Affordable, Effective Simulation Data Management for SMBs and Workgroups

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International Business Development

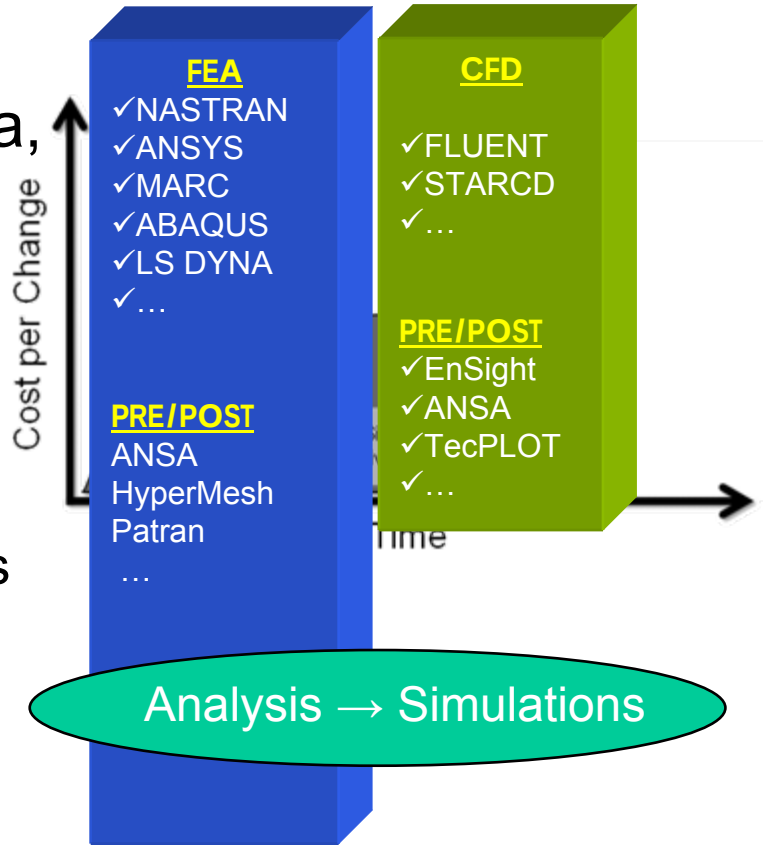
intrinSIM LLC

intrinSIM - Activities

- Premier source of **embeddable** software technologies for **engineering** applications
  - Commercial applications
  - In-house engineering tools
- Focus on business development
  - Support directly from technology provider
  - License agreements between licensee and technology provider
- Business management services
  - Business brainstorm sessions
  - Business model and process review

Introduction - CAE Challenges

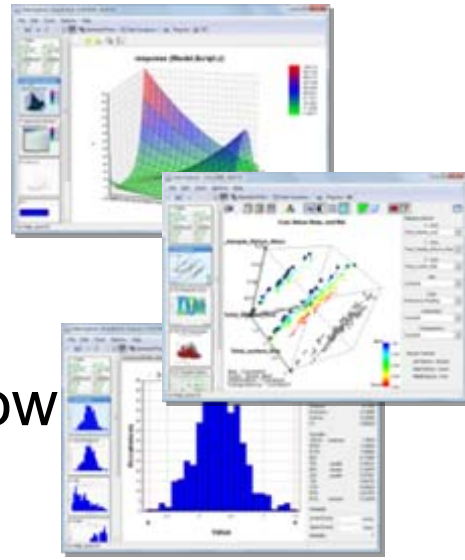
- CAE use is evolving from Analysis to Simulation Driven Design (SDD)
- Effect: Data, data, and more data, and then even more data
  - SDD dramatically increasing the number of simulations
  - CAE result files typically very large
  - Many CAE applications, many formats, multiple user environments
  - Higher level tools (DSE, Systems Engineering, Robust Engineering, stochastics…) will cause data to explode even further



- Challenges impacting large companies and SMBs
  - SDM valuable tool to meet the challenges

Introduction – SDM Opportunity

- SDM systems being deployed by more and more large organizations
  - Enabling Simulation Driven Design
  - Easier access to simulation results for better and faster design decisions
  - Capturing and re-use of simulation know-how
  - Understanding of simulation context
  - Ensuring best simulation practices
  - Global, enterprise wide implementation
- Result: Better products with reduced development time & cost
- SDM trend has not yet reached SMBs



Introduction

- The difference between a boy

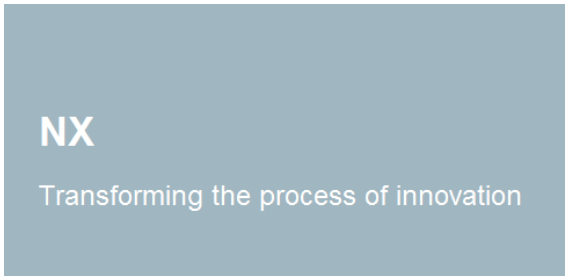
and a man

is the cost of their toys.

Introduction

- The difference between a SMB

and a large OEM



is the cost of their tools?

- What makes a tool affordable (aka good ROI)?
- Different criteria for large OEMs and SMBs

Differences in SDM Requirements

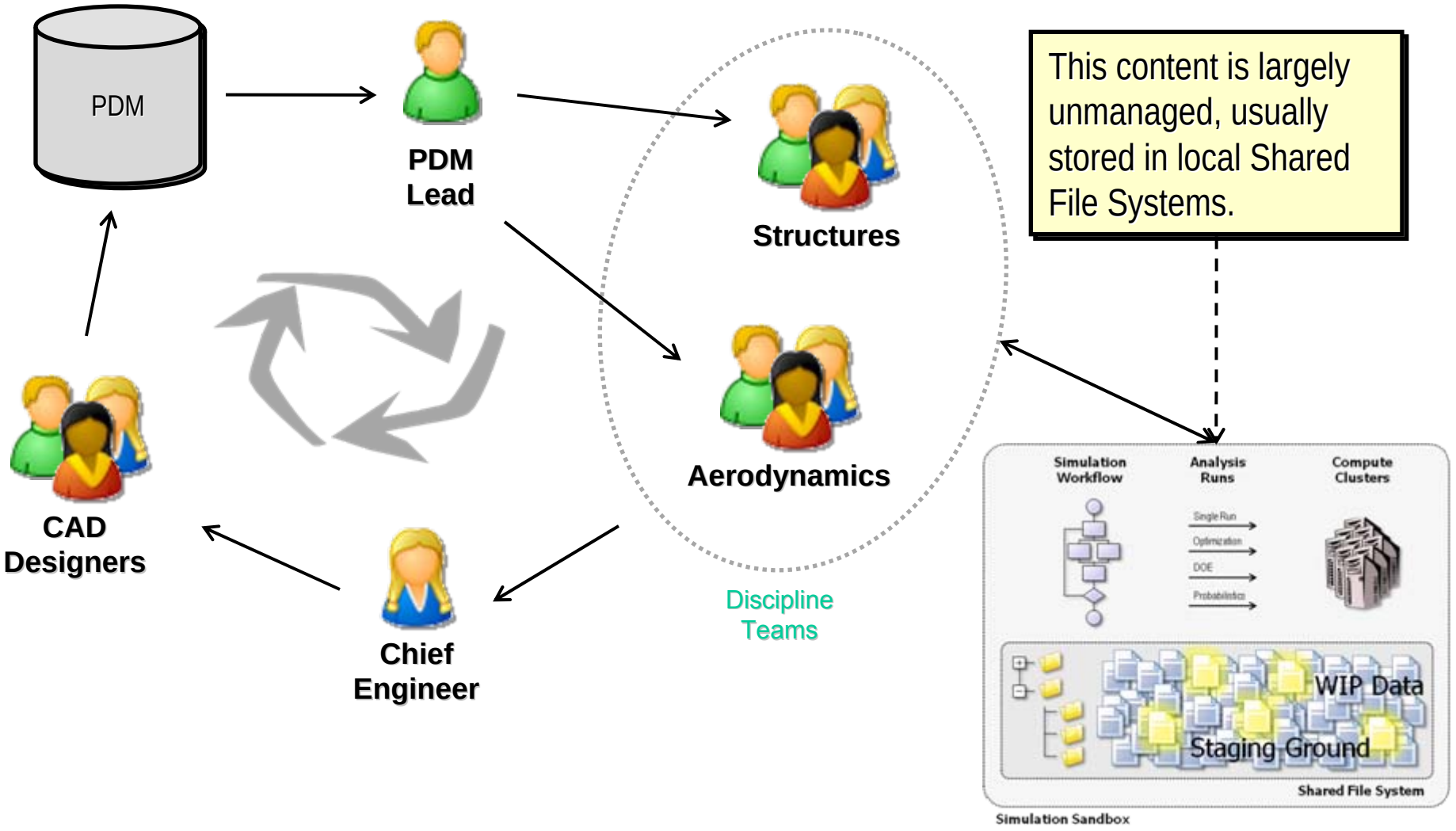
Auto & Aero OEMs

- Automated simulation processes ensuring user independent “best practice”
- Dependable simulation results easily available for design decisions
- IT department familiar with complex DB apps
- Large number of users justifies higher initial cost (customization, training, ..)

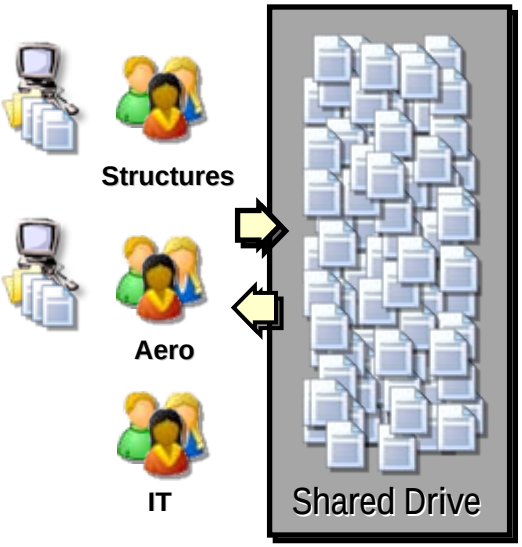
Small and Medium Businesses

- Flexibility, speed and ease of implementation more important than full process automation
- Same as OEMs
- Out of the box installations w/o IT admin required
- Small teams need tools with minimum training that allow customization by users

Typical SDM Practice at SMBs



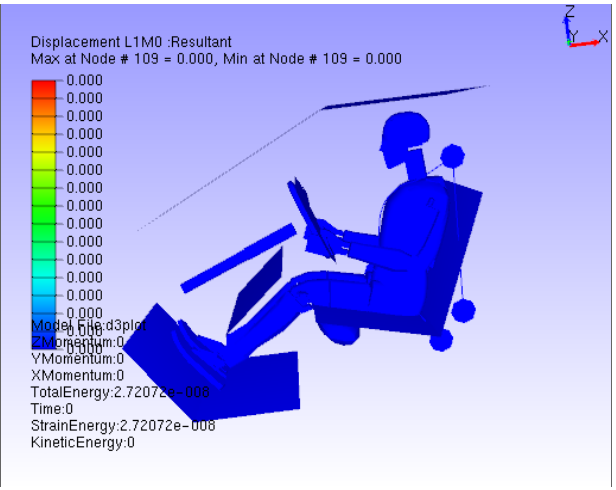
Problems with Current Practices



Simulation Data Management

- Analysis files scattered
- All related files poorly organized
- Can't find information
- Access to files weakly managed
  - Unauthorized access to data??
- Hard to understand who changed what file and why
- File dependencies not dealt with consistently
- Content management (archival, deletion) difficult to organize
- In summary, there is no management

Problems with Current Practices

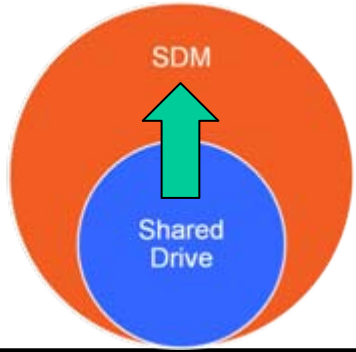


Simulation Data Sharing

- Results often not easily available for good, timely design decisions
  - **Data files are HUGE !!!**
- CAE data complex and varied
  - Many CAE applications and many formats, no standard
  - Complex field results for different physics
    - Solid Mechanics
    - Fluid Mechanics
    - Electro-Magnetics
    - Acoustics
    - Others …
  - Transient results (crash, CFD, non-linear, …)
  - 2D images not enough
  - 2D movies not enough

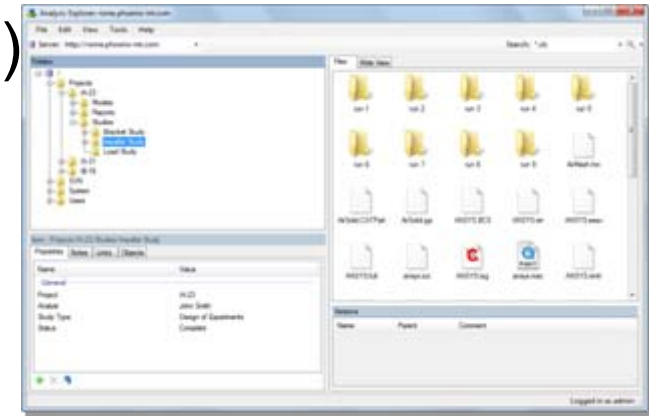
Realizable SDM Solutions for SMBs

- Simulation data management problems not efficiently solved with shared drives / folders
- (Initial) “cost” of enterprise level SDM systems usually not justifiable
  - Customization and training
  - Changes of work-flows and processes
  - Best value with highly repetitive tasks (templating) vs. SMB need for flexibility to meet demands from multiple customers
- Affordable option
  - Combination of best of class workgroup level solutions for data management, data sharing and process automation
    - Out-of-the-box functionality, easy to use and implement
  - Flexible implementation: schedule, functionality and degree of automation
    - Initial co-existence of shared drive/folders and SDM

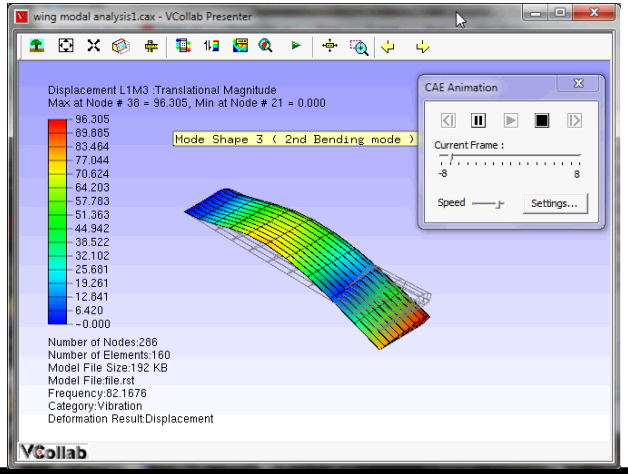


Capabilities of SMB/Workgroup Level SDM

- Solution examples
  - Analysis Library (Phoenix Integration)
    - Data management for simulation and other file types
    - Client/Server architecture
    - File access via Windows Explorer like client or web browser

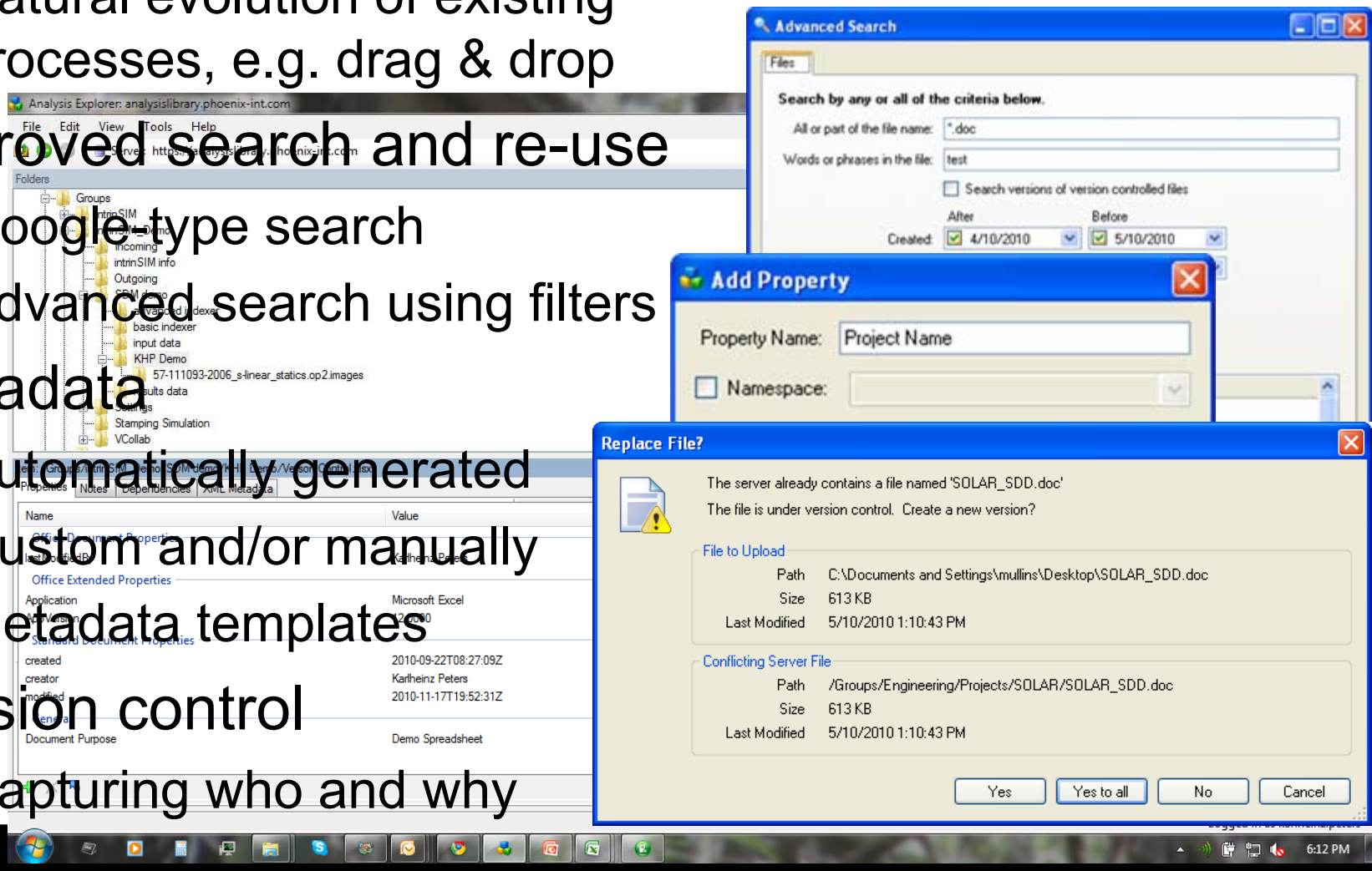


  - VCollab Presenter (VCollab)
    - CAE data compression, unified CAE result visualization for collaboration
    - Compression/conversion and viewing tools (including free viewer)
    - Possible to combine results for multiple physics (disciplines) in one file



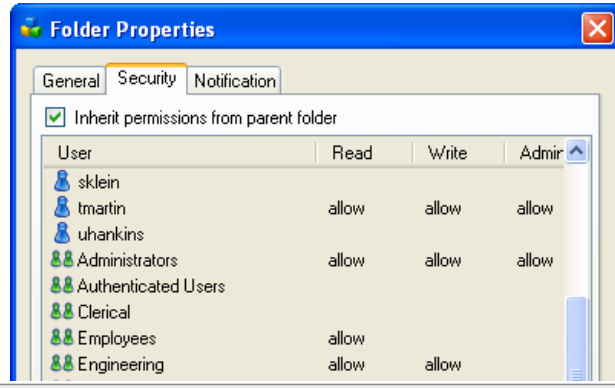
SMB/Workgroup SDM vs. Shared Drive

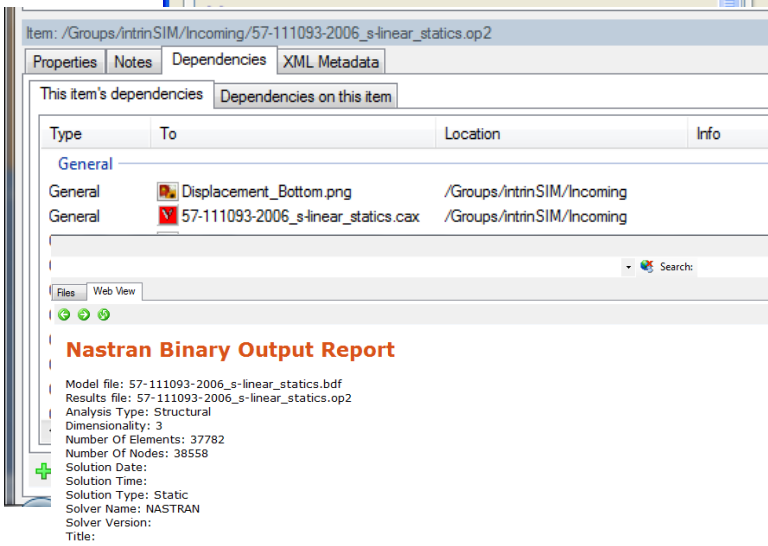
- Similar, flexible environment
  - Natural evolution of existing processes, e.g. drag & drop
- Improved search and re-use
  - Google-type search
  - Advanced search using filters
- Metadata
  - Automatically generated
  - Custom and/or manually
  - Metadata templates
- Version control
  - Capturing who and why

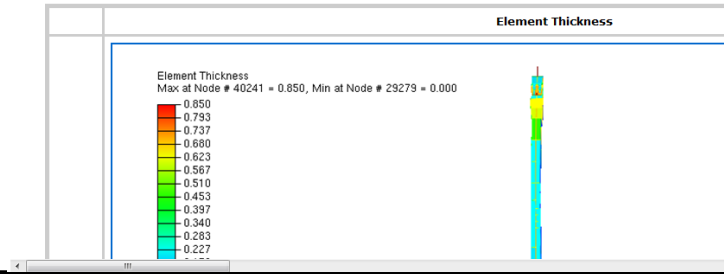


SMB/Workgroup SDM vs. Shared Drive

- Data security & change notification
  - User access control (read/write)
  - Automatic email notification on new versions or documents
- Dependencies
  - Audit trail capability
  - Items related to the current file, version, folder, or data item
- File pre-view
  - Content viewing w/o download

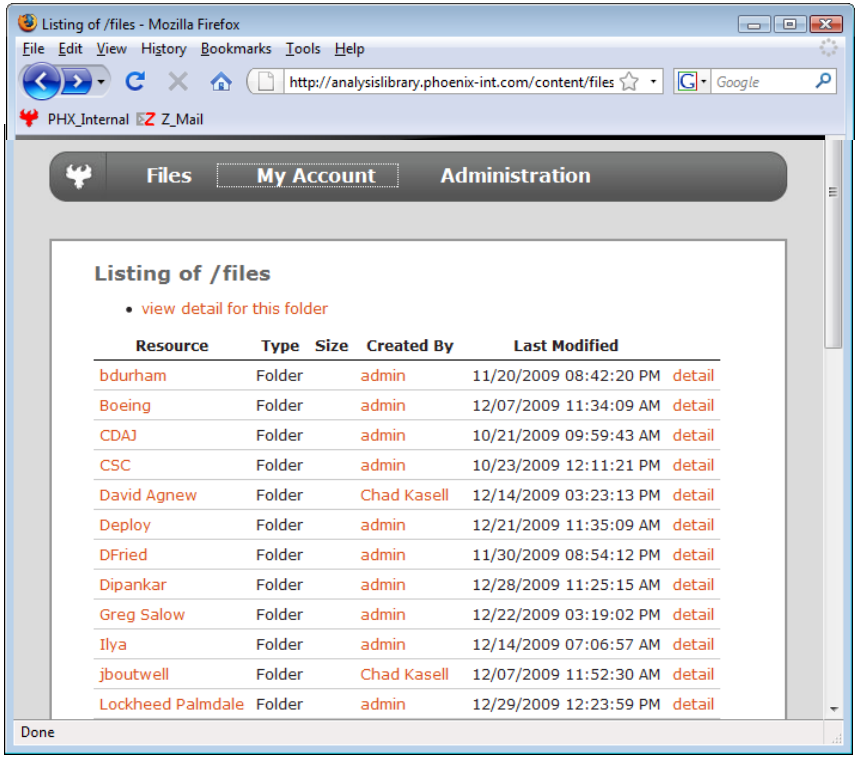






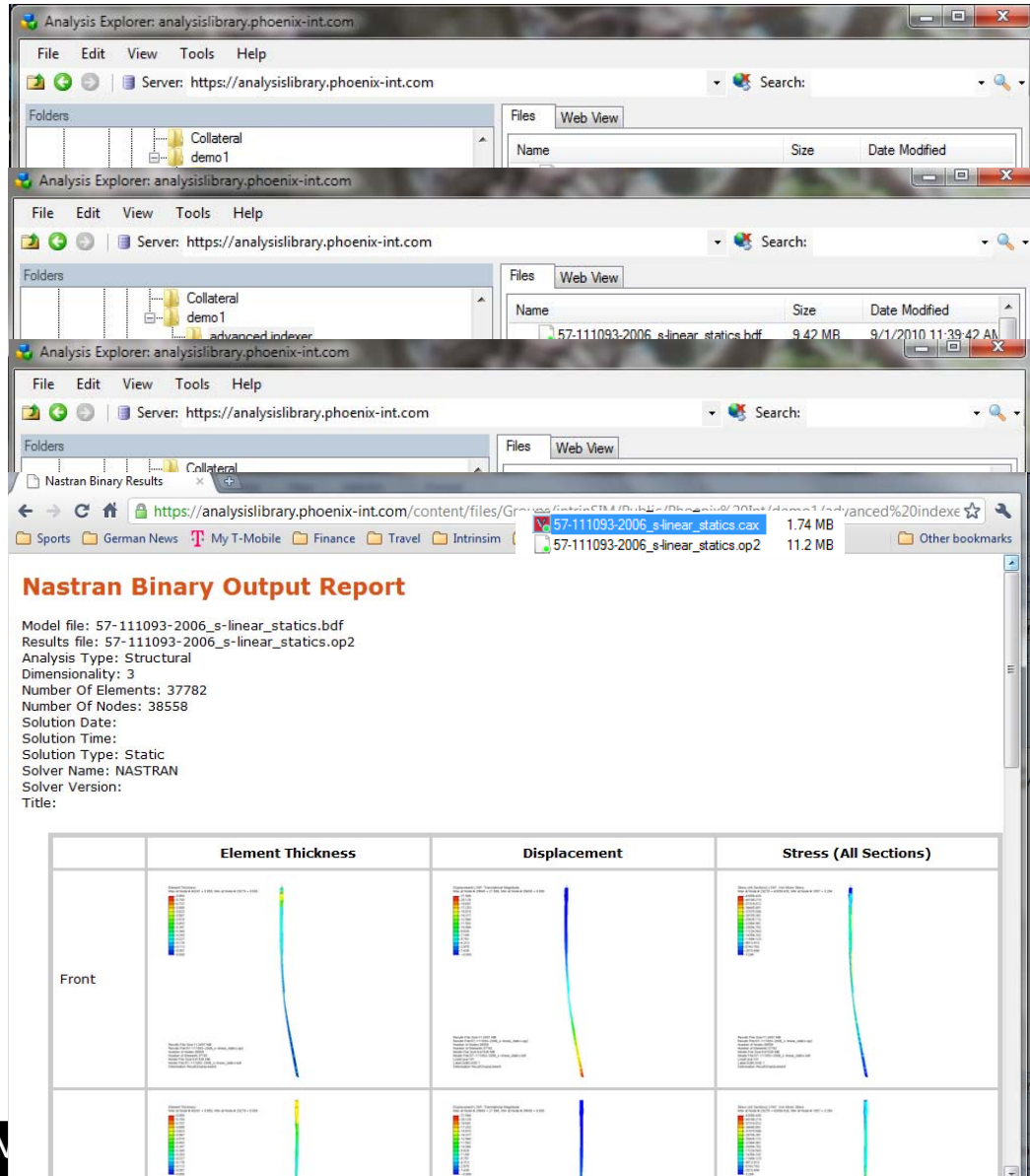
SMB/Workgroup SDM vs. Shared Drive

- Web access
  - Access via URL
  - No client required
  - Project management
  - Admin tool
- Customization API
  - Integration with other databases and applications
  - Process automation
  - Use case example: automatic creation of metadata and visualization data after result file upload



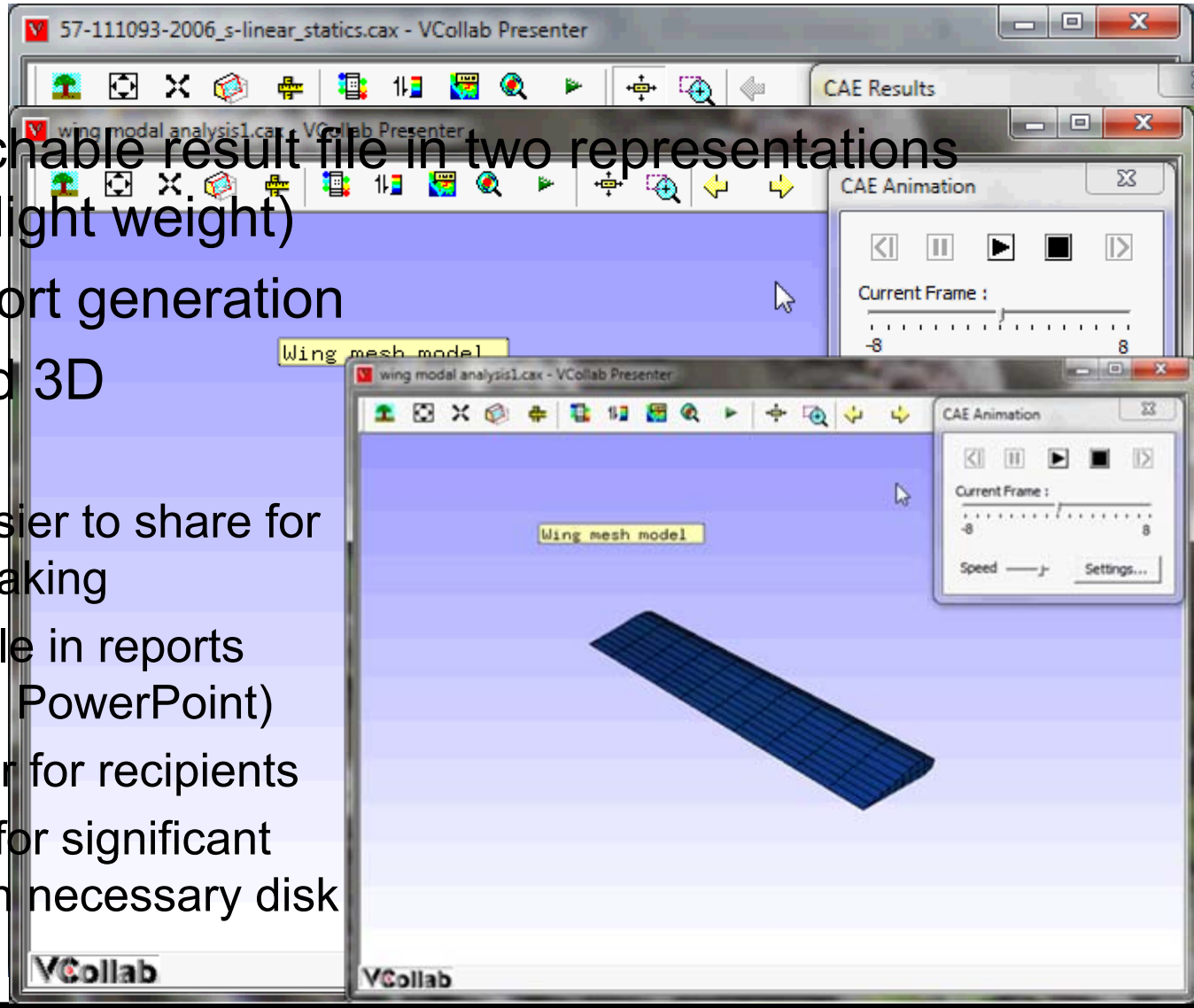
Automatic Creation of Light Weight Files for Reporting and Collaboration

- Upload of result (e.g. ".op2") file without metadata
  - Automatic extraction of metadata
  - Automatic creation of very light weight visualization data containing 3D mesh and result information
  - Automatic creation of result images in pre-defined views

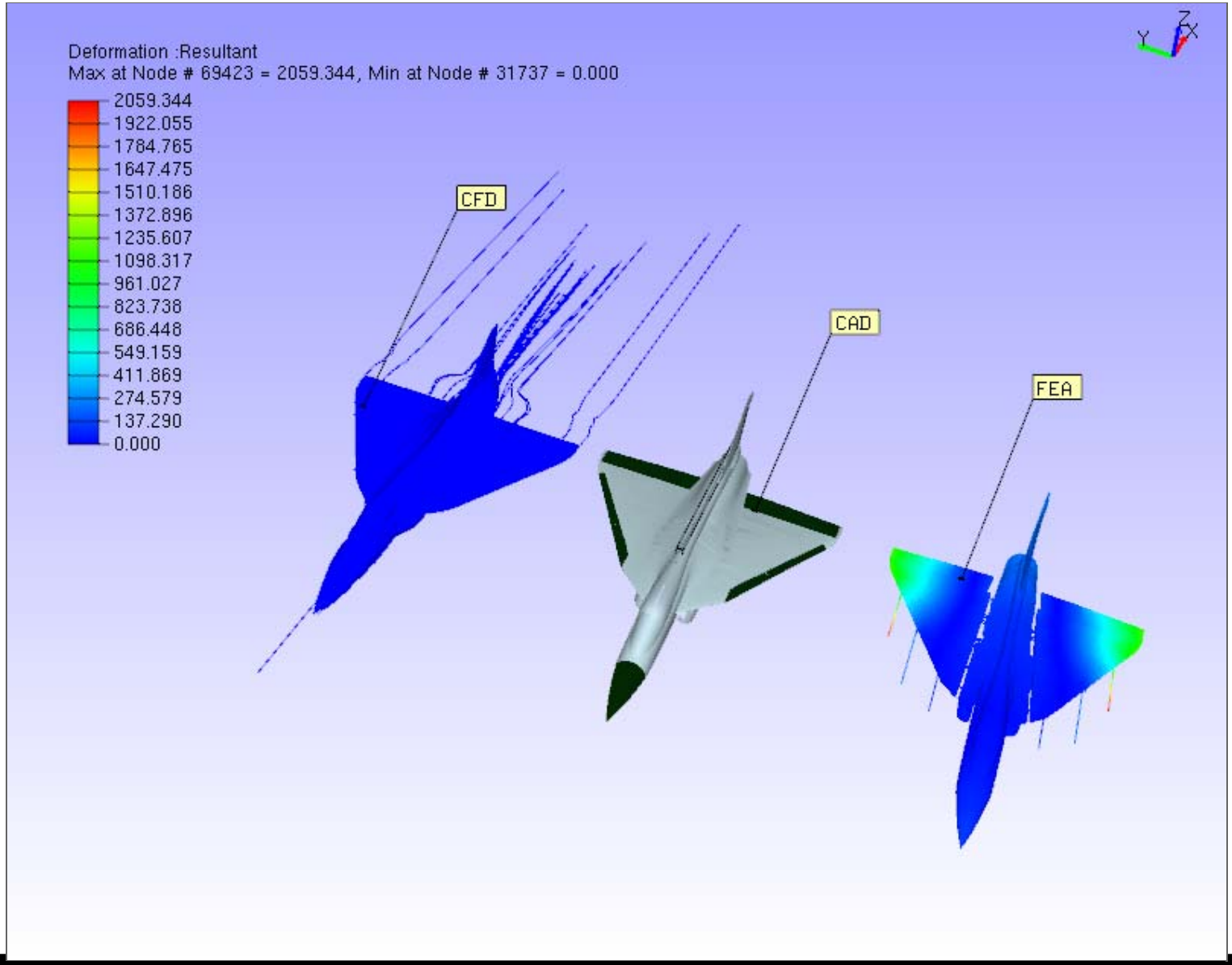


Automatic Creation of Light Weight Files for Reporting and Cooperation

- Benefits
  - Highly searchable result file in two representations (solver and light weight)
  - Efficient report generation
  - Compressed 3D result file
    - Results easier to share for decision making
    - Embeddable in reports (e.g. Word, PowerPoint)
    - Free viewer for recipients
    - Possibility for significant reduction in necessary disk capacity



Multi-Disciplinary Result Sharing



SDM for SMBs/Workgroups Conclusion

- Different affordability criteria than enterprise SDM

Both racing, but different rules and goals

SDM for SMBs/Workgroups Conclusion

- Different affordability criteria than enterprise SDM
  - Capability to combine shared drives' flexibility, ease-of-use as well as ease and speed of installation with
    - Efficient searches through metadata (auto-extracted or manual)
    - Change notification and version control
    - User access/privileges management
    - Capturing of file dependencies
  - ROI even in case of phased implementation
  - Ability to integrate with other tools for collaboration, decision support and work-flow automation
- SDM benefits justify investment also for SMBs
  - Easier access to simulation results for better design decisions
  - Understanding of simulation context
  - Capturing and re-use of simulation know-how
  - Enabling Simulation Driven Design

Questions?

THANK YOU!

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