Name of Program:
NIH Roadmap: Re-engineering the Clinical Research Enterprise:

Name and brief description of initiative:
NIH Clinical and Translational Science Awards (CTSA)

Brief description of goals of initiative: In October 2005, the National Center for Research Resources (NCRR) launched the Clinical and Translational Science Awards (CTSAs) program on behalf of the NIH Roadmap for Medical Research. The purpose of this program is to create a definable academic home for the discipline of clinical and translational science. To create this home, the program allows for local flexibility so that each institution can determine whether to establish a Center, Department, or Institute (C/D/I) in clinical and translational science. Key goals of this initiative are to encourage the development of novel methods and approaches to clinical and translational research, enhance informatics and technology resources, and improve training and mentoring to ensure that new investigators can navigate the increasingly complex research system.

Program contact information: Anthony R. Hayward, M.D., Ph.D. 301-480-3661; haywarda@mail.nih.gov

Website address of initiative: http://www.ncrr.nih.gov/clinicaldiscipline.asp

Brief description of biomedical informatics and computational biology components and their goals: The program is exploring a number of tools and approaches for identifying and accessing resources relevant informatics and technology. Biomedical Informatics will be the cornerstone of communication within C/D/Is and with all collaborating organizations.

Brief description of resources and tools available for sharing: To serve the broad field of bioinformatics and maximize the utility of the work, the program encourages the use of commercial informatics developments that could impact clinical research. These include the work of the ONC on the Federal Health Architecture (FHA) and the National Health Information Network (NHIN), and new research infrastructure tools such as the cancer Biomedical Informatics Grid (caBIG) and the Bioinformatics Research Network (BIRN).

Brief description of integrative efforts: A key goal of the CTSA program is to encourage Centers, Departments, or Institutes (C/D/I) in clinical and translational science to develop best practices and recommendations that reduce or remove institutional impediments to clinical and translational research and, through dissemination and sharing, enhance the inter-institutional collaborations.

Interactions with other initiatives: The program encourages both internal, intra-institution and external interoperability to allow for communication among C/D/Is and the necessary research partners, such as government, clinical research networks, pharmaceutical companies, and research laboratories.

Name and brief description of initiative:
Re-engineering the Clinical Research Enterprise NIH Roadmap Initiatives: Clinical Research Networks and National Electronic Clinical Trials and Research Network (NECTAR)

Brief description of goals of initiative:
Feasibility of Integrating and Expanding the Clinical Research Networks Program:
The goal of this initiative is to explore the feasibility of expanding and integrating clinical research networks at academic centers and community-based health care providers, who care for sufficiently large groups of well-characterized patients. Implementing this vision will require new ways to organize how clinical research information is recorded, new standards for clinical research protocols, modern information technology, and new strategies to strengthen the clinical research workforce. This initiative is aimed at promoting and expanding clinical research networks that can rapidly conduct high-quality clinical studies that address multiple research questions. The 12 network feasibility projects underway address a range of medical disciplines (heart, cancer, critical care, psychiatry, transplantation), over multiple ages and populations/settings (primary care, rural, minority, HMO), using varied information systems and informatics tools. For example, one of feasibility projects is defining common data elements and cardiovascular vocabulary used in clinical research. Another program is studying and defining the common data elements and vocabulary definitions used in tuberculosis clinical research. A third program is looking at how to facilitate the integration of primary physicians and their practice populations into the existing clinical research enterprise. The development of common infrastructure elements, e.g., informatics, governance, common language will facilitate cooperation among research groups and networks to address research questions of mutual interest and across disciplines.

Inventory and Evaluation of Clinical Research Networks (IECRN):
The primary objectives of the IECRN project are: 1) to identify a broad range of clinical research networks and provide a web-based clinical research network inventory database for researchers to identify and collaborate with other clinical research networks; 2) to describe and assess network practices 3) to identify and examine clinical research network practices that allow achievement of their goals through operating efficiently, promoting successful interactions within the network and with other networks; and 4) to conduct a National Leadership Forum for researchers to discuss the study findings. Invited keynote speakers of the National Leadership Forum are Dr. Elias Zerhouni, NIH Director and Dr. David Brailer, National Coordinator for Health Information Technology. The National Leadership Forum on May 31-June 1, 2006, has engaged clinical research network leaders in building a common framework for dialogue on the NIH Roadmap initiative, presented candidate “best practices”, supported cross-network exchange in the clinical research networks and provide a springboard to ongoing dissemination of information and practice models to the clinical research network community. Both the IECRN activities and the clinical research networks web inventory, which currently contains 229 Clinical Research Networks (http://www.clinicalresearchnetworks.org/summaries.asp), has allowed us to formally

examine the structure, practices, geographic distribution and other characteristics of clinical research networks. Of the 221 networks surveyed the following findings have been made: 120 were established in 1999 or earlier, and 101 after 1999; 61% are government funded; in the US 37% are clinical trials and 65% are non-clinical trials; 52% are US-based, 33% have sites both in the US and outside the US, while 15% are foreign-based; 50% of the networks are group practice or individual practice networks; at least one-fourth of older networks have done research in every specific category, except outcomes research and best practice modeling, while 63% of the newer networks have done observational epidemiology studies; older networks were more likely than newer networks to study men or women or their condition, while newer networks were more likely to study minorities or underserved or rural populations. Sharing clinical research network information and best practices will open opportunities to address research questions across the NIH.

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Website address of initiative: http://www.cceb.upenn.edu/roadmap

Brief description of clinical research informatics components and their goals:
The 12 NECTAR network feasibility projects underway address a range of medical disciplines (cardiology, cancer, critical care, psychiatry, transplantation) in differing environments using varied information systems and informatics tools. A controlled vocabulary is the foundation for the standards that are essential for these tools. Examples include defining common data elements and vocabularies for clinical research in cardiology and tuberculosis. A third program looks at the integration of primary physicians and their practice populations into the existing clinical research enterprise through the development of Open Source Grid Architecture (OSGA) web services to provide secure HIPPA compliant remote data querying at widely distributed data sites. These projects should help enable development of interoperability with clinical trials databanks in national clinical research networks. Information from the Clinical Research

Networks and National Electronics Clinical Trials and Research Network (NECTAR) Initiative, derived from the feasibility studies, will bring about better integration of clinical research networks at academic centers and community-based health care providers. NECTAR will provide the informatics structure that will serve as the backbone for interconnected and interoperable research networks. This network will promote clinical research collaboration by utilizing information technology innovations enabling researchers to broaden their research scope.

Brief description of resources and tools available for sharing:
The twelve Roadmap programs have a common theme that focuses on improving the efficiency and applicability of their clinical research infrastructure, thereby increasing the scope and collaborative capabilities, by expanding and standardizing the informatics infrastructure within the programs. Program members are working together and in collaboration with other NIH enterprises such as caBIG and BIRN, in a consolidated effort to identify and select the best methods and standards for informatics projects. The commitment and collaboration among researchers in the use of informatics tools will provide a common informatics platform to exchange data between disparate systems to support the research community.

Brief description of integrative efforts:
1. Daniel J. Clauw, M.D. – The Michigan Clinical Research Collaboratory:

An Integrated Academic-Community Research Enterprise
The goal of the project is to link three existing practice-based research networks, 1) a large family practice network, 2) hospital-based cardiology practice, and 3) psychology based research network. Software has been developed to link these networks, which is proceeding to a feasibility project that integrates these networks as part of this demonstration project.

Overlapping Initiatives:
The common security model, HL7 (Health Level Seven) software development kits
The CDISC (Clinical Data Interchange Standards Consortium) initiative
The BRIDG Model (Biomedical Research Integrated Domain Group Model) to facilitate information transfer between clinical care and clinical research systems
HL7FTK and the caCoreFTK with respect to clinical care, clinical research
Common security model
Web application and services
Controlled vocabulary inventory handling
Mapping using LOINC® (Logical Observation Identifiers Names and Codes), ICD-9, SNOMED® (Systematized Nomenclature of Medicine)

2. James Kahn, M.D. – University of California, San Francisco:
CNICS

This project is working with the Phoenix Group – CFAR (Center for AIDS Research) to develop technical and analytic tools to import HIV resistance data directly from clinical laboratories into the electronic medical record at the network's clinical sites. The group is focusing on how to develop XML (Extensible Markup Language), Java, and other standard languages for output from chip machines. In particular, the group is examining TRUGENE™ computers that use Nest Open Step and a system that uses XML translated information in a standard fashion to download into a database for research use from multiple venues. This is helpful in terms of translational research by allowing investigators to model a system that promotes research focused on understanding the influence of HIV resistance, HIV disease progression and establishment of predictors of antiretroviral treatment failure.

The project is focused on technology for expressing constrained vocabularies. An aspect of the project that is related to the Roadmap is creation of a patient portal to access individual medical information, including information about resistance to antiviral medications, and to get feedback from the patients about adherence to medications. This portal will ultimately be able to access different electronic medical record systems, so that patients may view their information. This will require translation of ICD-9 code into lay descriptions. The group is trying to interest the National Library of Medicine in this aspect of the project.

Overlapping Initiatives:
Development of XML, Java, and other standard languages for readout from chip machines to download into a database for research use from multiple venues
Mapping LOINC® or other standard medical terms into a commercial language, as well as using consumer-based languages for medical terms
Translation of ICD-9 code into lay terms

3. J. Richard Landis, Ph.D. – University of Pennsylvania:
CRN Harmony

There are several projects within this program that would benefit from partnering with caBIG to utilize tools that are under development or already developed. The first project is focused on standards and methodology development that will be implemented within Oracle® Clinical (OC). Progress has been made in the area of adverse event (AE) reporting and standard dictionary incorporation. In particular, this group is interested in available case report forms (CRFs) developed for use within the OC tools, and standard library tools and AE reporting systems that can be incorporated into OC Thesaurus Management System (TMS). These will be applied to several large, multi-center clinical trial networks. The first is a program that includes two NIDDK funded urology networks with 10 or more sites each, conducting multiple clinical trial protocols in each of the two networks. The objective is to apply standard AE reporting and data collection methods across all trials. The second is a national, industry-sponsored study screening a large pediatric population that will be developed in this system. Third, a large NIDDK cohort study in chronic

renal insufficiency would benefit from standard outcome events reporting, as available.

Overlapping Initiatives:
Standard case report form development and implementation AE Reporting Standard library implemented within OC Utilization of NCI EVS standard vocabularies implemented in OC TMS Penn, as a Roadmap program and caBIG™ participating site, as a test site for integration of these initiatives

4. Kevin Peterson, M.D. – University of Minnesota:
ePCRN

This project involves working with groups of primary care physicians to create an electronic primary care research network. They currently have 6500 primary care physicians involved in creating a national secure electronic infrastructure to support clinical trials in primary care clinics. Links have been made into data reporting systems, constructing a network which is a similar, more public version of what caBIG™ has developed. This project supports translational research in primary care settings by combining this network with the Global Tools Kits and other OGSA web services internet tool capabilities. This is an open-source group that has not purchased OC products.

Overlapping Initiatives:
Investigation of UML structure for open-source clinical trials Employment of cancer specific terminology in broader applications working with the NCI EVS group and caDSR groups Exploring questions about metadatabases available in OC, those not available, and other proprietary issues Interact with the OGSA DAI (Open Grid Services Architecture Data Access and Integration) Group to take advantage of global tool kit and other web services that will be developed such as the AER system Use of open-source API

5. Alan H. Morris, M.D. – LDS Hospital, Utah:
Critical Care Decisions

This project is focused on the Clinician-Patient encounter with the aim of responding to the unnecessary variation in healthcare delivery, high error rate, and deviation from providing the very best performance. An electronic tool set, UTAH Clinical Trial Tool Box, has been developed which provides various functions focused on the execution of clinical trials and can be applied to the execution of clinical care. It utilizes bedside computerized protocols operating in a hybrid system with stand alone laptops in several hospitals dealing with the following subject management issues:

control of IV fluid and support of cardiac circulation for an Acute Respiratory Distress Syndrome Network (ARDSNET) Clinical Trial, control of mechanical ventilation including protocols for managing arterial oxygenation, carbon dioxide pressure and pH, and the BAA Roadmap project, which is a protocol for managing blood glucose in critically ill people with IV insulin.

This BAA contract has been distributed in eight institutions: four pediatric and four adult ICUs; most in the USA, one in Singapore. The plan is to distribute to four more sites in a few months to utilize the same tools as the pediatric consortium, independent from the adult consortium, and also, use them for a pediatric group doing observational studies.

The focus on the clinician/patient encounter takes advantage of the construct developed by environmental psychologists that this encounter constitutes a transactional unit the two elements of which (patient and clinician) should not be separated when outcomes are being evaluated. It allows for more effective evaluation of how decisions are made by clinicians. Compliance of clinicians, with the instructions generated in an open-loop servo-control system with bedside terminals in the adults, is between 95% in the US and 98% in Singapore.

Overlapping Initiatives:
Security of data transfer for movement of clinically sensitive data across the web to an aggregate database
Use of multiple dictionaries compatible with the latest version of HL7, LOINC, and SNOMED to standardize a higher level of exchange of information across networks
Engage in a dialog in which people from caBIG™ and elsewhere might have comments and criticism about how to evaluate the clinician / patient encounter in an effort to make the clinician's behavior consistent.
Interest in generic version of CRFs

6. Steven B. Johnson, Ph.D. - Columbia University:
InterTrial

This project focuses on deploying information technology into a community network of 15,000 physicians in NY, NJ and CT. It connects with systems within academia and in particular, the Columbia University Hospital Cancer Center. The study concentrates on behavioral aspects of information technology usage. It is not centered solely on technology, but on the users; why they use technology, why they don't, and what are the factors for success. This project will develop models of these behavioral patterns that will be scaleable to small and large community settings as well as the larger academic medical center setting.

There are many different vendor systems in use throughout the community practices that contribute to a massive heterogeneity problem. It would not be feasible to focus on any particular vendor; instead the project will evaluate how to bridge between different

vendor systems. Velos, as a system for managing clinical trials is of interest to this project as would collaboration with others using Velos, such as Michigan.

Overlapping Initiatives:
NCI modules, the participant registry caMatch software The challenge of appropriately matching and drawing patients into trials This project seeks to work with NCI to make these technologies work outside of OC.

7. Eric B. Larson, M.D. - Group Health Cooperative:
HMORS Research Networks Coordinated Clinical Studies Network (CCSN)

The HMORS Research Networks Coordinated Clinical Studies Network is working to expand the existing capacity within the HMORS Research Network of 13 integrated delivery systems scattered throughout the country, which have the equivalent of 14 to 20 million lives in a widely distributed population-based delivery system. It has been in existence for ten years. The purpose of this project is to expand the network which includes a vaccine safety data link from CDC, a certification from AHRQ (Agency for Healthcare Research and Quality) and IDSRN (Integrated Delivery System Research Network), which is an AHRQ funded research group based in the network.
All but one of the plans will be based on an epic platform. In various stages of development, epic serves as the base for an electronic medical records system which will ultimately be integrated with other data collection systems. The deliverables involve improved conduct and problem solving of multi-site research across different health plans which include HIPAA issues, harmonizing IRBs, and developing a virtual data warehouse using cardiovascular disease variables. This will be modeled on the virtual data warehouse which was developed in the CRN sites from the HMO Research Network.

The informatics group is led by Mark Hornbrook, James Ralston and Gene Hart. The project has become involved with the population sciences special interest group to develop systems with investigators interested in population-based research.

Overlapping Initiatives:
Establishment of strong connections with NCI and caBIG™ Development of systems for population-based research Concerns about data security, HIPAA requirements, and corporate barriers to exchanging information across delivery systems that may be competing against each another

8. Dennis L. Confer, M.D. – National Marrow Donor Program:
AGNIS

The National Marrow Donor Program ® (NMDP) and the Medical College of Wisconsin's International Bone Marrow Transplant Registry (IBMTR are working

together to 1) Increase the scope of network activities between multiple clinical networks supporting hematopoietic stem cell (HSC) transplantation; 2) Increase network participation, including training, facilitating easy entry of new sites, acquisition of additional patient and investigator participation; and 3) Facilitate network communication and cooperation by developing new approaches and tools for electronic data exchange. The purpose of this study is to establish a model for exchange of clinical data within and between clinical research networks involved in HSCT. This model includes:

- Creation of a governance structure;
- Establishment of business rules;
- Development of a data dictionary; and
- Definition of a robust, platform-independent messaging system.

The implementation of clinical data exchange will include:

- A messaging exchange between the IBMTR and the NMDP;
- A messaging link extension of the above to a major U.S. transplant center, the University of Minnesota; and
- A messaging link extension to at least one international clinical data registry.

NMDP has conducted several national and international meetings to support the public system for electronic exchange of clinical network data as a collaborative effort of the Center for International Blood and Marrow Transplant Research (CIBMTR) and the NMDP and the EMDIS European Marrow Donor Information System. The program has established a technical committee to collaborate to seek solutions for sharing blood and marrow transplant data. Efforts to engage leaders in developing this initiative include providing a stipend and scheduling AGNIS meeting to coincide with major BMT meetings.

9. Carol Dukes Hamilton, M.D. - Duke University Medical Center:

Enhancing the U.S. Public-Health Systems Willingness and Capacity to Engage in Clinical Research

This project will be focus to enhance the willingness and capacity for clinics within the U.S. public health system to engage in clinical research. The specific long-term goal is progress toward worldwide TB control and elimination, the process, connections, and products we develop will have broad application among clinical research networks in the U.S. TB Trails Network will be collaborating with an established academic research organization, the Duke Clinical Research Institute (DCRI), using their infrastructure, their clinical trials expertise and tools, and their established and developing training programs. The aims and its objectives of the TBTC-DCRI are to:

- Engage public health leaders in the clinical research enterprise in general, and TB clinical research in particular, by investing them in priority-setting forums that will also help the TBTC to create a relevant, timely and dynamic future scientific agenda
- Identify and reduce barriers to clinical trials research in U.S. public health clinics

• Develop, with public health leaders and networks engaged in multicenter trials, a model for improving the process of human subjects protection review in multicenter trials

• Create an interoperable, secure web-based electronic data capture system for the TBTC that will interface with public health surveillance systems

• Designing a system that is compatible with the national infrastructure being deployed in state and territorial networks of public health.

• Leveraging ongoing surveillance data collection to improve the ability to recruit subjects to clinical trials, as well as compare trial populations with the population at large, which will be a measure of the applicability of findings.

10. Robert A Harrington, MD, FACC, FSCAI - Duke Clinical Research Institute: CTN Best Practices

This project focuses a customer management approach to interacting with network sites that will facilitate interoperable clinical research by enhancing site recruitment, training, performance, and accountability and by creating a sustained improvement in the efficiency and quality of the interaction between the clinical research subject and the investigator. In order to do this, there are four components:

• Treat the clinical research site as a customer, creating a mechanism to define and share best practices designed to engage, support, and invest sites in research. We will build site capability by developing tools and programs to help them enhance their understanding and knowledge of clinical research.

• Use cardiovascular disease as a model for developing common data elements and standard terminology that can be shared among researchers and networks; this will prevent sites from spending their time relearning new nomenclature for each study and it will enhance interest in the research by making data sharing among studies easier. We will use depression as an example of cross-discipline interoperability.

• Engage the site in identifying and prioritizing important new research ideas and we will provide an infrastructure that enables networks to quickly take research ideas from concept to implementation.

• Create a model for network informatics infrastructure and provide an integrated electronic repository of tools and programs that will assist the site in its study conduct activities and to foster communication across sites.

11. Gregory H. Reaman, M.D - The Children's Oncology Group: COG

This project develops a collaborative effort between two clinical trial networks, the Pediatric Blood and Marrow Transplant Consortium ((PBMTC) and the Children's Oncology Group (COG), in order to enhance the availability, safety, and efficacy of Pediatric blood and marrow transplantation. The focus is to optimize BMT protocol performance by the PBMTC and cancer treatment by the COG, and to advance the

science and application of BMT through coordinated development of research concepts and collection of data between the PBMTC, the COG, and related networks in BMT.

The goal is to foster clinical research networks that are based on common or inter-operable infrastructure elements and that conduct research both in academic and clinical care settings. To do this by integrating and expanding clinical research networks broadens the kinds of research questions that can be addressed and enhances the efficiency of conducting clinical research. By expanding the COG network to assist the PBMTC in conducting their trials more rigorously and more efficiently, these two networks demonstrate that this goal can be achieved.

12. Robert L. Williams, M.D. - University of New Mexico:
RIOS Net

RIOS Net has established a practice-based research network composed of clinicians serving predominantly Hispanic and American Indian populations. Thus, it has showed the capacity to:

- Conduct research in a range of clinical research topics using diverse research methods;
- Collaborate with other research networks;
- Conduct research involving traditionally underrepresented communities;
- Incorporate minority views in setting priorities, and
- Conduct research in settings that lead to better translation of research into practice.

Fifteen specific objectives are proposed with associated milestones. These objectives include the expansion of network membership, the creation of an infrastructure to fast-track the research process in the network, the creation of enhanced capability for translational research, expanded training of researchers, enhanced capacity for community participation in research, the formation and testing of linkages to other clinical research networks, and the enhancement of network Information systems.

Interactions with other initiatives:
Collaboration between Clinical Research Networks Roadmap Activities and the National Cancer Institute caBIG Activities.

As the network development activities of the Roadmap progress, it is clear that a portion of the work being done by the National Cancer Institute to improve the development and interoperability of cancer trials through the caBIG program shares similar objectives with the database management, clinical trial services, and interoperability development that is fundamental to the success of several of the Re-engineering the Clinical Research Enterprise contracts. The Re-engineering CRN will interact with caBIG through the existing workspaces that have the most relevance to the Roadmap projects. At the current time, three major workspaces have been identified as providing the greatest relevance to the Roadmap goals.

The **Clinical Trials Modeling System (CTMS) Workspace** provides several areas of common interest. This workspace includes:

1) Adverse Events Reporting Special Interest Group (SIG)
2) Compatibility Grading SIG
3) Financial Billing SIG
4) Lab Interfaces SIG
5) Protocol Representation SIG
6) Routine Data Exchange SIG
7) CTMS Study Calendar SIG
8) Best Practices SIG

The **Architecture Workspace** is also an important space for closer involvement with the Roadmap Program. The purpose of this workspace is to ensure *syntactic* interoperability among developer projects in caBIG. This includes:

1) Workflow SIG
2) Identifiers SIG
3) Regulated information exchange SIG
4) Security Access and ID Management SIG
5) Common Query Language SIG,
6) Best Practices SIG

The **Vocabularies and Common Data Elements (VCDE) Workspace** is responsible for ensuring *semantic* interoperability among all the developer projects within caBIG. The VCDE Workspace does not have special interest groups, but meets in small groups to review data standards and developer interoperability packages submitted to the group for caBIG compatibility.

These workspaces are best matched functionally by representation through the existing Network Development, Interoperability, and Messaging subcommittees of the Re-engineering SC. Individuals from several different Roadmap groups who express and interest in a particular SIG are working with that SIG. The EVS system is fundamental to each of the other workspaces, and provides an important measure of the level of compatibility of new software.
The following collaborative projects have been identified and are ongoing:
1) CTMS Workspace, Structured Protocol Representation SIG.
Goal:

- Develop a structured clinical trial protocol representation using Unified Modeling Language that appropriately captures a clinical trial model from the perspective of a large multicenter clinical research network. Speed the development of the caBIG model, while ensuring broad generalizability.

2) CTMS Workspace, Adverse Event SIG

Adverse Event Data Collection, Processing, and Reporting – Oracle Clinical (OC) Adverse Event Reporting System (AERS)

Goals:

• OHR/CRCU - develop an Academic Medical Center (AMC) version of Oracle Clinical Adverse Event Reporting System

• CRCU - pilot the AMC OC AERS with an existing RCT CRN (UPP)

• Full dissemination of materials and experiences to NCI, other Roadmap Programs, and UPenn Abramson Cancer Center.

Actions and Timeline:

3) CTMS Workspace, Data Management System Integration

caBIG Compliant Database Management System Implementation
Case Report Form Libraries and Oracle Clinical Remote Data capture (OC RDC)

Goals:

• Within the context of the UPenn Roadmap Program, CRCU and UPenn are currently in the process of supplementing their ability to develop Clinical Trials Data Management Systems by adding OC Remote Data Capture as a Clinical Research Informatics tool.

• UPenn would like to accelerate its process by learning and acquiring materials from caBIG. caBIG has experience with Oracle Clinical (OC) Remote Data Capture (RDC) via the Cancer Center Clinical Database (C3D – an OC-based clinical trials database) and trial definition based on Common Data Elements from an existing library of template Case Report Forms.

• After obtaining all possible benefit from caBIG experience, CRCU will pilot a RDC-based Clinical Trial DMS with a trial to be developed by an existing RCT CRN (UPP)

• Full dissemination of materials and experiences to NCI, other Roadmap Programs, and UPenn Abramson Cancer Center.

4) VCDE Workspace - Enterprise Vocabulary Service

OC Thesaurus Management System and EVS

Goals:

• Within the context of the UPenn Roadmap Program, CRCU and UPenn are currently in the process of supplementing their ability to develop Clinical Trials Data Management Systems by adding OC Remote Data Capture (RDC) and Adverse Event Reporting System (AERS) as Clinical Research Informatics tools.

• Use of these tools at the Clinical Research Enterprise-level will require that standards be employed. At the foundation of the "standards stack" is controlled vocabulary. NCI has developed standard vocabularies for a variety of settings in the life sciences and is meeting this need through a diverse collection of Enterprise Vocabulary Services (EVS). The NCI EVS is a collaborative effort of the Center for Bioinformatics and the NCI Office of Communications.

• UPenn would like to accelerate its process by learning and acquiring materials from caBIG. caBIG has experience with Oracle Clinical via the Cancer Central Clinical Database (C3D – an OC-based clinical trials database) and trial definition based on Common Data Elements from an existing library of template Case Report Forms. These

clinical research informatics tools also employ vocabulary standards from EVS. EVS also works with vendors to create and improve tools for vocabulary development and curation. The NCI Thesaurus, which is a biomedical thesaurus created specifically to meet the needs of the NCI, is produced by the NCI EVS project. The NCI Thesaurus is provided under an open content license. The EVS Project also produces the NCI Meta-thesaurus, which is based on NLM's Unified Medical Language System Meta-thesaurus supplemented with additional cancer-centric vocabulary. In addition the EVS Project provides NCI with licenses for MedDRA, SNOMED, ICD-O-3, and other proprietary vocabularies. The NCI Terminology Browser can be used to view and search the NCI Thesaurus and other biomedical vocabularies.

• Specifically, UPenn would like to work with caBIG to reproduce locally at UPenn the current EVS server and applications implementation to provide an NCI mirror site for services. EVS vocabulary services are currently implemented as Oracle relational databases accessed through Apelon server software. The NCI Thesaurus is a semantically modeled cancer-related terminology built using description logic. It is made available on the Internet using Apelon DTS server software. The NCI Meta-thesaurus is a database of many biomedical terminologies, mapped where possible to NCI Thesaurus terms and shared conceptual meanings. It is made available on the Internet using Apelon Meta-phrase server software. Both the DTS and Meta-phrase servers have proprietary APIs. NCICB has extended the functionality of both servers, including concept-level history support for NCI Thesaurus. NCICB has wrapped the proprietary Apelon APIs in our open caCORE API. The open caCORE API provides access to both the standard and enhanced capabilities of our vocabulary servers. The EVS Package contained in the caBIO component of caCORE 3.0 provides an integrated, fully supported standard means of accessing all the capabilities of the EVS servers.

• After implementing an EVS Services Site, UPenn will proceed to integrate EVS vocabulary standards into UPenn use of Oracle Clinical RDC and AERS.

• UPenn will fully dissemination materials and experiences to NCI, other Roadmap Programs, and UPenn Abramson Cancer Center and make EVS services available to same.

5) VCDE Workspace - Enterprise Vocabulary Service

Development of semantic interoperability with clinical trials databanks.

Goals:

• Develop semantic interoperability between the EVS system and the University of San Francisco Clinical Trials Databank as supported by JAMA and the NEJM. This would allow automatic and immediate transfer of clinical trial data to the databank at the time of publication of data, and provide semantic interoperability for metadata analysis.

6) CTMS Workspace – OGSA DAI SIG

OGSA Globus toolkit web services development

Goals:

• Development of Open Source Grid Architecture (OGSA) web services using the Globus toolkit to provide secure HIPPA compliant remote data querying at widely distributed data sites.

Interactions with other initiatives: The NECTAR Initiatives will work with the CTSA, caBIG, BIRN, NHIN, NLM, Health IT Programs, as well as additional initiatives that focus on clinical research network interoperability. Interactions on development and adoption of terminologies and ontologies; sharing of approaches for developing catalogs and inventories including NCBC software and other resource directories and "yellow pages;" shared interest in approaches for resource identification; including NCBC tools and resources in the NIF inventory should be considered. We are working to partner with other HHS Agencies to help coordinate standards and adoption of those standards.