



STK (Sierra Toolkit) Update

Trilinos User Group meetings, Oct 2012

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Review & Approval: SAND2012-9253C

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Sierra ToolKit (STK) modules overview

Parallel-consistent Mesh database

- Heterogeneous element types
- Unstructured

Algorithm-Support (AlgSup)

- Multi-threaded execution of bucket-loop algorithms

Search

- Proximity, mesh independent

Linsys, IO, Rebalance

- Bridges from mesh-data to external capabilities
- Built optionally

Util

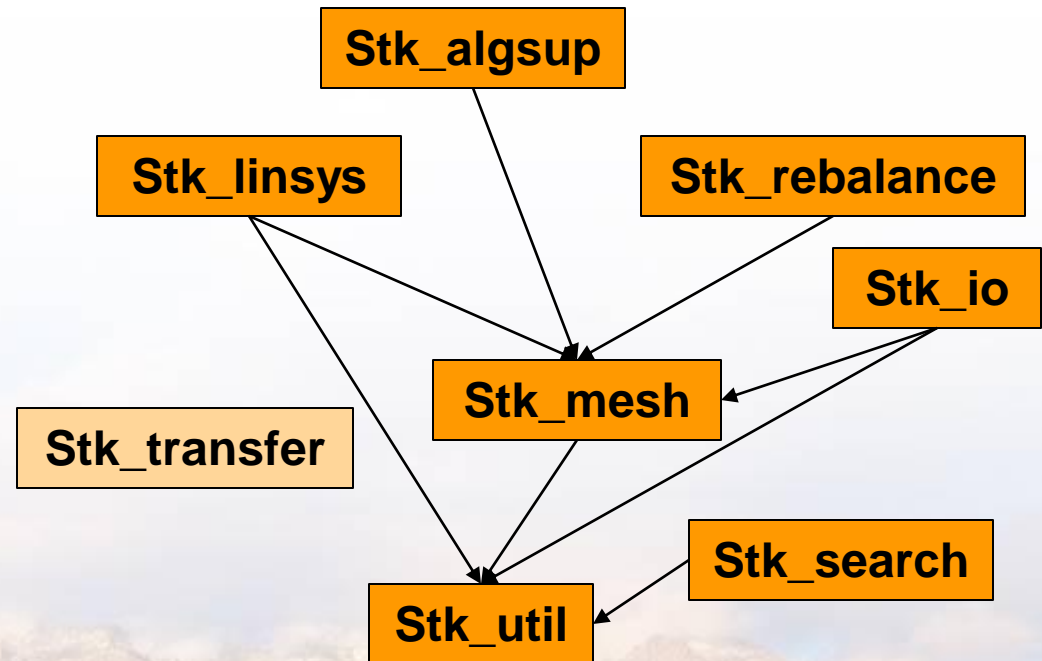
- Everything depends on util directly or indirectly

Transfer

- Not yet implemented

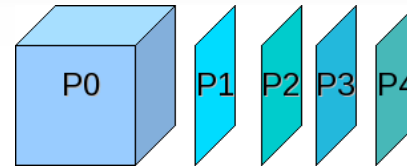
Dependency diagram:

- Arrows point towards a module that is used (depended on) by another module.

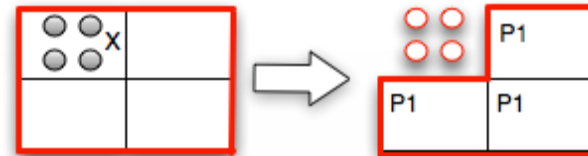


STK Mesh

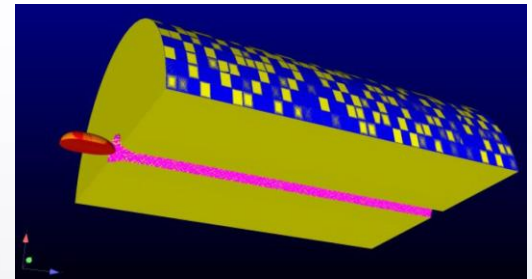
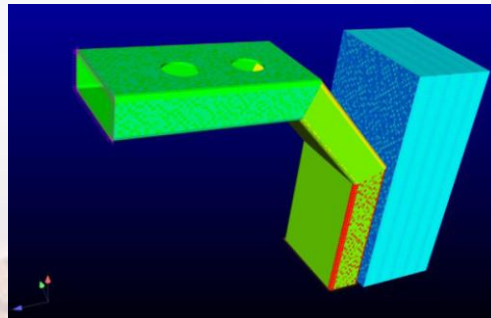
- Parallel distributed, parallel consistent



- Heterogeneous element types and field types



- Unstructured mesh



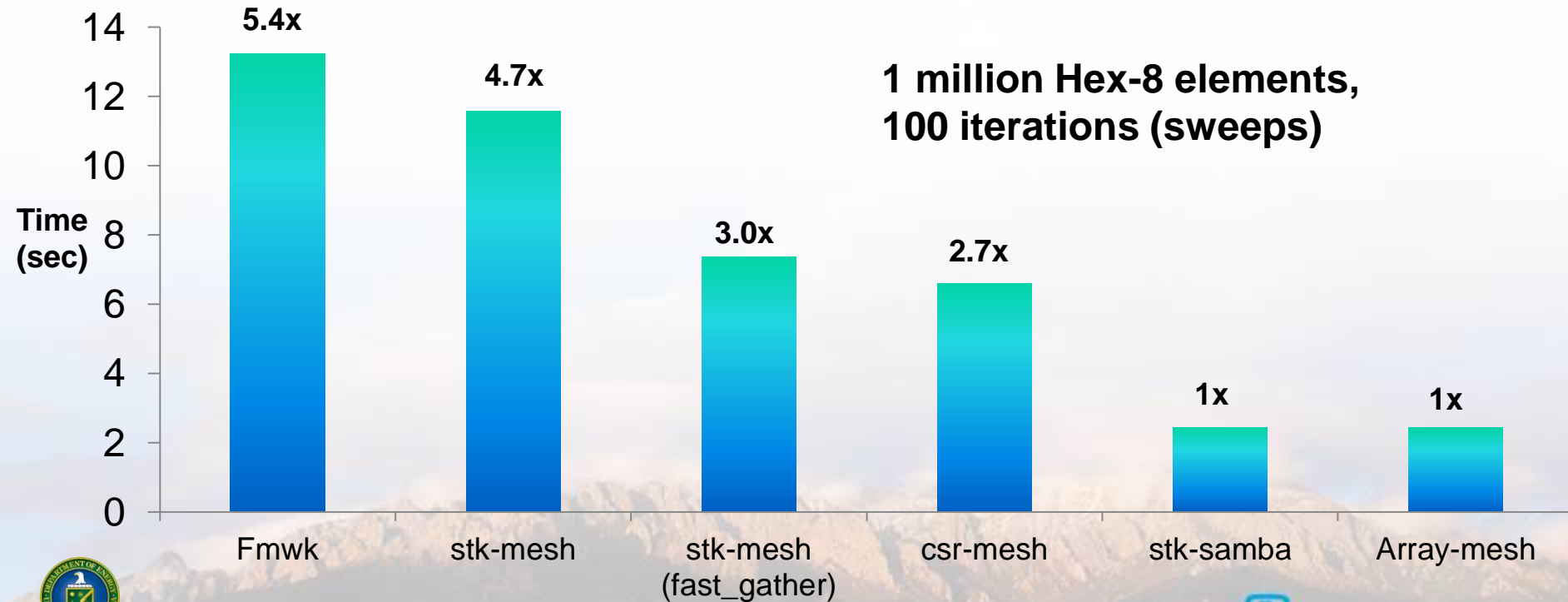
Simple Mesh Performance test: element-node gather

- Test:

For each element, gather data (coords) from connected nodes, perform computation (in this case, trivial centroid calculation)

- Goal:

Stress mesh traversal (relations), and field-data access





Next task: improve stk-mesh using lessons learned from research meshes

Value semantics:

- Entity object is replaced by 'index' into mesh

Memory reorganization:

- Use topology information in buckets to enable storing downward connectivities (aka relations) in contiguous memory

Usability/clarity:

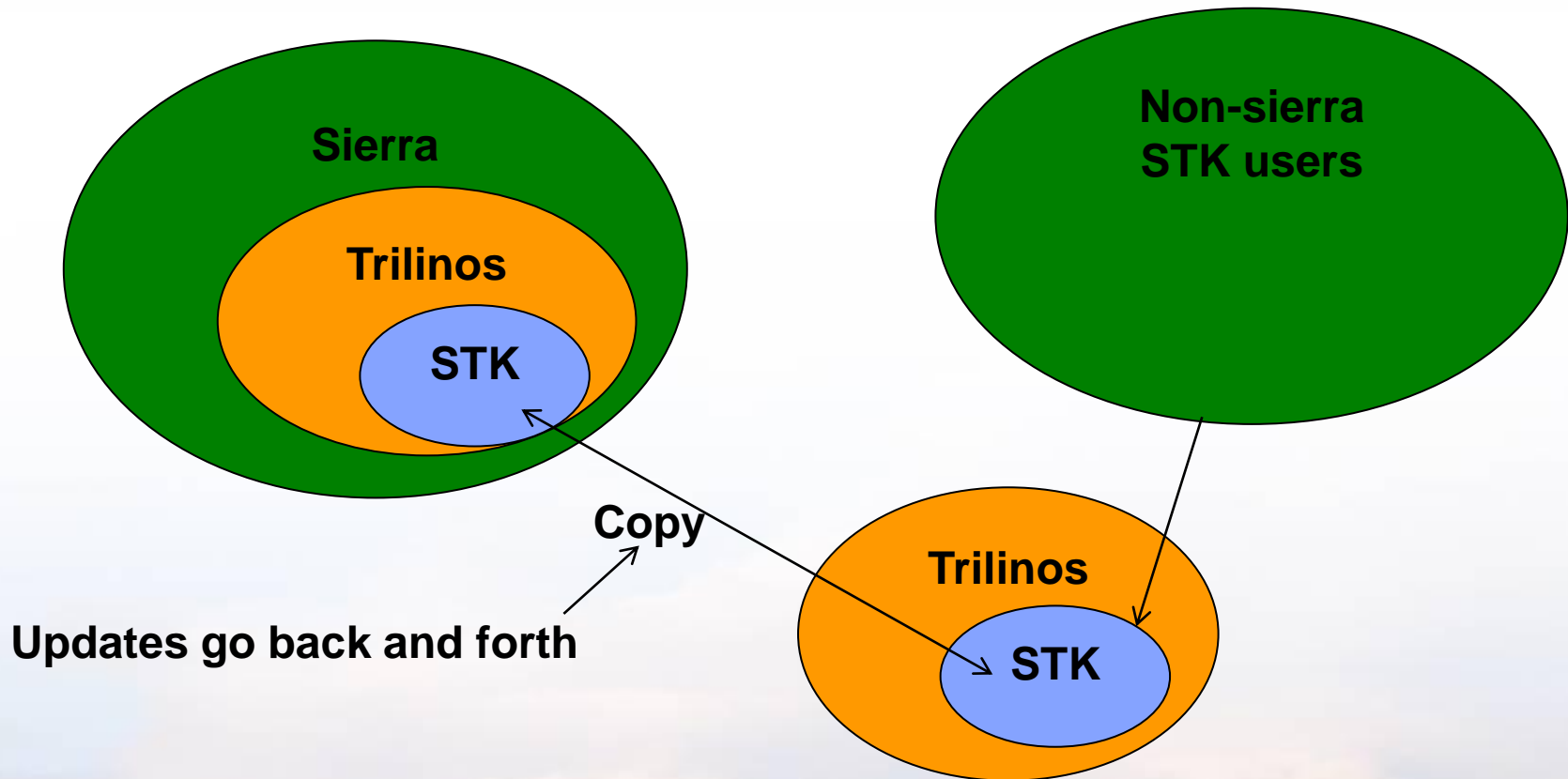
- Combine classes that were separated due to implementation reasons

Issue:

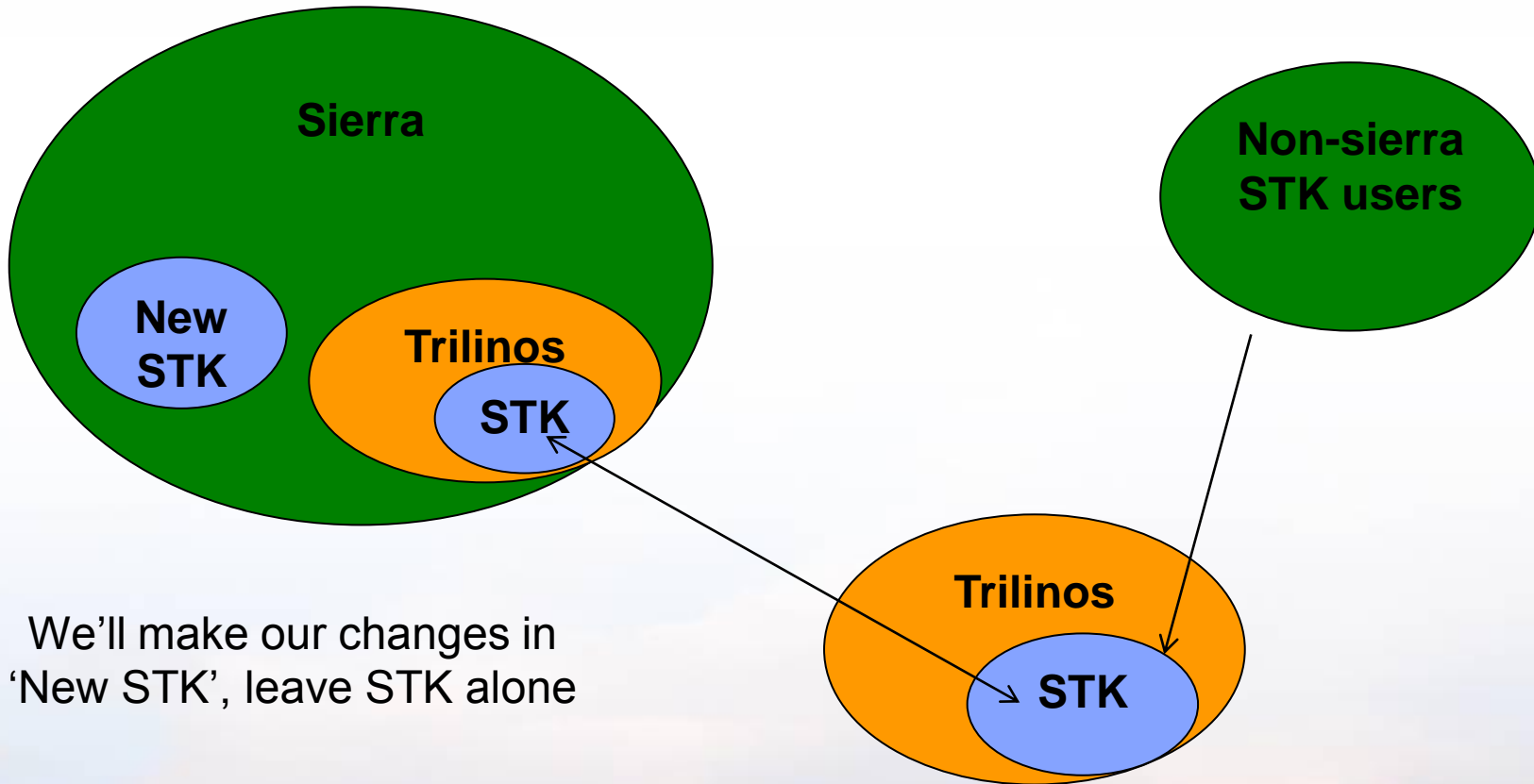
- Want to protect non-Sierra users of STK from upcoming churn
- Allow them to adopt changes on their own schedule



The Sierra source repository contains a copy of Trilinos, which contains STK



To protect non-Sierra STK users from churn, temporarily duplicate STK in Sierra...



Later, move new STK to Trilinos, allow non-Sierra users to transition at their leisure

Organization and naming of old and new STK is open question: Subpackages? Packages?

