TAYLOR GEOSPATIAL INSTITUTE

LOCATION. COLLABORATION. IMPACT.

TAYLOR FELLOWS PROGRAM

NOTICE OF OPPORTUNITY

GOVERNING COUNCIL MEMBERS MUST SUBMIT NOMINATIONS BY JUNE 30TH AND DECEMBER 31ST

Approved by the Research Council on September 21, 2022

Questions or inquiries regarding this NOO can be directed to: TGI@slu.edu

BACKGROUND

The Taylor Geospatial Institute (TGI), the nation's leading academic center for geospatial science, is committed to making St Louis a global center of excellence in geospatial science research, education, and innovation. The St. Louis region is well-positioned to become the nation's geospatial 'Silicon Valley' as laid out in the June 2020 "GeoFutures Strategic Roadmap," a plan for strengthening St. Louis's competitive advantage in geospatial research and technology. For more information on the Institute, please visit taylorgeospatial.org.

The Taylor Geospatial Institute envisions building a world-class, interdisciplinary geospatial science research collaborative to address scientific and societal grand challenges (e.g. food security, supply chain resilience, health equity, and national security). To achieve this goal, the Institute established the Taylor Fellows program, which is designed to retain existing faculty and promote the recruitment of geospatial talent to TGI partner universities.

The purpose of the Taylor Fellows program is to enable TGI member institutions to recruit and retain distinguished researchers in geospatial science core or adjacent fields to the St. Louis region, develop the next generation of scientific leaders, and catalyze regional collaboration to accelerate the St. Louis region's development as a global geospatial center of excellence.

Taylor Fellow appointments can be used to augment start-up offers for faculty searches focused on geospatially relevant domains. In addition to helping TGI member universities to financially enhance their start-up offers, the program can also aid recruitment by offering the Fellow a formal connection to the research network and resources of the TGI.

TAYLOR FELLOW BENEFITS

The Taylor Fellows are appointed through a competitive evaluation process for a period of up to three years. They can be re-appointed for a second term depending on their research productivity and contribution to advancing TGI's mission. The Fellows are expected to grow the eminence and impact of TGI's scholarship and research portfolios.

Each application is unique, and as such an appropriate benefits package will be negotiated on a case-by-case basis. The benefits package can be a combination of *one or more of the following benefits:*

- Discretionary funding up to $150K to help support the Fellow's research, to be used within 3 years.
- Fellowship stipend of $15K that can be used as additive pay or however faculty see fit to use it.
- A TGI post-doc line for up to two years.
- Individualized access to data analytics and computing resources.
- Grant proposal development support.

- Pre-Post Award Research Services if submitted through TGI.

TAYLOR FELLOW EXPECTATIONS

To succeed in the vision of making the wider St. Louis region a national research leader in geospatial science, the Institute needs to build a genuine, healthy, and growing research consortium. Taylor Fellows will play a critical role in developing this research consortium.

The title of Taylor Fellow does come with expectations. First and foremost, Fellows are expected to be pro-active champions for the TGI within their home institutions, universities, colleges, and departments. Furthermore, Fellows are expected to be ambassadors of TGI on the regional and national stage by using their Taylor Fellow title in their official capacities.

Taylor Fellows are also expected to accomplish the following:

- Participate in at least one collaborative research grant development workshop or meeting per year.
- Present in at least one TGI event per year.
- Acknowledge the support of TGI in publications.
- Submit one collaborative grant over the 3 years.

At least once a year, Taylor Fellows are expected to meet with the TGI Director or their designee to review the Taylor Fellow's previous activities and consult about future plans. If the Taylor Fellow does not meet the expectations set forth above, the Director may, after a consultation with the Research Council Representative of the Taylor Fellow's home institution, revoke the Taylor Fellow title from the recipient and terminate any further benefits from TGI to the recipient effective immediately.

APPLICATION PROCESS

Nomination

Each partner institution will establish their own process of selecting and nominating candidates. Taylor Fellows will be nominated by each partner institution through their Governing Council member.

The Governing Council member will submit the nomination and application documents to the Institute Director and send a copy of the application to TGI@slu.edu.

Evaluation and appointment

The application review process will be managed by the TGI Research Council and Institute Director. The Research Council, or a working group designated by the Director, will review the applications and make recommendations on the nominations and the benefits package to the

Director. The Director will approve or reject that nomination and the final custom benefits package based on the budget considerations and the shared priorities of the Institute.

Required supporting application documents for the nomination to be submitted by the Governing Council Members
Please submit the following documents as a single pdf attachment to TGI@slu.edu:

1) Cover letter from nominee describing how the candidate will contribute to TGI's mission.
2) Resume or Curriculum Vitae of the candidate.
3) Letter of support from the candidate's institution, which can be from the nominee's Dean, Vice President for Research, or Provost.
4) Description of the unique and appropriate benefit package requested by the Fellow.

Funding requests for new hires
The application for funding must be accompanied by the position description or, if an offer is already being processed, the CV and research statement of the candidate. If the Taylor Fellow application is approved prior to a candidate being identified, a second, expedited approval is required once the candidate is determined.

Application deadline
TGI accepts nominations semiannually, due on June 30th and December 31st of each year. Nominations related to new hires or faculty retention efforts can be made anytime as a special case.

RESEARCH PRIORITIES AND SCOPE

Through this request for applications, the Taylor Geospatial Institute aims to address grand societal challenges in food systems, health systems, and national security using cutting-edge geospatial technologies, data, and analytics and to build upon the broad existing research strengths of the St. Louis region. The goal is to advance core geospatial science and adjacent fields, to foster research that can improve food security along with health and social equity, and to strengthen supply chains, smart cities, and resilient communities.

Nominators are encouraged to read about the research priority areas provided in appendix A.

FREQUENTLY ASKED QUESTIONS

Question: Can I apply for the Fellows program directly if I am a faculty member at SLU or a TGI partner institution?
No. Fellows are nominated by institutions through their representatives on the TGI Governing Council. Please talk with the Governing Council member or Research Council member at your

home institution to learn more about this opportunity. For a list of Research and Governing Council members, please consult our website.

Question: Do my research expertise and interests have to match the research focuses in Appendix A?
Yes, but we are open to unique projects that use geospatial technology in novel ways or focus on developing a unique application.

Question: If a Taylor Fellow from a TGI-member institution moves to a non-TGI member institution, can the Fellow still hold the title and benefits from TGI if they are continuing collaborations?
Taylor Fellow appointments automatically end when the Fellow moves to non-TGI institutions. However, the Follow can petition to keep their appointment at the new institution until the end of their initial 3-year term. Each petition is reviewed and granted or denied based on funding availability and the Fellow's potential continued contribution to TGI after the relocation.

Question: Are faculty members from non-TGI institutions, including researchers from outside of the United States, eligible for Taylor Fellows appointments?
Internationally renowned scholars with exceptionally strong credentials in geospatial science may be considered for Taylor Fellows appointments on a case-by-case basis. If you would like to inquire about this possibility please contact TGI@slu.edu.

Questions or inquiries regarding this opportunity can be directed to: TGI@slu.edu

APPENDIX A – RESEARCH FOCUS AREAS

OVERVIEW

Building upon the St. Louis region's competitive strengths, the Geospatial Institute will address grand societal challenges in food systems, health , and national security with cutting-edge GeoAI and data analytics techniques. The Institute will generate research to improve food security, health and social equity, and build smart cities and resilient communities, and promote economic development through translation to commercial application and by training the next generation of the workforce (Figure 1).

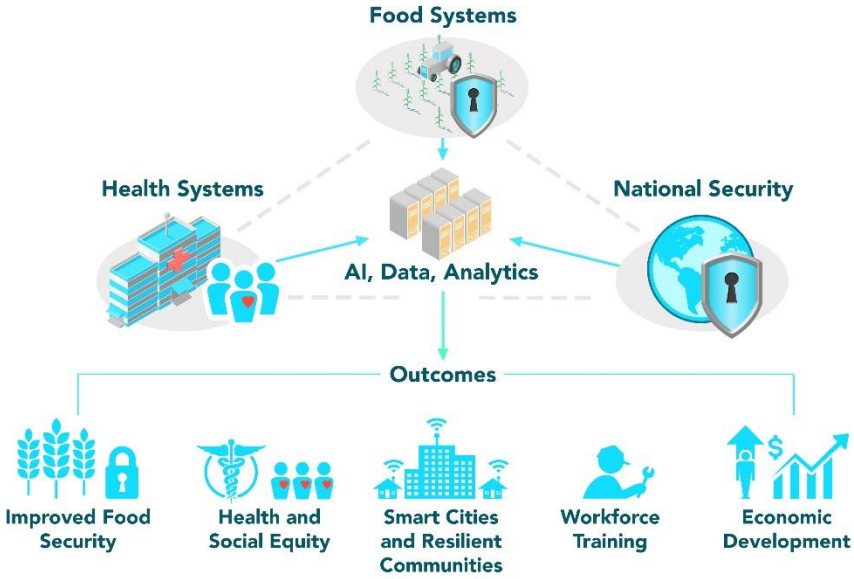

FIGURE 1. ADDRESSING GRAND SOCIETAL CHALLENGES AND OUTCOMES.

FOOD SYSTEMS

Everything comes from plants, not just the food on our dinner table, but everything from medicine, meat, to the strongest rubber used in spaceships.

One of the most challenging global problems today is feeding the growing global population, which will require increasing agricultural output by 70% in the next several decades. Food security is also an important national security issue and a major cause of social instability in many parts of the world. To address this challenge, we need to revolutionize the way we grow crops. We need to: create better crops that can thrive in the future climate with less water; utilize big data, advanced algorithms, and cloud computing at scale so we can monitor crops to improve yield and optimize resource use; and develop geospatial artificial intelligence to teach crops how to adapt to changing environments. To accomplish these goals, we must develop the capability to effectively harness

big data and turn that into actionable crop intelligence with precision and speed. This important technology should help address our societal needs and improve our quality of life.

Geospatial science is fueling innovation and adaptation in food security and agriculture ecosystems by enhancing efforts to develop new crops and improve existing ones that meet both economic demands and ecological requirements. Data-driven AI, multi-scale imaging from satellites, drones, and ground robots have pushed the envelope of technological developments. These advances can automate crop monitoring and compute precision farm directives for every farm in the world every week, covering about 1.76 billion hectares, and show farmers when to plant, fertilize, and harvest, as well as what their crop needs to improve yields and reduce input costs. With this technology, farmers can increase yields as much as 35% while lowering costs up to 25% using precision fertilization.

The St. Louis region boasts more than 1,000 plant science Ph.D. researchers, extensive research infrastructure, and a booming agtech sector, and thus is widely recognized as an international epicenter of agriculture research. The Geospatial Institute will build on this strong foundation, expanding on existing partnerships with regional institutions including the Donald Danforth Plant Science Center and regional universities, to address key challenges in food and ecosystem security including crop adaptation to changing climates and enhanced ecosystem functioning of our agricultural systems. Geospatial science is a powerful tool that is required to leverage agriculture as a means to combat climate change, regenerate soils and water systems, and reduce human impacts on biodiversity, while simultaneously producing food.

HEALTH SYSTEMS

Human health is largely determined by where we were born and live. From the air we breathe to the water that we drink, these resources are the building blocks of our health. Geospatial health builds on these very complex, and now easy to measure, air quality and water access and cleanliness concepts, to enhance what we know about where we work, live, and play. Geospatial technology and science have grown our opportunities in measuring location and its influence each day as we travel through our communities. Data from smartphones and watches, activity trackers, social media, and satellite imagery can better inform the drivers of community health throughout the world. Some examples of how we continue to grow the knowledge and application of geospatial tools in health include developing and implementing multi-sensor infectious disease prediction modeling, perception health, and extended e-health tools such as telehealth and app and sensor-based tools.

"St. Louis region has substantial and highly specialized healthcare industry sector with significant activities and opportunities for innovation. Geospatial visualization and analysis is critical for improving healthcare delivery and health outcomes as demonstrated by use of spatial analysis in helping to guide health responses to COVID-19 pandemic, including identifying hotspots down to specific streets." – Geofuture Roadmap

Through advancements in technology, nontraditional public health and healthcare data from disparate sources can be combined to inform an early sensing system that would provide real-time COVID-19 risk assessments. The data sources include measures of community mobility such as app-based symptom tracking and contact tracing, anonymized smartphone data, geolocated

social media mentions, satellite imagery analyses to identify vehicle traffic patterns of health care locations, and geolocated search terms. Synchronizing these data sources and fusing them to develop real-time models provide insights into community-level COVID-19 risks. There is great value in having this type of real-time risk assessment that can be used to identify health-related risks including risks related to the global COVID-19 pandemic, and other, more local examples like food poisoning from a restaurant. This type of early sensing system can enhance health equity by providing continued real-time data and analytics to devise needed real-time interventions.

Geospatial health research informs opportunities for workforce training in disaster preparedness and linking a trained workforce to locations where there is a need for healthcare workers. The tools we are devising will assist in growing, training, and preparing a workforce prior to arrival in locations that are experiencing disasters and other needs. The COVID-19 pandemic highlighted the lack of infection control preparedness. These tools and skills are necessary to have comprehensive response plans for a diverse workforce. For example, advanced supply chain management techniques for diverse health-related needs can also being explored. In addition to training and linking the workforce to locations in need, we are conducting a vaccine optimization study that leverages community mobility as a predictive and prioritized variable in the way vaccination allocation decisions are made. These types of analyses can be applied to many other challenges as well.

NATIONAL SECURITY AND GEOINT

Geospatial technologies are the new macroscope to execute on NGA's vission of "Know the Earth…Show the Way…Understand the World".

In 2017, the U.S. Department of Defense (DoD) decided to locate the new $1.75 billion National Geospatial-Intelligence Agency West (NGA-W) facility in North Saint Louis. When NGA-W opens in 2025, it will directly employ thousands of highly skilled employees. More importantly, a "geospatial ecosystem" of new knowledge-intensive businesses is expected to grow and generate thousands of new high-skill jobs in the surrounding area.

As the home for NGA-W, St. Louis has a strong legacy in mapping, geospatial analysis, and research and development primarily related to national security and defense. With over 350 companies in St. Louis supporting the NGA's mission with technologies involving advanced computing and geospatial analytics, national security is an anchor for regional geospatial research, training, and innovation.

National security and GEOINT encompasses all aspects of a geospatial science core, adjacent fields, and application domains from food security, political unrest, public health, environmental hazards (droughts, earthquakes, wildfires), and climate change. It includes but is not limited to the analysis of literal imagery, geospatial data, and information derived from the processing, exploitation, literal, and non-literal analysis of spectral, spatial, and temporal fused products utilizing computer vision, AI/ML, cloud computing, cyber-physical systems/IoT, and autonomy, among other critical technologies. These types of data can be collected on stationary and moving targets by electro-optical, synthetic aperture radar (SAR), related sensor programs, social media, mobile devices, and non-technical means (including geospatial information acquired by

personnel in the field).

U.S. National Security research aims to maintain a leading edge over adversaries in digital revolution and cutting-edge technologies such as GPS, GPS alternatives, GeoAI, etc. The lack of talent with deep expertise trained through years of research in geospatial core has been recognized as a major national security threat as revealed in a recent article from NGA Director Vice Admiral Sharp[1]. Through the nexus of industry-university-government-community engagement around geospatial science and technology and research in food systems, health systems and application areas such as climate, water, and environment, the Geospatial Institute will make a significant impact on the national security complex through innovation and by creating tomorrow's highly skilled workforce required to keep America safe.

[1] https://www.c4isrnet.com/opinion/2021/08/01/geomatics-is-vital-to-us-national-security-our-advantage-is-at-risk/