

Department of the Navy SBIR/STTR Transition Program

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ONR Approval #43-4388-18

Topic # N15A-T017

Grammars for Graph-based Assessment of Mission Readiness (GGRAMR)

Charles River Analytics, Inc.

WHO

SYSCOM: ONR

Sponsoring Program: Data Focused Naval Tactical Cloud EC, Distributed Common Ground Station

Transition Target: Tactical Service Oriented Architecture (TSOA) / Marine Air-Ground Task Force Command, Control and Communications program office (MC3)

TPOC:

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Other transition opportunities: The technology is applicable to any application that draws data from a graph database, e.g., Navy Command and Control Program Office (PMW-150), Defense Readiness Reporting System-Navy (DRRS-N), and Distributed Common Ground-Surface System (DCGS) Marine Corps & Navy

Notes: Previously, Charles River developed a tool to guide the warfighter through a formalized approach to assessing, analyzing, and forecasting human behavior (Contract Number FA8650-04-C-6403). The tool eventually underwent a successful Military Utility Assessment in 2008 and an Extended User Assessment with a Joint agency.

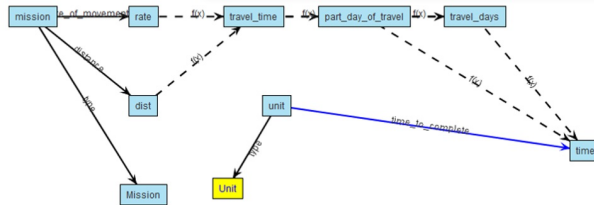


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WHAT

Operational Need and Improvement: Service-wide graph databases are increasingly used to store the vast amounts of information collected and used by the military. These graph databases have no schema, which makes it easy to add any new type of data quickly and easily, but it also means that the data is not organized to support specific applications. Technology is needed to translate the raw graph data into data that directly supports applications. The needed technology would be analogous to the "view" mechanism provided by relational databases, which translates database tables into virtual tables that are organized for specific applications. The example application is calculating unit readiness scores and predicting measures of performance (MOPs) from diverse raw data.

Specifications Required: Translating raw graph data into graph "views" for specific applications may involve collecting data from diverse branches of the graph and performing complex calculations over that data. The cost of specifying these queries and calculations must be minimized.

Technology Developed: Grammars for Graph-based Assessment of Mission Readiness (GGRAMR) provides a framework for the graph database equivalent of relational database "views." The views are created by graph grammars that transform raw graph data into graph data that is organized in specific ways to support critical applications. The GGRAMR framework includes algorithms for learning the needed graph grammars from examples. The technology is demonstrated by creating views of graph data that directly support the calculation of unit readiness scores, and creating views that support predicting measures of performance (MOPs) for mission essential tasks.

Warfighter Value: GGRAMR significantly reduces the time and expertise required to provide Warfighters with access to critical information. This provides the Warfighter with more information for a lower cost. For example, writing the queries and formulas required to calculate unit readiness and predict measures of performance would be a major effort and requiring highly skilled database engineers. GGRAMR greatly simplifies this process, and learns much of what is required from available examples.

WHEN

Contract Number: N68335-17-C-0151 **Ending on:** January 19, 2019

| Milestone | Risk Level | Measure of Success | Ending TRL | Date |
|---|------------|--------------------|------------|--------------|
| Base: Interim technology demonstration | N/A | Working components | 4 | 3rd QTR FY18 |
| Base: Final technology demonstration | Med | Working end-to-end | 6 | 1st QTR FY19 |
| If Option 1 awarded, final technology demonstration | Med | Option 2 award | 7 | 4th QTR FY19 |
| If Option 2 awarded, final technology demonstration | Med | Phase III award | 8 | 3rd QTR FY21 |

HOW

Projected Business Model: Charles River has over 30 years of steady growth providing innovative, cost-effective solutions through intelligent systems R&D. Over 100 Charles River projects have produced a wealth of advanced-technology prototype software that can facilitate the rapid integration of critical technology into operational systems. Charles River will license the technology to Prime contractors and/or graph database vendors and continue to support research and development contracts.

Company Objectives: Charles River seeks to meet with government representatives of Programs of Record that involve large graph databases and Prime contractors that support large graph databases that are interested in creating views of graph data that directly support the calculation of unit readiness scores, and support predicting measures of performance (MOPs) for mission essential tasks.

Potential Commercial Applications: Graph databases have widespread commercial applications as schema-less databases and cloud computing become more popular. Licensing this technology to a graph-database vendor would be an ideal way to achieve widespread deployment of the technology. Internet search engines would benefit from the maturation of data retrieval based on concept graph grammars. Currently, information retrieval is limited to word searches with some support to graph searches. Information retrieval by subject, delivered without redundancy, would transform information delivery.

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