Vital Role of Intelligent Software Agents in Enabling Net-Centric Command and Control

Dale E. Lichtblau

Information Technology and Systems Division

Institute for Defense Analyses
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Contention

• The net-centric GIG will require *intelligent* user assistant services—to an extent or degree not fully appreciated today.

• Therefore, intelligent software agents must have a paramount role in the GIG in order to achieve a transformation to net-centric operations and warfare.
Reference Model Activity Decomposition

“Provide Net-Centric Info Environment”
NCOW Reference Model as “Stack”

- User/Entity Interactions (A1)
- COI-Specific Interactions (A122)
- Intelligent User/Entity Assistance (A2)
- COI-Specific Services (A32)
- Core Enterprise Services (A31)
- Resources Provisioning (A4)

= Interface between major NCOW RM components
Net-Centric Core Enterprise Services

- Information discovery
- Storage
- Mediation
- Messaging
- Collaboration
- **User Assistance**
- IA/Security
- ESM
- Applications
User Assistant Services
(from DISA Workshop)

• Definition: Automated or manual capabilities that learn and apply user preferences and patterns to assist users to efficiently and effectively utilize GIG resources in the performance of tasks
• On-line help
• Language translation service
• User profile service
• Human-Machine interface
• User training
• User surrogate
Intelligent User Assistant Roles

• Key interface between users (interacting with the NCIE (A1)) and the core of the NCIE (A3 and A4)
  – Broker or matchmaker
  – Shifts “what is of interest to whom” burden from other core services to the user assistant
  – “Centralizes” GIG intelligence
Requirements Imposed by Net-Centricity

• Users must “post” (before processing)
  – Store data in accessible space
  – Describe (meta-data)
• Users will need help in deciding if new data (produced or collected) should be posted
• Users will need help in describing that data if it is to be shared
• Net-centric user assistant is ideal vehicle for ensuring that meta-data is underpinned by a common, uniform, coherent, “integrated” data dictionary
Does data already exist?

If yes, then retrieve from store

If no, then collect/generate

Create discovery and mediation metadata

In directly usable form?

If yes, then process it

If no, then invoke mediation

Store discovery and mediation metadata in catalog

Store (content) data

Discovery

Mediation

Process

Use

Intelligent Assistance

Storage

= Messaging
Intelligent Agents

- Software entities capable of independent (autonomous) action
  - Situation assessment
  - Problem solving
  - Inter-agent communication
  - Learning or adaptation
Types of User Assistants

• Information discovery
• Information dissemination
• Semantic mediation
• Matchmaker
• User interface assistance
# Agent-to-Support Function Mapping

<table>
<thead>
<tr>
<th>Intelligent Agent Type</th>
<th>Function Supported on Behalf of:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Information Discovery</td>
<td>Find, access, retrieve information</td>
</tr>
<tr>
<td>Information Dissemination</td>
<td>Discover and disseminate information</td>
</tr>
<tr>
<td>Semantic Mediation</td>
<td>Information translation and tagging</td>
</tr>
<tr>
<td>User Interface:</td>
<td></td>
</tr>
<tr>
<td>Basic User Interface</td>
<td>Tailor interface to user</td>
</tr>
<tr>
<td>Personal Assistant</td>
<td>Enhance user interactions</td>
</tr>
<tr>
<td>Matchmaker</td>
<td>Inter-agent negotiation</td>
</tr>
</tbody>
</table>
Design and Development Challenges

- DoD enterprise “ontology”
- Agent reliability and “trust”
- Mobile code
Summary

• Although a “core enterprise service,” the vital role of the GIG user assistant has not been appreciated
• The user assistant must be “intelligent” and requires a DoD-wide “ontology”
• Agent technology introduces technical complexity and security concerns that are not being addressed