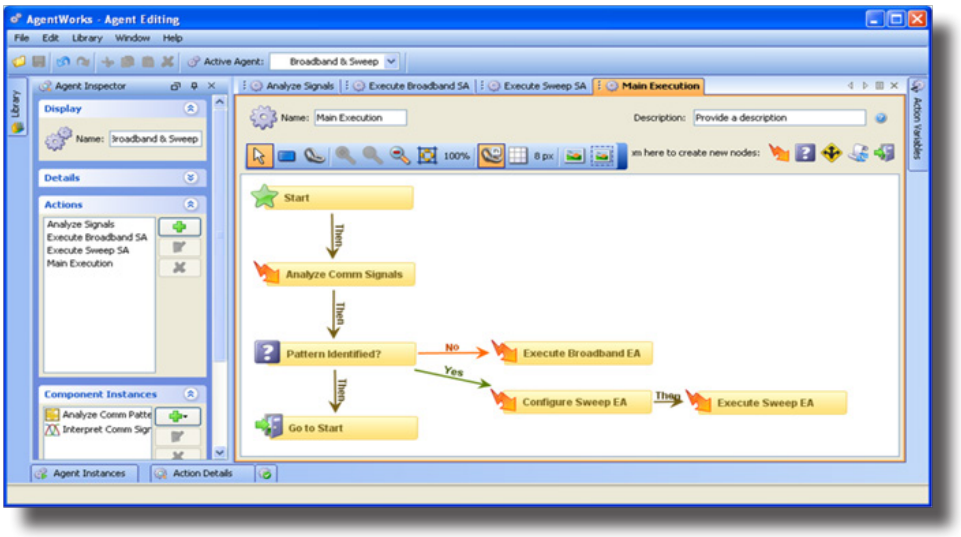
AgentWorks™

an application for graphically designing, building, and testing complex intelligent systems

charles river analytics

CAPABILITIES



The **AgentWorks**™ toolkit allows you to rapidly develop, verify, and visualize intelligent agent-based systems. It provides a component-based software modeling framework that enables the integration of hybrid computational reasoning engines into system-level behavior models or decision support applications. Applications of AgentWorks include: (1) models of human decision-making behavior that have been embedded as computer-generated forces (CGFs) in a range of military and civilian simulation platforms to support simulation-based training and acquisition programs; (2) decision support systems that offer a diverse suite of underlying computational reasoning capabilities to support an operational user in making faster and better-informed decisions; and (3) models of intelligent behavior that represent future unmanned system capabilities. AgentWorks currently provides a variety of computational reasoning engines, including Charles River's BNet® toolkit for Bayesian modeling and our Connect™ social network modeling and reasoning toolkit, allowing system developers to specify, design, implement, and validate agent-based systems within a shorter and less costly development cycle compared to the home-grown development practices now in use. AgentWorks supports a modular component structure, allowing you to rapidly integrate further reasoning capabilities as the need arises.

ARCHITECTURE

- **AgentWorks** allows you to quickly create complex agent-based models, providing you with a number of reasoning tools out-of-the-box. These range from simple math and rule-based components, to more complex components, such as social network analysis, fuzzy logic, and Bayesian modeling.
- **AgentWorks** supports a visual, flowchart-based environment, allowing non-technical or naïve users to be effective without the need for support from trained modeling and simulation experts.

- **AgentWorks** is built in Java, and converts all user-created agents to Java bytecode. This allows you to incorporate agents into any Java-based system as you would with an external code library. Individual user-customized components can be serialized to compact XML format for easy transfer into other user-build agents.
- **AgentWorks** uses our in-house service oriented Metronome™ framework, allowing you to create a familiar look and feel, including dockable windows, customizable views, preferences, application toolbars, frames, and more.
- **AgentWorks** uses a modular component-based system that allows you to rapidly prototype and develop new reasoning tools. This capability includes both new reasoning engines and the domain-specific modules developed in AgentWorks.

Previously, we constructed a graphical agent development environment, AgentWorks, designed to support intuitive development of behavior models using our cognitive architecture, the Situation Assessment Model for Person-in-the-Loop Evaluation (SAMPLE). SAMPLE is a hybrid computational modeling approach that uses appropriate technologies for different cognitive functions, including fuzzy logic engines for information gathering, Bayesian networks (BNs) for situation assessment , and expert systems for decision making. Combined, AgentWorks and SAMPLE provide a parallel cognitive modeling approach to those found in other models, such as ACT-R and Soar.

AgentWorks provides a hybrid computational modeling framework you can use to construct complex behavior models, which can then be executed as underlying logic for agents. It incorporates a range of artificial intelligence components, as well as more generic computational systems that can be combined as desired into analyses or behavior models. When these components are not sufficient to perform required tasks, you can extend AgentWorks with new customized components or third party components (e.g., a MATLAB component that enables the integration of more complex physics or mathematics models).

AgentWorks is currently designed to use a combination of Components and Actions, where Components provide underlying computational capabilities (e.g., BNs to analyze a particular situation), and Actions perform operations using those components (e.g., posting data as evidence to a BN, computing, and extracting results). This is a modular modeling approach, allowing the creation of complex behavior models that merge a range of physics models, analyses, and other behavior model elements within a single Action. However, the current approach does not support a further breakdown of the specific computational models used by an agent (e.g., the BNs, fuzzy logic systems, or expert systems). AgentWorks also provides intuitive tools to construct and configure the computational underpinnings of models.

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