

# Intelligent Light

## Breaking the Disk I/O Bottleneck in CFD by Eliminating It

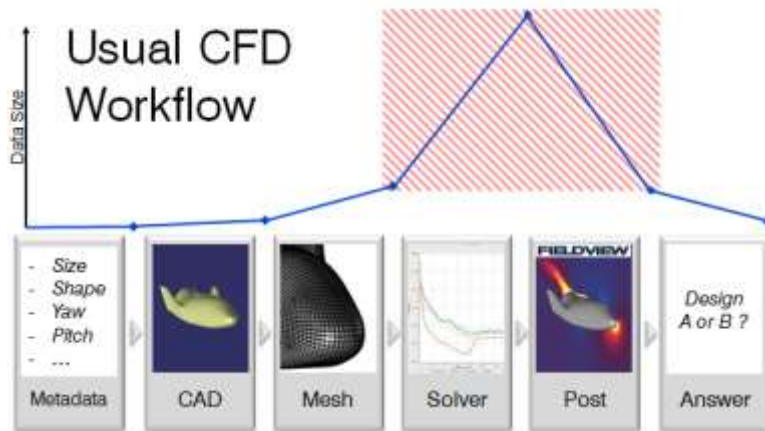
- Over 30 years in the software & services business
- **FieldView** launched in 1990
  - Post-processing and Visualization which is *Extracting and Delivering Knowledge*
- We've been helping our customers deal with the "Big Data" problem for years



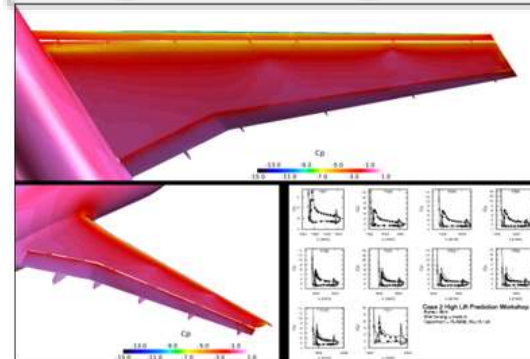
You have a Big Data problem if your data size is a problem for YOU.



# CFD Workflows and Data Value



## High Lift wing Example – Data Value



544M Grid Points  
54Gb File Size

With 7+ variables  
Wing/Body 160Mb  
Cut plane 33Mb

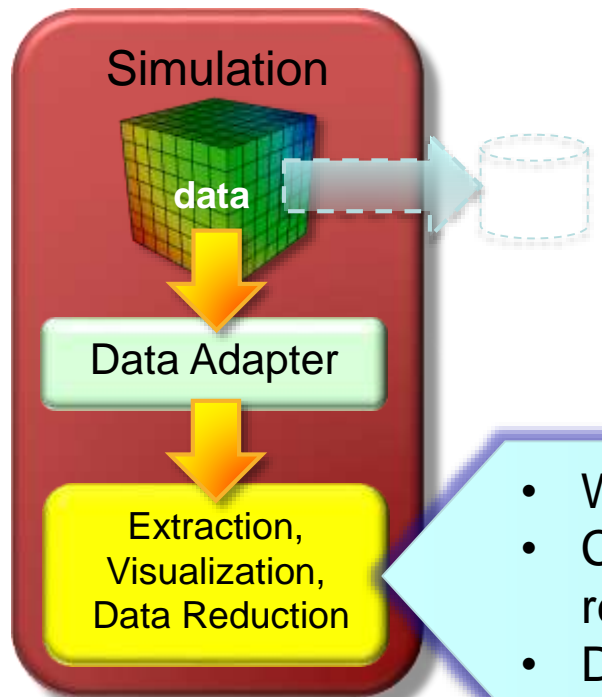
- A small amount of input data yields large data (files), the majority of which is not useful\*
- For example:  
1000 timesteps x 54Gb = 54Tb  
1000 designs x 54Tb = 54Pb

The **100x to 1000x** savings in disk space has three benefits (and one drawback):

- ☺ Solver throughput is increased as I/O time is reduced
- ☺ Post-processing is 100x to 1000x faster (eg. **FieldView XDBs** and **DOE VisIt**)
- ☺ Less disk space reduces the very high cost of ownership of spinning disk
- ☹ But you have to give up your big file

# Extract High Value Data Directly

Domain & Physics Based Data Reduction: *in situ* or *in transit*



- Operate directly on the simulation's data arrays when possible
- Eliminate or drastically reduce the need to write large files
- Simulation uses data adapter layer to make data suitable for extraction, visualization and data reduction

- Write very small files for analysis & visualization
- Compute Reduced Order Model (ROM) variants for reconstruction/feature detection
- Derive FFT, forces, other domain-specific analysis

- Removes physical, economical and 'psychological' barriers to scale
- Enables 1000's of jobs to easily be managed for design exploration and uncertainty quantification and subsequent reduction