

**CENTER FOR MULTI-INT STUDIES
RESEARCH PROGRAM PLAN
(FY 2014 - 2018)**



8/1/2013



NAVAL
POSTGRADUATE
SCHOOL

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LETTER TO THE READER

Dear Colleague:

This multi-year Research Program Plan (FY 2014-2018) is integral to the Center for Multi-INT Studies' (CMIS or Center) strategic planning process and establishes a 5 year strategic research trajectory. It defines the Center's strategic goals, delineates research objectives, communicates resource allocations, and establishes methodologies to achieve desired research outcomes. It also sets forth the FY 2014 research agenda, to include areas of research focus and associated resource allocations.

CMIS' strategic research goals are to:

- Goal 1. Provide national Multi-INT research leadership
- Goal 2. Expand the number, breadth, and depth of researchers conducting high-value Multi-INT research
- Goal 3. Deliver high-value research outcomes

These strategic goals have been formulated so that the activities of the Center provide NPS and the sponsor community research outcomes that advance the state-of-the-art in Multi-INT and intelligence integration and, ultimately, have profound and enduring impacts on the missions of the Department of Defense and Intelligence Community.

We are grateful to our sponsors and research partners for their continuing support in working with us to achieve our goals and objectives. We are also grateful for the support of the CMIS Advisory Board (CAB) in guiding our research activities. Research outcomes will be published and shared with stakeholders in our FY 2014 Annual Research Report, which will be published in November 2014.

Sincerely,


Jim Scrofani

1.0 INTRODUCTION

Multi-INT is an emerging, interdisciplinary field seeking to understand how integrating intelligence can vastly improve the intelligence value derived from a given intelligence system. In an era where collection of data has outpaced the ability of technology and humans to make sense of all available information, the orthodox notion of exclusively working in, or specializing in, independent, single intelligence domains (e.g. HUMINT, SIGINT, etc.) is undergoing significant reconsideration. Therefore, Multi-INT approaches, employed across the intelligence management process (currently referred to as the Tasking-Collection-Processing-Exploitation-Dissemination (TCPED) process, in several intelligence settings), must be examined, and integrated notions of requirements generation, tasking, collection, processing, and dissemination, and variants, must be considered.

Additionally, increasing volumes and sources of information are an inescapable feature of modern intelligence and national security enterprises. All Department of Defense (DoD) and Intelligence Community (IC) organizations use data sets from disparate sources to extract information about targets, such as geolocation, identity, behavior, and intent. In their unprocessed forms this data conveys only partial information (e.g. measurements, sensor readings, addresses, longitude and latitudes, etc.). Translating this information into knowledge requires understanding macro and micro relationships between the data, and converting that knowledge into effective, actionable, intelligence necessitates drawing conclusions about these relationships in as close to real-time as possible.

Ultimately, the CMIS Research Program aims to establish and communicate a national Multi-INT research agenda, build and catalyze a national research enterprise focused on this effort, and produce research outcomes that advance the state-of-the-art in Multi-INT and intelligence integration.

2.0 ORGANIZATION

This research program plan sets forth CMIS research plans from 2014-2018, on a fiscal year (FY) basis. It provides a strategic perspective, setting the agenda for CMIS activities over this 5 year period. The plan establishes CMIS strategic research goals, outlines organizational resources and funding, addresses how research priorities will be established and presents how research progress will be monitored. The specific plan for the upcoming FY is addressed in the appendices. The appendices detail the FY 2014 research areas of interest, the financial outlays, acquisition schedule and the progress tracking schedule. The main body of this plan and its appendices will be reviewed and revised in August of each year.

3.0 CMIS STRATEGIC RESEARCH GOALS

The CMIS research goals reflect sponsor community priorities and represent, both strategic, and enduring, priorities for the Center. CMIS will provide national Multi-INT research leadership; expand the number, breadth, and depth of researchers conducting high-value Multi-INT research; and deliver high-value research outcomes. These research goals are further organized into key objectives that provide tangible outcomes that drive the Center’s activities. Table 1 presents the CMIS research goals and their objectives.

Table 1. CMIS' Strategic Research Goals and their Objectives

Goals	Objectives
Goal 1: Provide National Multi-INT Research Leadership	1.1 Provide vision and a research agenda that enable Multi-INT and intelligence integration
	1.2 Explore strategic partnerships to achieve Multi-INT research goals
	1.3 Synthesize research results to provide a corpus of knowledge and capability for Multi-INT sponsors and other stakeholders
Goal 2: Expand the number, breadth, and depth of researchers conducting high-value Multi-INT research	2.1 Establish and maintain the Multi-INT Research Alliance
	2.2 Establish and maintain the Multi-INT portal
	2.3 Organize and convene workshops and conferences to enable collaboration and communication
Goal 3: Deliver high-value research outcomes	3.1 Develop and maintain a process to identify and focus research pursuits
	3.2 Develop and maintain a process to evaluate and track progress of research pursuits
	3.3 Develop and maintain a process to communicate research outcomes to the sponsor and research communities

Goal 1: Provide National Multi-INT Research Leadership

Many organizations throughout the United States, including a variety of DoD and IC entities, industry partners, national and service laboratories, and universities, carry out Multi-INT research. Over time, organizations working in these areas have, gradually and independently, developed a corpus of Multi-INT capability and expertise. However, because the work of these organizations has been driven by individual institutional goals and interests, we have not realized coordination of outcomes, nor have we effectively leveraged prior accomplishments, thus, we have witnessed limited advances and transitions to operations.

By closely working with the sponsor community, CMIS seeks to develop a national vision and research agenda to enable advances in Multi-INT and intelligence integration. Further, by leveraging strategic partnerships across the national Multi-INT research enterprise, CMIS expects to gain greater community insight, and realize significant benefits, including focused and coordinated research outcomes, mitigation of redundancies, and accelerated progress. Finally, CMIS intends to employ a variety of mechanisms to synthesize research results from relevant areas into bodies of knowledge that the Multi-INT community can use in strategic plans, program development, and mission success.

Goal 2: Expand the Number, Breadth, and Depth of Researchers Conducting High-value Multi-INT Research

The scope, breadth, and depth of the national Multi-INT research enterprise is not readily known and, therefore, may not be readily available to the sponsor community seeking to leverage outcomes and prioritize investment. Additionally, an increase in the number and diversity of institutions contributing to the discipline of Multi-INT research and development can be an intellectual multiplier which yields new and unexpected advances.

CMIS expects to gain greater community insight, and grow, foster, and mature this national enterprise by establishing and maintaining the Multi-INT Research Alliance (MIRA). MIRA is a consortium of vetted university and agency partners that is dedicated to advancing Multi-INT and intelligence integration research and education. This is the vehicle through which CMIS will facilitate growth and maturation of the Multi-INT community. CMIS will make available to alliance partners its Community Portal, access to Multi-INT knowledge repositories, access to physical and virtual research test beds and data, and relevant curricula and training materials. MIRA partners will share their research outcomes, curricula and specialized expertise with CMIS and affiliated sponsors.

The CMIS Community Portal is a Web portal that will serve as the MIRA access point and will be a focal point of the Multi-INT community. It will be dedicated to promoting the Multi-INT discipline and building a stronger community of interest across government, industry, academia, and professional organizations. Participation will be upon approval of CMIS but will be free and open to individuals pursuing or establishing Multi-INT research, education, and other relevant activities.

CMIS also seeks to expand the scope, breadth, and depth of the Multi-INT research enterprise through the organization and execution of focused workshops and conferences. These opportunities allow researchers to regularly assemble, build a sense of community, exchange information, and assist in solving Multi-INT community problems.

Goal 3: Deliver High-Value Research Outcomes

Delivering relevant and substantive research outcomes involves leadership and careful planning. CMIS has developed a process to deliver these high-value outcomes for the sponsor community that supports their programming, planning, budgeting and execution system (PPBES) demands. The process includes, identification of areas of research focus, transformation of these areas into specific research objectives, employment of various methods to realize research objectives, and management of research progress.

CMIS intends to realize research outcomes through internal NPS research programs, and through broad agency announcements (BAA), directed contracts, cooperative agreements, and other procurement vehicles that support extension of research opportunities to external institutions.

4.0 ORGANIZATIONAL RESOURCES AND FUNDING

Multiple organizations, within and outside the Federal government, support the CMIS' Multi-INT research program. The program is designed to culminate in both internal and external research outcomes. The planned sponsored research investment for FY 2104-2018 is shown in Table 2. Funding for both internal and external research activities is shown. Specific financial outlays for FY 2014 are discussed in Appendix C.

Table 2. Sponsored Research Investment FY 2014-2018

Program (\$000)	FY 2014	FY 2015	FY 2016	FY 2017	FY 2018
Internal Research	\$350	\$380	\$500	\$500	\$500
External Research	\$700	\$760	\$1,000	\$1,000	\$1,000



5.0 RESEARCH PROJECT SELECTION

CMIS' process for generating research outcomes is discussed in this section. The process includes developing strategic research focus areas, shaping those research areas into targeted research objectives and communicating them to the research community. CMIS will drive research outcomes both, internally, at NPS, and externally, from the national Multi-INT research enterprise. Figures 1 through 3 depict CMIS' processes for achieving research productivity.

Establishing a relevant research agenda, involves close coordination and support from both the sponsor community and subject matter experts in the relevant fields of research. In CY 2013, CMIS anticipates establishing a Strategic Governing Board (SGB), comprised of senior sponsor staff to assist in guiding research direction and investment, and a CMIS Advisory Board (CAB), comprised of subject matter experts in the area of Multi-INT and intelligence integration.

The research project selection cycle begins with identification of the relevant research focus areas. Working with the CAB, CMIS will nominate and present research focus areas for SGB consideration. These areas will reflect sponsor priorities, research gaps and best-value investment opportunities. The SGB will approve the focus areas. With the CAB, CMIS will develop these research focus areas into specific research objectives and formulate solicitation documentation to support research acquisition activities. The SGB will be presented with appropriate solicitation and supporting documentation for approval. This process is depicted in Figure 1.

Two selection cycles are maintained to promote internal, NPS, and external, national Multi-INT research enterprise, research outcomes. For external research outcomes, BAAs, directed contracts, and cooperative agreements may be considered. For internal research outcomes, a competitive call for proposal process will be used to select research projects.

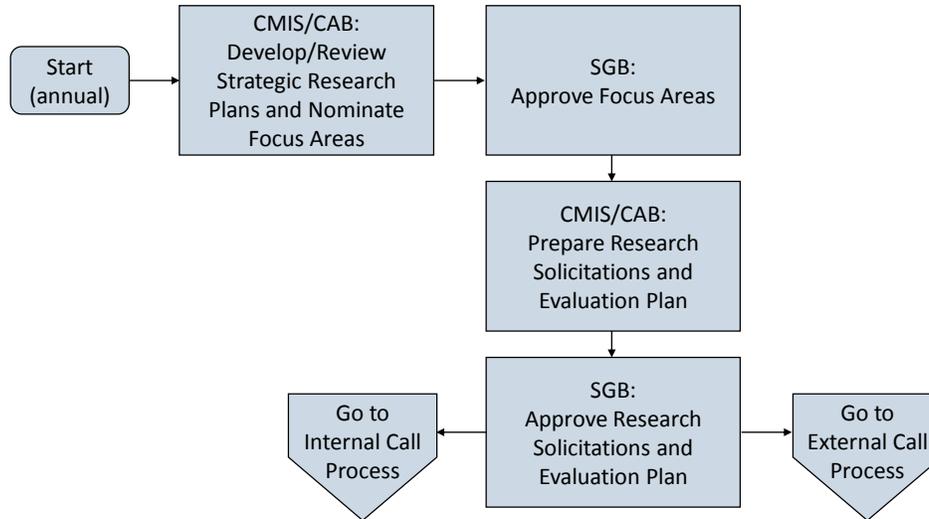


Figure 1. Flow Diagram for Research Program Selection

Upon SGB approval, CMIS will execute acquisition activities to solicit desired research outcomes. With CAB support, CMIS will evaluate and prioritize proposals in accordance with pre-approved evaluation plans and present results for SGB consideration and approval. Following SGB approval of selected solicitations, CMIS will make appropriate contractual awards to commence research activities. Figures 2 and 3 depict this process for internal and external research outcomes. The review process depicted in both figures will be discussed in Section 6.0.

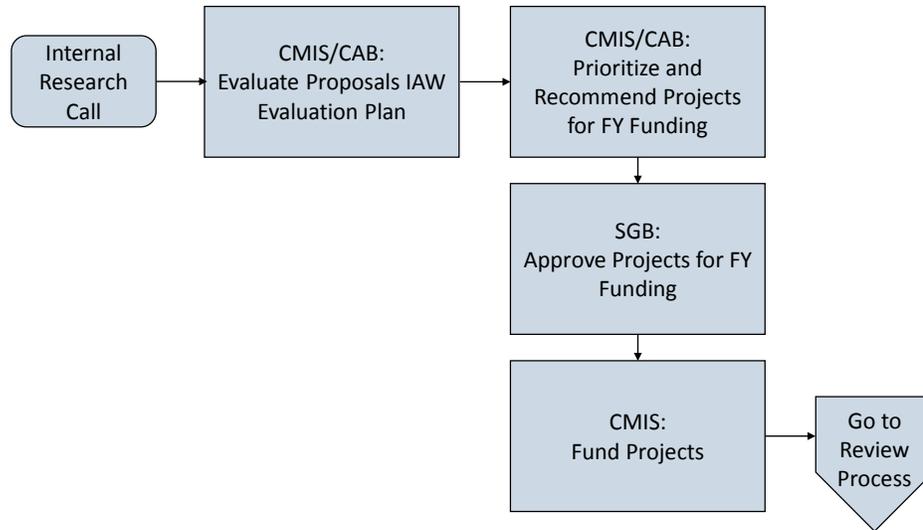


Figure 2. Flow Diagram for Internal Research Call Process



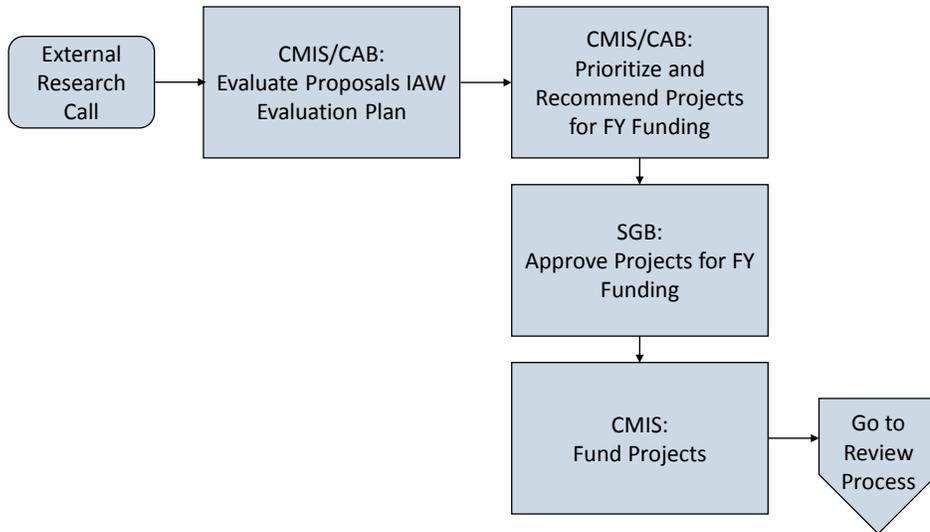


Figure 3. Flow Diagram for External Research Call Process



6.0 RESEARCH PROGRESS

Careful management of research activities will ensure that research efforts are focused on delivering valuable outcomes and resources are expended efficiently. CMIS will manage research progress through a variety of means including;

- Monthly status reports
- Quarterly progress reviews
- Technical interchange meetings
- Annual community research conferences

Monthly Status Reports (MSR)

Each performer will be required to submit monthly status reports. Minimum content requirements for these reports include;

- Technical progress
- Next 30 day research objectives
- Upcoming events/leave/training/travel
- Issues
- Financial status report
 - Spend plan progress and corrective action plan (when applicable)
- Updated progress quad chart

Quarterly Progress Reviews (QPR)

Performers will participate in quarterly progress review meetings to be held with CMIS Director, Director of Research, and members of the CAB, when appropriate. Performers will be expected to provide briefs detailing their interim research products, progress, and deliverable schedule. An initial kick-off meeting will start the QPR process.

Technical Interchange Meetings (TIM)

CMIS will conduct regular interchange meetings amongst the entire team of performers or targeted focus groups to facilitate research productivity and coordination. The goal of these meetings will be to encourage the exchange of new ideas and/or offer solution strategies. Interchange meetings will occur approximately every four months and will be held in the National Capital Region (NCR). Performers will be expected to present briefings covering relevant topics of interests. This effort will maximize the exposure performers have to new Multi-INT approaches and practices, and in-turn, foster novel advances in the state-of-the-art.

One of these meetings will be held in conjunction with the Annual Multi-INT Research Summit in August; the other in January.

Annual Multi-INT Research Summit (AMRS)

This meeting will be held with sponsor leadership, SGB, CAB, CMIS, MIRA, performers, and other invited stakeholders. The purpose is twofold: to report annual research progress, including briefs detailing research products, progress, and deliverables; and to establish strategic research plans for the ensuing fiscal year. Outcomes from the year and this meeting, will be documented and shared with stakeholders in the Annual Research Report, which will be published in November.

A summary of research program management events and their periodicities are contained in Table 3.

Table 3. CMIS Monitoring Schedule

Month	Monthly Status Report	Quarterly Progress Review	Technical Interchange Meeting	Annual Multi-INT Research Summit	Annual Research Report
Oct	X				
Nov	X				X
Dec	X	X			
Jan	X		X		
Feb	X				
Mar	X				
Apr	X	X			
May	X				
Jun	X				
July	X				
Aug	X	X	X	X	
Sept	X				

7.0 CONTACT FOR COMMENTS AND QUESTIONS

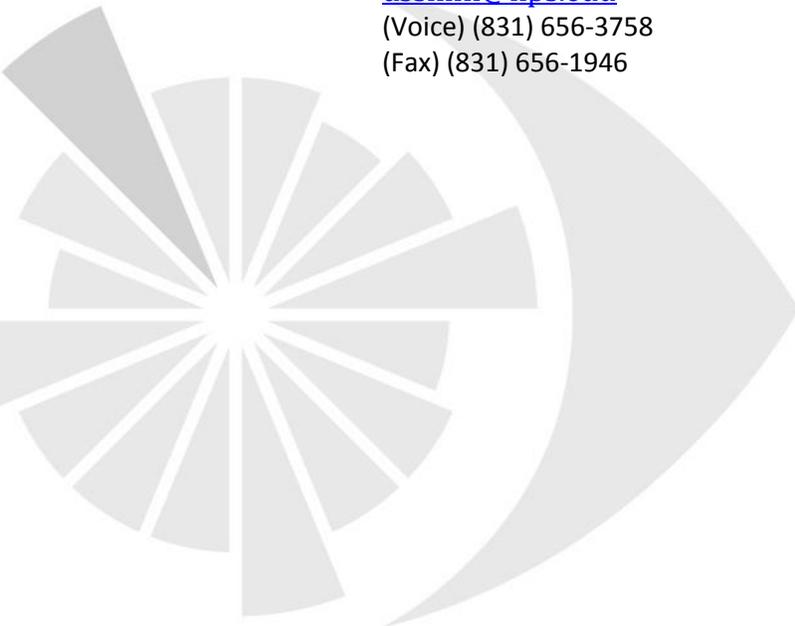
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APPENDIX A ACRONYMS AND ABBREVIATIONS

BAA	Broad Agency Announcement
CAB	CMIS Advisory Board
CMIS	Center for Multi-INT Studies
CY	Calendar Year
DoD	Department of Defense
FY	Fiscal Year
HUMINT	Human Intelligence
IAW	in accordance with
IC	Intelligence Community
MIRA	Multi-INT Research Alliance
MSR	Monthly Status Report
NCR	National Capital Region
NPS	Naval Postgraduate School
OPR	Office of Primary Responsibility
PPBES	Planning, Programming, Budgeting, and Execution System
QPR	Quarterly Progress Review
SGB	Strategic Governing Board
SIGINT	Signals Intelligence
TCPED	Tasking-Collection-Processing-Exploitation-Dissemination
TIM	Technical Interchange Meeting



APPENDIX B FY 2014 RESEARCH AREAS OF INTEREST

This appendix documents the FY 2014 research areas of interest and provides specific desired research objectives and outcomes. The focus areas approved by the SGB are Inferencing and Reasoning, Orchestrated Collection, and Visualization.

Inferencing and Reasoning capabilities that process/transform data from multiple sources to the levels of abstraction necessary for sensemaking, situation awareness and decision making

- Domain and Context Knowledge Representation
 - Intelligent and autonomous fusion and integration of contextually, conceptually and functionally related knowledge objects that may exist in different representation modalities and formalisms, in order to establish a comprehensive, multi-faceted and networked view of all knowledge pertaining to a domain-specific problem [1]
- Data Analytics
 - Transformation and modeling of data from multiple sources with the goal of highlighting useful information, suggesting conclusions, and supporting decision making
- Discovery (by Machine Learning)
 - Discovery and identification of new patterns that provide knowledge about a previously unknown entity or relationship, using machine learning approaches
- Forecasting
 - Anticipation of events, intent, vulnerabilities, and consequences with associated portrayal of uncertainties and probabilities

Orchestrated Resource Management to translate decision-maker information needs into the orchestrated actions of sensors, databases, etc., to produce the data necessary to satisfy stated needs

- Transformation of information needs (or requests) from high level objectives into observables consisting of sensing phenomenology, associated signatures, timeliness, and quality of measurement under expected conditions
 - Translation of Collaborative Collection Strategies, Operation Plans, External Requirements and/or Decision Maker inputs into information needs
 - Ranking and valuation of information needs based on operational priorities
 - Consolidation of information need redundancies and overlaps
 - Identification of multi-disciplinary approaches to information need satisfaction
 - Decomposition of information needs into observables with associated intelligence value
- Development and synchronization of optimal collection strategy across SIGINT, IMINT and ABI assets to satisfy intelligence knowledge gaps
 - Overarching collection strategy development based on required observables, intelligence value and asset capabilities/feasibilities
 - Automatic generation and maintenance of optimal collection plans in coordination with multiple intelligence assets
 - Dynamic replanning in response to changing situations and new information requirements while minimizing undesired plan perturbations

- Capabilities for the ISR community to execute event-driven anticipatory collection strategies
- Capabilities for ISR collectors to automatically respond to tips/cues
- Capabilities for ISR collectors to tip/cue tactical assets in a manner interoperable with theater asset management systems

Visualization capabilities to facilitate the analytical reasoning process through the creation of capabilities that maximize human capacity to perceive, understand, and reason about complex and dynamic data and situations [2]

- Visual representations and interaction techniques
 - Facilitate understanding of massive and continually growing collections of data of multiple types
 - Provide frameworks for the analysis of spatial and temporal data
 - Support understanding of uncertain, incomplete, and misleading information
 - Support multiple levels of data and information abstraction
- Data representations and transformations
 - Theory and practice for transforming data into new scalable representations that faithfully represent the content of the underlying data
 - Methods to synthesize information of different types and from different sources into a unified data representation that enables users to focus on the meaning of the data

[1] SSR Abidi, 'Medical knowledge morphing: Towards the integration of medical knowledge resources', 18th IEEE International Symposium on Computer-Based Medical Systems, Dublin, (June 23-24 2005).

[2] J.J. Thomas and K.A. Cook, eds., "Illuminating the Path: The Research and Development Agenda for Visual Analytics", IEEE Computer Society Press, 2005.

APPENDIX C FY 2014 RESOURCE ALLOCATION

Funding for the FY 2014 research areas is depicted in Table 4. Note that Directed Efforts investment provides flexibility in acquiring emergent supplies and services during the FY.

Table 4. FY2014 Resource Allocation

Research Topic/Area (\$000)	BAA Efforts	Directed Efforts	Internal Research
Inferencing and Reasoning	\$ 220		\$ 100
Orchestrated Resource Management	\$ 170	\$ 50	\$ 100
Visualization	\$ 170	\$ 50	\$ 100
Emerging Research Opportunities	\$ 40		\$ 50
Total	\$ 600	\$ 100	\$ 350
	\$ 700		
	External Research		

APPENDIX D FY 2014 RESEARCH PROJECT SELECTION SCHEDULE

Key milestones for project selection in FY 2014 are included in Table 5.

Table 5. FY 2014 Key Research Project Selection Milestones

Date	Action	OPR
15 Jul 2013	Establish CAB	CMIS
15 Jul 2013	Nominate Focus Areas	CMIS/CAB
22 Jul 2013	Approve Focus Areas	SGB
1 Aug 2013	Draft Solicitations/Call for Proposals and Evaluation Plan (Internal/External)	CMIS/CAB
15 Aug 2013	Announce Research Solicitations/Call for Proposals (Internal/External)	CMIS
15 Sep 2013	Receive Proposals/Evaluate Proposals (Internal/External)	CMIS/CAB
15 Oct 2013	Approve Recommended Awardees (Internal/External)	SGB
15 Oct 2013	Internal Awards Issued	CMIS
16 Nov 2013	Process External Awards	CMIS
31 Jan 2014	External Awards Issued	CMIS



APPENDIX E FY 2014 RESEARCH PROGRESS SCHEDULE

Key milestones for monitoring research progress in FY 2014 are included in Table 6. Note that dates are referenced relative to award date. For example a milestone that should be completed 3 months after project award will be designated A+3. These milestone dates are nominal and may be revised on a case by case basis.

Table 6. FY 2014 Research Progress Milestones

Date	Action	OPR
A+1	Hold Kick-off Meetings	
A+4	Hold QPR	
A+6	Hold TIM	
A+9	Hold QPR	
A+12	Hold FY 14 Annual Multi-INT Research Summit	

