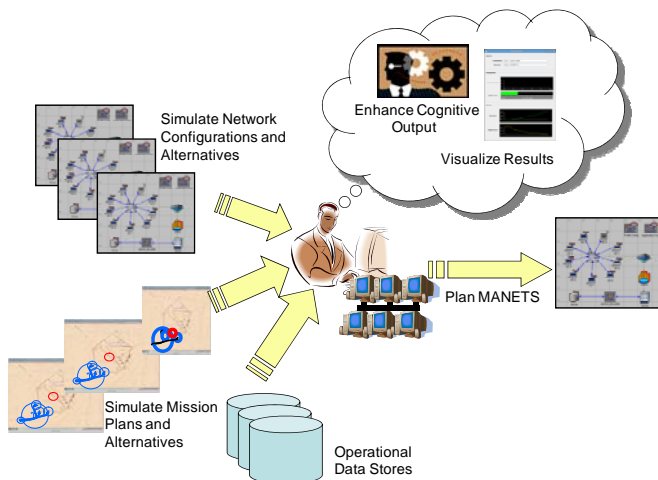


# CARET

## Course of Action Analysis with Radio Effects Toolbox

### What is the CARET Agent Framework?

CARET is an agent-based framework that helps signal operations planners manage and configure Mobile Ad Hoc Networks (MANETs) for forces on maneuver. It provides an agent infrastructure that promotes the analysis, planning, and re-configuration of network topologies within their intended mission context. CARET uses agent-driven network analysis simulation (through a variety of commercial network analysis tools and custom RF models) and updates from near-real-time data sources that provide Blue/Red Force position and network metrics to automatically assess network performance as missions evolve. It also provides predictive analysis and reasoning capabilities for diagnosing network trouble spots and identifying alternative topologies and configurations that can overcome Quality of Service (QoS) shortfalls.

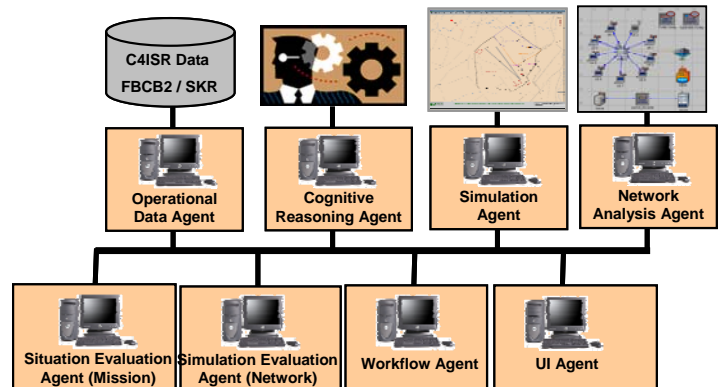


### Why is CARET Needed?

Effective planning for reliable forward deployed tactical edge networks is essential for many aspects of modern warfare, such as the need for on-the-move automated interference and de-confliction analysis tools compatible with counter-Improvised Explosive Device (IED) operations. One challenge presented by the current network operations planning approach is that existing planning processes are conservative in nature and don't fully take into account uncertainty presented by forces on the move. Once frequencies are assigned, nodes are connected, and radios selected, the configuration of networks often remains static throughout an operation. There is no additional planning to address unintended consequences and the fluidity of conflicts.



Techniques are required to understand the current state of operations, assess when certain QoS thresholds are not being met, and predict when certain service level guarantees may fail in support of a given mission. The CARET Agent Framework, shown below, provides this capability by using agent-driven network simulation to continually assess planned networks and evaluate potential alternative topologies throughout the course of an operation.



### CARET's Cognitive Modeling Capabilities

CARET provides additional cognitive modeling capabilities to assist the signal operations planner in diagnosing performance issues based on operational data. CARET's cognitive models provide diagnoses based on issues caused by Blue Force interference, equipment degradation, and Red Force jamming. These models also allow the signal planner to infer the causes of certain network behavior based on uncertain or incomplete information regarding the network or network equipment.

### Features at a Glance

- Evaluates networks during operation within context of the mission/operation
- Provides an agent-based framework that allows for custom analysis/evaluation functions
- Provides agent-driven stubs for visualization
- Provides cognitive models that allow for inferring potential diagnoses in the presence of uncertain or incomplete data
- Agents adhere to the Agent Systems Reference Model for interoperability
- Extracts data for operational data sources to calibrate simulations
- Uses commercial tools and open source RF models for network analysis