



# VMAP

## Interoperability of Engineering Data within Integrated CAE Workflows

- a defined international standard
- integrated import/export and translation tools
- supported by leading software vendors

**The VMAP standard and import/export interface tools will provide users with a vendor-neutral methodology of transferring material and engineering data between different CAE software along the whole simulation process chain.**

The VMAP project will be demonstrated by different manufacturing use cases:

- extrusion blow moulding (Rikutec)
- composite light weight vehicles (AUDI)
- injection moulding (Bosch)
- hybrid modelling of consumer products (Philips)
- composite component in aerospace (Convergent)
- additive manufacturing (Bosch)

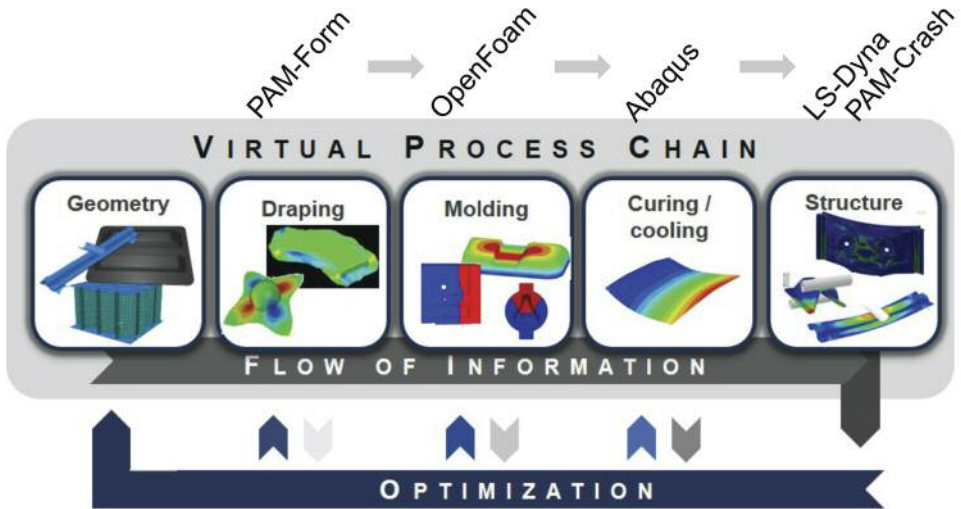
VMAP has already been directly integrated into CAE tools like MSC-Marc, MSC-Nastran, CadMould, PAM-RTM, PAM-Crash, Open-FOAM, COMPRO and RAVEN as well as independent/neutral translation tools like envyo that supports the LS-DYNA suite, Digimat, FiberMap, MpCCI and the ANSA pre-processor.

*The VMAP project objectives are endorsed by Audi, Bosch, EDAG, Rikutec and Philips.*



## Use Case Example – Composite Lightweight Vehicle (AUDI)

Codes integrated in this workflow are: PAM-Form (draping), OpenFOAM (moulding), Abaqus (curing and cooling) and LS-Dyna resp. PAM-Crash (structural analysis).



Kärger, L.; Bernath, A.; Fritz, F.; Galkin, S.; Magagnato, D.; Oeckerath, A.; Schön, A.; Henning, F. Development and validation of a CAE chain for unidirectional fibre reinforced composite components. Composite Structures 132: 350–358, 2015. dx.doi.org/10.1016/j.compstruct.2015.05.047

## VMAP Standards Community

The VMAP Standards Community has been established to drive the standards and software development effort during and after the initial project. We have held 2 web-meetings already but on 23 November 2019 we will hold a face-to-face meeting in Frankfurt, Germany.

We are open to all experts and entities who require successful VMAP standards and tools so please contact us without delay [vmap.eu.com/community](http://vmap.eu.com/community)

### Complex workflow?

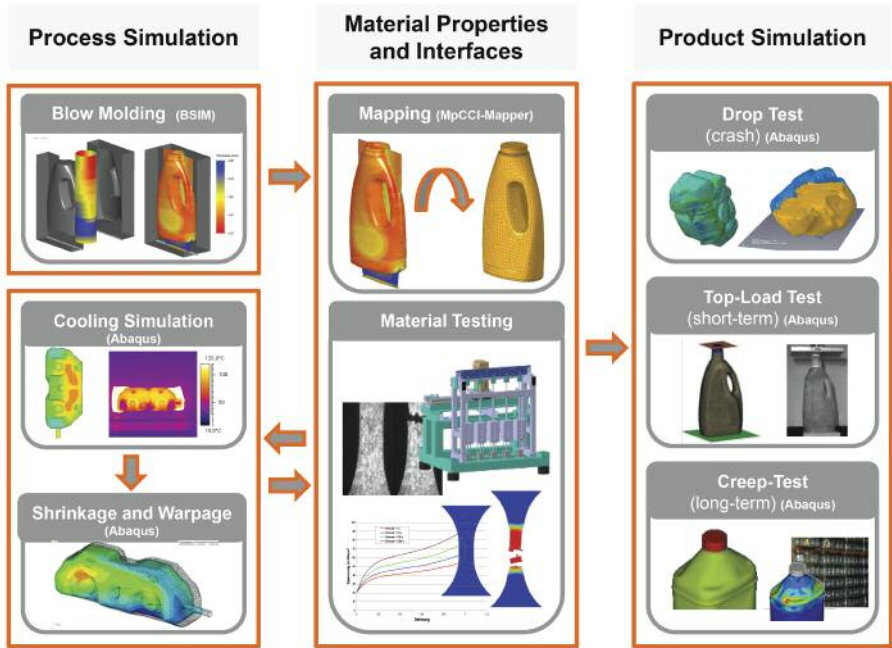
### Difficult material data transfer?

The more simulation processes we look at the better the VMAP Standard will be in a shorter period. Please contact us if you would like us to examine your process and consider it in our work.

[info@vmap.eu.com](mailto:info@vmap.eu.com) | [www.vmap.eu.com](http://www.vmap.eu.com)

## Use Case Example – Extrusion Blow Moulding (Rikutec)

Codes integrated in this workflow are: B-Sim (blow moulding), Abaqus (cooling & shrinkage), Abaqus resp. RADIOSS (structural performance and crash).



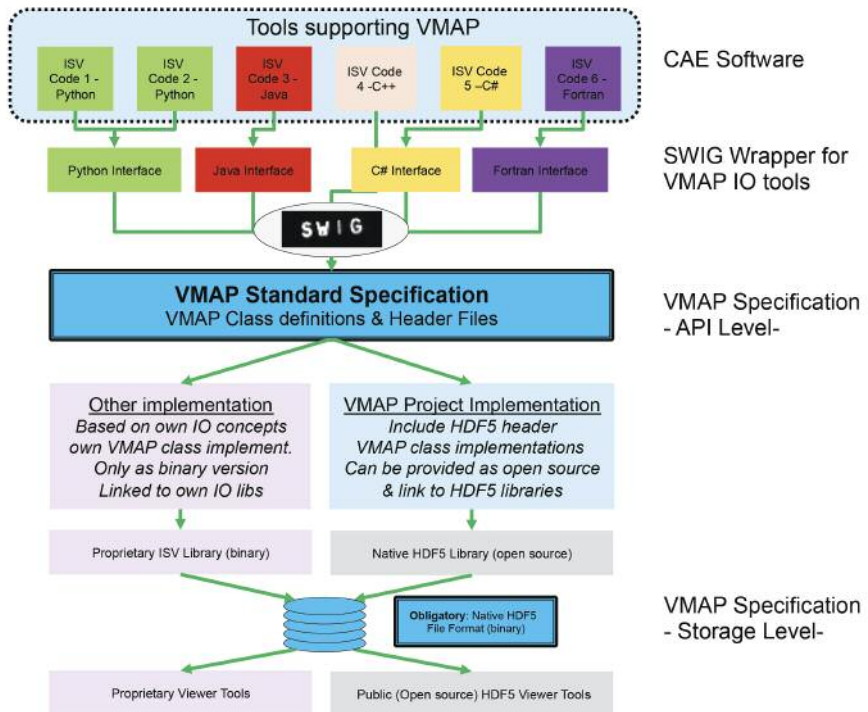
## Help for Software Developers

To enable quick and efficient incorporation of the VMAP standards into any CAE software VMAP will provide a set of Input/Output software tools to write/read directly with the VMAP standard database implemented on top of [HDF5 hdfgroup.org/solutions/hdf5/](https://hdf5.hdfgroup.org/solutions/hdf5/)

These tools will be placed in a **SWIG wrapper swig.org** that will enable CAE software written in any programming language to directly call the VMAP IO tools.

Alternatively, Independent Software Vendors may create their own IO routines for direct and efficient reading/writing to the HDF5 VMAP standard database.

Included in the tools provided for developers will be a series of small test cases that can be used to check the functionality of any implementation.



The project "VMAP: A new Interface Standard for Integrated Virtual Material Modelling in Manufacturing Industry" is organised via the [ITEA programme itea3.org/project/vmap.html](http://itea3.org/project/vmap.html) - project period is from October 2017 to September 2020.

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ITEA is the EUREKA Cluster programme supporting innovative, industry-driven, pre-competitive R&D projects in the area of Software-intensive Systems & Services (SiSS). ITEA stimulates projects in an open community of large industry, SMEs, universities, research institutes and user organisations.

ITEA is a EUREKA Cluster, the community is founded in Europe based on the EUREKA principles and is open to participants worldwide. [itea3.org](http://itea3.org)