# eRA Strategic Plan
## FY 2011 – FY 2015

***Version 2.2***
April 29, 2011

**Electronic Research Administration (eRA) Program**

**Prepared by:**
**eRA Business and Planning Office**


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**Disclaimer:** *Progress toward achieving the strategic goals outlined in this plan is highly dependent on funding availability and other factors beyond eRA's control. Also, eRA realizes that long range strategic plans are subject to change, based on evolving stakeholder business needs and emerging new technologies. Thus, this plan should be viewed as a 'living document' that will be updated annually at least.*

# 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 fulfill the **eRA Vision:**

> eRA'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.

This vision aligns with the **eRA Mission:**

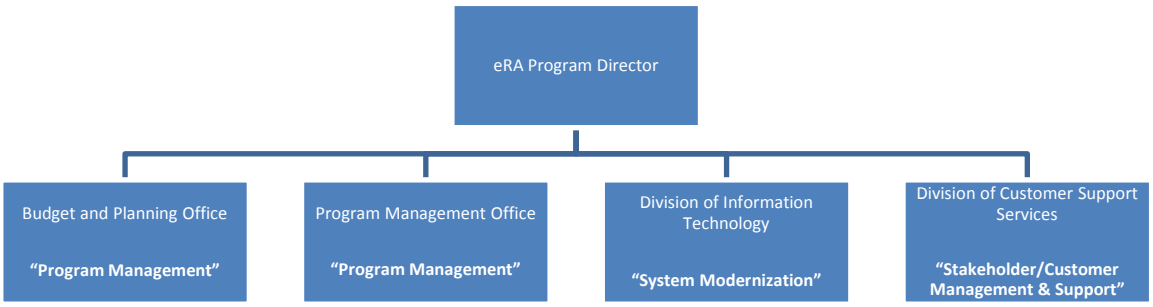
> To provide electronic systems to manage the receipt, processing, review, award and monitoring of billions of dollars in research and non-research grants awarded annually. These grants are funded by NIH (in support of the mission of improving human health) and eRA's partner agencies.

The need for a strategic plan is accentuated by the eRA Program's acceptance as a Grants Management Line of Business (GMLoB) Alternative Service Provider. This role necessitates 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 requirement in the Recommendation Report to the Grants Executive Board and the Office of Management and Budget:

- 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 NIH/Office of Extramural Research/HHS
- 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
- Involvement with and influence on the external factors that directly affect eRA's ability to provide services to the extramural community
    - Enterprise System governance structure
    - Grants.gov management
    - Integration Services Center (ISC) oversight
- Determine ways to further improve eRA's efficiency, particularly for Operations and Maintenance (O&M) activities.

## Budget and Planning Office

- Workforce/Resources: Have the right level of skilled federal and contractor staff to allow flexibility to take on and successfully execute Institute & Center (IC) funded tasks.
- 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.

## Program Management Office

- Governance: Operate with fewer constraints imposed by external governance (implies strong and mature internal governance practices are in place).
- Best Practices: Identify and implement program management best practices.
- 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 IMPAC II and Commons: Evergreening our way to ensure mainstream technologies (e.g., Service Oriented Architecture) on which to build the future of the eRA systems.
- 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
- Data Architecture: Develop Data and Applications Architecture and Data architecture modeling
- Develop system component independence to significantly reduce requirement for system-wide testing prior to component 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 transitioning current systems
    - Identify target partitioning of service/business function responsibility
    - Application of Business Process Modeling Tools
- Continue proactive approach to strengthening relationships and program reputation
- Collaborate with business partners
- Seek early involvement in addressing customers' business process changes
- Be involved with NIH planning and policy decisions and customer business process changes from the beginning, not as an afterthought.
- Continuously improve operational efficiencies.
- Reduce requirement for system outages for maintenance or other reasons

# 1.0 Introduction

This eRA Strategic Plan (FY 2011 – FY 2015) 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 new 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 (Appendix A).

## 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 B. Additionally, it informs NIH management as well as grant applicants 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."

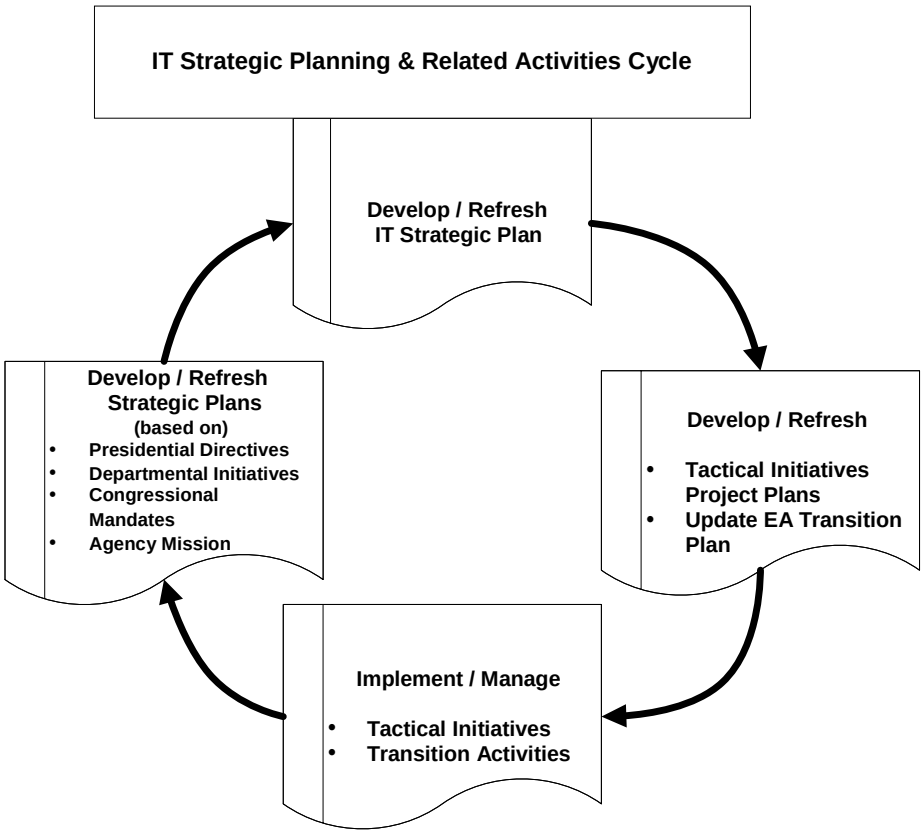
eRA is employing the strategic planning process to help the organization focus its vision and clarify its priorities in response to our changing environment and to ensure that staff are working toward the same goals.

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 B). The primary assumption regarding eRA's strategic environment are:

- Grants.gov will be able to support eRA grant submissions.
- All NIH grants submissions will be electronic by October 2012.
- Grants submission volume will not decrease.
- Expectations and deliverables, supported by NIH governance, will continue to be constrained by resources.

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 eRA Vision

eRA'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 Mission

To provide electronic systems to manage the receipt, processing, review, award and monitoring 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 (SAMSHA, CDC, FDA, AHRQ, VA).

## 2.3 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:

- 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 with the Extramural Business Community
2. Stakeholder/Customer Management and Support
3. Program Management
4. System Modernization

These areas align 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 with the Extramural Business Community

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 and respond to the needs of its customers.

The eRA operational structure is built upon customer support. Four of the six Service Teams are focused on specific business areas with the other two focused on software infrastructure and cross-Team coordination. These four teams are each led by CRMs that are directly involved in the business of the communities they support. The CRMs ensure that eRA is viewed as a partner in its efforts to facilitate the delivery of the stakeholder's needs.

Specific milestones for this critical goal are difficult to define. However, two 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 and publicize a well-defined process for determining eRA priorities. This process should directly reflect the needs and priorities of the extramural business community.

## 3.1 Be an Agent for Change

The eRA CRMs will understand the extramural business processes and will 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.
- 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.

## 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, called "Evergreening", 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 NIH 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 CRM's 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 issue here for NIH is not primarily one of being responsive to eRA's service center customers, but rather ensuring that the core mission of NIH is not compromised through modifications to IT systems to support other agencies. Therefore, introduction of higher levels of flexibility into NIH systems helps ensure that NIH is effectively insulated from the demands of service center customers, while also allowing for the optimization of NIH's own business processes.

# 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.

### 4.1.1 Enhance Marketability

Drive eRA support into grantee institutions and grantee service providers, as accomplished with eSNAP, 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 Grants.gov.

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. OneHHS 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 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.

| **Stakeholder/User Groups** |
|---|
| **User Groups** |
| Committee Management Users Group |
| Commons Working Group |
| ECB-QVR Steering Committee |
| Early Notification System Coordinators Group |
| eRA Electronic Tracking & Analysis Group |
| eRA Program Official Users Group |
| eRA Population Tracking Users Group |
| Grants Closeout Users Group |
| Grants Management Lead Users Group |
| eRA Technical User Group |
| RCDC Working Groups |
| Review Users Group |
| **NIH Policy Groups** |
| Electronic Application Coordination Group |
| Extramural Program Management Committee |
| Grants Management Advisory Committee |
| Program Leadership Committee |
| Review Policy Committee |

| **Stakeholder/User Groups** |
|---|
| Training Advisory Committee |
| Tracking & Inclusion Committee |
| **External Groups** |
| Grants.gov |
| HHS Operating Divisions<br>▪ AHRQ<br>▪ CDC<br>▪ FDA<br>▪ SAMHSA |
| Veterans Health Administration |
| **Other Enterprise Systems & Technical Groups** |
| CIT |
| NBS |
| NLM |
| **Other System Interfaces** |
| RCDC |
| RePORTER |
| NIH IC Systems |

### 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 15 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.
- Continue to move toward a centralized, standardized approach to authentication and authorization.
- Transform application and connection architecture by refining component architecture, reducing dependencies, improving the document generation infrastructure, and adopting a Service Oriented Architecture.
- 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:*

Instability resulting from legacy development issues undermines the good will created among users and stakeholders by improved management and organizational alignment. A detailed examination of the entire technical infrastructure has shown that there are many opportunities for using state-of-the-art technique techniques to provide a more robust, secure and efficient system.

### 5.1.1 Need for better grant-related information

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 and NIH. eRA is actively moving toward a more federated authentication model. This activity will be accomplished in three phases:

1. eRA applications are transitioning to use NIH Login capabilities. This will eliminate the need for a unique IMPAC II ID and password for most system users and enable us to leverage NIH Login for two factor authentication and Federation services.
2. Finally, the IMPAC II and Commons systems will transition to federated authentication. The federation infrastructure will be provided by CIT's NIH Login service which has an MOU with the InCommon Federation of educational organizations that represent a significant portion of the institutions NIH deals with. Additional identity providers will likely become available in the future.

These steps are described in further detail below.

### 5.2.1 Planned Initiatives

- **Standardized Authorization and Access Control**
  Authorization and access control is currently implemented by eRA using a variety of techniques at the application and database level. A standardized, consistent approach that provides a flexible and lightweight solution to all business requirements needs to be applied across all applications. eRA has developed a new Authentication and Authorization Service, AAS, which will provide advanced capabilities and consistency across all eRA applications. It provides the interface for eRA applications to utilize the NIH Login service, and has an updated authorization model. This new authorization model improves on the current reliance on a mix of database and application roles by allowing access to be granted based on finer grained privileges held by the user and eliminating the use of database roles for end-user provisioning. These privileges are aggregated to form flexible business roles that can be assigned to

users. The migration of all internal applications to AAS and NIH Login will increase consistency, provide for NIH-wide single sign on, allow for two factor authentication, and integrate with federal Federation efforts.

- **Federated Authentication**
  Federated Authentication will allow authentication control to be distributed to the organizations under which a user resides. For eRA internal applications, Federated Authentication should occur naturally as part of the migration to NIH Login, assuming other agencies and operational divisions outside of NIH that are supported by eRA can be set up as federated authentication sources. The eRA Commons is not currently controlled under OSSO, so a separate plan for integrating this external system with NIH Login and supporting Federated Authentication will be necessary. External application authentication also needs to be extremely efficient and scalable, so appropriate pilot activities and a gradual rollout will also need to be planned to ensure continuity of service.

## *5.3 Software Architecture*

The *eRA Software Architecture* Review, funded by CIT and performed by Gartner Inc indentified the connection architecture as the primary weakness of the eRA software architecture. Based on Gartner recommendations, the eRA Program placed significant focus on correcting the connection architecture issues of the J2EE converted applications. An improved connection architecture was identified and has been implemented in 2008 for the relevant internal applications in conjunction with the OSSO migration. This has greatly improved the user experience and the reliability of the affected systems.

### 5.3.1 Near-Term Initiatives

eRA has begun a number of initiatives to improve the management of shared modules, including breaking SBC and Framework into more granular physical components, using standard dependency tools to track application to component dependencies, integrating components at run time instead of build time, and exposing some components as services for use by external applications outside of eRA. All of these activities provide groundwork for implementing a SOA framework.

The program has also pursued initiatives to improve the integration and standardization of all eRA applications. The two most notable examples are workflow and rules engine integration. Traditionally the workflows and rules inherent in the grants business process have been manually coded into eRA applications.

One aspect of the eRA application architecture that continues to expand is document generation and management. While initial document management requirements for eRA were very minimal, more recent initiatives such as Internet Assisted Review and Electronic Submission have greatly increased the scope and complexity of document management functions needed by eRA. There are now almost 400 different types of documents managed by eRA with a variety of rules governing how they can be submitted/generated, retrieved, annotated and retained. Custom document management functions have been used to support these requirements, most recently with the implementation of a web service to allow flexible access to eRA documents across NIH.

### 5.3.2 Future Initiatives

Several priorities have been established for transforming eRA's application and connection architecture: refining component architecture and dependencies; improving the maintainability and flexibility of the document generation infrastructure; and adopting a Service Oriented Architecture.

### 5.3.3 Component Architecture and Dependencies

Continued refinements have been made to the eRA Component Architecture to efficiently reuse and manage common services. But these efforts have been undertaken on an ad-hoc and incremental basis. A more holistic, project based initiative would ensure that a comprehensive approach is used to capture all opportunities for reuse and that components are refactored and restructured to maximize reusability and manageability. This would also include expanding the usage of the standard rules engine to centralize and simplify rule based logic across eRA.

### 5.3.4 Document Generation Infrastructure

The Document Generation solution implemented on eRA has been developed in a piecemeal manner over many years to address various requirements using a combination of custom and off the shelf software. A comprehensive approach to analyze all current and future Document Generation requirements across eRA would identify opportunities to improve the maintainability and flexibility. This could include greater use of COTS or consolidation of current custom software, and could also be done in collaboration with an NIH Enterprise Architecture Document Service effort if it is of interest to the broader community. For example there are currently at least four different techniques used to produce formatted documents on eRA (Windows PDF generators, FlexDoc, iText, and Oracle Reports).

### 5.3.5 Service Oriented Architecture

Service Oriented Architecture (SOA) is a mainstream architectural approach that is embraced by the industry in general and by the NIH CIO, in particular. One of the most appealing aspects of this architecture is that is does *not* require that a system be completely replaced.

The initial implementation of IMPAC II was based on a monolithic Client/Server architecture, but it has gradually been moved toward a multi-tier, component-based architecture since the transition to J2EE technologies began in 2001. Many components have already been enabled as loosely coupled services, and the architecture is well positioned to be further evolved into a true Service Oriented Architecture. Some modules, particularly those converted from Client/Server, will require more effort to realize the full benefits of SOA.

The existing J2EE underpinning of eRA is a strong base technology for implementing SOA. A first logical step in developing a SOA infrastructure would be to identify those IT infrastructure services that should be provided on an enterprise-wide basis (perhaps by the CIO's office or CIT) and leverage these services for eRA as well as other NIH, OpDiv, and agency systems. The second step would be to look at services provided by eRA and enable these under a SOA implementation. The eRA Program has implemented a number of reusable 'services', both for internal and external use, however these do not have a standardized structure for discovery, usage, or security. The Document Retrieval Service is the first service being developed under the current NIH SOA model, and this work can be expanded to include new services and other existing services, including:

- Grant status (currently an eSubmission service for third party service providers)
- Person info (currently an eSubmission service for third party service providers)
- Document upload
- Subproject upload
- Grant Folder
- Electronic Notification
- IC and Program Class Code assignment
- Program Official assignment

### 5.3.6 Objectives for Establishment of Service-Oriented Architecture

Reuse COTS and GOTS services, including components derived from the existing eRA system, other agencies such as NSF, or commercially provided service:

- Leverage existing eRA software as much as possible. Services may be existing applications "wrapped" in a service framework or newly developed services.
- The eRA of the future must heavily utilize centrally and externally provided services to remove duplication of effort across NIH. Such services include the use of middleware tools, such as TIBCO, for data location and access services, data communications services and for business process orchestration.
- Encourage the use of commercial-off-the-shelf (COTS) products (as they are appropriate to the business and data architectures) to reduce risk and improve supportability. This can include the use of commercial hardware and software packages as well as commercially provided services as components of the SOA should they become available and viable.

### 5.3.7 Objective for Application of Business Process Modeling Tools

As a true enterprise, mission-critical system, the eRA of the future must be founded on a Service Oriented Architecture and utilize Business Process Management (BPM) tools to orchestrate variations in business process. eRA must also conform to the NIH Integration Architecture to provide the extensibility, flexibility, and interoperability that will be required by NIH ICs, HHS OpDivs, other agencies such as VHA, and grantee institutions. The use of BPM and SOA and the use of business process models to drive the BPM software using mechanisms such as Business Process Execution Language (BPEL) allow the control of the business processes to be placed in the hands of the business rather than the IT organization. The flexibility introduced with this approach allows for regular optimization of the business process without the need for change to the core eRA system services.

## *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 activity will require significant collaboration between the NIH Enterprise Architecture team, eRA, and external data teams within grantee institutions, other operating divisions of HHS, and other government 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 is working with CIT to configure new equipment centrally located and managed at the CIT Data Center. The new 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.

Further infrastructure upgrades are planned in the near- to mid-term to improve system stability and responsiveness. The next priority is to upgrade middle tier hardware and rationalize middle tier architecture so that it is comparable in all environments. In the database arena, Oracle software will be upgraded to the most current version, eliminating problems that patches to previous versions have been unsuccessful in correcting. Finally, recent and updated assessments of infrastructure performance and improvement priorities will guide selective re-engineering of infrastructure hardware, software, and associated operating procedures.

# 6.0 GOAL Area 4: Program Management

eRA Program Management practices will provide the necessary support to eRA for meetings 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 roll within a process or business area has the necessary information for success.
- Provide accuracy and full transparency in reporting Program activities to stakeholders.

## *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 GPRRA, 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- eRA Project Mapping to Strategic Goals

| Project Name | Project Lead | Project Manager | e RAStrategic Plan Mapping | | | |
|---|---|---|---|---|---|---|
| | | | Partnership w/ Extramural Business Community | Stakeholder/ Customer Management Support | Program Management | System Modernization |
| **2011 Governance Funded** | | | | | | |
| Electronic Application Processing Updates | Sheri Cummons | Nora Hermida | x | x | x | x |
| Research Performance Progress Report (RPPR) | Scarlett Gibbs | Nora Hermida | x | x | x | x |
| Improve Commons Personal Profile Usability *[Project received funding to achieve limited objectives]* | Scarlett Gibbs | Nora Hermida | x | x | x | x |
| Respond to Federal Register Notice (FRN) [*Project closed early due to budget reductions]* | TBD | TBD | x | x | | x |
| Accommodate Mandated FCOI Changes *[Project closed early due to budget reductions]* | Scarlett Gibbs | Nora Hermida | x | x | x | x |
| Peer Review BPM Requirements & Analysis *[Project closed early due to budget reductions]* | Eugenia Shiuk | Michael Rennolds | x | x | | x |
| **2010 Governance Funded** | | | | | | |
| Receipt & Referral Re-Engineering (Evergreening Pilot) *[2 year project]* | Jessie Floura | Lee McPherson | x | x | x | x |
| Type 7's - Electronic Intake | Sheri Cummins | Nora Hermida | x | x | x | x |
| Type 3's - Electronic Intake | Scarlett Gibb | Nora Hermida | x | x | x | x |
| **ARRA Funded** | | | | | | |
| Enhancing Peer Review (ARRA) | Sara Silver | Lee McPherson | x | x | x | x |
| Federal Financial Report (FFR) | Scarlett Gibb | Nora Hermida | x | x | x | x |
| Evergreening Software Upgrade – Technology Refresh | Natasha Globus-Martin | Bob Sweatt | | | x | x |
| Archive/Purge Records System | Sara Silver | Amanda Wingo | | | x | x |
| OPERA interface with Grants Management Module | Cathy Walker | Mike Rennolds | x | x | | x |
| Web Front-End for Submitting Complex Applications | Sheri Cummins | Amanda Wingo | x | x | x | x |
| eRA/NBS Integration | Stacey Kocher | Adrian Gutierrez | | | x | x |
| Federated Authentication for Commons | Adam Levy | Nora Hermida | | | x | x |
| **2009 Governance Funded** | | | | | | |
| Subproject Re-Engineering | Patti Gaines | Lee McPherson | x | x | x | x |
| **Maintenance Funded** | | | | | | |
| Oracle Database Upgrade | Tom Mason | Terry Goodell | | | x | x |
| X-Train/TA End To End | Linda Katzper | Nora Hermida | x | x | x | x |
| 508 Compliance | Eric Paquin | Janice Kochan | | | x | x |
| Recovery Act | Sara Silver | Adrian Gutierrez | | | x | x |
| | | | **4/29/2011** | | | |

# Appendix B- 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
- 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