Cost of Project: ____________
Contribution from Applicant’s Department/Unit: ____________
Amount Requested for Project: ____________

(Student Technology Fee Program
2015 Tech Initiatives Summary Sheet

Student Applicants:
Complete “Project Title,” “Applicants” information, and “Submission Date” only (top section).

Project Title: New User-Friendly Software for the WWU Terrestrial Laser Scanner Project #
(STF staff enters)

Department/Organization: Geology Dept.

Applicants (first applicant is considered primary contact):

Name: Douglas Clark _______ Mail Stop: 9080 Email: doug.clark@wwu.edu _______ Phone: 7939
Name: Scott Linneman _______ Mail Stop: 9080 Email: scott.linneman@wwu.edu _______ Phone: 7207

STF Grant Request (from page 1 of 2015 proposal form: line 6) ......................... $ 7691

Authorization for contribution resources (if applicable):

Submission Date: 3/25/2015

________________________________________________________________________

Submittal Approvals

AS President Required for all proposals submitted by Associated Students (AS). Signifies that all student
proposals have been prioritized by AS.

Department Chair Required for all proposals from a specific department. Signifies that the department can
support the project as submitted.

College Dean or Unit Head Signifies that the College or organizational unit can support the program as
described.

**Project’s Strategic Priority by College: **
For proposals originating from a college, the dean must review, sign, and strategically prioritize that
batch of proposals.

Space Administration Required for all proposals that require additional facilities or changes to existing
facilities. Signifies that all space-related issues have been addressed.

Vice Provost for Information Technology/CIO Required for all proposals related to all-university services
and all proposals not related to a specific discipline. Signifies that the technology support organizations and technical
infrastructure can support the submitted project.
Project Title: New User-Friendly Software for the WWU Terrestrial Laser Scanner

Department/Organization: Geology Dept.

Project Applicant(s):

Principal Contact
Name: Douglas Clark  MS 9080  Email: Doug.Clark@wwu.edu  Phone 7939

Others
Name: Scott Linneman  MS 9080  Email: Scott.Linneman@wwu.edu  Phone 7207

Amount Requested for Project

Proposed Budget:
1. Equipment total  $13,600
2. Plus site preparation (not STF funded)  + $
3. Total Project Cost (spreadsheet total from part IV of this form, Total Project Budget)  = $15191
   4. Less organization's contribution  – $7500
   5. Less site preparation  – $
   6. STF Grant Request  = $7691

IMPORTANT NOTE

1. THE STF Committee will accept only complete proposals by the announced deadline. Every section (I–IX) and all items of this proposal format must be addressed.

I. Executive Summary (800 words max)

Provide a summary of the project and the benefits to be derived. Explain what the students would gain from the project, and how the acquisition would meet the Student Technology Fee mission.

STF Mission:
The Student Technology Fee provides Western students with adequate and innovative technology experiences by:

- Broadening/enhancing the quality of the academic experience
- Providing additional student access to technology
- Increasing integration of technology into the curriculum

We request funding to purchase new processing software for our Terrestrial Laser Scanner (TLS), with the goal of dramatically increasing student access to this cutting-
edge technology; if successful, essentially all BS geology majors would learn the basic collection and processing of TLS data (currently none do).

In 2009, the Geology Department purchased a Terrestrial Laser Scanner as part of an NSF-funded pedagogical research project. The Optech ILRIS 3D-ER is a state-of-the-art laser scanning system. It has been used to monitor evolution of landslides, river bank erosion, and other landscape changes that affect our environment with potentially significant economic and health consequences. The scanner produces a high-precision 3-D “point-cloud” of any surface that is scanned, which can be converted into a detailed digital relief model during post-processing. The scanner, with post-processing software from a 3rd party (Innovmetric Polyworks) supplied by Optech, cost ~$160K. The scanner has worked well for many faculty, graduate student and a few undergraduate research projects. However, our original intent to use it on a broader scale for class projects and general instruction has never been realized because the Polyworks software proved to be a big disappointment, both to us and to Optech. Polyworks is designed for industrial applications with dedicated technicians and is anything but user-friendly. Processing scans requires complex manipulations through multiple levels of applications within Polyworks, each of which behaves differently with hidden or unclear requirements. The steep learning curve on this software has prevented potential users, especially undergraduates, from incorporating this powerful surveying tool in their research and class projects. We now have an opportunity to fix that situation.

The fix is a new software package called "ILRIS Scan", which Optech introduced earlier this year. ILRIS Scan is an all-in-one scanning, viewing, and processing software tool developed specifically for the Optech ILRIS Terrestrial Laser Scanner in partnership with Italian software developer Gexcel Srl. In stark contrast to Polyworks, ILRIS Scan provides a single interface for the entire survey workflow, from scanning to processing to data review—no need to switch between applications. Furthermore, Scan has a simplified interface that enables non-technical personnel to use the ILRIS scanner and its data with minimal training.

By dramatically increasing student access to this instrument, our proposal directly addresses the core goals of the STF mission: to enhance the quality of students’ academic experience, to provide additional student access to cutting edge surveying technology, and to increase the integration of technology into the curriculum. If funded, the new software would enable us to incorporate the TLS into several classes that currently rely on dated or obsolescent technology. For example, in Geology 310 (Geomorphology; a core class for all Geology BS majors), students currently conduct a lab that involves surveying a portion of campus with three technologies, two of which (total station and Jacobs staff) have largely been replaced in the professional world by TLS; with the new Scan software, students would be able to learn how to conduct TLS scans and evaluate their data quality. Other classes with similar surveying components that would incorporate TLS into exercises include Geol 413/513 (Fluvial Geomorphology), Geol 412/512 (Tectonic Geomorphology), Geol 440/540 (Glacial Geology). Various Environmental Sciences and Engineering classes may also be able to incorporate the TLS. Students in these classes also conduct term research projects; with Polyworks, TLS scanning is not a viable option for these projects. With ILRIS Scan, however, students would be able to incorporate it into many term projects.

We have confidence that ILRIS Scan will dramatically increase student access to TLS because WWU staff and students participated in a free trial of the Scan software last year, with great success. Students were able to process the point cloud data in a fraction of the time that Polyworks would have required. For this STF proposal, Optech is offering an
educational price for two installations of the software (one for our field laptop; one for a workstation in the GeoComputing Lab).

An additional important advantage of the new Scan software is a module that Optech is including in their package incorporates photogrammetric elevation data collected by Unmanned Aerial Systems (UAS or 'drones') to fill in the inevitable 'shadows' in the TLS data. This module will allow WWU students and faculty to use our STF-funded UAS to quickly create seamless land surface models that combines these two powerful surveying systems.

Number of students affected: Classes that could incorporate TLS immediately into existing labs: Geol 310 (Geology core; taught 3 times/year, ~30 students/quarter); Geol 412/512 (20 students/yr); Classes that could develop labs with TLS: Geol 413/513 (20 students/yr); Geol 440/540 (20 students/yr); Geol 470/570 (20 students every other year). Total students affected: 140-160/year.

The Geology Department will cover HALF the cost of the software and requests half from the STF funding.

II. Relationship to STF Objectives / Impact on Current Academic Programs

The STF Committee will use as its primary assessment criteria the three objectives—quality, access, and integration—defined in the STF mission (above). Given this criteria, describe your proposed project in detail.

1. Tell us—focusing on what the students will gain from the project—how the project would provide positive benefits to specific courses or instructional programs. Specifically, answer at least one of a, b, and c below:

   a. How would this project provide additional student access to technological resources?

      The drastically simpler processing interface presented by ILRIS Scan will dramatically increase student access to TLS technology, from essentially no undergraduates (and few graduates) currently to essentially all Geology majors (via the core Geomorphology course, Geol 310) and most graduate students (via numerous 400/500-level classes). The complexity of the current processing software (Polyworks) effectively prevents all undergraduates and most graduate students from using it. Our test of the new Scan software demonstrates that students of all stripes can rapidly process their own scan data to generate detailed digital models of any target.

      TLS is rapidly becoming the standard surveying technology in many industry and governmental professions (e.g., geotechnical surveying, forestry, road construction, mining, slope-stability projects, etc.) By exposing our students to this cutting edge technology, WWU will provide them with a substantial advantage over those students who do NOT have experience with TLS.

   b. How would this project broaden or enhance the quality of the student’s academic experience through the proposed technology?

      Currently, the survey tools available to our students are largely out-of-date or antiquated (e.g., Jacobs Staff, a form of pace and compass, is a century old; total stations, essentially a manual form of a TLS, is many decades old; even our GPS’ are not survey-grade). Needless to say, students are often dissatisfied with these
exercises, knowing that they are collecting data using archaic methods; as instructors, we are similarly dissatisfied, particularly when we have the latest instrument in our department but the processing software is simply too complex to use with them!

ILRIS Scan will remedy this situation dramatically, and help us realize our original intent in purchasing the instrument with a National Science Foundation grant: to improve undergraduate access to technology and their understanding of landscapes and landscape processes.

c. How would this project *increase integration* of technology into coursework?

If funded, the new software could be immediately integrated into numerous Geology courses that currently rely on outdated technology. We have already mentioned the surveying lab in our Geomorphology course (Geol 310). All Geology BS and BA students take this course, so this single lab would expose all Geology majors to the technology. Since the lab is early in the term, many Geomorphology students may opt to use the TLS for term projects as well (e.g. to study an eroding river bank). Other classes with field-based surveying components or projects that could immediately incorporate TLS include Geol 413/513 (Fluvial Geomorphology), Geol 412/512 (Tectonic Geomorphology), Geol 440/540 (Glacial Geology). Various Environmental Sciences and Engineering classes may also be able to incorporate the TLS.

2. Would other departments be involved with this project?

No ☐ Yes ☒ If yes, describe.

We have discussed the possible incorporation of TLS in ES and Engineering courses with faculty in those departments, with positive feedback so far, they are waiting for successful funding before spending effort designing lab components that incorporate TLS.

3. Has any part of this project previously been funded by the Student Technology Fee?

No ☐ Yes ☒ If yes, describe.

4. Is the proposed project a pilot project?

No ☐ Yes ☒

III. Utilization

List the anticipated number of times and duration per each use—per quarter or per academic year—that students would use the proposed technology. The committee is looking for **total student hours** and **total number of unique students** who would use the technology in that time period. Explain how you arrived at this utilization.

**Total student hours:**
Geomorphology (Geol 310): ~25 students/quarter, 3 times per year; 1 lab (all students): 4 hrs x 75 students = 300 hrs (includes analysis of resulting data); G310 term projects: ~10
students/quarter x 3 quarters x 20 hours ea. = 600 hrs (includes analysis) Total: ~900 student hrs/yr
Advanced Geology Classes: 1 400/500 level class per quarter, ~20 students/class, at least one 4-hr field trip/lab per class = 240 student hrs/yr

Total number unique students/yr: Geol 310: ~75/yr; 400/500 level classes: ~60/yr; total: 135 students/yr.

IV. Total Project Budget

This section details the estimated total cost of the project. Include costs that would be covered—by your department or another source—for ongoing costs such as personnel or operating expenses.

1. For assistance in preparing your budget, please consult with relevant campus support departments (ATUS, Purchasing, Space Administration, etc.).

2. For more information about these contacts and helpful tools/links: from the STF website home page (http://www.wwu.edu/stf), choose “STF Tech Initiatives” on sidebar, then section “II. Tech Initiatives Forms and Instructions.”

Attach an Excel spreadsheet if you have additional details.

<table>
<thead>
<tr>
<th>Item</th>
<th>Quantity</th>
<th>Item Cost</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scan Full (Educational) for existing ELRIS owners</td>
<td>2</td>
<td>6100</td>
<td>12200</td>
</tr>
<tr>
<td>Annual Maintenance, Scan Full Educational (1 yr additional maintenance, updates and support after the first year warranty, purchased with Scan Full)</td>
<td>1</td>
<td>1400</td>
<td>1400</td>
</tr>
</tbody>
</table>

Subtotal                                                  |          |           | 13600 |
Allowance for price increases (3% of subtotal)             |          |           | 408   |
Shipping (taxable)                                        |          |           | 0     |
Tax (8.7%)                                                |          |           | 1183  |
Total This budget total (or your attached spreadsheet total) should match the projected budget figure on page 1 of this proposal. (See box on page 1, line 3.) | | | 15191 |

Important Notes from the STF Committee:

- We recognize your proposed budget as an estimate. Final funding for successful projects will be established after thorough technical review; some costs may need adjusting due to price changes.
- We recommend that you include a 3 percent cushion to allow for price increases.
- We may impose special conditions on a proposal before approval. See STF Proposal Guidelines.
3. What funding or contributions are available from your department or other sources?

Note: “Contribution” is defined as a monetary contribution. A vendor discount, for example, is not considered a contribution.

Because the Geology Department recognizes the benefits to our students of making this technology more widely available to them, it is willing to cover roughly half the cost of the software upgrade and extended maintenance for it ($7500).

4. Could this project be divided into discrete elements that could be funded separately?

Note: A “no” response to this question creates an “all or nothing” proposal. That is, if the STF Committee decides against funding your entire proposal, it will not consider any elements for partial funding. If elements could be funded separately, the applicant is responsible for prioritizing them before submitting the proposal.

No ☐ Yes ☒ If yes, summarize and prioritize project elements with cost estimate for each.

5. Are course or lab fees charged for any of the courses that will use this equipment?

No ☐ Yes ☒ If yes, describe. Please note: The total funding requested from the Student Technology Fee must reflect the amount collected from course fees for equipment replacement and/or equipment acquisition.

$45 course fee for Geomorphology (Geol 310); $52.50 for Glacial Geology (Geol 440/540); $50 for Fluvial Geomorphology (Geol 413/513), and $52.50 for Tectonic Geomorphology (Geol 412/512). These fees are primarily to cover costs for field trips.

V. Impact on Existing Resources

Your proposal must address the project’s potential impact on existing resources. Give special attention to the impact on data transmission networks (e.g., sources accessed, networking equipment, etc.), and personnel (e.g., staffing, administrative support, faculty support, etc.).

1. Describe how existing equipment is used. Contrast this to projected use if your project were funded.

Currently, our ILRIS 3D-ER TLS system is used only by a few faculty members and select graduate students for thesis research projects (in other words, hardly at all). Although we have attempted to use it for undergraduate research projects in the past, the complexity of the existing Polyworks processing software made even that usage unviable. In contrast, with ILRIS Scan processing software in this proposal, we will be able to immediately incorporate TLS scans into labs for a core undergrad class as well as several advanced geomorphology courses. Once the benefits are demonstrated in these classes, we envision that other geology courses as well as possibly some ES and Engineering courses may want to adopt it as well.

2. Is similar equipment or technology available elsewhere on campus—such as the Student Technology Center, Classroom Services, Video Services, Western Libraries, a college lab?

No ☐ Yes ☒ If yes, describe why the existing equipment does not meet the needs outlined in this proposal.
3. If this project involves the replacement of equipment, including computers:

   a. Describe the “before and after” configuration changes. (A spreadsheet reflecting these changes may be attached.) Or, write “N/A.”

       N/A

   b. Describe the costs and benefits of replacing vs. upgrading. Or, write “N/A.”

       N/A

4. Would this equipment be available to students outside of your department?

   No ☐ Yes ☒ If the proposed technology would be used by students outside of your department, describe how they would gain access, how equipment availability would be publicized, the hours/week when equipment would be available, and any costs that would apply.

Because of the cost of the TLS hardware, we would restrict student usage outside the Geology Dept. to situations under the direct supervision of a faculty instructor. Faculty instructors would need to be checked out on proper usage of the equipment (via either Clark or Linneman in the Geology Dept.), or via the Geology equipment technician (Ben Paulson). We would advise departments of availability via contact with Department chairs. Availability would be based on a reservation calendar developed each quarter, with Geology Dept. courses/research projects having priority.

5. Does this project involve the check-out of equipment to students?

   No ☐ Yes ☒ If yes, discuss whether or not the Student Technology Center/ATUS Loan Pool could be assigned this task.

The STC loan pool would not be appropriate for checkout b/c the TLS is expensive and highly specialized equipment, owned by the Geology Dept. via an NSF-funded grant. As a result, any users would need to be fully trained via one of the two PI's on the original grant (Clark and Linneman) or by the department equipment technician (Ben Paulson)

6. Does the department have adequate operating funds to provide ongoing maintenance and support?

   No ☐ Yes ☒ If yes, describe.

   Department is committed to maintaining the TLS system and computers to run it on via operating budget and standard lab fees. Hardware is relatively maintenance-free with proper care.

7. Does the department have adequate personnel funds to provide ongoing staff support for the project?

   No ☐ Yes ☒ If yes, describe.

   Ben Paulson stores and maintains major field equipment for class-related work

VI. Space and Site Information

This section addresses any space alteration or site preparation necessary for the proposed project. Site alterations include painting, holes in walls, security systems, carpeting, construction, lighting changes, or conversion of a lab or office.
Special Note: If this project would require any site preparation, or if this project would use any space not currently under your department’s control:

a. You must submit a draft proposal to Space Administration by March 13, 2015.

b. Space Administration and Facilities Management will then conduct a site survey and respond to you by March 20, 2015 about project feasibility, cost, and schedule.

c. You must include the site survey response with your final proposal.

1. Location for installation of equipment or technology:
   Software will be installed on one desktop computer in the Geology Computing Lab (ES 230) and on one field-laptop (stored in ES 54, with TLS system)

2. Would site modification be required?
   No ☒ Yes ☐ If yes, describe the modifications (e.g., electrical, air, painting, lighting, security, network access, etc.).

3. Would this project use space not currently assigned to your department or area?
   No ☒ Yes ☐ If yes, describe.

VII. Project Schedule

Describe your overall implementation schedule. (Remember that project awards are announced during spring quarter, and that projects are to be substantially completed by the end of the calendar year.) If any site preparation is involved (see section VI above), align your project schedule with the schedule provided by Space Administration and Facilities Management.

Software would be purchased and installed as soon as funding is available. Assuming spring quarter purchasing, classes would begin using TLS during labs Fall 2015.

VIII. Constraints

List or describe any external or internal factors/constraints that could affect your project schedule, project objectives, or the project budget (e.g., if external approval is required for curricular changes, or if funding must be received by a certain date).

none

IX. Submitting the Proposal

1. Make sure your proposal does not exceed 12 pages (not including Tech Initiatives Summary Sheet).

2. Complete a 2015 Tech Initiatives Summary Sheet for the front of the proposal.

3. Submit the proposal and summary sheet electronically for prioritizing (PDF preferred, or Word document):
   a. Faculty and staff: Submit by internal due date, which must be before proposal due date of April 2.
b. **Students**: Submit by March 31 to AS VP for Academic Affairs at 
   ASVPforAcademicAffairs@wwu.edu.

4. Submit prioritized proposals:
   
a. **Organization reps and AS VP for Academic Affairs**: Submit to Student Technology Fee (STF) 
      Committee by 12:00 noon on April 2.

b. For each proposal, email one electronic version (PDF preferred, or Word document) of both the
   proposal and the summary sheet to diane.bateman@wwu.edu (the STF Committee secretary).

   **Note**: Paper copies of proposals are no longer required; please do not send.