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Questions and Answers: cancer Bioinformatics Grid (caBIG)

1. What is caBIG?

caBIG stands for the cancer Biomedical Informatics Grid. It is an open-source, open-access, voluntary information network that will enable cancer researchers to share tools, standards, data, applications, and technologies according to agreed upon common standards and needs. caBIG will create an informatics infrastructure that will link teams of cancer and biomedical researchers as part of a collaborative network, or grid.

The caBIG initiative was launched in July 2003 as a pilot study. Since then, caBIG has been designed and is being built in partnership with the Cancer Center community. It leverages the combined strengths of the National Cancer Institute (NCI), its national Cancer Centers, and others in the cancer research field.

NCI believes that caBIG will help redefine how cancer research is conducted, and eventually, how cancer care is provided. This network promises to accelerate progress in all aspects of cancer research -- including etiologic research, prevention, early detection and treatment.

2. Why is caBIG being developed now?

Recent advances in cancer research methods and technologies have resulted in an explosion of information and knowledge about cancers and their treatment. The ability to characterize and understand cancer is growing exponentially based on information from genetic and protein studies, clinical trials, and other research endeavors.

However, the capacity to harvest the opportunities from these advances is limited by certain factors. Specifically, there is no common mechanism for individual researchers, or even institutions, to easily share data. In addition, there is no unifying infrastructure or common standard for the technologies that cancer researchers currently have in use. This means that researchers often operate in a near-vacuum, or silo approach, without the benefit of outside information. They cannot easily share data or tools, or benefit from the innovative technologies developed by others.

3. What are the goals of the caBIG pilot?

The specific goals of the caBIG pilot are to:

- Prove that a spectrum of Cancer Centers with varying needs and capabilities can be joined in a common network, or grid, of shared data, applications, and technologies;
- Demonstrate how Cancer Centers, in collaboration with NCI, can develop new tools and systems that will support cancer research;
- Demonstrate that Cancer Centers can actively use caBIG and realize greater value in their cancer research endeavors;
- Create a versatile infrastructure that will continue to be expanded and extended to a broad cross section of the cancer research community.

4. What other major efforts could be compared to caBIG?

caBIG is a unique and ambitious undertaking, as no known precedent exists for a bioinformatics engineering initiative of this scale. The National Cancer Institute envisions that caBIG will become "the World Wide Web of cancer research." Researchers from around the world will have open access to the common platform of caBIG, be able to use common tools, and rapidly convert, relate, and analyze data from different sources. Members of the cancer research community will also actively contribute to caBIG activities based on their needs and interests.

The work of many groups across the government, academic, and private sectors is crucial to the success of caBIG. caBIG could have a profound effect on the ability of NCI, as well as the cancer research and biomedical communities, to understand and treat cancer.

5. How much will caBIG cost?

caBIG has a budget of $20 million for the first year of the pilot and anticipates similar funding levels for the second and third years of the pilot. Much of this money will be used to support the activities of the Cancer Centers participating as co-developers of caBIG in the pilot phase. Resources also will be used to ensure that the necessary infrastructure and coordination are provided to support the success of the grid.

It is anticipated that caBIG will improve the efficiency and cost-effectiveness of cancer research activities.

6. Who are the partners involved in caBIG?

To date, NCI and 50 of its designated Cancer Centers have formed the first group of co-developers and adopters of caBIG. Involving the Cancer Centers from the beginning is

central to NCI's strategy to develop caBIG with direct input and participation from the cancer research community, to ensure it will directly address their needs. As caBIG is an open-source, open-access process, other members of the cancer research community, and the private sector, are free and welcome to become involved at any time.

As the grid is established over the next year, the vision is to attract additional partners to the network from within the NCI and its grantees, other National Institutes of Health components, interested federal health agencies, industry groups, as well as the broader biomedical research community. Some of these groups have already contributed ideas to the development of caBIG vision.

Ultimately, the hope is that caBIG will form into a large community of voluntary participants from national and international biomedical research fields, all of whom share a common commitment to the importance of open and shared bioinformatics tools, standards, infrastructure and data. If this occurs, it will have broad beneficial impact across the entire biomedical research and health care communities.

7. How are the activities of caBIG structured?

caBIG activities are guided by Workspaces and Strategic Level Working Groups. There are five Workspaces altogether, including three Domain Workspaces for Clinical Trial Management Systems, Integrative Cancer Research, and Tissue Banks and Pathology Tools; and two Cross Cutting Workspaces for Architecture, and Vocabularies and Common Data Elements. There are three Strategic Level Working Groups for Training, Strategic Planning, and Data Sharing and Intellectual Capital.

Together, these groups are building the foundation for caBIG and guiding its future state and activities.

8. What is the role of the National Cancer Institute in caBIG?

NCI provides coordinating supervision of caBIG and works in collaboration with partners in the public, private, and academic sectors. As a government agency, NCI will provide sound stewardship of caBIG to ensure that the needs of the entire cancer research community are accurately addressed and represented. Though NCI will coordinate caBIG, it will be defined and built by the cancer research community and it is anticipated that it will eventually involve the national and international cancer research communities.

9. How will caBIG ensure that data shared across centers will be secure, and that human subject privacy will be upheld?

Security and privacy-related issues are at the core of the caBIG planning process. caBIG has formed Strategic Level Working Groups to address these issues as part of their charters. These groups are already working through potential issues to prevent them from becoming major concerns or barriers.

10. What are some specific examples of how caBIG will impact cancer researchers?

caBIG will involve the entire cancer research community, including those who conduct basic science research on the origins and mechanisms of cancer, those who study prevention, early detection, and treatment, and those who work on clinical trials to bring effective new diagnostics and treatments to patients. With caBIG, basic scientists will be better able to integrate disparate forms of data from their own laboratory, as well as from other research laboratories across the world. They will be able to integrate information based on tumor pathology; data from RNA, DNA, and protein expression levels (integrating genomic, expression array, and proteomic experiments); and data collected from patients involved in clinical trials. caBIG will increase the strength and scope of the experiments done in each participating center, thereby allowing the deduction of broader and more meaningful conclusions that can be translated more rapidly into better patient outcomes. caBIG will also help to enable another important step in the cancer research community -- taking the most promising ideas from bench to bedside, and back to the bench again.

11. What is the role of caBIG in helping NCI reach its challenge goal of "eliminating the suffering and death due to cancer by 2015?"

By directly addressing the needs of individual investigators and institutions for accessible, cost-effective and consistent bioinformatics tools, standards, and unifying architectures, it is hoped that caBIG will facilitate enhanced biomedical research and better outcomes for patients and communities. caBIG will allow cancer researchers to tap into the rich collection of emerging data, form new collaborations, and accelerate the pace of discovery. With caBIG, individual researchers will be able to answer questions more rapidly and efficiently, accelerating progress in all aspects of cancer research.

12. How will caBIG's progress be measured?

The caBIG initiative has tangible milestones and deliverables. As caBIG moves forward, progress towards these goals will be assessed. Processes have been established as part of caBIG's structure to actively monitor its progress and ensure that the caBIG goals are being met.

The enthusiasm and interest of the Cancer Center community also influences the progress of the caBIG pilot. To date, there has been tremendous amount of activity surrounding caBIG from the Cancer Center community. An impressive array of tools and data sets were put forward by the Cancer Centers as project activities for caBIG and Centers have embraced the open development and open access philosophy of caBIG. The National Cancer Institute is excited about the progress thus far and the willingness of the Cancer Centers to coordinate their activities to capitalize on mutual strengths and address the challenges posed by the lack of a unifying informatics infrastructure.

In the long term, the strongest testimonial to the progress of caBIG will be in the benefits it delivers to cancer sufferers and its ability to bring the National Cancer Institute 2015 challenge goal to fruition.

13. How do I get involved with caBIG?

There are many ways that you can get involved with caBIG right now:

- Track caBIG activities and progress on the National Cancer Institute's caBIG website.

- Attend open caBIG meetings and open Working Groups to contribute ideas and to better understand caBIG activities. Watch the caBIG website for information on these types of opportunities via the following link: http://caBIG.nci.nih.gov/caBIG/calendar

- Learn more about the National Cancer Institute's existing bioinformatics infrastructure – caCORE - as caBIG will harness the strengths of this platform and activities will be undertaken in a complementary way. Further information is available at the National Cancer Institute Center for Bioinformatics website via the following link: http://ncicb.nci.nih.gov/core

- Download and get familiar with the tools and applications already available on the caBIG website. This is only the beginning, and this list will start to grow rapidly over the next few months as more informatics applications become interoperable and available to share. The current inventory of infrastructure, applications, and datasets used to support the caBIG initiative can be accessed at the caBIG website. This inventory includes key infrastructure and applications from the National Cancer Institute Center for Bioinformatics and can be found via the following link: http://caBIG.nci.nih.gov/caBIG/inventory

- Start to think about how you could integrate the tools and databases you are working on into the caBIG community.

- Sign up for the caBIG mailing list at http://list.nih.gov/archives/cabig_announce.html to receive important notices about current and upcoming activities.

As the caBIG community continues to grow, additional infrastructure, tools and data will be made available. Furthermore, resources and informational tools will be provided by the caBIG community and the National Cancer Institute to assist those who want to use or contribute to the network. These will include training resources, support for use and adoption of tools, informational Workshops, and tools to facilitate broader use of caBIG by interested organizations.

12. Where can I find more information about caBIG?

The caBIG Web site can be found at: http://caBIG.nci.nih.gov

For an interactive overview of caBIG, go to: http://www.nci.nih.gov/directorscorner/caBIG

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