

SiLA & AnIML: Enabling Integration in the Lab of the Future

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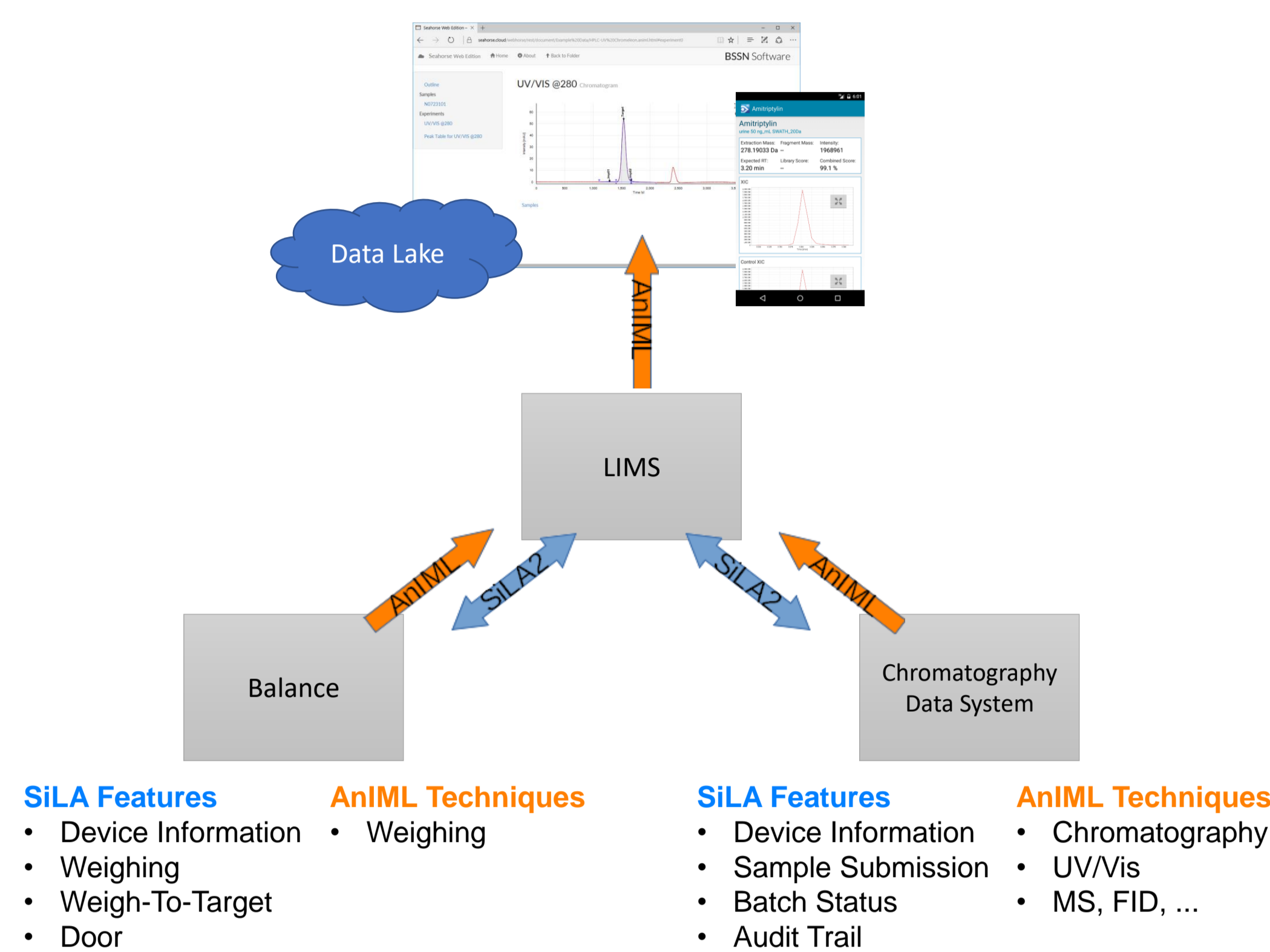
Abstract

Connectivity and seamless interoperability are among the goals for many lab-of-the-future projects. **Standard protocols and data formats** serve as infrastructure enablers for integration of instruments, systems, and seamless data flow.

We review the progress of the **AnIML** and **SiLA** standardization initiatives, which can provide key building blocks to establish interoperability.

While AnIML specifies an **XML-based standard data format** for analytical data, SiLA provides webservice-based communication standards for interfacing with instruments. Clients can use SiLA to **discover and interact with services in the lab**. These services may be instruments or other systems. All services communicate using an open protocol, built on cutting-edge web technologies. AnIML provides the data format to plan and document lab experiments. By joining forces, a new ecosystem is emerging that allows end-to-end integration of instrument control, data capture, and enterprise system (ELN, LIMS) connectivity.

SiLA & AnIML Successful collaboration of two standards organizations



Future Integration Paradigm

1. LIMS performs SiLA 2 Discovery
2. Instruments and services respond and are inventoried
3. Instruments and Services describe their capabilities
4. LIMS learns
 1. how to communicate
 2. data structures
5. LIMS performs instrument control, sample submission
6. Services return complete and traceable AnIML data package describing what they did
7. LIMS and other tools publish a holistic picture of the outcome to a global data lake

Use Cases

- LIMS/ELN instrument integration
- Long-term data retention
- Collaboration with CROs and contract labs
- High-throughput platform integration
- Sharing of companion data with scientific publications

SiLA = Communication

SiLA 2 Basics

- **Communication framework** for a service-based integration architecture
- Based on cutting edge technologies, e.g. HTTP/2 and gRPC
- Commands with parameters and return types
- Event mechanism and observable properties
- **Discoverability** for services
- Learning from SiLA 1 successes for big systems

SiLA 2 Standardizing Command Sets

- **Feature** definitions describe how to use SiLA for a given set of instrument capabilities
- Features contain a set of related commands
- Clients can discover features offered by a SiLA device or service
- Features are extensible to cover vendor-specific functionality
- **Feature definition language** describes command semantics, parameters and results, linking to **AnIML technique definitions**

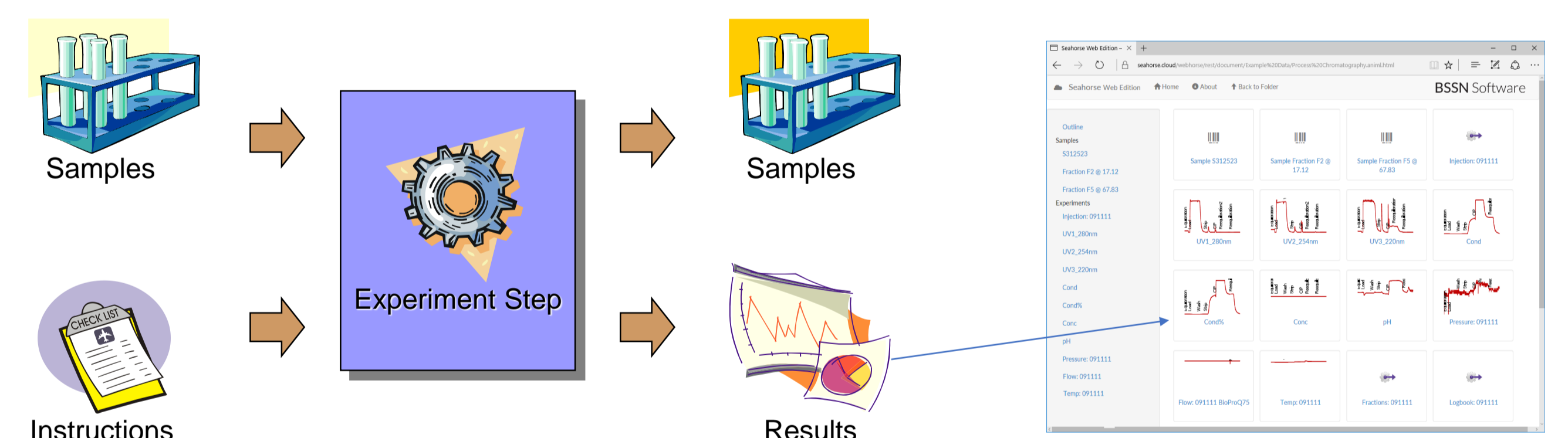
SiLA 2 Open Source Libraries

- Free libraries available in several languages (C#, C++, Java, Python)
- Multiple active open source projects

AnIML = Data

AnIML Basics

- Analytical Information Markup Language (AnIML)
- Open ASTM **XML data format** for analytical data, developed by a consortium of industry, academia, vendors, and government bodies
- Ability to capture data from **multiple analytical techniques**, possibly combined
- Capturing of sample and process data
- Audit trails, **digital signatures**, and validation for regulatory compliance



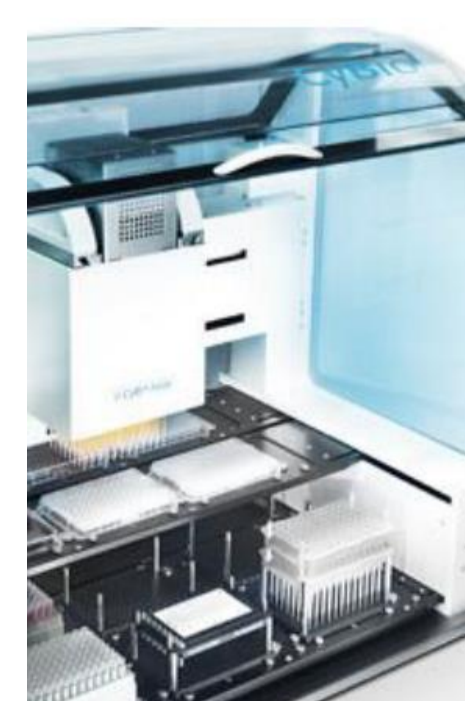
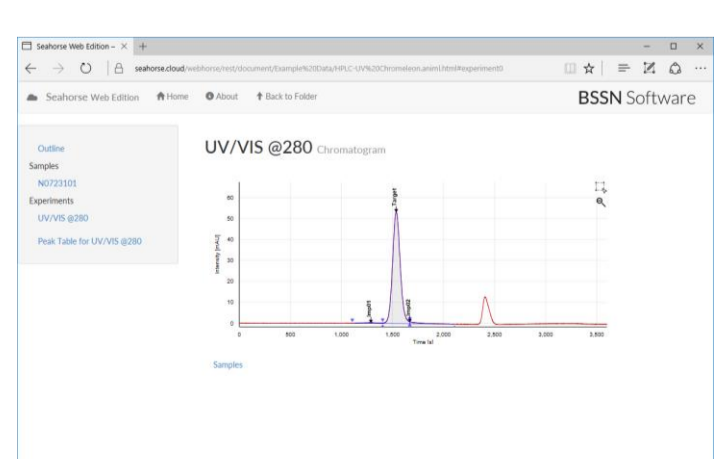
AnIML Standardizing Data Structures

- **Technique definitions** define how to use AnIML core for a given experiment type
- Definitions are **XML-based**, software can discover new techniques

Easy implementation led to rapid industry adoption

Adoption dashboard

- SiLA 1 drivers for approx. 200 instrument models
- AnIML converters for approx. 150 instrument models
- Large production systems leveraging SiLA and/or AnIML



Vendor support

- Major LIMS, ELN, CDS and instrument vendors have adopted AnIML
- 50,000+ AnIML users worldwide, large deployments of SiLA in Europe

Communication and Data Power the Lab of the Future

Communication and data need each other!

- A **communication protocol** alone leaves us with proprietary data structures. Data ends up in silos.
- A **file format** alone is not suitable for systems where components need to communicate. Copying files is not communication.

Summary

- **We're in it for the data.** That's why we're in the lab.
- The Lab of the Future is digital and based on **open connectivity**.
- AnIML and SiLA can accelerate integration and collaboration.
- **Easy to adopt**, no royalties or license cost
- Join us! Pick up a leaflet and email us at info@silastandard.org

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