LACE: A WEB-BASED, STRUCTURED EDITOR FOR PDS METADATA. M. Rose[1], R. Keller[2], and P. Sarram[3], [1]Lockheed Martin IS&GS, NASA Ames Research Center, Mark.Rose@nasa.gov, [2]NASA Ames Research Center, rich.keller@nasa.gov, [3]Pegah Sarram, pegahsarram@gmail.com.

Introduction: Many newer metadata standards are XML-based[1], including the PDS4 standard for the Planetary Data System (PDS)[2]. PDS4 metadata and data formats are required for all new mission data and analyses to be published within the PDS archive. At the same time, however, many scientists are not familiar with XML as a language for data modeling, nor are they familiar with tools for working with XML. Further, because of the relatively dense and verbose textual structure of XML, metadata written in XML is more difficult to create and read than prior textual metadata formats.

For these reasons, we have created LACE, an editor for PDS metadata that hides the complexity of XML from the user. Instead, the editor interface presents the user with familiar HTML forms and fields to fill in. At the same time, the metadata values are checked against schema restrictions in real-time to continuously show the areas of the metadata that still need attention. At any time the user can export the resultant metadata as a fully-formed, valid XML document. Working with LACE, it is not possible for users to create invalid PDS4 XML documents.

Schema-driven user interface: Although LACE was originally conceived as an editor for PDS4 metadata intended for the PDS, it is XML schema-driven: LACE dynamically adjusts its user interface to match the XML schema for the metadata standard[3]. In addition, it uses additional validation rules encoded as Schematron scripts, if provided[4]. LACE has been tested with other metadata standards such as SPASE from the Heliophysics community[5]. Users can also supply their own schema or Schematron, if desired. Thus, LACE functions as a general-purpose XML editor, and is not restricted to work with PDS4 metadata.

Integrated documentation: LACE automatically incorporates any documentation information from the XML schema(s) into the user interface, making the documentation available below the form fields for the affected XML element or attribute upon user request. In addition, LACE shows additional constraints specified in the schema, such as enumeration values or required patterns. Enumeration values are also available as drop downs on any field that requires a value from the enumeration. LACE will also display any customized error messages provided by Schematron rules.

Cloud-based collaboration: The LACE editor is cloud-based, that is, it runs entirely within a web browser, storing data remotely on a central server. This allows use of LACE from any modern browser without installation of specialized software. In addition, this format will allow the development of collaborative features such as those seen in enterprise-level, cloud-based applications.

Support for best practices: Since LACE stores the edited XML documents on the cloud-based server, it can reformat the documents when downloading them to the user. This allows LACE to conform to best practices within the community for which the metadata is being prepared. At this time LACE supports the practices of the PDS4 standard for the PDS archive, but it has been created in such a way as to facilitate use with other standards in the future.

Good usability: Development of LACE was accompanied by extensive user testing of the interface. Users have found the tool very easy to pick up and use with minimal instruction. It was the primary tool used by the data archive designer on the OSIRIS-REx mission for designing PDS4 label templates. Users have indicated that they found the interface intuitive and the documentation features helpful.

References

[1] T. Bray et. al., ed. (2006) "Extensible Markup Language (XML) 1.1 (Second Edition)," W3C XML Working Group.

[2] Planetary Data System (2014) "Planetary Data System Standards Reference, Version 1.3.0."

[3] D. Fallside et. al. (2012) "W3C XML Schema Definition Language (XSD) 1.1," W3C XML Schema Working Group.

[4] ISO/IEC (2006) "Information technology – Document Schema Definition Language (DSDL) – Part 3: Rule-based validation – Schematron," ISO/IEC 19757-3:2006.

[5] T. King, et. al. (2014) "A Space and Solar Physics Data Model from the SPASE Consortium," SPASE Group.