**Athena User's Guide**

Athena S&RO Simulation, V3

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# Introduction

This document presents the models and software of the Athena 3.1 Stability & Recovery Operations (S&RO) Simulation from the user’s point of view. Readers are advised to read this document first, before moving on to the other Athena documents.

The Athena simulation is a decision support tool designed to allow a skilled analyst to consider the intended and unintended consequences of various courses of action that might be taken during Stability & Recovery Operations. Athena is a descendant of the Joint Non-Kinetic Effects Model (JNEM), but includes many new models and other changes. In addition, where JNEM is a federated simulation, Athena is a stand-alone single-user application.

The intent of Athena’s models is first to capture and make explicit a wide variety of first order causal links, each of which makes sense on the face of it, and secondly to present the second and third order consequences of events while preserving the causal chain.

## Overview of This Document

This document covers three major topics. First, it describes the Athena models and philosophy at a conceptual level; those interested in more detail can see the low-level model descriptions in the *Athena Analyst’s Guide*. Second, it describes the Athena application itself, how to enter scenario data, and how to run the simulation. Third, it contains a cookbook of how to make use of Athena’s models and inputs for particular problems. Finally, it includes a complete glossary of terms.

## Other Documents

In addition to this user’s guide, Athena is delivered with the following documents:

*Athena Analyst’s Guide*

This document contains a detailed, low-level description of the models used in Athena; it serves as the specification document for the implementation of the models in the Athena code. Consult it when you need to know more about the models than is contained in this user’s guide.

*Mars Analyst’s Guide*

Mars is an infrastructure layer that is shared with the Joint Non-kinetic Effects Model (JNEM). The *Mars Analyst’s Guide* can be thought of as an appendix to the *Athena Analyst’s Guide* that describes the models that happen to be implemented in the Mars code base, including the Generalized Regional Attitude Model (GRAM) and the Mars Affinity Model (MAM). The former tracks direct and indirect effects on civilian attitudes; the latter models belief systems and the resulting affinities between actors and groups.

*Athena Rules Document*

This document describes the events and situations (drivers) that affect civilian attitudes in more detail than does this user’s guide, and also details each of the Driver Assessment Model (DAM) rule sets that assess the attitude change caused by the drivers.

When Athena is installed on Microsoft Windows, these documents are available from the Athena folder on the Start Menu. Alternatively, go to the Athena application directory and open “docs\index.html” in a web browser. Documentation can also be obtained directly from the Athena Project; contact William.H.Duquette@jpl.nasa.gov.

## Changes for Athena 3

In its conception, Athena was intended to be a single-user version of JNEM customized and extended to be a decision support tool for courses of action in the S&RO environment. JNEM depended on an external federation of simulations for much of its simulation input, e.g., combat, civilian casualties, presence and location of military forces, and so forth. Athena versions 1 and 2 relied on the analyst for much of this input as the simulation ran. In particular, the analyst was expected to run Athena forward in short one month to three month time steps; at each pause, the analyst was to role play each of the relevant actors in the region, make appropriate inputs and adjustments, and then advance time again. This placed a great burden on the analyst.

The big change in Athena 3 is the addition of actors and their strategies. By defining the relevant actors and their strategies, the analyst can set up a complete scenario, and then let the modeled actors respond to the changing conditions. It is still possible for the analyst to pause frequently and make course-corrections if desired, but this is no longer an essential feature.

More specifically, in Athena 3 we have:

* Added actors and their strategies (goals, tactics, and attached conditions)
* Added the notion of *belief systems*; comparison of belief systems is the basis for the model of inter-group and group/actor relationships.
* Added a model of actor support, influence, and control of neighborhoods.
* Added a model of Essential Non-Infrastructure Services, which uses a new paradigm for driving attitude change.
* Revised the user interface:
  + Separated Scenario Mode from Simulation Mode. The data presented is now appropriate to the task being done. In particular, data populated only during simulation is now longer visible during scenario preparation.
  + Added the Detail Browser, a web-browser-like window for browsing the scenario and the simulation results.

# Athena Overview

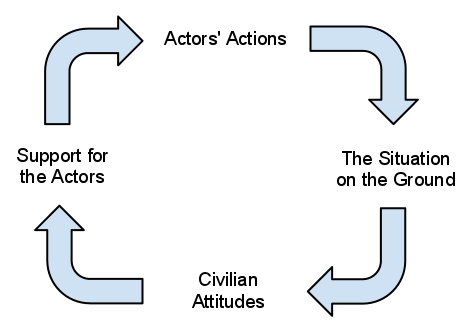
At its highest level, Athena models the actions taken by significant decision makers, called *actors*, within a region of interest, called the *playbox*. The playbox is divided into sub-regions, called *neighborhoods*. Each neighborhood is inhabited by some number of civilians, who are divided into *civilian groups*, and who form both the consumers and the labor force in the *local economy*.

The actors attempt to control, aid, or otherwise influence the civilians in the neighborhoods by means of their actions, which are called *tactics*. Executing tactics requires *assets*, of which there are two kinds: money and personnel. Each actor has an income, and may also own bodies of troops, e.g., army troops, police forces, humanitarian relief organizations, and so forth. These are called *force groups* or *organization groups*, depending on the nature of the group. By attaching *conditions* to tactics, an actor can determine when and under what circumstances tactics are used. The collection of an actor’s tactics and conditions is called the actor’s *strategy*.

The civilian groups have *attitudes*: satisfaction or dissatisfaction with respect to their concerns, and a willingness or unwillingness to cooperate (i.e., share information with) members of force groups. These attitudes vary over time in response to the events and situations that occur in the simulation, including those triggered by the actors’ actions.

In addition, civilian groups *support* individual actors. Support is based upon shared or compatible beliefs, but is also affected by actors’ actions and by conditions in the civilians’ neighborhoods. Actors may use their support themselves, or lend it to other actors. An actor with sufficient support in a neighborhood is said to have *influence* in the neighborhood; and an actor with sufficient influence may *control* the neighborhood.

Thus, we have the following feedback loop:



The actors’ actions determine the situation on the ground, which in turn affects civilian attitudes. This in turn affects civilian support for the actors, which then drives the actors’ actions. There are, of course, smaller feedback loops within this one; for example, an actor can increase his support in a neighborhood by moving a significant military force into that neighborhood. The force supports him, possibly enough so that he gains control, bypassing (at least temporarily) civilian attitudes altogether. Similarly, there is a feedback loop from the situation on the ground back to the actors’ actions—even politicians look at more than just the latest polls. But at a high level, this is the dynamic that drives Athena execution.

The primary outputs at the end of an Athena run are these:

* The actor in control of each neighborhood
* The stability and security of each neighborhood
* The civilian groups’ attitudes about the state of the playbox
* The resources required by each actor to bring about this end state.

Everyone is familiar with the story of the ten blind men and the elephant. The goal of Athena is to model each of the elephant’s parts, and to link them together so that the man who has the elephant by the tail is sure to get thwacked by the elephant’s trunk.

# Athena Objects

An Athena scenario consists of a collection of related objects created by the analyst. The Athena models operate on this collection of objects. The first step to understanding Athena is understanding the different kinds of object.

## The Playbox