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To cite this version:

Erwan Bocher, Olivier Ertz. Towards Cartographic Portrayal Interoperability – the Revision of OGC Symbology Encoding Standard. 1st ICA European Symposium on Cartography, International Cartographic Association (ICA), Nov 2015, Vienne, Austria. pp.116-119. halshs-01227842

HAL Id: halshs-01227842

https://shs.hal.science/halshs-01227842v1

Submitted on 18 Nov 2015

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Towards Cartographic Portrayal Interoperability – the Revision of OGC Symbology Encoding Standard

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Extended Abstract

For thousands years of art and science of map making, maps are visualization tools for knowledge discovery by making use of the highly developed human pattern recognition skills (Slocum et al. 2010). Definitely their power is emphasized through the Spatial Data Infrastructure (SDI) paradigm (Craglia 2010, Tóth 2012) with a main emphasis on reusing and combining data from different sources hence increasing the production of maps and allowing infinite visual spatial analysis possibilities.

Interoperability with standards plays a key role to bridge the heterogeneity between systems. Concerning cartography, in general, Fee (2009) underlines that sharing the "cartographic code" has always been a problem: when you get some data (e.g. shapefiles) you often do not get symbology. Depending on the used system, rarely you have a side-car style file (e.g. ESRI lyr file or any other X specific style file) and anyway, the used style language is neither standardized so as you do not have any guarantee to be able to load it in your non-X tool. The use of Web Map Services (WMS) standard (De la Beaujardiere, 2006) from the Open Geospatial Consortium[1] (OGC) does partly give a solution which standardizes the way for Web clients to request maps with predefined symbolization. But, as Iosifescu-Enescu (2009) does put forward,

[1] http://www.opengeospatial.org/

we agree on how it is also important to have at disposal a standard to allow user defined symbolization when requesting a map over the Internet. In other words, it does push portrayal interoperability one level further by the sharing of the “cartographic symbology recipes” that allows the SDI user to rework and customize a shared map in her/his desktop GIS. For WMS, this is the role of the Styled Layer Descriptor (SLD) specification (Lupp 2007) which extends WMS to allow user-defined styling together with the Symbology Encoding (SE) specification (Müller 2006) which allows to describe a symbology recipe. Even more, Ertz (2009) describes a context of collaborative authoring where several users contribute to the creation of a map, each user using her/his own software. These are common use cases which require a standardized way to author and share cartographic symbology recipes.

As Standard Working Group chairs at the OGC, we would like to share experiences and results concerning the ongoing revision of SE. Indeed, given the results of previous research work about SE (Ertz 2007, Bocher 2011) and several other pending change requests received by the OGC (Ertz, 2010), our motivation is firstly driven by a common claim about enhancing SE with new styling capabilities, reason why we decided to pursue our research work at the heart of the OGC. But more importantly, beside this valid claim, it has been noticed that some fundamental requirements were disregarded. Hereinafter we summarize additional basic principles that would help in the future SE to be able to better solve the above common use cases.

While SE seems to be focused on the encoding of symbology instructions, it is the underlying cartographic symbology model which is essential to consider before inserting new encodings of must-have styling capabilities.

It shall be established in strong relation with a clear definition of a rendering algorithm. Current SE does carry an ambiguity that doesn't guarantee the purpose of such a symbology standard that is to get the same visual rendering from one system to another.

It shall define clearly to what kind of data model the styling capabilities are designed for, e.g. discrete point GridCoverage (Baumann 2012, Portele 2007). Current SE does not specify this with no ambiguity in reference to other OGC standards, which may also cause an interoperability default.

It shall be modular with an extensible core (OGC Policy SWG 2009) that does allow to add new capabilities according to predefined extension points so as to ensure consistency of the model for the long-term. The definition of a minimalist core and surrounding extensions is also a way to lower the implementation bar allowing step-by-step conformance for the implementors (e.g. from simple or dashed stroke symbol to complex stroke extensions like compound stroke; from marker symbol to complex graph-based diagrams extensions like pie chart).

When new capabilities are requested through the Change Request process[2] from OGC, the good practice is to always design the integration in the symbology model with consistency. This is by identifying redundancy and trying to make the underlying concept of the new capability the most generic possible to be useful for several different use cases.

The symbology model shall adopt an approach of separation, this is a conceptual model being an encoding-neutral model with extensions offering several encodings. While XSD/XML is usually the default encoding for several OGC standards like GML (Portele 2007), such an approach does make sense nowadays according to the various encoding flavor that may exist and which are preferred by different cartographic tool users communities (CartoCSS[3], MapServer map file, etc).

Among others considerations (on performance, pre-processing, conformance testing, etc) altogether, these principles shape a strategy that should support the major claims about styling enhancements and favor a largest adoption of the standard.

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[2] http://www.opengeospatial.org/standards/cr

[3] https://github.com/mapbox/carto/blob/master/docs/latest.md

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