

# Data Models and Domains

**Allotrope Foundation** is a consortium of chemical & life sciences companies formed in 2013 to revolutionize the way we acquire, share and gain insights from scientific data through the application of community-derived data standards consistently delivered via an extensible technology framework.

Allotrope Foundation manages and enables a community-led effort to:

1. Standardize vocabularies commonly used in scientific data and experiments
2. Structure vocabularies into taxonomies and ontologies (Allotrope Foundation Ontologies – AFO) to add more context
3. Standardize schema (Allotrope Data Models – ADMs) using AFO terms to create unified descriptions of scientific domains (experiments, techniques, instruments, results, etc)
4. ADMs can be represented as:
  - Allotrope Simple Model (ASM) - standardized JSON files for text based tabular data
  - Allotrope Data Format (ADF) - standardize RDF graphs in an HDF5 container for semantically richer data



## VOCABULARY

Collection of terms with agreed upon definitions used to describe things



## TAXONOMY

Hierarchical classification of the vocabulary terms



## ONTOLOGY

Formal categories, properties, and relationships across taxonomy terms

## The Allotrope Framework

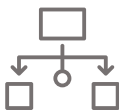
The Allotrope Framework provides a complete toolkit for data standardization to meet a wide range of use cases ranging from consistent data labeling to advanced semantic exploration & data science.

### Define



Vocabulary

### Classify

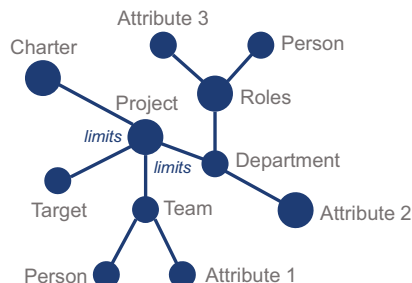


Taxonomy

### Relate



Ontology



CSV



ZIP



JSON



HDF5



RDF



XML

## CONTEXT

Terminology defined & desired relationships established in well-structured ontologies.

## STRUCTURE

Use of ontologies to define data models that are blueprints to consistently describe things.

## FORMAT

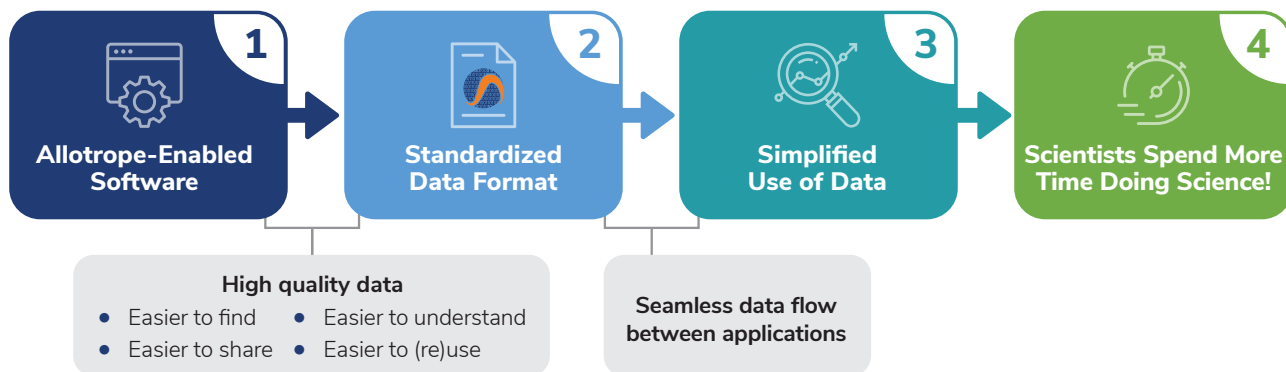
Use data models to create final representation of data used in software applications.

## Domain Coverage

The Allotrope Foundation community has released approximately **65 interoperable data models** (as of April 2026) – **and growing**.

- Automated Reactors – PAT
- Balance
- Binding Affinity Analyzer, SPR (Surface plasmon resonance) Detection
- Blood Gas Analyzer (BGA)
- Bulk Density
- Cell Counting
- Cell Culture Analyzer (Metabolite Analyzer)
- Chromatography Column
- Code Reader
- Conductivity
- Differential Scanning Calorimetry (DSC)
- Digital Analytical Method
- Disintegration
- dPCR (Digital PCR)
- Dynamic Vapor Sorption Analyzer (DVS)
- Electronic Lab Notebook (ELN)
- Electronic Spectrophotometry (Kinetic)
- Electronic Spectrophotometry (Point)
- Electronic Spectrophotometry (Spectral)
- Electrophoresis
- Flow Cytometry
- Foam Height
- Foam Qualification
- FPLC
- FTIR
- Gas Chromatography
- GC-MS
- Gloss
- Hot Tack
- Light Obscuration (Liquid Particle Counter/Solution Analyzer Detector)
- Liquid Chromatography
- Loss on Drying
- Mass Spectrometry – generic (including MALDI-TOF, Direct Injection etc.)
- Multi Analyte Profiling
- Nephelometry
- Nuclear Magnetic Resonance (NMR) – Solution
- Optical Microscopy
- Osmolality
- Oven/Coulometric Karl Fischer (KF)
- Particle Size Distribution (PSD)
- pH
- pH Sensor
- Plate Reader (Area Scan)
- Plate Reader (Kinetic)
- Plate Reader (Point)
- Plate Reader (Spectral)
- Pressure Monitoring
- Pumping
- qNMR
- qPCR
- Raman
- Rheology
- Scanning Electron Microscope (SEM)
- Solution Analyzer
- Specific Rotation
- Stirring
- Surface Area Analysis
- Tablet Hardness (Hardness Tester)
- Tandem MS
- Temperature Monitoring
- Tensile Testing
- Thermogravimetric Analysis
- Titration (inclusive of KF)
- Walkup LC-MS
- X-Ray Powder Diffraction


## What Success Looks Like



## Join the Community

Allotrope.org | info@allotropefoundation.org



 [Click here for a list of our members](#)

**Full Membership** is open to corporations, partnerships, organizations, or their subsidiaries that work with scientific data or provide related services. Full membership requires average annual revenue  $\geq$  \$7.5M over the past three years, including affiliated entities.

**Associate Membership** is open to the same types of organizations as Full Members that work with or support scientific data. Associate membership requires average annual revenue is  $<$  \$7.5M over the past three years, including affiliated entities.

**Partner Membership** is open to academic, non profit, or government organizations not composed of entities eligible for Full and Associate Membership.

\* Please refer to [www.allotrope.org](http://www.allotrope.org) for full membership details.