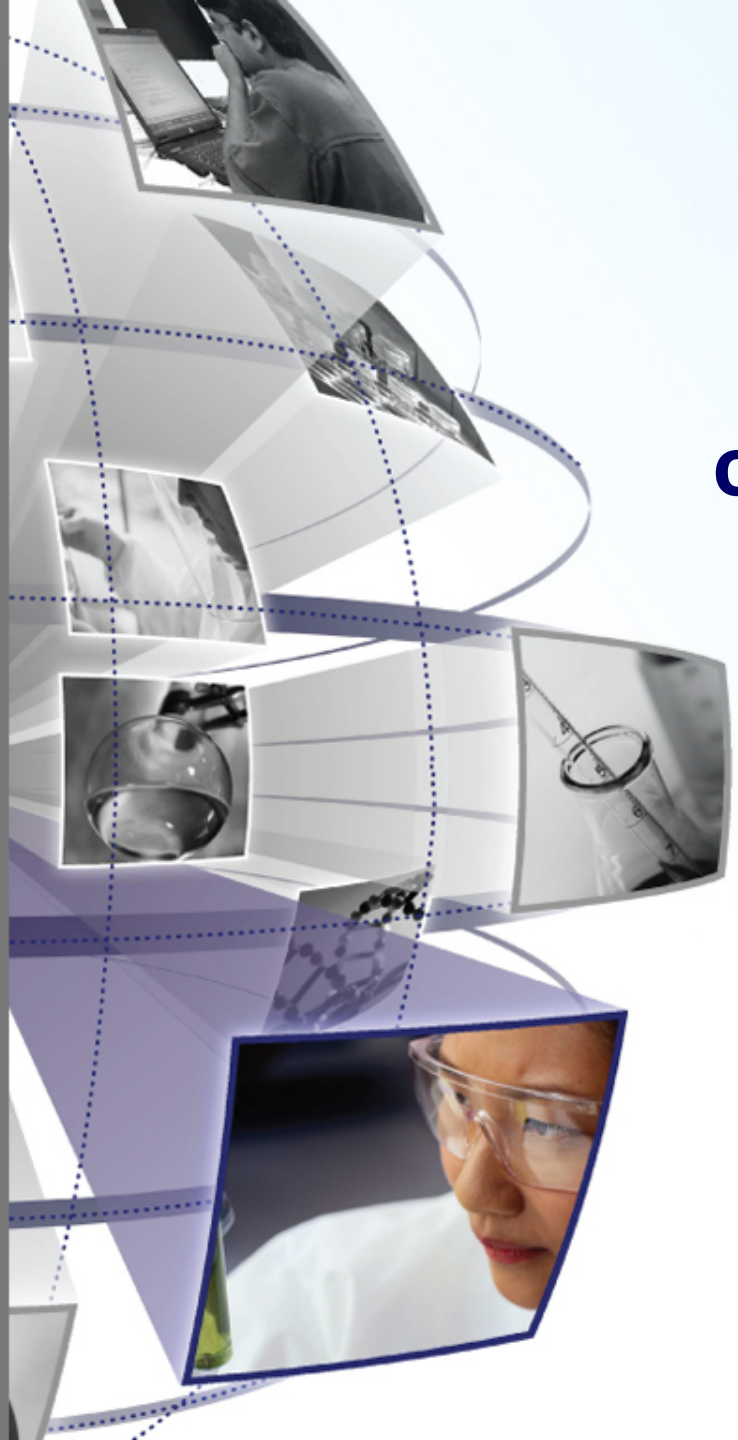
National Cancer Institute



caBIG™
cancer Biomedical Informatics Grid™

caBIG® Enables New Era of Biomedicine

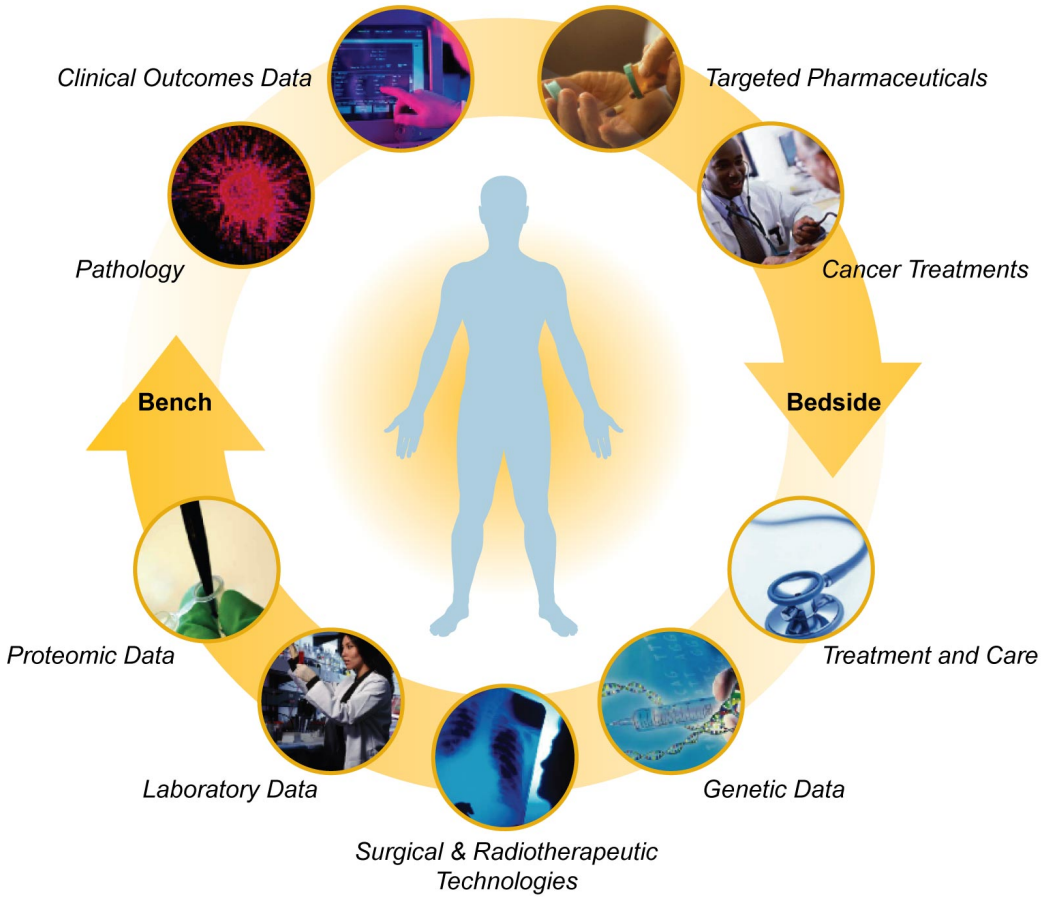
"*in silico*: How IT is Changing Medical Research"

March 17, 2009

Ken Buetow, Ph.D.

Associate Director, Bioinformatics and Information Technology
National Cancer Institute

21st Century Biomedicine



- **Personalized, Predictive, Preemptive, Participatory……**
- **Unifies clinical research, clinical care, and discovery (bench-bedside-bed) into a seamless continuum**
- **Results in improved clinical outcomes**
- **Accelerates the time from discovery to patient benefit**
- **Enables a health care system, not a disparate "sector"**
- **Empowers consumers in managing their health over a lifetime**

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21st Century Model: Link Discovery > Clinical Research > Clinical Care



The Concept: Connect scientific discovery, clinical research and clinical care into a seamless continuum that continually builds and applies knowledge

The opportunity for research:

- Faster, more efficient patient recruitment for trials
- Improved clinical trials outcomes due to improved patient selection
- Faster adoption by the health care delivery system
- Reduced infrastructure costs

The opportunity for health care providers:

- A pathway to innovation
- A strategy to address clinical care challenges to improve outcomes
- A chance for physicians outside academic medical centers to participate in clinical research
- Additional resource source

Pediatric cancer is a successful example of this approach

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21st Century Model : Link Discovery > Clinical Research > Clinical Care



Tremendous improvement in childhood cancer survival since 1975

- Overall reduction of cancer mortality by 50%
- acute lymphoblastic leukemia survival rate has improved from 5% in the 1960's to more than 85%
- Molecular characterization used to determine treatment

Childhood cancer is treated in a context that blends care delivery and clinical research

- Researchers and practitioners are able to correlate experimental laboratory data with clinical data (treatment, history, pathology, outcome, etc.)
- Clinical data are utilized to continuously evaluate outcomes
- Researchers develop and refine evidence-based strategies at an individualized level
- Care providers improve quality by adherence to care standards

Information flow is critical…
this model cannot be achieved without IT connectivity

Cancer and NCI: At the Forefront of Today's Biomedical Transformation



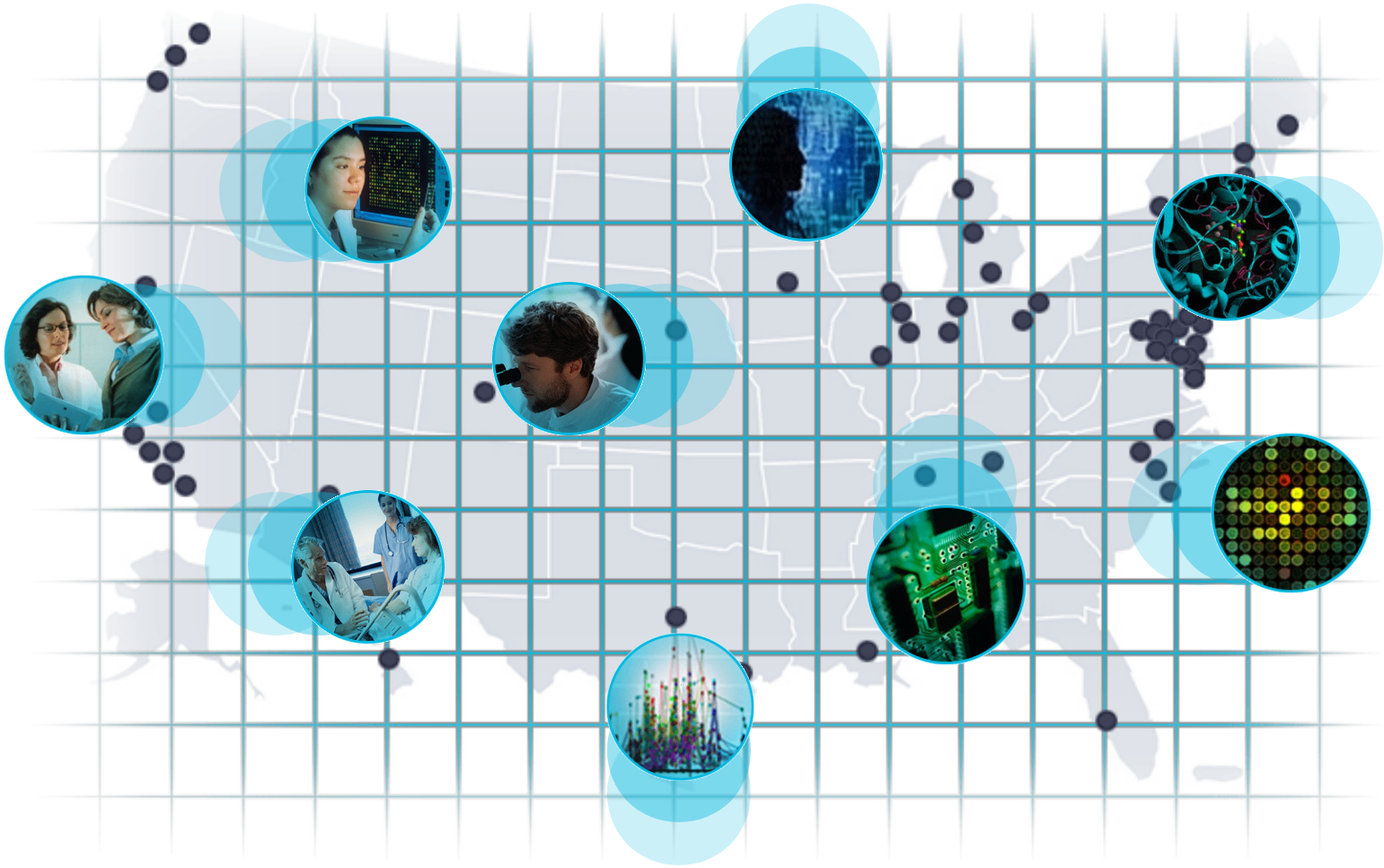
"**Cancer is** – and will continue to be – **a model for** the study of disease biology, for new thinking about the delivery of health-care, for the development of electronic medical records, and for **a healthcare system based on the uniqueness of each individual**."*

"caBIG® is, first and foremost, about connections – between NCI researchers, cancer centers, Community Clinical Oncology Program participants involved in clinical trials, cooperative groups that conduct trials on NCI's behalf, and participants in the NCI Community Cancer Centers Program. **caBIG® is….an internet for cancer research…**"*

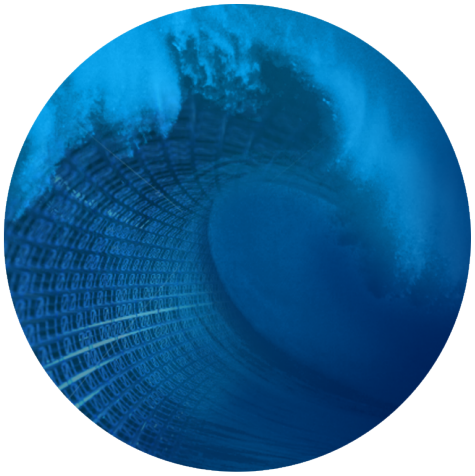
* NCI, "The Nation's Investment in Cancer Research", an Annual Plan & Budget Proposal, Fiscal Year 2010

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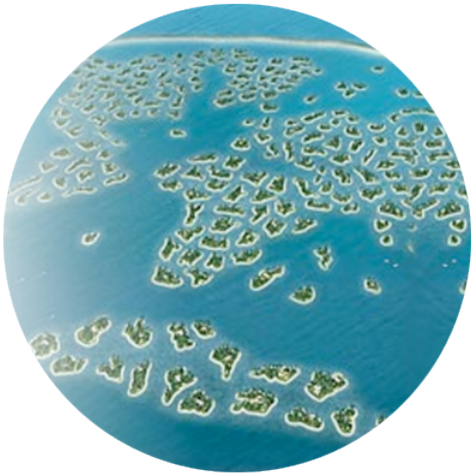
Key information and capabilities are distributed throughout the community



What Slows this Transformation



Tsunami of Genomic and Clinical Data



Islands of Information



Standard Language



IT Systems Do Not Inter-operate

caBIG® is a virtual network of interconnected data, individuals, and organizations that redefines how research is conducted, care is provided, and patients/ participants interact with the biomedical research enterprise.



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caBIG® Overcomes all the Obstacles to the New Era of Biomedicine

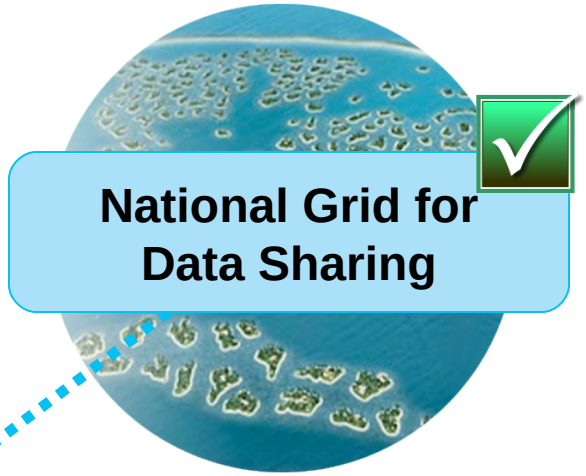




40+ Software Tools

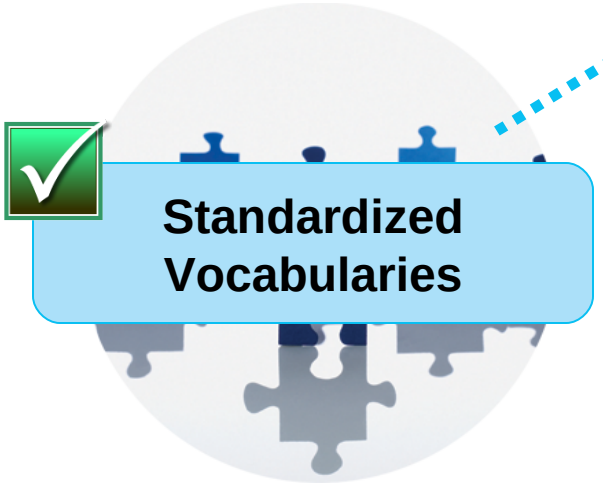
Tsunami of Genomic and Clinical Data

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National Grid for Data Sharing

Islands of Information



Standardized Vocabularies

Standard Language



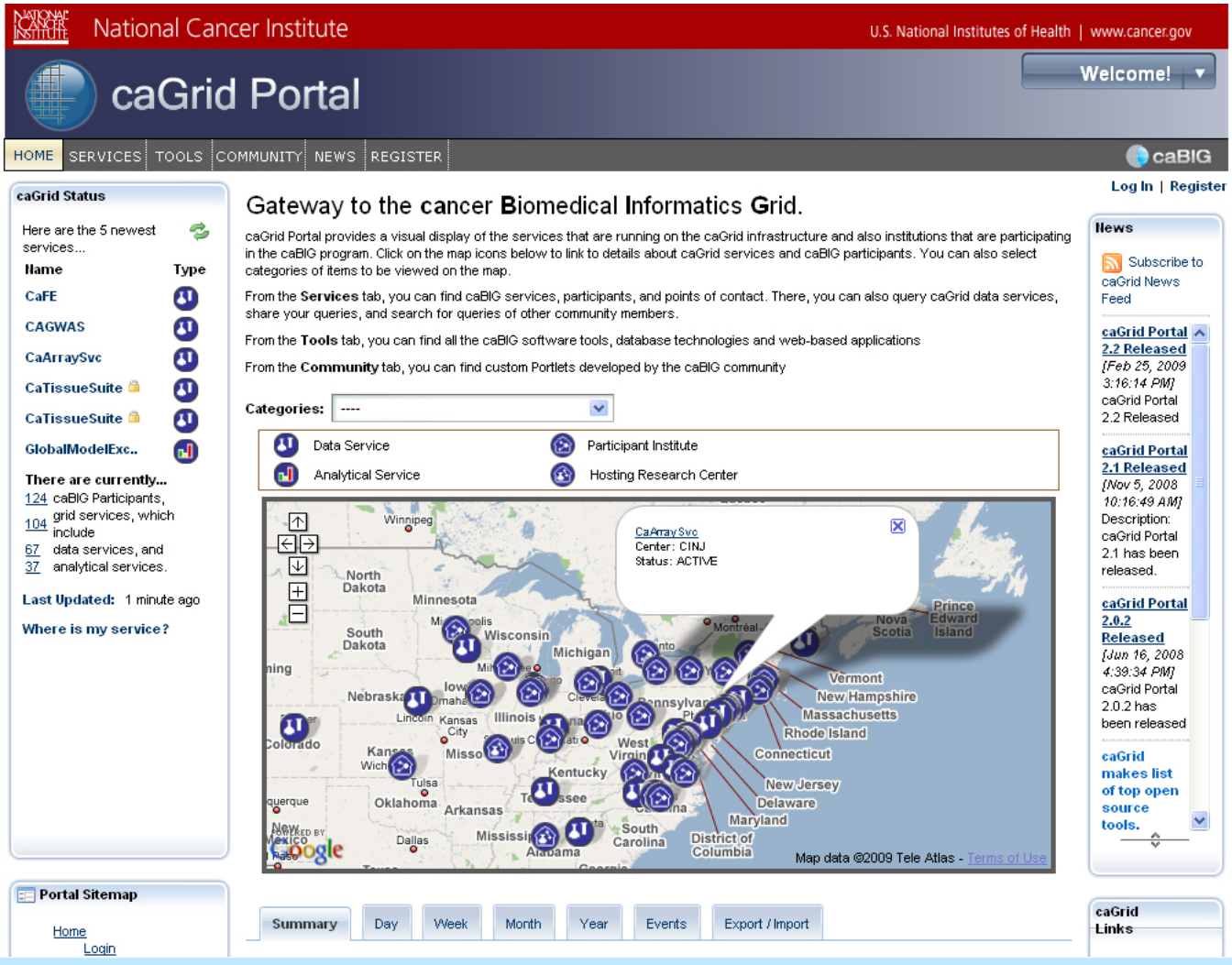
Interoperability

IT Systems Do Not Inter-operate

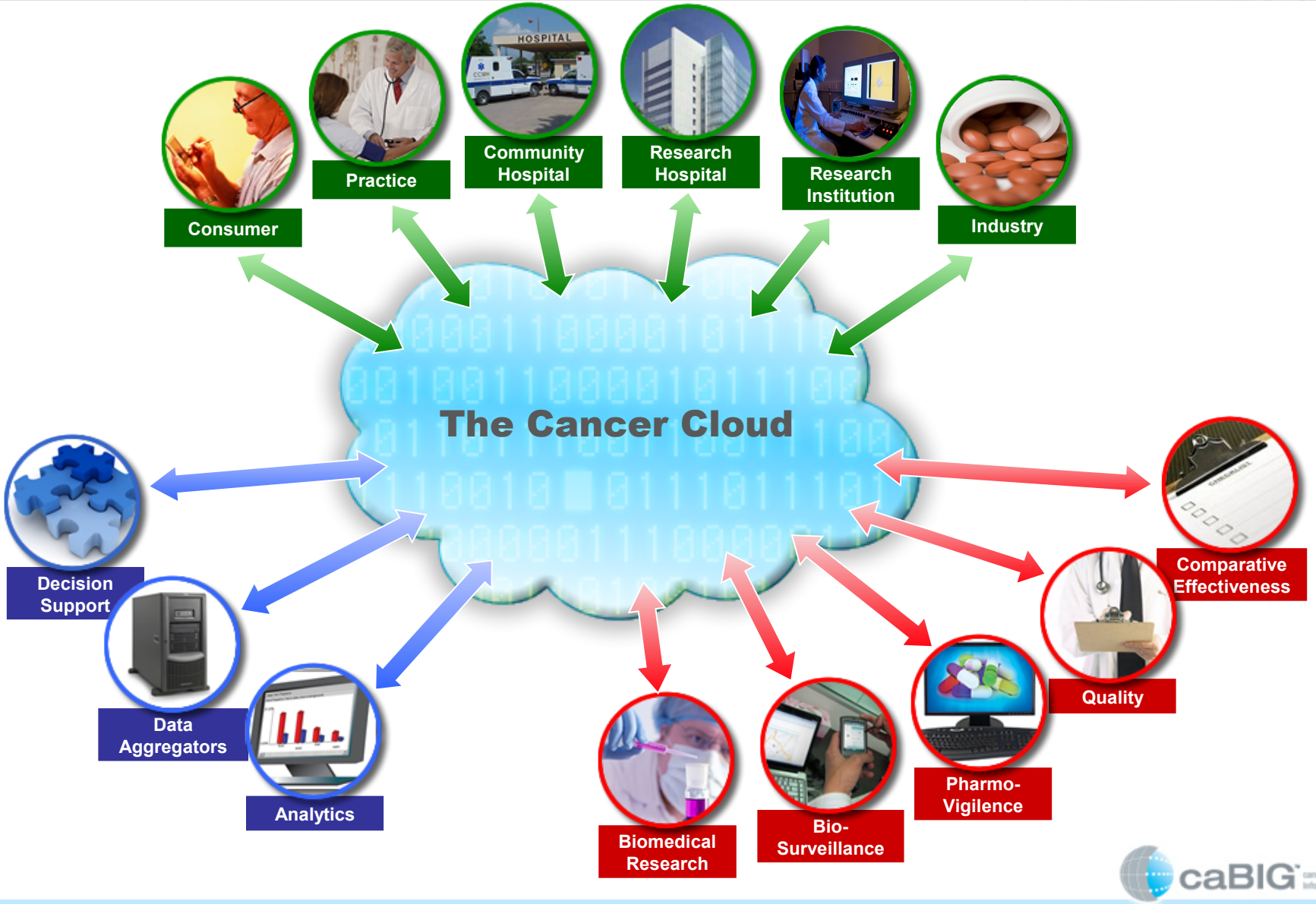
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Each Week, More Cancer Research Institutions Join the caBIG® Network

http://cagrid-portal.nci.nih.gov/web/guest/home

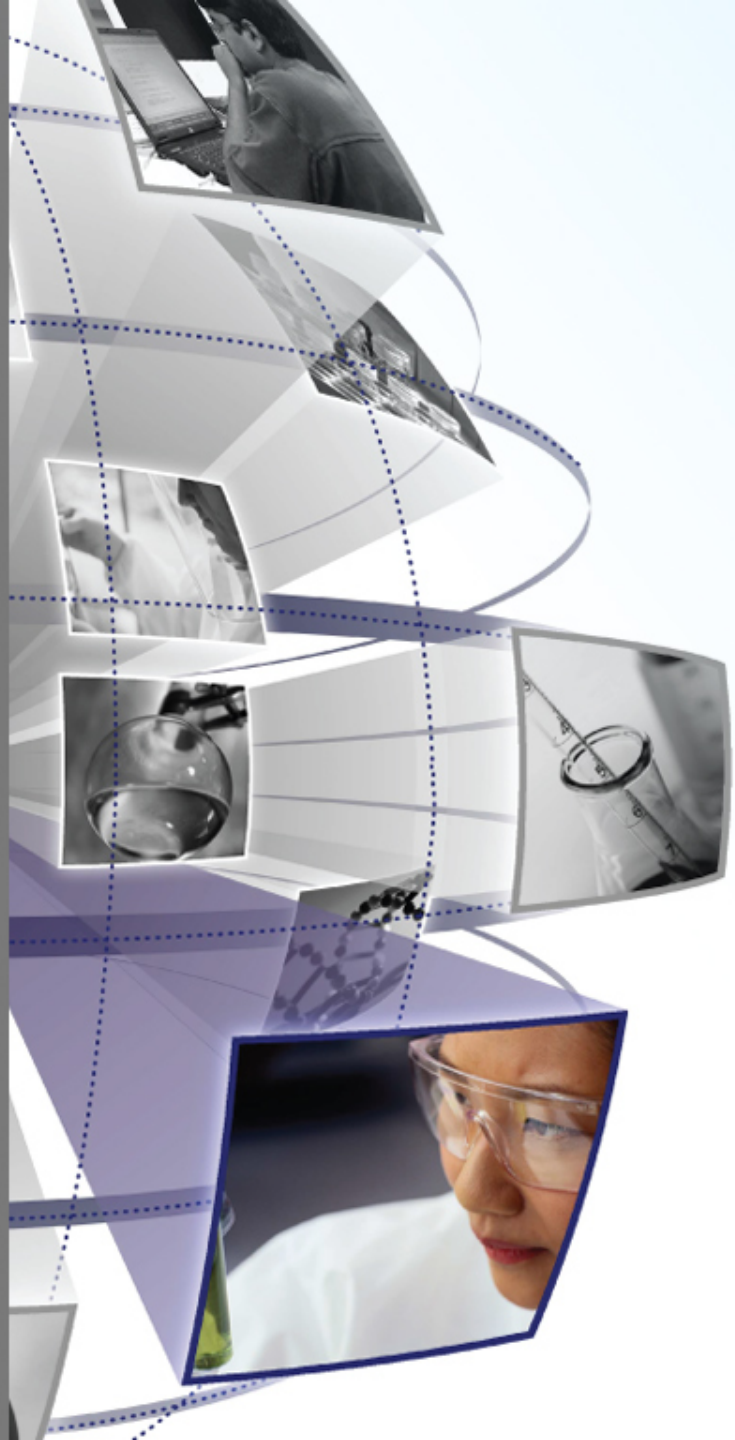


The Cancer Cloud-Supported Ecosystem



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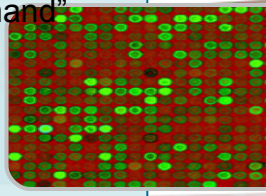
caBIG® Enables New Era of Biomedicine

Research



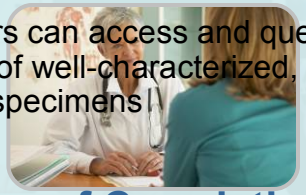
Participants

Patients join research networks, grant consent, agree to be “sought” and to enroll – “on-demand” participants



Biospecimen Collections

Researchers can access and query large collections of well-characterized, clinically annotated specimens

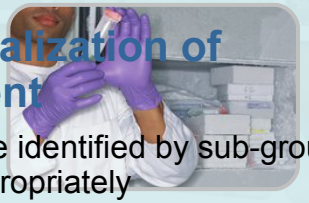


Discovery of Correlations

Biomarkers are identified and validated; disease sub-groups emerge

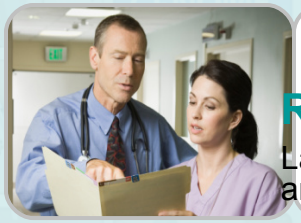
Individualization of Treatment

Patients are identified by sub-groups and treated appropriately











Clinica
Practice

Electronic Health Records

EHRs can connect to clinical trials in hospital settings

Research Finding Knowledgebases

Large-scale databases of latest research findings are connected to health delivery encounter

Learning Healthcare System

Local and national clinical encounter information is fed back to care providers to help inform clinical decision making

Consum





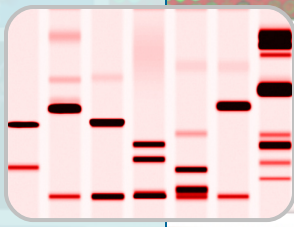
My Genomic Profile

Consumers get their genetic and predisposition risk information



My Prevention Strategies

Consumers work with genetic counselors; coordinate with health care provider

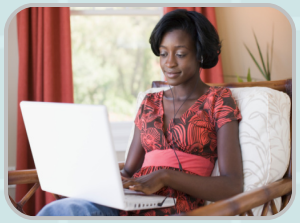


My Clinical Record

Consumers link to their clinical histories with genetic profiles; access clinical research; participate in volunteer networks







Standards

In ility



Data Sharing

Connectivity

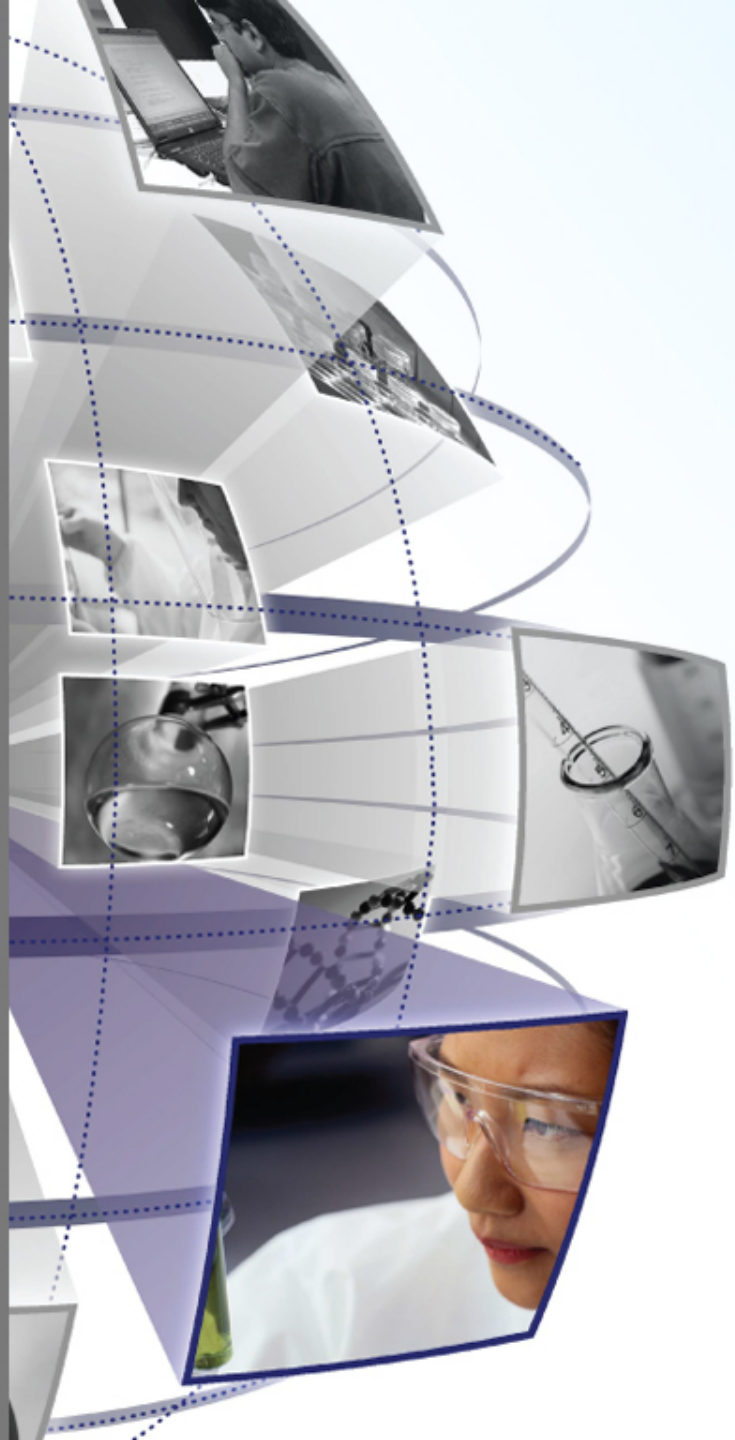
caGRID

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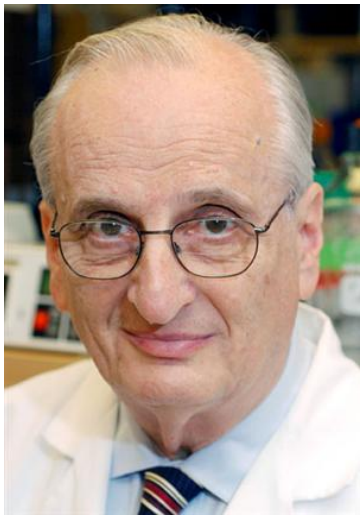
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caBIG® in Action

How IT Connectivity Changes Both Research and Care



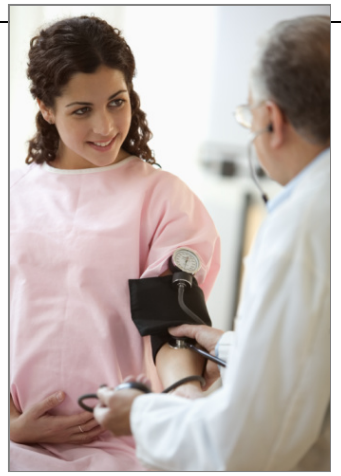
Judah Folkman 1933-2008

Immediately pursuing a research idea…

- NCI Scientific Retreat 2008
- FGFR2 gene changes are linked to breast cancer
- Question: Does endostatin play a role in breast cancer susceptibility since endostatin is part of same network as FGFR2?
- caBIG®-enabled analysis revealed there WAS a connection

Providing personalized clinical care…

- Physician treating pregnant woman with Melanoma unsure of optimal treatment
- Search of database of all clinical outcomes at that medical institution provided best treatment option based on 10 other pregnant women with the same cancer





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For More Information about caBIG®, please visit:

http://cabig.cancer.gov