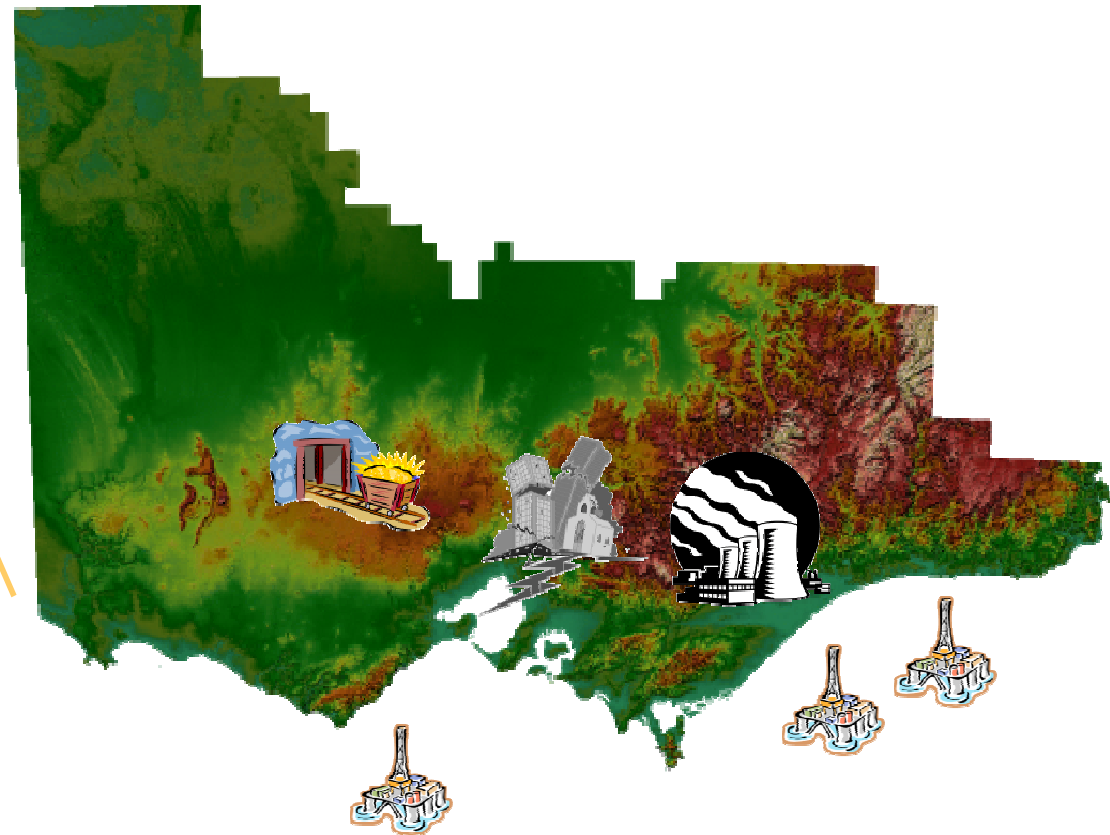
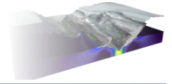


Software, complexity & reuse...

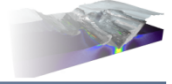
Robust -to- experimental codes for geodynamics

CIG-II Planning workshop 200903

Steve Quenette
VPAC / Monash, Australia

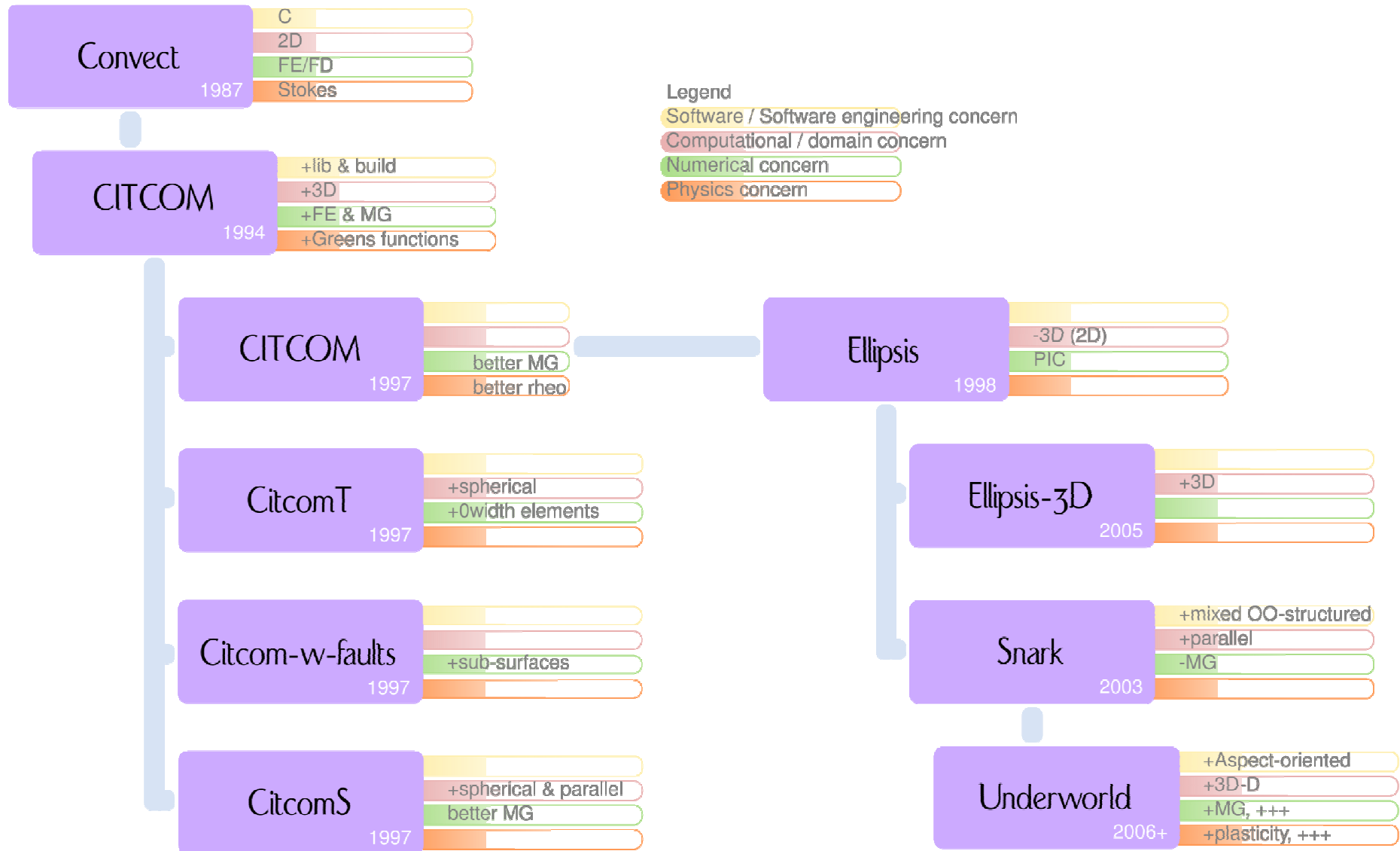
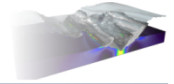


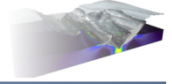
Real world drivers – real science problems



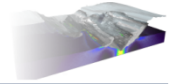
What is it you^(the US geodynamics community), wants?

A bit of history - the CITCOM family tree





Do we really want to write a new code and re-implement all our assets when a new method comes about?



Separation of concerns... Granularity at the features likely to change

Software / Software engineering concerns

Computational / domain concerns

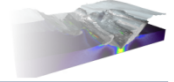
2D, 3D, free surfaces, AMR, ...

Numerical concerns

Multigrid, block solvers, ...

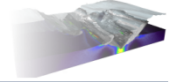
Physics concerns

Mohr Columb, MoresiMulhaus, ...

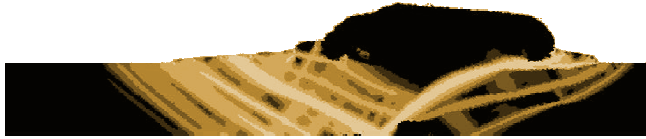
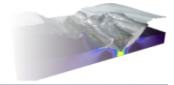


To provide communities with sustainable software infrastructure that can readily adopt new methods & knowledge and be applied to many related problems

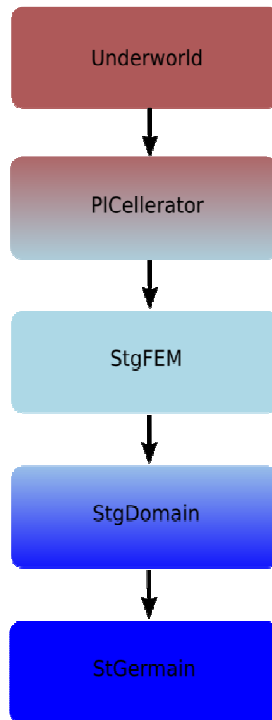
This is what StGermain is



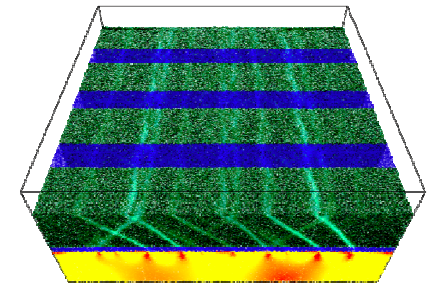
- Retreats
 - Get people together, focus on a problem
 - CIG have been good at this
 - “Documentation” is not enough
 - Break out of the mould – implement software in the modularity that changes!
 - The numerical schemes, physics, etc
 - Imagine if you could “trade features”... community created infrastructure
 - Hide parallelism, stitching, etc
-

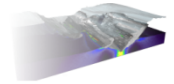


- History rich rheologies
- 3D, Parallel, stokes



- Our view: a **platform**
 - Built on StGermain
 - Framework, and a
 - Code
- Long term geodynamics
 - Plate to basin scale
- Rapid adoption of numerical research
- Not traditionally for “end users”



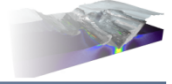


Holden Commodore SS
Australian designed
"Underworld"

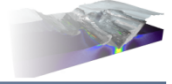


Pontiac G8
US branding
"G_ALE"

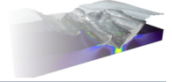
- The collaboration: (from the approach...)
 - Take Underworld at 2006 (early version)
 - Add surface processes, packaging & support to the US Community



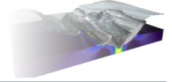
- It has diverged from the approach
 - Effectively a “fork” (but can be re-merged)
 - We’ve stopped developing features together
 - Making it easy to install has been an eye opener!
 - Engagement – its not clear to me what the GALE community would see as ideal?
 - How can we help?
-



- Benchmark driven
 - clear deliverables
 - Reused as “unit” test for the science features
 - Visits from Marc and Laurent
 - Is it all going to come down to preconditioning?
 - What’s the best environment for developing them?
-



- Readily describe bigger and more complicated problems...
 - Continue the Lego pieces of scientific concerns
 - StGermain
 - Describe new problems without C
 - PDE template library
 - Better stitching & less “scariness”
 - StGermain interface has changed since its inception
 - Especially wrt HPC directions
 - Better provide to the spectrum of users across all the problems
-



- What do you want?
 - Hopefully I've given you a f/w for thinking about it independent of our own technology
 - Sounds like we need a StGermain tutorial/workshop
 - CIG2 is poised to provide the software infrastructure
 - More scale, more physics, changing HPC landscape
 - Need to manage this! Expensive for CIG or expensive for user-developers?
-