

Creating, Maintaining and Publishing Value Sets in the VSAC

**Emir Khatipov¹, Maureen Madden¹, Pishing Chiang¹, Philip Chuang¹, Duc Nguyen¹,
Ivor D'Souza¹, Rainer Winnenburger¹, Olivier Bodenreider¹, Julia Skapik²,
Rob McClure^{1,2}, Steve Emrick¹**

¹National Library of Medicine (NLM®), National Institutes of Health (NIH), Bethesda, MD, USA; ²Office of the National Coordinator for Health Information Technology (ONC), Washington, DC, USA

The Value Set Authority Center (VSAC, <https://vsac.nlm.nih.gov/>) is developed by the NLM in collaboration with ONC and Centers for Medicare & Medicaid Services (CMS). VSAC provides access to value sets that are used to define concepts used in clinical quality measures and to support effective health information exchange and many other biomedical informatics applications and programs. VSAC has fulfilled the immediate need for a comprehensive resource that supports the creation and maintenance of value sets used by data elements in 2014 electronic Clinical Quality Measures (eCQMs). It currently continues to expand its repository beyond the Meaningful Use (MU) domain into such areas, as Patient Assessment Instruments, Common Data Elements for research, public health, the ONC S&I Framework, and other clinical modeling efforts.

In October 2013, NLM launched the VSAC Authoring Tool that allows authors to create, edit, clone, update and publish value sets. VSAC also provides data integration with the CMS Measure Authoring Tool (MAT) via a REST Application Programming Interface (API) that uses the *Integrating the Healthcare Enterprise (IHE) Sharing Value Sets (SVS)* specification.

The VSAC Authoring Tool features the following major characteristics, functionalities and capabilities:

- Robust workflow with Authors and Stewards as major players that perform specific functions via sets of tiered permissions and check points. Essentially, Authors perform editing functions, whereas Stewards approve the work of the Authors and submit value sets for publication.
- Users can create extensional value sets, which are sets of codes and terms derived from a single code system, and grouping value sets that represent one or more extensional value sets grouped together based on a common purpose of use.
- Users can search codes, as well as value sets containing specific codes and keywords, and add those to the value sets. Codes can also be imported in batch or through manual input, in which cases the system automatically validates them and provides user feedback when it detects problems.
- Definition of value sets are captured via specific metadata elements describing purpose of use and inclusion/exclusion criteria for the values.
- Value set definition can be applied to any version of a code system in the VSAC. This process is called expansion. VSAC generates and makes available to users expansion profiles that are used to create and publish code system version-bound value sets.
- VSAC can create program-specific expansion profiles that include mandated code system versions, built-in code validation rules and lists of excepted legacy and provisional codes. These profiles are used, e.g., for packaging annual MU value set releases in support of eCQM development process.

In the future, VSAC will provide an interface for authors to create intensional value set definitions. Such definitions will contain the rules that will allow the system to automatically remove or replace values to reflect code system updates, as well as to discover new concepts that are appropriate for inclusion into value sets. This will significantly ease the maintenance burden on value set authors.

Access to VSAC requires a free Unified Medical Language System® (UMLS®) Metathesaurus License, due to usage restrictions on some of the codes contained in the value sets. To author value sets, users need to obtain permissions by contacting VSAC's [Support Group](http://www.nlm.nih.gov/research/umls/support.html) (<http://www.nlm.nih.gov/research/umls/support.html>). To receive important VSAC announcements, users can subscribe to the [VSAC Updates e-mail list](https://list.nih.gov/cgi-bin/wa.exe?A0.nlm_vsac_updates) (https://list.nih.gov/cgi-bin/wa.exe?A0.nlm_vsac_updates).

Acknowledgments: This work was supported in part by the Intramural Research Program of the NIH, NLM.