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EDITORIAL

A domain-specific modeling milestone

Jeff Gray[1] · **Bernhard Rumpe**[2] · **Juha-Pekka Tolvanen**[3]

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In October 2021, the workshop on Domain-Specific Modeling (held at the SPLASH conference series) celebrates its twentieth anniversary since the first workshop in 2001 (http://www.dsmforum.org/events/DSM21/). The history of the workshop can be traced back to the 2000 OOPSLA conference (Minneapolis MN) and a Birds of a Feather (BoF) session that brought together those attendees who were interested in DSM topics. From that original BoF meeting, some of the attendees (Juha-Pekka Tolvanen, Jeff Gray, Steven Kelly, and Joern Bettin) decided that it was time for an official forum for collecting initial research efforts in the DSM area. The first workshop (actually called DSVL—Domain-Specific Visual Languages, and first called "DSM" in 2003) was held in October 2001 in Tampa, FL. That workshop, which almost did not happen due to the proximity of the 9/11 tragedy in the USA, received 20 submissions, from which 14 papers were presented. Details about that first workshop are still available at: http://www.dsmforum.org/events/DSVL01/DSVL01.html

Although concepts such as metamodeling and other approaches for supporting customized domain-specific modeling languages are commonly discussed today, such was not the case during the formation of the DSM workshop. The early editions of the UML conference were not as receptive to DSM techniques, and the 2001 DSM workshop was the first open forum that welcomed researchers working in the specific area. In fact, it was not until the name change of the 2005 MODELS/UML conference that the modeling community began widespread acceptance of a broad range of DSM approaches over those focused just on UML extension mechanisms (coincidentally, the 2005 MODELS/UML conference had a panel that discussed these differences, called "A DSL Or UML Profile. Which Would You Use?").

The peak period of the DSM workshop was from 2006 to 2008, with an average of nearly 40 participants and 20 paper presentations. As DSM topics became more accepted at other venues, the depth of participation of the DSM workshop waned as the maturity of the area was realized. The DSM workshop also produced three special journal issues, including 5 papers in the *Journal of Visual Languages and Computing* (June 2004), 6 papers in *IEEE Software* (July/August 2009) and 6 papers in a SoSyM theme issue (January 2013).

Over the past 20 years, the DSM workshop witnessed the evolution of the area, with specific observation of the following trends:

- Extension and expansion of existing approaches (e.g., UML profiling) was prevalent in the beginning of the DSM series, but moved to language creation with native metamodels. This may be due to the maturity of tools that reduced greatly the technical part of language creation.
- Language design and tooling have been present at all times and will most likely continue (including mobile, tablet, and browser-based tools).
- The presence of case studies and examples have increased since the early years of DSM, but it is more challenging to get those contributions published unless they provide additional novel ideas about DSM, in general.
- Language evolution and its management has become one of the most important topics, as well as testing DSM solutions.
- The level of abstraction continues to rise. An emerging trend is that abstractions are becoming closer to the needs of non-programmers, e.g., via the no-code, low-code, citizen developer approaches, or subject matter first manifesto (https://subjectmatterfirst.org/).

✉ Jeff Gray
jeff.gray@sosym.org

Bernhard Rumpe
bernhard.rumpe@sosym.org

Juha-Pekka Tolvanen
jpt@metacase.com

[1] University of Alabama, Tuscaloosa, Alabama, USA

[2] RWTH Aachen University, Aachen, Germany

[3] MetaCase, Jyväskylä, Finland

It is unclear whether the DSM workshop needs to continue much further into the future since there are many other areas where research contributions in DSM can be published. Yet, a workshop has the benefit of providing an entry point to the subject that supports demonstrations, position papers, and industry level participation that is hard to achieve with traditional academic conferences. Below are several key observations that can be made that point to the future directions of DSM:

- Support for various formalisms; traditionally diagrams, but also other forms like maps, matrices, layouts (e.g., game field) and their combinations
- Support for versioning that DSM users can apply (and understand)
- Deeper investigation into the human side of language creation as DSM languages are often made for non-programmers. This side has been far less addressed in the research as most focus has been on abstract syntax (metamodel) rather than on concrete syntax.
- Many more empirical studies and comparisons of approaches are needed.

We invite you to check out the 2021 contributions and the history of the DSM workshop at: http://www.dsmforum.org/DSMworkshops.html

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