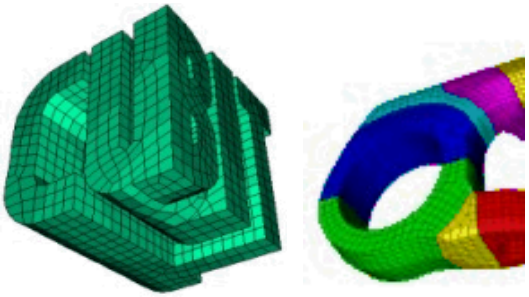
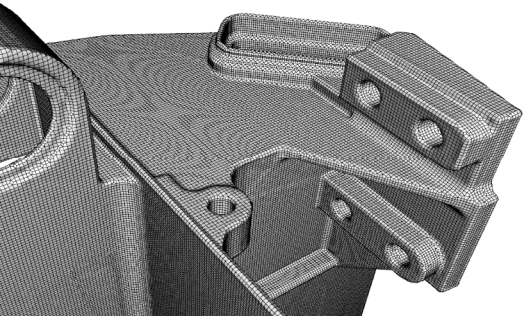
SAND2016-9368PE





CUBIT FY16 External Review

Byron Hanks

CUBIT Project Lead

September 26, 2015

Sandia National Laboratories

Exceptional service in the national interest

U.S. DEPARTMENT OF ENERGY

NNSA National Nuclear Security Administration

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CUBIT External Review

Sandia National Laboratories

- Objectives
  - Engage community
  - Present current R&D
  - Get feedback and recommendations
  - Guide future R&D directions

- Review Panel
  - Andrey Chernikov, Old Dominion University
  - Xevi Roca, Barcelona Supercomputing Center
  - Nilanjan Mukherjee, Siemens
  - Scott Canann, CD-adapco
  - Adrien Loseille, INRIA
  - Hang Si, Weierstrass Institute for Applied Analysis and Stochastics

CUBIT External Review Agenda

Sandia National Laboratories

- Dinner
- 6:00-6:10 – CUBIT Project Overview
- 6:10-6:20 – Panel self organize
- 6:20-7:20 – Panel and others visit posters
- 7:20-8:00 – Panel discuss and prepare feedback
- 8:00-8:30 – Panel give feedback

What is CUBIT?

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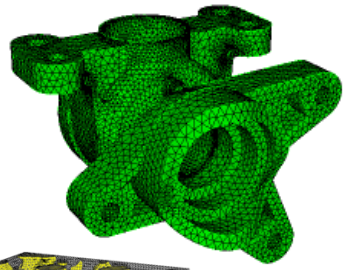
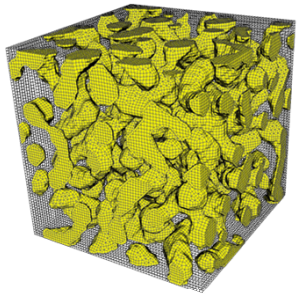
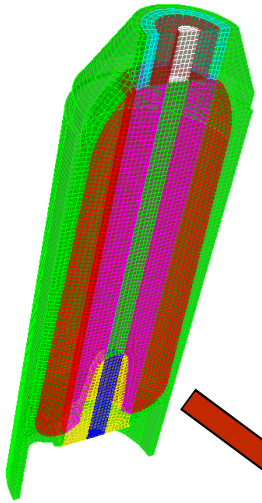
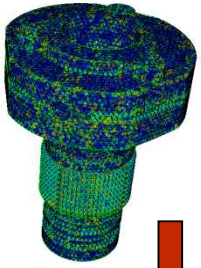


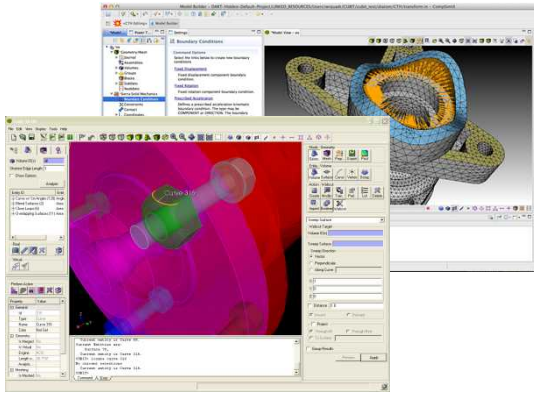


Advanced Meshing Algorithms

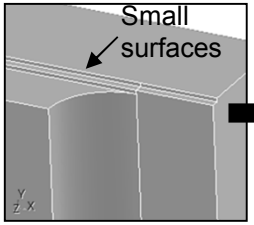


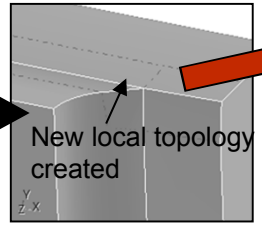


Mesh Quality



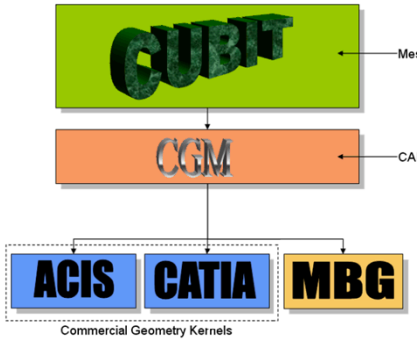
GUI and customization



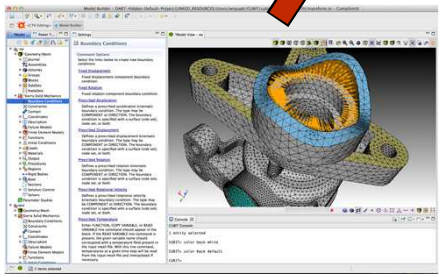


Geometry Cleanup/Simplification

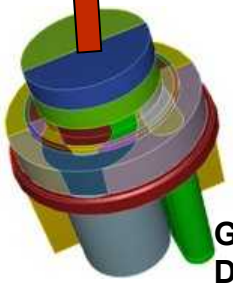
CUBIT



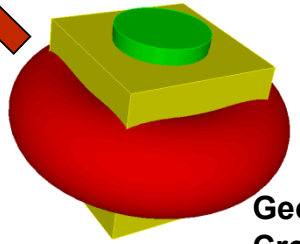
CAD Interface



Model Attribution



Geometry Decomposition



Geometry Creation

CUBIT Project Goals

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1	**Reduce time to numerical model**	Reduce the time to generate Sandia's analysis models
2	**Enable new meshing paradigms**	Provide meshing capabilities for V&V/UQ and meshing inline with analysis
3	**Grow partnerships**	Develop strategic partnerships to strengthen our capabilities and program

The CUBIT Team 2015

Sandia National Laboratories

- **Sandia, Albuquerque**
  - Ted Blacker, Manager
  - Byron Hanks, Project Lead
  - Steve Owen
  - Matt Staten
  - Roshan Quadros
- **Student Interns**
  - Ryan Viertel
  - Madison Brewer
  - Bradley Parks
- **Elemental Technologies, Utah**
  - Ray Meyers
  - Corey Ernst
  - Clinton Stimpson
  - Corey McBride
  - Randy Morris
  - Michael Plooster
  - Mike Stephenson
  - Karl Merkley

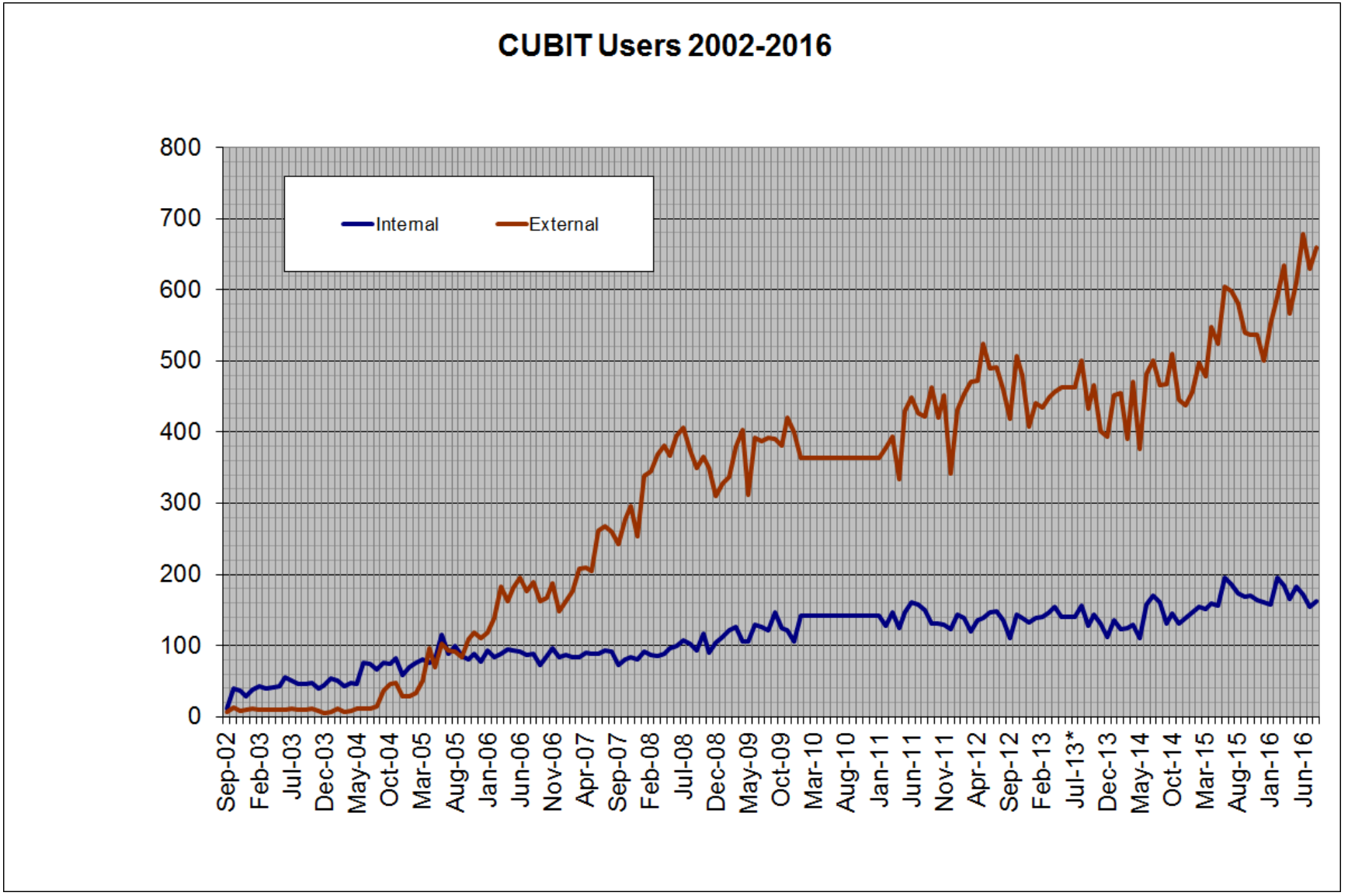
Cubit Funding

Sandia National Laboratories

- Funding outlook
  - Overall outlook = Good
  - Continued downward pressure on core funding source
  - Additional/External funding sources increasing

- Key funding objectives
  - Next-generation advanced hardware (hybrid architectures)
  - Large meshes generated inline
  - Faster turnaround time

CUBIT Usage 2002-2016



Poster Session

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- Hybrid Mesh Scaling for Solution verification
- Frame fields
- Geometry-based refinement criteria for Sculpt meshing
- Tet meshing for microstructure models
- Lattice structures for additive manufacturing
- Thread scaling with OpenNURBS
- Smoothing surfaces generated with topology optimization