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# Presentation of the PC version of the ESABASE/Debris Impact Analysis Tool

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(2) ESA/ESTEC

19th European Thermal & ECLS Software Workshop  
ESA/ESTEC  
11 – 12 October 2005

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page 1



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## Presentation Outline

- Background and Motivation
- Presentation of PC ESABASE
  - Concept
  - Handling
  - Components
- Hands-On Demo
- Conclusion & Outlook

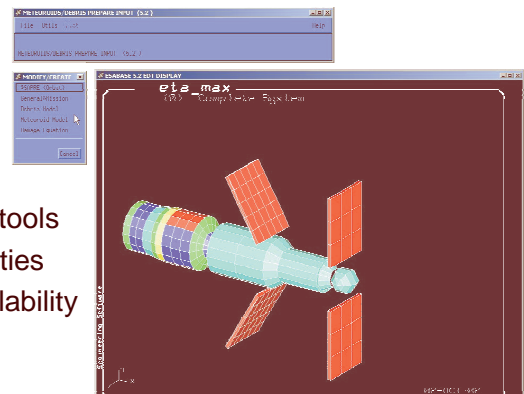
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page 2

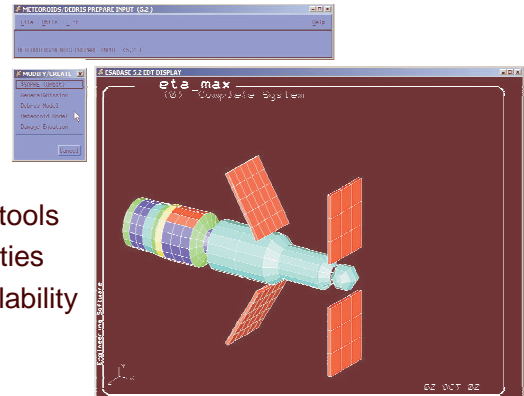
# Background

## Background and Motivation

- Ageing Space Environment Analysis Tools
  - Platform dependence
  - Cumbersome user interfaces
  - Restricted data models
  - Undefined or non-existent interfaces to external tools
  - Unsatisfactory pre- and post-processing capabilities
  - Serious constraints of their acceptance and availability (ESABASE;..)

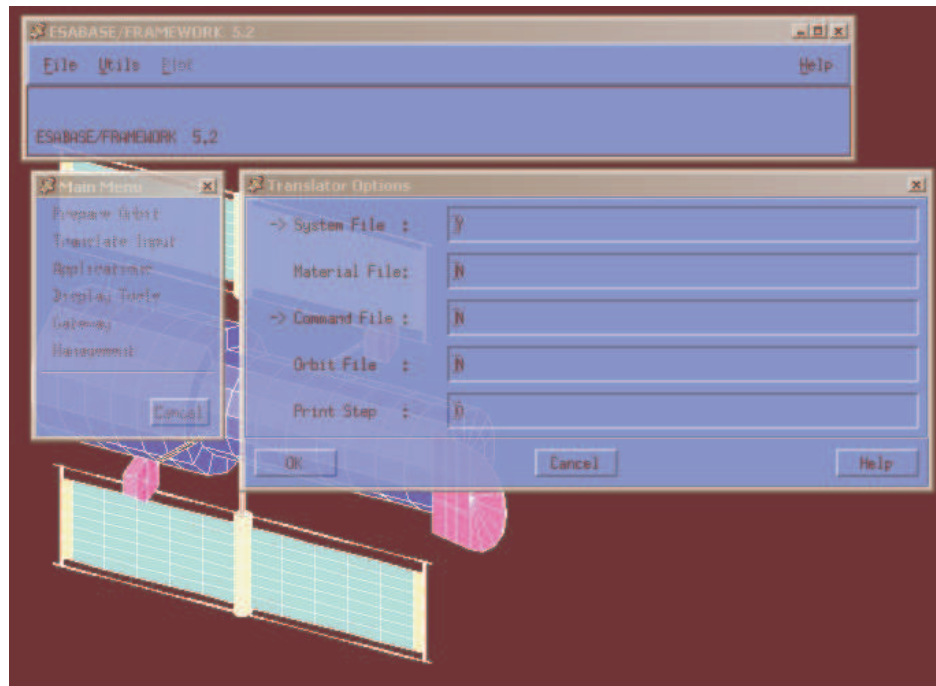


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  - Undefined or non-existent interfaces to external tools
  - Unsatisfactory pre- and post-processing capabilities
  - Serious constraints of their acceptance and availability (ESABASE;..)
- ESA Study
  - „Porting of the existing ESABASE/Debris Application to PC platform“
  - Usage of Off The Shelf (OTS) tools and Open Source software
  - Provision of Open Interfaces (STEP)
- Result
  - PC-ESABASE = Open Frontier framework + ESABASE/Debris solver



## Presentation of PC ESABASE

Concept  
Handling  
Components



## User Input Acquisition

- Satellite Model
  - Geometry
  - Kinematics
  - Pointing
- Mission
  - Orbit
  - Duration
  - Maneuvers
- Solver parameters
  - Debris
  - Other



## PC ESABASE Concept

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### Application of Models

- “General Services”
  - Orbit Propagation
  - Meshing
  - Ray Tracing
- Physical model(s)
  - Debris & Meteoroids
  - Radiation
  - ...
  - ..

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page 7



## PC ESABASE Concept

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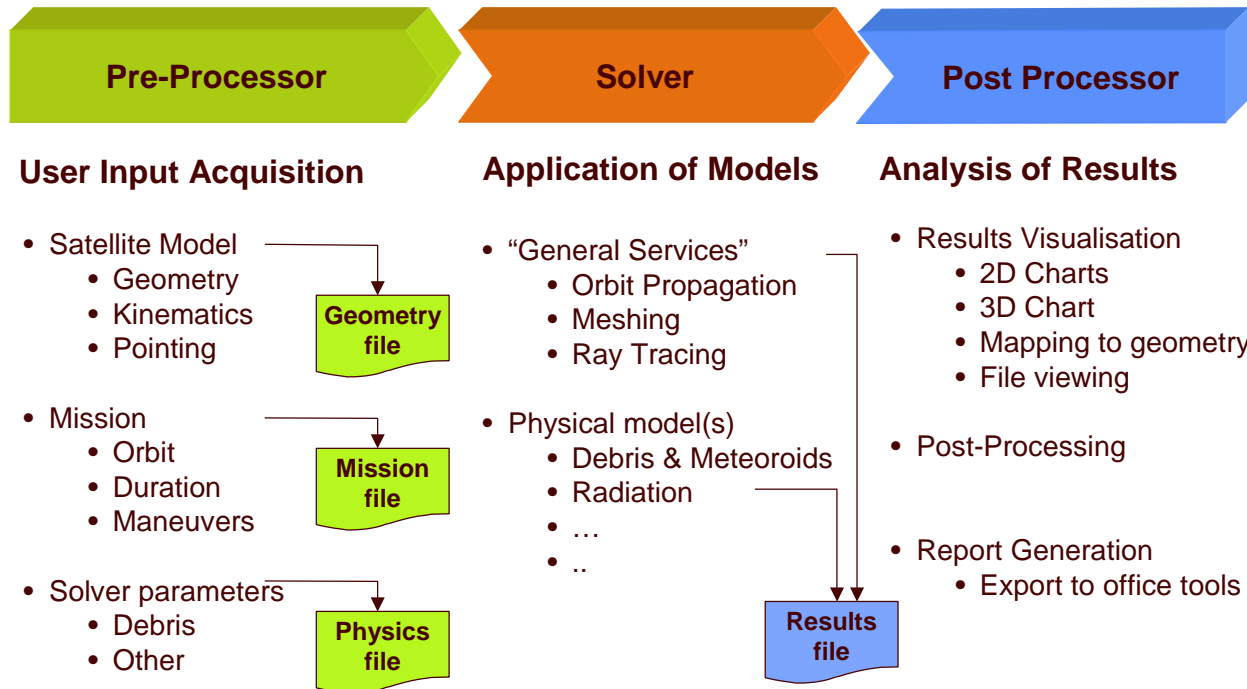
### Analysis of Results

- Results Visualisation
  - 2D Charts
  - 3D Chart
  - Mapping to geometry
  - File viewing
- Post-Processing
- Report Generation
  - Export to office tools

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page 7



- An analysis case („Project“) is specified by three + one dedicated project files
- Each file is physically existing, enabling standard file handling activities
  - Configuration control
  - File access via networks
  - Compression, encryption, backup
  - File exchange in distributed teams
- A project may contain several files of the same type, allowing for parametric case studies by combining files representing different options

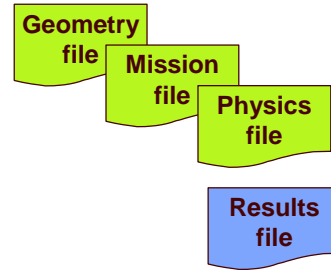


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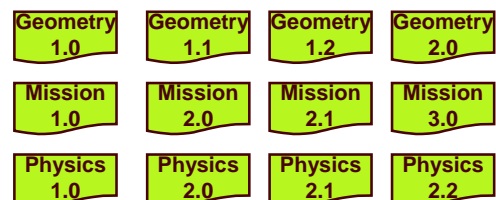
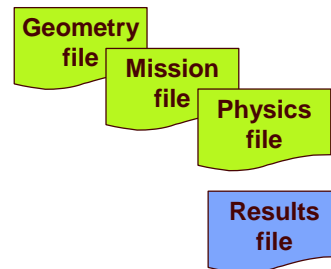


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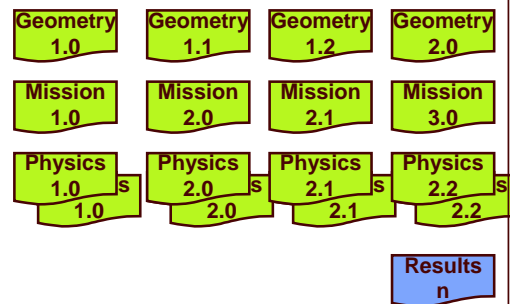
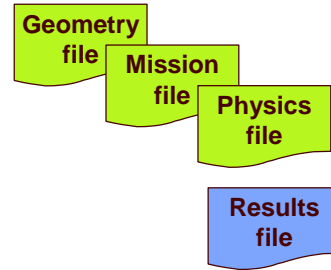


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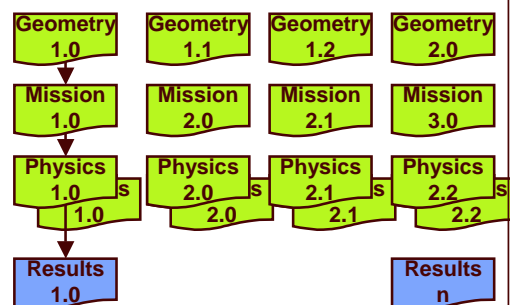
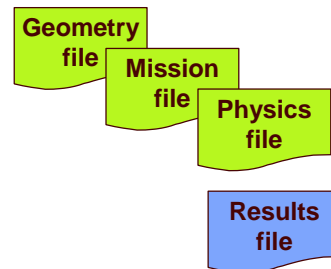


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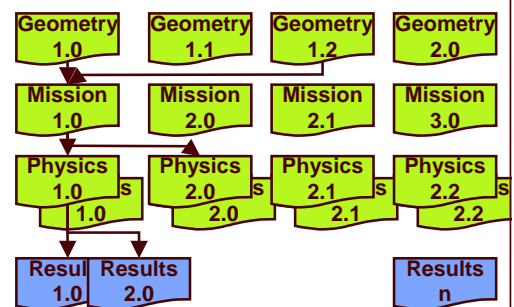
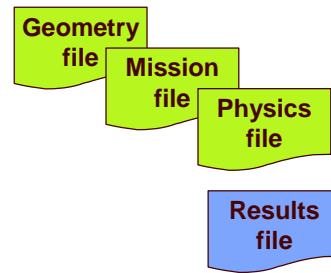
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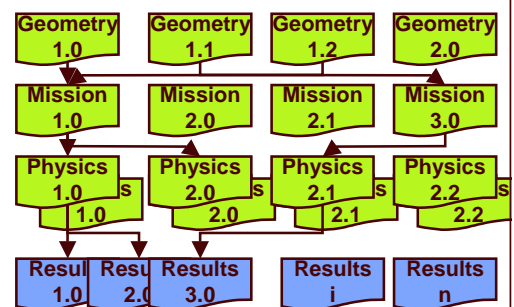
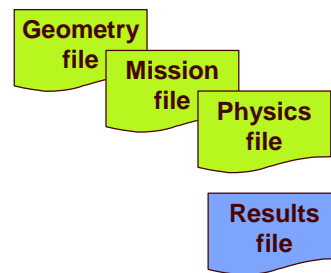




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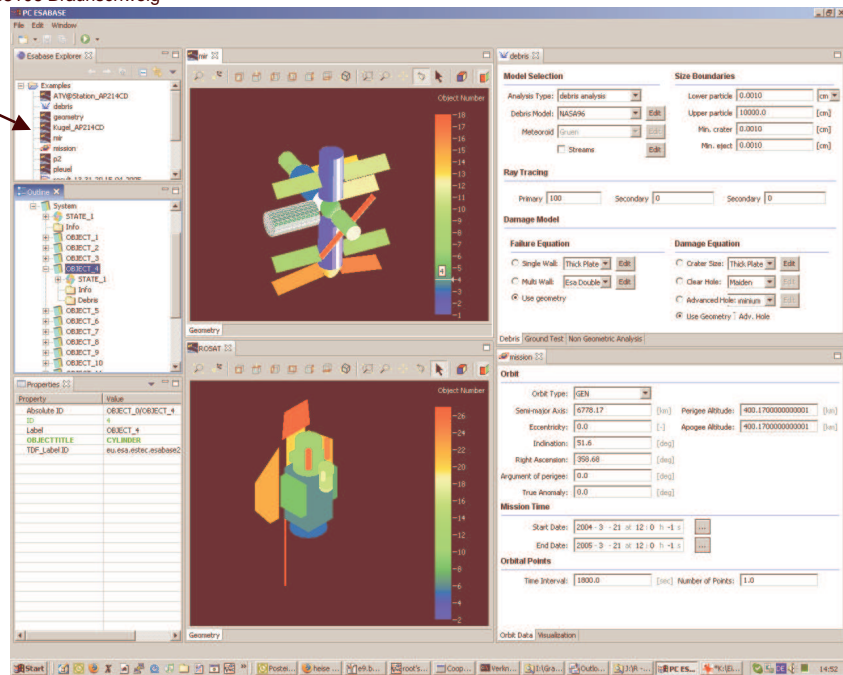


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## Project Explorer

- List of currently open projects
- List of available project files, organised in project directories

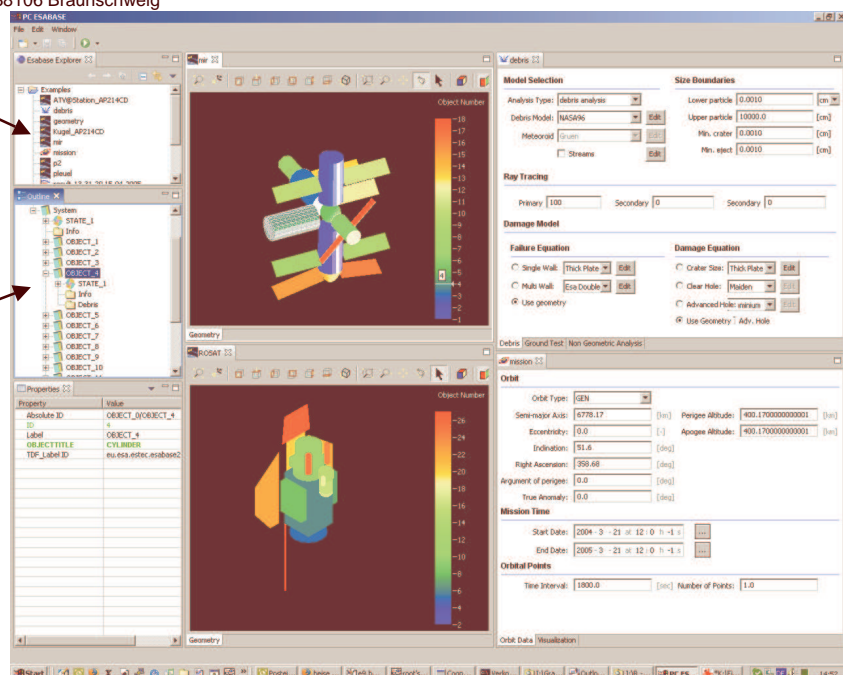


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## Outline

- Structured, generic visualisation of selected data file



## Project Explorer

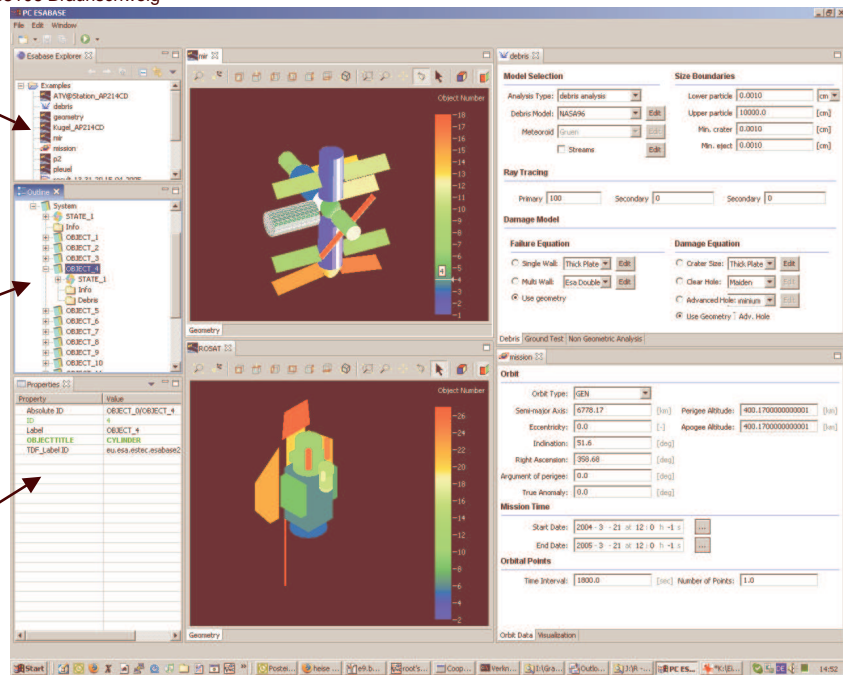
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## Property Editor

- Generic editing of data model content



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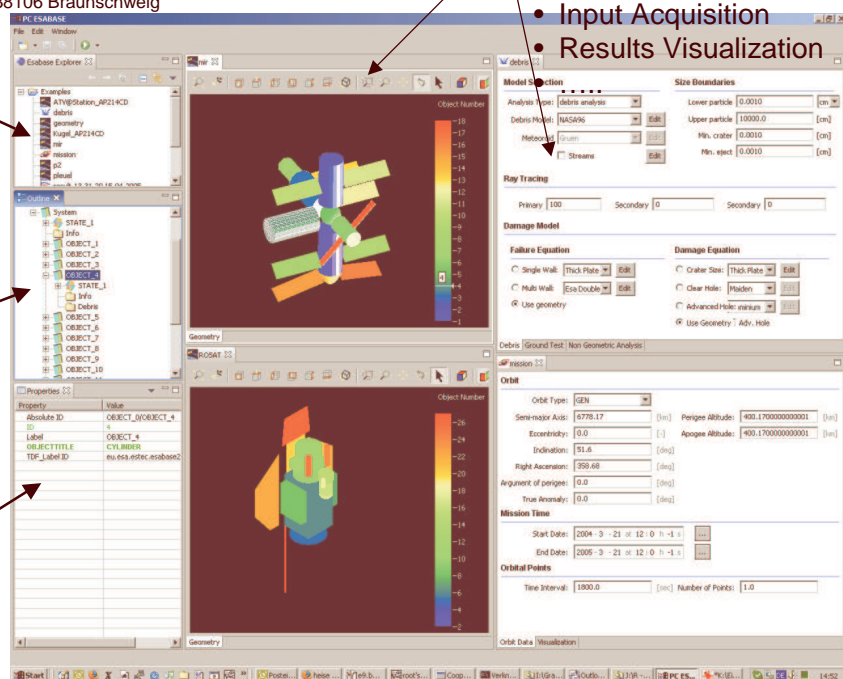
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## Property Editor

- Generic editing of data model content

## Editor Area

- Dedicated editors for specific purposes
- Geometry editing
- Input Acquisition
- Results Visualization



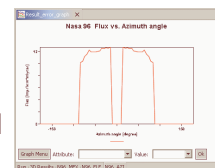
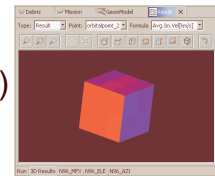
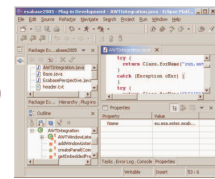




## PC ESABASE Components

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- GUI → Eclipse (CPL)
  - full availability to the features of the Java Standard Widget Toolkit (SWT)
    - Window management
    - File handling
  - Offers a „Plugin Model“
- Model Builder/Viewer → Open Cascade (GPL like license)
  - Open Source CAD library
  - available on PC and other platforms (Windows, Linux, Solaris)
  - Interfaces: STEP (AP 203 and 214), IGES and others
- Visualisation → VisAD (LGPL)
  - Java component library for interactive and collaborative visualization and analysis of numerical data



Look and Feel	Version
Mac OS X	1.0.0
Mac OS X Aqua	1.0.0
Mac OS X Carbon	1.0.0
Mac OS X Classic	1.0.0
Mac OS X Gnome	1.0.0
Mac OS X KDE	1.0.0
Mac OS X Motif	1.0.0
Mac OS X Solaris	1.0.0
Mac OS X Windows	1.0.0
Mac OS X Windows XP	1.0.0
Mac OS X Windows Vista	1.0.0
Mac OS X Windows 7	1.0.0
Mac OS X Windows 8	1.0.0
Mac OS X Windows 10	1.0.0

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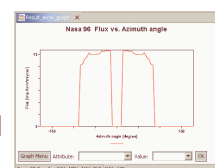
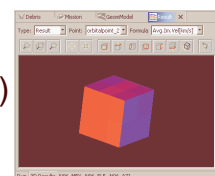
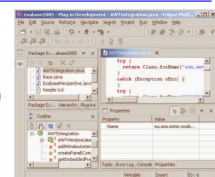
page 10



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  - Java component library for interactive and collaborative visualization and analysis of numerical data
- Reporting → JFreeReport (LGPL)
  - JFreeReport is used to display formatted data tables and analysis reports



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Presentation of the PC version of the ESABASE/Debris Impact Analysis Tool  
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page 10



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## Hands-On Demo



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## Conclusions and Outlook



## Summary and Outlook

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- Based on Open Source OTS tools the Open Frontier Platform has been created
- Open Frontier provides
  - A solution for PC platforms
  - An ergonomic framework for user input acquisition and visualisation
  - A flexible work flow concept
  - A STEP interface (STEP SPE in preparation)
- Options for extensions/applications
  - Inclusion of solvers from various disciplines → e.g. radiation
  - Offers particular advantages due to the fact that different solvers may work on exactly the same geometry
  - The availability of already available Eclipse plugins provide extensive possibilities for pre- and post processing.

Presentation of the PC version of the ESABASE/Debris Impact Analysis Tool  
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page 13



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19th European Thermal & ECLS Software Workshop, 11 – 12 October 2005, ESA/ESTEC, Noordwijk, The Netherlands

page 14