Abstract
The Genie approach supports the modelling, generation, and operation of highly reconfigurable, component-based systems. Its implementation is called the Genie tool. Genie has been used in two case-studies.

i) An adaptive flood warning system,
ii) A dynamic service discovery application.

In this context, adaptation is enabled by the Gridkit reflective middleware platform.

Benefits
Genie promotes software reuse and use of models as first-class entities to raise the level of abstraction beyond coding, by specifying solutions using domain concepts. The Genie tool offers two domain-specific languages (DSLs) for the modelling and generation of adaptive systems supported by the reflective middleware platforms. These DSLs are the OpenCOM DSL and the Transition Diagrams DSL respectively. Moreover, the approach offers a structured management of variability using orthogonal variability models.

Reflective Middleware
At Lancaster, we have pioneered reflective middleware technologies in response to the requirements of the next generation of distributed applications; these platforms have 2 important properties:
- they are configurable to meet the needs of an individual application domain;
- they are dynamically reconfigurable to enable the platform to change its behaviour at runtime in order to respond to environmental changes.

Gridkit
Gridkit is the embodiment of the reflective middleware-based philosophy to provide support for reconfiguration and adaptation. Gridkit is a self-managing, configurable middleware for pervasive applications spanning diverse conditions e.g. from sensors to Internet scale applications. Notably, the middleware builds overlay networks to dynamically create network services that support the middleware behaviour. http://gridkit.sourceforge.net/

Future Work
We are exploring how transition diagram models in Genie can be traced from requirements models in i*. As a result, the adaptation scenarios and monitoring condition trade-offs at the requirements level were traced to the policies defining Gridkit’s reconfigurations. We are exploring how to realize the automatic generation of the triggers (and their types) in the transition diagrams in Genie from the i* models. Our vision is to make requirements drivers of the reconfiguration at runtime.

Validation and the detection of conflicts between policies are needed to guarantee the correct generation of artefacts. We are enhancing Genie with validation capabilities.