LYRASIS Catalyst Fund - Open LiDAR Database for Accessibility Application

Applicant Organization: UVA Science & Engineering Library **Amount:** $38,446

Proposal Title: Open LiDAR for Accessibility Community & Schema Development

Project Goal: The University of Virginia's Science and Engineering Library, in partnership with the National Federation of the Blind, will use off-the-shelf open source tools and cloud hosting to improve 3d LIDAR data capture and communication to expand its potential within and beyond our library. Our team which has deep GIS, 3d scanning, and accessibility experience will bring stakeholders, scholars, advocates and archivists together to develop schemas and best practices for 3d scanning that will enhance the impact and use of the technology and specifically benefit the blind and vision impaired community.

Project Description, Challenge and Need

3d scanning has been available as a consumer technology for over two decades, however the field is still considered niche. There are few open standards for using 3d scanning in libraries and archives, let alone metrics for how it should be approached from the perspective of accessibility. Light Detection and Ranging (LiDAR) is a 3d scanning technology that allows users to calculate size, location, and distance. The applications for LiDAR data are diverse - ranging from making models for 3d printing to indoor wayfinding to creating and managing VR/AR content. For example, indoor wayfinding - how people navigate indoor spaces where GPS is unavailable - is also a product associated with LiDAR technology. The use and access to this technology is of special significance to the blind and vision impaired community, as it has a range of applications that can enhance quality of life.Is there a person standing six feet away and are they wearing a mask? It's a question already being answered by a LiDAR enhanced app. In 2020, the iPhone 12 Pro and iPad 12 were released as the first tools to bring LiDAR globally to consumer hands. With the entry being reduced to around $1,000-$1,300 per device we are asking LYRASIS to provide sufficient funding to bring 20+ experts and community members together to consider how these emerging data products relate to our collections and spaces. Working with our partners at the National Federation of the Blind and the Virginia Dept for the Blind and Vision Impaired we will work to ensure that blind and vision impaired people both produce and consume in this evolving ecosystem. Initiating this process with a broad team of experts will help create this needed documentation and provide guidelines to serve the diverse needs of the LYRASIS community as 3d scanning becomes a normalized part of modern data, like 2d images did with the first digital cameras 20+ years ago.

Before end products are created to improve accessibility there is foundational work to be done. In the academic market, we have recruited accessible design experts from the Taskar Center for Accessible Design and VCU's haptic feedback labs. In the for-profit sectors, we are coordinating with GoodMaps.com, which has a high-dollar proprietary LiDAR-based indoor wayfinding product specifically designed for the blind, as well as WearWorks, which creates digitally controlled touch-based communication systems also known as "haptic feedback" tools with the blind. We also acknowledge that some of our processes may require closed-source apps that enjoy an improved user interface within the iOS device. Because of these challenges, we believe this shortcoming is a reasonable accommodation and may be addressed in the metadata as well as in our documentation.

Project Plan

Our process has three primary components: assessment, development, and delivery. During assessment, we will be working to remove barriers between stakeholders and experts. Apps may be installed on devices to simplify workflows, slack channels, phone calls, emails, while user group meetings will take place to ensure there is a personal connection between our team members. Although COVID-19 protocols may interfere with in-person meetings, we have gathered regional experts, located most within an hour of each other, so that as restrictions are lifted, we will be able to collaborate in person. During the development stage we will begin capturing actual data from our participants and opening those data points for discussion by our experts. We have budgeted for shipping in this proposal because although we are checking out this equipment in six month segments we want to give participants the freedom to share more easily and affordably. Finally, in our delivery phase we will pull together our work and provide live proof-of-concepts for our data and plain language documentation that may be shared in the community. The primary components of our project plan include:

1. Assessment: Our initial team brings over a hundred years of combined experience in 3d scanning, GIS mapping, machine learning and accessible design together with blind and low vision ground truth stakeholders. Adding to

that we bring in several decades of library scholarship and web development so that FAIR principles and robust API standards will be baked in to our process. By providing every member of our team with the same type of scanning device we hope to lower the barriers and be able to focus on the content itself.

2. Development: Integration of 3d scanning data into existing standards and schema is an open discussion. By working in an off-the-shelf Drupal and some extension modules we will provide a process that should be approachable for all LYRASIS members who use Drupal as part of Islandora, Murkutu, DKAN or any other software that operates off of APIs such as OAI-PMH. UVA, the NFB, and Code for Cville all rely on Drupal for their primary web deliverables, and are thus reasonably qualified to support this project. By making primary stakeholders at the NFB members of the lead development team we aspire to bring the level of sustainability needed to meet or exceed ITAV expectations.

3. Delivery: At the end of our work we will present our results in an open to the public online meeting. Although we do not anticipate developing any code we intend to release a Drupal 8 configuration management file to be stored on github that other sites may use to start working with 3d scanned data in their archives. We will provide detailed documentation in the form of zoom recordings, a white paper, and potential documentation in Wikidata

Proposed 2021-2022 Timeline:

July-Oct - Onboarding into tools such as Slack & the initial Drupal site. Devices are prepared for use in the libraries and will be checked out to participants for six month periods. Apps are installed as needed, and meeting dates are scheduled. Online kickoff meeting on Zoom. Open to the public with brief introductions from each participant describing goals and interests. Facilitate study group formations - although we do not know the full scope of interest in LiDAR technology we have already identified 3 dominant themes: indoor wayfinding, object scanning, and machine learning. We will ask members to self-select at least one of these focus groups to participate with. Uploading of files with minimal OAI Dublin core fields available.

Nov-Feb - All participants are expected to have uploaded content into our test sandbox archive. At this stage of development we hope to begin addressing schema that may be useful for better describing the content. A summary document of the initial work will be provided in English and Spanish at a minimum, and requests for comment will be issued to the community. A plan for reusing equipment will be developed and applications for a second round of development will be accepted (extensions may be requested and accepted).

Mar-Jun - Schema proposals will be made public and placed into wikidata where possible. We will work with Lane Rasberry Wikimedian-in-residence at UVA to facilitate. If geospatial data has merge potential with Open Street Map or other central repository we will document that process. Deliverables will include 3-5 sessions publicly available on zoom and recorded for re-use, and a final white paper with best practices delivered to LYRASIS. Equipment working at the end of the trial is to be shipped forward to our second brigade as determined by the LYRASIS community.

Budget:

Line	Basis	Cost
Travel to the LYRASIS Member Summit	As provided by LYRASIS	$1,200
LiDAR Equipped iPhones & iPads x25	As provided by LYRASIS	$28,000
Shipping and handling budget	As provided by LYRASIS	$1,000
Fabrication budget	As provided by LYRASIS	$2,000
App purchases	As provided by LYRASIS	$2,500
Erich Purpur salary (required minimum 1% PI effort)	As provided by University of Virginia	$685
Erich Purpur fringe benefits at 38.1%	As provided by University of Virginia	$261

Total Budget Request	$38,446

Key Team Leaders & Initial participants:

Erich Purpur, MSLS: UVA Science and Engineering Library GIS & 3d scanning Advisor

Lou Ann Blake, JD: National Federation of the Blind Lead Researcher

Dr Jon Kropko: Code for Cville and UVa Data Science Professor

Initial Participants: Joe Orozco - blind web developer @NFB, Mausam Mehta - blind UVA Student, Catherine Bacik - O&M trainer at VDBVI, GoodMaps.com, Wear.Works, at VCU Dr Dianne Pawluk - engineer & accessibility designer, Dr Satinder Gill - engineer & accessibility designer, Joyce Oshita - Accessibility VMware, Maggie Cawley Executive Director Open street map, Lane Rasberry Wikimedia and wikidata specialist, Dr. Anat Caspi - Director of the Taskar Center for Accessible Technology, Nick Bolten - author of accessmap.io, Anson Parker - UVa Health Sciences Library, Arin Bennett - UVa Library 3d scanning VR consultant, Will Rourke - UVa multi-media consultant

Deliverables:

Open LIDAR Drupal + SOLR database archive in English and Spanish with OAI-PMH endpoints

3 open zoom meetings: initial meeting with stakeholders, 6 month, and 1 year review

100 LIDAR Scans: minimum of 5 scans uploaded per participant * 20 participants

1 interim review, 1 final review