



Project no 512897

Project acronym: CADPIPE
Project title: Cad Production Pipeline

SIXTH FRAMEWORK PROGRAMME HORIZONTAL
RESEARCH ACTIVITIES INVOLVING SMES CO-OPERATIVE
RESEARCH

Information society technologies

D21 FINAL REPORT
Full version of the two project years

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VTT Information Technology

Including: Publishable Executive Summary
Including Annex1: Plan for Using and Disseminating the Knowledge (PDK)

Period covered: from 1.10.2004 to 31.12.2006

Date of preparation: 07.02.2007

Start date of project: 1.10.2004

Duration: 27* months

Project coordinator name: VTT Information Technology

Project coordinator organisation name

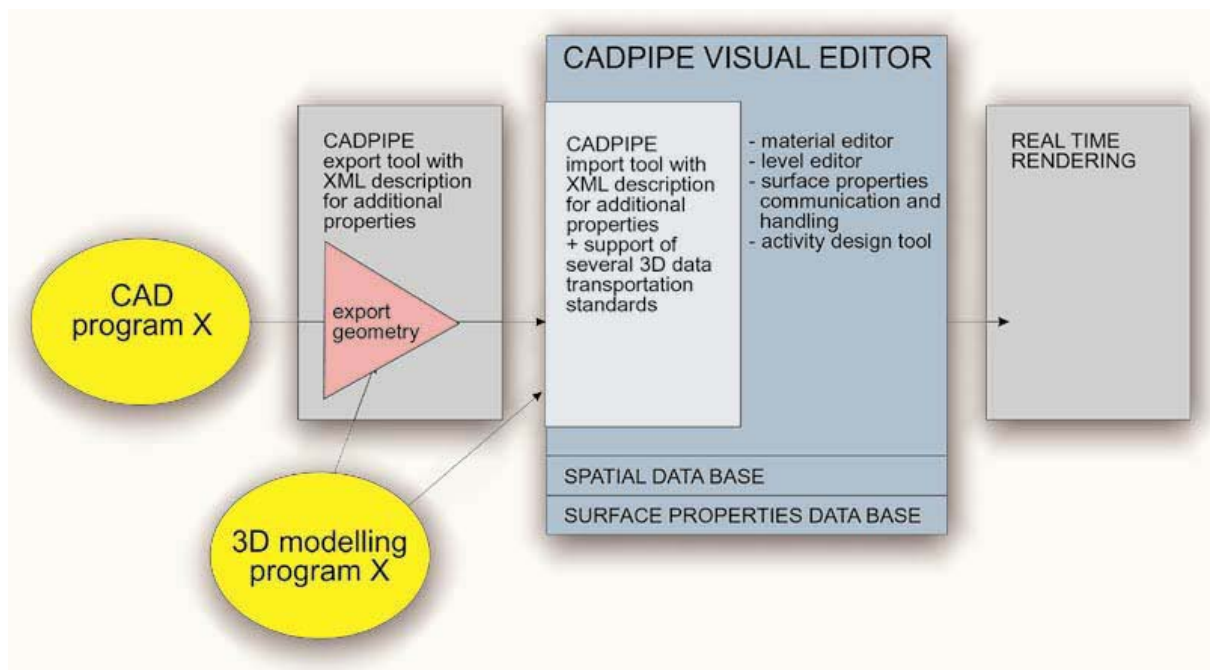
Revision 1.0

*Project was terminated 23.12.2004 - 1.4.2005. Project ended 31.12.2007



C · A · D · P · I · P · E

PUBLISHABLE EXECUTIVE SUMMARY OF THE CADPIPE PROJECT



Cadpipe software product is actually a set of software wrapped behind the one user interface. This makes possible the easy further development and easy to learn usability.

The CADPIPE project aims to build solutions for:

- Decreasing the amount of different working environments to CAD, 3D visualisation and real-time rendering environment. There will be no longer need to use separate format conversion tools between CAD and 3D visualisation tool as well as visualisation tool and the real-time rendering system.
- Smoother data conversion pipeline that allows more accurate information preservation within the pipeline.
- The possibility to add basic interactive and physical behaviour properties to the models in the 3D visualisation phase.
- More efficient real-time rendering performance for the data as it can be prepared in the modelling or visualisation tool to suit the needs for real-time rendering.

Contractors

Partic. Role	Partic. Type	Partiv. No.	Participant name	Participant short name	Country
CR	SME	2	SenseTriX Oy	SENSE	FI
CR	SME	3	NIKI Information Technologies Ltd	NIKI	GR
CR	SME	4	DeltaCad	DELTA	FR
CR	SME	5	<i>InfoTRON A.S.</i>	<i>InfoTRON A.S.</i>	TR
CR	SME	6	DeskArtes	DESKA	FI
CR	SME	7	Ingeniería y Soluciones Informáticas del Sur S.L.	ISOIN	SP
CR	SME	8	SienaBioGraFiX s.r.l.	SienaBioGraFiX	I
CR	SME	9	Melon Technologies JSC	MELON	BG
CR	SME	10	Nemetschek	NEMET	BG
CR	SME	11	TESTALUNA srl	TL	I
CO	RTD	1	VTT Information Technology	VTT	FI
CR	RTD	12	Fraunhofer Institute IFF, Fraunhofer-Gesellschaft zur Foerderung der angewandten Forschung e.V.	FgH/IFF	G
CR	RTD	13	ICI International Computer Institute	ICI	TR
CR	RTD	14	MIRALab, Universite de Geneve	UNIGE	CH

A short History of the Project

The first three months of the project were not effective project time because of the risen problems in the kick-off-meeting led to the termination of the project. The starting date (1.10.2004) was not given until the 23rd of December when the project was rejected by the same letter.

Just some allocated research work in WP1 was made by two RTD partners (by their own risk: 12 FhG/IFF and 13 ICI) the actual full-time project started in the beginning of April 2005.

When having only two months time left of the allocated research, RTDs put all their available effort and resources to the project. This made possible the work to become done in decent time but could not be effecting to the actual submission dates of the deliverables. The gap has been caught till the end of the year 2005 and not any serious delays have occurred.

The project has been running fluently after the official start in 1st of April 2005. Four Technical board meetings and two personal live Technical meetings have been made during the first project year to ensure the software modules' compatibility and seamless work together under the common user interface. Several technical project meetings have been made between the members of separate project teams to ensure the product modules will fulfil the demands of the requirements specifications and follow the demands of the system architecture description.

The second project year 2006 started by the Mid Term Review of the project 19.-20.1.2006 in Izmir, Turkey and the software demonstrations seen in this meeting ensured the SME partners that the CADPIPE product will have the needed properties and the project was expected to bring a good result. After the Mid Term Review, RTD partners had Technical meeting about the software development. The development server was decided to become established and the responsibilities of the software development were checked and appointed for the forward software development. The software development server ensured fluent communication between the software developer partners.

The Technical Board Meeting in 30.05.2006 accepted the deliverables till that date by majority of votes (by 75% or more votes each).

Exploitation Agreement draft was written and demonstrated. Exploitation Plan was demonstrated and new activities were written in the document.

In the beginning of the summer the software modules were ready for modules tests. Some problems with the SME partners were met by installations of the correct test surrounding.

Software integration started during the summer. Integration process was not so easy as it was planned to. First Integrated version of the CADPIPE was uploaded to the software server for partners just a week before the TB meeting and was demonstrated in the TB meeting 15.09.06. Some of the partner had still had time to test the CADPIPE before the meeting to tell their experiences.

CADPIPE Test Co-ordinator Ivan Orvieto (Testaluna) and Professor Aydin Ozturk guided the test period by the most professional way and kept track on the test report timing and prepared the report.

Second stage of the project was testing the integrated CADPIPE test prototype (final testing period was started). The reporting executed by e-mail every time any problem occurred so the RTD partners could do the most effective coding of the software by the response.

Third stage - CADPIPE alpha was developed in the first half of December till the End Term TB meeting.

End Term Meeting demonstrated the final CADPIPE Beta-version product in 14.-15.12.06. in Geneva, Switzerland. Partners were pleased to the project results and accepted the CADPIPE Beta-version product by majority votes. Exploitation Agreement was signed between partners and a common software site owned by partners was established by the domain name CADCHAIN.org for further product development and IPR issues.

All deliverables have been accepted by partners by high number of votes each (75% of partners or more and not a single no vote).

Project budget and person month allocation

The project has finished and pre set targets in WPs and Tasks have all achieved.

The economy and person month activity is about in balance except the minor adjustment in the budget of 13 ICI who couldn't use the whole allocated budget and the research done in early stage of 12 FhG/IFF and VTT so that their allocated budget run out. This did not affect to the tasks which all have been made filling the demands of the DOW and with the good quality accepted by SME partners.

Summary of exploitable public result



The huge amount of time consuming and expensive handwork in Virtual reality and other virtual modelling content providing for real-time-rendering has lead to Cadpipe project.

1. Project PUBLIC web pages 31.5.2005. Address: <http://cadpipe.vtt.fi> Responsible person/RTD: Hannu Kuukkanen/VTT.
Project web pages are open for all and describes the project and delivers the public information and documents as the project result. Web pages may be useful channel in later use with Cadpipe consortium after project. VTT established the project server for the product development and delivery of the project results.
2. Research report on State of the art of material rendering techniques. Published in 31.5.2005 Responsible person/RTD: Nadia Magnenat-Thalmann, In co-operation with: HyungSeok Kim, Stephane Garchery, G. Papagiannakis, Unige Miralab .
State of the art of material rendering techniques report aims to provide a general classification of real physical material properties and their simulation using 3D computer graphics algorithms. Their physical properties are analyzed as well as the general equation that describes the simulation of the reflectance of light when interacts with their surface. Finally various analytical models are illustrated that are currently employed in real-time lighting and shading of such materials.
This report has been published.
3. Research report on State of the art of hardware rendering, parametric surfaces and data reduction. Published in 31.5.2005 Responsible person/RTD: Aydin Ozturk, International Computer Institute, Ege University. In co-operation with Unige Miralab: HyungSeok Kim, Stephane Garchery, Nadia Magnenat-Thalmann.
The objective of this report is to provide a survey of relevant topics and focus on the state-of-the art techniques on hardware based rendering. Lighting models based on Bidirectional Reflectance Distribution Functions were considered and algorithms and corresponding hardware implementations were reviewed.
This report has been published.

4. Research report on current CAD conversion pipelines and standard 3d data formats. Published in 31.5.2005 Responsible person/RTD: Steffen Strassburger, Fraunhofer Institut für Fabrikbetrieb und -automatisierung IFF. In co-operation with Tina Haase.
This report aims to provide an overview of standard 3d data formats. Furthermore it aims on evaluating current CAD conversion pipelines. First of all this text describes the most popular data formats. Afterwards important properties that need to be taken into account for examining the conversion pipeline will be identified and described. As a result this paper suggests an adequate data format that satisfies CADPIPEs demands.
This report has been published.
5. (WP4 task 4.2) XML standard description. Demonstration in 31.12.2005. XML standard description to export properties not supported in transportation file standards. Person responsible: Jukka Rönkkö VTT. XML standard description will be useful only for the further product development of the CADPIPE system at the moment. XML standard description will be free to use for the CAD domain even though it has been designed specially for the use of this project. XML standard description is a document.
CADPIPE software family requires a common data model for inside data handling and for data transmission. The CADPIPE data model bases on the Collada specification created and published by the Collada* Consortium**. COLLADA 1.0 specifications Aug 02, 2004
This document is the description of the classified, constructed Cadpipe project specific 3D data model, easy to code and utilize by the XML technology (for CADPIPE purposes). In this project we have named it as "XML standard description" of the Modelling Data. This work has been assigned to the WP4 task 4.2. XML CAD format standard description can be developed further after the project by the guidance and control of the project consortium or it may be assigned to control of some other domain authority.
This document IS PUBLIC.
6. (WP7 task 7.2) Technology transfer in partners report contains a short users manual of the CADPIPE software and short report about end user lectures and report of activities made to ensure software development partners to understand the structure of the code..
7. (WP7 task 7.3) Seminars, Fairs is a list of public dissemination activities
8. (WP7 task 7. 4) Public Summary of the Final Report contains shord description of the project

Other reports (deliverables) are not public but property of the SMEs.

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FINAL ACTIVITY REPORT OF THE CADPIPE PROJECT

The whole project in a nut-shell

The first three months were not effective project time because of the risen problems in the kick-off-meeting led to the termination of the project. The starting date (1.10.2004) was not given until the 23rd of December when the project was rejected by the same letter.

Just some allocated research work in WP1 was made by two RTD partners (by their own risk) the actual full-time project started in the beginning of April 2005.

When having only two months time left of the allocated research, RTDs put all their available effort and resources to the project. This made possible the work to become done in decent time but could not be without affect to the actual submission dates of the deliverables. The gap has been caught till the end of the year 2005 and not any serious delays have occurred which could have any affection to the work flow.

The second project year started by the Mid Term Review of the project 19.-20.1.2006 and the software demonstrations seen in this meeting ensured the SME partners that the CADPIPE product seems to have the needed properties and the project result was expected to bring a good result.

After the Mid Term Review, RTD partners had Technical meeting about the software development. The development server was decided to become established and the responsibilities of the software development were checked and appointed for the forward software development.

The Technical Board Meeting in 30.05.2006 voted for the deliverables and all were accepted by partners by majority of votes (by 75% or more votes each).

Exploitation Agreement draft was written and demonstrated. VTT's lawyer checked the document by request of the partners to ensure its legalit. Exploitation Plan was demonstrated and new activities were written in the document.

1st and 2nd payment have been paid. VTT proposes that an extra payment (part of the last payment) will be paid to the partners before the last 3rd payment. The suggestion was voted by patners and became accepted by majority of votes 11/14.

In the beginning of the summer the software modules were ready for modules tests. Some problems with the SME partners were met by installations for the correct test surrounding. RTD partners made new executable versions to hinder these problems and the module test were started.

Software integration started during the summer. Integration process was not so easy as it was planned to be due to summer time (summer holidays) and some technical problems in cooperation of software modules. First Integated version of the CADPIPE was inserted in the software server for partners just a week before the coming TB meeting and was demonstrated in the TB meeting 15.09.06. Some of the partner had still had time to test the CADPIPE before the meeting to tell their experiences.

CADPIPE Test Co-ordinator Ivan Orvieto (Testaluna) and Professor Aydin Ozturk guided the test period by the most professional way and kept track on the test report timing and prepared the report D17.

Technical Board meeting in 15.09.06 where the integrated CADPIPE software was demonstrated. The D17 was accepted by the partners by majority votes: 12/14.

Second stage of the project was testing the integrated CADPIPE test prototype (final testing period was started). The reporting happened by e-mail every time any problem occurred so the RTD partners could do the most effective coding of the software by the response.

Third stage - CADPIPE alfa was developed in the first half of December till the End Term TB meeting.

End Term Meeting demonstrated the final CADPIPE Beta-version product in 14.-15.12.06. in Geneva, Switzerland. Partners were pleased to the project results and accepted the CADPIPE Beta-version product by majority votes. Exploitation Agreement was signed between partners and a common software site owned by partners was established by the domain name CADCHAIN.org for further product development and IPR issues.

Section1: Project objectives and major achievements during the project

Designed applications during the first project year (first reporting period) CADPIPE production line:

- in the fly data reduction software (demonstrated)
- tools for 3D data export for modelling (demonstrated)
- properties database (demonstrated)
- spatial data base (demonstrated)
- data converter/s (demonstrated in the 3D export)
- Graphic User Interface (visual out-look demonstrated)

Project's current relation to the state-of-the-art

During the WP1 the End User Query was made among CAD users, modellers and customers. The result was reflecting the previous pre research before the Cadpipe project proposal. End user comments about present problems were rather familiar:

- finding appropriate data for modelling (blueprints, 3 view drawings etc)
- creating of clean light maps.
- our maps have too much points & details for landscape rep. It makes slower down working on it, such as refreshing, zooming, moving, cutting etc.
- most of CADs are not computer friendly.
- it is not as easy as drawing by hand
- lack of automation
- the rendering calculation is time consuming
- animating the humans needs a lot of hand work. The use of a lot of different tools - need a lot of steps...
- -too much handwork, no compatibility

CADPIPE will find a solution to all these problems.

How the end users and their customers see the future of the virtual modelling?

- I think virtual reality technologies and higher performance computers will help modellers for more realistic models and environments
- interactive working will be more easier. Faster operation tools will be available.
- I hope that the interface design of these programmes will get more simple than now which may help to diminish the time. The prices are so high that the universities often can't support these programmes and we can't learn them at school, they teach us Rhino, AutoCAD etc. but after graduation companies ask more complicated ones which are adapted to rapid prototyping like Alias, Catia, Proengineer .. And maybe holograms in 3D would help before stereolithographies
- faster and more automotive processes
- more automatic corrections, less steps, more intuitive approach
- 5 years later an 10 year-old boy can model 3D.
- the enterprise who will have their production automated will have more business. Good luck for this project.

This all previous is reflecting the work in the Cadpipe project.

We aim to a solution which shall reduce the amount of vain hand work and software compatibility problems to raise the profitability and speed up the production pipe line of the real-time-rendering domain.

In the time the project ended no other equal product was visible in the market. Not even around the Collada, which is rather young "standard". If the Cadpipe product can be commercialised in a short time after the project, it will have very good opportunity to have a wide open market available. There are few understandable reasons for that: CADPIPE product is too open compared to commercial products, it bases on most standards and the forward development is easy for any partner. COLLADA description is too young to be trusted in commercial parties other but the core development group. Still it can be clearly visible that COLLADA standard is modern thinking and strong and has all the possibilities to become accepted wider on the seriously thinking CAD modelling domain.

Summary of the objectives for the whole project period

During the WP1 a wide range of research was made on the domain of 3D rendering technology and production

As the result of this stage the Requirement Specification for the CADPIPE product was written. This document is NOT PUBLIC and do not include to the deliverables.

1. Project PUBLIC web pages 24.3.2005. Address: <http://cadpipe.vtt.fi> Responsible person/RTD: Hannu Kuukkanen/VTT.
Project web pages are open for all and describe the project and deliver the public information and documents as the project result. Web pages may be useful channel in later use with Cadpipe consortium after project.
2. Research report on State of the art of material rendering techniques. Published in 31.5.2005 Responsible person/RTD: Nadia Magnenat-Thalmann, In co-operation with: HyungSeok Kim, Stephane Garchery, G. Papagiannakis, and Unige Miralab.
This report has been published.
3. Research report on State of the art of hardware rendering, parametric surfaces and data reduction. Published in 31.5.2005 Responsible person/RTD: Aydin Ozturk, International Computer Institute, Ege University. In co-operation with Unige Miralab: HyungSeok Kim, Stephane Garchery, Nadia Magnenat-Thalmann.
This report has been published.
4. Research report on Real time culling techniques and spatial databases. Published in 31.5.2005. Responsible person/RTD: Aydin Ozturk, International Computer Institute, Ege University. In co-operation with Ahmet Bilgili and Serkan Ensoner.
This report is NOT a PUBLIC document.
5. Research report on current CAD conversion pipelines and standard 3d data formats. Published in 31.5.2005 Responsible person/RTD: Steffen Strassburger, Fraunhofer Institut für Fabrikbetrieb und -automatisierung IFF. In co-operation with Tina Haase in co-operation with all SMEs..
This report has been published.

Additional report was made after an end user query. This document is NOT PUBLIC and do not include to the deliverables.

The actual product design started in WP2

The first step after the research was to write the System Architecture Description which is the tool for the actual software product development. This document is NOT PUBLIC and do not include to the deliverables.

6. (WP2 task 2.1) Surface Property Database description for the usage of the CADPIPE system Demonstrated in 1.9.2005 Development of the surface properties data bank (Properties Database). Person responsible: Jukka Rönkkö VTT. Surface Property Database description will be useful only for the further product development of the CADPIPE system and it's actually a document. The documentation is NOT PUBLIC.
7. (WP2 task 2.2) Material editing tool to the VisualEditor tool-set. Demonstration in 31.12.2005. Person responsible: Steffen Sraßburger FgH/IFF. Material editing tool software will be at the moment for demonstration only. Material editing tool includes a shader and is a software module which can possibly become sold as a separate editor but will be more useful as an integrated software module to some other application. Material editing tool will be integrated to the Cadpipe system. The documentation is NOT PUBLIC.
8. (WP3 task 3.1) Spatial database Demonstrated in 1.9.2005 Development of the spatial database based on the information from phases 1) and 2). Person responsible: Jukka Rönkkö VTT. Spatial database description will be useful only for the further product development of the CADPIPE system and it's actually a document. The documentation is NOT PUBLIC.
9. (WP4 task 4.1) CAD Export tool Demonstration in 31.12.2005 Development of an CAD export tool for STEP AP203, STEP AP214, STL, IGES, 3DS (Kinetix) and Collada. (WP4) to the Visual editor. Person responsible: Jukka Rönkkö VTT. CAD Export tool is a set of software components which will be integrated to the Cadpipe system. CAD Export tool will be developed forward and AutoCAD format support has been suggested to become developed during this project. The documentation is NOT PUBLIC.
10. (WP4 task 4.2) XML standard description. Demonstration in 31.12.2005. XML standard description to export properties not supported in transportation file standards. Person responsible: Jukka Rönkkö VTT. XML standard description will be useful only for the further product development of the CADPIPE system at the moment. XML standard description will be free to use for the CAD domain even though it has been designed specially for the use of this project. XML standard description is a document. This document IS PUBLIC. XML CAD format standard description can be developed further after the project by the guidance and control of the project consortium or it may be assigned to control of some other domain authority.

During the WP4 development in Visual Editor tools

4.3 VisualEditor import tool , 30.3.2006 (actual date: 1.4.2006)

Responsible person/RTD: Steffen Straßburger and Tina Haase
Fraunhofer IFF

4.4 VisualEditor tools to spatial database connectivity (Visual database connectivity), 30.3.2006 (actual date: 1.4.2006)

Responsible person/RTD: Timo Tossavainen and Jussi Markkanen
VTT Information Technology

During the WP5 development in Visual Editor tools

5.1 Activity Designer tool, Design. Responsible person/RTD: UNIGE 31.3.06 first version
(actual date: 1.4.2006) Responsible person/RTD: Nadia Magnenat-Thalmann and
Stephane Garchery, Unige Miralab

Activity Designer Development Prototype was ready in 02.05.2006 and was demonstrated in the TB 03.05.2006

5.2 Level Editor tool, 01.04.06 (actual date: 1.4.2006) VTT, Responsible person/RTD: Timo Tossavainen, VTT Information Technology. Prototype was ready in 02.05.2006 and was demonstrated in the TB 03.05.2006

5.3 Common interface for Visual Editor tool-set. Documentation for CommonUser Interface 01.08.2006 (actual date: 1.8.2006), (final version 13.09.2006)
Responsible person/RTD: Aydin Ozturk, ICI, Ege University

Designed applications during the second project year (last reporting period)

- VisualEditor import tool (demonstrated 30.3.2006)
- Visual database connectivity, (demonstrated 30.3.2006)
- Design of ActivityDesigner (demonstrated 31.3.06 first version)
- Activity Designer Development Prototype (was demonstrated in 03.05.2006)
- LevelEditor (demonstrated 01.04.06)
- Documentation CommonUser Interface (demonstrated 01.08.2006), (final version 13.09.2006)
- All CADPIPE modules ready for tests ready 30.05.06
- Final integration (demonstrated 14.-15.12.06 and CADPIPE Beta-version product ready 31.12.06)

All listed software modules are IPR property of SMEs and any deliverable made are not public.

Section 2 The progress per workpackage

MILESTONE Month 1 of the project in 1.10.04.

Extranet demonstrated in the Kick-off-Meeting 08.10.2004, (published in 01.04.2005). Address: <http://dohaota.vtt.fi>, Responsible person/RTD: Hannu Kuukkanen/VTT in co-operation with all SMEs adjusting browser properties and booking themselves as extranet users. Centra e-meeting system was accepted for e-meetings 08.10.2004.

Extranet is in use of project partners and includes all the project material. Pages will be up-to-date all the time, at least after every Technical Board meeting. All partners have privileges to copy, read and change the documents and data in the Extranet and to participate in conversations and meetings in it.

The first three months were not effective project time because of the risen problems in the kick-off-meeting led to the termination of the project. The starting date (1.10.2004) was not given until the 23rd of December when the project was rejected by the same letter.

Just some allocated research work in WP1 was made by two RTD partners (12 FhG/IFF and 13 ICI, by their own risk) the actual full-time project started in the beginning of April 2005.

Technical meeting in 31.03. - 01.04.2005 in Magdeburg

RTD partners collected the technical meeting in Magdeburg FhG/IFF residences in the end of March. Because of the new start for the project all research tasks had to become checked and time tables up-to-dated following the new DOW written with EU.

FhG/IFF and ICI demonstrated their research made during the first three months.

- VTT presented the renewed DOW and the differences to previous was pointed out.
- WP1 - research definition and goals. The Requirements Specification shall be written during the WP1.
- Internal milestones for defining APIs for each module will be specified.
- WP1- Research Status and Goals. The document: "WP1 Tasks and Responsibilities" was written
- Discussion about the overall architecture of the CADPIPE software and responsibilities was made

- Delivery dates were updated and responsibilities of each partner were added to the deliverables table of DOW (separate document "Delivery Dates" was written).
- VTT presented the architecture plans of the Cadpipe system. (PowerPoint document "CADPIPE Architecture")

Table: A short interview to WP1, responsibilities of research, use cases and user requirements of different modules:

responsible	contributors	module
12 FhG/IFF:	14 Unige	Material Editor
14 Unige:		MaterialMapper
1 VTT:		SceneEditor
1 VTT:	12 FhG/IFF	CADImporter
8 Sienna, 6 DeskA:		Abstract material representation
1 VTT:	14 Unige	Joints etc. Animations
13 ICI:	14 Unige	Reduction module (simplifying, culling, etc.)
14 Unige:	1 VTT, 13 ICI	Lighting and material rendering representation, parameteric rendering

Table: WP, responsibilities and support of software development:

responsible	contributors	module name	correspondence in DOW	comment / deadlines
12 FhG/IFF:	5 InfoTRON, 6 DESKA, 7 Isoin	2.1 Surface Property Database	Surface Property Database	Description of the surface property data. Demonstration 1.9.2005
12 FhG/IFF:	14 UNIGE, 2 Sense, 9 Melon, 10 Nemet, 7 Isoin	2.2 Material editing tool	Material Editor	demo version 19.1.06
14 UNIGE:	2 Sense, 9 Melon, 10 Nemet, 7 Isoin	2.2 Material mapper (part of Material editing tool)	Material Editor	demo version 19.1.06
1 VTT:	10Nemet, 2Sense, 6Deska, 5InfoTRON, 8Siena BioGraFiX	3.1 Spatial database	Spatial database	description of the spatial data for VisualEditor document & demonstration 1.9.2005
1 VTT:	3Niki, 11TL, 7Isoin, 6Deska, 9Melon, 10Nemet	4.1 CAD Export tool	CAD Export	demonstration 31.12.2005
1 VTT:		4.2 XML standard description	XML standard description	document & demonstration 1.12.2005
1 VTT:	12 FhG/IFF, 2 Sense, 9 Melon, 10 Nemet, 7 Isoin	CAD Export / Import Parametric	CAD Export	demo version 19.1.06

WP1 - research definition and goals

- a) Requirements specification is one of the main results (demonstration of the present content suggestion was made) (12 FhG/IFF by assistance of SMEs and all RTDs)
- b) what are the needs in visualisation from the point of view of end users (use-cases of the NEW system 13 ICI + All RTDs)
- c) the domain trends shall be analysed and pointed out the affection to the project results (13 ICI).
- d) what is the most common software used presently in data handling for the visualisation and what are the present methods used in 3D CAD file preparation for real time rendering (13 ICI + 14 Unige)
- e) what are the present most common CAD tools, what is/are the supported 3D data exchange format/s and what is the quality of the data in each export (what properties each CAD tool supports) (12 FhG/IFF + ICI)
- f) what properties will be needed, formats, standards for input (ISO International Standardisation Organisation) (13 ICI + 12 FhG/IFF)

- g) what are the best file formats for the 3D data exchange (real specifications of the formats - what is the real capacity of the standards or other file formats) (12 FhG/IFF)
- h) research for the parametric surface export quality and other problems, graphics cards ... (14 Unige + 13 ICI)
- i) usability of different libraries (14 Unige + 13 ICI + + 12 FhG/IFF)
- j) research for what are the possibilities to control the triangulation. How to get the data into the process in a format this can be made in the latest possible stage (up to the moment of final rendering) (14 Unige)
- k) research for the databases (1 VTT)
- l) research for the data structures usable for the 3D objects, visualisation (lights, textures, materials, physics) and other properties (animation, object hierarchy). (1 VTT+ 14 Unige + 12 FhG/IFF)
- m) How it will be possible to use XML for 3D data and Cadpipe purposes (1 VTT)

We agreed that in the WP1 detailed requirements and use cases will be written of these modules.
Deadline for the WP1 use cases reporting 30.06.2005

During the negotiation, was talked about an idea about to save the CAD information inside the CADPIPE system by using CAD type of knowledge management for example by using OpenCascade as the kernel of different tools.

Fraunhofer Institute promised to focus on the triangulation based solutions and VTT will be concentrating to save the geometry as far as possible.

Research for this will be done in WP1

Dissemination and Exploitation plan and Exploitation Agreement demonstration

VTT declared the present budget after the first 4 month reporting period. The detailed budget situations and reports was seen in the "Budget Review" document.

The new project time table was processed to reflect the deliverables dates and vice versa. This means some changes had to be made in both but the final versions was present in the document "Time Table".

Requirements Specification. To make clear some terms visible in the document:

- support for 3D file formats (not CAD 3D formats)

Material editor, database:

- may include (later) wide range of information about materials, even such which is not connected straight to the visualisation. Like: hardness, flexibility, thickness, mass, the properties needed in physics for example.

About the Export tool:

During the CADPIPE project there will not be developed a separate export for any existing CAD software but utilise the existing by supporting them via their export formats selected after the WP1 as described in the DOW.

In the Requirements Specification there will be seen also a list about the Features Required. To point the interest in the properties SMEs have to name them by some of the following labels each:

1). Has to be 2). Nice to have 3). Not important or Option

The base document for the Requirements Specification will need a more processing before it is ready to be sent to the SMEs

Dissemination and Exploitation plan draft was interviewed to the partners.

Exploitation Agreement draft was interviewed to the partners.

Because of the need of some project module renaming the new names will be mapped to the DOW names and WP numbers in the table of deliverables.

MILESTONE Month 8 of the project in 31.5.05.

WP 1 was completed in 31.5.05. Some research continued in certain areas (new Collada 3D model standard) which required further efforts from the Consortium in order to ensure the best results.

All research in WP1 was submitted in time as first versions. **Technical Board meeting in 22nd of June 2005 (10 of the 14 partners were represented)** confirmed that the partners had received the deliverables of the WP1 which were sent by e-mail on 1 June. The participants of the Technical Board Meeting had no objection to the deliverables.

Some additions (mainly pictures) had to be made and final version deliverables (reports) were submitted in the 21.6.05, only three weeks late from the stated date of 31.5.05.

The first set of deliverables: D1 (1 VTT, 14 MiraLab), D2 (14 MiraLab), D3 (13 ICI, 14 MiraLab), D4 (12 FhG/IFF, 14 MiraLab) and D5 (1 VTT, 14 MiraLab) were accepted by 100% votes of the partners present and one "Yes" vote by e-mail. This makes 78,5% of total consortium (not a single "No" vote).

The Requirements Specification was written (first draft in 4.5.2005 by VTT and final version of the WP1 in 20.5.05 by all SME partners by the guidance of 2 Sense as the SME co-ordinator)

First drafts of both Exploitation Plan and Exploitation Agreement were prepared by the SME partners involved (2 Sense, 6 DeskA, 5 Infotron).

A draft document had been prepared to which inputs from partners were requested as early stage as possible. Exploitation Agreement document defines the IPRs of the deliverables and need to be carefully planned by the end of 2005. The IPRs are planned to be allocated to the partners according to their person months in the project (All SMEs). There were further discussion about the exploitation plan and agreement in the following Technical Board Meeting.

Before starting the programming phase of the project, questions related to the architecture, application interface and specific RTD problems had to become planned. A new version of the Requirements Specification (2 Sense, all partners) was submitted to the partners, separate use-cases were written for every CADPIPE tool.

ICI made a short end user query about user needs and their approximation of coming trends of the domain. The query was reported as well during the WP1. The functionality was ranked as the first property required, second was reliability and third property was interoperability. The fourth meaningful property was cost, among the 25 listed properties of the tool.

Co-ordinator (1 VTT) had prepared Excell Reporting template which helped partners in reporting follow-up. The Project Coordinator had distributed templates to which the Consortium partners had asked to add their expenses and personnel months / hours in the Cadpipe project. The partners were urged to fill and submit these templates to the Co-ordinator by the end of July at latest. Reporting the work in WPs and tasks had been made in periods of six months which makes easier the project follow-up for the co-ordinator. During this first reporting period, not any serious delays had been made. HyungSeok Kim (14 UNIGE) prepared the mailing lists for RTDs and SMEs to allow voting on Technical Board Decisions

CADPIPE product development:

MILESTONE Month 12 of the project in 30.9.2005

Deliverables D6 and D8 were submitted 1.9.2005 and accepted by partners in Technical Board meeting in 4th of October 2005 by 100% votes. **11 of 14 partners were present 4.10.2005.** Actual submission date was 30.9.2005 and additional writing time had to be asked from EU.

Additional documents to the deliverables were: System Architecture Specification and Exploitation Plan.

System Architecture Specification was demonstrated in the TB meeting and accepted by partner

WP2 2.1 Surface Property Database demonstration was made (12 FhG/IFF).

WP2 3.1 Spatial database demonstration was made (1 VTT, 10 Nemet).

Exploitation Manager had processed the Exploitation Plan to the first version and promised to send it to the partners for comments.

Suvi Kivipuro, VTT had few words about the project economy.

Suvi sent out the new reporting template to all by the end of October.

Tasks and timetable for the rest of the project year was handled. The timetable and responsibilities in every task was seen in the separate table "**WP, responsibilities and support of software development**"

The meeting came to a conclusion that Mid Term Review and Technical Board meeting for demonstrations in January will take place in Turkey in the end of January 2006.

Technical meeting was suggested. The call for this meeting was sent by e-mail.

Technical Meeting by RTDs was held in Geneva, Swizerland 13.10.2005.

All RTDs were presented. Common negotiation about the technical details of product design was important to get the product modules work together later. The APIs (Application Protocol Interface) were under discussions.

Issues on the table:

- Short interview from each RTD if any coding has been made
- One of the important issues needed to become solved was WP2 integration. This was discussed later in between FgH and MIRALab i.e. how SceneEditor, Activity Designer and MaterialEditor/Mapper will be combined.
- Tasks to be done till the end of December. A clear concept was made on who is going to do what and how the several modules will interact with each other.
- Model DB design and implementation

Table: A short interview to WP4-5, responsibilities of research, use cases and user requirements of different modules:

responsible	contributors	module name	correspondence in DOW	comment
MELON	DeskA, ISOIN, Melon, Nemet, TL, MiraLab, FgH/IFF, VTT, ICI	Objective of this task is to design the Export/Import tool of selected data formats and the tools for spatial database connectivity	4.3 Export/Import tool the 4.4 VisualEditor tools to spatial database connectivity D11, D12	Module for testing
FgH/IFF	MiraLab, VTT	Export/Import tool	Export/Import tool	Module for testing
VTT	DeskA, ISOIN, Melon, Nemet, TL, FgH/IFF, ICI	the tools for spatial database connectivity	Tools for spatial database connectivity	Module for testing
VTT	MiraLab, ICI	Spatial database manipulation tools	Spatial database manipulation tools	Module for testing
UNIGE	Sense, DeskA, ISOIN, Siena, MELON, NIKI, NEMET, TL, ICI	Activity Designer	Activity Designer	Module for testing
ICI	MiraLab, FgH/IFF, VTT,	GUI Graphic User Interface	User Interface	Documentation, modules for testing

Partner activity in the WorkPackages

Avtity	Sen se	Niki	Delta	Infot ron	Desk a	Isain	Siena	Melon	Nem et	TL	IFF	ICI	UNIGE	VTT	total	assign ed
WP4	0,00	4,50	0,00	0,00	0,44	1,95	0,00	4,07	1,40	2,00	7,57	7,18	2,26	4,25	35,61	35,61
WP5	1,08	0,00	0,00	0,00	0,44	1,35	1,40	3,92	1,40	2,00	7,31	0,44	2,26	5,38	26,97	26,97
Manag ement	0,12	0,18	0,25	0,00	0,14	0,37	0,06	0,60	0,49	0,00	0,15	0,08	0,00	0,00	2,44	2,44
total															65,02	65,02
	1,20	4,68	0,25	0,00	1,02	3,67	1,46	8,59	3,29	4,00	15	7,70	4,52	9,63		

WP4-5 – research and development of the software - definition and goals

- 1. VisualEditor import tool(WP4)** Development of a tool for Visual Editor system (Spatial Import tool). To get all the designed properties out of the 3D-modelling system, the special tool will be needed. By this program, the data will be in correct format for the spatial database. The data will be forwarded as best possible data feed for the use of the real time rendering through rendering export..
- 2. VisualEditor tools to spatial database connectivity (WP4)**
- 3. Development of a spatial database import tool for the Visual Editor system. (WP4)**
When exporting data form the Visual Editor tool all properties should be added from Properties Database to the visualisation data and handled correctly for rendering. This will need also a data reducer program for optimising the amount of data fed to the real time rendering engine and conserving the correct geometry.
- 4. Development of activity design tool (WP5)** for the Visual Editor system. The design tool gives possibility of adding extra properties in the 3D-visualisation phase. The data preparation include attaching physical and interactive properties to the objects during the export action as well as performing data segmentation suitable for the database

5. **Design of the level editor tool. (WP5)** A separate level editor will handle visualisation of levels of detail preparation for viewing the data
6. **Design of the Common Visual Editor User Interface (WP5)** This user interface collects the Visual Editor toolset to one solution easy to use and utilise

WP1 detailed requirements and use cases had been followed in the software development.

In the **Requirements Specification** document. To make clear some terms visible in the document:

- support for 3D file formats (not CAD 3D formats)

Material editor, database:

- may include (later) wide range of information about materials, even such which is not connected straight to the visualisation. Like: hardness, flexibility, thickness, mass, the properties needed in physics for example.

About the Export tool:

During the CADPIPE project there will not be developed a separate export for any existing CAD software but utilise the existing by supporting them via their export formats selected as described in the DOW.

In the Requirements Specification there will be seen also a list about the Features Required.

To point the interest in the properties SMEs named by some of the following labels each:

1). Has to be 2). Nice to have 3). Not important or Option. All "Has to be" labelled properties have been included to the software. All the others are possible to add without any other limitation but the project time and funding resources.

Milestones for WP4-5: The VisualEditor tools will be developed and demonstrated till the month 17th and 19th and 23rd and the Beta version of the CADPIPE system will be ready till the end of the project month 24. After the project this software will be developed forward to the commercial products by partners.

MILESTONE Month 19 of the project in 1.4.2006.

During the WP4 development in Visual Editor tools

4.3 VisualEditor import tool, was demonstrated in the Technical Board meeting in 03.05.06, (ready in 30.3.2006). Responsible person/RTD: Steffen Straßburger and Tina Haase, Fraunhofer IFF in co-operation with SME partner Niki. Software was demonstrated and accepted in e-meeting 03.05.06.

4.4.1 VisualEditor tools to spatial database connectivity (Visual database connectivity) was demonstrated in the Technical Board meeting in 03.05.06, (ready in 30.3.2006). Responsible person/RTD: Timo Tossavainen and Jussi Markkanen VTT Information Technology by assistance of SME partners: Niki, Melon, Nemet, Isoin, TL, Isoin, DESKA
Software was demonstrated and accepted in e-meeting 03.05.06.

4.4.2 VisualEditor to spatial database connectivity and SceneEditor (Visual database connectivity), (ready in 30.3.2006)
Responsible person/RTD: Timo Tossavainen and Jussi Markkanen
VTT Information Technology with SME partners: Niki, Melon, Nemet, Isoin, TL, Isoin, DESKA
Software was demonstrated and accepted in e-meeting 03.05.06.

During the WP5 development in Visual Editor tools

5.1 Activity Designer tool, Design. Responsible person/RTD: UNIGE first version (ready in 30.3.2006)
Responsible person/RTD: Nadia Magnenat-Thalmann and Stephane Garchery, Unige Miralab by cooperation of SME partners: Sense, Melon, Nemet, Isoin, Siena BioGraFiX, TL
Activity Designer Development Prototype was ready in 02.05.2006 and was demonstrated and accepted in e-meeting 03.05.2006

5.2 Level Editor tool, (ready in: 1.4.2006) VTT, Responsible person/RTD: Timo Tossavainen, VTT Information Technology by assistance of SME partners: Sense, Melon, Nemet, Isoin, Siena BioGraFiX, TL. Prototype was ready in 02.05.2006 and was demonstrated and accepted in e-meeting 03.05.2006

5.3 Common interface for Visual Editor tool-set. Documentation for CommonUser Interface 01.08.2006 (actual date: 1.8.2006), (final version 13.09.2006)
Responsible person/RTD: Aydin Ozturk, ICI, Ege University by assistance of SME partners: , Sense, Isoin

During the WP6 Industrial tests

Milestones for Industrial tests were assigned to month 19 and 23 and 26

6.1 Preparation for Industrial tests document writing was led by Guy Hubert as responsible person to the task from SME Delta and assisted by Hannu Kuukkanen RTD/VTT. First version was ready in 31.03.06 and was demonstrated and accepted in e-meeting 03.05.2006

Work-package No	Workpackage title	Lead contractor No	Person months	Start month	End month	Deliverable No
WP6	Industrial tests	11	33,16	8	26	D16, D17,

Work package leader is 11 SME TestaLuna (Italy)

Responsible SME was TL and responsible person for this work package is Ivan Orvieto
Responsible RTD for this work package is ICI.

6.2 Industrial tests

Deliverable was ready in 15.9.2006 (actual date 1.8.).

The whole CAD production pipeline and its components has been tested and validated during the development process and in the end as the Beta-version. The 3D design industry SMEs participating in the project are using the system in different bordered circumstances of their business like: importing the 3D data of their customers and pre-preparing it for real time rendering with all the properties needed. After the test period, reports has been written and Test Co-ordinator left them to the RTDs, Software Development Managers and Task Co-ordinators responsible for the product development to make all needed corrections ready for the final demonstration which took place in the End Term Review meeting in the end of the project.

WP6, responsibilities and contributors of tasks of product tests

responsible	contributors	module name	correspondence in DOW	comment
TL	MiraLab, InfoTron, Deska, Isoin + VTT	Surface Property Database	Surface Property Database	storage and retrieval of mapping between a material class and its visual representation storage of material parameters: basic texturing, bump/normal mapping, reflection model
INFOTRON	MiraLab InfoTron, Deska, Isoin + UNIGE	Material editing tool to the VisualEditor tool-set	Material editing tool to the VisualEditor tool-set	Capability to interactively query objects by object name or class and to load from the spatial database for visual inspection capability to visually edit material parameters and to retrieve and store them into the surface properties database
DESKA	Nemet, Sense, InfoTron, Deska, SienaBiografix, + FgH/IFF	Spatial database	Spatial database	Storage and retrieval of multiple world descriptions including object locations, constraint references and class information of objects (what type they are) Capability to store object descriptions graphics geometry and object class as well as references from surfaces to material database materials query from a specific world or from the object repository query by object distance from a specific world query by constraint name from a specific world or Constraint Repository

	other	other	other	other	WP leader	other	other	other	other	other	other	other	other	other
Partner Nr.	2	3	4	5	6	7	8	9	10	11	1	12	13	14
Man months	2,04	3	1,74	2,49	1,0	4,2	2,2	3,6	3,78	2,70	0,52	0,18	5,02	3,97

WP7 Dissemination tasks

Tasks of WP7 Dissemination	Sub Tasks	Deliverable	Type & content	Milestone	Assessment criteria
7.1 Dissemination and Exploitation plan		Technology and knowledge dissemination and exploitation plan agreed by partners	document	Month 8	Acceptance of partners
	7.1.1 Validation	Validation of the commercial viability of the application, including feature benefits and cost implications, by representatives of the target market sectors	document	Month 22	Acceptance of partners
7.2 Technology transfer in partners		Assimilation of knowledge by the SME partners	other	Month 27	Acceptance of partners
	7.2.1 Assimilation				
7.3 Seminars, Fairs		Representation material, articles	other	Month 27	Acceptance of partners
	7.3.1 Represent. in fairs, Seminars				

7.4 Final Report				Month 27	Acceptance of partners
	7.4.1 Collecting the project report				
		Collecting all information and writing the report into finalised format	report	Month 27	Acceptance of partners
7.5 Dissemination and Exploitation report + Exploitation Agreement		Writing the Dissemination and Exploitation plan and processing the Exploitation Agreement with partners	documents report	Month 27	Acceptance of partners
7.6 Dissemination of the knowledge			document	Month 8,22,27	

The person months of partners responsible.

other	other	other	other	other	other	other	other	other	WP leader	other	other	other	other
Sense2	NIKI 3	Delta4	INFO5	Deska 6	ISOIN 7	Siena 8	Melon 9	Nemet 10	TL 11	VTT 1	IFF 12	ICI 13	MiraL14
3,6	2	2,04	3,99	2,14	4,2	1,4	1,41	1,68	2,60	0,52	0,18	5,02	1,70

The objective for this work package has been to design The Dissemination and Exploitation plan, including PDK (Plan for Disseminating the Knowledge) is the document to draw the guidelines for the dissemination and exploitation progress and to embed the Exploitation Agreement, which is the result and a part of it.

Technology transfer in partners have been made in meetings by demonstrations and by the research reports written and delivered during the project. Several talks in seminars and demonstrations in fairs have been made by written slides and leaf-lets.

The most important issue during this WP has been the technology and knowledge dissemination and assimilation of knowledge by the SME partners. During the project has been written representation material, articles and conference papers and collected all information as reports into finalised format. About four non-confidential deliverables have been written for publications.

Exploitation of the results of R&D projects should lead to the situation where partners should also see the project as part of their actual business, rather than a marginal activity.

The only draw back was the IST2006 exhibition where the CADPIPE project did not get the stand. There were three of the CADPIPE project partners present in the IST2006 conference or exhibition and networking sessions. From this point of view the IST2006 was actually fruitful.

Several other exhibitions, seminars and articles in publications and papers have been carrier out.

The following list will make clear, that at least 15 thousand persons have heard about CADPIPE or seen the demonstration. This work will continue after the project.

WP8

Work-package No	Workpackage title	Lead contractor No	Person months	Start month	End month	Deliverable No
WP8	Management with EU	1	1,8	1	27	D21, D24

VTT as the project coordinator has been running the project by rules and demands of EU and prepared all the documents under VTT Information Tehcnology's quality control.

Section 3 on Consortium Management

Project has been separated in about four month milestones over the two years of the project

This refers to the submission of the Deliverables and Technical Board meetings for demonstrations and to vote for the acceptance of the deliverables and other project result. The second project year consisted of 5 milestones, 15,19,22,25 and 26 last project month was the 27 (12.2007).

MILESTONE Month 1 of the project in 1.10.04.

The first three months were not effective project time because of the risen problems in the kick-off-meeting led to the termination of the project. The starting date (1.10.2004) was not given until the 23rd of December when the project was rejected by the same letter.

Three of the original partners resigned because of the misunderstanding of the funding type. Two of them were represented (drawn with in the project) by the same consult and the third has been joining to the consortium in late stage and did not read carefully the rules of the Craft funding sent to them. These SMEs did not sign the Consortium Agreement, so VTT as Co-ordinator, came to the conclusion they were not with in the consortium any more and by the acceptance of the signed consortium searched and hired new partners to replace them. This issue lead to the contact of the European Commission after the reclamation of late three partners. The partners were ready to resign the consortium peacefully after the meeting with EC officers in Brussels in 21.01.2005

Participants of the EC meeting:

EC: Stefan Weiers, Fotini Zianga, Joachim Ball

SMEs: ISOIN, Carmen Aguilera (Spain), Sensetrix, Seppo Laukkanen SME co-ordinator (Finland), Vebco and M-Bis (Germany), represented by Markus Lueken

RTD: Fraunhofer Institute, Steffen Starsburger (Germany)

Co-ordinator, VTT Information technology (Finland): Pekka Silvennoinen Executive Director and Hannu Kuukkanen, project manager

Tekes (Finland): Erja Ämmälähti, Counsellor, Technology and research

After this meeting the new DOW was written, some declaration about the suitability of the two new partners: Testaluna and Siena Biografix had been made (InfoTron was accepted by the EC by the present description sent by co-ordinator) and the new start of the project was negotiated with EC.

For the management, documentation repository and information purposes CADPIPE Extranet was published in 01.04.2005 after the new DOW and start for the project had been accepted.

Centra e-meeting system was accepted for e-meetings in 08.10.2004. Centra has been used for some consortium meetings during the project.

Extranet is in use of project partners and includes all the project material. Pages will be up-to-date all the time, at least after every Technical Board meeting. All partners have privileges to copy, read and change the documents and data in the Extranet and to participate in conversations and meetings in it.

Between the Technical Board meetings which are the executive meetings of the project, the wider Technical meetings has been as face to face meetings in between the TB meetings. Smaller technical meetings have been taken place inside the WPs by e-meetings and e-mail exchange.

The light Scype e-meeting application has been chosen for this purpose.

Technical meeting in 31.03. - 01.04.2005 in Magdeburg (all RTDs were represented)

RTD partners collected the technical meeting in Magdeburg FhG/IFF residences in the end of March.

Because of the new start for the project all research tasks had to become checked and time tables up-to-dated following the new DOW written with EU.

FhG/IFF and ICI demonstrated their research made during the first three months.

The document of the WP1, responsibilities of research, use cases and user requirements of different modules was written.

MILESTONE Month 8 of the project in 31.5.05.

WP 1 was completed in 31.5.05. Some research continued in certain areas (new Collada 3D model standard) which required further efforts from the Consortium in order to ensure the best results.

All research in WP1 was submitted in time as first versions. **Technical Board meeting in 22nd of June 2005** confirmed that the partners had received the deliverables of the WP1 which were sent by e-mail on 1 June.

HyungSeok Kim (14 UNIGE) prepared the mailing lists for RTDs and SMEs to help e-mail voting on Technical Board Decisions

CADPIPE product development:

MILESTONE Month 12 of the project in 30.9.2005

Deliverables D6 and D8 were submitted 1.9.2005 and accepted by partners in **Technical Board meeting in 4th of October 2005** by 100% votes . **11 of 14 partners were present 4.10.2005**. Actual submission date was 30.9.2005 and additional writing time had to be asked from EU.

Additional documents to the deliverables were: System Architecture Specification and Exploitation Plan.

System Architecture Specification was demonstrated in the TB meeting and accepted by partners.

WP2 2.1 Surface Property Database demonstration was made (12 FhG/IFF).

WP3 3.1 Spatial database demonstration was made (1 VTT, 10 Nemet).

Exploitation Manager has processed the Exploitation Plan to the first version and promised to send it to the partners for comments.

Technical Meeting by RTDs was held in Geneve, Swizerland 13.10.2005.

Common negotiation about the technical details of product design was important to get the product modules work together later. The APIs (Application Protocol Interface) were under discussions.

- GUI draft was discussed to be important to start as soon stage as possible to avoid problems in user interface design later.

MILESTONE 15, 31.12.2006

CADPIPE MEETING in Izmir

ICI 19.-20.1.2006 (partners' Mid Term Review)

10 partners of 14 were present

The low participation number may have reasons in the busy time near the change of the year. The other remarkable reason might have been the Bird Flue news from Turkey.

In spite of the low presence of the partners the meeting was very fruitful and the demonstrations seen, filled all expectations of getting a good product as the final result.

Supported standards (situation in 19.-20-1-2006)

- Import/Export: Iges, Step (AP203 and AP214), 3DS, OpenFlight, LightWave, Vrml, Collada (see Compatibility list as Excel)

CADPIPE Data format is Collada which can be stored in several types of data bases, even as a normal folder structure. XML structure is based on Collada format

-System Architecture Specification (doc) up-to-date version was presented by no comments

- Short interview of the present situation in reporting and project economy as

project report (Excel table). Budget in numbers were seen as Excel table. Some reports did not reach VTT to became added to the table. VTT will add the numbers to the final table and send it when ready.

- the report effects to the budget were discussed. EU pays after the reports and payment will follow the reported costs.

- about the reported expenses (valid costs). The acceptable costs were taken under conversation. Most problematic seemed to be the "other costs" and "consumables". Suvi Kivipuro sent a short description about this issue.
- auditor's report should not be needed in the Mid Term but in the end of the project
- The next steps of the project will be continued in the timetable. Not any remarkable problems were visible after the first project year.

Demonstrations

Project as WPs:

WP2 - 2.2 Material editing tool to the VisualEditor tool-set was demonstrated by 12 FhG/IFF and 14 Unige

WP4 - A4.1 CAD export tool design. Development of an Export/Import tool for the Visual Editor tool-set for multiple (six) selected open or standard formats export were demonstrated by 1 VTT

- A4.2 XML export standard description was demonstrated by 1 VTT

WP5 - GUI draft was demonstrated by 13 ICI. ICI had an extra demonstration in BRDF models and Nurbs Rendering

- ICI's demonstration on **common user interface** was made. The development was started in the beginning of this year but the seen results were encouraging and pointed the UI to become easy to use. The actual demonstration/deliverable date for UI will be in 30.8.06 but the UI design should be ready in 1.6.06 for integration. Other demos of ICI: BRDF models and Nurbs Rendering

- the two modules of the **MaterialEditor** were demonstrated. Overlapping properties should be checked. Demonstrations were made by Unige, Hyung Seok Kim, Mustafa Kasap and Fraunhofer IFF, Tina Haase,

GLSL implementation of BRDF (Oren Nayer, Phong, CookTorrance) models demonstrated. CURET (<http://www1.cs.columbia.edu/CAVE/curet>) BRDF model parameter database and its application on the material editor are presented. Basic GUI components including OpenSceneGraph View component, Property Editor Window Component (Similar to TreeView), Docking-Hiding toolbar window component which used in Material editor and their usage are also presented.

- **polygon simplification** module was demonstrated by Hyung Seok.

- VTT's demonstrations by Timo Tossavainen

File loader (Cad Export) for six file formats as promised in DOW. Present standards for Import/Export: Iges, Step (AP203 and AP214), 3DS, OpenFlight, LightWave, VrmI, Collada (separate compatibility list as Excel in extranet). After the loading, 3D objects were manipulated on the screen. AutoCad format support was suggested to become added among supported standards.

XML structure demonstration. CADPIPE will use a subset of Collada internally. We discussed partitioning Collada to Spatial, Object, and Material databases in CADPIPE. Collada's ownership changed from Sony to Khronos Group. Also, Collada seems to be focused on games at the moment, but this has no adverse effects on CADPIPE development. Collada 1.3.1 specification has been published and it is open.

- IPRs were explained to be free for commercial use in open source code and in UNIGEs libraries

CADPIPE Technical Board Meeting in 03.05.2006

E-meeting on Wednesday the 3rd of May

Reporting was accepted by EU and the payment was sent to partners following reported person months by the Consortium Agreement Annex3. (point 5)

The reporting of the partners was rather well following the allocated PMs.

Some deviations occurred but they can be balanced during the last project year.

The product development has been mainly done and the project was near to start the evaluation and test period. Tests were started by module testing and what had to be done before the full production line evaluation was the integration of the modules. RTD partners had the technical meeting for this reason after TB.

Presentations were made and all the deliverables were accepted by clear majority 10/14

Other issues:

Outside the WPs: The Exploitation Plan document. Had been up-to-dated and the second version had been sent few days after this meeting.

Outside the WPs: The Exploitation Agreement document. This document was designed by Ismo Mäkelä (DeskArtes) and was checked by VTT's lawyers to become checked by legal point of view.

Outside the WPs: The Evaluation Process Plan draft. was on the progress with DeltaCad Guy Hubert. The document was be sent to partners with other documents after the TB meeting

ICI and the grant rules in Annex5 were discussed and clarified.

1st and 2nd payment was paid. VTT proposed that an extra payment (part of the last payment) will be paid to the partners before the last 3rd payment. This was accepted by majority votes.

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Technical Board Meeting in 15.09.2006

WP6 Task 6.2 Industrial tests

Was demonstrated and accepted in this meeting

About the test arrangements

Some problems with the module installation EXEs were reported and new versions were prepared and installed to the test server. By the test reports, all SMEs had the latest version installed to their computers.

The maturity of the modules

The properties in the first test modules did not contain all the needed properties but the evaluation process had to become launched in time to ensure time enough for evaluation before the summer holidays. We got fast responses by no delay by e-mail, which was very important. CADPIPE Test Co-ordinator Ivan Orvieto (Testaluna) and Professor Aydin Ozturk guided the test period by the most professional way and kept track on the test report timing and prepared the report D17.

Support of file formats up to 33 at the moment

CADPIPE import filter supports 33 file formats at the moment. The compatibility list will be delivered to partners. The most important file format were listed during the tests. One of the most important information we got was the properties each format imported to CADPIPE.

Dissemination of the project

- ICRPM conference in Espoo (international conference on rapid prototyping and manufacturing) VTT had a demonstration on the CADPIPE project in the conference and got connections to six conference members for later contacts. This conference demonstration and my presence in the Finnish radio, raised as well national interest of Seamk which is a high school and known as an active hub of the wide furniture design domain in western Finland.
- IST2006 Helsinki (PEACH (presence) & INTUITION, (Network of Excellence, EU-funded network of nearly 60 partners) VTT is a partner of INTUITION and tries to get CADPIPE visible in IST

Presentation of the integrated CADPIPE

was seen as Video clip. CADPIPE as one tool by VTT
Timo Tossavainen. Latest version of the product EXE file was delivered by the project test server in the beginning of the week 39.

Management during the final reporting

For final reports VTT sent the reporting forms and instructions to partners in 04.01.07.

We reminded that the audit certificate should cover the period from 1 Oct 2004 to 31 Dec 2006. Our EU secretary attached the model audit certificate (financial guidelines, EC) and the check-list and named C forms. Audit certificates were asked to become sent to VTT FIRST by email latest on 31 Jan 2007 for checking!

After checking the documents VTT gave permission to send the 2 original, signed and stamped ones to VTT.

We reminded partners that the form C: should cover the period from 1 Jan 2006 to 31 Dec 2006.

Exception: the charge of audit cost (excl. VAT) also (although paid after the end of the project).

By the separate e-mail we asked partners to send the rest information (person months, cost follow up by categories, technical work done...) for reporting.

Reporting time

VTT asked more time for reporting because of the delay of partner reports in 02.02.007 and got the extension to the 16.03.2007 by the letter 05.02.2007:

“With reference to your e-mail dated 02/02/2007 A/104617 requesting an extension of 30 days for the submission of your reports of the End term reporting period, this e-mail informs you that the Commission agrees to your request.

Thus the new deadline for the submission of the reports of your **Contract COOP CT 2004 512897 is therefore 16/03/2007** instead of **14/02/2007**”.

Table 2: Milestones List

List all milestones, giving date of achievement and any proposed revision to plans.

Milestone no.	Milestone name	WP no.	Date due	Actual/Forecast delivery date	Lead contractor
1(8)	1.1 Establishing an Extranet	WP1	31.5.2005	31.5.2005	14 MiraLab
1(8)	1.2 State of the art of material rendering techniques	WP1	31.5.2005	31.5.2005	14 MiraLab
1(8)	1.3 State of the art of hardware rendering, parametric surfaces and data reduction	WP1	31.5.2005	31.5.2005	14 MiraLab
1(8)	1.4 Real time culling techniques and spatial databases	WP1	31.5.2005	31.5.2005	14 MiraLab
1(8)	1.5 Study on current CAD conversion pipelines and standard 3D data formats	WP1	31.5.2005	31.5.2005	14 MiraLab
2 (12)	2.1 Surface Property Database	WP2	1.9.2005	30.9.2005	12 FhG/IFF
3 (15)	2.2 Material editing tool to the VisualEditor tool-set	WP2	31.12.2005	31.12.2005	12 FhG/IFF
2&7 (12/25)	3.1 Spatial database	WP3	1.9.2005	30.9.2005	10 NEMET
4&7 (15/25)	4.1 CAD Export tool	WP4	31.12.2005	31.12.2005	9 MELON
4&7 (15/25)	4.2 XML standard description	WP4	1.12.2005	1.12.2005	9 MELON
5&8 (19)	4.3 VisualEditor import tool	WP4	1.4.2006	1.4.2006	9 MELON
5 (19)	4.4 VisualEditor tools to spatial database connectivity	WP4	1.4.2006	1.4.2006	9 MELON
5&8 (19/26)	5.1 Activity Designer tool	WP5	1.4.2006	1.4.2006	1 VTT
5&8 (19/26)	5.2 Level Editor tool	WP5	1.4.2006	1.4.2006	1 VTT
6&8 (23/26)	5.3 Common user interface for Visual Editor tool-set	WP5	1.8.2006	1.8.2006	1 VTT
5 (19)	6.1 Preparation for Industrial tests	WP6	1.4.2006	1.4.2006	6 DESKA
6 (23)	6.2 Industrial tests	WP6	1.8.2006	1.8.2006	6 DESKA
1&3 (8/15)	7.1 Plan for using and disseminating knowledge	WP7	1.5.2005 31.12.2005	1.5.2005 31.12.2005	11 TL
8 (26)	7.2 Technology transfer in partners	WP7	31.11.2006	31.11.2006	11 TL
8 (26)	7.3 Seminars, Fairs	WP7	31.11.2006	31.11.2006	11 TL
9 (27)	7.4 Final Report + Public Summary	WP7	31.12.2006	31.12.2006	11 TL
8 (26)	7.5 Dissemination and Exploitation Report	WP7	31.11.2006	31.11.2006	11 TL
8 (26)	7.6 Plan for using and disseminating knowledge (final)	WP7	31.11.2006	31.11.2006	11 TL
9 (27)	8.1 Project co-ordination	WP8	31.12.2005 31.12.2006	31.12.2005 31.12.2006	1 VTT

Tasks of WP7 Dissemination									Milestone
7.1 Dissemination and Exploitation plan									Month 8
7.2 Technology transfer in partners									Month 26
7.3 Seminars, Fairs									Month 26
7.4 Final Report									Month 27
7.5 Dissemination and Exploitation Report									Month 15,26
7.6 Dissemination of the knowledge									Month 8,15,19,26
7.8 Project Management									Month 8,12,15,19,23,26
Tasks of WP8 Management with EU									Milestone
8.1 Project co-ordination									Month 1,8,12,15,19,23,27
Tasks of WP9 Dissemination									Milestone
									Milestone
Milestones	o	o	o	o		o	o	o	Month 1,8,12,15,19,23,27
Project meetings	*	*	*	m		*	*	x	

Key: * Project/ Co-ordination/ Committee Meetings o Milestone m Mid term review x End term review

Management structure

Every SME partner has been with in the development of the Requirements Specification document in co-operation with RTDs. SMEs have been as well active in design of the Exploitation Plan and Exploitation Agreement. The second versions of these documents have been written at the moment. The CADPIPE System Architecture description has been written by RTDs following the Requirements Specification.

The following SME partners have been in active roles in guiding and managing the development of the documents:

SME Coordinator Senese (2): Consortium Agreement and Requirements Specification

Exploitation Manager 6 DeskA, Software Dissemination coordinator: Exploitation Plan and Exploitation Agreement.

Dissemination Manager 5 InfoTRON, Industry aspects, 3D Modelling business, Spatial Data Base software design co-ordinator: Exploitation Plan and Exploitation Agreement.

PDK (Plan for Disseminating the Knowledge) by guidance of PDK co-ordinator 11 SiennaBioGrafix and with co-operation of the Dissemination Manager 5 INFOTRON and Exploitation Manager 6 DeskA

The WP leader of WP1 leader is partner nr. 11 RTD (UNIGE) Unige Miralab (Switzerland), WP1 consists of the research and project preparation work.

The WP leader of WP2 is partner nr.12 RTD (FhG/IFF)Fraunhofer Institute IFF, Fraunhofer-Gesellschaft zur Foerderung der angewandten Forschung e.V. FgH/IFF (Germany). Development of the Surface Property Database and Material Editing tool

The WP leader of WP3 is partner nr.10 SME (NEMET) Nemetschek , (Bulgaria). Development of the Spatial database

The WP leader in WP4 is partner nr. 9 SME (MELON) Melon Technologies JSC, MELON (Bulgaria), this WP is for the development of the VisualEditor tools,

The WP leader in WP5 is partner nr. 11 RTD (VTT) VTT Information Technology. WP is for Spatial database manipulation tools development

The WP leader in WP6 is partner nr. 6 SME (DESKA) DeskArtes. This WP is for the industrial tests

The leader of the WP7 is partner nr. 11 SME Testa Luna TL (Italy) . The objective of the WP7 is to design a Dissemination and Exploitation plans, technology transfer between partners, to lead planning and arrangements of talks in seminars and demonstrations in fairs

Detailed partner contribution in every task will be seen in the table "**Exploitable results and Contribution overview table**" in the end of the Section 3.

In product development in WP2-WP4, responsibilities and contributors of tasks are visible till the end of the first product development period in 2005.

Section 4 (Other issues)

Potential to Improve Competitiveness of the Partners

The market opportunities for SME companies in this project are good. This attitude has been strengthening among the SMEs during the first project year, after seeing the first demonstrations of the project in the Mid Term Review of the partners.

Exploitable results and Contribution overview table (software)

Exploitable Knowledge (description)	Product(s) or measure(s)	Sector(s) of application	Timetable	RTD + Partner(s) involved
2.1 Surface Property Database	document & demonstration 1.9.2005	description of the storable data format	2005 2006	12FhG/IFF 5InfoTRON, 6DESKA, 7Isoin
2.2 Material editing tool	demonstration 31.12.2005 beta version 31.11.2006	material editor	2007	12FhG/IFF, 7Isoin, 5InfoTRON, 6DESKA
2.2 Material mapper (part of Material editing tool)	demonstration 31.12.2005 beta version 31.11.2006	material mapper, abstract material rendering representation	2007	1VTT, 13ICI, 12FhG/IFF, 14Unige, 7Isoin, 5InfoTRON, 6DESKA
3.1 Spatial database	document & demonstration 1.9.2005	description of the storable data format	2005 2006	1VTT, 2Sense, 6Deska, 10Nemet, 5InfoTRON, 8Siena BioGraFiX
4.1 CAD Export tool	demonstration 1.12.2005 beta version 31.11.2006	Export tool	2007	1VTT, 3Niki, 11TL, 7Isoin, 6DESKA, 9Melon, 10Nemet
4.2 XML standard description	document 1.12.2005	description of the XML data format, Model DB API Spatial DB API	2006	1VTT
4.3 VisualEditor import tool	demonstration 1.4.2006 beta version 31.11.2006	CAD data import, Parametric Export/Import, Triangular Import,	2007	1VTT, 12FhG/IFF, 3Niki,
4.4 VisualEditor tools to spatial database connectivity	demonstration 1.4.2006 beta version 31.11.2006	data handler tool	2007	1VTT, 3Niki, 9Melon, 10Nemet, 7Isoin, 11TL, 6DESKA
4.4 VisualEditor tools, SceneEditor	demonstration 1.4.2006 beta version 31.11.2006	Scene editor for output scene building	2007 2008	1VTT, 3Niki, 9Melon, 10Nemet, 7Isoin, 11TL, 6DESKA
5.1 Activity Designer tool	demonstration 1.4.2006 beta version 31.11.2006	tool to create / edit Joints etc. Animations	2007 2008	14Unige, 2Sense, 9Melon, 10Nemet, 7Isoin, 8Siena BioGraFiX, 11TL
5.2 Level Editor tool	demonstration 1.4.2006 beta version 31.11.2006	tool to prepare the data for viewing out-put stream	2007 2008	1VTT, 2Sense, 9Melon, 10Nemet, 7Isoin, 8Siena BioGraFiX, 11TL
5.3 Common user interface for Visual Editor tool-set	demonstration 1.8.2006 beta version 31.11.2006	Common User Interface for the Visual Editor	2007 2008	13ICI, 1VTT, 2Sense, 7Isoin

Sensetrix Oy (Sense 2) Will get new tools for making content for Virtual Reality and Augmented Reality applications to add new software to their product pallet for 3D software sales

NIKI Information Technologies Ltd, (NIKI 3) NIKI expects to get new product for development and for sale: Real time rendering, Import and Export tools for CAD systems, data reduction and simplification of CAD files, Spatial data base.

DeltaCAD, (Delta 4) DeltaCAD expects will build a partner network and will have new software to be adopted their present CAD product pallet for software design and resale.

InfoTRON A.S (InfoTRON A.S. 5) InfoTRON A.S will get new software products for development and sales like: real time rendering production pipeline, Import and Export tools for CAD systems, data reduction and simplification of CAD files, tools for spatial data base, and design application for textures to 3D objects.

Deskartes (DeskA 6) DeskArtes will get new advanced products into their 3D production pipeline.

They'll develop forward and market CADPIPE tool set world widely with their own 3D Industrial Design software products, Visualisation and Communication tools, and value adding software technology for Rapid Prototyping, Simulation, Data Verification and Healing. DeskA has an excellent regional and due to their participation in global projects also international collaboration network. Sales inside EU and export sales outside EU

ISOIN, (Isoin 7) ISOIN will get new software products for development and sales: real time rendering production pipeline, import and export tools for CAD systems, data reduction and simplification of CAD files, spatial data base tools, design application for textures to 3D objects and reducing the 3D data for mobile devices.

SienaBioGraFiX (8) will get new products for development and for sale: real time rendering production pipeline, import and export tools for CAD systems, data reduction and simplification of CAD files, spatial data base tools.

To utilise in biological, physic-chemical, computer graphics and multimedia.

Melon Technologies (Melon 9) Participating in CADPIPE will help Melon Technologies validate its plans for investing in the development of 3D rendering engine of their own. Melon will utilize the partnership with R&D leading institutions such as Fraunhofer Institute and widen the partnerships into other areas of mutual interest such as virtual learning and computer based training. CADPIPE will also provide Melon with the opportunity to enlarge the scope of technical expertise and know-how. Melon will be able to offer local and regional SMEs in the field of architecture and mechanical engineering the necessary tools to export their work into a standard format and thus use it as they like. This will also enable Melon to use more 3D-animation elements (due to the smaller size of the CADPIPE objects) in its multimedia products and especially in the product presentations.

The participation in that project will have a huge PR and Marketing effect for the company, as it will have the publicity and effect throughout the EU which is Melon's primary market of operations.

Nemetschek (Nemet 10) as benefits of this project Nemetschek will get both intellectual property rights, product licenses and sales rights Nemetschek has lots of experience with sales and marketing of CAD products in the Eastern Europe and Middle East.

TESTALUNA srl (TL 11) will get new product developed mainly for their own content providing. The whole Cadpipe production pipeline adoption and usage as their production of 3D game industry. To utilise the project results in production and development of Web-games, mobile games, simulations, and virtual communities combining high quality entertainment with training, educational or therapeutic purposes. Games to communicate, inform, education and entertainment.

The Dissemination and Exploitation plan, including PDK (Plan for Disseminating the Knowledge) is the document to draw the guidelines for the dissemination and exploitation progress and to embed the Exploitation Agreement, which shall be the result and a part of it.

The Dissemination and Exploitation plan has been accepted by **Technical Board Meeting in Izmir ICI 19.-20.1.2006**

The mid term of the project was on the 15th project month 31st December 2005.

Technology transfer in partners has been made by research reports and demonstrations in Technical Board meetings especially in meetings on 04.10.2005 (project month 13) and 19.-20.01.2006 (project month 16). The delay of meeting dates compared to this timetable is due to the fit in calendars of partners, preparation of deliverables (reports and demonstrations).

Summary of project results classified as public or not public

1. 1.1 (PUBLIC) Project web pages 31.5.2005. Address: <http://cadpipe.vtt.fi> Responsible person/RTD: Hannu Kuukkanen/VTT.
Project web pages are open for all and describes the project and delivers the public information and documents as the project result. Used as the project information channel for CAD and modelling domain, media and other parties interested in the project or its results.
Web pages may be useful channel in later use with Cadpipe consortium after project.
2. 1.2 (PUBLIC) Research report on State of the art of material rendering techniques. Published in 31.5.2005 Responsible person/RTD: Nadia Magnenat-Thalmann, In co-operation with: HyungSeok Kim, Stephane Garchery, G. Papagiannakis, Unige Miralab .
This report has been published.
3. 1.3 (PUBLIC) Research report on State of the art of hardware rendering, parametric surfaces and data reduction. Published in 31.5.2005 Responsible person/RTD: Aydin Ozturk, International Computer Institute, Ege University. In co-operation with Unige Miralab: HyungSeok Kim, Stephane Garchery, Nadia Magnenat-Thalmann. Used for the Requirements Specification for product development.
This report has been published.
4. 1.4 (NOT PUBLIC) Research report on Real time culling techniques and spatial databases. Published in 31.5.2005. Responsible person/RTD: Aydin Ozturk, International Computer Institute, Ege University. In co-operation with Ahmet Bilgili and Serkan Ensoner.
This report is NOT a PUBLIC document.
5. 1.5 (PUBLIC) Research report on current CAD conversion pipelines and standard 3d data formats. Published in 31.5.2005 Responsible person/RTD: Steffen Strassburger, Fraunhofer Institut für Fabrikbetrieb und -automatisierung IFF. In co-operation with Tina Haase. Used for the Requirements Specification for product development.
This report has been published.
6. 4.1 (NOT PUBLIC) CAD Export tool, Demonstration in 31.12.2005. CAD export tool for STEP AP203, STEP AP214, STL, IGES, 3DS (Kinetix) and Collada. CAD Export tool is a set of software components which has been integrated to the Cadpipe system. CAD Export tool support to other CAD file formats can be developed forward. In the end of the project the support was already much wider than written in the DOW. The documentation is NOT PUBLIC.
7. 4.2 (PUBLIC) XML standard description. Demonstration in 31.12.2005. XML standard description to export properties not supported in transportation file standards. Person responsible: Jukka Rönkkö VTT. XML standard description will be useful only for the further product development of the CADPIPE system at the moment. XML standard description will be free to use for the CAD domain even though it has been designed specially for the use of this

project. XML standard description is a document.

CADPIPE software family requires a common data model for inside data handling and for data transmission. The CADPIPE data model bases on the Collada specification created and published by the Collada* Consortium**. COLLADA 1.0 specifications Aug 02, 2004
This document is the description of the classified, constructed Cadpipe project specific 3D data model, easy to code and utilize by the XML technology (for CADPIPE purposes). In this project we have named it as "XML standard description" of the Modelling Data. This work has been assigned to the WP4 task 4.2. XML CAD format standard description can be developed further after the project by the guidance and control of the project consortium or it may be assigned to control of some other domain authority.
This document IS PUBLIC.

8. 4.3 (NOT PUBLIC) VisualEditor import tool , was demonstrated in the Technical Board meeting in 03.05.06, (ready in 30.3.2006). Responsible person/RTD: Steffen Straßburger and Tina Haase, Fraunhofer IFF in co-operation with SME partner Niki. Software was demonstrated and accepted in e-meeting 03.05.06.
9. 4.4.1 (NOT PUBLIC) VisualEditor tools to spatial database connectivity (Visual database connectivity)
was demonstrated in the Technical Board meeting in 03.05.06, (ready in 30.3.2006).
Responsible person/RTD: Timo Tossavainen and Jussi Markkanen VTT Information Technology by assistance of SME partners: Niki, Melon, Nemet, Isoin, TL, Isoin, DESKA
Software was demonstrated and accepted in e-meeting 03.05.06.
10. 4.4.2 (NOT PUBLIC) VisualEditor to spatial database connectivity and SceneEditor (Visual database connectivity), (ready in 30.3.2006)
Responsible person/RTD: Timo Tossavainen and Jussi Markkanen
VTT Information Technology with SME partners: Niki, Melon, Nemet, Isoin, TL, Isoin, DESKA. Software was demonstrated and accepted in e-meeting 03.05.06.
11. 5.1 (NOT PUBLIC) Activity Designer tool, Design. Responsible person/RTD: UNIGE first version (ready in 30.3.2006) Responsible person/RTD: Nadia Magnenat-Thalmann and Stephane Garchery, Unige Miralab by cooperation of SME partners: Sense, Melon, Nemet, Isoin, Siena BioGraFiX, TL
Activity Designer Development Prototype was ready in 02.05.2006 and was demonstrated and accepted in e-meeting 03.05.2006
12. 5.2 (NOT PUBLIC) Level Editor tool, (ready in: 1.4.2006) VTT, Responsible person/RTD: Timo Tossavainen, VTT Information Technology by assistance of SME partners: Sense, Melon, Nemet, Isoin, Siena BioGraFiX, TL. Prototype was ready in 02.05.2006 and was demonstrated and accepted in e-meeting 03.05.2006
13. 5.3 (NOT PUBLIC) Common interface for Visual Editor tool-set. Documentation for CommonUser Interface 01.08.2006 (actual date: 1.8.2006), (final version 13.09.2006)
Responsible person/RTD: Aydin Ozturk, ICI, Ege University
14. 6.1 (NOT PUBLIC) Preparation for Industrial tests document writing was led by Guy Hubert as responsible person to the task from SME Delta, assisted by Hannu Kuukkanen RTD/VTT. First version was ready in 31.03.06 and was demonstrated and accepted in e-meeting 03.05.2006
15. 6.2 (NOT PUBLIC) Industrial tests report. Responsible person to the task from SME TL was Ivan Orvieto assisted by Hannu Kuukkanen RTD/VTT. First version was ready in 31.03.06 and was demonstrated and accepted in e-meeting 03.05.2006

16. 7.2 (NOT PUBLIC) Technology transfer in partners report contains a short users manual of the CADPIPE software and short report about end user lectures and report of activities made to ensure software development partners to understand the structure of the code.
17. 7.3 (PUBLIC) Seminars, Fairs is a list of public dissemination activities
18. 7.4 (partly PUBLIC) The Activity Report contains a short publishable section of the project “Publishable Executive Summary for the CADPIPE Project”

Other reports (deliverables), are not public but property of the SMEs.

IPRs of the project result

Sensetrix Oy has been leading of the IPR agreement negotiations as the SME co-ordinator. The first version of Exploitation Agreement made by SME contractors is ready and written by Ismo Mäkelä from DeskArtes. The Project Co-ordinator, VTT will also be responsible for the organising any action necessary to protect the generated IPR. No such action has been needed yet.

Exploitable results overview table

Exploitable Knowledge (description)	Exploitable product(s) or measure(s)	Sector(s) of application	Timetable for commercial use	Patents or other IPR protection	Owner & Other Partner(s) involved
2.1 Surface Property Database	document & demonstration 1.9.2005	description of the storable data format	2005 2006	A common format for the property data in CADPIPE system	SME partners/12FhG/IFF 5InfoTRON, 6DESKA, 7Isoin
2.2 Material editing tool	demonstration 31.12.2005 beta version 31.11.2006	material editor	2007	IPRs for developers and licence sales by partners. Software	SME partners/12FhG/IFF , 7Isoin, 5InfoTRON, 6DESKA
2.2 Material mapper (part of Material editing tool)	demonstration 31.12.2005 beta version 31.11.2006	material mapper, abstract material rendering representation	2007	IPRs for developers and licence sales by partners. Software	SME partners/1VTT , 13ICI, 12FhG/IFF, 14Unige, 7Isoin, 5InfoTRON, 6DESKA
3.1 Spatial database	document & demonstration 1.9.2005	description of the storable data format	2005 2006	A common format for the spatial data in CADPIPE system	SME partners/1VTT , 2Sense, 6Deska, 10Nemet, 5InfoTRON, 8Siena BioGraFiX
4.1 CAD Export tool	demonstration 31.12.2005 beta version 31.11.2006	Export tool	2007	IPRs for developers and licence sales by partners. Software	SME partners/1VTT , 3Niki, 11TL, 7Isoin, 6DESKA, 9Melon, 10Nemet
4.2 XML standard description	document 1.12.2005	description of the XML data format, Model DB API Spatial DB API	2006	open standard for the domain. A common way to describe 3D data and it's properties by XML	open/1VTT
4.3 VisualEditor import tool	demonstration 1.4.2006 beta version 31.11.2006	CAD data import, Parametric Export/Import, Triangular Import,	2007	IPRs for developers and licence sales by partners. Software	SME partners/1VTT , 12FhG/IFF, 3Niki,
4.4 VisualEditor tools to spatial database connectivity	demonstration 1.4.2006 beta version 31.11.2006	data handler tool	2007	IPRs for developers and licence sales by partners. Software	SME partners/1VTT , 3Niki, 9Melon, 10Nemet, 7Isoin, 11TL, 6DESKA
4.4 VisualEditor tools, SceneEditor	demonstration 1.4.2006 beta version 31.11.2006	Scene editor for out-put scene building	2007 2008	IPRs for developers and licence sales by partners. Software	SME partners/1VTT , 3Niki, 9Melon, 10Nemet, 7Isoin, 11TL, 6DESKA

5.1 Activity Designer tool	demonstration 1.4.2006 beta version 31.11.2006	tool to create / edit Joints etc. Animations	2007 2008	IPRs for developers and licence sales by partners. Software	SME partners/14Unige, 2Sense, 9Melon, 10Nemet, 7Isoin, 8Siena BioGraFiX, 11TL
5.2 Level Editor tool	demonstration 1.4.2006 beta version 31.11.2006	tool to prepare the data for viewing out-put stream	2007 2008	IPRs for developers and licence sales by partners. Software	SME partners/1VTT, 2Sense, 9Melon, 10Nemet, 7Isoin, 8Siena BioGraFiX, 11TL
5.3 Common user interface for Visual Editor tool-set	demonstration 1.8.2006 beta version 31.11.2006	Common User Interface for the Visual Editor	2007 2008	IPRs for developers and licence sales by partners. CADPIPE software as one product	SME partners/13ICI, 1VTT, 2Sense, 7Isoin
AFTER PROJECT					
A Virtual Reality Simulation Center is under negotiation	Sales and utilization	CADPIPE system	2007	CADPIPE software as one product	3NIKI

Table 1: Deliverables List

List all deliverables, giving date of submission and any proposed revision to plans.

Deliverable No	Deliverable title	WP no	Date due	Actual/ forecast Delivery date	Estimated indicative person-months	Used indicative person-months	Lead contractor
D1	1.1 Establishing an Extranet	WP1	31.5.2005	31.5.2005	2,3		14 MiraLab
D2	1.2 State of the art of material rendering techniques	WP1	31.5.2005	31.5.2005	8,4		14 MiraLab
D3	1.3 State of the art of hardware rendering, parametric surfaces and data reduction	WP1	31.5.2005	31.5.2005	8,5		14 MiraLab
D4	1.4 Real time culling techniques and spatial databases	WP1	31.5.2005	31.5.2005	7,4		14 MiraLab
D5	1.5 Study on current CAD conversion pipelines and standard 3D data formats	WP1	31.5.2005	31.5.2005	7,4	total of 102 in WP1 research	14 MiraLab
D6	2.1 Surface Property Database	WP2	1.9.2005	1.9.2005	8,8		12 FhG/IFF
D7	2.2 Material editing tool to the VisualEditor tool-set	WP2	31.5.2005	31.12.2005	6,8	total of 18 in WP2 in 04-05	12 FhG/IFF
D8	3.1 Spatial database	WP3	1.9.2005	1.9.2005	22,1	total of 16 in WP3 04-05	10 NEMET
D9	4.1 CAD Export tool	WP4	31.12.2005	31.12.2005	20,7		9 MELON
D10	4.2 XML standard description	WP4	1.12.2005	1.12.2005	1,5		9 MELON
D11	4.3 VisualEditor import tool	WP4	1.4.2006	1.4.2006	6,0		9 MELON
D12	4.4 VisualEditor tools to spatial database connectivity	WP4	1.4.2006	1.4.2006	6,6	total of 30 in WP4 04-05	9 MELON
D13	5.1 Activity Designer tool	WP5	1.4.2006	1.4.2006	21,8		1 VTT
D14	5.2 Level Editor tool	WP5	1.4.2006	1.4.2006	4,2		1 VTT
D15	5.3 Common user interface for Visual Editor tool-set	WP5	1.8.2006	1.8.2006	1,7	total of 3 in WP5 04-05	1 VTT
D16	6.1 Preparation for Industrial tests	WP6	1.4.2006	1.4.2006	19,5		6 DESKA
D17	6.2 Industrial tests	WP6	1.8.2006	1.8.2006	17,2	total of 0 in WP6 04-05	6 DESKA
D18	7.1 Plan for using and disseminating knowledge	WP7	1.5.2005 31.12.2005	1.5.2005 31.12.2005	21,8		11 TL
D19	7.2 Technology transfer in partners	WP7	31.11.2006	31.11.2006	8,1		11 TL
D20	7.3 Seminars, Fairs	WP7	31.11.2006	31.11.2006	0,8		11 TL
D21	7.4 Final Report + Public Summary	WP7	31.12.2006	31.12.2006	1,1		11 TL
D22	7.5 Dissemination and Exploitation Report	WP7	31.11.2006	31.11.2006	1,1		11 TL
D23	7.6 Plan for using and disseminating knowledge (final)	WP7	31.11.2006	31.11.2006	1,3	total of 34 in WP7 04-05	11 TL
D24	8.1 Project co-ordination	WP8	31.12.2005 31.12.2006	31.12.2005 31.12.2006	1,7	total of 0,4 in WP8 04-05	1 VTT

Table 2: Milestones List

List all milestones, giving date of achievement and any proposed revision to plans.

Milestone no.	Milestone name	WP no.	Date due	Actual/Forecast delivery date	Lead contractor
1(8)	1.1 Establishing an Extranet	WP1	31.5.2005	31.5.2005	14 MiraLab
1(8)	1.2 State of the art of material rendering techniques	WP1	31.5.2005	31.5.2005	14 MiraLab
1(8)	1.3 State of the art of hardware rendering, parametric surfaces and data reduction	WP1	31.5.2005	31.5.2005	14 MiraLab
1(8)	1.4 Real time culling techniques and spatial databases	WP1	31.5.2005	31.5.2005	14 MiraLab
1(8)	1.5 Study on current CAD conversion pipelines and standard 3D data formats	WP1	31.5.2005	31.5.2005	14 MiraLab
2 (12)	2.1 Surface Property Database	WP2	1.9.2005	30.9.2005	12 FhG/IFF
3 (15)	2.2 Material editing tool to the VisualEditor tool-set	WP2	31.12.2005	31.12.2005	12 FhG/IFF
2&7 (12/25)	3.1 Spatial database	WP3	1.9.2005	30.9.2005	10 NEMET
4&7 (15/25)	4.1 CAD Export tool	WP4	31.12.2005	31.12.2005	9 MELON
4&7 (15/25)	4.2 XML standard description	WP4	1.12.2005	1.12.2005	9 MELON
5&8 (19)	4.3 VisualEditor import tool	WP4	1.4.2006	1.4.2006	9 MELON
5 (19)	4.4 VisualEditor tools to spatial database connectivity	WP4	1.4.2006	1.4.2006	9 MELON
5&8 (19/26)	5.1 Activity Designer tool	WP5	1.4.2006	1.4.2006	1 VTT
5&8 (19/26)	5.2 Level Editor tool	WP5	1.4.2006	1.4.2006	1 VTT
6&8 (23/26)	5.3 Common user interface for Visual Editor tool-set	WP5	1.8.2006	1.8.2006	1 VTT
5 (19)	6.1 Preparation for Industrial tests	WP6	1.4.2006	1.4.2006	6 DESKA
6 (23)	6.2 Industrial tests	WP6	1.8.2006	1.8.2006	6 DESKA
1&3 (8/15)	7.1 Plan for using and disseminating knowledge	WP7	1.5.2005 31.12.2005	1.5.2005 31.12.2005	11 TL
8 (26)	7.2 Technology transfer in partners	WP7	31.11.2006	31.11.2006	11 TL
8 (26)	7.3 Seminars, Fairs	WP7	31.11.2006	31.11.2006	11 TL
9 (27)	7.4 Final Report + Public Summary	WP7	31.12.2006	31.12.2006	11 TL
8 (26)	7.5 Dissemination and Exploitation Report	WP7	31.11.2006	31.11.2006	11 TL
8 (26)	7.6 Plan for using and disseminating knowledge (final)	WP7	31.11.2006	31.11.2006	11 TL
9 (27)	8.1 Project co-ordination	WP8	31.12.2005 31.12.2006	31.12.2005 31.12.2006	1 VTT

IPRs of the project result

The basic IPRs have been agreed in the Consortium Agreement Annex3 and the final IPR ownership has been described in the Exploitation Agreement, signed by all the SMEs during the project. The possibility of readjustment of the IPRs will be left to the Technical Board of the project. Sensetrix Oy will be leading of the IPR agreement negotiations as the SME co-ordinator. The first version of Exploitation Agreement made by SME contractors is ready and written by Ismo Mäkelä from DeskArtes. The Project Co-ordinator, VTT will also be responsible for the organising any action necessary to protect the generated IPR. The objective of the agreement of intellectual property rights (IPR) is to define rights and goals related to exploitation of results generated under commissions as well as under self- and joint-financed research and development work. Results of development work are protected by applicable technical and juridical protection measures. It is a first rate importance for VTT that technological property of a client is handled as confidential and that the competitive advantage the client gets from the commission can be protected by an applicable intellectual property right (IPR).

Protection and Licensing of Knowledge

The main innovations in the project will be protected by means of patents, and prepared for licensing. By the first project milestone the partners have signed an Exploitation Agreement for the dissemination and exploitation of all the results of the work to companies outside the consortium, after the initial period of confidentiality. The agreement will also cover collaboration between the partners to fully facilitate exploitation of the foreground technology. This will encompass agreements in respect to the patent application made during the second year of the project, and go on to detail the terms and conditions under which licensing of the technology can take place. This licensing to third parties is seen as critical to the rapid roll out of the technology across the Union and beyond, speeding the proliferation of the technology and penetration of market sectors or geographically distant from the partners. VTT as the co-ordinator will give their juridical support for all protection and patenting issues

Direct & indirect benefits

The additional functionality and low cost of the system which is under development will enable effective competition with existing software and open totally new markets by the total production flow solution. This will contribute to growth in the visualisation and software enterprises within the EU in seven main ways:

- The **domestic sale of the CADPIPE concept**, including displacement of imported systems and growth in EU region.
- The **export sale of the CADPIPE concept**.
- The **domestic sale of components and software of CADPIPE system**, including displacement of imported systems and growth in EU region.
- The **export sale of components and software of CADPIPE system**, including displacement of imported systems and growth in EU region.
- **Bring new market** for visualisation business by cheaper and faster CAD file preparation process. The bottle-neck has been in 3D data conversion from CAD to realtime-rendering. This has made the production slow and expensive.
- **Reduced costs** of software development in candidate countries
- **Reduced costs** of IT technology of the Virtual Reality SMEs
- Network for further development of the system to make possible continuing development and up-to-dating of the system **inside and over EU boundaries**.

Affects on competitiveness

The economic objectives

- To rise the level of competitiveness, and export trade outside Europe for SME software and modelling domain companies
- To rise the profitability in the modelling business
- To rise the amount of modelling orders
- To bring new business for software designers and developers
- To bring new software products and business in CAD domain
- To bring new products and business in IT sector
- New sales possibilities over the EU borders

Industrial Objectives.

- New product development and design for the new market area
- Network of software developers over the present EU borders
- New products for software for content providers
- New easier and cheaper possibilities to use subcontractors
- New software products for IT partners
- Development and Integration of the production line, which are capable of varying type CAD data handling and communication with Real-time-rendering applications and standards

Effect on Transitional Technological Co-operation among SMEs & Research organisations

The SME partners with in this project have pointed out to be ready to fare and real co-operation. They have found out their individual and common interest in the project and the product possible to become built only by straight conversation with RTDs and working as a hub of the 3D and Virtual domain to form a real customer of the RTD institutes. Their activity in preparation of the Requirement Specification for the CADPIPE system has been very valuable for the project. The wide range of different type of enterprises coming from very different type of national backgrounds is not only a rich knowledge base but as well a very good test bed for the final product during the industrial tests in WP6.

Present situation on the Virtual Reality market of Europe

The project research in WP1 included an end user query where the future trends were charted. No radical changes have been noticed in the VR, AR and 3D real time rendering development or market during the past project months. The idea of CADPIPE software was strengthening after we had the report reflecting all the properties which have been planned to become available in the final product.

The rise of COLLADA standard has been welcomed as a part of the CADPIPE. Any case such an XML structure for the 3D data had been made during the project. This standard gives more stabile and wider basement for the 3D information model in CADPIPE. The COLLADA as is, will not serve as the only solution because of it's limitations as a young standard but it will be more easy to use it as the trunk of the data structure and rather develop new branches for this project. The version of COLLADA will be free to use for the project and for further development.

Use and sales of the exploitable result

The market opportunities for SME companies in this project are good. This attitude has been strengthening among the SMEs during the first project year, after seeing the first visible results of the project.

Sensetrix Oy (Sense 2) Will get new tools for making content for Virtual Reality and Augmented Reality applications to add new software to their product pallet for 3D software sales

NIKI Information Technologies Ltd, (NIKI 3) NIKI expects to get new product for development and for sale: Real time rendering, Import and Export tools for CAD systems, data reduction and simplification of CAD files, Spatial data base.

DeltaCAD, (Delta 4) DeltaCAD expects will build a partner network and will have new software to be adopted their present CAD product pallet for software design and resale.

InfoTRON A.S (InfoTRON A.S. 5) InfoTRON A.S will get new software products for development and sales like: real time rendering production pipeline, Import and Export tools for CAD systems, data reduction and simplification of CAD files, tools for spatial data base, and design application for textures to 3D objects.

Deskartes (DeskA 6) DeskArtes will get new advanced products into their 3D production pipeline.

They'll develop forward and market CADPIPE tool set world widely with their own 3D Industrial Design software products, Visualisation and Communication tools, and value adding software technology for Rapid Prototyping, Simulation, Data Verification and Healing. DeskA has an excellent regional and due to their participation in global projects also international collaboration network. Sales inside EU and export sales outside EU

ISOIN, (Isoin 7) ISOIN will get new software products for development and sales: real time rendering production pipeline, import and export tools for CAD systems, data reduction and simplification of CAD files, spatial data base tools, design application for textures to 3D objects and reducing the 3D data for mobile devices.

SienaBioGraFiX (8) will get new products for development and for sale: real time rendering production pipeline, import and export tools for CAD systems, data reduction and simplification of CAD files, spatial data base tools.

To utilise in biological, physic-chemical, computer graphics and multimedia.

Melon Technologies (Melon 9) Participating in CADPIPE will help Melon Technologies validate its plans for investing in the development of 3D rendering engine of their own. Melon will utilize the partnership with R&D leading institutions such as Fraunhofer Institute and widen the partnerships into other areas of mutual interest such as virtual learning and computer based training. CADPIPE will also provide Melon with the opportunity to enlarge the scope of technical expertise and know-how. Melon will be able to offer local and regional SMEs in the field of architecture and mechanical engineering the necessary tools to export their work into a standard format and thus use it as they like. This will also enable Melon to use more 3D-animation elements (due to the smaller size of the CADPIPE objects) in its multimedia products and especially in the product presentations.

The participation in that project will have a huge PR and Marketing effect for the company, as it will have the publicity and effect throughout the EU which is Melon's primary market of operations.

Nemetschek (Nemet 10) as benefits of this project Nemetschek will get both intellectual property rights, product licenses and sales rights Nemetschek has lots of experience with sales and marketing of CAD products in the Eastern Europe and Middle East.

TESTALUNA srl (TL 11) will get new product developed mainly for their own content providing. The whole Cadpipe production pipeline adoption and usage as their production of 3D game industry. To utilise the project results in production and development of Web-games, mobile games, simulations, and virtual communities combining high quality entertainment with training, educational or therapeutic purposes. Games to communicate, inform, education and entertainment.

Economic Justification of proposed Research

We all expect to become the initial players in the supply team able to offer the products and licensed manufacturing technology on a global basis. The predicted business benefits for each of us, to 2008 are quantified (Table below). This represents a total potential for Euro 100.191 of increased profits for partners. Hence we expect to recover our joint investment within 18 months from the end of our development activities, but would additionally expect to generate about 360.500 euros sales over five years. This is rather realistic estimation and should not be changed by the knowledge of today's market.

Economic Benefits

#	Partner	Nature of Business Benefit	Predicted Benefit € over 3 years
2	Sensetrix	New service concept and software sales	12 069
3	NIKI	Rising sales by advanced production	7 528
4	DeltaCad	Rising sales of software sales	9 310
5	INFOTRON	Rising sales by advanced production	8 510
6	Deska	Rising sales by new software products	8 376
7	ISOIN	Rising amount of orders in visualisation	15 694
8	SienaBioGraFiX	New service concept and software sales	10 539
9	Melon	Rising sales of software	12 449
10	Nemetschek	Rising sales of software	14 831
11	TL	Rising productivity and sales	8 339
		Total €	107 646

Designed applications during the first project year

CADPIPE production line:

- in the fly data reduction software (demonstrated)
- tools for 3D data export for modelling (demonstrated)
- properties database (demonstrated)
- spatial data base (demonstrated)
- data converter/s (demonstrated in the 3D export)
- Graphic User Interface (visual out-look demonstrated)

Software developer partners will have the source code and all the support of RTDs to develop further the prototype software as their own products.

3D visualisation enterprises will have the Cad file preparation pipeline recommendation for their production and several powerful tools to fasten and rise the quality of their production. As well this solution will bring more quality and compatibility for 3D data exchange.

CADPIPE production line may contain parts of new software and ideas, which will be protected by patents. This all is novel technology in the domain of CAD data transportation by professional quality. No commercial products are available (not visible competitors at the moment of writing, not even from the side of the COLLADA development group) at least in decent price for SMEs. If CADPIPE will be the first CAD production pipeline utilizing COLLADA standard, our possibilities are in the very correct timing with this project and product.

Markets Which May Be Developed

Existing customers will develop the primary application market for the CADPIPE production line for real time rendering systems and for exchange of CAD file. In particular, we will be working with the new formula of network organisations and companies to develop technological and commercial

partnerships, and to bring the proposed product to market as rapidly as possible for standard production after the development is complete.

Targeting to the potential market: the CADPIPE software will be designed with the assistance of the SME professionals and RTD partners. The WP1 has produced a research report in which the present state-of-the-art has been studied and direction of the domain trends has been analyzed and taken into account in the product design and development.

CADPIPE's economic and social total impacts

Annual Market Potential of CADPIPE service

Market Potential (Annual)	Europe		Global excluding EU			Total	
	Price	Units	Market	Units	Market	Units	Market
Product	€ x1000	pieces	million €	pieces	million €	pieces	million €
Concept and service system consulting	1	4000	4	2000	2	6	0,006
Components and software	1	20000	20	3000	3	23	0,023
Visualisation service sales	2	37000	74	500	1	37500	75
			98		6 total		179,029
					M€		

The CADPIPE service including all its components: 3D CAD data professional quality exchange and preparation for real time rendering to several type of terminals.

The CADPIPE service including all its components: 3D CAD data professional quality exchange and preparation for real time rendering to several type of terminals.

The size of the CAD/CAM SME market:

The potential SME market of CAD/CAM sector is about 8 512 enterprises (40% end users) and 22 000 million US \$ (25.262 million €) in the world (CyberEdge Information Services Inc. (01/10/02)).

"An indication of the size of the CAD/CAM SME market in Europe can be seen from an analysis of Business-advantage.Co, UK database of nearly 20 000 CAD/CAM user sites in the UK. This shows that nearly four out of five of all CAD/CAM using businesses have less than 250 staff.

By developing new products during the project, software partners will have totally new business and establishment for their competitiveness in custom, EU and export market. By manufacturing and selling CADPIPE production line or its separate components.

The partners expect to be able to capture 1-3 % of the rising sales of EU Virtual Reality market in five years. 1% means 473,44 milj. € of 41,23 billion US \$ (47.344 milj. €) markets (see page 10). To add these numbers extra sales in accompanying software development for example: for server base mobile use, the market may rise still more. If the game industry continues its success on the mobile market, the rising of 3D modelling and production system sales will develop unbelievable high.

Indirect benefits

Improved quality and reliability in delivery because of good demonstration of products

Improved quality of customer services - satisfying customers - better match of desire and product rising business image by possibility to use more professional quality 3D visualisation in shorter production time.

Contribution to Community societal objectives

The social objective of our work is: Straight effects to the employment, because of new, innovative products and services developed during and after this project. By licensing, the amount of economical

benefits and effect to employment will rise (approximations about the total reduce of employment of domain is about +1% by new type of production and economical profitability on the interior domain +50% by automating 3D production and possibility of making clusters over country boundaries). This will increase the market opportunities to the systems vendors, with a direct impact on the 3D modelling and 3D content providing related employment.

The project objective of the facilitation of Information Technology introduction will improve the 3D-related skills of workers at the software industry SMEs

The system will be customer friendly, low cost and easy introduction and use for the SME business.

Usability of IT-technology is the most important thing in business use. There is no time to study new systems and every employee should be ready to use the system in no time.

Employment Opportunities

Based on our estimates of penetration of the European & Global markets for the generic product groups, and in addition, the indirect market for system sales, this could potentially generate new job opportunities over a 5 year period (Table below).

Table: Employment Opportunities
Employment Opportunities

K€ of Sales Per Job Created	Sale in Europe	Export Sales	of jobs created	
EU sales Software	14	1	124	
Export sales Software	1	1	18	
New visualisation orders in EU	117	2	999	
New visualisation orders out of EU	4	0	34	
		Create a total of	1175	new jobs

Note:

Employment figures are calculated from the predicted sales volumes in the primary, secondary and support applications. They are based on the industry norm of €100k of sales per employee

Economic impact

3D visualisation market will grow through lower production expenses. Lot of needed modelling had been left out because of present high prices of the data preparation. Several new areas can be adopted into the production chain from ready-made 3D design data files. The automate reduction system will prepare data for example for mobiles, PDAs, for TV and Video solutions and for game industry.

The production chain will be easier because of more compatible data transportation.

New possibilities in production network in making clusters for profitable production and to response to the rising sales.

Straight effects to the employment will be in new, innovative software products developed during this project. By licensing, the amount of economical benefits and effect to employment will rise remarkably more.

This will increase the market opportunities to the systems vendors, with a direct impact on the IT-related employment.

The project objective of the facilitation of Information Technology introduction will improve the IT-related skills of workers at the software industry SMEs

Economic Objectives - within 5 years of completion of the RTD is to grow EC by 141 (€M)			
1	Creation of new products that increase exports by	4	€M

2	Creation of new products that will displace	imports of	10	€M
3	Creation of totally new market and growth of		126	€M

Improving Levels of Skills

Our work will help to develop new products and markets, resulting in skills enhancement:

Knowledge about data reduction; to add knowledge in reduction of multi modal native 3D data of the source CAD design file. This file may contain tens of times (even more) data what is reasonable to use in Real time rendering. After reduction the data will be still containing all needed information for visualisation production and business. Enabling to prepare and manufacture 3D data by non-expensive hardware and import and export from/to/between different programs.

Knowledge and science of the area of "Real-time rendering"; to add knowledge in the domain of spatial database import and usage for viewing of large mass of data in decent give outs for several type of terminals from Virtual Caves to mobile phones.

Knowledge about compatibility in CAD file formats; Enabling to understand the idea of preparing the 3D native data for compatible transportation and use including the most properties the source data had had in the design system.

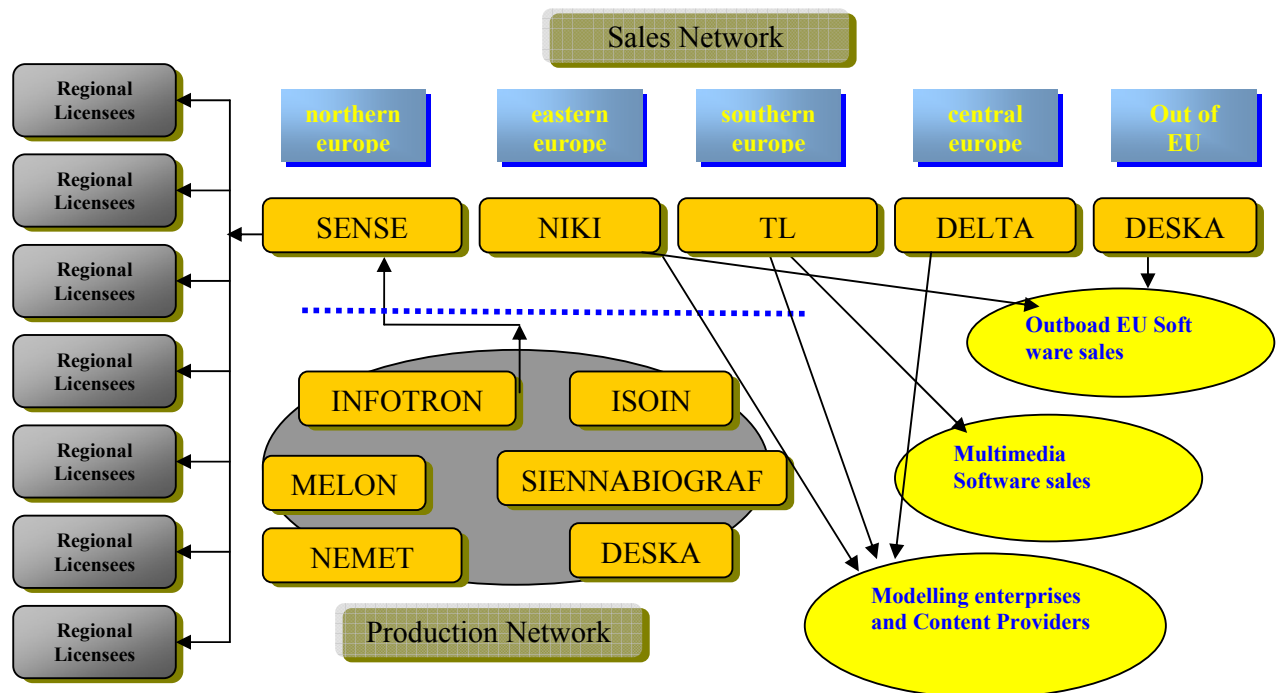
Development of CADPIPE production pipeline; enabling to understand how the production line in 3D CAD data can be managed by the non expensive, automate and semi-automate way and know how to add visual properties to the data during the production line.

Gender dimensions

Women are the growing gender in the IT and visualisation industry. There is no doubt they couldn't use the same software as male designers. The CADPIPE production pipe line system gives designer an easy to use user interface - simpler than any previously used software because it makes possible to do the data preparation work only by one program interface (the same work has been done by several different programs before). Usability with no need of special skills or equipment is the aim of CADPIPE concept. In the CADPIPE project we will have both genders as design and development experts.

Routes to Exploitation

It is currently envisaged that the route to exploitation will utilise the supply chain model shown in Figure below where each partner has a clear and unique role to play in that supply chain. The model clearly shows the interdependency of the partners on each other as well as identifies the role of the software component producers as well as the role of the sales companies. These roles have proven to be the very correct ones during the first project year.



DESKA (6) have agreed to act as the hub for our exploitation activities and named as **Exploitation Manager** and **Out of EU Export sales co-ordinator** (Fig. Management Structure) and Software Dissemination Co-ordinator. Deskartes and Ismo Mäkelä has been the leader in development of an Exploitation Agreement for the dissemination and exploitation of all the results of the work within the consortium and, in principle, to companies outside the consortium after an initial period of confidentiality. More detailed plans will be made during the second year of the project to set up technological and commercial collaboration between each other to fully facilitate exploitation of the technology.

INFOTRON A.S. (5) has been guiding our exploitation activities as Dissemination Manager. In this role they have been in lead of work and plans of dissemination of the project result. The Exploitation Plan (including PDK = Plan for Disseminating the Knowledge) will cover the plan for management of knowledge and intellectual property and a description of disseminating knowledge beyond the consortium during the lifetime of the project and afterwards. The Exploitation Plan has been designed in co-operation of DESKA and VTT.

Every SME partner has been with in the development of the Requirements Specification document in co-operation with RTDs. SMEs have been as well active in design of the Exploitation Plan and Exploitation Agreement. The second versions of these documents have been written at the moment. The CADPIPE System Architecture description has been written by RTDs following the Requirements Specification.

The following SME partners have been in active roles in guiding and managing the development of the documents:

Exploitation Manager Deska (6), Software Dissemination coordinator: Exploitation Plan and Exploitation Agreement.

Dissemination Manager INFOTRON (5), Industry aspects, 3D Modelling business, Spatial Data Base software design co-ordinator: Exploitation Plan and Exploitation Agreement.

SME consortium coordinator Senese (2): Consortium Agreement and Requirements Specification

PDK (Plan for Disseminating the Knowledge) by guidance of PDK co-ordinator SiennaBioGrafix (11) and with co-operation of the Dissemination Manager INFOTRON (5) and Exploitation Manager DeskA (6) and

The WP leader in WP6 is partner nr. 6 SME (DESKA) DeskArtes. This WP is for the industrial tests. During the preparations, SMEs will get the documentation and lectures in using the CADPIPE system.

The leader of the WP7 is partner nr. 11 SME Testa Luna TL (Italy) . The objective of the WP7 is to design a Dissemination and Exploitation plans, technology transfer between partners, to lead planning and arrangements of talks in seminars and demonstrations in fairs

Detailed partner contribution in every task will be seen in the table Exploitable results overview table. In product development in WP2-WP4, responsibilities and contributors of tasks were assigned till the end of the product development period in 2005. The check up of the tasks and responsibilities was made in the Mid Term Review meeting.

About the joint ownership of the product written in Exploitation Agreement:

Each *SME Contractor* shall be entitled to use *Knowledge* in its internal use in connection within its business area and in connection with its products as defined as follows:

Sensetrix Oy. May use *Knowledge* in development, sales and marketing of products and services.

NIKI Information Technologies Ltd May use *Knowledge* in development, sales and marketing of products and services.

DeltaCAD. May use *Knowledge* in development, sales and marketing of products and services.

infoTRON A.S. May use *Knowledge* in development, sales and marketing of products and services.

DeskArtes Oy. May use *Knowledge* in development, sales and marketing of products and services.

ISOIN. May use *Knowledge* in development, sales and marketing of products and services.

SienaBioGraFiX s.r.l. May use *Knowledge* in development, sales and marketing of products and services.

Melon Technologies. May use *Knowledge* in development, sales and marketing of products and services.

Nemetschek. May use *Knowledge* in development, sales and marketing of products and services.

TESTALUNA srl. May use *Knowledge* in development, sales and marketing of products and services.

However, each *SME Contractor* must follow the restrictions given in this Agreement.

Ownership

The *Ownership* of the *Knowledge* is divided evenly between the *SME Contractors*. The list of shares is kept updated by the *Co-operation manager*.

Co-operation manager

The *SME Contractor* responsible for collecting and disseminating the reports as well as keeping records on the ownership of the *Knowledge* is the *Co-operation manager*. SenseTrix is named as the *Co-operation manager*.

Section 2 – Plan for Dissemination of Knowledge

Overview table

Planned/ actual Dates	Type	Type of audience	Countries addressed	Size of audience	Partner responsible /involved
24-25 November 2005	INTUITION Workshop and Exhibition: Virtual reality and virtual environments, France http://www.intuition2005.org/	Research and industry	several EU countries and other	~300	VTT
19.1.2005	DETECT-IT seminar lecture. Espoo, Finland	Industry (Mobile Technologies Partnering Event)	Finland	~100	VTT
15.3.2005	"Euroopan Tiede ja teknologia" Nr.1 /06 Journal, TEKES	Research and industry. Short article.	Finland	~1000	VTT
9- 15.3.2006	CeBIT-fair Deutsche Messe AG Hannover	VR research and industry, software developers and end users	Multinationa l	>100.000	VTT Infotron,
21.-23.6. 2006	Fraunhofer conference, "Virtual Reality and Augmented Reality for Engineering, Testing and Operating Technical Systems	Research and industry:	Germany,	~1000	VTT, UNIGE Infotron, DeskArtes, TL,
5th - 7th 7. 2006	CASA 2006 conference, (the COMPUTER ANIMATION and SOCIAL AGENTS) Conference The Computer Graphics Society (CGS), University of Geneva, Switzerland,	professionals specialized in almost all fields of Computer Animation	from several countries	~10000	VTT, FhG/IFF, UNIGE
22.-24.11 2006	IST 2006 Helsingin Messukeskus TEKES and European Commission Information Society Technologies. Exhibition and conference Suomen Messut www.finnexpo.fi	Research and industry	International CADPIPE did not get own stand but three of the partners were present in the net working sessions	~10000	VTT Nemet Niki
8.10.2004	Project web-site http://cadpipe.vtt.fi	public	open for all		VTT/all
8.10.2004	Project Extranet http://dohaota.vtt.fi	partners only	partners	20 users from 14 partners	VTT/all
15.11.2005	Posters of the CADPIPE project	research and industry, software developers and end users	English version only		VTT
9.5.2005	Flyers of the CADPIPE project	research and industry, software developers and end users	English version only		VTT Infotron,

Planned/ actual Dates	Type	Type of audience	Countries addressed	Size of audience	Partner responsible /involved
9.5.2005	<i>PowerPoint of the CADPIPE project</i>	<i>research and industry, software developers and end users</i>	<i>English version only</i>		<i>VTT Infotron,</i>
1.10.2006	<i>Flyers of the CADPIPE software</i>	<i>software resellers and end users</i>	<i>multilingual in partner countries</i>	?	<i>VTT Infotron, DeskArtes, TL, Sensetrix, ISOIN, NIKI, DeltaCAD, MELON</i>
1.10.2006	<i>Direct e-mailing</i>	<i>software resellers and end users</i>	<i>multilingual in partner countries</i>	?	<i>VTT Infotron, DeskArtes, TL, Sensetrix, ISOIN, NIKI, DeltaCAD, MELON</i>
1.10.2006	<i>Film/video demonstration</i>	<i>software resellers and end users</i>	<i>English version only</i>	?	<i>VTT Infotron,</i>
30.11.2006	<i>Radio interview in Science News. Finnish National Radio channel.</i>	<i>General public</i>	<i>Finnish</i>	<i>>100.000</i>	<i>VTT</i>
30.4.2006 30.8.2006 31.12.2006	<i>Publication. Written and published at least 4 articles in Research, CAD and Design sector journals and other technical journals</i>	<i>Research and Higher education, Industry, end users</i>	<i>multilingual in partner countries and wider audience</i>		<i>RTDs, Infotron, DeskArtes,</i>

Dissemination Manager 5 InfoTRON, will act as the head of the dissemination activity.

PDK (Plan for Disseminating the Knowledge as a part of the Exploitation Plan) has been written by guidance of PDK co-ordinator 11 SiennaBioGrafix and with co-operation of the Dissemination Manager 5 INFOTRON and Exploitation Manager 6 DeskA. Infotron (as Dissemination manager) as main authority

Other partners involved to this work are: Testaluna (leader of the Dissemination WP7), Sensetrix (SME co-ordinator), ISOIN, NIKI, DeltaCAD and MELON (SME partners who have most allocation of person months in the WP7)

The person months of partners responsible can be seen in this table:

other	other	other	other	other	other	other	other	other	WP leader	other	other	other	other
Sense2	NIKI 3	Delta4	INFO5	DeskA 6	ISOIN 7	Siena 8	Melon 9	Nemet 10	TL 11	VTT 1	IFF 12	ICI 13	Unige 14
3,6	2	2,04	3,99	2,14	4,2	1,4	1,41	1,68	2,60	0,52	0,18	5,02	1,70

Public dissemination of the knowledge as limited publications will be necessary for the project to get visibility and to fulfil the interest of EU. Dissemination of the knowledge in partners is the most

important thing to have all the information that will be later needed in further development of the new products and for sales purposes.

The tasks that has been done on the field of dissemination and exploitation:

The objective for the WP7 is to design a Dissemination and Exploitation plan, technology transfer between partners during the research and software development. Dissemination of knowledge in seminars, demonstrations in fairs. This will be made by the guidance of the Dissemination and Exploitation plan. Technology transfer between partners have been made in meetings by demonstrating the software modules and making final software demonstrations and a lecture to learn the usage of the product and for the software developer partners – how to understand the CADPIPE system and coding. CADPIPE project has been visible by talks in seminars and demonstrations in fairs. At least four technical articles about this project has been already published in technical papers.

The Technology and knowledge Dissemination and Exploitation plan has been agreed by partners as one of the deliverables of this project. To support the assimilation of knowledge by the SME partners, representation material, articles have been made for public use. All information has been collected as the reports for partners and 4-6 non-confidential deliverables have been published

Demonstrations: The CADPIPE production line concept will be demonstrated to the Finnish CAD using industry by Sensetrix and DeskArtes with the assistance of VTT is. The Central-European demonstration will be performed by the SME partners by the assistance of Fraunhofer Institute, the East-European demonstration will be arranged by assistance of ICI and the South-European demonstration will be arranged by assistance of Unige Miralab with assistance of partners.

The CADPIPE information will be delivered to the European CAD domain via professional publications and fairs.

One publication route will be the Finnish CAD/CAM Association and other good research news forum is ERCIM (the European Research Consortium for Informatics and Mathematics). VTT is a member of both. RTDs and SME partnerstogether have collected a list about the possible publications which the partners see as important channels of delivering the information + seminars and fares around the EU where it will be important to be visible with this product.

Publications, Press Releases and Reports to the *Commission*, Disclaimers and Markings

If the *Parties* have agreed a *Project Deliverable* to be available to the public, any *Party* may publish information included in such *Project Deliverable* without any notifications to the other *Parties* and without any other *Parties'* consent. In the publication proper references to the origin of the information shall be made.

The progress after the project

The CADPIPE compatibility tool and CADPIPE production line, builds a network not only for the every-day-production but for the continuing software development process in CAD software and visualisation industry.

Tools made during this project will make possible adding new software versions, adding new compatibility rules, adding new data sources and developing and up-to-dating the converters. For data conversions, there are few tools combined to the system usable via one user interface. Every new tool will be added to the list of the compatibility tool to show its dependences to other software and file formats.

This continuous development will need co-operation of the domain. This is only way to maintain the achieved competitiveness of the SMEs in visualisation business and for sake of this, there will be strong need of continuous redevelopment of the system. The software business with in the project will have interest of keeping the designed tools up-to-date for this same reason.

Basing on the strongest standards keeps the development and renovation easy and in comfortable price category. The development work can be designed in small steps (modules) not to rise the price of the system and to reduce the time-to-market.
The module-based solution makes possible to choose the service pallet for special purposes of an individual enterprise.

Section 3 - Publishable results

Dissemination of Results

Obtained results and knowledge will disseminate through the use of project's case studies and manufactured pilot systems and prototypes. Collected and calculated materials and data, as well as tested properties and manufactured pilot Beta-version system and software will be valuable tool for the partners in building a network of licences. Software partners will play an active role in technology transfer and marketing contact with potential customers. Developed technology will be available in **pilot products, exhibition presence, papers, reports and public www-pages. Technical articles** (4 articles) in Research, CAD and Design sector journals and other suitable technical journals have been published. Where possible, links will be established with existing EC funded projects and relevant Thematic Networks involving CAD data transformation, CAD information exchange and visualisation preparation software development technologies. A new EU-proposal is under construction by presence of the available fitting expertise of this same consortium.

RTDs VTT (1) and FgH/IFF(12), Unige (13) and ICI (14), will disseminate the scientific achievements in software, design and system characterisation at suitable events, and through the publication of research papers, and will present consortium-approved papers on the potential applications of the technology at suitable **conferences and seminars**.

Summary of each Deliverable by comment about its confidentiality

1. Extranet. Published in 31.5.2005. Address: <http://dohaota.vtt.fi>, Responsible person/RTD: Hannu Kuukkanen/VTT.
Extranet is in use of project partners and includes all the project material. Pages will be up-to-date all the time, at least after every Technical Board meeting. The extranet IS NOT PUBLIC.
2. Project PUBLIC web pages 31.5.2005. Address: <http://cadpipe.vtt.fi> Responsible person/RTD: Hannu Kuukkanen/VTT.
Project web pages are open for all and describe the project and deliver the public information and documents as the project result. Web pages may be useful channel in later use with Cadpipe consortium after project.
3. Research report on State of the art of material rendering techniques. Published in 31.5.2005 Responsible person/RTD: Nadia Magnenat-Thalmann, In co-operation with: HyungSeok Kim, Stephane Garchery, G. Papagiannakis, and Unige Miralab. This report has been published.
4. Research report on State of the art of hardware rendering, parametric surfaces and data reduction. Published in 31.5.2005 Responsible person/RTD: Aydin Ozturk, International Computer Institute, Ege University. In co-operation with Unige Miralab: HyungSeok Kim, Stephane Garchery, Nadia Magnenat-Thalmann.
This report has been published.
5. Research report on Real time culling techniques and spatial databases. Published in 31.5.2005. Responsible person/RTD: Aydin Ozturk, International Computer Institute, Ege University. In co-operation with Ahmet Bilgili and Serkan Ensoner.
This report is NOT a PUBLIC document.
6. Research report on current CAD conversion pipelines and standard 3d data formats. Published in 31.5.2005 Responsible person/RTD: Steffen Strassburger, Fraunhofer Institut für Fabrikbetrieb

und -automatisierung IFF. In co-operation with Tina Haase.
This report has been published.

7. (WP2 task 2.1) Surface Property Database description for the usage of the CADPIPE system Demonstrated in 1.9.2005 Development of the surface properties data bank (Properties Database). Person responsible: Jukka Rönkkö VTT. Surface Property Database description will be useful only for the further product development of the CADPIPE system and it's actually a document. The documentation is NOT PUBLIC.
8. (WP2 task 2.2) Material editing tool to the VisualEditor tool-set. Demonstration in 31.12.2005. Person responsible: Steffen Sraassburger FgH/IFF. Material editing tool software will be at the moment for demonstration only. Material editing tool includes a shader and is a software module which can possibly become sold as a separate editor but will be more useful as an integrated software module to some other application. Material editing tool will be integrated to the Cadpipe system. The documentation is NOT PUBLIC.
9. (WP3 task 3.1) Spatial database Demonstrated in 1.9.2005 Development of the spatial database based on the information from phases 1) and 2). Person responsible: Jukka Rönkkö VTT. Spatial database description will be useful only for the further product development of the CADPIPE system and it's actually a document. The documentation is NOT PUBLIC.
10. (WP4 task 4.1) CAD Export tool Demonstration in 31.12.2005 Development of an CAD export tool for STEP AP203, STEP AP214, STL, IGES, 3DS (Kinetix) and Collada. (WP4) to the Visual editor. Person responsible: Jukka Rönkkö VTT. CAD Export tool is a set of software components which will be integrated to the Cadpipe system. CAD Export tool will be developed forward and AutoCAD format support has been suggested to become developed during this project. The documentation is NOT PUBLIC.
11. (WP4 task 4.2) XML standard description. Demonstration in 31.12.2005. XML standard description to export properties not supported in transportation file standards. Person responsible: Jukka Rönkkö VTT. XML standard description will be useful only for the further product development of the CADPIPE system at the moment. XML standard description will be free to use for the CAD domain even though it has been designed specially for the use of this project. XML standard description is a document. This document IS PUBLIC.XML CAD format standard description can be developed further after the project by the guidance and control of the project consortium or it may be assigned to control of some other domain authority.
12. CADPIPE software and its software modules which are the property of the SMEs.

The publishable results as written to the DOW:

Deliverable No	Deliverable title	Delivery date	Nature	Dissemination level
D2	1.2 State of the art of material rendering techniques	31.5.2005	Report	PU
D3	1.3 State of the art of hardware rendering, parametric surfaces and data reduction	31.5.2005	Report	PU
D5	1.5 Study on current CAD conversion pipelines and standard 3D data formats	31.5.2005	Report	PU
D10	4.2 XML standard description (CADPIPE 3D data structure extension basing on Collada standard)	1.12.2005	Document	PU
D19	7.2 Technology transfer in partners	31.11.2006	Report	PU
D20	7.3 Seminars, Fairs	31.11.2006	Report	PU
D21	7.4 Public Summary of the Final Report	31.12.2006	Document	PU

Rest of the results will be published only by the permission of the partners.

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