Dear members of the MIP Award Selection Committee,

with pleasure, we would like to nominate the following paper for an SPLC Most Influential Paper Award:

P. Asirelli, M.H. ter Beek, A. Fantechi, and S. Gnesi:
Formal Description of Variability in Product Families.
In Proceedings of the 15th International Software Product Line Conference (SPLC'11), IEEE, 2011, 130-139. http://dx.doi.org/10.1109/SPLC.2011.34

This paper was the first to enrich Modal Transition Systems (MTSs) with an associated set of logic formulae to make them amenable to model and verify the behaviour of software product lines, capturing all common variability notions known from feature models. It was well known at the time that plain MTSs cannot efficiently (in a compact way) model, e.g., the notions of alternative and mutually exclusive features. The paper moreover discussed the commonalities and differences with the well-known Featured Transition Systems (FTSs) of Classen et al., who is acknowledged for his comments that improved the paper.

At that time, several different extensions of MTSs and of other behavioural formalisms have been introduced (e.g. modal I/O automata, variable I/O automata, feature Petri nets, PL-CCS, ecc.), but not many of them have remained the subject of recent and current research like FTSs and MTSs have, as witnessed for instance by the following publications:

- H. Beohar, M. Varshosaz, M.R. Mousavi. Basic Behavioral Models for Software Product Lines:Expressiveness and Testing Pre-Orders. Science of Computer Programming, Volume 123, 2016, Pages 42-60. https://doi.org/10.1016/j.scico.2015.06.005
- T.M. Castro, L. Teixeira, V. Alves, S. Apel, M. Cordy, R.Gheyi. A Formal Framework of Software Product Line Analyses. ACM Trans. Softw. Eng. Methodol. 30(3): 34:1-34:37 (2021). https://doi.org/10.1145/3442389
- A.S. Dimovski. CTL* family-based model checking using variability abstractions and modal transition systems. Int. J. Softw. Tools Technol. Transf. 22, 1 (2020), 35-55. https://doi.org/10.1007/s10009-019-00528-0
- M. Varshosaz, L. Luthmann, P. Mohr, M. Lochau, M.R. Mousavi. Modal transition system encoding of featured transition systems. J. Log. Algebraic Methods Program. 106 (2019), 1-28. https://doi.org/10.1016/j.jlamp.2019.03.003
- M. Varshosaz, M.R. Mousavi. Comparative Expressiveness of Product Line Calculus of Communicating Systems and 1-Selecting Modal Transition Systems. SOFSEM 2019:

Theory and Practice of Computer Science. SOFSEM 2019. Lecture Notes in Computer Science, vol 11376. Springer, Cham. https://doi.org/10.1007/978-3-030-10801-4_38

- M. Cordy, X. Devroey, A. Legay, G. Perrouin, A. Classen, P. Heymans, P.-Y. Schobbens, J.-F. Raskin. A Decade of Featured Transition Systems. From Software Engineering to Formal Methods and Tools, and Back. Lecture Notes in Computer Science 11865, Springer, 2019, 285-312. https://doi.org/10.1007/978-3-030-30985-5_18

Fundamental for the success of both FTSs and MTSs are likely the associated verification frameworks (SNIP/ProVeLines and VMC). The verification framework for MTSs with variability constraints, VMC, was introduced in a tool paper in the 2012 Formal Methods Symposium, by now cited 63 times according to Google scholar. VMC was also the subject of a paper and tutorial in this year's SPLC, based on a tool chain built on VMC that allows to perform an efficient kind of family-based model checking accepting either of the FTSs or MTSs as input:

- M.H. ter Beek, F. Mazzanti, F. Damiani, L. Paolini, G. Scarso, and M. Lienhardt, Static Analysis and Family-based Model Checking with VMC. In Proceedings of the 25th International Systems and Software Product Line Conference (SPLC'21), ACM, 2021, 214-214.
- M.H. ter Beek, F. Mazzanti, F. Damiani, L. Paolini, G. Scarso, M. Valfre, and M. Lienhardt, Static Analysis and Family-based Model Checking of Featured Transition Systems with VMC. In Proceedings of the 25th International Systems and Software Product Line Conference (SPLC'21), Volume 2, ACM, 2021, 24-27.

The paper has received quite some attention since its original publication, as witnessed by citations in multiple papers that appeared over time, and still today, in SPLC'21, some of which reported above. While citations alone are not sufficient to merit the MIP award, we note that the paper has received 118 citations and its extended version published in the Journal of Logical and Algebraic Methods in Programming in 2016 already received 67 citations (as of October 31, 2021, according to Google Scholar). With each more than 10 citations per year, this makes it a very well-cited SPLC paper. Moreover, according to Google scholar the journal version is the most cited article of this journal of the last 5 years (https://scholar.google.com/citations?hl=it&view_op=list_hcore&venue=490PD04WSsYJ. 2021).

Individual email confirmation on this joint nomination is provided from each of us.
Sincerely,

Paolo Arcaini (National Institute of Informatics, Japan)
Ferruccio Damiani (University of Turin, Italy)
Axel Legay (UCLouvain, Belgium)
Mohammad Mousavi (King's College, London, UK)
Ina Schaefer (TU Braunschweig, Germany)
Pierre-Yves Schobbens (U Namur, Belgium)
Leopoldo Teixeira (Federal University of Pernambuco, Brazil)