OAK RIDGE NATIONAL LABORATORY FACT SHEET
MANAGED BY UT-BATTELLE FOR THE DEPARTMENT OF ENERGY

Information Management

Intelligent Software Agent Technology

Army Issues and Technology Impact

The Army has the complex challenge of having to make real-time decisions on the basis of massive amounts of disparate information. Providing the right information, to the right person, *at the right time* is paramount.

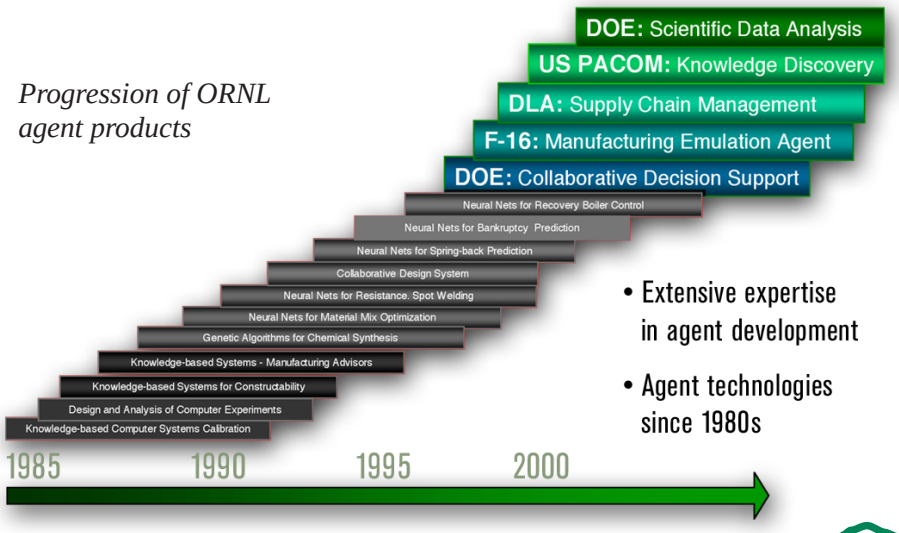
- In the **FCS and OFW**, information dominance will maximize the effectiveness of soldiers to overwhelm an enemy, but only if this information is effectively managed.
- In **Command and Control**, the squad leader needs a different granularity of data than does his lieutenant, a major, or a general.
- In **Homeland Security**, both anti-terrorism activities (prevention) and counter-terrorism activities (intervention) have the challenge that important information is hidden among the plethora of available information.
- In **Intelligence**, as in homeland security, large volumes of disparate, disconnected intelligence information contain key nuggets of information.
- In **Logistics** management, from the manufacturing source to the soldier in the field, routing information must be analyzed to save time and money.

Intelligent software agents are a breakthrough technology, proven for large-scale, real-time critical problems and widely recognized as the solution of choice for these types of problems. The application of ORNL's nearly 20 years of expertise and experience can enable leap-ahead capabilities to the warfighter within the Information Age.

Technical Concept

Within this wide range of disparate problems are two common issues: extremely large data inputs and the need for real-time solutions. The application of software agent technology is critical to each problem. Software agents facilitate complex decision-making by developing an intelligent agent–based system that is capable of (1) organizing distributed and changing information, (2) highlighting significant information while removing redundant "noise," and (3) simulating possible alternative scenarios.

Progression of ORNL agent products



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Development Approach

A key challenge to the U.S. Army in its transformation will be making rapid and effective battlefield decisions based on widely scattered and changing theater information. In future combat scenarios, an ever-increasing number of information-producing devices will be deployed, creating the need for a system that can make sense of it all.

In a battlefield situation, for example, a hierarchy of intelligent agents will analyze and highlight key information for the decision makers. The levels of information at each step in the analysis include the following:

- **Retrieval agents** would rapidly gather information from information-producing devices, such as handheld computers,"wired" machinery, or weapons.
- **Classification agents** would receive information from a specific set of retrieval agents and analyze the information based on device-specific parameters.
- **Theater agents** would receive information from the classification agents and look for relationships and connect independent pieces of information from the classification agents' input.
- **Decision-support agents** would take the results from the theater agents and present the information to decision makers. This information could be provided graphically or as text, depending on the preference of the user. It could also be tailored to the given needs of the mission or to the rank of the decision maker. The software hierarchy could also generate "what-if" scenarios to determine potential problems before orders are given.

Related Programs

Since the 1980s, ORNL has provided software agent solutions to a variety of customers to solve information problems involving a large data source, often requiring real-time solutions. Recent ORNL agent solutions can be found at

- *USPACOM*—software agents in the ORNL Virtual Information Processing Agent Research (VIPAR) project empower Intelligence analysts;
- *Lockheed Martin Joint Strike Fighter Plant*—ORNL software agents empower the organization of the JSF manufacturing line;
- *DOE*— ORNL software agents demonstrated the value of merging disparate distributed business data, saving $39M annually;
- DOE—ORNL software agents manage tera-scale scientific data (over 2^{40} bytes, or a thousand billion bytes) for *Scientific Discovery*;
- *Defense Logistics Agency*—ORNL agents optimized the supply chain by grouping aircraft parts into manufacturing families; and
- *ORNL*—ORNL's own software agents monitor its own web site, discerning cyber threats from benign activity.

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