



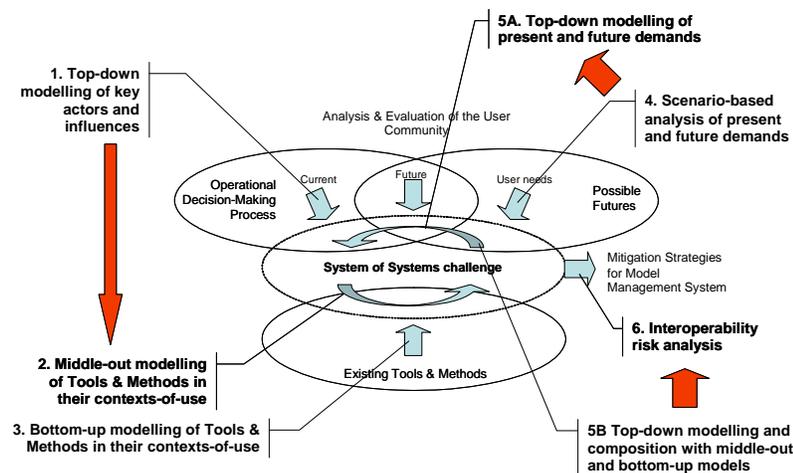
September 2007

JFSP Software Tools and Systems Study Approach

The Joint Fire Science Program has engaged Carnegie Mellon University's Software Engineering Institute (SEI) to lead an independent examination of current fire management software tools and systems. The JFSP Software Tools and Systems Study goal is to describe a Model Management System and develop recommendations which will guide the agencies as they move into a software "system-of-systems" environment. Success in this environment requires the agencies build sufficient technical, organizational, and operational practices, and govern these practices in a manner that is "tuned" to the realities of the systems-of-systems environment. In particular, the governance cycle requires a strong understanding of operational context, and this is what drives the SEI's approach to all of the tasks.

The SEI's Study Approach

The SEI's approach spans the constraints and challenges of systems-of-systems.



The SEI will use a number of techniques throughout the study. One example is Projective Analysis, or PAN. The SEI will use PAN to "model" how the wildland fire community uses tools and systems in support of operational decision-making. PAN focuses on the constraints agencies face when dealing with dynamic operational demands:

- The constraints imposed by what their technologies can – or can not – do
- The constraints imposed by how the agencies "do business"
- The constraints imposed by the contexts-of-use into which the agencies provide services

PAN looks at these constraints from two perspectives:

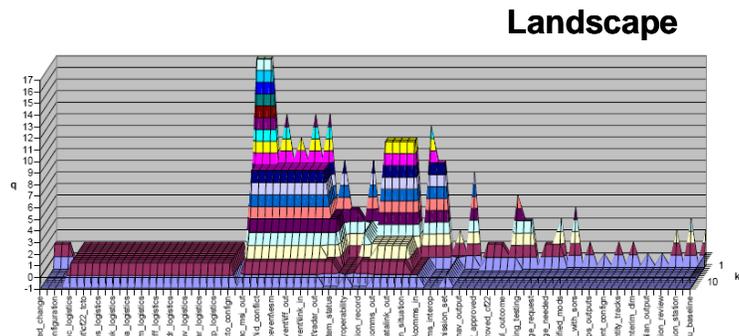
- From a “top-down” view – how do agencies work in collaboration with other agencies in the pursuit of both their individual and joint goals and missions?
- From a “bottom-up” view – how do agencies ensure their infrastructures have enough agility to satisfy the variety of demands to which they are required to respond?

PAN further examines how the constraints do or do not align by modeling five related views:

- The physical structures and functioning of the various resources and capabilities
- The digital processes, data and software that interact with the physical processes
- The “lateral relations” of command, synchronization, and collaboration within and between the agencies for the services they provide in response to demands
- The agencies’ formal hierarchies of accountability.
- The operational “contexts-of-use” – how do the demands arise that determine what capabilities are needed, where are they needed, and when are they needed

A Different Look at Integration

PAN produces a stratified (or layered) analysis of interoperation, and a series of interoperability landscapes. The interoperability landscapes (or “interoperability topo maps”) characterize particular types of risk (as shown in the example on the right). Peaks indicate strong areas of interoperability, while the valleys indicate weak areas. Taken together, PAN provides a way to identify potential root causes of interoperability risks. Other techniques are then used to refine the mitigation strategies.



Another technique the SEI will use is Scenario-Based Planning (SBP). Through SBP, the SEI will elicit user needs and explore possible futures for the wildland fire community, and then characterize several divergent – but eminently possible – futures. The emerging Model Management System will then be assessed in light of these multiple futures, with a goal to devise a robust Model Management System able to support the wildland fire community in multiple futures.

Both the PAN and SBP techniques gather data through interviews, workshops, and document reviews.

The Software Tools and Systems Study is a collaborative research effort by the JFSP and the



An Interagency Research, Development, & Applications Partnership

