17)
- Publishing @ VT Libraries (NLI). McMillan, Dooley. Feb. 2016. (8)
- The New International Movement to Standardize Rights Statements -- and How We're Participating in it at Virginia Tech (NLI): French. Mar. 2016. (15)
- Library Data Services: Supporting data-enabled teaching and research at VT (Open Data Week event) (NLI): Ogier. Mar. 2016. (7)
- Show me the Open Data (NLI): Pannabecker, Ogier. Mar. 2016. (4)
- That I May Share: Approaches to Sharing Original Learning Materials (NLI): Pannabecker, Mathews. Mar. 2016. (5)
- Are textbooks too expensive for students? (NLI): Walz. Mar. 2016. (11)
- What We Mean (And Don't Mean) When We Say 'Open Education' (NLI): Walz. Mar. 2016. (24)
- ORCID's (NLI): Young. 2 sessions. Nov. 2015-Mar. 2016. (17)
- Altmetrics (NLI): Young. 2 sessions. Nov. 2015-Mar. 2016. (4)
- Data Publishing (NLI): Ogier, Coleman. Apr. 2016. (8)
- What is Informatics? (NLI): Ogier, Miller. Apr. 2016. (5)
- Where Can I Post My Articles? ResearchGate, VTechWorks Institutional Repository, and other options (NLI): 2 sessions: Pannabecker, Young. Apr. 2015. (14)
- Systematic Review Methodology and Tools (NLI): Pannabecker, DeBose. 12-hour 1.5 day workshop. May 2016. (5)
- Impact and Identity (NLI): Ogier, Pannabecker, Haugen. 12-hour 1.5 day workshop on professional identity, researcher profiles, VTechWorks, Elements, and impact metrics. Jun. 2016. (14)

72 course-embedded sessions address research, scholarly communication and data related topics to 1902 undergraduate and graduate students:

- AAEC 5104 – Research Project Planning: Haugen, Pannabecker. (Spring) (6)
- AGE/ECON - Copyright & IP: Scholarly Writing Workshop: Walz.
- ARCH 5045 - Creativity, Law and Policy. Walz.
- BCHM FYE 1014: Pannabecker. (Fall) (200)
- BIOL 1004: Pannabecker. (Fall) (350)
- BIOL 4764 – Microbiology Senior Seminar: Pannabecker. (Fall) (30)
- BIOL 4404 – Ornithology. Pannabecker. (Spring) (50)
- BIOL 5174 – Introduction to Graduate Studies in Biological Sciences: Pannabecker. (Fall) (25)
- BMVS 5714 - Copyright for Biomedical Literature: Walz.
- Building and Construction graduate student seminar course: Mathews, Pannabecker. (Spring) (21)
- CALS FYE: Haugen. 3-8 sessions. (Fall)
- CNRE Environmental Informatics - The World of Data: Nicholls, DeBose. (Fall) (24)
- CNRE Environmental Informatics - Data in Scholarship: Nicholls, DeBose. (Fall) (13)
- CNRE Environmental Informatics - Publishing Data: Nicholls, DeBose. (Fall) (13)
- CNST 5084 - Communicating Research to the Public through ETDs: Young. (Spring) (15)
- CNST 5084 - Publishing and Peer Review: Young. (Spring) (15)
- ECON - Avoiding Plagiarism: Walz.
- ECON 4544 - Research as an Integrative Process: Walz.
- ENGL 1106 - Research Methods: Survey and Interview Methods: Nicholls. (3 sessions). (Spring) (58)
- ENGL 1106 – First year composition course; research paper/fieldwork project focus: Pannabecker. (4 sessions). (Spring) (80)
- ENGL 5074 - Scalar Workshop: French. (Fall)
- ESM 4204/ESM5224/BMES 5124 – Musculoskeletal Biomechanics: Pannabecker, Thompson. (Fall) (35)
- HIST 3544 - Intro to Digital History: French. Mar. 2016. (40)
- HIST 5964 - Student Digital Media Projects, Copyright & Fair Use: Walz.
- HNFE interns seminar (Fall (2 – 1 online, 1 in-person)): Pannabecker. (23)
- HNFE 4004 – Seminar in HNFE (Human Nutrition, Food & Exercise): Writing and Discourse in the Major (Fall, Spring): Pannabecker. (101)
- HNFE FYE seminar for transfer students: Pannabecker. (Fall) (35)
- HNFE FYE 1114: Pannabecker. 2 sessions. (Fall) (80)
- HNFE 2014: Pannabecker. (Fall, Spring) (210)
- HNFE 3224: Pannabecker. (Spring) (35)
- PSYC 4284 – Lab in Social Psychology: Pannabecker. (Spring) (28)
- MATH FYE 2984: Walz.

- Medical History Resources, (Summer) for NEH Seminar – The Spanish Influenza of 1918, with a focus on open access and open educational resources for teaching and research: Pannabecker. (15)
- NEUR FYE 1004: Pannabecker. (Fall) (60)
- Professional Communication in Agriculture: Haugen. (3 sessions) (Spring)
- PSYC 1094: Pannabecker. 3 sessions. (Fall, Spring) (40)
- PSYC 4984 – Advanced Research Methods: Pannabecker. (Fall, Spring) (20)
- PSYC 5315 – Graduate Research Methods (Introduction to Open Access): Pannabecker. (Fall) (25)
- Psychology graduate student and faculty - Datasets and Library Resources & Services: Pannabecker. (Fall) (13)
- Public Health Masters Program – Professional Resources at VT: Pannabecker. (Spring, Fall) (42)
- STAT FYE 1004 - Searching for Data: Ogier. (Fall) (15)
- STAT FYE 1004 - Critical Analysis of Data: Ogier. (Fall) (15)
- STAT FYE 1004 - Ethical Use of Data: Ogier. (Fall) (15)
- STAT FYE 1004 - Infographics: Ogier. (Fall) (15)
- STL 2304 - Introduction to Westlaw: Walz.
- Translational Biology Medicine and Health (TBMH) – graduate student workshops: Pannabecker. 2 sessions. (Fall) (40)
- Virginia Tech Carilion School of Medicine (VTCOSM) – 1<sup>st</sup> year medical student orientation: Pannabecker. (Fall) (50)
- Virginia Tech Carilion School of Medicine (VTCOSM): Pannabecker. (Spring) (50)

5 invited lectures to 80 faculty, staff, and students:

- Library services at ARECs - MAREC (14), Alson H. Smith (16); Loudon County. July 2015. (20)
- Open Educational Resources: Walz. Psychology department meeting. (20)
- Copyright and Fair Use: McMillan. English Graduate Teaching Assistants. Sept. 2015. (20)
- Where Can I Post My Articles? ResearchGate, VTechWorks Institutional Repository, and other options. 1 invited session for Industrial and Systems Engineering Department. Pannabecker, Young. May 2015.
- Open Educational Resources: Walz. LED/TLOS Course Redesign cohort. (LED/TLOS Course Redesign) (20)

15 workshop sessions offered to 201 faculty, staff, and students:

- Wikipedia Workshop (Oct. 2015): French
- Virginia Data Management Bootcamp (Jan. 2016): Why Manage Data (38). Nicholls, DeBose; Writing Data Management Plans (20). Nicholls; Store, Archive, Publish (20). Coleman; Library Data Services (20). Ogier. (78)

- Advanced Research Skills Program (Jan. 2016): Understanding Data. Nicholls; Becoming a Researcher. Pannabecker. (74)
- Book Publishing Workshop (Jan. 2016): Potter (20)
- Wikipedia Edit-a-thon: Art and Feminism (Feb. 2016): French
- Graduate Student '[Managing Your Scholarly Career](#)' Seminar (Apr. 2016): The World of Scholarly Publishing Today. Potter; Preparing a Thesis or Dissertation. McMillan; How to Share and Publish Your Research Data. Nicholls; Raising Your Scholarly Profile. Young, Pannabecker; Access and Preservation, French. (25)
- Publishing Workshop (Apr. 2016): Potter (4)

10 workshops/speaker series attended by 465 faculty, staff, and students:

- Scalar webinar. July 2015. French, Coordinator. (13)
- Open Access Week. Oct. 2015. Young, Coordinator. (82)
  - Faculty and graduate student panel discussion. (8)
  - Data and digitization for the liberal arts and human sciences. (15)
  - You can receive \$1500 for publishing your next article. (2)
  - Trends in scholarly publishing: A conversation. (7)
  - Scholarly Communication in the Era of Big Data and Computation. Keynote: Victoria Stodden. (50)
- Virginia Data Management Bootcamp. Jan. 2016. (78)
  - Why Manage Data. Nicholls, DeBose. (38)
  - Writing Data Management Plans. Nicholls (20)
  - Store, Archive, Publish. Coleman. (20)
  - Library Data Services. Ogier. (20)
- Open Education Series (NLI and CIDER conference). Nov. 2015-Feb. 2016. Walz, Coordinator.
  - High Quality Open Educational Resources – Development, Use Cases, Adaptation, Efficacy. Finkbeiner.
  - Elevating Public Educators as Agents of Change: Collaborating Toward New Approaches in Education. Mink.
  - New Approaches in Education: OER and OER Commons for Librarians, Instructional Designers, and Instructional Design Faculty/Students. Mink;
  - Open Educational Resources in Teaching and Learning: What, Why and How. Mink.
  - [Open Educational Resources: Supporting Faculty Exploration, Adoption, Adaptation, and Authoring.](#) Watson.
  - [Open Educational Resources: Institutional Costs and Benefits.](#) Watson.
- Omeka Workshops: Omeka Playdate (8) /Omeka for Developers. Amanda French/Patrick Murray-John. Dec. 2015. French, Coordinator. (6)
- Building Online Scholarly Archives and Exhibits with Omeka. Jan. 2016 French, Coordinator. (3)
- Fair Use Week. Feb. 2016. Pannabecker, Coordinator; Team: Walz, Sebek, Fralin, Gilbertson (71)

- Interactive exhibit 2nd floor Learning Commons (30 opening reception); 60+ substantial exhibit interactions; 1000s of casual viewings
- The New International Movement to Standardize Rights Statements -- and How We're Participating in it at Virginia Tech. French. (15)
- Is it a Fair Use? A Hands on Discussion. Pannabecker, Walz. (4 sessions) (19) <http://hdl.handle.net/10919/70970>
- Behind the Scenes of the Fair Use Exhibit: How We Made Our Copyright Decisions. Pannabecker, Sebek, Walz, Fralin, Gilbertson. (7) <http://hdl.handle.net/10919/70971>
- Open Education Week. March 2016. Walz, Coordinator. (150)
  - That I May Share: Approaches to Sharing Original Learning Materials. Pannabecker, Mathews. (5)
  - Project Showcases. (30)
  - Are textbooks too expensive for students? Walz. (11)
  - What We Mean (And Don't Mean) When We Say 'Open Education. Walz. (24)
  - Keynote presentation by Robert Biswas-Diener <http://vtechworks.lib.vt.edu/handle/10919/70901> (45)
  - SGA Open Education Awareness Campaign (35)
- Open Data Week. March 2016. Young, Coordinator. (54)
  - Data Anonymization: Lessons from a Millennium Challenge Corporation Impact Evaluation. Hall, Vance. (8)
  - The Freedom of Information Act (FOIA). Hopkins, Capaldo, Roy. (10)
  - Library Data Services: Supporting data-enabled teaching and research at VT. Ogier. (7)
  - Show Me the (Open) Data! Pannabecker, Ogier. (4)
  - Scraping Websites: How to automate the collection of data from the web. Code for NRV. (18)
  - Intro to APIs: What's an API and how can I use one? Code for NRV. (7)
- Mini VT Data Management Bootcamp. DeBose, Miller, Coordinators.

## Appendix B

### R&I Implementation Plan Goals January 2016-June 2017

Goal: Increase faculty, staff, and student engagement in new scholarly communication practices 1) through education/consults on library managed digital curation services, digital curation best practices, and availability of open content, and 2) that support the university's research education initiatives.

- Action A: DEVELOPING NEW LEARNING RESOURCES: Produce and communicate data and scholarly communication guides/toolkits [templates]/ resources
  - Measure:
    - number of new resources
    - learning resource usage (e.g. libguides viewed, templates downloaded)
    - number of VTechData and VTechWorks deposits, scholarly products published, VT researcher ORCID, and OASF requests
    - number of data and digital scholarship project support requests
  - Target:
    - 4 new libguides (ETD, Repositories, Researcher Identifiers (ORCID), Computational Tools)
    - creation of a Data Services toolkit, Open Access template
    - 5 new online learning modules
    - 10% increase in libguides usage, consulting requests, repository deposits, scholarly products published, DMPs supported
    - 20% increase in VT faculty ORCID
    - templates available for 75% of curation-level data formats found in VTechData
  - Documentation: libguides, toolkits, education/instruction and consulting statistics, documentation of marketing efforts (in educational sessions, GRAD 5124, NLI sessions), documentation of service discovery (libguide, website, toolkits)
- Action B: INCREASING DIGITAL RESEARCH AND SCHOLARSHIP EDUCATION AND CONSULTING OPPORTUNITIES: Increase education and consulting in informatics, data, digital humanities, and digital scholarship
  - Measure:
    - description of digital fluency-related programs (type, participant numbers, departments/ colleges represented, topics covered, learning outcomes assessment, insight gained)
    - description of consulting sessions (departments/ colleges/ research group represented, topics covered, depth, length, outcomes assessment, insight gained)
    - evidence of exploration of new educational opportunities
  - Target:

- 100 events and educational sessions total, 20 course-embedded sessions, 40 digital research and scholarship destination area aligned sessions, 3 destination areas supported, 6 graduate student seminar series lectures on digital scholarship
      - 10% increase in 2016 attendance at annual programs (OA Week, OE Week, Open Data Day, data management bootcamp)
      - new educational opportunities for digital fluency identified
        - 5 faculty and 3 GTAs consulted
        - informatics education consulting program initiated (in response to [Computational Thinking](#) Pathways Core Outcome)
      - proposal for a graduate level credit-bearing data management course developed
      - Fair Use Week event introduced
    - Documentation: destination area alignment, education/instruction and consulting statistics, documentation of marketing (GRAD 5124, NLI sessions), needs/opportunity assessment reports
- Action C: RAISING AWARENESS OF SERVICES, RESOURCES, AND EXPERTISE: Increase marketing and promotion of library digital research and scholarship services, particularly library support for open access
  - Measure:
    - description of outreach activities (participant numbers, assessment of outcomes, insight gained)
    - evidence of website improvements
    - documentation of marketing communications and support from Creative Services Team
    - number of VTechData and VTechWorks deposits, scholarly products published, VT researcher ORCIDS, and OASF requests
    - number of data and digital scholarship project support requests
  - Target:
    - VTechWorks - 200 new users, 75,000 records total, bitstream views up to 9,000,000, 5000 new scholarly items (including 20 creative works and open educational resources)
    - VTechData - 500 new datasets (100 fully curated)
    - new R&I web presence
    - 10% increase in libguides usage, consulting requests, repository deposits, scholarly products published, DMPs supported
  - Documentation: VTechWorks, VTechData, scholar.lib, outreach statistics, Creative Services support for open programming

Goal: Broaden VT's global and interdisciplinary research impact by developing digital curation infrastructures and services that support open and data-enabled research and scholarship of faculty, staff, and students.

- Action A: MEASURING IMPACT: Increase usage and global audience indicators for VTechWorks, VTechData, publishing services products, digital collections, and digital library products
  - Measure:
    - evidence of outreach activities (data integration, SEO)
    - downloads and views, downloads and views by country and continent
    - repository deposits by VT department
    - dataset shares by university/department
    - impact indicators in digital library GitHub code repository
    - DOI/URI cites/tweets/mentions, cites by university/department/discipline
  - Target:
    - 20% increase in usage and impact indicators for VTechWorks, scholarly publications, and digital collections content
    - 20 new VTechWorks repository deposits for each college and institute
    - initiate collection of usage/impact indicators for VTechdata and digital library products
  - Documentation: outreach activity documentation, VTechWorks, VTechData, scholar.lib, ejournals, conference proceedings, usage data, Data Citation Index/CrossRef, GitHub, Twitter, Wikipedia, Altmetrics.com
  
- Action B: REDUCING BARRIERS: Develop campus researcher networks.
  - Complete VTechWorks, VT VIVO, and ORCID integration with Electronic Faculty Activity Reporting System
    - Measure:
      - outreach activities (by type, participation, departments/ colleges, topics covered)
      - number publications (metadata and files) harvested from Elements into DSpace, ORCID's created in Elements, ORCID's in VTechworks and VTechData, VT VIVO profiles
    - Target:
      - 10 Identifiers, Profiles, and Impact Metrics sessions/workshops/presentations for faculty
      - 50 faculty archived publications in VTechWorks via Elements
      - 20% increase in VT faculty ORCID's
      - 20 VIVO profiles created
      - VT VIVO indexed by SURA VIVO search
    - Documentation: VT VIVO, SURA VIVO, VTechWorks faculty publications collection
  - Offer opportunities for researchers from different disciplines to come together to share research ideas, stories, issues and challenges
    - Measure:
      - evidence of exploration of new public programs
    - Target:
      - 2 sessions/workshops for faculty and graduate students

- Documentation: website
- Action C: DESIGNING SERVICES: Increase data-driven planning based on assessment of research and scholarly environments
  - Measure:
    - publishing needs assessment plan created
    - description of assessment activities (department/ college/ research group represented, topics covered, depth, length, insight gained)
  - Target:
    - each college, department, institute engaged
    - 30 researchers interviewed
    - requirements gathered for publishing services
  - Documentation: assessment plans and reports, destination area alignment
- Action D: STRENGTHENING PRESERVATION SERVICES: Improved digital preservation workflows, processes, and infrastructures
  - Measure:
    - number of deposits to Archivemata, MetaArchive, APTrust
    - evidence of adherence to established imaging preservation standards
    - preservation policies and procedures developed
    - roadmaps developed for involvement in national/regional access and preservation initiatives
    - trusted repository certification initiated for VTechWorks
  - Target:
    - 200 files in Archivemata
    - 2TB of data in APTrust by September 2016
    - policy and procedures developed for Archive-It web archiving service and legacy project hosting/archiving
    - engagement roadmaps for: MetaArchive, DPN, APTrust, DPLA
    - TRAC certification or ISO standard adherence explored for VTechWorks
  - Documentation: Archivemata, MetaArchive, APTrust, documented imaging standards, processes, and workflows, policies, request forms, planning documentation
- Action E: ESTABLISHING NEW INITIATIVES AND SERVICES: Launch of new digital research and scholarship initiatives and services: DHub, Informatics Lab, VTechData, pilot open educational resources grant program, regional and campus digitization service, and Digital Green project
  - Measure:
    - evidence of active services and initiatives
  - Target:
    - DHub research education studio constructed
    - DHub and Informatics service models created

- VTechData - design and implementation of dataset curation workflows in VTechData complete, VTechData service policy online, 100 fully documented curation-level datasets
  - pilot open educational resources grant program policies and procedures developed; 1 project funded
  - 5 faculty clients of campus digitization service
  - 1 client of regional digitization service
  - 5 informatics lab consults
  - Digital Green collaboration initiated
  - Documentation: DHub web site, Informatics Lab web site, Imaging Service web site, VTechData
- Action F: BUILDING NEW DIGITAL LIBRARIES: Design and develop working prototypes for three new digital library projects that increase access to Virginia Tech data and archival collections.
  - Measure:
    - evidence of stakeholder requirements gathering for hydra and fedora-based Geoblacklight, IAWA digital collection (use case for Special Collections digital library), and phase 2 VTechData projects
    - working prototypes developed
  - Target:
    - Geoblacklight - 500 geospatial data records indexed
    - IAWA digital library - common data store framework leveraged for hydra head prototype, 100 digital objects (files and metadata) ingested
    - VTechData phase 2 - Finish PCDM integration, enable more flexible content model for data, explore big data reuse infrastructure and techniques using the Goodwin Hall sensor data reuse as a typical use case
    - hydra and fedora-based digital library development project intake/prioritization process defined
  - Documentation: Geoblacklight prototype, IAWA prototype, VTechData phase 2 roadmap

## Appendix C

### R&I Implementation Plan Goals July 2014-December 2015

Goal: Research Environmental Assessment

Theme 2, Objective 1

Outcome: Services and infrastructures developed and refined based on research environmental assessment (data survey, focus groups and interviews with faculty and researchers)

Measure: Number of departments, colleges, research institutes surveyed; number of researchers surveyed/interviewed

Target: 70% survey completion rate among VT researchers; one research center studied; 10 researchers interviewed

Documentation: Assessment plan, documentation of outcomes and research areas represented, requirements gathered for data services to support research faculty

Goal: Outreach and Communication of Data Curation and Scholarly Communication Services

Theme 2, Objective 1 and 2

Outcome: Greater awareness among the campus community of data curation and scholarly communication services through developed/refined libguides and web pages and increased number of instructional sessions and workshops

Measure: Increased consults, instruction participants, libguides usage, VTechWorks dataset deposits, data-related research collaborations, digital scholarship collaborations, workshops, presentations, Open Access Subvention Fund (OASF) requests

Target: 10% increase in metrics

Documentation: library web pages, published libguides, instruction and workshop documentation, consults and collaborations documentation

Goal: Advancing Data Curation Services

Theme 2, Objectives 2 and 3

Outcome: Defined data curation service model

Measure: Defined scope of service and documented data curation services, policies, and workflows; campus partnerships explored

Target: Improved documentation of Data Management Plan support, library geospatial data services, repository data deposit processes, data curation processes, and data transformation requests; customized DMPTool; published service model framework and research data archiving policies

Documentation: library web pages, research data archiving policies, DMPTool, VTechWorks, service activity documentation

## Goal: Advancing Repository and Publishing Services

Theme 2, Objectives 2, 3, and 4; Theme 4, Objective 2

Outcome 1: Increased number of materials archived in the repository

Measure: Increased number of archived conference proceedings, technical reports, OASF funded articles, digitized theses and dissertations

Target: 20% increase in open works in the repository (to 50,000 items), 3000 digitized theses and dissertations

Documentation: VTechWorks, service activity documentation

Outcome 2: Operationalized Dark Archive repository

Measure: Preliminary policies and procedures drafted and circulated for input to internal library stakeholders, DSpace installed and maintained, Special Collections master files and Event Capture master files deposited, initial harvest into the MetaArchive Cooperative

Target: Functional Dark Archive repository, 200 files deposited

Documentation: Dark Archive repository UI, policies, service activity documentation

Outcome 3: Expanded publishing services

Measure: Monograph publishing explored, increased number of journals using Open Journal Systems (OJS) platform; increased number of conferences supported by Open Conference Systems (OCS) platform

Target: 200 existing journal issues migrated to OJS, 2 new OJS-based journals

Documentation: journal and conference websites, service activity documentation, VTechWorks

## Goal: Digital Library Development

Theme 2, Objectives 1, 2, and 3

Outcome 1: Prototype data management repository developed based on the hydra+fedora framework (also based on use cases Signature Engineering Building project and/or OIRED project)

Measure: Internal and external stakeholder requirements solicited (research environmental assessment, service model planning/development), incorporated, prototype tested, sample research datasets deposited, preliminary data archiving policies developed

Target: Functional and pilot tested hydra+fedora repository framework, 100 datasets deposited

Documentation: Github code repository, repository UI, research data archiving policies

Outcome 2: Prototype web archiving digital library developed that integrates SiteStory with Apache web server to act as a server crashing prevention tool

Measure: Satisfied granting agency requirements, software developed, tested, openly released, and results disseminated

Target: Functional prototype, feasibility testing of large web operation complete

Documentation: Github code repository, user manual, research paper/white paper, final report

Goal: Data and Scholarly Communication Curriculum Development

Theme 2, Objective 4; Theme 3, Objective 2

Outcome 1: Developed and improved scholarly communication literacy instruction

Measure: curriculum developed and learning outcomes created; increased number of intellectual property, copyright and scholarly communication instructional sessions, workshops and consults

Target: 10% increase in number of instructional sessions, workshops, and consults

Documentation: scholarly communication curriculum, service activity documentation

Outcome 2: Developed and improved data literacy instruction

Measure: scaffolded framework for data literacy developed and learning outcomes created; toolkit of data literacy instructional content developed; increased number of workshops and partnerships

Target: 10% increase in number of workshops; 5% increase in number of partnerships

Documentation: toolkit, data literacy curriculum, service activity documentation

Goal: Advancing VT's Research Information Management Network

Theme 2, Objective 1

Outcome 1: Completed VIVO pilot project

Measure: Sample researcher profiles in test instance of VIVO, data exposed to the national network, feedback solicited from stakeholders

Target: 50 profiles created for researchers in arts, humanities, science, and engineering disciplines

Documentation: VIVO UI, assessment plan, documentation of outcomes and research areas represented

Outcome 2: Completed Symplectic Elements implementation

Measure: Synchronizer for publications, grants, and teaching data feeds working, repository ingest tested, VIVO harvester tested, user training initiated

Target: profiles created for all faculty members, 50 papers deposited in VTechWorks, 50 profiles harvested into VIVO, training completed for 10 departments

Documentation: Elements UI, VIVO UI