

Enabling Technologies for Smarter Healthcare

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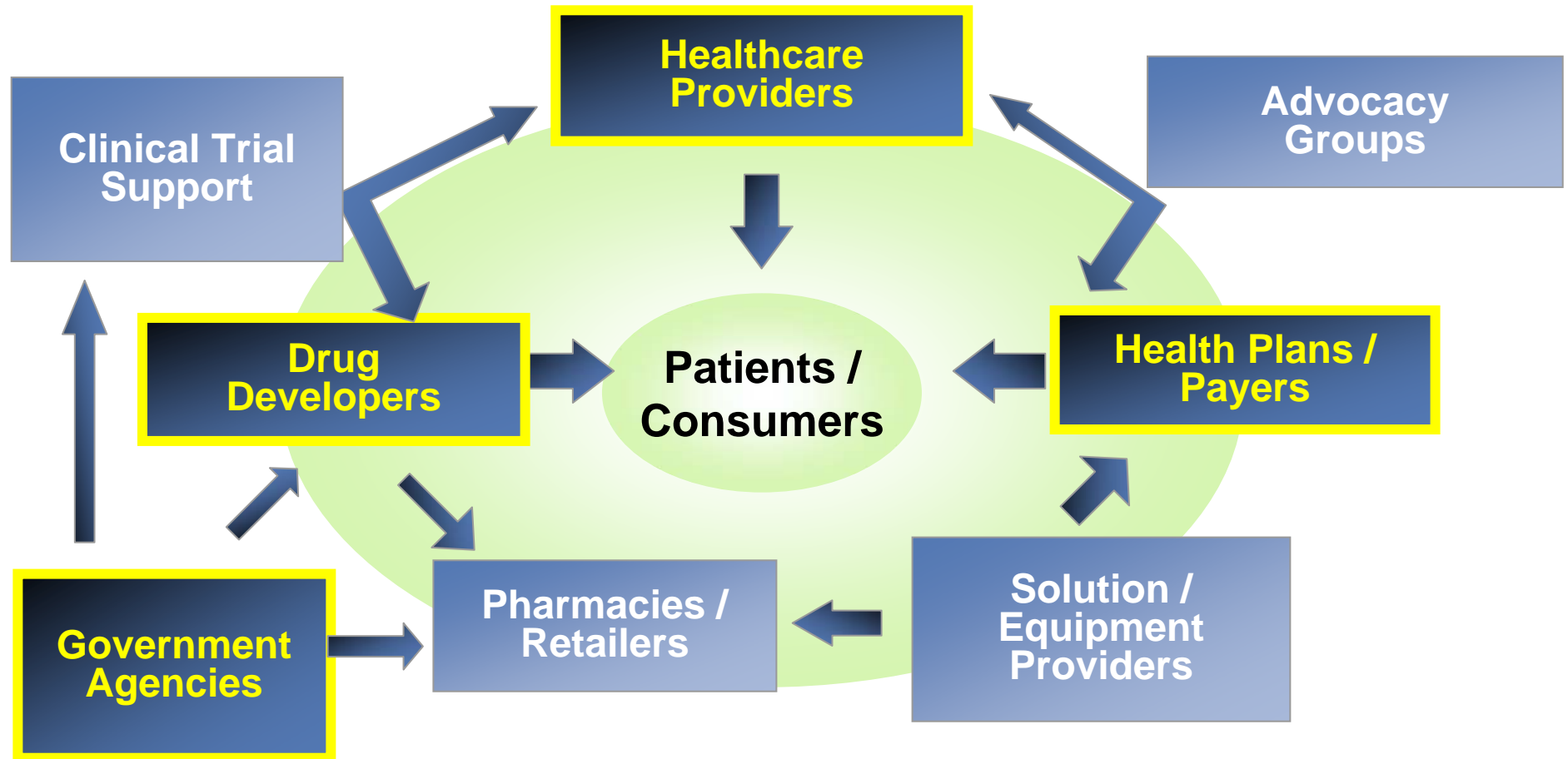
Today's Discussion

- Who am I
- The Environment
- Interoperability and National Scale Electronic Health Record Efforts
- Analytics

IBM through the years

Pre 1900	1900s	1910s	1920s	1930s	1940s	1950s	1960s	1970s	1980s	1990s	2000s
<p>What makes you special?</p> <ul style="list-style-type: none"> Your products? Your services? Your financial strengths? Your customer base? Your supply chain? Your management systems? Your business model? Your history? Your brand? Your expertise? <p>Whatever it is that makes you unique... infuse it with the new enablers of innovation, and you can earn higher profits, penetrate new markets, drive productivity – in a word, differentiate yourself from the competition.</p>											

We approach HCLS as an ecosystem of constituents centered around the needs of patients and consumers

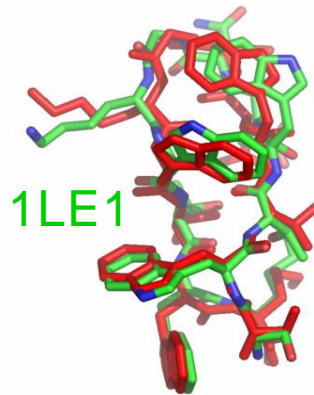
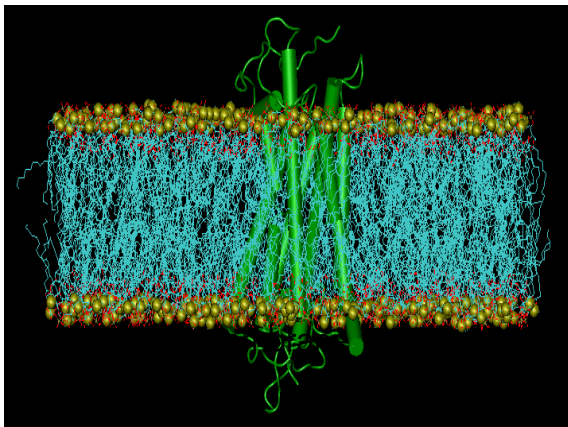


IBM Research Worldwide



The IBM Research Healthcare and Life Sciences Institute

- Brings technology and innovation from across IBM Research - 3200 scientists, 8 laboratories around the world - to bear on customer problems.
- Works collaboratively with leading edge IBM Healthcare and Life Sciences customers and partners.
- From molecular biology to innovative uses of information technology in today's healthcare.

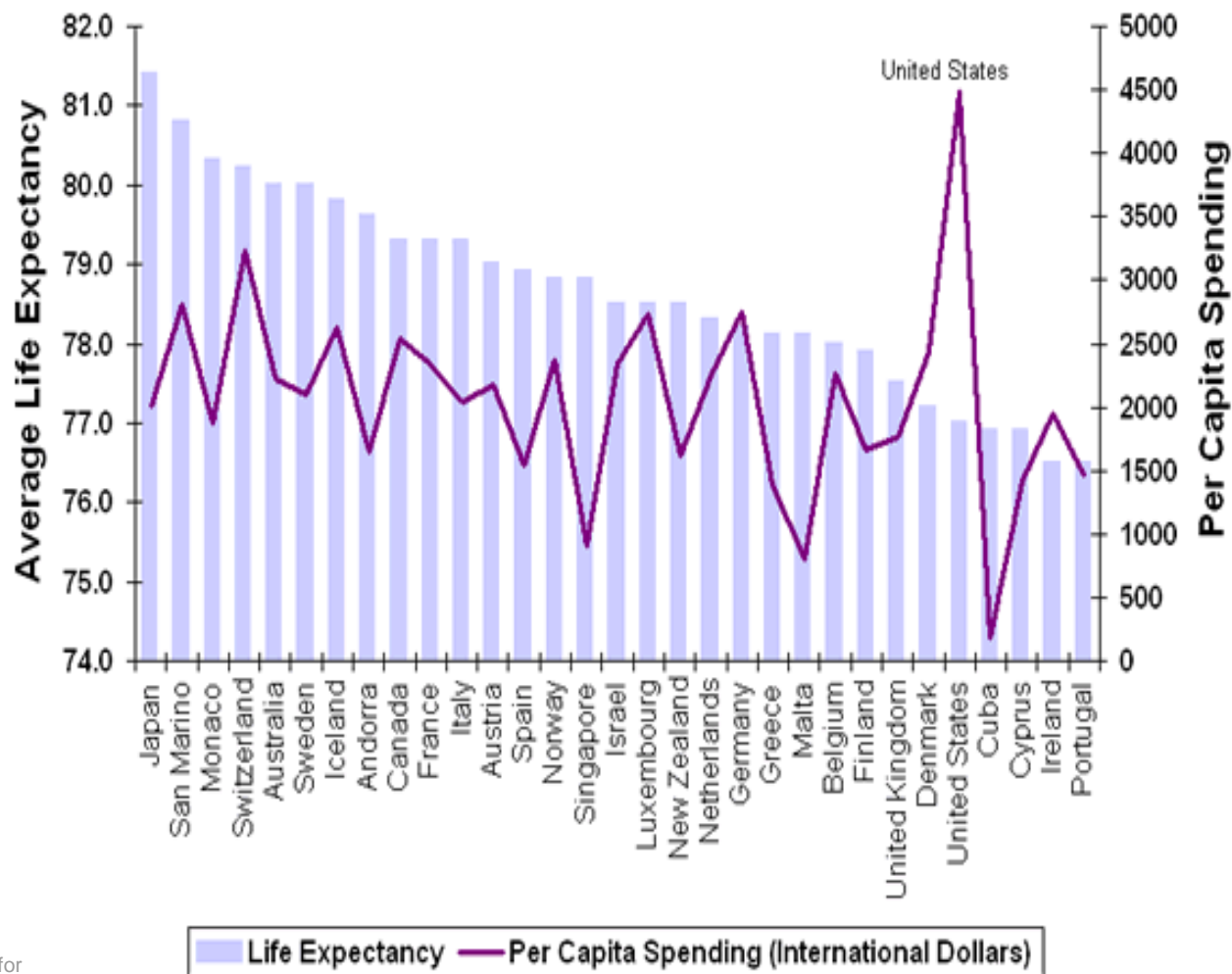


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Healthcare Environment – More Spending Does Not Guarantee Better Health as Measured by Longevity

- World spends about \$4.5 Trillion, U.S. spends about \$2 Trillion
- US ranked 37th by WHO in Healthcare effectiveness (btw Costa Rica and Slovenia)
- In the U.S 42% of spend is Centers for Medicare and Medicaid Services, much of the rest is large employers
- 47 million Americans have no health insurance
- Approximately 100K deaths in US every year from preventable medical error.



Source: IBM Global Business Services and IBM Institute for Business Value

Services Quality

Service Provider Measure

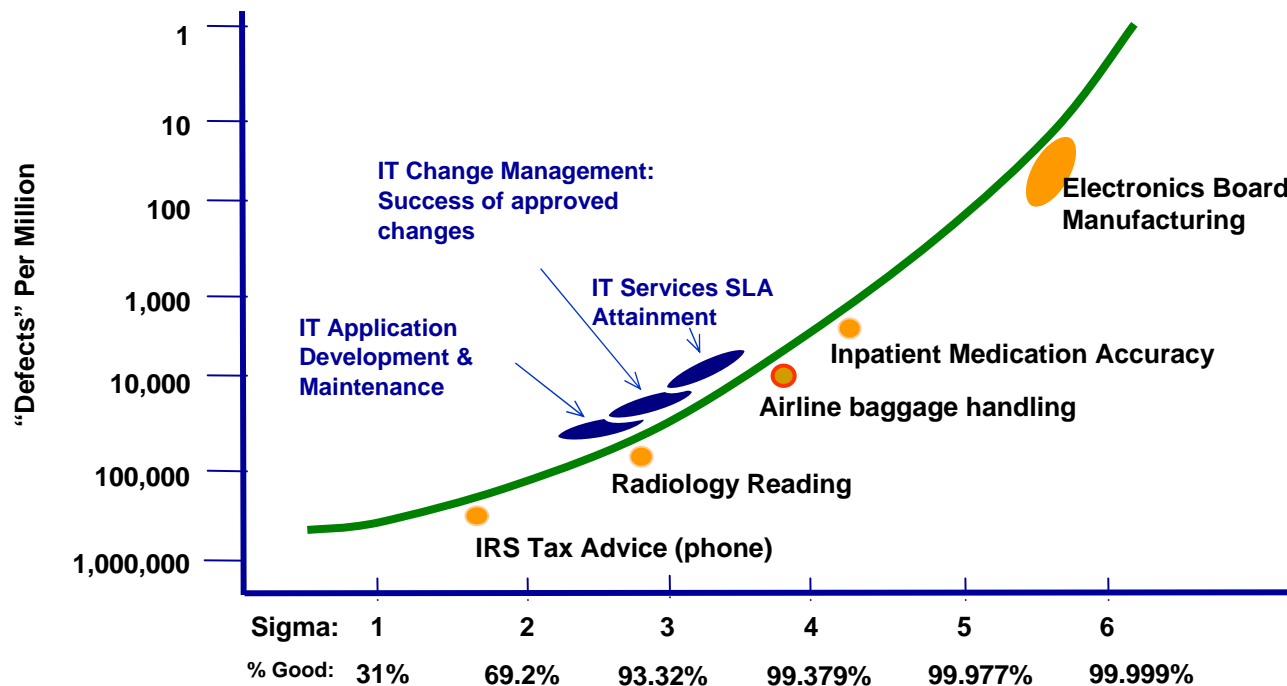
SLA Attainment + Production Efficiency +
Financial Plan



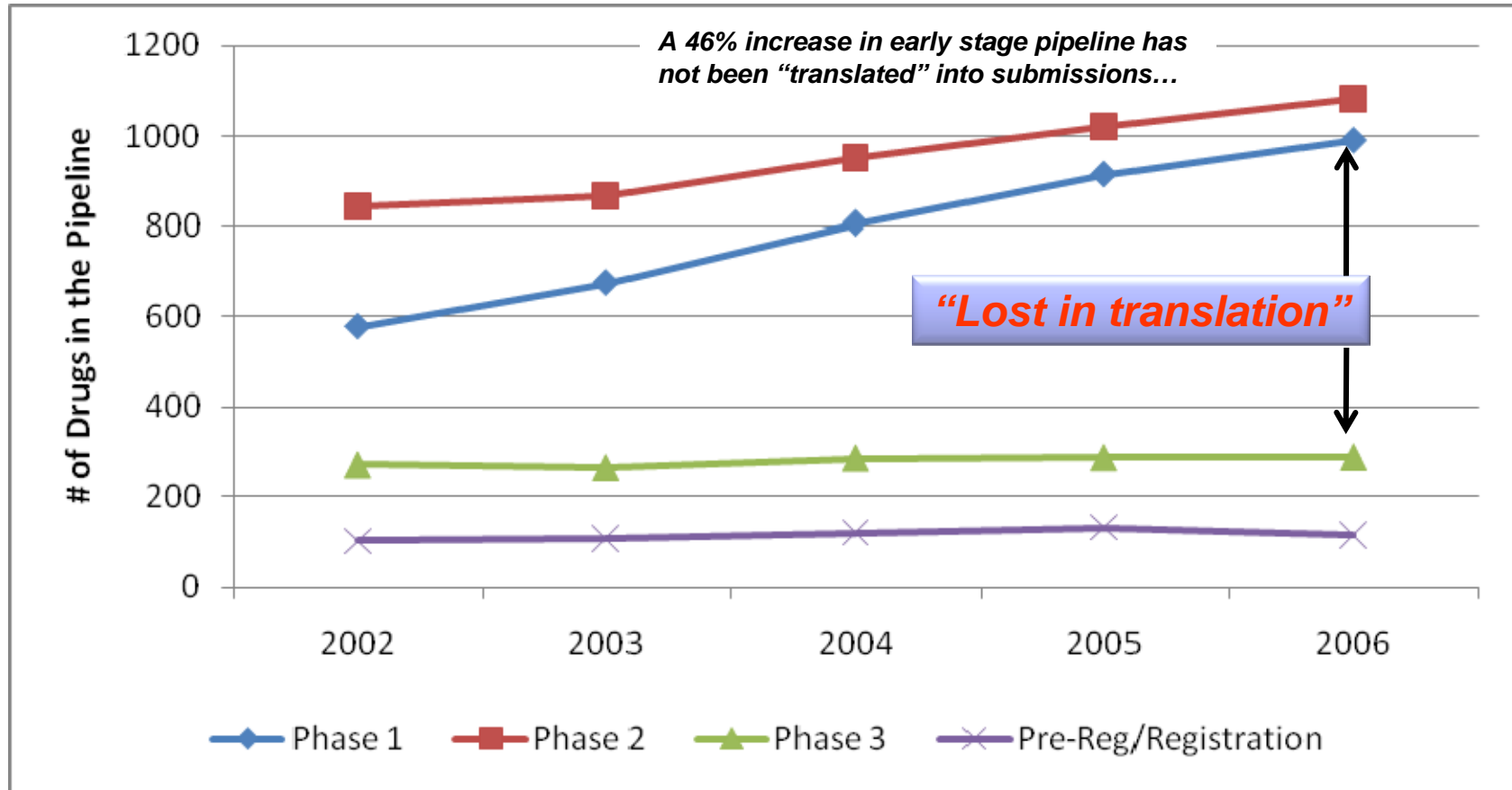
Service Consumer Measure

CSAT = Consumer Perception – Consumer
Expectation

“Sigma” Level Examples: IT Services vs Other Industries

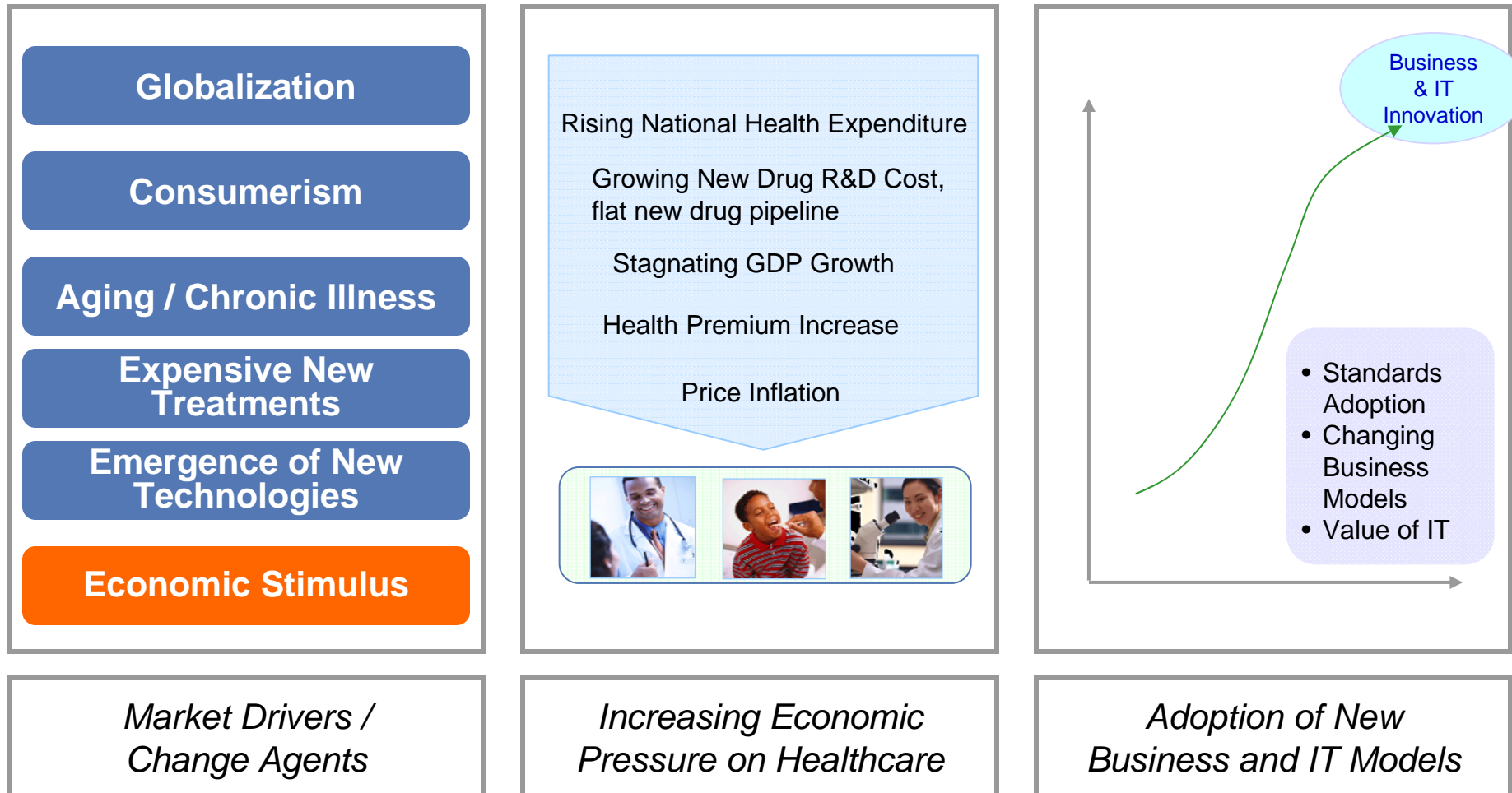


Attrition in the Drug Development Pipeline as high as 90%



While historically this attrition has been because of efficacy (differentiated) and safety in the future the additional limiting factor will be funds..

Forces Driving Industry-Wide Transformation in Healthcare are Leading to Business and IT Innovation



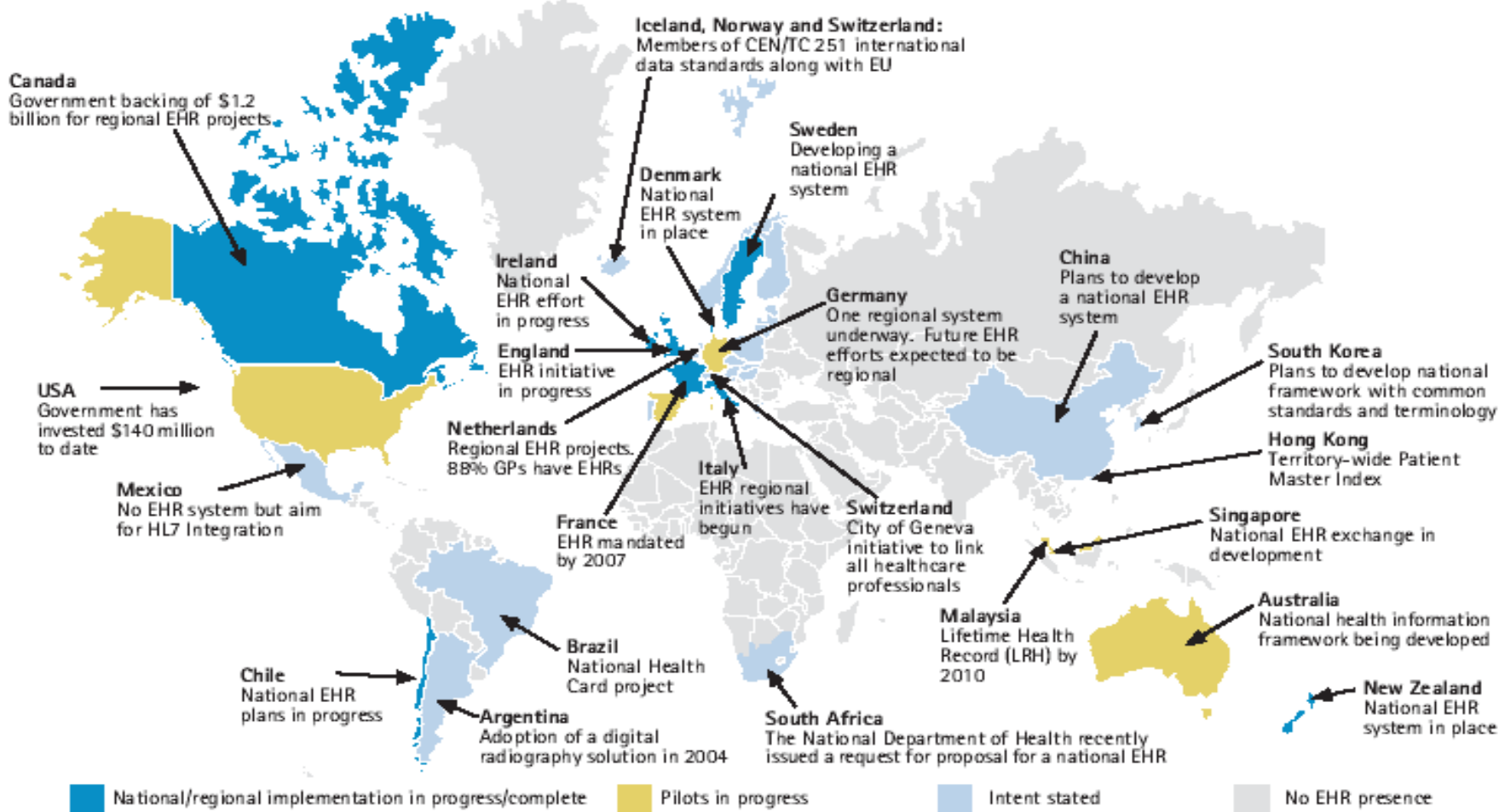
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Working Definitions for Today's Discussion

- **Electronic Medical Record – EMR.** An electronic collection of patient documents specific to one physician, clinic, hospital. (Also Electronic Patient Record – EPR)
 - Institution or physician centric
 - Episodic
 - Many versions and types exist
- **Electronic Health Record – EHR.** An electronic collection of all healthcare documents for an individual
 - Patient Centric
 - Longitudinal
 - ‘Gold Standard’ – physician and institution maintained
 - Very few exist in reality
- **Personal Health Record – PHR.** An electronic collection of all healthcare documents that an individual chooses to maintain
 - Patient Centric
 - Longitudinal
 - Patient Controlled and Editable
 - Emerging area for healthcare in some countries

Electronic health record (EHR) adoption around the world*



* Deemed accurate as at January 2006

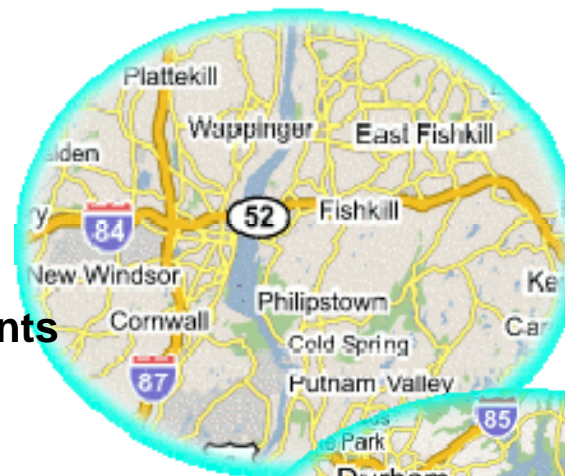
<http://www.accenture.com/NR/rdonlyres/15D767DA-7F3F-4AE6-ABDD-8260DA7BFFC5/0/eHRbrochureJune06.pdf>

IBM NHIN Architecture Prototype Project

Delivered to ONCHIT January 2007

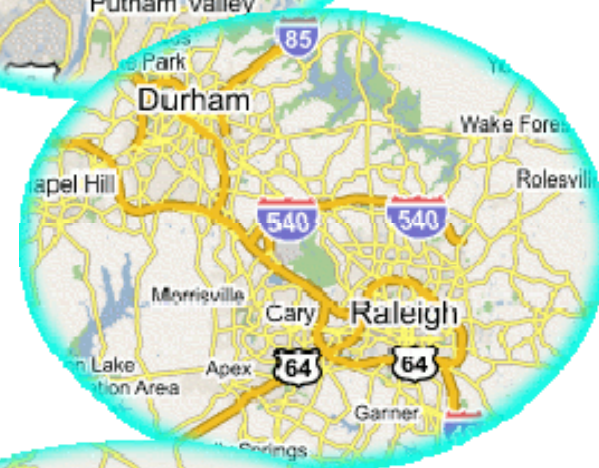
• Fishkill, NY

- Taconic Health Information Network & Community (THINC)
- Dr. John Blair, CEO and President
- 2,300 physicians supporting 700,000 patients
- Shared data using HealthVision hub



• Research Triangle, NC

- North Carolina Healthcare Information and Communications Alliance (NCHICA)
- Holt Anderson, Executive Director
- Research Triangle area:
 - Competitive, high-tech urban environment
 - UNC, Duke, Wake Forest



• Rockingham County, NC

- North Carolina Healthcare Information and Communications Alliance (NCHICA)
- Rural environment with NC and VA patients
- Small, competitive practices and hospitals



NHIN Healthcare Marketplace Partners

THINC Mid-Hudson Valley NY	Research Triangle/ Pinehurst NC	Rockingham County NC/ Danville, VA
<ul style="list-style-type: none"> • Kingston Hospital • St. Francis Hospital • Vassar Brothers Medical Center • Physician Practices <ul style="list-style-type: none"> ■ Hudson Valley Primary Care ■ Bridge Street Family Medicine ■ Springside Medical Associates ■ Rabi Sinha, MD ■ Hudson River Community Health 	<ul style="list-style-type: none"> • Duke University Health System <ul style="list-style-type: none"> ■ Durham Medical Center • FirstHealth of the Carolinas <ul style="list-style-type: none"> ■ Moore Free Care Clinic ■ Pinehurst Medical ■ Pinehurst Surgical ■ Southern Pines Women's Center 	<ul style="list-style-type: none"> • Morehead Memorial Hospital <ul style="list-style-type: none"> ■ Eden Internal Medicine ■ Pulmonary, Allergy and Asthma Clinic of Danville • Moses Cone Health System <ul style="list-style-type: none"> ■ Family Tree OB/GYN ■ Moses Cone Internal Medicine Residency Program

Core Architecture Products and Partners

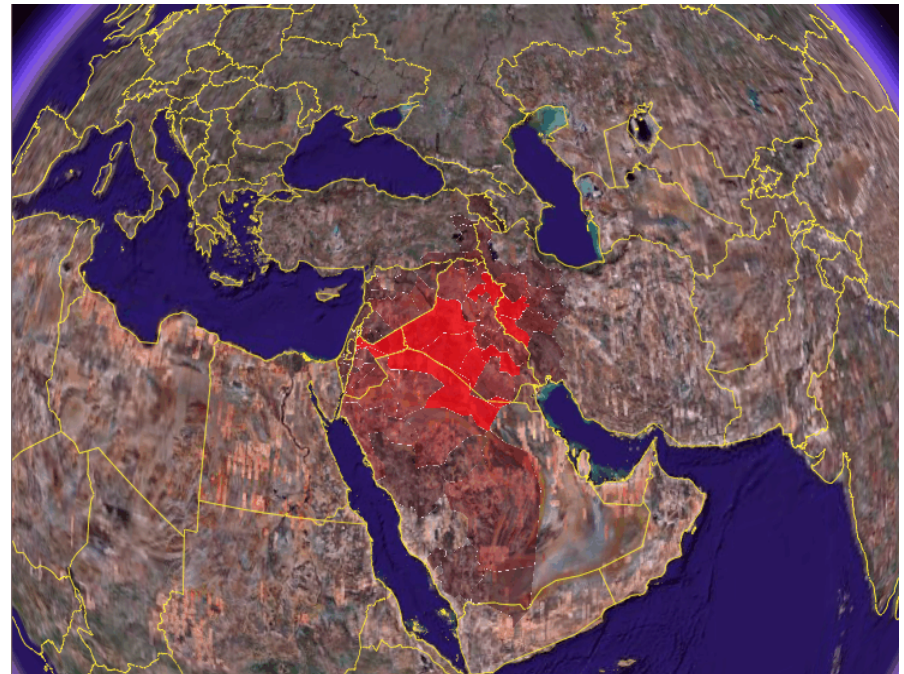
IBM Tivoli IBM Data Power	IBM IHII IBM HCN Gateway	Eclipse OHF Bridge openEMR Viewer	Initiate Systems CTIS (Hosting)	Cisco Systems
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Vendors Interfacing to IBM's Core Architecture

LabCorp Reference Lab	Spectrum Labs Reference Lab	CapMed Personal Health Key	SureScripts Pharmacy Exchange	PossibilityForge openEMR
HealthVision Physician Portal	Meditech EMR	Possibility Forge openEMR	McKesson Horizon Physician Portal	Allscripts TouchWorks
GE Healthcare Centricity Physician Portal		New York Dept. of Health	North Carolina Div. of Public Health	

Data Sharing is important in Public Health as well as Clinical Care

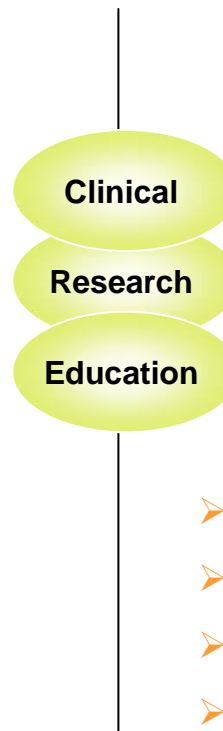
- MECIDS = Middle East Consortium for Infectious Disease Surveillance
 - Jordan, Palestine and Israel
- Establish national and international surveillance networks:
 - Monitor population health
 - Provide a common platform for communication, data sharing, and analysis
 - Collaborate
- Initial scope of food-borne diseases
 - Salmonella, Shigella
 - Extend to more diseases easily



FOAK customer introduction

Guangdong Hospital of Traditional Chinese Medicine (GDHTCM)

- Founded in 1933
- A large modern enterprise group with 1 central hospital and 4 branches
- Leading in Traditional Chinese Medicine (TCM) and Western Medicine
- Owns many disease specifics and national key clinics
- Undertook clinical researches of National Key Research Program, e.g. 863 and National Natural Science Research Fund



- 5 hundred million medical installation assets
- 2,000 inpatient-beds
- 4 million outpatient-visit in a year around
- 10,000 outpatients visit every day

IHE – Integrating the Healthcare Enterprise

- **IHE is a healthcare industry organization promoting coordinated use of established standards to improve healthcare IT system integration**
- IHE defines a common framework and process for harmonizing, implementing, and testing multiple standards.
 - Enables healthcare interoperability within and between hospitals and clinics
 - IHE profiles clarify the use of existing standards, such as HL7 and DICOM
- IHE produces healthcare integration profiles which:
 - Address a given healthcare integration scenario
 - Build upon one or more existing, established standards
 - Define constraints which limit the options available when using underlying standards
 - To reduce the effort and cost to integrate systems spanning a diverse set of healthcare IT vendors
- Sponsor “Connect-a-thons” to demonstrate standard’s based interoperability between industry vendors

HIMSS Interoperability Showcase Leadership

Accenx TECHNOLOGIES, INC. Connecting Healthcare
 BlueWare
 capsul
 careevolution HEALTHCARE TECHNOLOGY
 CERNER All Together
 ECLIPSYS The Outcomes Company
 GE Healthcare
 IBM
 Initiate
 net.orange healthcare. simplified.
 PHILIPS
 SIEMENS

Implementer

POWERED BY AGUO
 AGFA HealthCare
 alert
 ALLSCRIPTS
 ANOLOTL
 B. BRAUN SHARING EXPERTISE
 Canon
 CapMed
 Carestream
 DeJarnette
 digiChart
 Drägermedical
 Epic
 FUJITSU
 GREENWAY
 HEALTHVISION
 INC
 icw
 INTERSYSTEMS
 Lilly
 LiveData
 MCKESSON
 mie
 MEDNET USA
 MedQuist
 Microsoft
 MDMARK
 MISYS
 NextGen
 NoMoreClipboard.com
 ORACLE
 OUTCOME
 QUINTILES
 sage software
 Software Partners
 SPACELABS Healthcare
 CPHI
 WelchAllyn
 Wellogic

Supporter

3M
 We want you to know™ Aetna
 CARDIAC SCIENCE
 CAREfx
 COMPUWARE
 covisint
 DAIRYLAND HEALTHCARE SOLUTIONS
 dbMotion
 EMAGEON
 Emergisoft
 HZ
 NAVIMEDIX
 patientkeeper
 Software

Organizational Participants

CABLE MEANS BUSINESS
 CAQH
 CDISC
 EHRVA
 HEALTHCARE INFORMATION TECHNOLOGY STANDARDS PANEL
 ISO
 NIST
 National Institute of Standards and Technology
 Technology Administration, U.S. Department of Commerce

Source: IHE

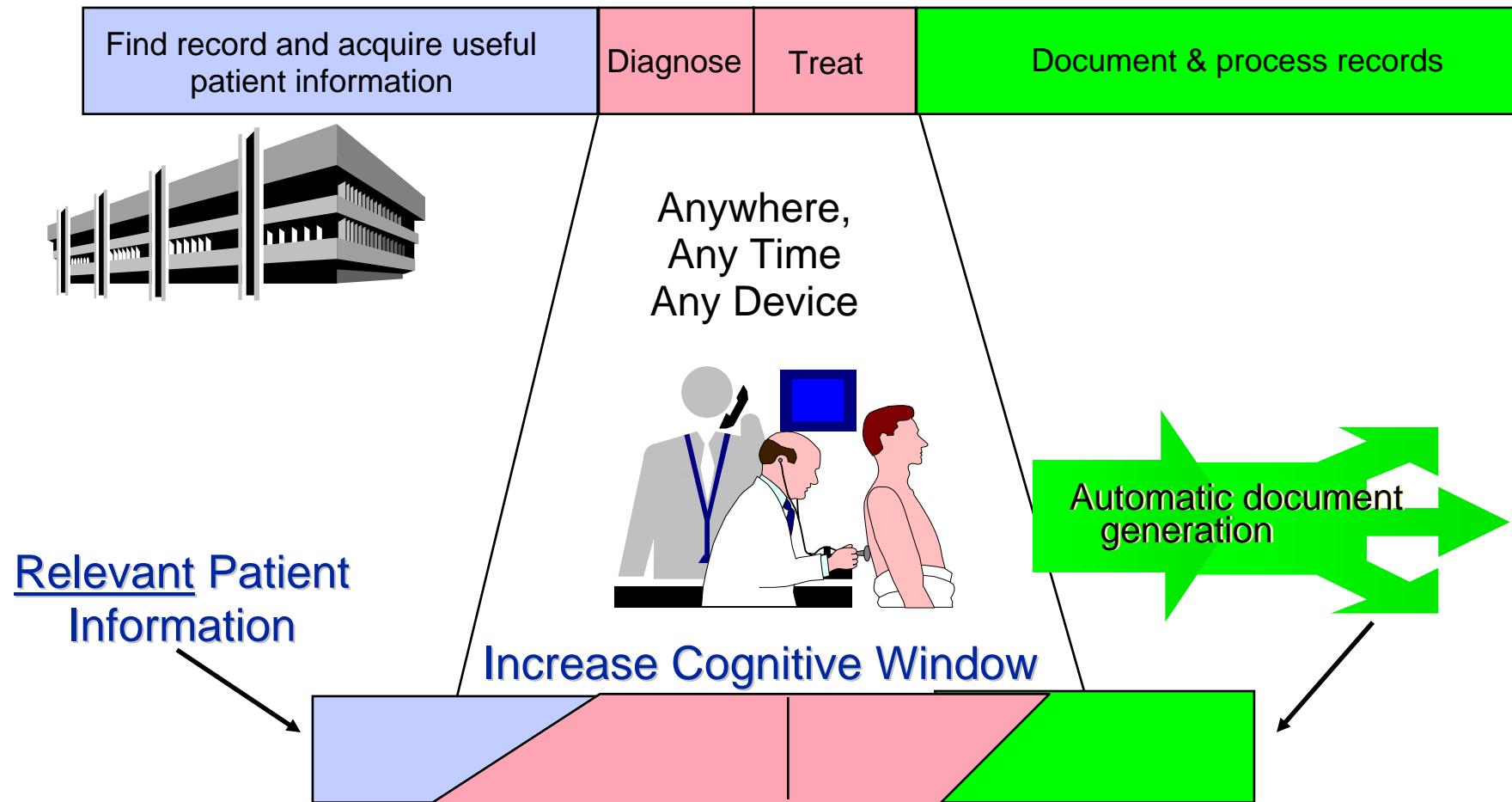
Eclipse Open Healthcare Framework (OHF) and Open Health Tools (OHT)

- The Eclipse Foundation
 - Open source community whose projects are focused on providing an extensible development platform and application frameworks for building software.
- The Eclipse Open Healthcare Framework (OHF)
 - project within Eclipse formed for the purpose of expediting healthcare informatics technology.
 - extensible frameworks and tools which emphasize the use of existing and emerging standards in order to encourage interoperable open source infrastructure, thereby lowering integration barriers.
- Open Health Tools (OHT) is a new *healthcare-centric* open community, started in 2007 dedicated to the design and development of open standards-based healthcare information technology
 - Membership in OHT already includes: US Federal Government Department of Veterans Affairs, Canada Infoway, UK National Health System, Australia NEHTA, IBM, Oracle, Eclipse, BT, HL7, IHTSDO, Misys, OMG, Red Hat, among others.
 - OHT is working with Eclipse which incubated this new, large OSS effort.

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Clinician's Environment – the Challenge for IT at the Point of Care



Source: John Silva, M.D.

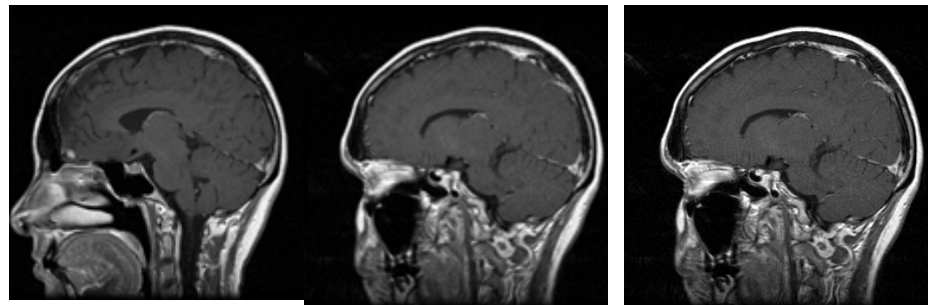
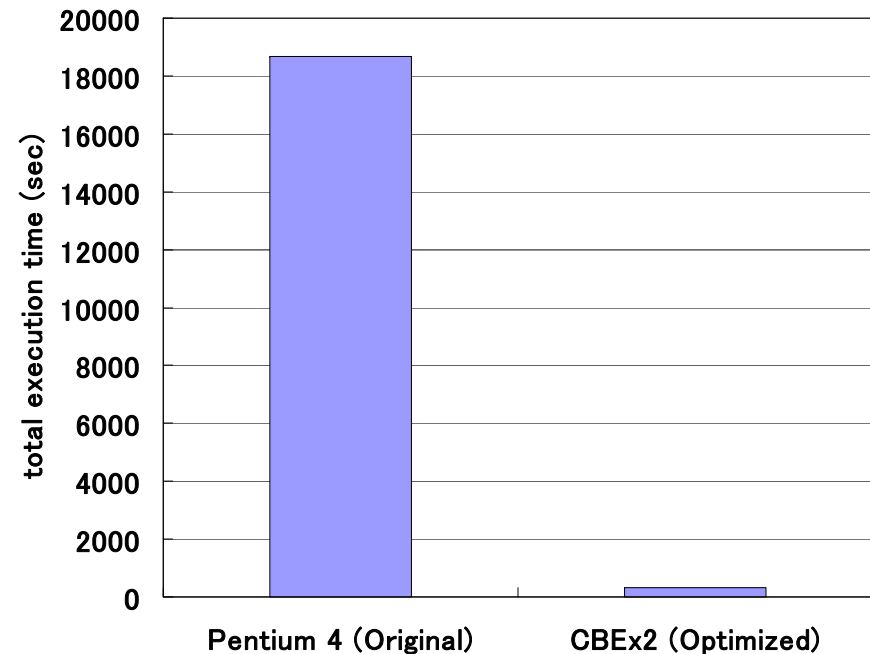
- Clinician's Use Systems
- Horizontal Platform for Knowledge Workers

Mutual-Information Linear Image Registration

- Original Code
 - Pentium 4 @ 3GHz
- Optimized Code:
 - CBE @ 3.2GHz x 2
 - Converted from C++ to C
 - Parallelized for 16 SPEs
 - SIMDized
 - Optimized for Memory BW
- Data: **98 data sets**

Results:

- Execution time reduced from 5 hrs, 11 mins to 5 mins, 9 secs



Medical Information Hub

The screenshot displays the ASME Medical Information Hub interface. The window title is "ASME" and it includes a menu bar with "File" and "Help". The patient information section shows "Nancy Ann Berggren (010160-1118)" and her address "Park Allé 48, 3400 Hillerød".

The interface is divided into several panes:

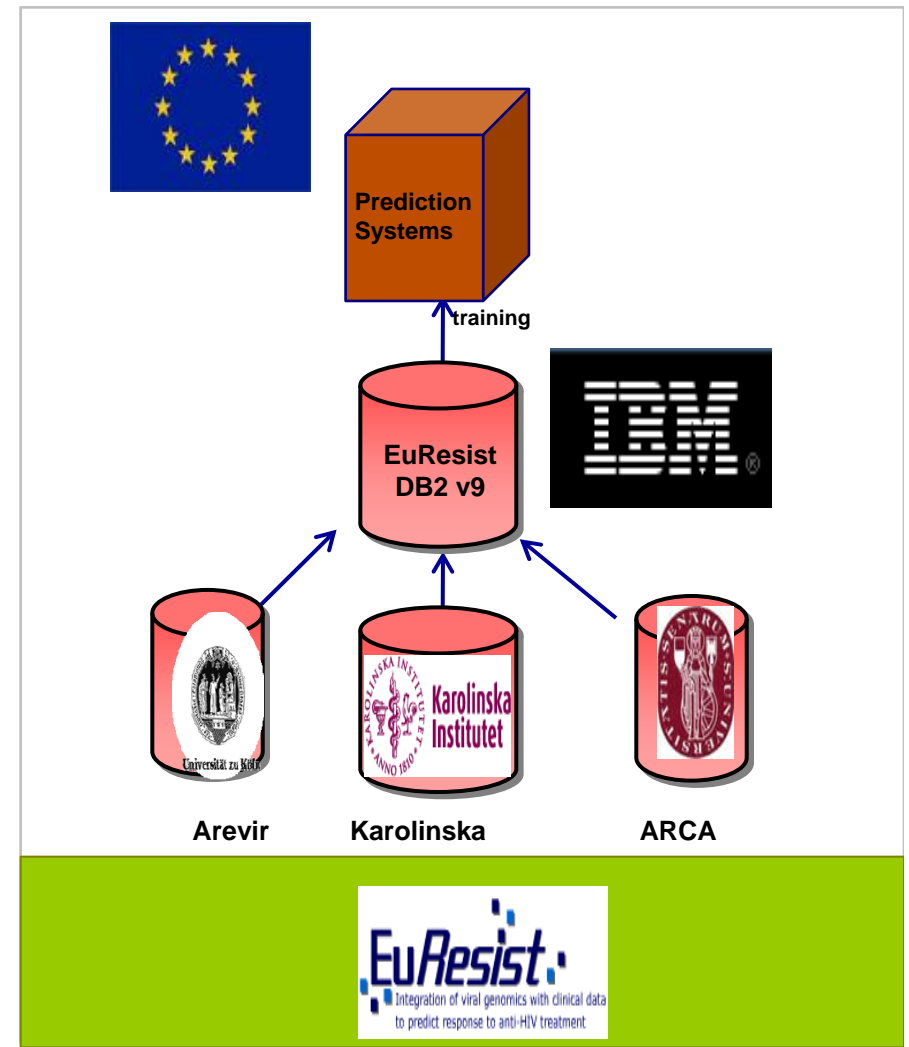
- Search:** Contains a search box with the text "highlight anatomy" and three checked checkboxes: "Anatomy", "EMR", and "SNOMED".
- History/Patient Record:** A tree view showing XML elements and attributes, including "Element: Deliver_patientdata" and "Element: Person".
- Notes:** Contains a note titled "17.02.03 - Ambulatory visit 04.9 Rheumatology Section" with details: "Start time: 08:30", "End time: 17.02.03 09:00", "Room:", "Priority:", and "Status: Done". The note text includes: "Might be a bit better, but still acute pains in primarily left side. Is therefore still not mobile now one month after the surgery." and "Can with some difficulties sit straight up. There is significant pain in the stomach. No pain in the legs. Kan med nogen besvær komme på lejet. Der er betydelig ømhed mod venstre. I øvrigt er cikatricen fuldstændig i orden." and "It is unexpected that no change has occurred the last 14 days and it is unclear if the patient's other diseases are the cause of the pain. We agree on a new".
- Patient:** A 3D anatomical model of a human figure with a blue arrow pointing to the back.

Source: Andre Elisseeff Zurich Rsch and Nhumi Corp

<http://www.youtube.com/watch?v=VAwYdmUd59A>

EuResist – Data and Deep Analytics to Improve HIV/AIDS Therapy

- ***EuResist – EU Programme***
- Predict in-vivo efficacy of anti-retroviral drug regimens against a given HIV. Based on viral genotype data integrated with treatment response
- IBM hosts and manages the largest HIV clinical genomics dB in the world
- Freely available on-line clinical support system



Aalim - Multi-modal data analysis and decision support

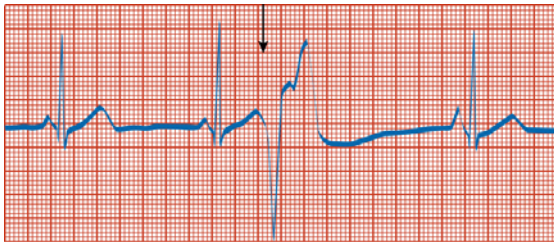


Figure 17-36 R-on-T premature ventricular contraction. (From Huff J. ECG Workout [4th Ed]. p 195. Philadelphia, Lippincott Williams & Wilkins, 2002.)

Copyright © 2005 Lippincott Williams & Wilkins. Instructor's Resource CD-ROM to Accompany Critical Care Nursing: A Holistic Approach, eighth edition.

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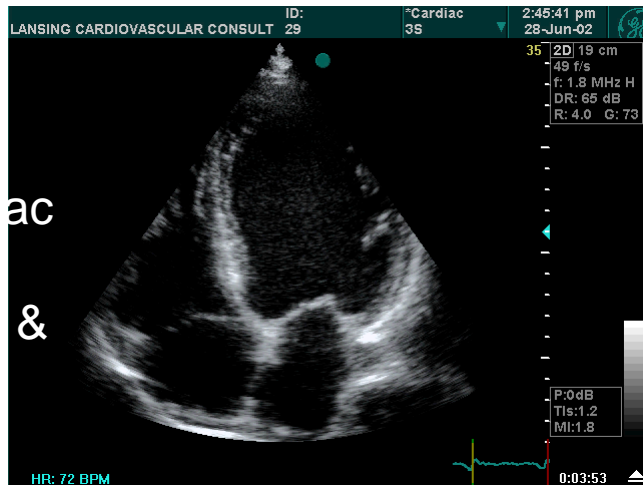
<section>
  <code code="8709-0" codeSystem="2.16.840.1.113883.6.1" codeSystemName="LOINC"/>
  <title>Skin Exam</title>
  <text>Erythematous rash, palmar surface, left index finger.
  <renderMultiMedia referencedObject="MM2"/>
  </text>
  <entry>
    <Observation>
      <code code="106076001" codeSystem="2.16.840.1.113883.6.96"
      codeSystemName="SNOMED CT" displayName="Skin finding"/>
      <value xsi:type="CD" code="271807003"
      codeSystem="2.16.840.1.113883.6.96"
      codeSystemName="SNOMED CT" displayName="Rash"/>
      <targetSiteCode code="48856004"
      codeSystem="2.16.840.1.113883.6.96" codeSystemName="SNOMED CT"
      displayName="Skin of palmar surface of index finger">
        <qualifier>
          <name code="78615007" codeSystem="2.16.840.1.113883.6.96"
          codeSystemName="SNOMED CT" displayName="with laterality"/>
          <value code="7771000" codeSystem="2.16.840.1.113883.6.96"
          codeSystemName="SNOMED CT" displayName="left"/>
          </qualifier>
          <targetSiteCode>
            <entryRelationship type="CoDe" code="SPRT">
              <RegionOfInterest MMID="MM2"/>
              <id root="10.23.4567.44897"/>
              <code code="ELLIPSE"/>
              <value>3 13 7 2 4 4</value>
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                <ObservationMedia id="root" root="10.23.4567.3457"/>
                <value xsi:type="ED" mediaType="image/jpeg">
                  <reference value="leftHand.jpg"/>
                </value>
                </ObservationMedia>
              </entryRelationship>
            </RegionOfInterest>
          </entryRelationship>
        </entry>
      </Observation>
    </entry>
  </section>
  
```



EKG Images/Time Series

HL7, CDA, XDS
UMLS, MESH

Cardiac CT images (DICOM)



Patient demographic information from EMR



Source: Tanveer Syeda-Mahmood Almaden Rsch

AALIM: Advanced Analytics for Information Management

- **Based on the key idea**
 - Similar patients (based on their multimodal exam data) -> similarity in the diagnosis (and hence treatment and outcomes)
- **Is a clinical decision support system that**
 - Integrates data to form a **holistic longitudinal picture** of a patient's condition
 - Analyzes **multi-modal cardiac** diagnostic data per patient.
 - Demographics, vitals, medications, billing codes, significant problems
 - Cardiology textual reports with clinical history
 - ECG waveforms, Cardiac echo videos
 - Finds **similar patient cohorts** from EMR to a given patient's data in individual modalities and in their combination.
 - Sophisticated multimodal analytics based on **EKG, Echo videos, and reports.**
 - Summarizes the findings in **easy-to-read reports** accessible via Web-browser.
 - Dominant diseases, medications, etc.

Aalim
Advanced Analytics for Information Management

Search for patient record number:

patient: | M | 79 | 5' 5" | 243 lbs

Overview | Longitudinal | Contextual | Literature

Tests Overview
View All Tests

Most Recent ECHOs:

Most Recent CATH Text Reports:

Most Recent EKGs:

Cardiac Overview

00 02 04 06 08

- 272.4 Other and unspecified hyperlipidemia (Disorders of lipid metabolism)
- 401.9 Unspecified (Essential hypertension)
- 411.1 Intermediate coronary syndrome (Other acute and subacute forms of ischemic heart disease)
- 411.89 Other (Other acute and subacute forms of ischemic heart disease Other)
- 412 Old myocardial infarction ()
- 413.9 Other and unspecified angina pectoris (Angina pectoris)
- 414.00 Of unspecified type of vessel, native or graft (Other forms of chronic ischemic heart disease Coronary atherosclerosis)
- 414.01 Of native coronary artery (Other forms of chronic ischemic heart disease Coronary atherosclerosis)
- 414.9 Chronic ischemic heart disease, unspecified (Other forms of chronic ischemic heart disease)
- 459.0 Hemorrhage, unspecified (Other disorders of circulatory system)
- 780.4 Dizziness and giddiness (General symptoms)
- 788.9 Other symptoms involving urinary system (Symptoms involving urinary system)

anti-infectives
anti-hyperlipidemic agents
central nervous system agents
coagulation modifiers
cva "antiadrenergic agents, peripherally acting"
cva angiotensin converting enzyme inhibitors
cva angiotensin ii inhibitors
cva antianalgesic agents
cva calcium channel blocking agents
cva cardioselective beta blockers
gastrointestinal agents
respiratory agents

Contextual Overview

Common Diseases
Key: Patient's diagnosis | Other suggested diseases based on cohort patients

[95%]	401.9	Unspecified (Essential hypertension)
[85%]	414.01	Of native coronary artery (Other forms of chronic ischemic heart disease Coronary atherosclerosis)
[85%]	272.4	Other and unspecified hyperlipidemia (Disorders of lipid metabolism)
[70%]	428.0	Congestive heart failure, unspecified (Heart failure)
[70%]	414.0	Of unspecified type of vessel, native or graft (Other forms of chronic ischemic heart disease Coronary atherosclerosis)

Common Drugs
Key: Patient's prescribed drugs | Other drugs prescribed to the cohort patients

[90%]	angiotensin converting enzyme inhibitors
[90%]	cardioselective beta blockers
[90%]	nonsteroidal anti-inflammatory agents
[85%]	narcotic analgesics
[85%]	glucocorticoids

AALIM System Screens

Patient overview page:

gives a 1 page summary of significant problems, medications, comparative diagnostics, exam results, etc.

Cath Lab Schedule Diseases Problems Drugs

Search for patient record number Search

[M] 79 | 5' 8" | 243.2lb

Overview Longitudinal Contextual Literature

Longitudinal graphs of selected measurements:

[View All Graphs](#)

Ejection Fraction

Heart Rate

Weight

Blood Pressure

4Q2007

<p>Significant Problems List:</p> <ul style="list-style-type: none"> 414.81 Of native coronary artery (Other forms of chronic ischemic heart disease Coronary atherosclerosis) 411.89 Other (Other acute and subacute forms of ischemic heart disease Other) 411.1 Intermediate coronary syndrome (Other acute and subacute forms of ischemic heart disease) 412 Old myocardial infarction (I) 413.9 Other and unspecified angina pectoris (Angina pectoris) 	<p>OSCRs:</p> <ul style="list-style-type: none"> 412 Old myocardial infarction (I) 272.4 Other and unspecified hyperlipidemia (Disorders of lipid metabolism) 401.9 Unspecified (Essential hypertension) <p>Suggested By Aalim (No Priority Order):</p> <ul style="list-style-type: none"> 410.4 Of other inferior wall (Acute myocardial infarction) (CATH) 	<p>Drugs:</p> <ul style="list-style-type: none"> BISOPROLOL NIACIN VYTORN
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Cath:

3Q2007

<p>Significant Problems List:</p> <ul style="list-style-type: none"> 414.81 Of native coronary artery (Other forms of chronic ischemic heart disease Coronary atherosclerosis) 411.89 Other (Other acute and subacute forms of ischemic heart disease Other) 411.1 Intermediate coronary syndrome (Other acute and subacute forms of ischemic heart disease) 412 Old myocardial infarction (I) 413.9 Other and unspecified angina pectoris (Angina pectoris) 	<p>Drugs:</p> <ul style="list-style-type: none"> BISOPROLOL MINIRAN PLAVIX VYTORN
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2Q2007

<p>Significant Problems List:</p> <ul style="list-style-type: none"> 414.81 Of native coronary artery (Other forms of chronic ischemic heart disease Coronary atherosclerosis) 411.89 Other (Other acute and subacute forms of ischemic heart disease Other) 411.1 Intermediate coronary syndrome (Other acute and subacute forms of ischemic heart disease) 412 Old myocardial infarction (I) 413.9 Other and unspecified angina pectoris (Angina pectoris) 	<p>OSCRs:</p> <ul style="list-style-type: none"> 412 Old myocardial infarction (I) 414.01 Of native coronary artery (Other forms of chronic ischemic heart disease Coronary atherosclerosis) 272.4 Other and unspecified hyperlipidemia (Disorders of lipid metabolism) 401.9 Unspecified (Essential hypertension) 413.9 Other and unspecified angina pectoris (Angina pectoris) 411.89 Other (Other acute and subacute forms of ischemic heart disease Other) <p>Suggested By Aalim (No Priority Order):</p> <ul style="list-style-type: none"> 427.89 Other (Cardiac dysrhythmias Other specified cardiac dysrhythmias) (ECG) 425.2 Left bundle branch hemiblock (Conduction disorders) (ECG) 	<p>Drugs:</p> <ul style="list-style-type: none"> BISOPROLOL CLOPIDOGREL
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EKG:

Longitudinal view tracks patient's key measurements over time. Gives detailed year-by-year view of evolving conditions and medications prescribed.

Aalim - Mozilla Firefox
 File Edit View History Bookmarks Tools Help
 http://aalim.kaiser.org:8080/aalimPHI/patientstab.jsp?patientSwitchID=XXXXXXXXXX
 Aalim
 Advanced AnaLytics for Information Management
 View Options Logout

Cath Lab Schedule Diseases Patients Drugs

Search for patient record number: XXXXXXXX Search

XXXXXXX Patient 1 | M | 79 | 5' 5" | 243.2lbs

Overview Longitudinal Contextual Literature

Multimodal search for related cases (cohort), based on:
 Use complete patient history
 Use recent patient history
 OSCR EKG ECHO TEXT (Cath Report, Echo, ECG...)

Statistical Analysis of the Retrieved Cohort:

Common Diseases

Key: Patient's diagnosis | Other suggested diseases based on cohort patients

[80%]	401.9	Unspecified hypertension
[80%]	272.4	Other and unspecified hyperlipidemia
[71%]	414.01	Coronary atherosclerosis of native coronary artery
[54%]	428.0	Congestive heart failure, unspecified
[48%]	412.0	Old myocardial infarction
[47%]	413.9	Other and unspecified angina pectoris
[44%]	250.0	Diabetes mellitus without mention of complication
[31%]	427.31	Atrial fibrillation
[27%]	-45.81	Aortocoronary bypass status
[24%]	410.9	Acute MI of Unspecified site
[23%]	782.3	Edema
[23%]	250.4	Diabetes mellitus with renal manifestations
[23%]	425.4	Other primary cardiomyopathies
[20%]	443.9	Peripheral vascular disease, unspecified
[20%]	411.1	Intermediate coronary syndrome
[19%]	250.6	Diabetes with neurological manifestations
[19%]	428.1	Left heart failure
[18%]	414.0	Coronary atherosclerosis of unspecified type of vessel
[17%]	-45.82	Percutaneous transluminal coronary angioplasty
[17%]	244.9	Unspecified hypothyroidism

Common Drugs

Key: Patient's prescribed drugs | Other drugs prescribed to the cohort patients

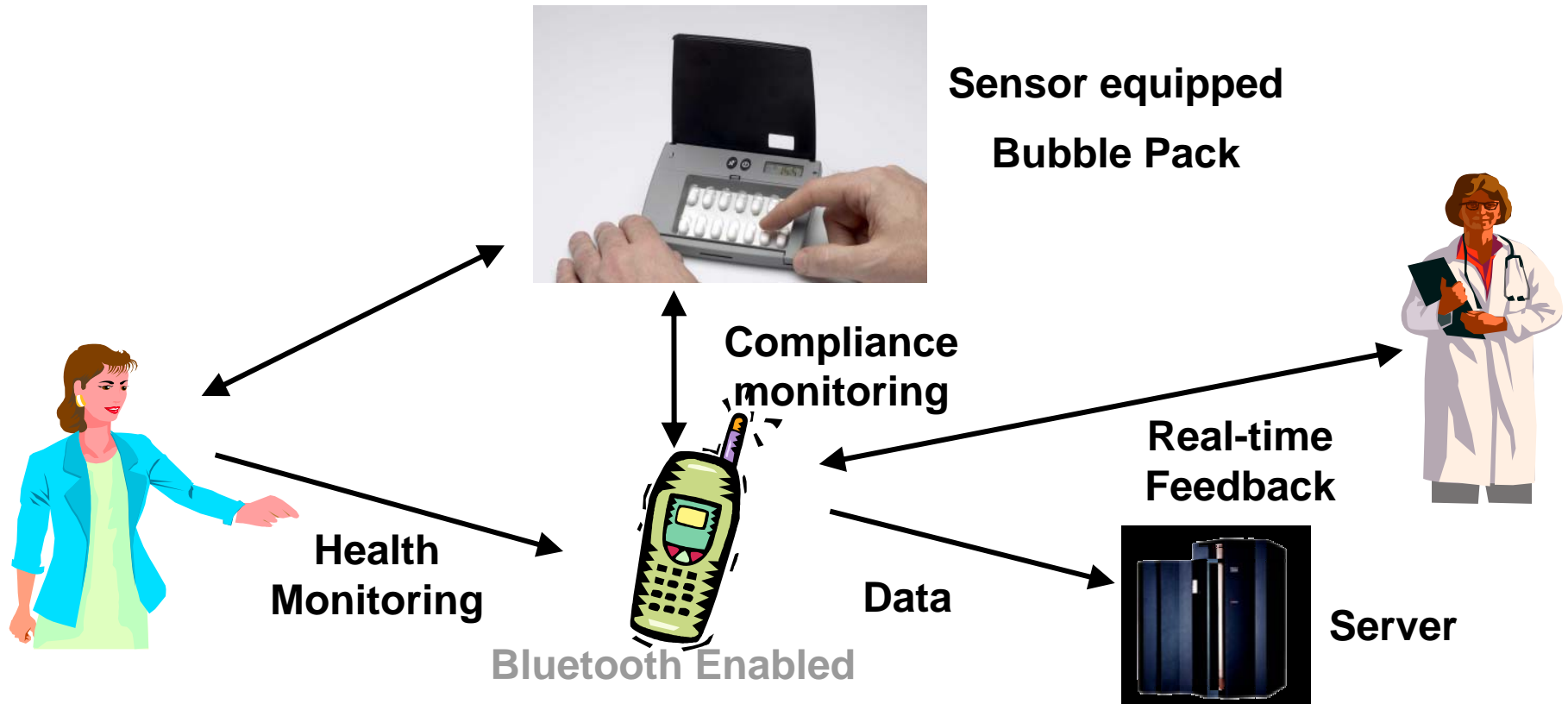
[92%]	statins
[91%]	miscellaneous analgesics
[88%]	angiotensin converting enzyme inhibitors
[88%]	laxatives
[78%]	salicylates
[77%]	loop diuretics
[76%]	first generation cephalosporins
[74%]	cardioselective beta blockers
[70%]	aminopenicillins
[61%]	proton pump inhibitors
[57%]	quinolones
[57%]	platelet aggregation inhibitors
[55%]	glucocorticoids
[55%]	nonsteroidal anti-inflammatory agents
[52%]	isosorbide
[48%]	adrenergic bronchodilators
[47%]	miscellaneous antimalarials
[46%]	nasal steroids
[45%]	thiazide diuretics
[43%]	one touch **ultra** test st

Read aalim.kaiser.org

Contextual view gives comparative diseases and treatment information based on similar patient statistics. Is personalized for the patient's specific conditions and exams.

Mobile Health – Robust Monitoring for Outpatient Population

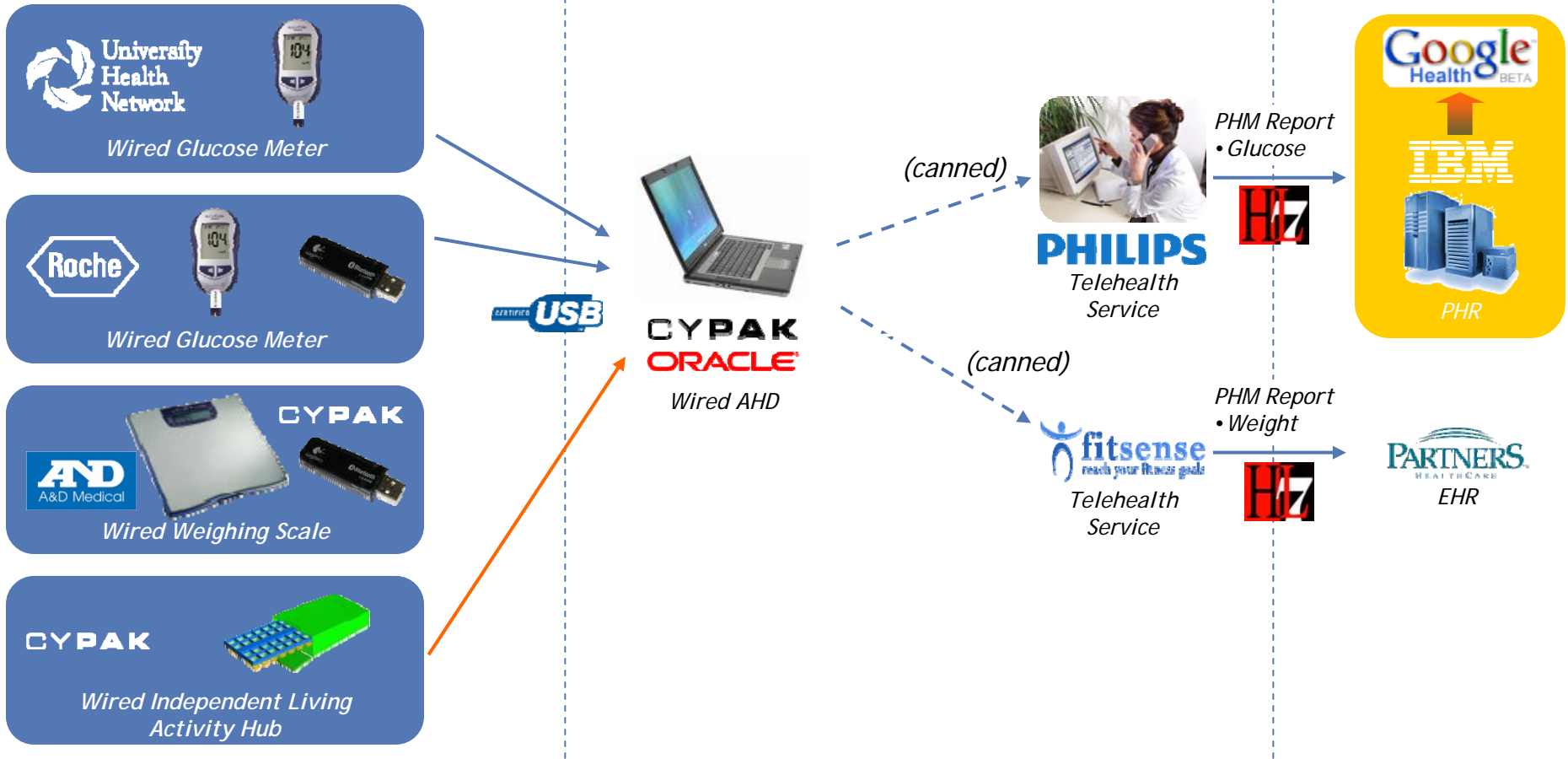
- Initial application for pharmaceutical industry drug trials
 - Real-time feedback improves patient safety
 - Enables monitoring and dosage adjustments based on results
 - Accuracy & compliance documented



PlugFest November 2008

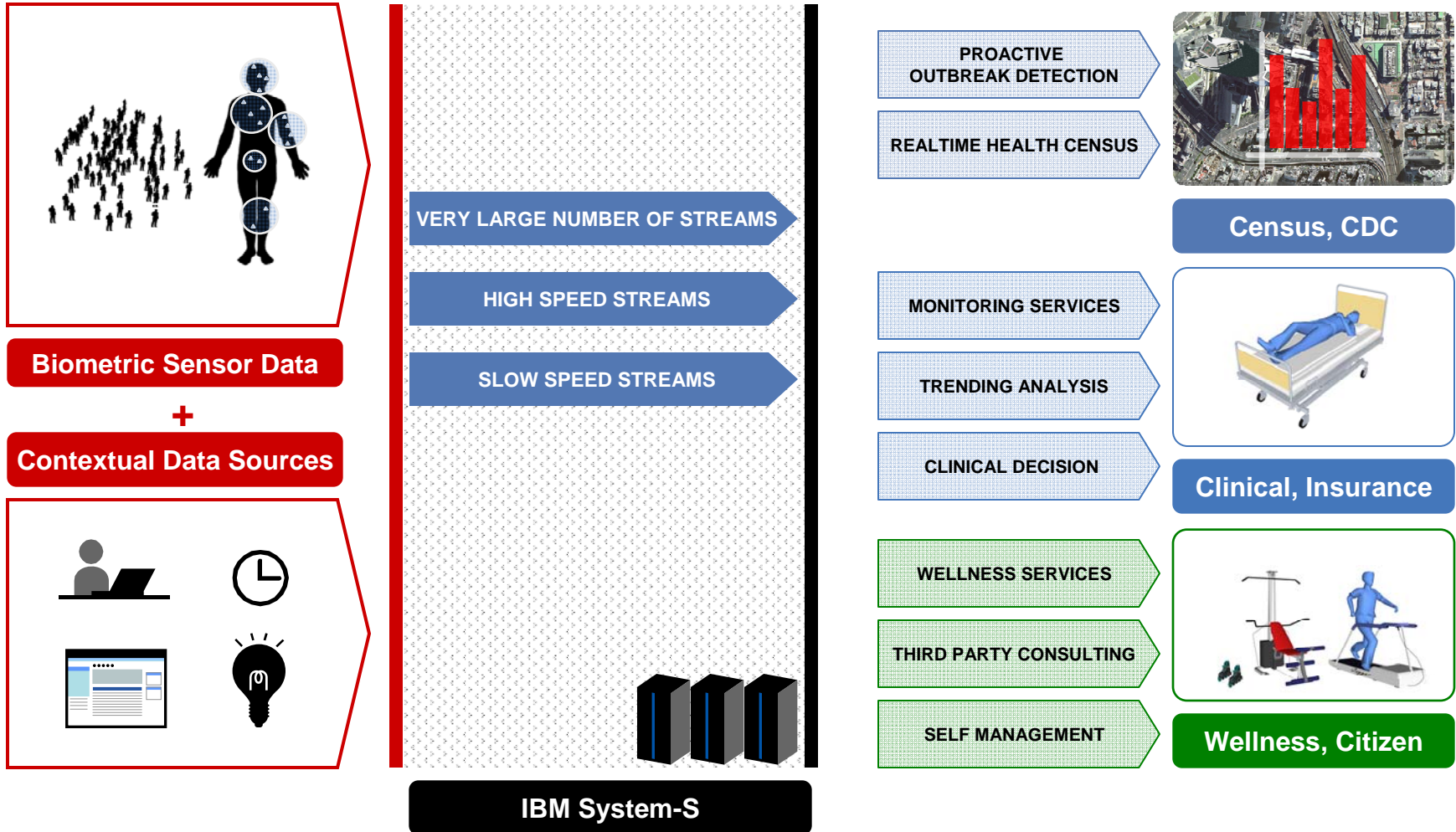
PAN Interface Device Manager

XHR Interface Sender Receiver



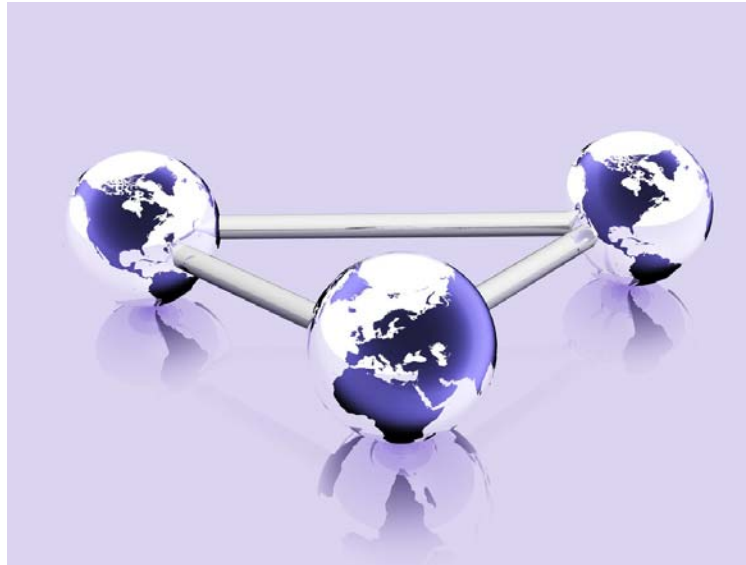
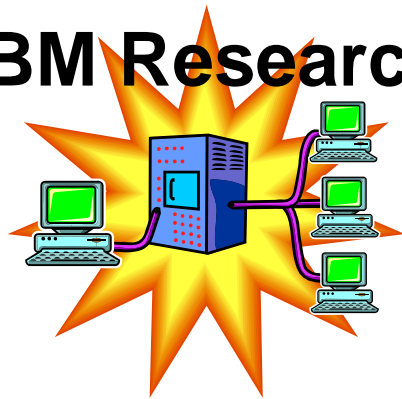
Online Analytics using a stream optimized system

CENTURY'S FOCUS

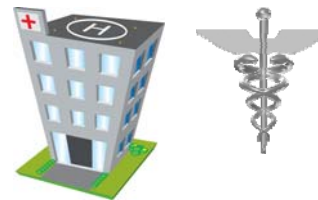


A Three-Way Collaboration

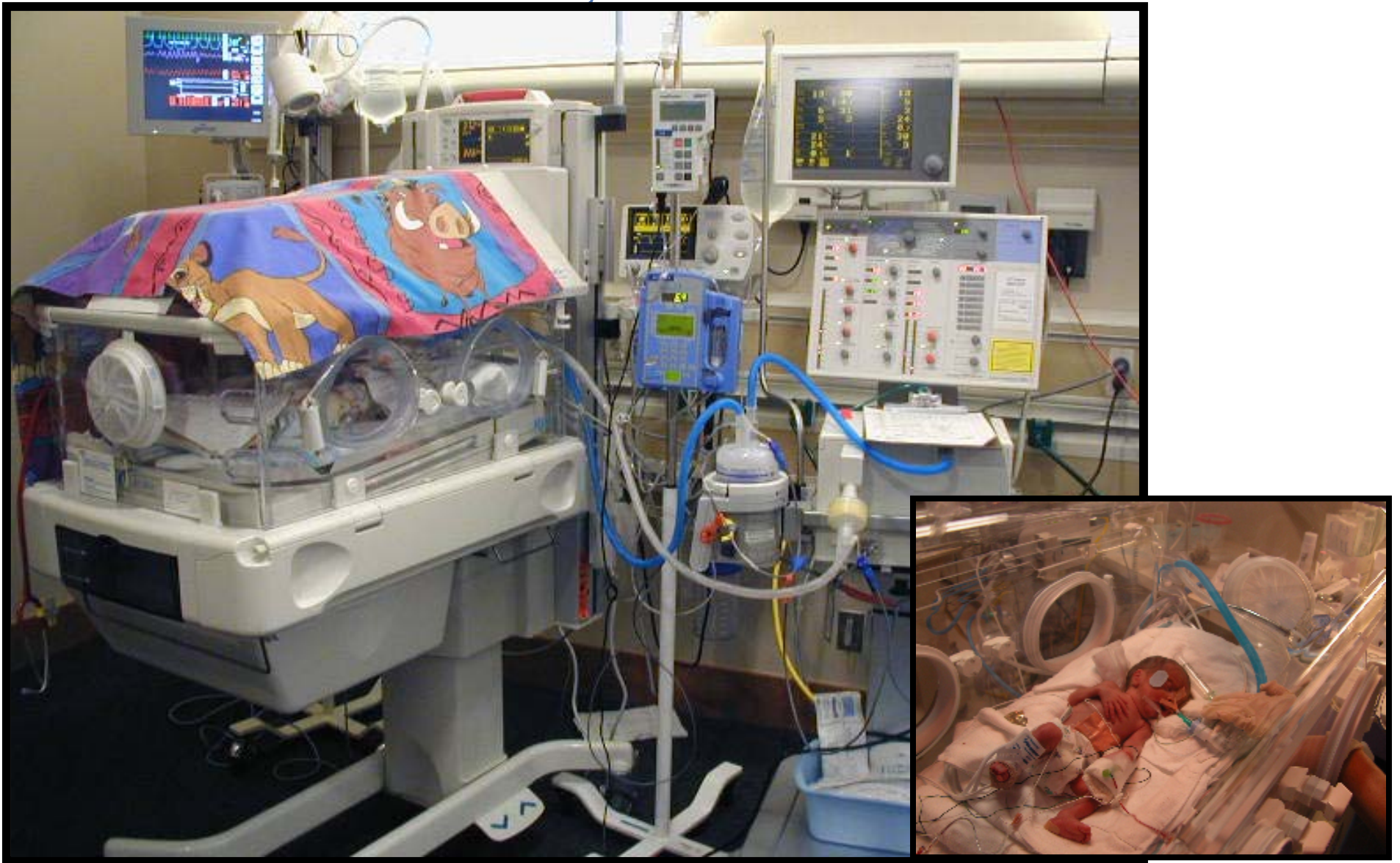
IBM Research



SickKids



Neonatal Intensive Care Unit, or NICU

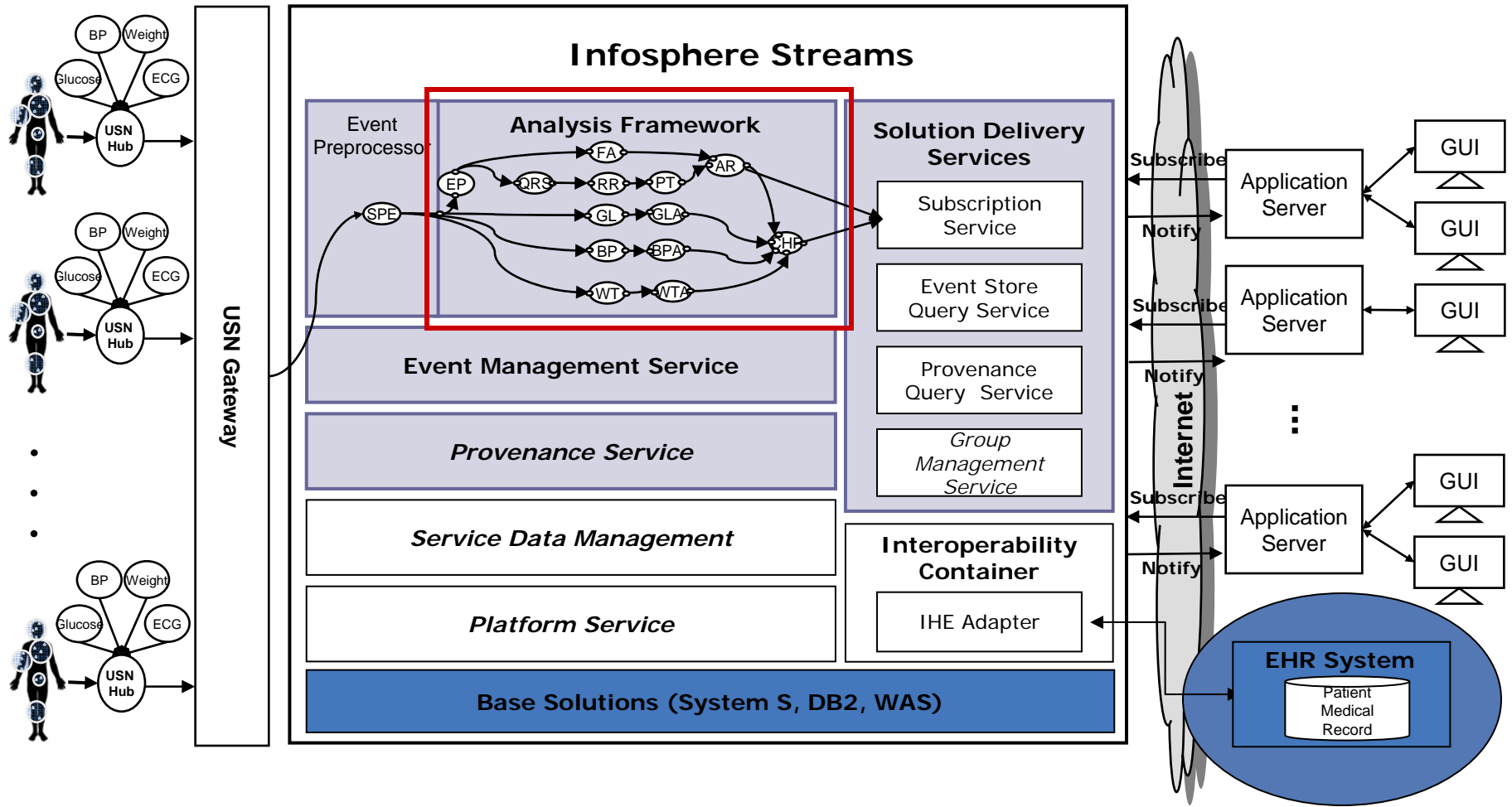


Neonatal Care



- 1 in 14 babies are born premature in Canada
- Premature babies can be up to 17 weeks early and weigh only 450gms
- They can spend 3-4 months in NICU
- Similar conditions apply elsewhere around the world

High Level View of Streams Architecture



Ubiquitous Sensor Network

Stream-based Distributed Interoperable Health care Infrastructure (CENTURY)

Solutions (Applications)

‘Data Baby’ – Working with Sick Children’s Hospital and U of Ontario Institute of Technology

- **Project Artemis**
- InfoSphere Streams is configured to perform online analytics on streaming data coming from medical instruments used to monitor premature infants in the Toronto Sick Children’s Hospital.
- Up to 24 hour ‘advanced warning’ of the onset of nosocomial infection.
- IBM Smarter Planet reference and TV advertisement



IBM is ranked the #4 most Innovative Company of 2010 by Bloomberg Business Week – citing IBM's collaboration with a Toronto hospital