### General

<table>
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<tr>
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<th>Martin Strietzel</th>
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<tr>
<td>Additional experts</td>
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### Short Description/Transmitted Information
- VMAP is a vendor neutral standard for CAE data-storage to enhance interoperability in virtual engineering workflows.
- VMAP specification is freely (open & cost-free) available.
- VMAP development kit will be available under a Creative Commons Attribution-Share-Alike license (details currently under preparation, release planned early May 2020).
- VMAP Standardization Community will be organized by NAFEMS association, details to be defined.

### Application Scope
- Describe models and results from 3D simulation tools (FEA, FVM, mesh-less models, etc.).
- Initial use for detailed manufacturing and product/component simulations.

### Maturity
- Industrialization (potentially standardization).

### Goals
- Flexibilization of integrated simulation tool-chains, by:
  - Standardized exchange format for models and result properties.
  - Geometry and discretization.
  - Coordinate and unit systems.
  - Result and state variables.
  - Parameters for (material) models.
  - Meta and user data.
  - Supplied IO routines for easy implementation.
| **Penetration** | • Industrial use-cases within VMAP project ([https://www.vmap.eu.com/use-cases-2/](https://www.vmap.eu.com/use-cases-2/))  
| | • Further use-cases from industrial partners in preparation  
| | • Growing tools support ([https://www.vmap.eu.com/tools/](https://www.vmap.eu.com/tools/)), such as MSC, ESI, Dynamore and many more  
| | • Ongoing technical discussions with further software vendors (Autodesk, Ansys, 3DS, Transvalor, MagmaSoft, SigmaSoft, etc)  
| | • The overall assessment is:  
| | • Individual domains  
| **Visibility** | • Approx 50%  
| **Promoting Bodies** | • NAFEMS, ITEA, VMAP Community (> 50 partner, member fee planned, similar to FMI)  
| **Type** | • Own VMAP Standard rules, based on Modelica (FMI)  
| **IT Standard Classification** | • Interoperability Standard  
| | • Integration Standard  
| **Data Format** | • HDF5 ([https://www.hdfgroup.org/solutions/hdf5/](https://www.hdfgroup.org/solutions/hdf5/))  
| | Binary Format  
| **Relations to other standards** | • STEP AP209 & 242  
| **Overlap with other standards** | • None or minimal  
| **Available accompanying documentation (Software vendors)** | • [https://www.vmap.eu.com/](https://www.vmap.eu.com/)  
| | Software vendors will prepare own documentation  
| **Available accompanying documentation (Industry Users)** | • Under preparation  
| | • Few test Cases,  
| | • Guidelines  
| **Available accompanying documentation (Management)** | • “Modelling & Simulation A vision of the state of play”  

General | Details | Positioning in V-Model | Relevance and Benefit for MBSE | Risks and Impediments | Additional Resources
• The only standard for exchange data in 3D CAE workflows
1 Remark:

- VMAP is based on the ITEA VMAP project –
- See also
  - “Modelling & Simulation A vision of the state of play”
2 Reached goals:

• Standard released and in use within a growing user and implementor community
3  Further goals

- Addressing new use-cases within Multi-Scale Material simulation and Manufacturing Modelling
  - A follow-up project called “VMAP analytics - Smart Analytics for Multi-Scale Material and Manufacturing Modelling” has received ITEA label and will probably start in November 2020 (https://itea3.org/project/vmap-analytics.html)
- Setting a global de-facto standard

Additional Resources

### Positioning of VMAP in V-Model

- The standard allows the community to utilize multi-disciplinary simulation processes based on standard data exchange between the dedicated simulation domains;
- This capability simplifies the usage and by this widens the availability of multi-disciplinary simulation to the MBSE.
• Extend the usage within more simulation tools;
• Expand the usage over more simulation disciplines;
• Simplify the usage by providing libraries for a more simple migration from specific and individual interfaces to VMAP.

### Additional Resources

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<td>Nov. 25, 2020 by Peter Tabbert</td>
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1 https://intranet.prostep.org/download/attachments/22806894/image2020-7-6_16-40-10.png?api=v2
2 https://intranet.prostep.org/display/~petertabbert
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