Scalable Complex Systems Simulation
Adam Sampson – CoSMoS, CRISP, White Space Research

High-level parallel programming for simulation
Simulation at a realistic scale means harnessing parallel computing resources: multicore, cluster, cloud...

- Exploit natural concurrency of complex systems for parallel execution – preserve from modelling through to simulation
- Apply concurrent programming techniques: describe agents and their interactions, and schedule intelligently at runtime
- Use scalable means of spatial interaction – games technology

Process-oriented ABM of bird flocking: interactive, distributed simulation with distributed visualisation on Tromsø Display Wall

Blood clotting
EPSRC TUNA 2007: Proof-of-concept cluster simulation, using process-oriented techniques; non-real-time

2010: Interactive simulation on single multicore machine

Nuffield 2011:
Combine with existing equational models of platelet signalling to simulate effects of combinations of drugs

Cancer modelling: building on cell-scale models to enable in-silico science at the tissue scale

Ongoing work using CoSMoS techniques:
Granuloma formation

EPSRC 2008-present
Reusable engineering techniques for simulation as a scientific instrument – scalability, maintainability, trustworthiness

cosmos-research.org

Lymphocyte migration