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The Knowledge Network (KnowNet)

Deepening the Nation's Understanding of Terrorist Behavior

**Sandia National Laboratories
Advanced Concepts Group**

The Problem

Terrorist behavior is a manifestation of multiple phenomena: political action, social upheaval, asymmetric warfare, government oppression, and religious revivalism.

Terrorist motivations are elevated by a broad range of factors: idealism, alienation, hopelessness, search for meaning, religious conviction, political competition, and fanaticism.

Terrorist activities are influenced by many aspects of culture, depending on the motivation behind them, and are supported by multiple societal and financial foundations, without which they cannot be carried out.

The roots of terrorism can be viewed through various historical lenses—such as those of geopolitical entities, ethnic groups, political movements, religious warfare. Its actors can be understood in terms of their psychological makeup, social networks, demographic characteristics, educational level, childhood environment and family dynamics. Its tools can be examined in terms of the physical sciences, and its structure and methods in terms of organizational and complex systems theory.

With such a broad and dynamic problem space, can there be a comprehensive and deep capability to “know terror”—that holistically informs national and international policies to eliminate terrorism, that provides dynamic contextual interpretation of indicators and warnings to analysts and security personnel, and that maintains up to date resources for ever-changing information needs?

This is a “wicked problem”, and, as with most wicked problems, the expertise required for its solution exceeds existing capabilities. Researchers, by the nature of their work, tend to be either specialists with a deep and narrow focus, or generalists with a broad view but lacking depth across all domains. The capability required for national security includes both research types—and the entire spectrum in between—in a readily accessible, easily interpreted, intellectually deep, responsive and growing body of knowledge across all disciplines that have something to say about terrorism.

The Knowledge Collective

How can such a national capability be developed? Imagine a diverse group of experts drawn from a wide variety of research fields, operating as collective



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“brain” to be tapped by multiple “agents” who grapple each day with myriad and ever-changing aspects of the terrorist problem. These agents—which can be human or automatically generated computerized entities—remotely survey a collective knowledge base using sophisticated knowledge extraction and data visualization tools. With a deep and comprehensive, up-to-date view of relevant resources, state of knowledge and variability of theories and data pertaining to their area of interest, questions are passed by the “agents” to the collective for analysis and debate. Answers are returned as either a synthesis of many perspectives, or multiple individual answers noting differences and commonalities. Areas requiring further research are identified and posted, and results of queries are captured for the collective benefit.

The Benefits

Who would benefit from this collective and in what way? Researchers in specific fields benefit as they become part of a self-organizing, adaptive, multi-minded, purposeful team of collaborators, enabled through technology and enhanced access, to discover and draw richly upon knowledge outside their domains of expertise and perform analysis with advanced state of the art software tools. Ideas and methods migrate across discipline boundaries to rapidly advance new thought and lines of inquiry and make connections.

Collaboration tools connect researchers, users, and software engineers in real time through advanced information technologies. The end result is a deeper, ever evolving, widely distributed national understanding of terrorism, accessible by all those who are responsible for, or who contribute to, national security.

Fuel for the Collective

Data and ideas are the key components of quality research. In the study of terrorism, rich data sets and their understanding are particularly difficult for western analysts to develop, due in part to cultural and language barriers, in part to the secretive, exclusive nature of the system of study, and in part to the ever changing and adapting nature of terrorism and the world context in which it occurs. Through the collective, members will access a broad-based, high-quality stream of information collected from local news sources from all parts of the world, abstracts compiled from other media, research results, such as surveys and interviews with targeted groups, and contributed references. A storage and retrieval scheme, using context-based queries, will locate information and discover hidden relationships in this aggregation of information. Knowledge extraction and visualization tools will make these relationships transparent.

The KnowNet Concept

Figure 1 shows a notional view of KnowNet. The key components are the humans who make up the collective, the technical infrastructure that supports it, and the design of the interfaces between the two. The technical infrastructure supports live person-to-person and group interactions and tools for the delivery and analysis of information to a network of geographically and institutionally distributed researchers, operators, and collectors. Information requirements are passed from operators and researchers to the network’s collectors. Items of interest that the collectors discover are “pushed” directly to researchers or operators. Items of general interest are placed in a communal archive for later retrieval through both automated and directed search mechanisms.

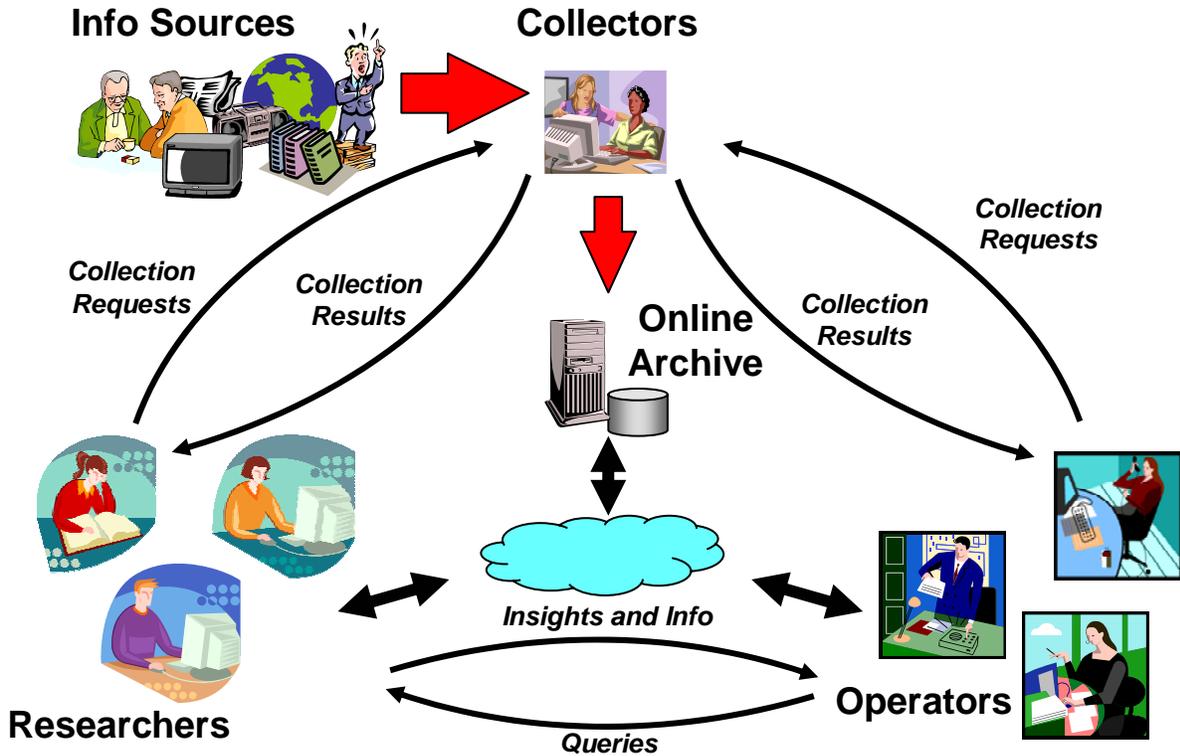


Figure 1. Elements of KnowNet

Challenges

While the concept seems straightforward and doable enough in theory, the technical and organizational challenges that must be overcome to make it a reality are nontrivial. There are logistical challenges: accessing a sufficiently broad and unique stream of information may require emplacement or recruitment of collectors around the globe. Filtering the wheat from the chaff flowing from these raw information sources requires translating and analyzing content in a way that is informed by an understanding of what might be relevant to the KnowNet community. Once digested, the vast quantities of information need to be stored and indexed for ready retrieval, and subsequently easily accessed and manipulated by users of varying degrees of familiarity with information technologies.

There are also the inherent challenges of integrating human and machine systems. For instance, how will the collective operate so as to maintain and foster the quality of surprise and serendipity that often accompanies learning and innovation?

Intelligent interfaces, context-driven searches and a number of human factors need to be explored for KnowNet to be useful.

There are challenges in fielding KnowNet so that it is user friendly. Over-the-wire group interactions can be stilted. Text-based person-to-person communications can be burdensome. In the world of research, jealousies driven by the need to “publish or perish” and competition for research funds inhibit collaborative efforts. Government

sponsorship can impart a negative image in some research communities.

There are also organizational issues. Who will own KnowNet? Who will pay for it? Manage it? Maintain it? How will different “customer” requirements get prioritized?

Realizing the Vision—The Steps

KnowNet is a national concept to enable diverse communities to come together for a quantum step in our ability to “know” about terrorism. Its success will depend on the value and utility it provides to all members of those communities. Its design must therefore be the product of many minds and must represent the position of broad network of potential users and supporting researchers. To realize this vision, we recommend the following steps.

- Vet the KnowNet concept with a representative group of domain experts, potential users and sponsors, to refine the concepts and develop a constituency
- Engage key research and end-user organizations to develop a broad-based coalition of support
- Using a limited number of researchers, end users, and collection staff, launch a demonstration project to establish a pilot infrastructure and evaluate the efficacy of the concept
- Refine the operating procedures and system design as required using lessons learned from the demonstration effort and then launch the network as a full-scale national program

The Advanced Concepts Group at Sandia National Laboratories will advance the first step through a workshop August 18-20, 2003, in Albuquerque, NM. The workshop will address questions related to:

- What needs would KnowNet serve,
- How the network might be employed by various end users and researchers,
- How the human and technical aspects of the network might be structured
- How the KnowNet might be grown and managed,
- And how it might be funded.

Participants in the workshop are recognized experts from a diversity of fields—such as of psychology, neurosciences, group dynamics, anthropology, history, diplomacy, law enforcement, intelligence analysis, computer science, human factors, and knowledge management. Key federal, state, and local stakeholders will represent the user community. Technical experts will participate to explore the current and future technology viabilities. A workshop report will be issued, containing group recommendations, and potential venues for advancing those recommendations nationally.

For more information, contact nkhayde@sandia.gov or rlcraft@sandia.gov