



Museums for America

Sample Application MA-260411-OMS-26

Project Category: Lifelong Learning

SAMSAT: San Antonio Museum of Science and Technology

Amount awarded by IMLS:	\$241,276
Amount of cost share:	\$337,500

SAMSAT, the San Antonio Museum of Science and Technology, will expand and enhance student learning by creating an open-source platform for adding artificial intelligence (AI) experiences to existing exhibits. The project team of museum staff, professional volunteers, and external experts will develop the AI Museum Studio (AMS). During the two-year project, the team will build, prototype, test, and refine AMS, with deployment and field testing at SAMSET and The DoSeum, a San Antonio children's museum. The museum will AMS-enable 10 exhibits and document the platform through user guides and videos. The platform will be built with simple customization tools that remove the need for advanced software experience to support sharing the resources broadly with other museums. The museum will build a national outreach list to disseminate information about AMS, conduct online workshops and demonstrations, and present project results at a professional conference.

Attached are the following components excerpted from the original application.

- Narrative
- Schedule of Completion
- Digital Products Plan

When preparing an application for the next deadline, be sure to follow the instructions in the most recent Notice of Funding Opportunity for the grant program to which you are applying.

Museums For America Narrative

from SAMSAT, the San Antonio Museum of Science and Technology

The Nation's Technology History and Opportunity, Through Open Source AI

PROJECT JUSTIFICATION

From both a market review and our own experience, we believe two things about AI in museums: (1) There is no shortage of use case opportunity (Charr, MuseumNext, 2024; Deakin, MuseumNext, 2022; Ask Mona, 2025); (2) Primary challenges include budget, the technical capacity of the staff, and the veracity of output generated for clients (Heritage Research Hub, 2025). We propose to create AI Museum Studio (AMS), an open source platform that addresses these challenges, with the end goal of enabling use cases for ourselves and other museums. At SAMSAT, we will use AMS to open our Space and IT Museum, a celebration of our nation's technology history based on 10,000+ artifacts in our collection, and a bridge to education and career opportunities in local and priority industry clusters. For other museums, AMS will create access for those without software development expertise, and the underlying code will be open source, establishing a platform for ongoing innovation. SAMSAT has the needed combination of museum operations experience, software development and technical expertise, connection to K-12 schools, and connection to workforce organizations. We will build AMS to serve visitor needs, leverage ongoing AI innovation, and build AI and other expertise that builds the nation's technology workforce.

Briefly about us. SAMSAT is a museum and science center. We are located on the campus of Port San Antonio, the former Kelly AFB campus, closed in 2001. Port San Antonio is likewise the name of the organization that has redeveloped the campus, replacing 10,000 lost jobs with 19,000 jobs and a \$20 billion economic impact (Texas Comptroller of Public Accounts, 2025). The Port campus boasts numerous high-tech employers including Boeing (a long-time SAMSAT sponsor), Lockheed Martin, Booz Allen Hamilton, and StandardAero. Sixteenth Air Force, global HQ for AF cyber operations (AFCYBER), is directly adjacent with an annex on the Port campus.

We operate SAMSAT AREA 21[®] at the Boeing Center at Tech Port ("Tech Port"—an alternate name for Port San Antonio). The location highlights local industry including cyber, robotics, aerospace, advanced manufacturing, and biomedical technology. AREA 21 hosts our 21DISCOVERY™ field trips that served 26,800 K-12 students in 2025. Our field trips align to education pathways and local priority technology industries, noting an average \$44,000 uplift in salary for a San Antonio STEM professional versus an average wage. SAMSAT hosted 89 high school and college interns in 2025, including 25 performing exhibit development.

We operate programs for the Defense STEM Education Consortium (part of DoD STEM), NSF (Intern R&D at the Science Center), and the City of San Antonio. Among our staff of thirteen are a 15-year former software developer and executive, a Microsoft-certified IT professional, and an events AV professional. We sit at the intersection of museums, technology, development, K-12 education, and workforce. We understand museums, and in building our new Space and IT Museum, we will push the boundaries of AI in museums, aligned to culture and education, and also to workforce and economic impact.

The DoSeum, a nationally recognized San Antonio children's museum, is a development partner in our proposal. The DoSeum served 460,000 students in 2025. Their participation brings a second perspective, a second set of use cases, an audience that precedes ours in the future workforce pipeline, and greater perspective on the features needed in an open source platform.

Targeted program goal and objective. We target MFA Program Goal 1, Lifelong Learning, and Objective 1.1, supporting public programs. AMS will enhance exhibits for both visitor and school field

trip experiences, noting that we will put a particular focus on schools/students and families. AI Museum Studio will help us repeatedly create rich experiences for our target audiences. While this is our primary objective, we note clear impact on Objective 1.2, support exhibitions and interpretations, and in light of our partnership for this program with a second area museum, we overlap with Objective 2.2, community-centered partnerships.

Advancing our strategic plan. Summarized, SAMSAT's Strategic Plan is: (1) 2027: Open the Space and IT Museum; (2) 2029: Using expanded capacity, double the number of students served from 25,000 per year to 50,000 per year, and other museum visitors to 30,000/year; (3) 2029: Double students in extended programs to 1,500 per year; (4) pursuit of AAM accreditation.

Most fundamentally, we use cultural and education methods to make a practical impact on community needs, as described in the Strategic Plan summary. AI embodies large opportunity. We will bring our combination of museum knowledge and technical expertise to bear, becoming experts at deploying AI for our strategic and tactical goals, which in turn will drive growth. Working with a partner, and the open source strategy in this proposal, will ground us in broader experience and provide benefit over the long term.

The challenges we address, and how they were identified. Since February of 2025, SAMSAT has operated at or near capacity in our education programs, with field trips almost every school day outside school testing periods. During peak times, we turn away schools. We have 10,000+ artifacts available for curation, and nine years' experience in how to use these artifacts as a platform for student learning. As part of our partnership at Port San Antonio, we have an extended lease of a 27,000 sq. ft. former fitness facility now named the David Monroe Education Center. We are transforming this space into the Space and IT Museum. The primary barrier to growth of our museum education programs is curated space for field trips and other programs. The barriers to standing up this space are funding and staff to develop.

These challenges are a reflection of our clients' priorities, especially the schools we serve. Our scale of delivery, based on demand, indicates the extent teachers and schools seek inspirational, hands-on experiences for students. When we synthesize the multiple input channels that inform our services for schools, we hear their constant request, which is to show students real-world examples, and to give students hands-on STEM experiences. These activities in turn address community needs seen in our Strategic Plan: science and technology history awareness and pride; students and families seeing themselves in the work; and seeing and pursuing the education and career opportunities that benefit students, families, and our city and country.

Primary audience and involvement. Our project's primary audience is the schools and students we serve through field trips. Our *SAMSAT Educator Fellows* inform our services for schools. This group of twelve educators from across our region, and across the grade levels we serve, provide regular input to SAMSAT on curriculum and programs. In 2025, we served 26,800 students and 838 teachers through SAMSAT programs, across 33 ISDs and other school systems. Each student, teacher and school will benefit from the AI-enabled features in our space.

SAMSAT also collects feedback from all educators, students, families and others served in our programs. All are asked to complete an evaluation form, and feedback is reviewed weekly by education staff. The evaluation form is online at www.samsat.org/eval.

One specific effort will be providing students and families specific, detailed information on the education and career pathways accessible in their schools and ISDs, from coursework, the extracurriculars, to financial and wraparound supports. Based on preliminary tests, we believe AI capabilities can transform

generic pathway advice into specific pathway recommendations that are more real and actionable for students and families.

We also involve the community in development. Our immediate community is steeped in the culture built around Kelly AFB over the 85 years of the base's service. As an example of impact, our community advisors led us to highlight Kelly AFB's history in the lobby of the new Space and IT Museum. Many area residents worked on base. As visitors enter the building and lobby, Kelly's history will welcome local visitors with a culture they know, before introducing new knowledge about the nation's technology history.

Ultimate beneficiaries. In our community, those benefiting long-term are the students, families and communities we serve. Families who become aware of our nation's history, the story of Kelly AFB, and the rewards of STEM education and careers, are more likely to support STEM education and pathways for their children, and/or to become part of the Port San Antonio ecosystem themselves. Individual students benefit through the social-emotional rewards of STEM, 4C skills (communication, collaboration, critical thinking, creativity), and the \$880,000 lifetime earnings uplift over a 20-year career (\$44,000 yearly) above a San Antonio average wage (U.S. Bureau of Labor Statistics). For every 1,000 students we inspire into a STEM career, our community will see an \$880 million economic impact, and across ten years, we contribute to an \$8 billion impact to our community.

Benefits also accrue to our partner, The DoSeum, and to other museums and their clients. AMS will reduce staff expertise, reduce development costs, and provide options for hardware and software that museums fit to their needs. What we learn in adapting AI to cultural organizations will be documented, shared, and embodied in AMS. Beyond SAMSAT and San Antonio, there is potential for benefit, custom to each community.

PROJECT WORK PLAN

Before providing plan details, we share a straightforward description of "What is AI Museum Studio?" as important context for the work plan, and for the overall proposal. We also provide an example of how AMS can be used to create an AI experience for students/visitors ("users").

AI Museum Studio adapts one's chosen LLM to a human-centered and governed experience.

1. **An open source platform for wrapping an AI-driven museum experience** around an exhibit, activity, or any other presence in a museum, cultural, or educational space.
2. **The development front-end interface is a web site** we will build.
3. **The "developer"** (coding skills not needed):
 - a. Defines in plain language a title and topic description.
 - b. Optionally, provides specific allowed AI prompts to be made available.
 - c. Provides context/guardrails for responses.
 - d. Selects either a cloud-based LLM service, or a locally deployed LLM.
 - e. Makes other choices that define the look-and-feel of the user interface.
4. **If using a cloud based service, a URL on our web site provides the experience!**
5. **If using a local LLM, or if a non-cloud experience is needed for other reasons**, the developer downloads, from the open source location, local server code, and downloads an open-format spreadsheet from our web site with the information they provided above. Documentation is provided for local setup and configuration (IT skills required).
6. **After usage, access customer insights** captured by AMS.

Example: Imagine that SAMSAT wishes to build a career pathway experience around a "history of space missions" exhibit featuring NASA space robotic mission narratives and artifacts.

1. Access the web site, log in, start a new project titled "San Antonio: Space Career Pathways".

2. Use the builder UI to enter prompts that will be made available to students.
3. Use the builder UI to define add context and guardrails to be fed to the LLM. Context example: “Southwest Research Institute (SwRI) is in San Antonio, and conducts space missions. Include SwRI in career pathways.”
4. Save the project, and then access the user experience, which for example might be at URL www.samsat.org/ams/sa-space.
5. Optionally, download the generated spreadsheet, configure a local LLM and AMS server, and run the experience fully local.

The project will be executed via agile development. Multiple iterative steps involving all stakeholders will move the project from conception to conclusion, building the experience above.

Work Plan and Sequence

SEPTEMBER 2026: Kick-off, Planning, Preparation

- Kick-off meeting: Museum staff, education staff, developers, partner, professional volunteers.
- Develop AMS formal (if high-level) user requirements: Open source, configurable LLM, potential Retrieval-Augmented Generation (RAG) usage, UI for definition of prompts, and RAG/prompt contextualization. Types of prompts expected in final version. Logging for guardrail analysis, customer usage and feedback, customer insights. Design of specific user feedback mechanisms. NOTE: Retrieval-Augmented Generation is a technology that can add a large base of custom knowledge as an “appendix” to LLMs, deeply integrating that local knowledge. Use of RAG will be a key investigation in AMS development, and its value compared to simpler contextualizing and guardrail prompts.
- Identify first hardware configurations: local LLM requirements, and/or cloud LLM targets, visitor interface device, etc.
- Identify museum spaces/topics for first application.
- Preparation of museum spaces to support hardware (power, kiosks, etc.).
- Start GitHub open source project.

OCTOBER 2026 TO DECEMBER 2026: Development Phase I

- Research: Deployment of test local LLM.
- Research: Prompt testing, RAG context testing, testing across all partner topics, with student and teacher test groups, museum visitor groups.
- Research: Specific focus on detailed education pathways tied to topics.
- UI first phase of iterative development.
- User testing of assembled product: different LLMs, test prompts, test RAG contexts.
- Multiple iterations as needed, and process review. Monthly partner/professional volunteer meetings.

JANUARY TO APRIL 2027: Front of House Testing, Four Exhibits

- One front-of-house deployment at SAMSAT.
- One front-of-house deployment at partner location.
- Monthly partner and professional volunteer meetings to review. Docent-supervised usage to start.
- Weekly review meetings of logs, staff and docent insights. Review of general evals watching for positive/negative impact at AI-enabled locations.
- Rapid fixes and deployments; process review. (Save major updates for next phase.)

MAY – JUNE 2027: Major AMS and museum space updates (follows prior process)

- All based on field testing results.

JULY – AUGUST 2027: Front-of-House Expansion, Add Five Exhibits

- Two additional front-of-house deployments at SAMSAT.
- One additional front-of-house deployment at partner location.
- Repeat prior front-of-house process.

YEAR TWO: SEPTEMBER 2027: Major Review and Planning

- All-Stakeholder review of project, successes, challenges, enhancements needed.
- Selection of five Year 2 exhibits for AMS-enabled enhancement.
- Definition of tools needed to support open source usage and dissemination.
- Identify a (non-academic) publication target, begin development.

OCTOBER 2027 TO MARCH 2028: Scale Internally, Prepare to Disseminate

- Implement AMS in five new exhibits total, SAMSAT and partners, per process above.
- Build documentation, videos—technical, operational, executive—to support dissemination.
- Build and launch new AI class, based on AMS, as part of SAMSAT’s 21DISCOVERY field trip for K-12 students. Integrate into 21DISCOVERY class catalog.
- For SAMSAT’s ongoing high school intern program, use AMS in selected internships.

APRIL TO AUGUST 2028

- Build national outreach list, contact directly to inform and invite interest.
- Conduct online information workshops, demonstrations.
- Propose and present at a national conference on AMS and overall SAMSAT program.
- Prepare final report.

Risks and Mitigation *scale 1-5, 5 is highest*

<i>Risk</i>	<i>Likely?</i>	<i>Impact</i>	<i>Mitigation</i>
Accuracy of LLM models The models are not consistent and accurate enough to be used in museums.	2	4	• Restrict to specific prompts. • Some exhibits may not be amenable. Try test prompts early. • Test different models, check results. • Research use of RAG for improved context/guardrails.
Context/guardrail ability failures	2	4	• Early tests of whether prompts and/or RAG can limit outputs. • See first risk.
Lack of general interest beyond partners	3	3	• Involve partner from the start. • Monitor market and research for findings/practices.
AI development outpaces project	3	3	A real but somewhat unpredictable risk. Regardless, a human wrapper of some type—technical, operational, governance—will always be needed. Start now!

Personnel to Plan, Implement, Manage

Project Director: Cliff Zintgraff, Ph.D. CEO, SAMSAT. B.S. Computer Science; M.S. Science & Technology Commercialization; Ph.D., Learning Technologies. Fifteen years as a software developer, manager, architect, executive. Six years as SAMSAT's Chief Learning Officer. PI for NSF Intern R&D at the Science Center (college interns developing exhibits). Extensive product development and commercialization experience, and extensive management experience. Lead Editor of *STEM in the Technopolis: The Power of STEM Education in Regional Technology Policy*, advancing the strategy of "using the priorities of cities to create great learning experiences for K-12 students." Lead for all content and education program development in SAMSAT AREA 21[®]. Founder of the SA Smart Mayor's Challenge, now in Year 9, 2,350 K-12 students served. 195,000 students served during his time at SAMSAT. In the community, Board Chair of Workforce Bridge San Antonio; Co-Lead of the Alamo STEM Ecosystem; Civilian Leadership Program ("Honorary Commander"), 688th Cyberspace Wing, Sixteenth Air Force.

Project Manager: Michael Thoennes. Former Director of the TEK Center, Lake Oswego, Oregon. Prior Director of STEM Education at SAMSAT, building numerous education programs. Project Manager for SAMSAT Educator Fellows Program. Project Manager for NSF Intern R&D at the Science Center, overseeing development of five museum exhibits. Seventeen years of technology experience. Heavy self-taught user of ChatGPT, Ollama, and Qwen3-TTS.

Josh Martinez, Director of STEM Education. Leads all SAMSAT education programs. Founder of SAMSAT R20 Premier Esports, in Year 5, serving 300 students monthly at the Boeing Center at Tech Port. Fellow of the Network of Academic and Scholastic Esports Federations (NASEF). Certified information technology professional with twelve years of industry experience.

Giselle De Leon, Senior STEM Educator. Content and training lead for all SAMSAT STEM Educators. Project lead (four years) of the SA Smart Mayor's Challenge. As a local resident, she serves as a liaison to our immediate community. Science Communication Fellow aboard EV Nautilus (robotic sea exploration), August 2025.

Tomie Escobar, Chief of Staff, Senior Program Manager. Seven years at SAMSAT. Administrative manager for SAMSAT education projects with NSF, DoD STEM, City of San Antonio, many others.

Sandra Shreve, Chief Administrative Officer. Six years at SAMSAT. Lead of overall administration, financial management. Authorized Organizational Representative.

Time, Financial, Personnel and Other Resources.

Building on the schedule above, we believe the following project strategies, time, and activities are key: (1) Using an agile approach to development, in light of the rapid emergence and ongoing development of AI; (2) Sufficient time for AI tool research, prototyping, experimentation with different exhibits and topics, and multiple perspectives on creation of a generally useful tool; (3) Time invested in tools to enable local scaling and external promotion and use. Time estimates are: (1) AI/prompt research and RAG research over iterative cycles: 6 person-months; (2) Prototyping, agile development, 12 person-months; (3) exhibit selection/preparation, 6 person-months; (4) Scaling/dissemination activities, 8 person-months. Resources required include two LLM-capable servers, eight iPads, and two touchscreen TVs.

Building on the personnel listed above, SAMSAT has robust experience conceiving, designing, and managing experiences at the intersection of science, technology, education, community, and culture. We will bring our staff to bear as listed above. We will tap partners with AI development experience for the expertise needed in AMS development. We note that several experiments have already been run, especially around the use of AI to deliver specific, detailed pathway information to students based on their attended school.

Tracking Progress Toward Results

The schedule above establishes a baseline for tracking. We will track results against schedule, and against the number of AMS-enabled exhibits planned. SAMSAT has a standard template for managing the three elements of any project—schedule, budget, and performance—with activity reviewed weekly. Once deployed front-of-house, staff/docent and evaluation form data will inform whether AMS features are meeting larger goals, and the ability of operational staff to successfully manage and use the features put on the museum floor.

PROJECT RESULTS

The table below describes intended results, how they tie to the challenge identified, changes in knowledge, skills, behaviors and attitudes, and how products are made accessible. For each item, we describe both local impact, and impact through the open source AMS project.

<i>What is addressed?</i>	<i>Local impact</i>	<i>AMS open source impact</i>
Intended results/challenge	More opportunities for students to receive STEM inspiration and hands-on experiences, including in AI; greater access for teachers and schools; more access and relevance for museum visitors. More awareness of nation's technology accomplishments.	A tool for museums with limits on budget and technical capacity to bring AI to bear on their specific challenges and potential use cases. A tool for developers to more quickly build local or more complex AI-enabled experiences.
Primary audience change	More students will become aware of the history and potential of STEM fields, in general and for them personally. Students and families will see pathway opportunity and how to pursue.	A systemic uplift on the benefits provided by museums: historical awareness, connection to culture, education and career opportunities, and general pride in the nation's accomplishments.
Resulting products	Ten exhibits will be enhanced by interactive, dynamic AI interaction. These exhibits are, by definition, available to the public.	AMS, AI Museum Studio, will be available to museums nationwide.

Underlying the local impact comments above, and as noted in our strategic plan, we target doubling the number of students served in SAMSAT programs by 2029. Capacity benefits like those provided by AMS are key to reaching this goal.

Sustaining Benefits

The project is designed to be self-sustaining. For local impact, an AI-enabled exhibit that improves student and visitor experience and reduces docent staffing requirements will provide significant operational benefit. Those benefits are consistent with the challenges described in the market research cited for this proposal. The AMS open source platform, if found valuable by museums, will likewise build a community that makes the platform self-sustaining for benefit of all involved.

Schedule of Completion

Program Year 1

[illegible]

Program Year 2

[illegible]

Digital Products Plan

Type

SAMSAT will create AI Museum Studio (AMS), a modular, open-source framework for adding AI interpretation to museum exhibits through kiosk interfaces.

Digital products created through the project will include:

1. The AMS source code
2. 10 deployment packages and configuration files
3. Installation and troubleshooting documentation
4. Training and presentation resources

SAMSAT will favor open-source software and open or openly documented, widely adopted file formats to support reuse, interoperability, and long-term access.

Primary technologies are expected to include:

1. Python for application and retrieval logic
2. HTML, CSS, and JavaScript for the kiosk interface
3. JSON, CSV, and spreadsheet-compatible tabular formats for structured content and configuration
4. Markdown and PDF for documentation
5. GitHub for versioned public release and technical documentation
6. Ollama as the local model runtime and API layer, hosting the LLM locally and providing the interface for inference requests
7. Compatible model families such as Qwen, Gemma, and Llama

These tools were selected because they support low-cost deployment, local control where needed, broad portability, and reuse by other museums.

Descriptive information for released files will include:

1. Title
2. Creator
3. Date
4. Version
5. File format
6. Software dependencies
7. License.

Availability

SAMSAT will make the core digital products created with IMLS support available to the public at no cost. The AMS source code, documentation, implementation guides, and sample

configuration templates will be released through a public GitHub repository with versioned releases and maintained through SAMSAT's repository management and backup practices.

AMS will be deployed on-site through kiosk interfaces connected either to a local workstation running an open-source model runtime such as Ollama, or, where appropriate, to a cloud-based model. Materials that cannot be shared openly, such as API credentials, security keys, and third-party or partner-owned content not cleared for redistribution, will be withheld from public release. Where needed, SAMSAT will provide templates, sample files, or explanatory documentation so that other institutions can still replicate the framework.

Access

The AMS source code will be released under an open-source license, such as Apache 2.0. Project-created documentation, training materials, and implementation guides will be shared under a Creative Commons Attribution 4.0 (CC BY 4.0) license. Work products resulting from IMLS funding will be distributed free of charge.

The project is not expected to require public release of personally identifiable user data. Any usage or evaluation data collected to improve the system will be limited and managed in aggregated or de-identified form where appropriate. If any project materials raise privacy, rights, or cultural sensitivity concerns, SAMSAT and its partners will review those materials and withhold restricted content from public release as needed.

Sustainability

SAMSAT will preserve and maintain project digital products through version control, routine backup, managed storage, and technical documentation. During the award period, source code and documentation will be maintained in a managed repository with release notes and version tracking. Working files will be stored on organizational systems with routine backup procedures.

After the grant period, SAMSAT will preserve the most significant digital products as long-lived assets, including source code, tagged software releases, technical documentation, installation guides, sample configuration files, and final public project materials. SAMSAT will keep these materials publicly available for at least five years after the end of the award period. Long-term sustainability will be supported by maintaining the GitHub repository, retaining backup copies of release files and documentation on SAMSAT-managed corporate storage, using widely adopted file formats, and providing documentation sufficient for another museum or technical contractor to reinstall and adapt the system.