ADAPT: Collaborative data curation (Quality Made, Hylos)

Who we are: ADAPT is a Mines-based industry-academia consortium that advances data informatics for Additive Manufacturing (AM). Faculty from several departments at Mines including Computer Science are affiliated with the consortium. Field-Session projects have the potential to lead to research opportunities for CS undergraduates.

Project Background: The ADAPT is part of an active project funded by the Office of Naval Research: Quality Made. Quality Made (QM) has been charged with delivering a 6-axis, laser hot-wire robotic welding system for 3D printing large-scale parts. In addition to data generated at Mines, collaborators from Carnegie Mellon University, Iowa State University, Oak Ridge National Laboratory, GKN Aerospace, Wolf Robotics, and Lockheed Martin Corporation all provide information critical to developing reduced-order models that predict build-quality from processing parameters, in situ process monitoring data, and physics models. These reduced-order models require input from these other collaborators. At present, this information is collected through adapt.citrination.com, a commercial, cloud-based materials informatics platform. This solution will not be viable when QM moves into Phase II in 12 months, and another data curation system will be needed to collect data from our collaborators.

Task: This solution should include user authentication, a concise web interface, and a data storage backend for managing and organizing contributed data. An existing platform, hylos, was designed to handle this type of data collection and curation, but will require further development before widespread deployment. *hylos* currently provides a web UI (written in clojure and NodeJS) and a backend data management system (written in Flask/SQLAlchemy). Both are deployed in Docker. The successful project will build off this existing platform to enable stateless user-based authentication (SSO) for remote access, an administrative dashboard that includes the following capabilities:

- (required) Project, sample, and method creation. (These terms will be introduced and defined by the client.)
- (required) User management: Creation, Retrieval, Update, Delete.
- (recommended) Deployment of *hylos* on AWS with the frontend and backend on separate instances.
- (recommended) Search/indexing improvements to the UI/UX.
- (optional) Development of programmatic (API) read and read/write access.
- (optional) Abstraction of data storage to allow for further fragmentation/federation of data storage.

Team Size: 3-4 students.
Location: right here on campus.
Clients: Profs Kappes (Mech Eng) and Dinesh Mehta (Computer Science).