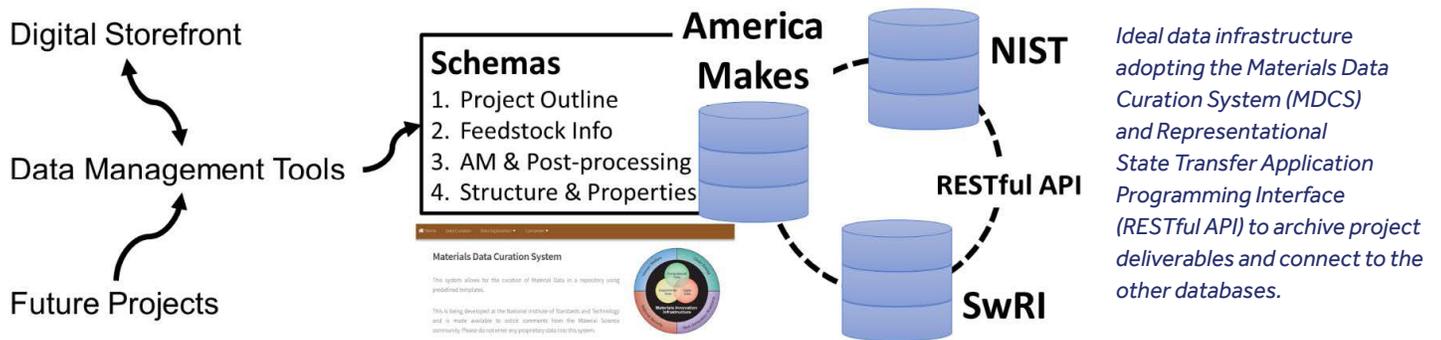


Development of a Pedigree Informatic System for America Makes Materials

Development of a human-readable, searchable, and extendable XML-based database to systematically archive various types of data from America Makes projects.



PROBLEM

America Makes project deliverables contain high volumes of complicated data making data management tools more critical. To this end, an interoperable information system is crucial. A well-designed database and visualization software are the key tools of an information system to understand the present knowledge and point out the gaps. An ideal database contains schemas to label data with detailed descriptions (metadata) which specify the differences among the datasets for subsequent visualization and analyses. Since additive manufacturing (AM) is a developing technology, an extensible database is preferred for maturing the technology. The needs of schemas and a database for AM development correspond to one of the strategic goals of the Material Genome Initiative (MGI).

OBJECTIVE

The objective of this project is to develop a human-readable, searchable, and extendable XML-based database to systematically archive various types of data from America Makes projects. The project seeks to enable the America Makes membership and government stakeholders to cross search the project deliverables for evaluating project performance and identifying technology gaps. This data infrastructure could also be integrated with the America Makes Digital Store Front using API functions for general America Makes members.



**AMERICA MAKES
TECHNOLOGY
DEVELOPMENT
ROADMAP**

This project aligns to:



**ASTM
PROCESS CATEGORY**
Material Jetting, Binder Jetting,
Material Extrusion, Powder Bed Fusion,
Directed Energy Deposition

**EQUIPMENT &
MATERIAL
Multiple**

TECHNICAL APPROACH

The project approach leverages the data management tools developed by Southwest Research Institute (SwRI) and the open source data infrastructure from NIST to improve the searchability and interoperability of the America Makes Digital Storefront. A preliminary data management tool is being developed to automatically parse different types of raw data to XML format. A pedigree chart of XML schemas is being created to cure the project data and organize the deliverables into a hierarchical structure of materials, processing strategies, structures, and property measurements. The schemas are being developed based on the success of the NIST AM-Bench program. (AM-Bench provides a continuing series of controlled benchmark measurements, in conjunction with a conference series, enabling modelers to test their simulations against rigorous, highly controlled AM benchmark test data.) During the project period, the sample XML files are being archived in a MDCS instance inside the SwRI firewall for additional cyber protection. Through the built-in functions and the RESTful API, MDCS enables the interconnection of instances for data federation among the allied institutes. This framework provides a consistent mechanism to cure and share data and requires low maintenance for future projects.

PROJECT START DATE

April 2021

EXPECTED END DATE

July 2021

EXPECTED DELIVERABLES

- XML schemas
- Automated data parsing and entry software
- Visualization software
- Final project report and suggestions for future developments of data infrastructure

FUNDING

\$50K total project budget

PROJECT PARTICIPANTS

Project Principal:

Southwest Research Institute

Public Participants:

U.S. Department of Defense