eRA Strategic Plan
FY 2015 – FY 2019

Version 6.0
September, 2015

Electronic Research Administration (eRA) Program

Prepared by:
eRA Division of Administrative, Technical and Strategic Coordination

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Reference Documents

Document Name	*Version, Date*
eRA OMB 300	August 29, 2014
eRA Exhibit 53	August 29, 2014
eRA Now and Tomorrow	May 31, 2006
OER Mission Statement (http://grants.nih.gov/grants/intro2oer.htm)	March 22, 2011

Revision History

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January 11, 2007	0.2.5	Revisions based on comments and edits by customer	Donna Frahm, Bill Starr, Lenore Morrison
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Executive Summary

In 2005 the Director of NIH commissioned a Blue Ribbon Panel to examine the challenges facing eRA in accomplishing its mission to support the NIH grants management process. The Panel tasked an independent reviewer (Gartner Consulting) to prepare an assessment report. The May 31, 2006 report **eRA: Now and Tomorrow** outlined key elements of an eRA Strategic Plan including moving from an IT focus to a business focus and upgrading the organizational and technical infrastructure to align with needed flexibility. Continued investment in strategic planning was recommended to provide the foundation necessary for successful implementation of business and information technology (IT) initiatives to achieve eRA program goals. This document is the next step in planning, implementing, and managing the ongoing campaign to align with the Office of Research Information Systems (ORIS) Vision by fulfilling the eRA Vision:

ORIS Vision

> ORIS's vision is to be a vital partner in advancing NIH's efforts – to increase the healthy life expectancy of all people and reduce the burdens of illness and disability – by facilitating the funding of medical research through its grants systems.

eRA Vision

> The eRA's vision is to be recognized as the world expert and leader in research grants systems and data.

These organizational visions align with the **eRA Mission:**

> To provide electronic systems to manage the receipt, processing, review, award, monitoring and reporting of billions of dollars in research and non-research grants awarded annually. These grants are funded by NIH (in support of the mission of improving human health) and eRA's partner agencies.

The need for a strategic plan is accentuated by the eRA Program's designation as an HHS Grants Management Center of Excellence (COE) and acceptance by OMB as a Grants Management Line of Business (GMLoB) Alternative Service Provider. These roles require a deep look at the eRA program as a provider of grants management services for multiple organizations in addition to NIH. Long-term strategic planning is essential to meet the expectations of HHS and the requirements in the *Recommendation Report to the Grants Executive Board and the Office of Management and Budget*:

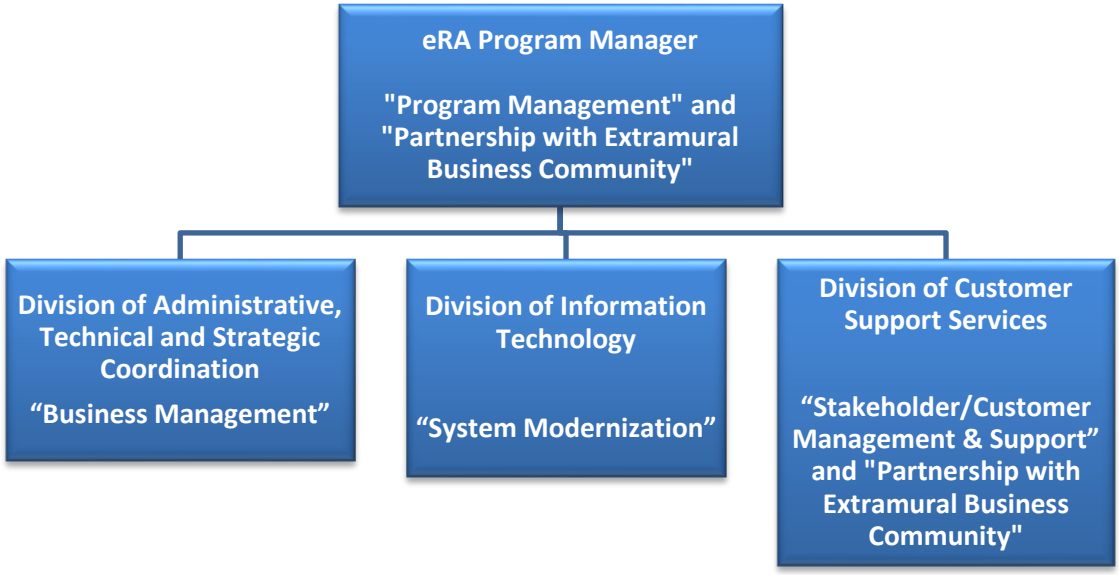
- HHS requires all grant making OPDIVS and STAFFDIVS to utilize one of the two HHS COE's for their grants management processing

- GMLoB requires that Consortia Lead agencies operate like a business. Leads should be customer-focused, responsive, cost-effective, provide a valuable service,

understand and recover full costs, and ensure long-term sustainability of operations. The immediate goal of named Consortia Leads should be to identify and secure commitments from member agencies. The Committee recommends that OMB ensure that all Consortia Leads actively and visibly pursue marketing activities.

This plan will serve as a road map for business and information technology initiatives designed to move the eRA Program and systems from their current state toward that final vision, while successfully fulfilling the Program's intermediate goals and objectives at each milestone along the way.

Our approach is to divide the strategic plan into four major focus areas: Partnership with the Extramural Business Community, Stakeholder/Customer Management and Support, System Modernization and Program Management. This aligns with the eRA management structure and ensures clear ownership of strategic goals and initiatives within the eRA organization.



Areas of concern or focus for each Office:

Program-Wide:

- Alignment with HHS/NIH Systems Processes
  - Enterprise Architecture
  - Security
  - Capital Planning Investment Control (CPIC)
  - Enterprise Project Life Cycle (EPLC) policies
  - NIH Enterprise Data Architecture
  - Governance
  - Program Metrics/Performance Measures
- Alignment with NIH/Office of Extramural Research/HHS

- Identify and implement best practices in all areas of program operations

- Collaboration with external Partners
  - Enterprise System governance groups
  - Integration Services Center (ISC), provided by NIH's Center for Information Technology
- Collaboration with Grants.gov and GrantSolutions
  - Collaborate on service offerings
  - Communicate and cooperate to ensure minimal confusion and burden for applicants
- Share knowledge and expertise in Grants Management and Information Technology (IT) systems across HHS and government wide.

- Determine ways to further improve eRA's efficiency, particularly for Operations and Maintenance (O&M) activities.

- Implement and maintain robust system and database failover and disaster recovery capabilities.

Division of Administrative, Technical and Strategic Coordination

- Workforce/Resources: Have the right level of skilled federal and contractor staff to allow flexibility to take on and successfully execute funded tasks.
- Ensure that NIH does not subsidize or profit from eRA activities specifically performed for non-NIH business partners.
- Return on Investment: Facilitate cost efficiency & effectiveness.
- Annual Budgeting & Financial Management: Work with the management team to assure allocation of resources consistent with strategic priorities and commitments and to assure progress with respect to agreed performance targets.
- Program Reporting: Represent the program to Departmental and Executive Branch officials responsible for monitoring program performance and results.
- Contract Administration and Administrative Support: Procure and administer all contract resources necessary to accomplish program objectives.

- Governance: Operate with fewer constraints imposed by external governance (implies strong and mature internal governance practices are in place).

- Project Management: Support overarching and Service-Team-specific projects and help move the organization up the management capability maturity curve.
- Practice Development: Provide solutions for issues associated with process, staff training and development, performance measurement, monitoring, and reporting.

- Quality Assurance: Promote continuous improvement in the ability of processes to meet or exceed the expectations of eRA's customers and stakeholders.

Division of Information Technology

- Lead the program-wide effort to technically define the next generation of the infrastructure and architecture for IMPAC II and Commons: our way to ensure mainstream technologies on which to build future eRA systems.
- Evaluate potential to adopt cloud computing solution to implement the Presidential Memorandum for "Administrative Flexibility, Lower cost, and better results."
- Continued implementation of the Section 508 standards, regulations, policies, and procedures as defined in HHS Policy for Section 508 Electronic and Information Technology.
- Develop and maintain system and application software that effectively and efficiently meet the needs of the extramural community
    - Evaluate opportunities for Reuse and Collaboration
    - Software infrastructure changes to increase reliability, stability, availability and scalability, security and confidentiality
- Develop system components with manageable dependencies that significantly reduce requirement for system-wide testing prior to component upgrades, as well as reduces system downtime during the upgrades.
- Expand the eRA abilities to perform automated load and functional testing

Division of Customer Support Services

- Maintain or further enhance high level of support and customer service of current functionality while eRA re-engineers current systems and implements new functionality
- Continue proactive approach to strengthening relationships and program reputation
- Communicate and interact with eRA customers and stakeholders (both at NIH and non-NIH) to identify pain-points and system needs and advocate for addressing these areas as senior management establishes eRA-wide priorities
- Collaborate with business partners
- Seek early involvement in addressing customers' business process changes and communicate anticipated stakeholder's needs to program management
- Be involved with NIH planning and policy decisions and customer business process changes from the beginning, not as an afterthought
- Continuously improve operational efficiencies
- Maximize production system availability

1.0 Introduction

This eRA Strategic Plan (FY 2015 – FY 2019) provides a framework for strategic and tactical initiatives that will advance the best and most effective investment of information technology (IT) resources, in alignment with the Secretary's goal of "One Department" and the management improvement initiatives of the Presidential administration.

1.1 Purpose

The eRA Strategic Plan describes the vision of end-to-end electronic life-cycle management of the extramural grants process in NIH, other HHS OpDivs, and external agencies. The plan presents a "roadmap" to achieving that vision. It is designed to promote the success of the eRA Program through effective planning and management of the internal investment and operations, as well as to ensure alignment with HHS and NIH mission and core principles. It drives the strategic intent for preparation of the referenced OMB 300, Exhibit 53 as well as the eRA annual budget requests and eRA Project Mapping to eRA Strategic Goals.

1.2 Scope

The eRA Strategic Plan provides the strategic and tactical direction for management and IT operations within the Program under the context of statutory and policy requirements in Appendix A. Additionally, it informs NIH management as well as grant applicants, grantees and system users about the long-term goals and objectives of eRA. Readers should be able to understand these goals and objectives in relation to the goals and objectives set forth by the Office of Management and Budget, HHS, and NIH.

1.3 Strategic Planning Process

"Strategic planning is a systematic process through which an organization agrees on – and builds commitment among key stakeholders to – priorities which are essential to its mission and responsive to the operating environment."

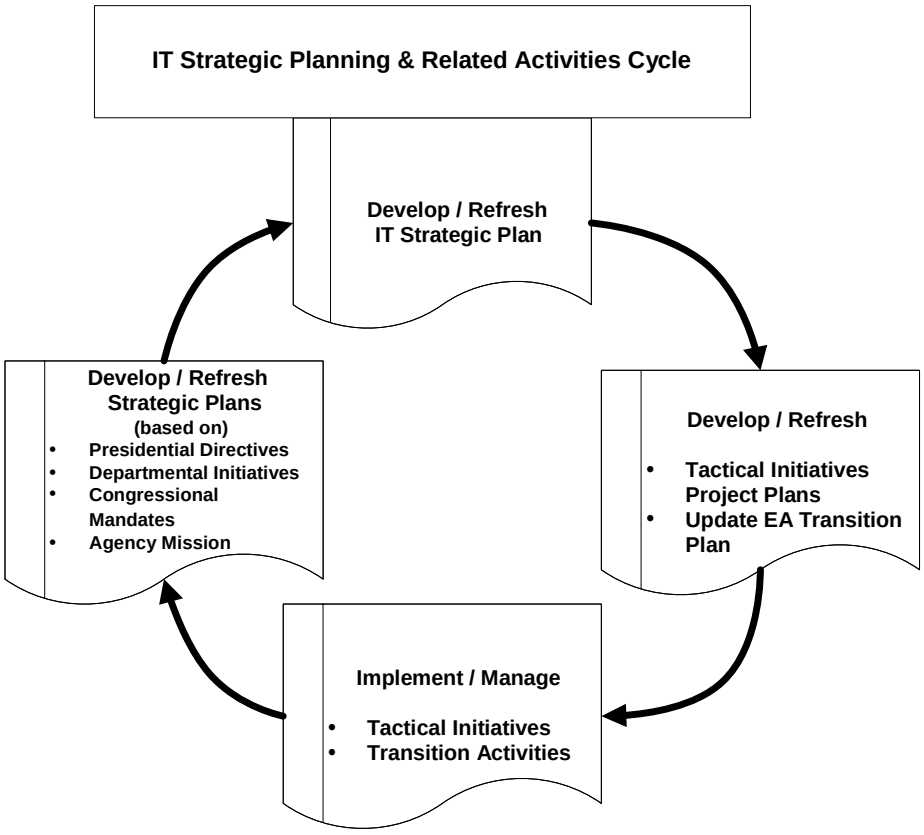
eRA is employing the strategic planning process to help the organization focus its vision and clarify its priorities in response to our changing environment and to ensure that staff are working toward the same goals.

The plan is established based upon present-day assumptions about our future priorities and environment as well as statutory and policy drivers (illustrated in Appendix A). The primary assumption regarding eRA's strategic environment are:

ASSUMPTIONS:

- Grants.gov will continue to be a mechanism for supporting eRA grant submissions.
- Expectations and deliverables, supported by NIH governance, will continue to be constrained by funding and resources.
- Increased emphasis on transparency and traceability of funds.
- eRA will continue to service the grant management needs of both NIH and non-NIH federal organizations.

Given the dynamic nature of the NIH IT environment, the plan will be reviewed, validated and updated yearly to ensure its continued alignment with our governing principles. Once an updated plan has been approved, it will be maintained as part of a systematic planning and implementation cycle, as shown in the graphic below. This cycle provides a flexible management environment to ensure that the business and IT strategic and tactical activities align with and support the Agency's/Program's changing priorities. eRA is committed to evaluating reasonable opportunities and creating practical approaches for enabling eRA to successfully achieve the defined goals and objectives.



2.0 Vision, Mission, and Goals

2.1 ORIS Vision and Goal Areas

ORIS's vision is to be a vital partner in advancing NIH's efforts – to increase the healthy life expectancy of all people and reduce the burdens of illness and disability – by facilitating the funding of medical research through its grants systems.

2.2 eRA Vision

The eRA vision is to be recognized as the world expert and leader in research grants systems and data.

1. Promote awareness of eRA capabilities and garner high- level support
2. Provide system and data security at a level that appropriately protects data and system availability
3. Be influential in the development of data policy
4. Ensure an awareness of data and its use in eRA activities
5. Strengthen data integrity and infrastructure
6. Ensure that new, non-NIH partners are a good match for eRA services (collaborate with Grants.gov and GrantSolutions whenever appropriate)

2.3 eRA Mission

To provide electronic systems to manage the receipt, processing, review, award, monitoring and reporting of billions of dollars in research and non-research grants awarded annually. These grants are funded by NIH (in support of the mission of improving human health) and eRA's fee for service customer agencies (SAMHSA, CDC, FDA, AHRQ, VA).

2.4 Goal Areas

eRA's focus is on supporting the mission of ICs, Operating Divisions, and agencies served by providing tools to electronically manage and report on grants in a way that:

- Works to minimize the administrative burden of applying for grants or managing grants
- Maximizes efficiencies
- Provides a strong and scalable infrastructure
- Is responsive to evolving customer needs
- Employs sound management controls

Source: ***http://era.nih.gov/about_era/index.cfm***

To ensure that eRA stays focused on the high-level goals and has a structure to address the details of the initiatives and projects necessary to achieve these goals, eRA has identified four Goal Areas:

1. Partnership and collaboration with the Extramural Business Community, Grants.gov and GrantSolutions

2. Stakeholder/Customer Management and Support
3. Program Management
4. System Modernization

These areas align with ORIS and eRA goals and with the organizational structure of the eRA Program to take advantage of the planning, decision-making, and collaborative processes and groups already in place. Measurement of the progress in each goal area is contained in the annual eRA Project Mapping. The following sections address each of these goal areas.

3.0 GOAL Area 1: Partnership and Collaboration with the Extramural Business Community and External Partners

eRA will maintain its focus on partnership and collaboration with customers working hand-in-hand with the business community it supports. Through the active participation of eRA's Customer Relationship Managers (CRMs) in stakeholder committees and user groups, the collaborative rapport will continue permitting eRA to understand the needs and priorities of its customers.

The eRA operational structure includes significant customer support with service teams focused on specific business areas and on software infrastructure and shared components. CRMs collaborate with team leads and eRA management to ensure that eRA is viewed as a partner in its efforts to facilitate the delivery of the stakeholder's needs.

Three items will be used to determine success:

- Survey a significant segment of the NIH extramural business community to determine their level of satisfaction with eRA systems.
- Develop a well-defined process for identifying customer requests for eRA system enhancements.
- Develop a well-defined process for identifying customer requirements in project related activities and get stakeholder approval for meeting the requirements prior to closing the project.

3.1 Be an Agent for Change

The eRA CRMs understand the extramural business processes and act as agents for positive change by proposing methods by which IT can facilitate the work of the extramural community. Fulfilling this role will require staff to focus on two different areas:

- Being especially sensitive to the "pain points" of the various extramural business areas and raising awareness to eRA Program management.
- Remaining aware of evolving IT trends and capabilities.

To maintain these skill levels, staff will be directly involved with the functional owners of the various business areas. Maintaining currency with IT trends will also require continual technical training and participation in various technical conferences, seminars, etc.

3.2 Collaborate with Business Partners

- Work collaboratively with our business partners to leverage existing IC, Agency, and OpDiv software and concepts as much as possible. Future services may be provided by customer systems, wrapped for use in a service framework and accessed via NIH Integration Architecture or designed and implemented by customer organizations.
- OMB designation as a Grants Management Line of Business (GMLoB) service provider will require more formal protocols for collaboration and communication with customers and stakeholders external to NIH.

- Interact and collaborate with Grants.gov to ensure that the application process continues to improve for applicants who request grants from NIH or the other organizations supported by eRA systems.
- Interact and collaborate with GrantSolutions to share software and services as appropriate for improved efficiencies and higher levels of customer satisfaction.

3.3 Facilitate Periodic Business Process Reengineering among the various business areas

Since the grants management business processes must frequently change to meet new legislative (or other) requirements, it is imperative that they be periodically reviewed and refined. This effort is typically led by the business community with the support of eRA. Once the processes employed by a business area have been reviewed, eRA updates the IT resources it provides to that business area. In this way, both the extramural work and the IT services that support that work are examined and upgraded on a regular basis.

3.4 Optimization of other business processes

There are many business processes that impact the efficiency of NIH and the agencies and OpDivs it serves or place administrative burdens upon grantee institutions – resulting in higher indirect costs for grantees. It is therefore essential that eRA CRMs and other members of the program leadership team work with their customers and stakeholders to optimize business processes and allow greater flexibility, thereby minimizing the overall administrative burden on those served. This issue has been heightened in significance through the integration of the other HHS OpDivs and Grants Management Line of Business customers into the eRA system. The goal is to ensure business processes are supported by technology solutions versus technology driving the business processes for NIH and its partners.

- Therefore, introduction of higher levels of flexibility into eRA systems helps ensure that NIH and the agencies and OpDivs it serves are effectively insulated from each other's demands of service center customers, while also allowing for the optimization of their own business processes.

3.5 Collaboration with Other Federal System Managers

There are often times ways to leverage the systems and software developed by others. Whenever feasible this approach should be considered as a way to minimize expenses and provide system consistency across the federal sector.

4.0 GOAL Area 2: Stakeholder/Customer Management and Support

eRA will achieve full partnership with the NIH ICs, HHS OpDivs, and external agencies.

- Enhance partnerships with business process owners, customers, and stakeholders to improve the success rate of technology implementation.
- Be involved with NIH planning and policy decisions and customer business process changes from the beginning.
- Use mature project management processes, by implementing the Enterprise Performance Life Cycle (EPLC) methodology to communicate approach, scope, schedule and progress to stakeholders.

4.1 Drivers for Change

The major eRA reorganization implemented in 2006 has been successful in sharpening the organization's focus on building effective working relationships with customers and stakeholders at the grass roots as well as leadership levels. By all accounts, communication and coordination has improved markedly as a result and continues to be an important goal for eRA. eRA re-evaluates organizational and team structure periodically to ensure that communication, coordination and efficiency is optimized for NIH and its Partners.

4.1.1 Enhance Marketability

Drive eRA support into grantee institutions and grantee service providers, with enhanced electronic submission capabilities (i.e. Type 3s, 6s, 7s, Just in Time etc.) where eRA supports grantee internal business processes:

- Reduce grantees' administrative burden related to interacting with NIH, allowing sponsoring institutions to devote greater emphasis to the research itself.
- Make it easy for grantees to interact with eRA systems.

The eRA of the future should provide grantee institutions with access to core services as support for their internal business processes. The associated 'value proposition' is that access to core services will make it possible to reduce the administrative burden on the grantee, making it possible to invest the savings in research rather than administrative functions.

4.1.2 Facilitate Business Process Improvements

According to a recent internal study, significant grants management business process changes are being driven by the NIH Reform Act of 2006. Increasingly, funded research will cross traditional organization boundaries, both within NIH and across agencies. The report identified the following changes with implications for extramural grants management processes:

- Management of trans-NIH and trans-agency research;
- More flexible research administration processes and funding approaches;
- More innovative approaches to evaluation of the scientific merit of applications;
- Standardization of information or content ICs produce;

- Greater flexibility in categorizing information for reporting purposes;
- Adoption of technology that can support more efficient and flexible extramural research administration;
- Greater agility in addressing more rapid changes in Grants Management requirements (changes are challenging the ability of the program to respond);
- Support for external users (PIs and others) as core stakeholders of NIH grant systems.

The Act requires NIH systems to support trans-NIH and trans-agency initiatives. HHS requires support of other HHS OpDivs, and the GMLoB requires that NIH systems support other government agencies such as the Veterans Health Administration as underwriters of extramural health research. Greater flexibility is required in the eRA system in order to support these broader needs without compromising NIH's mission.

Based on these forces for change, the following objectives have been identified as critical to the continued success of the extramural program from eRA's perspective:

- Get grant awards into the hands of investigators faster;
- Reduce the cycle time from receipt to notification of award;
- Support grants funding shared with other agencies;
- Support early identification of multi-disciplinary research;
- Support enterprise-wide reporting of the whole extramural portfolio – grants, contracts and cooperative agreements, across multiple ICs and multiple funding agencies;
- Support flexible business processes.

These objectives require significant changes to be made to business processes and systems including:

- **Sharing of best practices** – As customers have evolved and tuned their business processes, many have developed ways of doing business that are more efficient and/or more effective in meeting their research missions. Where best practices have been developed, it has been difficult to transfer those best practices to others, in part due to a lack of communication forums for best practices, and in part because of the inflexibility of IT systems to support best practices. This problem in some cases has led to the development of "Extension Systems" that add or modify functionality provided by eRA and other systems, but further reduce the ability of individual customers to share business processes with others.
- **Sharing extension systems** – As customers have optimized their business processes, extension systems have been developed to support the variations in processes from the "standard" process supported by eRA and other systems. Once developed, it is often difficult to share the benefits of these systems because the systems are often tied to other IC-, OpDiv, or Agency-specific systems, use different technology platforms, or due to the difficulty of cost recovery for the operations and maintenance of the IC system on others' behalf.
- **Integrate reporting across the extramural and intramural programs** – In order to enable management of the entire research portfolio, both extramural and intramural, and also including trans-agency research, it is essential that information from activities

across NIH and other cooperating agencies be made available to the Division of Program Coordination, Planning, and Strategic Initiatives (DPCPSI). This implies that not only must the source data be available; it must be made available in a timely manner and with consistency of data definition. Without such timeliness and consistency, the level of manual work required to synthesize data reliably and repeatably into the information required to guide and manage research initiatives undermines the effectiveness of the management processes.

4.1.3 Ongoing stakeholder and customer relationship management efforts

eRA Customer Relationship Managers and other members of the eRA Division of Customer Support Services are actively engaged with representatives of a wide range of stakeholder and customer interest and working groups. (*See table on the following pages.*) These groups provide invaluable means by which to exchange views, compare notes, explore concerns and prospective solutions, and inform eRA management about relative priorities in allocating scarce development resources available to underwrite system enhancements.

User Groups
Agency Integration Stakeholder Group
Center for Scientific Review
Committee Management Users Group
Commons Working Group
ECB-QVR Steering Committee
Early Notification System Coordinators Group
eRA Electronic Tracking & Analysis Working Group
eRA Program Official Users Group
Extramural Activities Working Group
Inclusion Operating Procedures System and UsersGroup
Agency Integration Stakeholders Group
Grants Management Lead Users Group
eRA Technical User Group
RCDC Working Groups
Review Users Group
Foreign Award and Component Tracking Working Group
Office of Scientific Analysis and

Reporting
NIH Policy Groups
Office of Budget
Public Access Steering Committee
Office of Policy for Extramural Research Administration
Office of Extramural Policy
Office of Federal Advisory Committee Policy
Office of Financial Management
Electronic Application Coordination Group
Extramural Program Management Committee
Grants Management Advisory Committee
Program Leadership Committee
RCDC Governance
Review Policy Committee
Training Advisory Committee
Tracking & Inclusion Committee
External Groups
Defense Health Agency
Grants.gov
GrantSolutions
HHS Operating Divisions ▪ AHRQ ▪ CDC ▪ FDA ▪ SAMHSA
National Science Foundation
Unified Financial Management System
Veterans Health Administration
Other Enterprise Systems & Technical Groups
CIT
Enterprise Systems Working Group
NBS

NLM
nVision
Other System Interfaces
GPS
LRP
MyNCBI
NIH IC Systems
QVR
RePORTER
SciENcv
SPIRES
StarMetric

4.1.4 Customer feedback integral to annual eRA Operational Analysis

Extensive customer feedback from internal users (those within NIH) is gathered on an annual basis to support the *eRA Operational Analysis*, consistent with NIH OCIO and HHS OCIO guidelines adopted as part of the Enterprise Performance Life Cycle management framework. Documentation and analysis of user satisfaction with the system at large, as well as with each of 22 major system modules, offers insights into recent past performance and potential opportunities for improvement. Satisfaction ratings and comments address availability, responsiveness, functionality, reliability, and related performance variables.

5.0 GOAL Area 3: System Modernization

eRA will provide and support IT systems to automate end-to-end grant application and processing efforts -- responsively and dependably.

- Assure stable, acceptable, responsive enterprise system.
- Minimize administrative burden on grant applicants and extramural staff.
- Take advantage of cutting edge information technologies to dramatically reduce procurement and operating costs and greatly increase the efficiency and effectiveness of services provided to customers.
- Transform applications by refining component architecture, reducing dependencies, and improving the document generation infrastructure.
- Continue to move toward a more distributed database architecture conducive to loosely-coupled services.
- Continue to work with Center for Information Technology (CIT) to upgrade hardware and network infrastructure to be centrally located and managed at the CIT Data Center.

5.1 Drivers for Change:

Examination of the entire technical infrastructure has shown that there are many opportunities for using state-of-the-art techniques to provide a more robust, secure and efficient system.

5.1.1 Need for more granular data storage and reporting

While eRA currently provides detailed data and a good level of reporting functionality related to extramural grants, the ability to synthesize information from extramural and intramural grants, contracts, and other research mechanisms is also necessary to provide NIH management with an accurate and true picture of the overall NIH research portfolio. To the extent that eRA can provide this information in a timely fashion to NIH, the program becomes an asset with a very high return on investment – with the return directly measurable through the rapid delivery of the fruits of research to impact the nation's health.

5.1.2 Shift from Technology to Business Focus

eRA must continue its transition from being an IT-focused program to a Business-focused program. This transition will be expedited by the emerging architectural plan that leads to an eRA built upon a Service Oriented Architecture. This will help to:

- Ensure high levels of flexibility and extensibility to enable eRA to quickly adapt to the rapidly changing and varying needs of ICs, OpDivs, and other agencies. The flexibility required to support other agencies can lead directly to agility in support of the extramural grants mission.
- Align system enhancements and development efforts with the delivery of "services" designed to meet the needs of portions of the target business architecture.

5.1.3 Need for Business-Driven Support of Customers

Past issues (real or perceived) with system stability and reliability, coupled with a perceived loss of control of their internal business processes, have driven many customers to develop their own extension systems or, in some cases, parallel systems to eRA. Such redundancy increases the complexity of the eRA system further and makes sub-optimal use of NIH funds. This issue drives eRA to become more business driven than it has been in the past, where a "one size fits all" approach was sometimes the norm. Becoming business driven reduces the drive for smaller customers to follow the path of their larger cousins and allows the larger customers to consider moving all core business processes into eRA – in both cases resulting in less duplication and reduced costs.

5.2 Authentication and Authorization

A cornerstone of the eRA Architecture is dealing with authentication and authorization. Although this was initially developed independently for each application and was database centric, eRA has evolved to a centralized and standardized approach. This service should continue being enhanced in order to meet extramural business needs and support the integration and sharing of different services across eRA, NIH and our Partners. eRA has moved toward a more federated authentication mode. eRA applications transitioned to NIH Login capabilities. This eliminated the need for a unique IMPAC II ID and password for most system users and enabled us to leverage NIH Login for two factor authentication and Federation services.

5.3 Software Architecture

eRA continually re-examines its software infrastructure. One of the aims is to reduce the number of different architectural approaches used in the system. This will reduce the overall system complexity; risks introduced by changes and upgrades, and provide the flexibility to support new requirements. The goal is to have a layered, modular approach to creating applications. Coupled with well understood and documented inter-dependencies, this will allow for efficient development and integration. This provides the foundation for the continuous evolution of the system technology stack to ensure its sustainability over a long period. Moreover, it also promotes reduction of maintenance efforts and costs over the entire system life-cycle.

Another approach eRA has implemented is the establishment of a User Interface Standard and Style-sheet for consistency and ease of use for our customers. Implementing a standardized interface and style-sheet approach not only enhances the user's experience, but also promotes the use of code re-use and the utilization of shared services. We are also adding improved data quality initiatives such as auto-complete and pre-programmed selections.

5.3.1 Cloud Computing

In 2014 eRA completed an evaluation study for moving some of its infrastructure to a public cloud service provider. It was included as part of that was a prototype implementation of ASSIST running on Amazon AWS. We are now in the process of developing a Cloud Migration Strategy based on the results of the evaluation study.

5.3.2 Mobile Technology

With the growing use of mobile devices by our customers, and our desire to provide a good end user experience while using a variety of devices, we have begun an effort to make our systems more accessible with mobile devices. Given that our current applications were not designed with mobile use in mind, it is not surprising that only 2% of our page views are from mobile devices, but we determined that 85% of those mobile page views were for a small number of pages on the eRA Commons site. Given this, we embarked on a pilot program to provide a mobile version of the Commons status page. The application was presented to the Commons Working Group in May 2015 and was well received. We will continue to look for opportunities to expand our support for mobile devices.

5.3.3 Deployment Automation

In addition to efficiency in development and integration, efficiency in the operational deployment environment plays even more important role. Our goal is to achieve automated operations management within a new dynamic infrastructure that allows accelerating IT service delivery, improve operational efficiency, ensure compliance and reduce risk. Fully automated deployments to non-production environments have been implemented, and a 'Rapid Release' process has been defined for accelerated delivery of new functionality.

5.3.4 Document Service Evolution

In the past, eRA systems uploaded and retrieved documents using Oracle BFile and, sometimes, directly on the shared network file storage. Over the past few years, we have evolved our Document Service to provide a centralized service-oriented approach to allow eRA and partner systems to retrieve and upload documents using SOAP and REST services. The current phase of this evolution, which involves the retirement of BFILE columns, is scheduled to be completed by January 2016. At that point, eRA and partner systems will be decoupled from the underlying storage mechanism used by Document Service. This will allow us the flexibility to evolve our document storage technology (for e.g. to use Cloud services) with minimal impact to other systems.

5.3.5 Document Generation Infrastructure

eRA systems need to generate different documents and reports in various formats (for e.g. grant images in PDF, preliminary summary statements in Word, grants management workbook in Excel). In the past, this has been done using different technologies (Office VB automation, iText, FlexDoc, Jasper etc.). To increase development efficiency and maintainability, we are consolidating our document generation and reporting technologies to a smaller set of COTS and open source technologies. We have already consolidated all custom report generations to use Jasper, and are in the process of migrating all document generation functionalities to use Aspose.

5.3.6 Service Oriented Architecture

eRA has established standard architectural platform allowing efficient delivery of business services and ability to build business solutions using services provided by eRA, as well as by our partners. The platform defines complete solution stack including service security model, interface definition, implementation technology, deployment architecture, and service delivery. The established platform and supporting processes allow eRA to provide business

solutions to individuals via user interface and partner organizations via services using shared components thus reducing costs and delivery time. The portfolio of services provided by eRA grew from less than ten few years ago to several dozen today.

eRA Service Oriented Architecture success resulted in increased interest from eRA partners. They are interested in more services being provided by eRA to serve various aspects of their business processes. The program plans to continue evolving the architecture and service delivery model following best IT industry practices. We will focus on the following areas:

- Enhancing service governance process to better manage growing number of services, both provided and consumed by eRA.
- Adopting modern architecture solutions based on micro-services and composite services to further improve program agility and responsiveness to our customers.
- Continue re-design of "legacy" applications to allow them to take advantage of existing, as well as coming services.
- Take advantage of numerous services available from service provider for public consumption to deliver more value to our customers and to reduce their burden/efforts by simplifying and automating various parts of grant management process.

5.3.7 508 Compliance Implementation

Section 508 was enacted to eliminate barriers in information technology, to make available new opportunities for people with disabilities, and to encourage development of technologies that will help achieve these goals. In 2013 eRA did a comprehensive evaluation of our compliance with Section 508 and made changes to the systems where necessary. We also reviewed our development practices and modified them where necessary to ensure we remain in compliance.

eRA will maintain and improve Section 508 compliance through a three step process:

1. Identification of the applicable standards by the analysts during the requirements phase
2. Coding to the applicable standards by the developers based on information provided in the Section 508 Development and Test Document
3. Testing that the applicable standards have been coded correctly based on information provided in the Section 508 Development and Test Document

5.4 Distributed Database Architecture

The initial development of eRA consolidated many data silos across centralized NIH applications. As with the applications however, the original eRA database is too monolithic, introducing manageability issues and lacking the flexible access controls needed for today's business needs. During the past three years, eRA has been moving toward a more distributed database architecture that will be conducive to loosely coupled services.

The development of the future eRA must be founded on a comprehensive understanding of the data used by key stakeholders. Once more, there is a strong need to understand the data used by the stakeholders in the NIH business architecture and to ensure that there is harmonization among the data entities used. The future of eRA requires a clear understanding of the existing eRA data model from a logical perspective—the current models are largely physical data models—as well as the relationships between the eRA data model and other data models used by NIH and external institutions and agencies.

Based on this understanding of the "As Is" data architecture, the data must first be harmonized to understand relationships between data entities in different organizations. Then, a target data architecture must be developed that describes and coalesces the core data entities central to NIH into single entities that can be used for data interchange both within and outside of NIH. This approach is currently being used to define data relationships and interfaces between eRA and other organizations/systems, including Grants.Gov, SciENcv, Grant Solutions, and other federal grant making agencies..

5.4.1 Objectives for Distributed Data Architecture

Develop a clear understanding of the data used throughout the organization, exchanged between systems, and exchanged with other agencies, grantees, and other related institutions. This goal is achieved through the NIH Enterprise Data Architecture and the NIH Integration Architecture.

- eRA Data Architecture must align with the NIH Enterprise Data Architecture with data that is fully harmonized across intramural and extramural programs. Caveat: eRA may extend the NIH Data Architecture in support of OpDivs and GM Line of Business agencies.
- eRA Data Architecture must support all forms of data as *mineable* assets in a tool-agnostic manner, including:
    - Document-based data (PDF, Word, PowerPoint, etc.)
    - Document meta-data, i.e., data that describes the content of documents, both manually coded and developed using Knowledge Management (KM) tools (e.g., Collexis fingerprints).
    - Table-based data to support structured data queries for both transaction processing and reporting.

5.5 Hardware and Network Infrastructure

eRA, in collaboration with CIT has migrated production equipment which is centrally located and managed at the CIT Data Center. This equipment and future network architecture will be able to support any next generation needs for eRA. The recently completed infrastructure upgrade replaced aging servers and storage area networks (SANs) with more reliable and scalable new hardware, upgraded software to improve administrative efficiency, and simplified network and security architecture by moving all production servers to the CIT Data Center, where CIT now provides comprehensive hardware and operating system support.

As part of eRA's modernization efforts, in 2014 we began a project to address system redundancy and accessibility. The goal of this project was to upgrade our database hardware and software and to significantly improve our recovery time and recovery point objectives. To date, we have upgraded our database hardware and software to Oracle Exadata running Oracle 12c with two RAC nodes in the NIH Building 12 data center and 2 RAC nodes running in the Sterling datacenter. All data is replicated from the active nodes to the standby nodes, typically within one second, and each node has the capacity to run our full database load. All our middle tier servers are running in a fully redundant configuration within the Building 12 datacenter, and the next phase of this project is to add the capability for the middle tier to fail over to the Sterling data center.

6.0 GOAL Area 4: Program Management

eRA Program Management practices will provide the necessary support to eRA for meeting its objectives by:

- Establishing and continually improving software development life cycle practices and processes.
- Establishing and improving an organizational culture of collaboration for achievement of common goals and objectives.
- Improving disaster recovery plans and implementation to enable service restoration as quickly as available resources permit.
- Fostering a quality management approach which is inclusive of all organizational levels in determining direction and measurement of achievement.
- Creating and improving internal and external communication practices which ensure each role within a process or business area has the necessary information for success.
- Provide accuracy and full transparency in reporting Program activities to stakeholders.

eRA is moving forward with adopting Agile/Lean methods for delivering quality software in smaller increments to achieve greater customer satisfaction, quality software (code), flexibility/agility, reduced risk and an increase in productivity. While there are many approaches to using Agile, eRA has started teams with Scrum where the team delivers potentially shippable software at the end of every 2-week iteration, known as sprints.

6.1 Drivers for Change

Successful IT investment begins with an understanding of strategic business imperatives, underlying business processes, and a commitment to harness technology to help business leaders achieve their desired end state.

6.1.1 Align with OMB, Departmental & NIH Strategic Goals and Priorities

eRA functions within a complex environment created and sustained by NIH through its extramural grants program. It is therefore imperative that eRA align its solution architecture, particularly its Business Process Model and Data Architecture, with the NIH Enterprise Architecture and business processes. Even as eRA works to support NIH Institutes and Centers as well as other HHS operating divisions, eRA must also ensure that it complies with numerous external requirements. As a federal government program, eRA's services and initiatives must comply with and support numerous federal statutes, guidelines, and regulations.

eRA plays an integral role in implementing the following statutes:

- The Government Performance & Results Act of 1993 (GPRA), by means of its performance planning, monitoring, and reporting functionalities;
- Clinger-Cohen, otherwise known as the Information Technology Management Reform Act of 1996, by virtue of its emphasis on business process improvement and its reliance upon business imperatives to drive innovations in technology;
- The Government Paperwork Elimination Act of 1998 (GPEA), by providing individuals or entities the option of submitting information and conducting

transactions with grant-making agencies electronically and by maintaining electronic records;

- The Federal Financial Assistance Management Improvement Act of 1999, by streamlining and simplifying grant application, administrative, and reporting procedures and allowing applicants to electronically apply for and report on the use of funds;
- The Federal Advisory Committee Act, updated most recently in 2001, by tracking and reporting on the work of the Integrated/Initial Review Groups and special Emphasis Panels and the National Advisory Councils and Boards engaged in Peer Review;
- The E-Government Act of 2002, by promoting internet access to the federal grant application, review, award, and reporting processes and by reducing the cost and administrative burdens on applicants, awardees, and their sponsoring institutions;
- The Federal Funding Accountability & Transparency Act of 2006 by transmitting the requisite information on federal awards so that it is available to the public via a single, searchable website;
- The National Institutes of Health Reform Act of 2006, by reporting on collaborative research across HHS Agencies, grants involving clinical trials, handling of tissue samples, provisions for uniform coding of research grants, and the management of potential conflicts of interest; and
- The American Recovery & Reinvestment Act of 2009, by tracking and reporting on health research grants underwritten by provisions of the recently enacted federal stimulus package.

The most influential statutory requirements include, but are not limited to the following examples:

6.1.2 The Government Performance and Results Act (GPRA)

GPRA requires federal agencies and their major operating divisions to prepare strategic plans covering "a period of not less than five years forward from the fiscal year in which it is submitted, [to be] updated and revised at least every three years." GPRA also called for production of annual performance plans linked directly to the longer-term strategic plan. Performance objectives and measures should be organized within the context of a 'balanced scorecard' addressing customer, business process, financial, and 'learning and growth' concerns. Reporting on progress with respect to annual performance targets is one of the BPO's external reporting responsibilities. Performance results are monitored by the NIH Office of the Chief Information Officer (OCIO), HHS OCIO, and OMB.

6.1.3 Information Technology Management Reform Act

Several years after the enactment of GPRA, the Information Technology Management Reform Act, popularly known as Clinger-Cohen, imposed more rigorous performance- and results-based management reporting requirements on agency information technology investments. Ideally, annual performance reporting is set within the framework established by an agency's strategic plan.

6.1.4 HHS "One Department"

eRA must ensure that information technology serves to support the business needs of the organization and that all technology solutions support the HHS "One Department" guiding principle. In other words, in addition to aligning its business strategy and operating tactics with the needs of its customers, eRA must align with and support NIH and HHS business and supporting technology strategies.

Appendix A- Governing Statutes and Policies

eRA Systems Impact

- American Recovery and Reinvestment Act (ARRA) of 2009 (Public Law 111-5)
- HHS Policy for Section 508 Electronic and Information Technology, January 2005
- HHS Section 508 Implementation Policy, January 6, 2005
- HHS OCIO Policy for IT Enterprise Performance Life Cycle (EPLC), October 6,2008
- Financial Systems Integration (FSI); Anti-Deficiency Act, 31 U.S.C. § 1341

Federal

- Anti-Deficiency Act, 31 U.S.C. § 1341
- American Recovery and Reinvestment Act (ARRA) of 2009 (Public Law 111-5)
- Chief Financial Officers (CFO) Act of 1990 (Public Law 101–576)
- Clinger-Cohen Act (CCA) of 1996 (formerly the IT Management Reform Act of 1996 (Division E of Public Law 104–106) and Federal Acquisition Reform Act of 1996 (Division D of Public Law 104–106))
- E-Government Act of 2002 (Public Law 107–347)
- Federal Information Security Management Act (FISMA) of 2002 (Public Law 107–347)
- Federal Managers Financial Integrity Act of 1982 (Public Law 97–255)
- Federal Financial Management Improvement Act of 1996 (Public Law 104–208)
- Federal Acquisition Streamlining Act of 1994 (Public Law 103–355)
- Government Performance and Results Act (GPRA) of 1993 (Public Law 103–62)
- Paperwork Reduction Act (PRA) of 1995 (Public Law 104–13)
- Government Paperwork Elimination Act (GPEA) of 1998 (Public Law 105–277)
- Government Accountability Office (GAO) Information Technology Investment Management: A Framework for Assessing and Improving Process Maturity, GAO–04–394G, March 2004
- GAO Cost Estimating and Assessment Guide: Best Practices for Developing and Managing Capital Program Costs, GAO–09–3SP, March 2, 2009
- GAO Accounting and Information Management Division (AIMD) Assessing Risks and Returns: A Guide for Evaluating Federal Agencies' IT Investment Decision-making, AIMD–10.1.13, February 3, 1997
- National Defense Authorization Act for Fiscal Year 2012, Division E - SBIR/STTR Reauthorization Act of 2011 (Public Law 112-81)
- OMB Circular A–11, Part 7 Planning, Budgeting, Acquisition and Management of Capital Assets
- OMB Circular A–11, Part 7 Supplement, Capital Programming Guide (June 2006)
- OMB Circular A–76, Performance of Commercial Activities (05/29/2003) including changes made by OMB Memorandum M–07–02 (10/31/2006) and a technical correction made by OMB Memorandum M–03–20 (08/15/2003)
- OMB Circular A–94, Guidelines and Discount Rates for Benefit–Cost Analysis of Federal Programs (Revised 12/12/2008)
- OMB Circular A–127, Financial Management Systems

- OMB Circular A–130, Management of Federal Information Resources
- OMB Memorandum 97–02, Funding Information Systems Investments, October 25, 1996
- OMB Memorandum 05–23, Improving Information Technology (IT) Project Planning and Execution, August 5, 2005

HHS:

- HHS Policy for Section 508 Electronic and Information Technology, January 2005
- HHS Section 508 Implementation Policy, January 6, 2005
- HHS Acquisition Regulation, December 20, 2006
- HHS Office of Acquisition Management and Policy (OAMP) — Acquisition Policy Memorandum No. 2008–02, October 1, 2008
- HHS Information Resource Management (IRM) Policy for Conducting Information Technology Alternative Analysis, February 14, 2003

HHS OCIO:

- HHS OCIO Policy for IT Capital Planning and Investment Control (CPIC), December 30, 2005
- HHS OCIO IT Policy for Enterprise Architecture, August 7, 2008
- HHS OCIO Policy for IT Enterprise Performance Life Cycle (EPLC), October 6,2008
- HHS OCIO Policy for IT Performance Baseline Management, 2009
- HHS OCIO Information Security Program Policy, December 15, 2004
- HHS OCIO Policy for Department-wide Information Security, September 24, 2007
- HHS OCIO Policy for Records Management, January 30, 2008
- HHS CIO Roles and Responsibilities — Circular No. IRM–101, March 1999