

A Model-Driven Approach for Visualisation Processes using VizDSL

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Abstract

- **Problem:** understanding complex structured information (standards specifications) using interactive visualisation
- Combining model-driven techniques with interactive visualisation simplifies understanding
- **Proposed solution:** Our approach is tool independent, separates data navigation and changes in presentation for reusability and doesn't require programming expertise

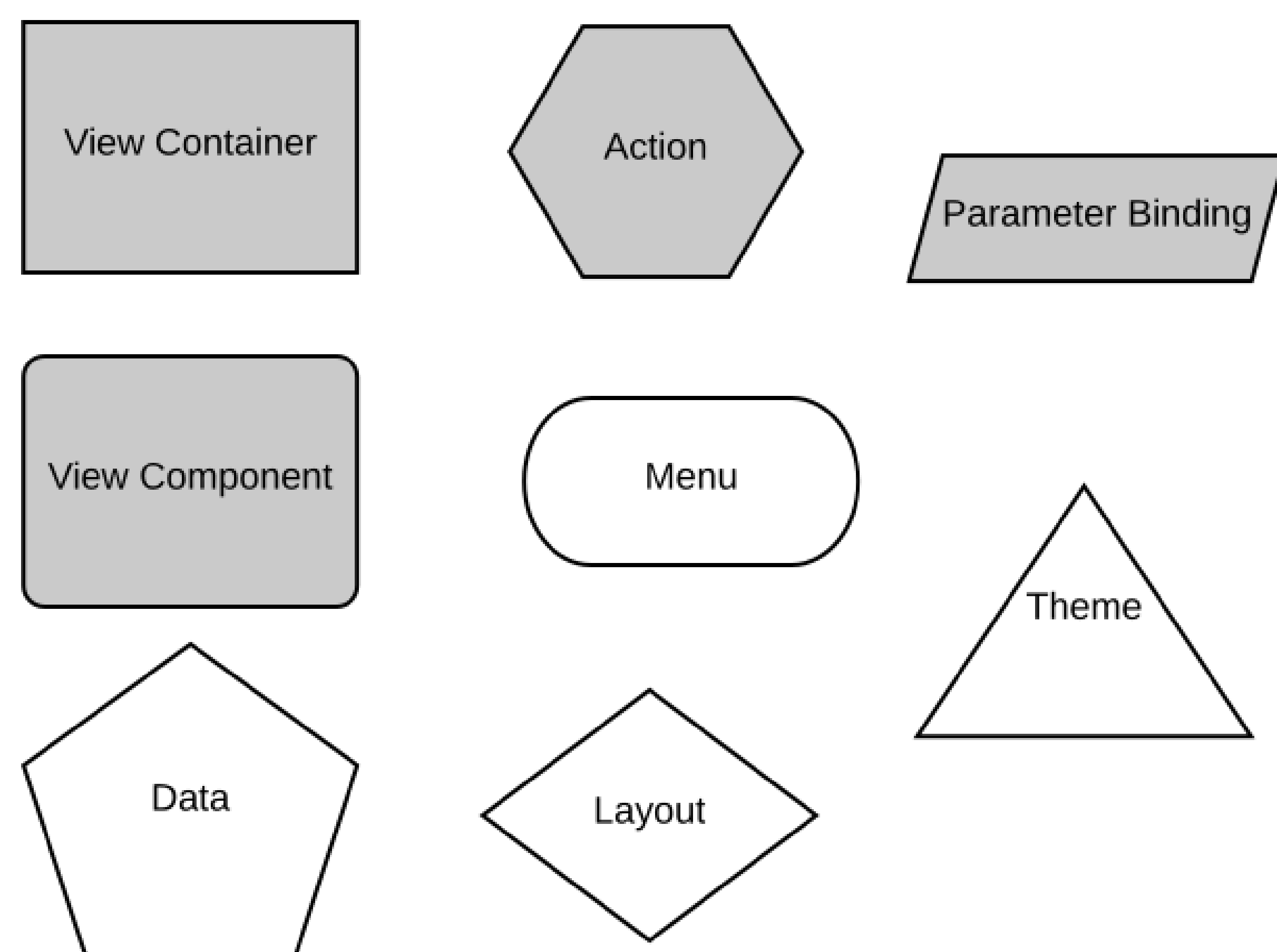
Background

- **Visualisation:** Can be used to facilitate better understanding of complex data structures, in a way which is accessible for different user groups.
- **Domain Specific Modelling Languages:** Used to formally describe a domain and are used in conjunction with transformation engines/code generators to generate software artifacts such as code.
- **Interaction Flow Modelling Language (IFML):** Example of graphical DSL used to model content, user interactions and controls for application front ends; platform independent; adopted as a standard by the OMG in 2013

VizDSL

- We have developed a graphical Domain Specific Language (VizDSL^{1,2}) which can be used to model an entire visualisation process, including user interactions and navigation
- **VizDSL:** extends IFML through it's UML specification

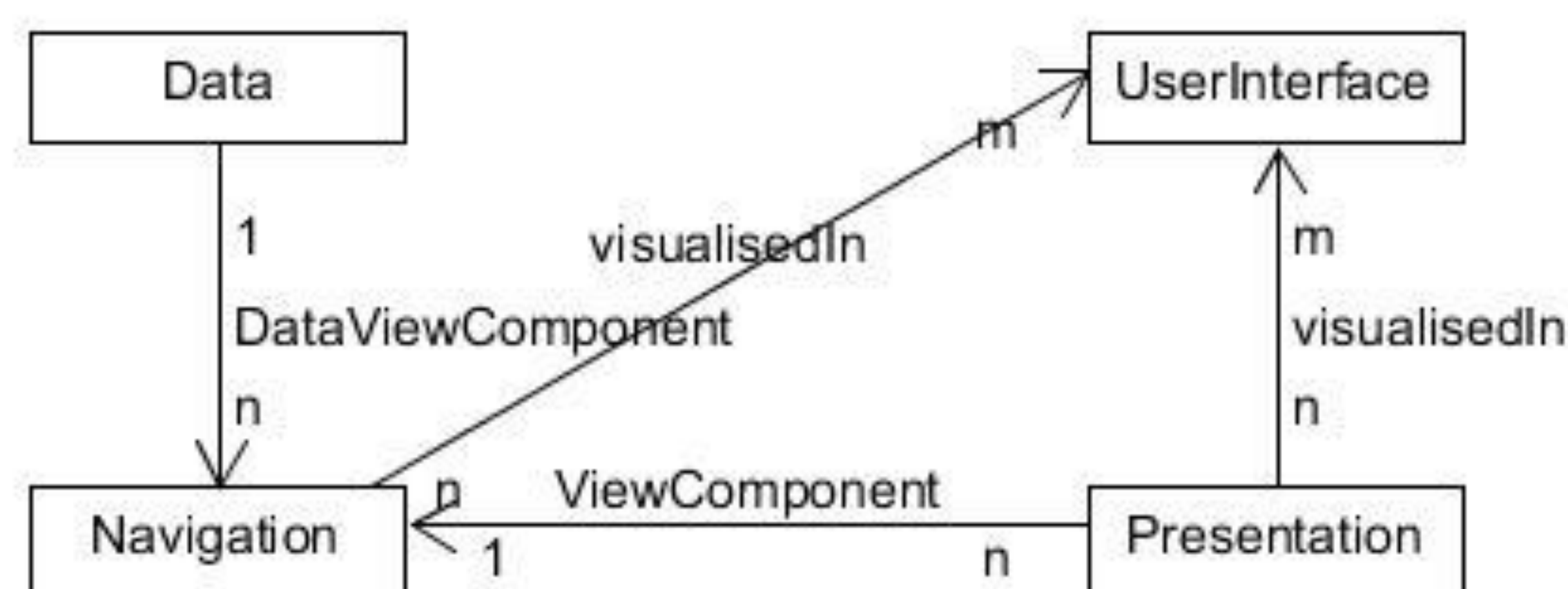
VizDSL Visual Syntax



Industry Case Study

- Taken from engineering domain: **Oil and Gas Interoperability (OGI) Pilot**
- Automation of maintenance processes requires standards-based interoperability for simplification of information exchange (MIMOSA CCOM)
- **MIMOSA CCOM:** information model for exchange of asset model; complex and difficult to understand; subject to change
- **Interactive visualisation:** aids understanding
 - Software tools: lack separation between data navigation and presentation so difficult to reuse; no clarity regarding interactions and navigation
 - Programmatic approach: requires programming expertise; users are engineers/domain experts, not programmers
- **Model-driven approach:** uses VizDSL to model and execute interactive visualizations in the visualisation process³

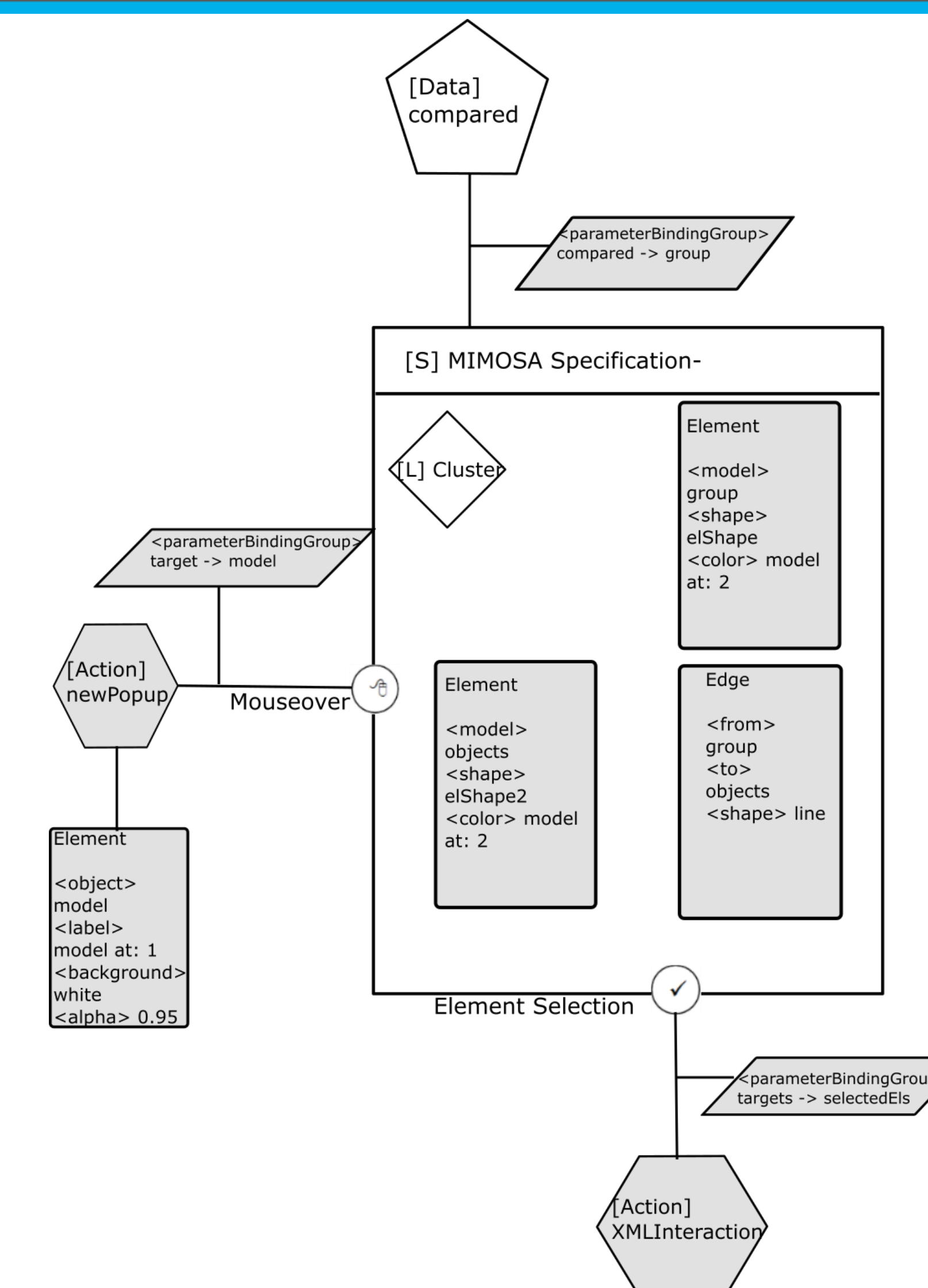
Visualisation Process



Comparing MIMOSA CCOM Versions

- Identifying changes between different versions of the MIMOSA CCOM specifications is very important for correct information management
- For example, deprecated elements may have associated instance data; needs to be checked by domain expert/engineer
- Three visualisation processes in this case:
 - Gaining overall understanding of structure of standard versions
 - Comparing different standard versions to identify elements which have been created, modified or deleted
 - Exploring raw data associated with these elements

Model for Standard Version Comparison



Visualisation of Standard Version Comparison



References

[1] Rebecca Morgan, Georg Grossmann, and Markus Stumptner. VizDSL: Towards a Graphical Visualisation Language for Enterprise Systems Interoperability. In *Proc of International Symposium on Big Data Visual Analytics (BDVA)*, pages 31–38. IEEE, 2017.

[2] Rebecca Morgan, Georg Grossmann, Michael Schrefl, Markus Stumptner, and Timothy Payne. VizDSL: A Visual DSL for Interactive Information Visualization. In *Proc. of CAISE 2018, LNCS 10816*, pages 440–455. Springer, 2018.

[3] Rebecca Morgan, Georg Grossmann, Michael Schrefl, Markus Stumptner. A Model-Driven Approach for Visualisation Processes. To be published in *Proc. of ACSW'19*