



Confluence™ System for Knowledge-Based Decision Support

Benefits

- Converts information into up-to-date knowledge about the current state of the mission
- Delivers feedback on accomplishments and actions and recommends next steps to achieve mission goals
- Provides information about past and present activities of individuals involved in the mission and forecasts future actions
- Tracks and manages resources and assets
- Develops an in-depth understanding of concepts and details to provide answers to complex questions

What if ... you had a capable and trusted assistant who understood the big picture, understood your mission and that of your subordinates, colleagues and superiors, and used that knowledge to process and understand the flood of detailed data in a networked world? Who could examine each piece of data and reason about its meaning to the mission and relate it to other pieces of data, to build a holistic mission-level understanding of the situation, while shielding you from the deluge of detail by transforming the river of raw data into useful mission-management knowledge? Who could then provide customized support based on that understanding, to help you better understand and manage the situation?

What if the knowledge, reasoning, understanding and support offered by this hypothetical assistant could be captured in an automated system that worked tirelessly 24 hours a day, 7 days a week, 365 days a year and was made widely available to provide role- and situation-specific assistance to mission participants at all levels from all organizations? ... That is the promise of Confluence.

Raytheon



Delivering knowledge-based decision support by transforming low-level, detailed data into higher level mission knowledge

Confluence amplifies human effectiveness by automating the integration and transformation of low level detailed data into higher level knowledge to offer role-customized assistance. With Confluence, people can operate at the decision level of thinking, dealing with mission objectives, tasks, etc., within the context of a shared situational understanding, while maintaining the ability to drill down to situational awareness information and low level data, as desired. With such assistance, existing missions can be managed more effectively, and larger and more complex missions become practical. The core capabilities are mission-independent and applicable to a wide variety of problem areas, both civilian and military.

Technology

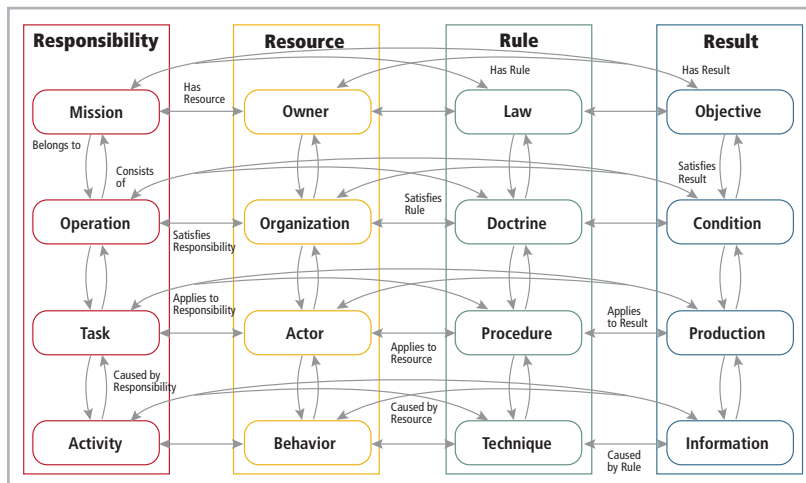
The Confluence system utilizes recent advances in knowledge representation and software agent-based reasoning to tie together and address mission knowledge in a holistic fashion. The knowledge representation is based

on an innovative Raytheon-developed upper-level ontology which abstracts key mission concepts and relationships and captures them in a mission-independent manner.

This upper ontology, known as the “Stewardship, Safety, Security, and Stability Ontology,” or “S4 Ontology” for short, formally represents the concepts of “Responsibilities, Resources, Rules, and Results,” along with relationships between them at multiple layers of details. The ontology captures knowledge about the physical, information, cognitive, and social domains¹. Traditional systems focus primarily on the physical and information domains, while the cognitive and social domains — which are concerned with understanding decisions and effective coordination — are largely unsupported. Confluence brings together all four domains to improve collaborative decision-making.

The S4 ontology provides a foundation for representing and reasoning about knowledge associated with any mission. Once configured with the knowledge of a specific mission, software reasoning agents draw from, and contribute to, the knowledge base as situations unfold, and they perform a variety of knowledge-based reasoning tailored to the mission and situation.

The Confluence system is currently under development. Prototype applications are being developed in the mission domains of incident management, port security and combat operations. The Confluence system is some of its kind in delivering some of the promise of artificially intelligent systems to the world of safety and security through connecting the physical world to that of collaborative and synergistic decision making in complex missions.



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Customer Success Is Our Mission

¹ Alberts, David S. and Hayes, Richard C., "Power to the Edge: Command and Control in the Information Age," CCRP Publications, www.dodccrp.org, pg. 113.