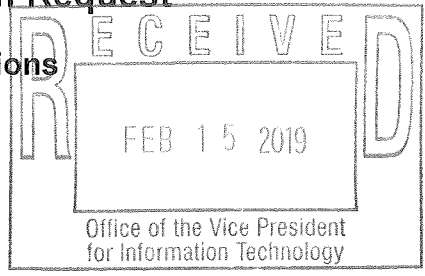


#1908

NDSU Student Technology Fee Action Plan Request

I. Action Plan Introduction and Authorizations



NDSU ORGANIZATION OR UNIT NDSU Libraries NDSU Department of Geosciences		
TITLE OF PROJECT: Spatial Data Visualization Lab		
Project Duration (3 years maximum)	From: March 1, 2019	To: December 20, 2019
Type of Project (Check one)	New <input checked="" type="checkbox"/> X	Previously Submitted <input type="checkbox"/> Renewal <input type="checkbox"/>
Total Technology Fee Request	\$27,921.60	
Project Director (Must be NDSU faculty or staff) Hallie Pritchett Bernhardt Saini-Eidukat Stephanie Day Peter Oduor	Campus Address: Library 106B Phone: 701-231-8897 Fax: E-mail: hallie.pritchett@ndsu.edu	
Name (Type or Print)	Signature	Date
Project Director Hallie Pritchett		2/14/19
Unit Head Joe Mocnik		2/12/19
Project Director Bernhardt Saini-Eidukat		2-11-19
Unit Head Scott Wood		2-11-19
Project Director Stephanie Day		2/11/19
Unit Head Bernhardt Saini-Eidukat		2-11-19
Project Director Peter Oduor		2/11/19
Unit Head Bernhardt Saini-Eidukat		2-11-19
IT Division Consultant Melissa Stotz		2-11-19

Executive Summary (maximum of 175 words)

Visual representation of spatial data is an essential tool for almost every area of study at NDSU. Students in every college use spatial data and inference for class projects and research. Resources that support spatial data visualization should be housed in a collaborative environment conducive to carrying out project work, with a staff member to help organize, manage, and curate the tremendous amounts of complex data used in such projects. The Libraries are the ideal place to establish such an environment.

The Libraries, along with the Department of Geosciences, propose a new **Spatial Data Visualization Lab (SDVL)**. Its services and resources will include support for multidisciplinary projects in spatial data visualization, including instructional support. The goal is to provide students with a network of services which will support them in all phases of their spatial data scholarship. The services will be offered to at least two classes immediately as well as being the focus of several outreach events in its first year. This service will help hundreds of students incorporate spatial data visualization each year.

The Technology Fee Advisory Committee will only accept for consideration Student Technology Fee Action Plan Request forms which are fully completed and signed, and whose Project Directors have no past due reports on previously awarded projects as of the current submission deadline date, according to the guidelines listed in the instructions, pages 1 and 2.

Technology Action Plan Request forms will be opened and reviewed after the submission deadline.

NDSU Student Technology Fee Action Plan Request

II. Project Overview

1. How does this project meet student needs?

Across the university, students are encountering and need to visualize spatial information. Access to the tools for learning and applying these skills in a collaborative environment is paramount for students' career goals. While some of these tools may be available now, they are scattered across the university; this project will make them available, with peer and/or instructional support, in a student-accessible space in the Main Library.

2. What audience does this project directly serve? What audience is indirectly served? How many students are affected?

This technology will be used by students from across the university and from many disciplines, including the humanities, social sciences, engineering, natural resources and natural sciences, business, health professions, and agriculture. Each year, 60 students from across campus take Introduction to GIS, while another 20 - 30 students take Advanced GIS, Remote Sensing, or Remote Sensing of the Environment. Over 120 students learn basic spatial concepts in GEOL 105L every year, and another 120 in GEOL 106L. In addition, introductory GIS courses are offered in Agricultural and Biosystems Engineering, Natural Resources Management, Transportation Engineering, and Emergency Management. Hundreds of undergraduate and graduate students in Agriculture, Computer Science, Civil and Environmental Engineering, Natural Resource Management, Environmental and Conservation Sciences and other disciplines work with big data, watershed modeling, animal behavior, soil chemistry mapping, population distribution, transportation routing, etc., regardless of whether or not they take a course specifically focused on spatial concepts.

3. For projects that target a subset of NDSU's students, please describe the possibility for broader application in the future.

Spatial data is used for analyzing problems as diverse as locating new businesses, routing transportation and emergency service, election analysis, tracking spread of disease, crop health mapping, and many more. We envision providing an awareness campaign along with training for faculty who would like to incorporate spatial data visualization into their courses. Possibilities also exist in training affiliated state and federal agency staff, such as the North Dakota Forest Service, the North Dakota Department of Health, the USDA, and other practitioners.

4. Describe both the immediate and long term impact of this project.

Students will develop skills for manipulating, understanding, and explaining spatial data that can be used for class projects and in their careers. This project will create a long-term campus resource with the potential for serving as a center of interdisciplinary teaching and research on spatial topics.

5. Who will pay for ongoing expenses following the technology fee funded portion of this project (e.g., who will replace hardware or software after it has reached its end of life)?

The Spatial Data Visualization Lab is the first phase of what will become the Digital Scholarship Lab on the second floor of the Main Library; as such, the Libraries will be responsible for ongoing expenses.

6. Describe how this project will follow NDSU's best practices in information technology. (Please make sure the NDSU IT Division staff you consulted signs in Part I of this form.)

Computers will follow NDSU, NDUS, and NDSU Libraries policies for use. Design and installation will be overseen by the NDSU Libraries in consultation with IT.

7. What service on campus is most similar to the one proposed here? How does this project differ?

GIS software is installed on some campus cluster computers, but these labs have no large working spaces for maps and no staff/student assistance. There is a small lab space in the Department of Geosciences that is not designated for general campus student use. Other departments have software installed in faculty or grad student offices, which are not accessible to students in general. The Spatial Data Visualization Lab's services and resources will include support for multidisciplinary projects in spatial data visualization and collaboration, including instructional support, and be housed in a collaborative environment conducive to carrying out project work regardless of department affiliation.

NDSU Student Technology Fee Action Plan Request

III. Project Description (5 pages maximum)

Include information on the background of this project: how did it come to fruition?

Visual representation of spatial data such as topography, geography, population density, remote sensing information, land use, business planning, precision agriculture, spread of disease and many others is an essential tool for almost any area of study at NDSU, and indeed for modern life. Portable map and navigation applications on mobile devices are now ubiquitous. Students in every college use spatial data and inference for class projects and research. According to the US Bureau of Labor, the career outlook for people with geospatial skills is excellent¹.

A common software tool for this work is a Geographic Information System (GIS). In addition, students need to display and manipulate remote sensing data from satellites or drones. These tools and services should be housed in a neutral, collaborative environment conducive to carrying out project work. An accompanying issue is the need for a staff person to organize, manage, and curate the tremendous amounts of complex data used in these types of projects. The Libraries are the ideal place to establish and house such a facility.

Spatial Data Centers are becoming commonplace in research universities. An example is the University of Minnesota's very successful U-Spatial Initiative². For NDSU to remain competitive in educating students to their fullest potential, a similar model should be implemented.

The Libraries, along with the Department of Geosciences which is heavily invested in working with spatial data, propose a new **Spatial Data Visualization Lab (SDVL)**. The SDVL's services and resources will include support for multidisciplinary projects in spatial data visualization, including instructional support. The goal is to provide students with a network of services which will support them in all phases of their spatial data scholarship.

It should be noted that the SDVL is the first phase of the Libraries' proposed Digital Scholarship Lab, which is part of its new Digital Scholarship Initiative. The Digital Scholarship Lab will be located on the second floor of the Main Library. It is envisioned as a flexible lab/instruction space with staffing, hardware, and software to support all aspects of digital scholarship. Implementation phases include:

- Phase I: Support for spatial data visualization with the creation of the Spatial Data Visualization Lab
- Phase II: Support for numeric data visualization, including data discovery, access, and curation
- Phase III: Support for digital humanities, including text mining, online exhibits, projects, and publishing
- Phase IV: Relocate and expand the Libraries virtual reality technology

Project background

Spatial data visualization has undergone a revolution in the past two decades. What was once the domain of specialized computer systems is now accessible to anyone on mobile devices. Although GIS is available in general use clusters across campus, advanced technologies are currently only accessible by NDSU students in "enclaves" within scattered academic and research labs. This proposal has come to fruition by the recognition of the need for a centrally located and managed spatial data visualization facility that is focused on the needs of students from across the university and from any discipline, including the humanities, social sciences, engineering, natural sciences, business, health professions, and agriculture. Types of data that will be of interest will include satellite imagery, elevation, LiDAR, aerial imagery, hydrography, municipal/political/population, soils, bedrock geology, transportation, vegetation, and many others.

¹ <https://www.bls.gov/ooh/architecture-and-engineering/cartographers-and-photogrammetrists.htm>

² <https://spatial-research.umn.edu/>

This project will provide the technology needed for students to access spatial data visualization by providing a neutral space for learning and collaboration. The outcome will be a facility to help students to effectively interpret, manipulate, and visualize spatial data for use in their current class and research projects, and in their future careers.

The Number of Students That Will Benefit

Each year, 60 students from across campus take Introduction to GIS, while another 20-30 students take Advanced GIS, Remote Sensing, or Remote Sensing of the Environment. Over 120 students learn basic spatial concepts in GEOL105L every year, and another 120 in GEOL 106L. In addition, introductory GIS courses are offered in Agricultural and Biosystems Engineering, and Emergency Management. Hundreds of undergraduate and graduate students in Agriculture, Civil and Environmental Engineering, Natural Resource Management, Environmental and Conservation Sciences, and other disciplines work with watershed modeling, animal behavior, soil chemistry mapping, population distribution, transportation routing, etc., regardless of whether or not they take a course specifically focused on spatial concepts.

Proposed Spatial Data Visualization Lab services:

1. Spatial data discovery, access, and curation
 - a. Databases such as satellite, other remote sensing, and GIS
 - b. Metadata and documentation
 - c. Support for the data lifecycle (e.g. data organization, management, sustainability, and preservation)
2. Data visualization and manipulation in 2-D and 3-D
3. Instruction and instructional support

A clear description of how the expertise, equipment, and resources available to the project team, along with the funds requested, will address this need.

The Libraries will make available rooms 201 and 202 on the second floor of the Main Library for the establishment of the SDVL (Fig. 1). In the long term, the Libraries envision dedicating a full-time or part-time staff position to oversee the programming of the SDVL. In the short term, the Department of Geosciences, with other departments and in collaboration with Libraries, will train graduate and undergraduate students as spatial data mentors. The Department of Geosciences currently teaches introductory and advanced courses in GIS and Remote Sensing (including data from satellites, terrestrial sensors, and drones).

Equipment and furniture required for this proposal include workstations, large screens, movable tables, chairs, and network services. Initial software to be installed includes ArcGIS, MatLab, SAS, QGIS, R, and GRASS.

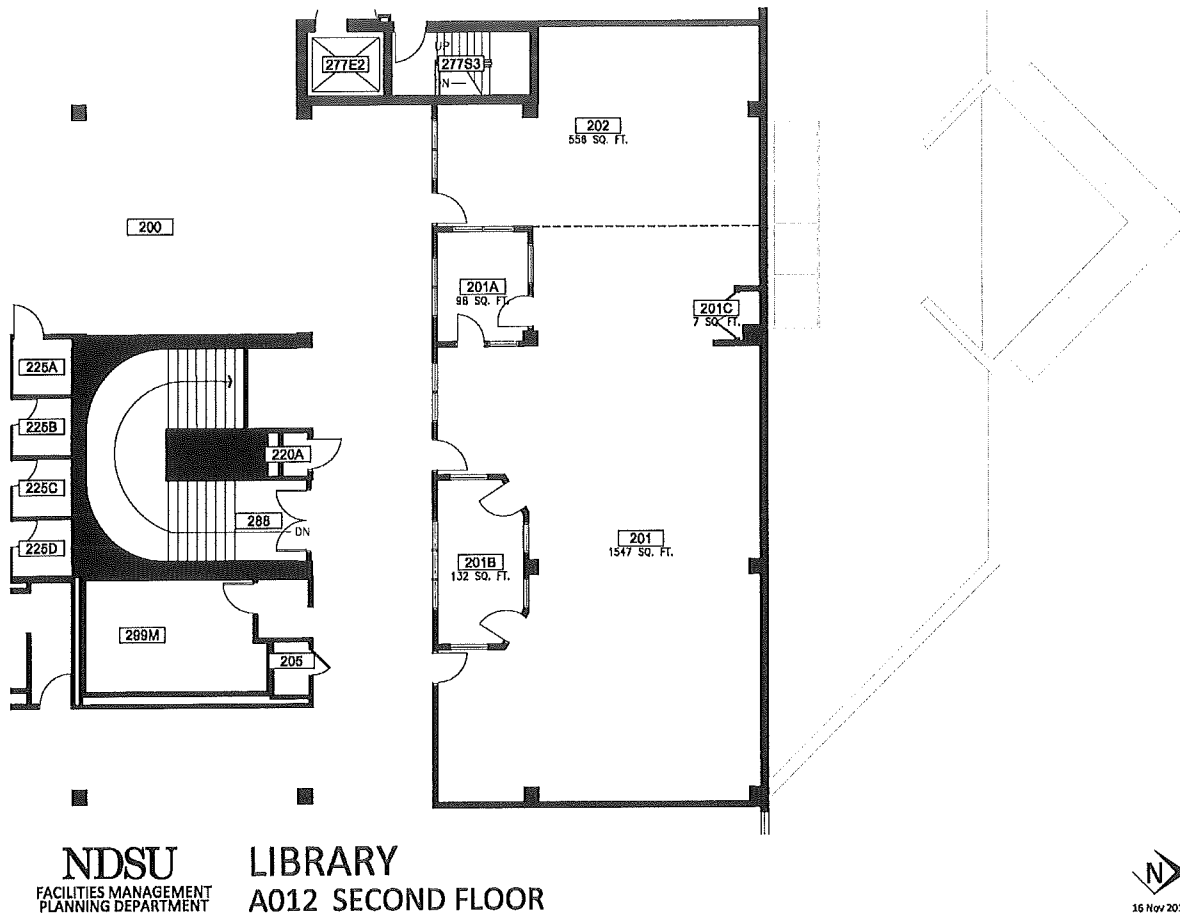


Figure 1. Layout of room 201 and 202 that will be made available for the SDVL.

NDSU Student Technology Fee Action Plan Request

IV. Milestones

List the date for each project milestone. These milestones should represent the *significant* accomplishments that will be associated with the action plan. For each milestone, please indicate its expected outcome and the means for assessing that outcome. (The table may be extended as needed.)

	<u>Date</u>	<u>Milestone</u>	<u>Expected Outcomes</u>	<u>Means of Assessment</u>
1.	March 1, 2019	Initiation of Project	Planning for room layout, materials and equipment	Completed plan and final budget
2.	Summer-Fall 2019	Room preparation	Move collections and furniture housed in Rooms 201 and 202 elsewhere in the building	Room emptied
3.	January 1, 2020	Ordering Phase	Materials, equipment, networking and furniture ordered	Orders submitted
4.	May 1, 2020	Equipment Installation	Furniture and networking installed; equipment installed	Equipment installation complete
5.	July 1, 2020	Software Installation	Software purchased and installed	Lab is fully functional
6.	August 1, 2020	Marketing	Create marketing materials	Add to NDSU Libraries website and disseminate information to campus
7.	Mid-August, 2020	Open house	Space is available for campus use	Campus use
8.	December, 2020	Usage review	Usage statistics	Usage counts

NDSU Student Technology Fee Action Plan Request

V. Supporting Documentation

The Libraries

NDSU Dept. 2080

P.O. Box 6050

Fargo, ND 58108-6050

701.231.8753

Fax 701.231.6128

Ariel 134.129.115.34

ILL Fax 701.231.7138

NDSU Student Technology Fee Advisory Committee

February 15, 2019

Dear Committee Members:

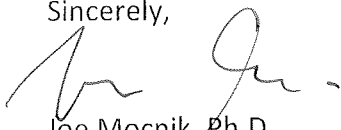
Please accept this letter in support of the Spatial Data Visualization Lab funding request to enhance multidisciplinary efforts to further spatial data visualization services by utilizing the joint expertise of the Department of Geosciences and the Libraries.

Researchers struggle with best practices in the organization, management, and curation of data, a problem that continues to grow as datasets become increasingly large and complex. In response, the Libraries is working to develop a new Digital Scholarship Initiative to support data literacy that will incorporate new and existing services and resources within the Libraries as well as strengthen and develop partnerships throughout NDSU. Our goal is to create a network of services to support researchers in all phases of the digital scholarship lifecycle. The Spatial Data Visualization Lab is the first phase of the larger Digital Scholarship Lab that is part of our broader Digital Scholarship Initiative. The Digital Scholarship Lab is envisioned as a flexible lab/instruction space with staffing, hardware, and software to support all aspects of digital scholarship, including spatial data visualization.

As the intellectual center of the university, the NDSU Libraries facilitate access to research and cross-disciplinary discovery. This makes the Libraries the logical place to house and support a multidisciplinary facility such as the Spatial Data Visualization Lab. In partnership with the Department of Geosciences, we anticipate helping hundreds of students incorporate spatial data visualization into their coursework and projects each year.

Please feel free to contact me directly with any inquiries at josp.mocnik@ndsu.edu or 231.8887.

Sincerely,



Joe Mocnik, Ph.D.

Dean of Libraries

To: Technology Fee Advisory Committee (TFAC)

From: NDSU Students as signed below

Re: Support for Spatial Data Visualization Lab (SVDL)

February 12, 2019

This letter is to communicate our support for a Spatial Data Visualization Lab to be housed in the NDSU Library. Technologies such as Geographic Information Systems (GIS), Global Positioning Systems (GPS), remote sensing from satellites and drones, topographic and watershed analysis, and laser scanning are becoming extremely important for project work and in careers.

Many students don't have access to equipment that may be housed in departments. This facility will help to reduce duplication of resources by providing a central location for students to access data, equipment, and expertise for spatial projects. Undergraduate and graduate students from a variety of backgrounds and disciplines across campus will benefit from a centrally located service that can be a site for collaboration and learning spatial skills.

Please contact any of us with questions you may have.

Sincerely,

Name	Date	Program	Email or Phone
Zachary Phillip	2-12-19	ECS	zachary.phillips@ndsu.edu
Samuel Marolt	2-12-19	Geology	Samuel.marolt@ndsu.edu
Girish Upadhyay	2-12-19	ECS	girish.upadhyay@ndsu.edu
Charles Nixon	2.12.19	ECS	charles.nixon@ndsu.edu
Noah Strom	2-12-19	Geology	noah.strom@ndsu.edu
Kaitlyn Fleming	2-12-19	ECS	kaitlyn.fleming@ndsu.edu
Cole Huggins	2-12-19	ECS	cole.huggins@ndsu.edu
Antonio Molina	2-13-19	T and L	antonio.molina@ndsu.edu
Brady Jochim	2/13/19	Biology	
Wil Vanderlinde	2/13/19	NRM	wil.vanderlinde@ndsu.edu
Megan Ostrand	2/13/19	Soil	megan.oststrand@ndsu.edu

NDSU Student Technology Fee Action Plan Request VI. Budget

(double-click on the form to begin entering data)

1.	NDSU ORGANIZATION OR UNIT Library and Geoscience
2.	PROJECT DIRECTOR(S) Hallie Pritchett Bernhardt Saini-Eidukat Stephanie S. Day Peter Oduor

3.	SALARIES AND WAGES			
	Personnel description	Number employed	Number of months	Funds Requested
	A. Staff			
	B. Graduate students	1	7	\$6,720.00
	C. Undergraduate students			
4.	TOTAL SALARIES AND WAGES			\$6,720.00
5.	FRINGE BENEFITS			\$201.60
6.	TOTAL SALARY, WAGES AND BENEFITS			\$6,921.60

7.	EQUIPMENT	\$21,000.00
	Describe Equipment specifics in the Budget Justification section	

8.	MATERIALS AND SUPPLIES	\$0.00
	Describe Materials and Supplies specifics in the Budget Justification section	

9.	TOTAL TECHNOLOGY FEE REQUEST	\$27,921.60
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10.	MATCH (Describe in Match Section)	\$6,000.00
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11.	TOTAL PROJECT EXPENDITURE	\$33,921.60
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NDSU Student Technology Fee Action Plan Request

VII. Budget Justification

Describe how you arrived at the budget totals in Section VI, Budget.

You are expected to follow all applicable university policies and procedures regarding salary expenditures.

You are expected to follow the state-approved purchasing guidelines when purchasing materials and supplies.

- Equipment: List name, estimated cost and quantity of each item and explain why it is important to the project. Include installation and maintenance costs in your estimates.
 - (a) Dual monitor workstations (6) \$3000 (based on quote from Daktech)
Desktop computers will be necessary to allow students to access technology
 - (b) Large monitor for teaching or display (1) 70" display - \$3000
A large monitor will be used to share with a larger groups or for collaborative projects.
 - (c) Graduate Student (Fall and Spring Semester) – \$12/hour for 20 hours per week
A Graduate student will provide support for students using the lab.
 - (d) Moveable Tables (12) \$300
Tables will be movable to allow for various collaborative environments, and for students who prefer to use their laptops. Tables can also be stored when not in use.
 - (e) Chairs (12) \$200
Chairs will also have wheels for ease of movement and collaboration.

- Materials and Supplies: List name, estimated cost and quantity for each non-equipment items and explain why it is important to the project.

The following software will be installed on all workstations to allow students to analyze and visualize spatial data:

- (a) ArcGIS (ESRI): industry standard geographic information system software*
- (b) MatLab: software numerical computation, visualization, and programming*
- (c) SAS (Statistical Analysis System): an integrated system of software solutions that enables users to perform statistical and mathematical analysis*
- (d) QGIS: free open source geographic information system software (www.qgis.org/en/site/)
- (e) R: free open source software for statistical computing and graphics (www.r-project.org/)
- (f) GRASS (Geographic Resources Analysis Support System) GIS: free open source geographic information system software (grass.osgeo.org/)

*available at no cost through the NDSU Software Licensing Program
(www.ndsu.edu/its/software/software_licensing_program/)

NDSU Student Technology Fee Action Plan Request

VIII. Budget Match

1. Attempted Budget Matches:

Grad student support at \$12/hour to staff the lab during Fall and Spring Semesters.

2. Actual Budget Matches:

The Libraries will provide a 2000 square foot room on the second floor of the Main Library to house the Spatial Data Visualization Lab, as well as tables and chairs as described in Section VII above. The Libraries will also be responsible for any necessary network upgrades to support the Spatial Data Visualization Lab.

3. Additional Budget Match information: