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Research Opportunities Compiled by:

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Opportunity #1

Synchronized Net-Enabled Multi-INT Exploitation

Agency: Department of the Air Force - Air Force Materiel Command - AFRL - Rome Research Site
BAA-10-07-RIKA

Description: The overall technical objectives of this BAA are to research innovative, disruptive technologies and methods for the automatic and dynamic cueing and collection of intelligence for situational awareness and assessment, with an emphasis on Machine-to- Machine (M2M) capabilities. Technologies, such as artificial intelligence, ontological reasoning, and knowledge-based processing will be used to:

- (1) Automate the exploitation of collected, processed, and stored information in support of Intelligence, Surveillance and Reconnaissance (ISR) within air, space and cyberspace for on-going US missions;
- (2) Enhance the US exploitation system efficiency, to include multi-platform collections, multi-intelligence correlation, and resource optimization and management;
- (3) Dynamically characterize and correlate raw sensor data from existing multi-source, multi-platform, real-time collection systems; and
- (4) Automate knowledge-based exploitation for Effects-Based Operations (EBO) through assessment, cueing, electronic attack, and battle damage assessment, as a means to achieve mission objectives.

These capabilities will enable both automated and "man-on-the-loop" (MoTL) concepts to address the increased volume of data and the increased time criticality of analysis - both of which are necessary to support dynamic exploitation and real-time EBO.

The focus areas of this BAA are to:

- (1) Dynamically characterize and correlate data sources on existing multi-source, multi-platform, real-time collection systems;
- (2) Enhance collection system efficiency to include multi-platform collection for dynamic exploitation;
- (3) Automate knowledge-based assessments to cue sensors and recommend opportunities to achieve mission objectives; and
- (4) Automate exploitation of collected, processed, and stored information in support of ISR and Information Operations for current and future US missions.

Some of the particular issues related to these specific focus areas include, but are not limited to, the following:

- (a) Target specific characteristics for identification/ correlation. Battlefield management depends heavily on multi-intelligence assets to provide current threat analysis for successful deployment of war-fighting resources. One area that supports this analysis is target specific operating characterization and equipment/unit correlation, which is normally a "brute-force/labor intensive" effort.
- (b) Automated collection, signal ID, and first/second/third order level processing. Dense, hard-to-get, advanced modulated, and Low Probability of Intercept (LPI) signals, as well as movements and hidden assets, dictate the need for automated, dynamic collection using both on-board and off-board assets. Multi-Intelligence (Multi-INT) 'fingerprinting' techniques should continue to be investigated as a means of supporting identification and automated tracking efforts.
- (c) Related enabling engineering constructs and architectures to enable advanced exploitation. For example, the Semantic Service Oriented Architecture (SSOA) construct contextualizes the dynamic knowledge available, thereby enabling dynamic discovery of new services as they become available and providing resources for enabling semantic descriptions of those services. SSOAs enable knowledge acquisition and management over disparate architectures without a priori schema information. Semantic SOA development will provide a flexible way to quickly integrate novel services using an intelligent matching process. Approaches are sought which will allow heterogeneous services to seamlessly interoperate and which may include the use of data mediation/intermediary translation services such as data transformation,

aggregation, service orchestration and adaptation. A standards based design approach will be used, and as appropriate, will be compliant with all International Standards and with the Net-Centric.

- (d) Management software aboard platforms and systems which specifically address exploitation mission objectives. Given current levels of activity, operational requirements, hostile environments, and resources being heavily tasked, collection systems will need to be developed for embedding on advanced collection platforms, such as Unmanned Aerial Vehicles (UAVs). Resident management software processing systems will need to accomplish the automated, dynamic collection of intelligence information as well as auto-collaborating with other sensors in order to share information and to derive knowledge.
- (e) Advanced knowledge-based processing for exploitation. Timely and accurate decision support to the warfighter requires innovative knowledge-based processing for sensor management, emitter and entity identification, and multi-intelligence cross-cueing, to include, but not limited to, techniques for automated knowledge acquisition and knowledge modeling, real-time inferencing, and real-time operating system.
- (f) Network-centric collection management, data/information exchange and correlation. Networked SIGINT sensors extend the sensor virtual collection space, thus significantly enhancing the potential to collect difficult and hard-to-collect intelligence. Therefore, network centric collection management should be investigated to include, but not be limited to, multi-platform signal correlation and Multi-INT sensor cueing.
- (g) Technologies and capabilities to more fully leverage Motion Imagery (MI) information, to include, but not limited to: object tracking of both stationary and moving targets (robust enough to handle objects being obscured or leaving and returning into the sensors field of view), cross cueing capabilities across heterogeneous collections of sensors and platforms, visualization capabilities to display multiple intelligence data sources in a common geospatial reference, deriving accurate geo-positioning information, and automated event cueing to alert on specified activities or configurations. Integration of automated MI or Full Motion Video (FMV) analysis with automated analysis of other intelligence inputs.
- (h) Technologies and capabilities for the acquisition and storage of Human Intelligence (HUMINT) information. HUMINT provides for up-close human based observation, and is often the first and last data source for evidence collection related to an event. Although this source can be very subjective, it can also be very productive and often times the only method by which the true effects of an action can be evaluated. It is critical to examine methods of representing and storing HUMINT data without compromising the sources.
- (i) Advanced Digital Signal Processing (DSP) techniques for use in a network-centric exploitation environment. This will include new algorithms, techniques and methods for meeting the future needs in the areas of Electronic Intelligence (ELINT), Communications Intelligence (COMINT), Audio Processing, Special Signals, Measurement and Signature Intelligence (MASINT), Steganographic Intelligence (STEGINT) and Imagery Intelligence (IMINT), as well as any combination of these. Consideration should be given to "surgical" exploitation techniques for reducing data and processing requirements through intelligent collection.

The development of advanced algorithms which reduce the overall sensor intake, more intelligently process the data among the available resources/nodes, and addresses security, bandwidth, and load-balancing throughout the overall system will be given consideration. The primary focus of this BAA is to have an advanced exploitation capability which effectively enables automated/Man on The Loop (MoTL) exploitation techniques; provides a framework for advanced exploitation, course of action (COA) development, correlation and cueing, and mission planning techniques developed under this BAA and elsewhere; and supports the integration of ISR, network-operations and other intelligence gathering while decreasing the demand for bandwidth in support of collection and intelligence generation.

Link to Full Announcement:

https://www.fbo.gov/index?s=opportunity&mode=form&id=c4379a7d48e26e9709215cff297457d0&tab=core&_cview=0

Opportunity #2

**Future Internet Architectures
National Science Foundation
NSF 10-528**

Description: Continuing its long-standing commitment to support groundbreaking research through Network Science and Engineering (NetSE), the Directorate for Computer and Information Science and Engineering (CISE) invites research teams to submit innovative and creative proposals that describe projects to conceive, design, and evaluate trustworthy Future Internet architectures. Proposing teams should include individuals with expertise in a range of relevant disciplines and/or different research methods, from theoretical to experimental to applications-driven.

Link to Full Announcement:

http://www.nsf.gov/publications/pub_summ.jsp?ods_key=nsf10528

Opportunity #3
Ocean Acidification
National Science Foundation
NSF 10-530

Description: Since the publication of The Royal Society's report Ocean Acidification Due to Increasing Atmospheric Carbon Dioxide (June 2005, [2]www.royalsoc.ac.uk), there has been growing concern for the potential adverse impacts of a slowly acidifying sea upon marine ecosystems. In recognition of the need for basic research concerning the nature, extent and impact of ocean acidification on oceanic environments in the past, present and future, this announcement has the following broad goals:

- To understand the chemistry and physical chemistry of ocean acidification and, in particular, its interplay with fundamental biochemical and physiological processes of organisms;
- To understand how ocean acidification interacts with processes at the organismal level, and how such interactions impact the structure and function of ecosystems, e.g. through life histories, food webs, biogeochemical cycling, and other interactions;
- To understand how the earth system history informs our understanding of the effects of ocean acidification on the present day and future ocean.

New research frontiers require the development of interdisciplinary partnerships and capacity building within the scientific community. Accordingly, full research proposals, exploratory proposals, and community development efforts such as workshops and symposia all are encouraged. Proposals must clearly demonstrate links between the research outcome and the emphasis areas described within the solicitation. Preference will be given to proposals that create new partnerships across traditional disciplines (including molecular and cellular biology, physiology, marine chemistry and physics, ecological sciences, paleoecology, and earth system history) and use diverse approaches (observational systems, experimental studies, theory and modeling) to examine cutting edge research questions related to ocean acidification.

- Anticipated Type of Award: Standard Grant
- Estimated Number of Awards: 14 to 20. The number of awards may range from 14-20, pending availability of funds, and will vary with category (see below).
- Anticipated Funding Amount: \$12,000,000 to \$15,000,000

Three categories of awards are anticipated.

- **Category (1)**, full research projects, may be a maximum of four years duration and \$2,000,000. These proposals will be subject to external merit review in accordance with NSF's Merit Review criteria;
- **Category (2)**, exploratory awards, will follow the guidelines and review criteria of EAGER proposals (Early-concept grants for exploratory research, see Proposal and Award Policies and Procedures (PAPP) Guide [9]http://www.nsf.gov/publications/pub_summ.jsp?ods_key=papp), for a maximum of two years duration and up to \$300,000. Projects will be subject to internal or external merit review, in accordance with established NSF guidelines;
- **Category (3)**, community and capacity building projects may request a maximum of \$100,000. Projects will be subject to internal or external merit review, in accordance with established NSF guidelines.

- Organization Limit: None Specified
- PI Limit: None Specified
- Limit on Number of Proposals per Organization: None Specified
- Limit on Number of Proposals per PI: 1

An individual may appear as Principal Investigator (P.I.), co-P.I., other senior personnel or investigator on only one proposal in FY 2010 that responds to this program solicitation. This limitation includes proposals submitted by a lead organization, any sub-award submitted as part of a proposal, or any collaborative proposal, and this includes all categories of projects described above (1-3). Proposals that do not meet this requirement will be returned without review. These restrictions apply only to this solicitation and are not meant to inhibit submissions of proposals by investigators to other NSF activities or programs.

- Letters of Intent: Submission of Letters of Intent is required. Please see the full text of this solicitation for further information.
- Preliminary Proposal Submission: Not Applicable

Link to Full Announcement:

http://www.nsf.gov/pubs/2010/nsf10530/nsf10530.txt?WT.mc_id=USNSF_179

Opportunity #4**Recovery Act Limited Competition: Framework Programs for Global Health Signature Innovations Initiative (R24)****DHHS – NIH****RFA-OD-10-007**

Description: This NIH Funding Opportunity Announcement (FOA), supported by funds provided to the NIH under the American Recovery and Reinvestment Act of 2009 (Recovery Act or ARRA), Public Law 111-5, invites applications from U.S. institutions and their partners to enhance the infrastructure and opportunities at the participating institutions for training postdoctoral investigators to carry out innovative, multidisciplinary research in Global Health. The initiative emphasizes hands on, problem solving, and collaborative approaches and may require the development of new training models and new partnerships within and beyond the university community. This FOA will utilize the NIH Resource-Related Research Project (R24) award mechanism. The Fogarty International Center intends to commit up to \$2.7 million under this FOA. We anticipate that 6-10 awards will be made for fiscal year 2010, pending the number and quality of applications and availability of funds.

Link to Full Announcement:

<http://grants.nih.gov/grants/guide/rfa-files/RFA-OD-10-007.html>

Opportunity #5

Harold Amos Medical Faculty Development Program Robert Wood Johnson Foundation Building Human Capital 2009-2010 Call for Applications

Description: The *Harold Amos Medical Faculty Development Program* was established to increase the number of faculty from historically disadvantaged backgrounds who can achieve senior rank in academic medicine and who will encourage and foster the development of succeeding classes of such physicians. Four-year postdoctoral research awards are offered to universities, schools of medicine and research institutions to support the research and career development of physicians from historically disadvantaged backgrounds who are committed to developing careers in academic medicine and to serving as role models for students and faculty of similar background. The program defines the term "historically disadvantaged" to mean the challenges facing individuals because of their race, ethnicity, socioeconomic status or similar factors.

Eligibility Criteria

To be eligible to apply, candidates must be physicians who:

- are from historically disadvantaged backgrounds (ethnic, financial or educational);
- are citizens or permanent residents of the United States or its territories at the time of application; and
- are now completing or have completed their formal clinical training. (Preference will be given to physicians who have recently completed their formal clinical training.)

We will select finalists from among those submitting applications and requested to submit Finalist Documentation, which must be submitted by a university, school of medicine or research institution that is exempt from federal income taxes under Section 501(c)(3) of the Internal Revenue Code with which the prospective scholar will be affiliated during the term of the fellowship.

Selection Criteria

Successful scholars will demonstrate that they:

- have excelled in their education;
- are prepared to devote four consecutive years to research;
- are committed to:
 1. pursuing academic careers;
 2. serving as role models for students and faculty from historically disadvantaged backgrounds; 3) improving the health status of the underserved; and/or 4) decreasing health disparities.

Total Awards

- Up to eight four-year awards will be funded in this grant cycle.
- Scholars will receive an annual stipend of up to \$75,000 each, complemented by a \$30,000 annual grant toward support of research activities.

Use of Grant Funds

Grants will be made to the participating universities in accordance with RWJF's regular funding guidelines. Under the program, the universities provide scholars with their stipends, health insurance, expenses associated with the move to their fellowship site, and funds for a computer. Financial support also is available at each university for expenses associated with scholars' research, including travel.

Key Dates

- March 17, 2010 (8 p.m. ET)—Deadline for receipt of online applications.
- March 18, 2010—Deadline for postmark of supporting documents.
- July 2010—Applicant interviews with national advisory committee members.
- September 2010—Deadline for receipt of online Finalist Documentation.
- December 2010—Notification of awards

Total Award

- Up to eight four-year awards will be funded in this grant cycle.

Scholars will receive an annual stipend of up to \$75,000 each, complemented by a \$30,000 annual grant toward support of research activities

Link to Full Announcement:

<http://www.rwjf.org/applications/solicited/cfp.jsp?ID=20910>