



# Quality-Aware Development of Big Data Applications with DICE

*Damian A. Tamburri*

*on behalf of G. Casale, E. Di Nitto and P. Jamshidi*

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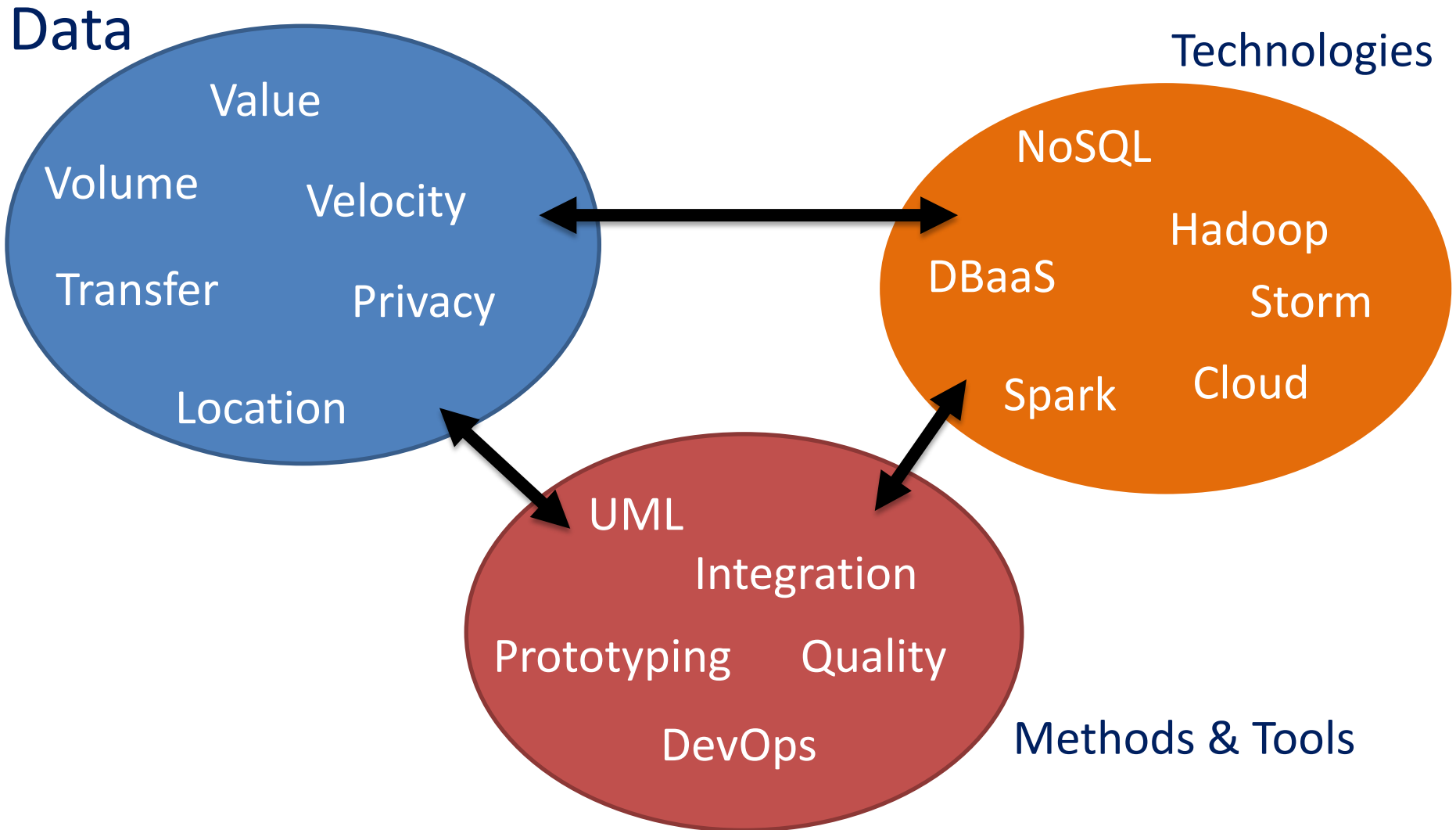
# The Rise of Big Data



- Software market rapidly shifting to Big data
  - Expected 32% compound annual growth rate in EU through 2016
  - Just 35% of Big data projects are successful [CapGemini'15]



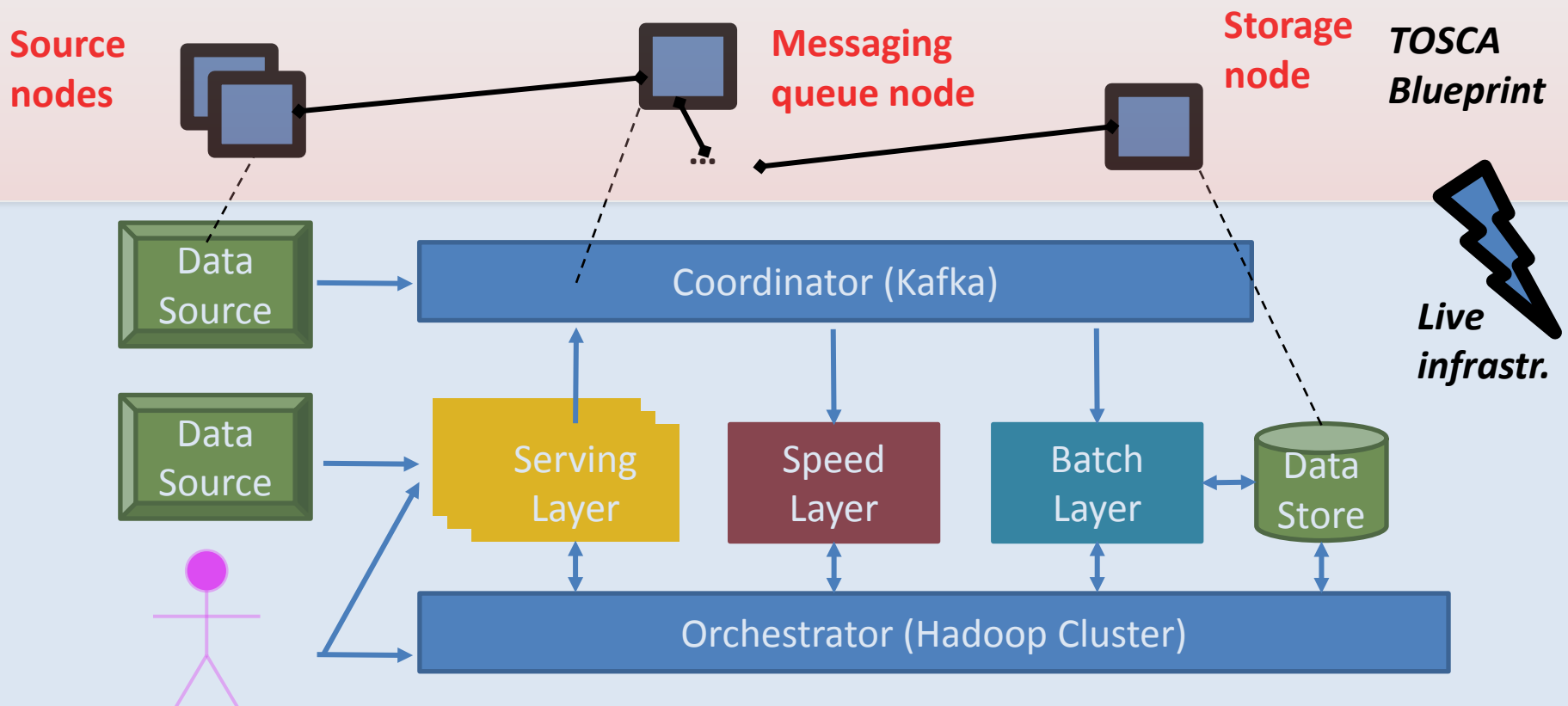
# The Rise of Big Data: Data-Intensive Applications (DIA)



# DIAAs live in DevOps contexts!



- Continuous DIA architecting;
- Infrastructure-as-code (e.g., TOSCA\*) to allow track/update of “deployment” architectures;

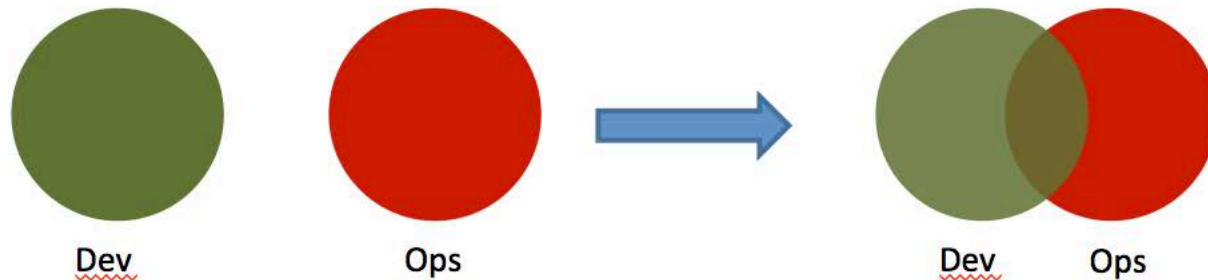


\*Topology and Orchestration Specification for Cloud Applications (TOSCA) OASIS industry standard.

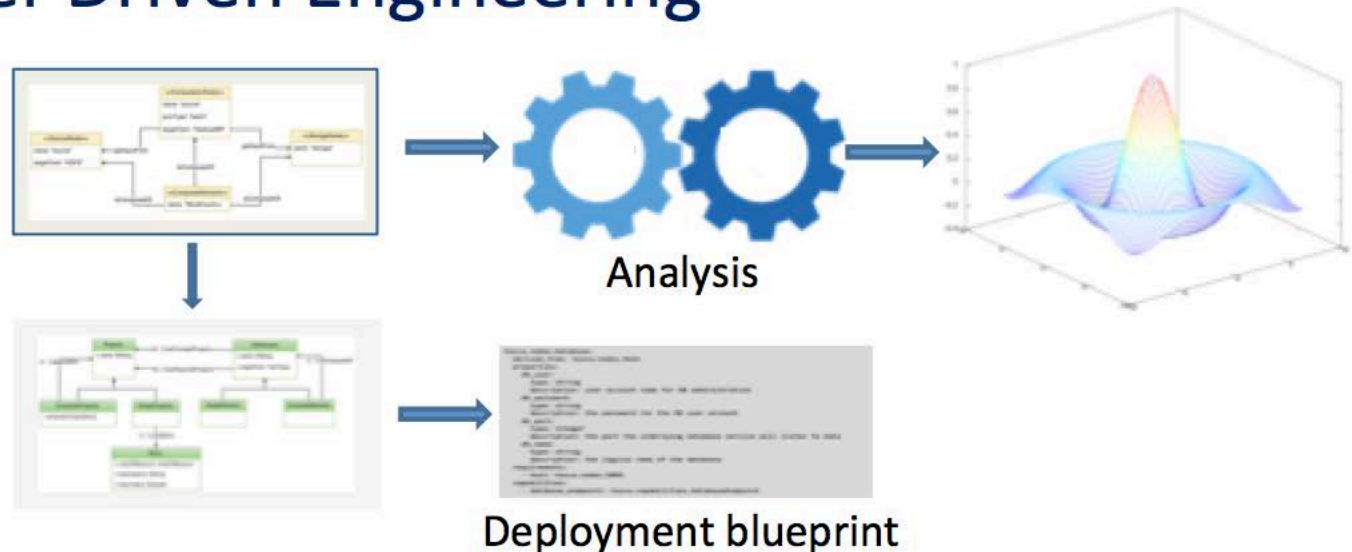
# MDE for Big Data, the DICE vision and approach



## ○ DevOps



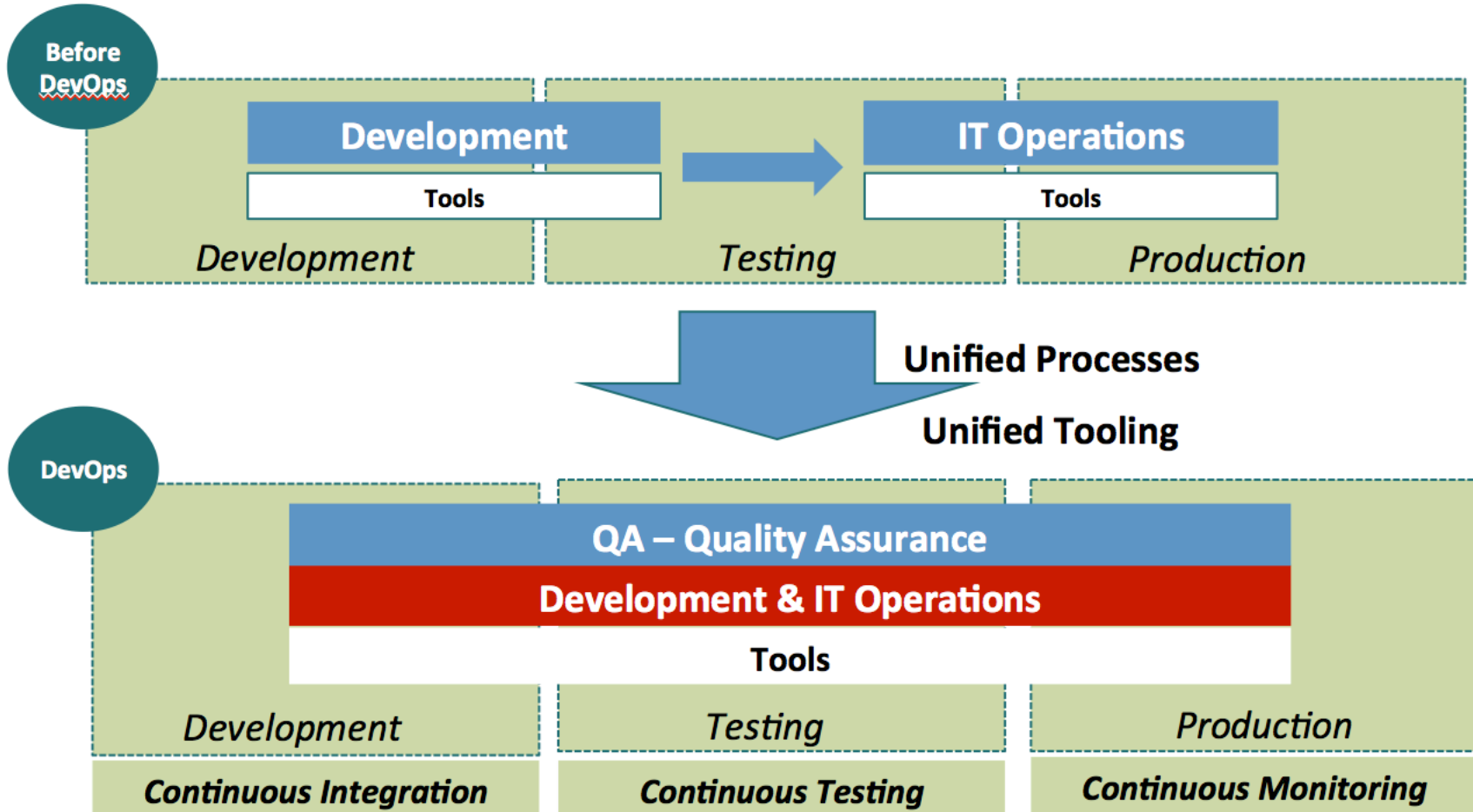
## ○ Model-Driven Engineering



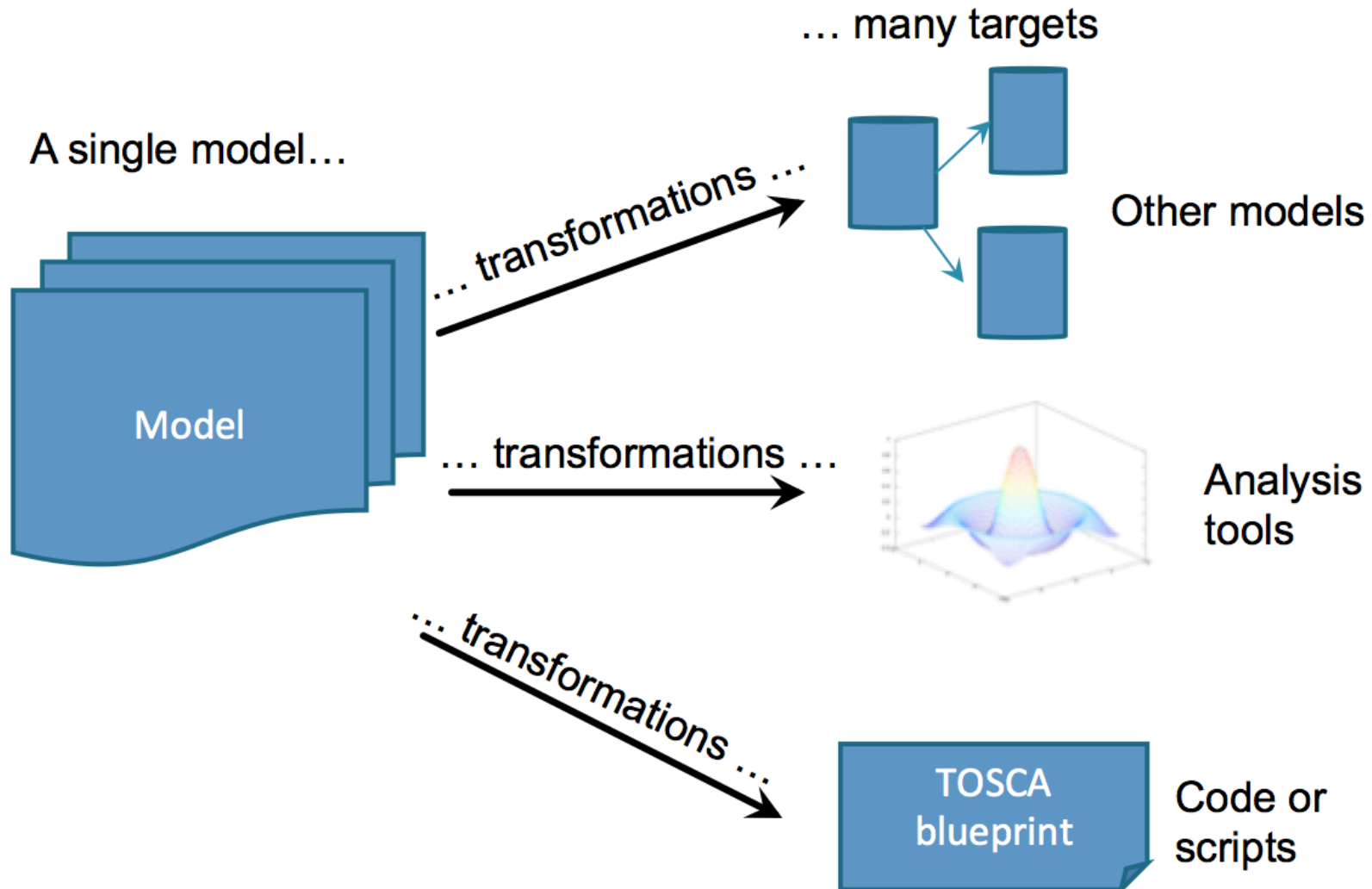
# MDE for Big Data, the DICE vision and approach → DevOps!



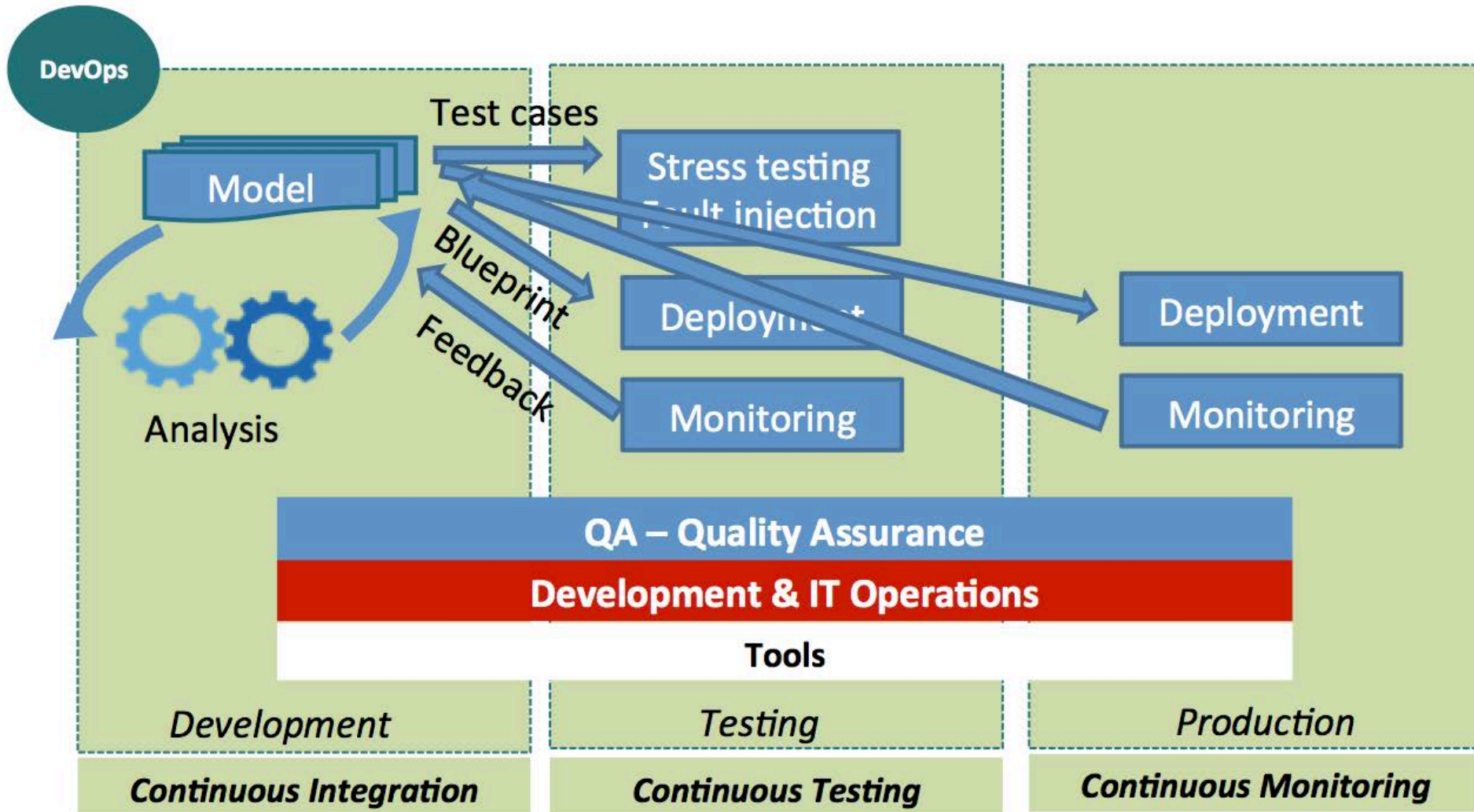
- DevOps is “A set of practices and tools to reduce the time to commit a change to production, while ensuring high-quality.” (*Bass et al., '15*)



# MDE for Big Data, the DICE vision and approach → MDE!

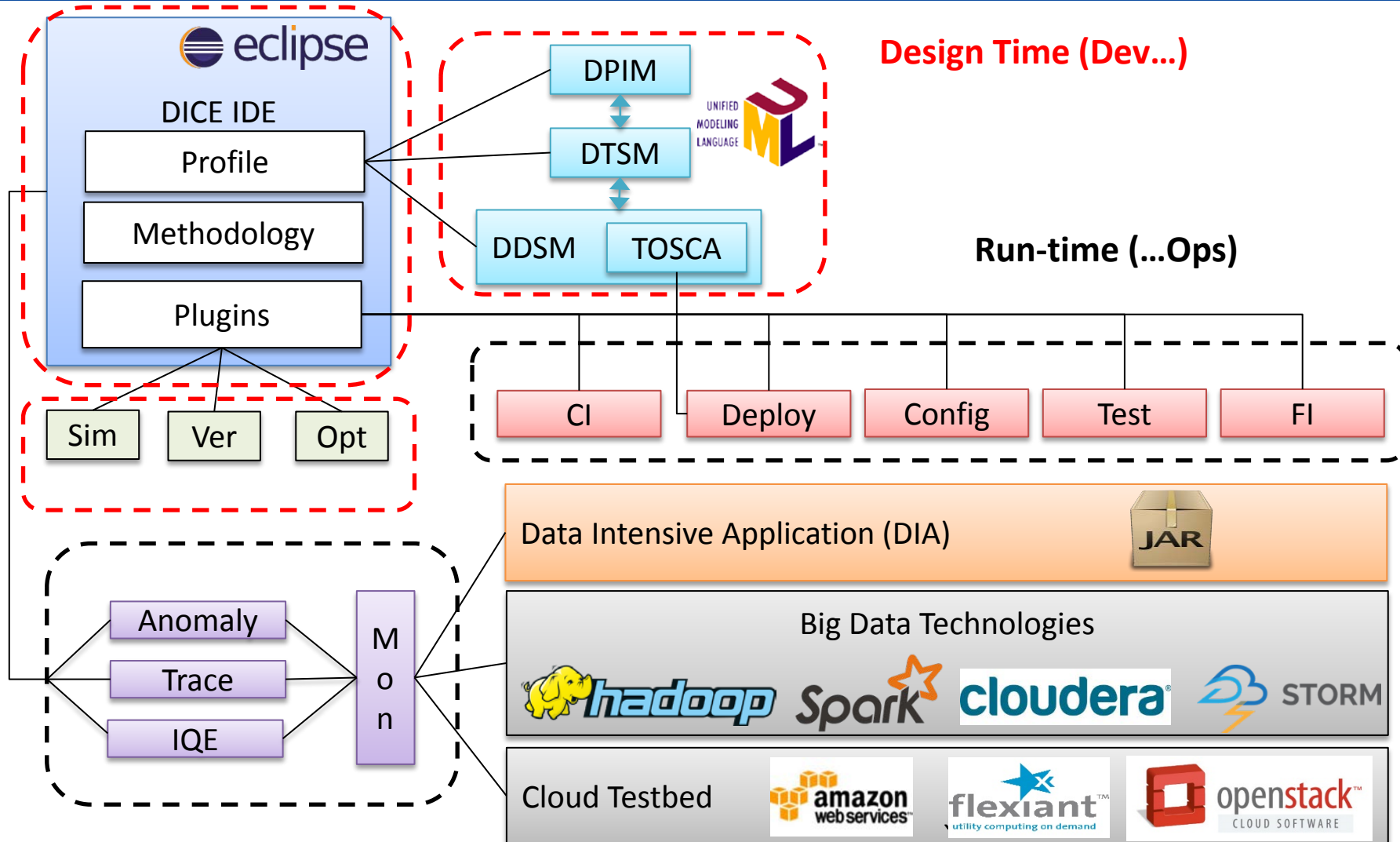


# MDE and DevOps: a possible synergy in DICE

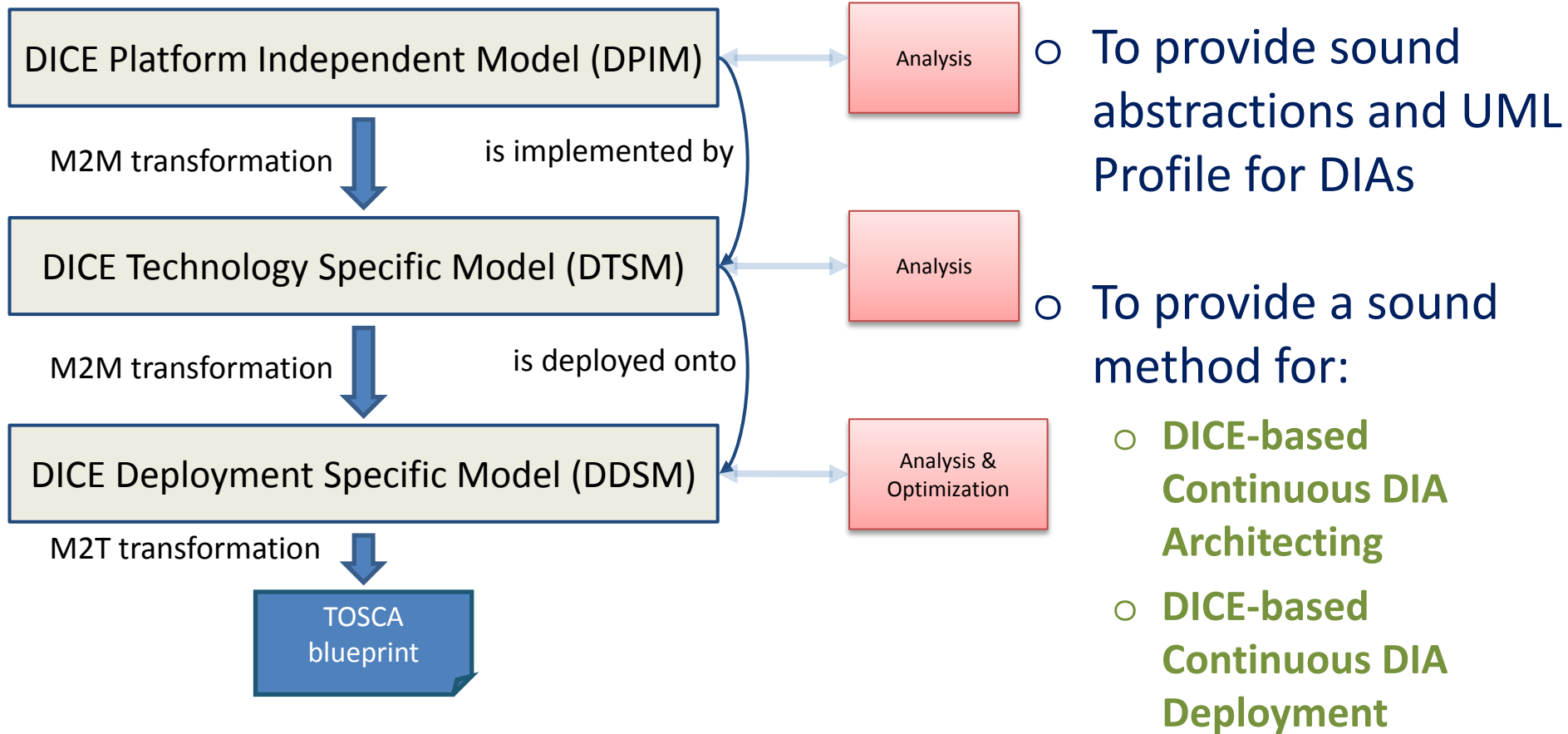




# DICE, a Complete MDE Toolkit for DIAs\*



# DICE incremental modeling and analysis<sup>[6]</sup>





# Thanks!

[www.dice-h2020.eu](http://www.dice-h2020.eu)

# Bibliography



- [1] A. Rajbhoj, V. Kulkarni, and N. Bellarykar. Early experience with model-driven development of mapreduce based big data application. In Software Engineering Conference (APSEC), 2014 21st Asia-Pacific, volume 1, pages 94–97, Dec 2014.
- [2] S. Santurkar, A. Arora, and K. Chandrasekaran. Stormgen - a domain specific language to create ad-hoc storm topologies. In Computer Science and Information Systems (FedCSIS), 2014 Federated Conference on, pages 1621–1628, Sept 2014.
- [3] Abel Gómez, José Merseguer, Elisabetta Di Nitto, Damian A. Tamburri “Towards a UML Profile for Data Intensive Applications”, Proceedings of 2<sup>nd</sup> “Quality Aware DevOps” (QUDOS) workshop, to appear
- [4] Elisabetta Di Nitto, Pooyan Jamshidi, Michele Guerriero, Ilias Spais, Damian A. Tamburri “A Software Architecture Framework for Quality-Aware DevOps”, Proceedings of 2<sup>nd</sup> “Quality Aware DevOps” (QUDOS) workshop, to appear
- [5] Matej Artac̆, Tadej Borovšak, Elisabetta Di Nitto, Michele Guerriero, Damian A. Tamburri, “Model-Driven Continuous Deployment for Quality DevOps”, Proceedings of 2<sup>nd</sup> “Quality Aware DevOps” (QUDOS) workshop, to appear
- [6] Guerriero, Michele; Tajfar, Saeed; Tamburri, Damian A. & Di Nitto, Elisabetta (2016), “Towards a model-driven design tool for big data architectures.”, in 'BIGDSE@ICSE', ACM, , pp. 37-43 .
- [7] S. Bernardi et Al. “A Dependability Profile within MARTE”, JOURNAL OF SOFTWARE AND SYSTEMS MODELING.