

Collaborative Product Visualization (CPV) Final Report

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Abstract

ProSTEP iViP's project group "Collaborative Product Visualization" had the simplification of product data exchange via harmonization of the visualization data exchange as aim. This project final report addresses the non-technical lessons learned as well as the issues. Technical issues are addressed in the recommendation proposal; financial issues are addressed in the project plan.

In this document the project course is reflected. The done work packages are reflected shortly. Parallel developments like the presentation of new visualization file formats or publication of related recommendation during project time are mentioned.

The course of the project didn't work out as originally planned. Some distinctive points are discussed, mostly concerning the small number and slow progress of pilots. It's important to mention that there were only few and slow pilots.

An outlook gives some notes and information which should be regarded on a successor project.

Document History

Version	Date	Author	Description
1.0	Nov 06	Malzacher, J.	Initial Version

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1 Participants

- :em AG
- Adam Opel GmbH
- BMW AG
- Continental Teves AG & Co. OHG
- DaimlerChrysler AG,
- Delphi Deutschland GmbH
- DiK TU Darmstadt
- Knorr-Bremse SfN GmbH
- Keiper GmbH & Co. KG
- Kisters AG
- Küster Holding GmbH
- Parametric Technology GmbH
- PROSTEP AG
- Robert Bosch GmbH
- Siemens AG
- T-Systems International GmbH
- Unigraphics Solutions GmbH

2 Introduction

Around 2004 visualization of product data became one of the subjects to call the public's attention. Visualization means the virtual representation of three-dimensional product geometries outside of CAD-systems. By use of simple viewers much more people are involved in the product developing process, instead of users of 3D-CAD-systems in development departments only. They then are able to use 3D-geometries in terms of view, understanding and analysing.

With this background ProSTEP iViP e.V. commissioned two studies. The first analysed the application of the format JT in different application fields whereas the second study analysed the structure and visualization data exchange.

Due to the great interest the project group "Collaborative Product Visualization" under ProSTEP iViP e.V. 's patronage started its work in January 2005. The aim was the simplification of product data exchange via harmonization of the visualization data exchange. The project group was co-financed by ProSTEP iViP e.V. and the VDA group CAD/CAM. The project's duration was scheduled until July 2006.

When the project group started its work, the technical status of the participating companies differed. Some companies had already successfully established visualization for use within specific areas. The degree of dispersion and acceptance varied from company to company. Other companies were still in the phase of preliminary analysing in order to establish visualization in their companies. This can be best illustrated with the "apocalypse of the two elephants", whether standards are coming too early or too late (Source: D. Clarke, MIT). The participating companies were located on different parts of the curve.

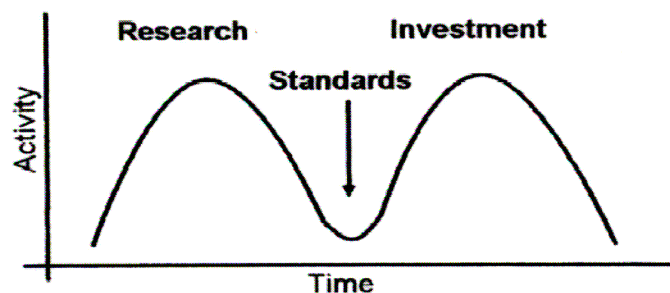


Figure 1: Apocalypse of the two elephants (Source: D. Clarke, MIT)

Dr. Ralf Mendgen, Robert Bosch GmbH, was Project chair, the project was coordinated by Arndt Ufer (until June 30th, 2006) resp. Jens Malzacher, both DiK, TU Darmstadt.

3 Objective

Objective of the project group was the harmonisation of the cross-enterprise exchange of visualization data. The process of data exchange between sender and receiver was to be accelerated by using such light-weighted data. This could be seen as complement to the already existing techniques of exchanging data. All this should be documented in a way fit for being published as a VDA recommendation.

4 Project course

In the following passages the project course will be described. First it is described in a short table. After that the description becomes more detailed. In the last chapter some parallel developments are mentioned.

In the beginning only users with the aim of determining user-specific requirements and thus develop Use Cases participated in the project group. In the second phase, during the implementation in pilots however, vendors and IT-companies participated as well.

4.1 Project time frame at a glance

The project course was as follows:

Time	Activity
Workshop on January 27, 2005	Kick-off, Definition of the interview guideline for the process analysis
Quarter 2/05	
Q 2/05	Realisation of the process analysis in the companies
Workshop on May 19, 2005	Intermediate results of the process analysis Planning of the pilots I
Workshop on June 28, 2005	Publication of the results of the process analysis Planning of the pilots II
Quarter 3/05	
Q 3/05 – Q 2/06	Implementation of the pilots
Workshop on October 11, 2005	Formulation of reference scenarios Intermediate results of the pilots I
Quarter 4/05	
Workshop on December 06, 2005	Intermediate results of the pilots II
Quarter 1/06	
Workshop on March 28, 2006	Presentation of the pilots' results
Quarter 2/06	
Workshop on July 06, 2006	Final Workshop, recommendation of action

Table 1: Project time frame at a glance

4.2 Realisation in detail

In the following passage the realisation is described. For more details please refer to the workshop documentation like minutes and presentations.

4.2.1 1st Quarter 2005

4.2.1.1 January 27, 2005: Kick-off Workshop

Besides the common definition of aims the main focus of the event lay on the elaboration of an interview guideline for the process analysis for the visualisation data exchange within the companies. Within the interview guideline four areas are surveyed: areas of use, process of data exchange use, technical settings and further ideas.

Milestone for the interview guideline was met.

4.2.2 2nd Quarter 2005

During the second quarter of 2005 the process analysis had been performed by the DIK, TU Darmstadt.

4.2.2.1 May 19, 2005: Workshop on the process analysis

By this date about 30 interviews had already been held in four companies in the course of which analyses different departments and fields along the product development could be carried out, e.g. design, manufacturing, purchase and cross-section departments like IT.

During these analyses five Use Cases were identified. On this basis first agreements on the implementation had been made between the workshop participants.

4.2.2.2 June 28, 2005: Workshop on process analysis

The process analyses were completed. About 40 interviews in seven companies had been held.

Following Use Cases were identified:

- Bidding/ Inquiry
 - Sub case Bidding
 - Sub case Inquiry
- Design Review
 - Sub case Design space request
 - Sub case Design in context
 - Sub case Design Package Review
- Engineering Change Information
- Drawingless Design
- Small Supplier Integration

Collaborative Product Visualization

Defining reference processes for the cross-enterprise use of visualization data for **data exchange**, **data access** and **communication**

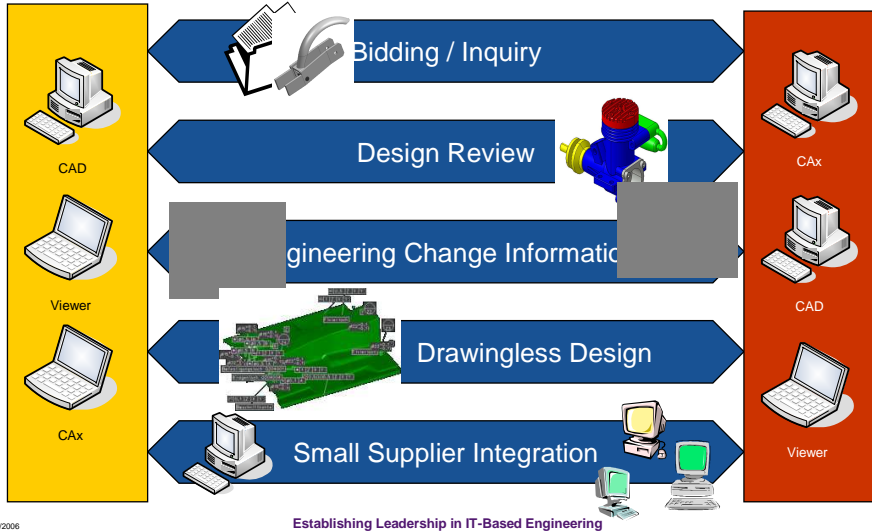


Figure 2: CPV's project graphic showing the five use cases

Further agreements on the implementation had been made between the participants. Altogether 12 pilots were planned to start in the further course of 2005.

During the then starting phase of implementation vendors and IT-companies participated in the project group as well.

Milestone for the process analysis was met.

A discussion on the hitherto existing results showed disagreements on the realisation of data protection, filtering and configuration.

A characteristic for measuring success seemed necessary and was to be queried. Therefore operating figures were developed which count the number and relation of visualization data exchange in volume and number of files compared to the native geometry data exchange.

4.2.3 3rd Quarter 2005

4.2.3.1 October 11, 2005: Workshop on the formulation of reference scenarios/ intermediary results of the pilots I

Use Cases were already defined. Until then no results were achieved by the pilots. A report was given on contacts of a comparable US-American initiative. The way of documenting the pilots was discussed and defined. Furthermore reflection on functionality and requirements on a QChecker were made.

4.2.4 4th Quarter 2005

4.2.4.1 December 06, 2005: Workshop on intermediary results of the pilots II

The already running pilot teams reported their intermediary results. Furthermore several technical solutions for the import of visualization data in CAD, which are necessary for the Use Case "Design in Context", were presented by the IT vendors participating in the project.

As milestone the group decided to continue the project in 2006.

4.2.5 1st Quarter 2006

4.2.5.1 March 28, 2006: Workshop with presentation of the pilots' results

The pilots were delayed, the progress slow. The general acceptance of visualization data was discussed. As they were already behind the original timetable, it was adjusted. As already commenced in the previous workshop technical solutions for visualization data were presented.

4.2.6 2nd Quarter 2006

4.2.6.1 July 06, 2006: Final Workshop

Pilots still ran very slowly. Though there was only a small number of pilots the group agreed to submit recommendation proposals to ProSTEP iViP and VDA.

4.3 Developments parallel to the project group's work

Parallel developments have directly or indirectly influenced the project course. Important topics are listed below in time-line order:

- The VDA guideline 4965 ECM (Engineering Change Management) was published in April 2005. It influences one of the CPV-Use Cases.
- Dassault's format 3D XML was published in summer 2005.
- In August 2005 the SASIG guideline D21 appeared, which describes where visualization data could be used reasonably inside a company.
- In August 2005 the ISO/FDIS 16792 was published, which describes how drawing information should be added to 3D-models.
- In autumn 2005 Adobe's format 3D-PDF was introduced.
- There are more activities concerned to the drawing less process, which started with the SASIG D21 and ISO/FDIS 16792 publication. They often use visualization file formats as information carrier for the PMI information.

5 Marginal conditions making life difficult

The course of the project didn't work out as originally planned. In the following several distinctive points are discussed, mostly concerning the small number and slow progress of pilots:

- Currently existing and defined processes usually don't accept visualization data as input data. Especially the extensively defined processes of OEMs are not flexible enough. The extended use of visualization data is therefore possibly restricted. Accordingly the processes have to be changed. The generation of visualization data out of the processes is no problem via automated tessellation.
- As the implementation of CATIA V5 hasn't been completed yet, and has high priority, additional activities like the implementation of visualization data exchange cannot be carried out due to lack of capacity at the moment.
- Furthermore a "structural" problem exists. Those company members participating in CPV usually work in their company's IT-departments and thus are not allowed to give instructions/directions to those operating the pilots (usually members of the product development departments). The support depends on the good will of these application departments.
- Often, the application of visualization data means more work in the design departments and its advantages appear only in later product creation phases. Without seeing this global advantage the willingness of the design departments to cooperate might be insufficient.
- To be able to operate a pilot on visualization data exchange, the involved companies need to have common projects in a certain phase of project development suitable to CPV's scope. This is not always given despite declaration of intent, so that the pilot has to be postponed.

6 Outlook

The last open topic in CPV is the publication of the CPV recommendation within ProSTEP iViP and VDA. Therefore a recommendation proposal will be submitted at the meetings in December 2006. According to the project groups' decision, not all defined use cases will be part of the recommendation. Only the ones with pilot validated use cases "inquiry/bidding" and "design review" will be mentioned as the recommendation's main scope.

The started survey on the defined collaborative product visualization operating figures will be continued. VDA plans a general survey in which recurring topics are inquired. CPV will be part of the survey.

The topic "collaborative visualization" has not been made sufficiently available yet. For a successor project, CPV2, there already exist some issues. One issue concerns the three not validated use cases, especially how they can be redefined and validated. Another issue consists of the making of an analysis on technical settings. For this issue users need experience in order to state e.g. best maximum chordal errors for tessellation or the best settings for the data exchange itself.

There are some dependencies according the time frame for a possible successor project. First of all the use of visualization files shall be more common within the companies' departments and in companies in general. There shall be appropriate free capacities within companies for performing pilots. This is important for the validation of the not-every-day/not-wide-common use cases. Last but not least new developments in technical issues of file formats and new features in the related software, like viewer, will allow new use cases. Therefore use cases and technical development shall accompany.