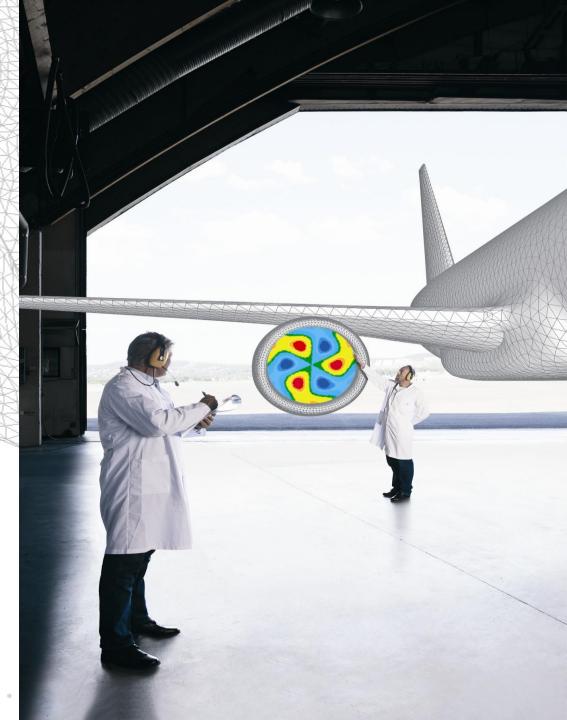# Building Simulation Reports Efficiently

The Challenges of Reporting

Tor Helge Hansen, Dr.Ing.
Managing Director

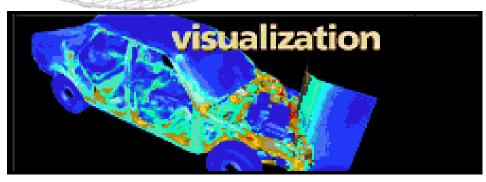![ceetron logo](understanding by visualization)

Ceetron History

- ViewTech ASA. Established in 1995 as a spin-of from SINTEF, Scandinavia's largest independent research organization

- Founded by Dr. Ketil Aamnes and Dr. Tor Helge Hansen

- Developer of **GLview Product Suite.** Specialized in the field of 3D visualization and animation of results from FEA simulations.

- ViewTech AS merged with Dynamic Imaging in year 2000, became **Ceetron AS**.

- Office in Tønsberg established 2003
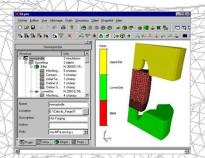
- Staff: Total 12. 3 Ph.D. 8 M.Sc.
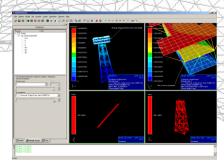
Company Profile

- Mission Statement
  - **Understanding By Visualization**

- Business Idea
  - **Ceetron is a software company offering advanced 3D visualization products and solutions for customers within energy, marine and automotive industries.**

- Key application areas
  - **Pre/Post processing and result interpretation**
  - **Presentation, communication and data sharing**
  - **Integrated simulation environments**

- Company Values
  - **Leading edge technology and know-how**
  - **Customer satisfaction and after sales support**
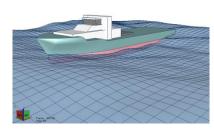 - **Responsible and dedicated professionals**

GLview Application Areas
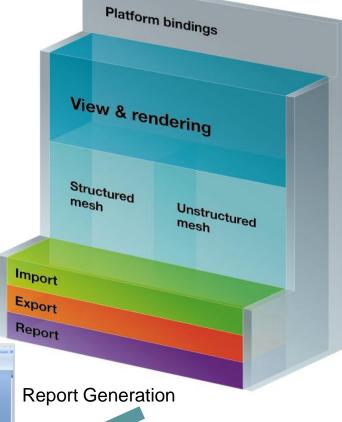
Graphical User Interface for pre-processing

Post-processing and result interpretation

Presentation and data sharing

Report Generation

Platform bindings

View & rendering

Structured mesh

Unstructured mesh

Import

Export

Report

1500+ Companies using GLview Technology

ceetron®
understanding by visualization

ws/Atkins

Rolls-Royce

Ferrari

VOLVO

vectayn

HYUNDAI
HEAVY INDUSTRIES CO.,LTD.

HONDA

Raufoss

KVÆRNER™

BG

DNV

ROLEX

Statoil

ThyssenKrupp

DERA

Bayer

Goodrich

IES

UNiSYS

BECHTEL

Rockwell
Science Center

BMW

HYDRO

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technologies

Distributor:
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OEM partners:
Det Norske Veritas
SINTEF Petroleum Research
MARINTEK
LINKftr
Windsim

Distributors:
Engineering Research Nordic AB
Dynagraph AB

Distributors:
Applied Computing & Engineering Ltd.
TEAM Engineering Ltd.
Analysis Design Productivity Ltd.

Distributors:
Numerical Simulation Technology Corp.
Transwoods Co. Ltd.

Distributor:
FE-Design
OEM partners:
FE-Design
T-Systems Gmbh

OEM partner:
Virtual Motion

OEM partner Netherlands:
AMARCON BV

Distributor:
Apic

OEM partner:
Blue Ridge Numerics Inc.

Distributor:
Ingeciber S.A.

Distributor:
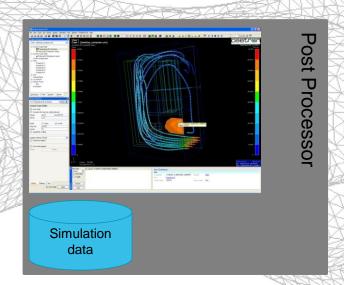HITEX
OEM partner:
Transvalor S.A.
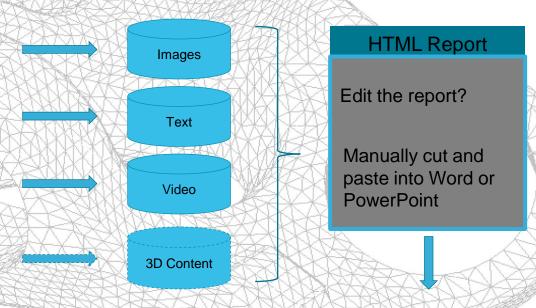
Distributor:
Smart-CAE

The Challenges of Reporting

1. Collecting and storing engineering report content

2. Integration with industry standard editing tools and report formats

3. Automated and interactive report building using one single tool
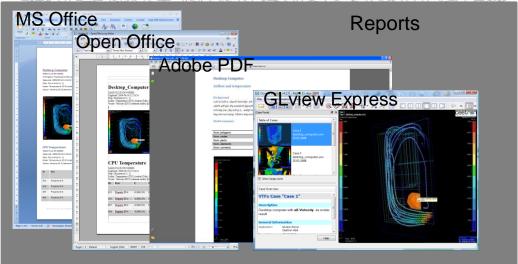
4. Interactive 3D content in reports

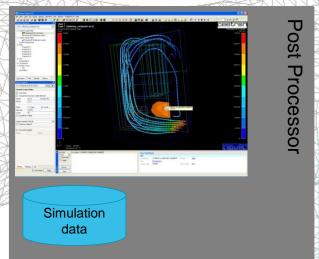# 1. Collecting and storing engineering report content

Collecting and storing Report Content – the Classical Approach

Post Processor

Simulation data

Images

Text

Video

3D Content

HTML Report

Edit the report?

Manually cut and paste into Word or PowerPoint

Reports

MS Office
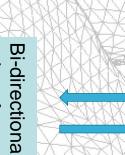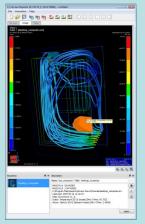
Open Office

Adobe PDF

GLview Express

Collecting and storing Report Content – an alternative approach

Post Processor

Bi-directional Interface

Report Builder

Situations:
- Images
- 2D Plots
- 3D Models
- Video
- Tabular data

Simulation data

Repository

Create reports using templates

Reporting tools

Adobe PDF

Open Office

MS Office

GLview Express

2. Industry standard report formats and editing tools

Commonly used editing tools

- ## MS- Office
  - Used by most CAE engineers. MS-Office has 80% market share among enterprise users (2009)

- ## Open Office, Star Office, Lotus Symphony, iWorks ++
  - Approximately 8-10% - but increasing

Commonly used report formats

- PDF – portable document format
  - De-facto industry standard format
  - Most 3rd party editing tools can generate PDFs
  - Limited support for 3D CAE content (excellent CAD viewers)
- docx, pptx
  - XML based – known as Open XML. Based on ODF
  - Native format of MS-Office. Supported by Open Office
- ODF . Open Document Format.
  - Open format for representing electronic documents such as spreadsheets, charts, presentations and word processing documents.
- HTML
  - Open format. Easy to create HTML reports
  - HTML generators in 3rd party tools creates out which is difficult to maintain and edit for further use
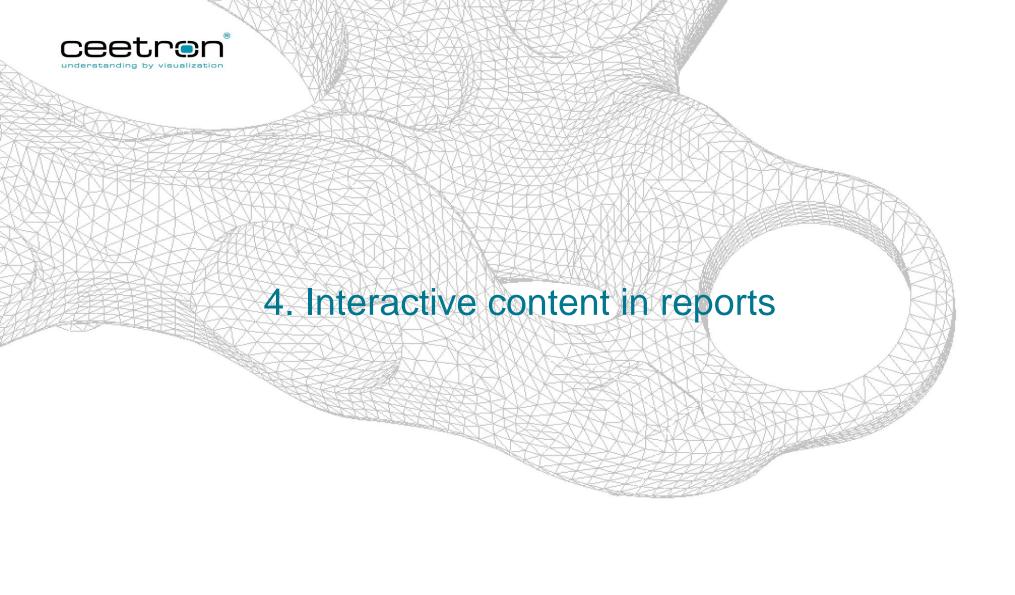
3. Automated and interactive reporting using one tool
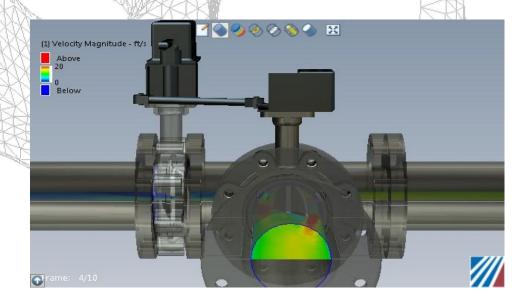
Automated vs. Interactive reporting

- Reports from CAE simulation projects are very different

- Simple and Repetitive simulation processes will allow for fully automated reports.
  - Some engineers would prefer to skip the post-processing and interpretation step and have the report produced directly.

- Complex Simulation Workflows requires interactive reporting functionality
  - Multiple Simulations Actions generate input to reports
  - Several engineers provide input to the engineer
  - Report Modification feature is important

4. Interactive content in reports

Interactive 3D Content in reports

- **3D content can be included in MS Office and Open Office documents**
  - MS Office XML and Open Office ODF formats allow for 3D content to be included

- **Increased understanding**
  - The user can explore the model and the results in full 3D
  - More data readily available

- **3D content reduces**
  - The number of images needed
  - The number of videos needed

- **Increased flexibility**
  - Easier to answer ad-hoc questions

GLview Report Builder

Short demo

Conclusion

- The concept and the architecture of the GLview Report Builder is a first attempt to respond to important challenges in generating reports from CAE simulation projects.

- Future Development is in the direction of integrating the Report Builder with Simulation Data Management systems. Work is in progress…..