Air Force SBIR/STTR

Innovation

Air Force SBIR/STTR Innovation Story

SBIR Topic Number:
AF06-072

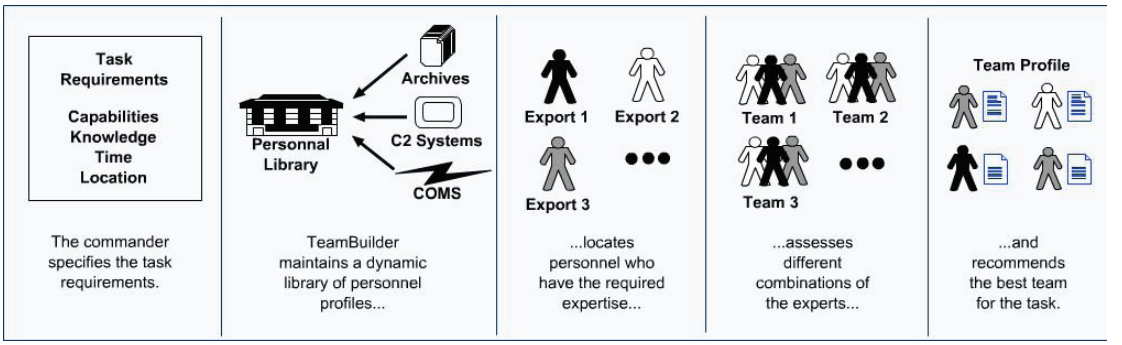
SBIR Title:
Locating and Integrating Members for Virtual Ad-Hoc Teams

Contract Number:
FA8650-07-C-4510

SBIR Company Name:
Aptima, Inc.,
Woburn, MA

Technical Project Office:
AFRL Information Directorate, Rome, NY

This Air Force SBIR/STTR Innovation Story is an example of Air Force supported SBIR/STTR technology that met topic requirements and has outstanding potential for Air Force and DoD.



TeamBuilder—Concept of Operations

TeamBuilder: Assembling Ad Hoc Virtual Teams to Respond to Emergent Demands

- The Air Force has a requirement to rapidly identify individuals with the technical expertise and personal characteristics needed to effectively participate on ad-hoc virtual teams formed to respond to emergent demands
- Aptima, Inc. has designed and implemented TeamBuilder, a framework that enables military commanders to rapidly identify and assemble ad-hoc teams with the right mix of experts who are likely to work well together
- The technical and social skills of potential team members are inferred through analysis of their technical publications, education, work history, e-mail, Word and PowerPoint documents, group and social network activities, etc
- The TeamBuilder framework is not domain specific and can thus be applied to environments with different data sources including the Department of Defense, other government agencies, and most commercial organizations

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Air Force Requirement

The Air Force has a requirement to rapidly identify individuals with the technical expertise and personal characteristics needed to effectively participate on ad-hoc virtual teams formed to respond to emergent demands-- often across barriers of time and space. Faced with asymmetric threats and the expanding set of military missions (e.g., humanitarian and police functions), commanders are often confronted with a varying array of situations for which they need expert assistance outside of their immediate staff. In this era of network centric operations, connectivity and bandwidth are increasingly available to commanders so that outside experts can be called upon when a specific situation arises. The end goal of this effort is to assist commanders in identifying and integrating the best mix of experts as members of virtual ad-hoc teams on demand.

SBIR Technology

Aptima, Inc. developed and demonstrated TeamBuilder, a prototype system for automated team formation in which team member selection is based on a combination of individuals' technical and social collaborative skills. Effective teams require a mix of both technical expertise and collaborative skills in order to function effectively. Assessing an individual's technical experience can be achieved by analyzing multiple sources of data (education, technical publications, work experience, etc). The more challenging assessment of an individual's social skills has also been addressed in this research. The basic idea is that the data produced by individuals (including Word documents, PowerPoint presentations, email, phone calls, etc.) contains latent information pertaining to their social collaboration skills. Furthermore, this information is scattered across multiple heterogeneous data sources (technical publications, group memberships, activities, social networks, etc).

The TeamBuilder framework utilizes machine learning methods (probabilistic latent semantic analysis (PLSA) and other methods) to develop an association between individuals and their primary areas of expertise or interest. As part of this effort, Aptima has formalized mathematically the derivation of teamwork measures by analyzing (through the use of Hierarchical Language Techniques and Social Network Analysis) various sources of organizational data (e.g. e-mail headers, phone logs, existing human resource documents). The TeamBuilder framework provides the capability to objectively measure teamwork skills in a novel manner significantly different from traditional survey approaches.

Potential Application

The TeamBuilder tool will assist military commanders faced with the challenge of rapidly assembling ad-hoc teams with the right expertise for the mission while maximizing team processes that are so vital for team performance. The TeamBuilder software provides many benefits to the organization. It will reduce the time needed to compose a team by making immediate suggestions for team membership based on minimum input from the commander. TeamBuilder will also capitalize on human resources more effectively than any one unaided individual. TeamBuilder can pull individual competency data from many different sources and can identify hidden internal and external human resources. Furthermore, the tool will focus on bringing together team members who will be able to "hit the ground running", thus minimizing process loss due to team start up. Finally, TeamBuilder will enable any organization – military or civilian – to capitalize on their available human resources and form teams to maximize subsequent mission performance. Because of the way TeamBuilder is architected in layers, it will be straightforward to install it in environments with different data sources. Thus, TeamBuilder potentially offers dramatically improved operations for Department of Defense and other government agencies, as well as commercial organizations, which need to expeditiously form high-functioning ad-hoc teams.

Company Impact

The effectiveness of TeamBuilder was successfully demonstrated by means of an internal company-wide study. To demonstrate the power of TeamBuilder, Aptima used a test scenario in which the mission requirement (expressed in free text) was to respond to a recent Navy SBIR solicitation. Specifically, the goal was to select the best team of experts to prepare an effective proposal for this specific solicitation. During the test scenario, 30 employees with relevant experience were identified. The selection was further narrowed down through the formation of candidate teams. An evaluation of the optimal team identified by TeamBuilder revealed that this team was indeed effective at performing that particular task. Additional details describing this TeamBuilder use case can be found in the final technical report on this SBIR project (Defense Technical Information Center (DTIC) Accession Number: ADB358034).

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