January 25, 2006

Applications of New Health Information Technologies in Medicine In Local and Regional Communities

Health Strategy &

Healthcare Informatics Teams

Agenda

- RHIO Analysis
- Implications
- A Suggested Assessment Instrument for RHIOs

What We Did

- A collection of members from several business teams set out to understand the realities of current technologies in medicine (we wanted to understand emerging Health IT Organizations
- Visited 4 prominent emerging health IT organizations in autumn in 2004
- Try to better understand the emerging trends
- Attempted to understand the hype vs. realities of RHIOs around the country

Overview

- Each community's approach is unique and consistent with both their objectives and values.
- Many communities are focusing on IOM objectives of improving patient care, ensuring patient safety, and leveraging information access to create physician efficiencies.
- The complexity of creating a RHIO can not be underestimated. Foremost is the challenge of creating community trust to achieve even basic cooperation among stakeholders.
- Information based upon stakeholder interviews and public information
- Information presented based ONLY on team's observations – nothing in this deck should be construed as judgments

What is a RHIO?
Our Working Definition

- A regional organization or a business set forth to **improve the effectiveness, efficiency and overall quality of health** in a geographic region
- A comprehensive knowledge-based network of **interoperable systems** of clinical, public health, and personal health information that would **improve decision-making by making health information available** when and where it is needed
- The set of **technologies, standards, applications, systems, values, and laws** that support all facets of individual health, health care, and public health
- **Voluntary**
- **Self sufficient/sustaining**

What a RHIO Is Not

- Not simply centralized data repository
- Not government regulated/organization
  - Government may play a role
- Not an entity existing for the competitive advantage of any one stakeholder in a community or region
- Not something thrust upon a community but rather something the community grows for its own support

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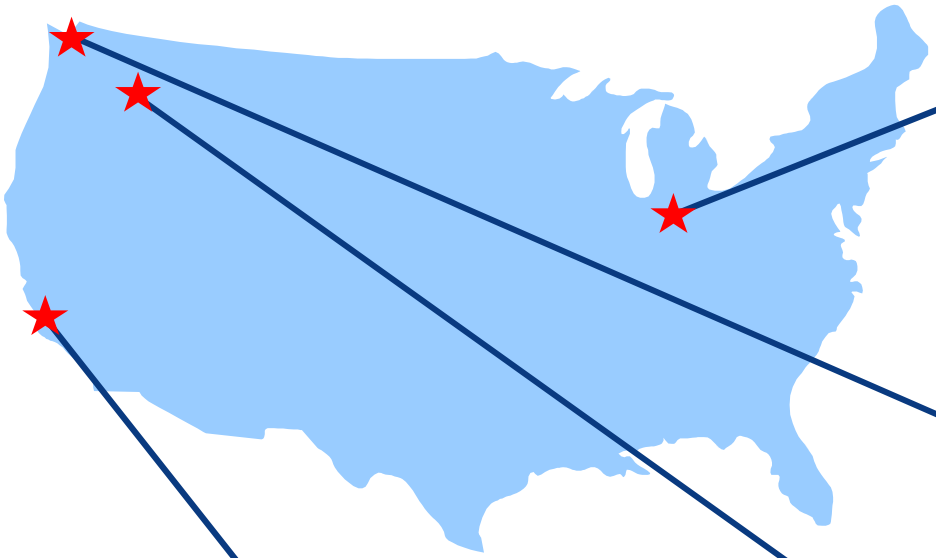
1. Introduction to Selected RHIOs
2. Governance & Stakeholder Involvement
3. Information Architecture
4. Key Observations & Conclusions

RHIOs Reviewed & Key Contacts



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Genesis

INPC	INHS	SBCCDE	Whatcom
■ Sponsoring institution: Regenstrief Institute ■ Work began in 1991 ■ 1996 initial proof of concept pilot – provide data from all hospitals for ED care ◆ Findings were mixed – Wishard costs↓ – Methodist costs↑ – 25% of ED procedures not billed ■ Subsequently added ◆ Public health ◆ MD practice access ◆ Research	■ Founding members: Providence and Empire Health Systems ■ 1994 – Initial collaboration around LifeFlight ■ 1997 – merged IT systems ■ Currently grown to 18,000 users between 32 hospitals	■ Lead organization: SB Regional Health Authority ■ 1999 CA Healthcare Foundation provided $10M (6 yr.) grant ◆ Goal – show CDE is 1. Technically feasible 2. Fiscally viable 3. Demonstrate improvement in quality of care ■ CHCF hired Care Science to design, build and implement technology	■ Peace Health System ■ HInet work started early 1990s ◆ Hospital + 84 MDs initial group ■ Over 15 years 100% of MDs (-3) involved in "Community Health Record" (over 300) + Local Hospital ■ Heavily invested in Care Management of CHF and DM ■ Initial investment by docs & hospital; local Blue (initially invested but has withdrawn)

- **Communities have been working together 5-14 years to get where they are**
- **Much of the effort is driven by strong hospital systems**

Value Proposition: Why Are They Doing It?

INPC (Federated Centralized)	**INHS** (Centralized System)	**SBCCDE** (Distributed Peer-to-Peer, Indexed)	**Whatcom** (Centralized)
■ Patient care ◆ Guideline-based medicine ◆ EBM rules in place to ↓ costs and provide ↑ consistent care ■ Identification of at-risk and undiagnosed ■ Data aggregation ■ Data research ■ Medication/Treatment adherence	■ IT efficiency, economies of scale ■ Pay-as-you-go ■ No outside funders other than hospitals (no payors, PBMs or Pharma)	■ Patient care ◆ Access to data in real-time environment ■ Essentially a large regional trial ■ Learnings to be used to shape future RHIOs	■ Community HInet lowers cost of participation of community physicians ■ Broad public support through PHR (Shared Care Plan) ■ HInet participants pay into system ◆ Clinicians ◆ Long Term Care ◆ Health Plans for Care Managers ◆ HINet employs 5 people, EHRs outside of this have other staffs (60 people running Last Word in 6 hospitals

Funding Sources

INPC	INHS	SBCCDE	Whatcom
■ Heavily Grant Funded ◆ Regenstrief Found. ◆ Federal – NIH – NLM – AHRQ ◆ Philanthropies ◆ eHI-CCBH for Indiana Health Info Exchange ■ No direct sustainability business model – HOWEVER, IHIE created to build secure public utility through which info can flow for fee ■ **>$25m + 14 yrs**	■ Operating efficiencies of economies of scale are funding expansion ◆ New hospitals join network to reduce HIS expenditures ◆ Direct Pay-for-Services Model ■ 32 hospitals currently on network ■ EMR services paid for on pay-as-you-go system by MDs	■ 100% Grant Funded ■ Sustainable business model pending ■ Future appears to depend on whether users see value and willing to pay ■ **$10m – 6 yrs**	■ Infrastructure costs for HInet were born by Hospital & Physicians ◆ Each contributed $1M – Blue/Hospital, docs spent on office equipment ◆ Operational costs of HInet covered by local BCBS affiliate & hospital for 3 years until value established ◆ Currently physicians pay approx $700/yr for HiNet access ◆ Other stakeholders also pay for access ■ Disease Management Program—Pursuing Perfection—funded via RWJF grant ■ eHI-CCBH Funding for eRx pilot

Depth and Breadth of Reach

INPC	INHS	SBCCDE	Whatcom
■ 95% of hospitals (ED) ◆ Five major hospital systems (14 hospitals) ■ 3 hospital association group practices ■ 4 homeless clinics ■ Public health department ■ Limited ambulatory care practices in community (other than ED's) ■ Laboratory systems	■ 32 Hospitals across large geographic region ■ About 300 Ambulatory Care docs (with large groups waiting to go onto system (GE Logician, +2 other EHRs) ■ Very high percentage of laboratory results from both hospital labs + commercial labs in system ■ Telepharmacy reaches to high % of rural hospitals on system	■ 2 hospitals ◆ 9 clinics ◆ 3 urgent care centers ◆ 180 physicians ◆ 1 pharmacy ◆ 1 med lab ■ Santa Barbara County Public Health ◆ 6 clinics ◆ 3 med labs ◆ 2 pharmacies ◆ Medical group ■ Santa Barbara Regional Health Authority (MediCal) ■ Lompoc Valley Community Health Care Organization ■ UniLab Quest	■ 1 Hospital (only in county) -Peace Health ■ 300 local docs (99%) are connected to HiNet ■ 8 out of 9 Nursing Homes connected ■ 3 large group practices w/ disparate EMRs are on system ◆ Better Health Record (European) ◆ GE Logician ◆ IDX-Last Word ■ Patients access Shared Care plan via web ■ Telepharmacy with 6 small, rural hospitals ■ 95 % Labs are in Last Word (EHR) ■ Outpatient Imaging – all data in same system ■ 600 pts are on Shared Care Plan, integrated w/ EHR (AHRQ project)

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Governance

INPC	INHS	SBCCDE	Whatcom
■ Sponsoring organizations sit on a BoD ■ Regenstrief Institute for Health Care ■ University School of Medicine ■ Health and Hospital Corporation of Marion County ■ 11 participating hospitals including: ◆ University ◆ Methodist ◆ Wishard ◆ Community ◆ St. Francis ◆ St. Vincent Hospitals ◆ Riley Hospital for Children	■ BoD comprised of IT directors from stakeholder organizations.** ■ Stakeholders: ◆ Empire Health Services ◆ Providence Services ◆ Sacred Heart Medical Center ◆ Yakima Valley Farm Workers Clinic ◆ Inland Power and Light ◆ Group Health Cooperative ◆ Steam Plant Square	■ Care Science + BoD from CHCF ■ SBCCDE Council oversees Technical Advisory Committee, Clinical Advisory Committee, and Alliances ■ Stakeholders: ◆ SBRHA ◆ Lompoc Valley Community Health ◆ Sansum-SB Medical Foundation ◆ Midcoast IPA ◆ CareScience ◆ UCSB ◆ Unilab ◆ Cottege Health Systems ■ California Health Care Foundation's role is mainly financial. Handles budget, cash receipts, and disbursements	■ HINet is wholly owned by Peace Health which operates HInet ◆ Leadership positions dually held by hospital employees ■ Local BCBS initially involved, withdrew ■ Community Board Participants: ◆ St. Joseph Hospital ◆ Family Care Network ◆ Madrona Medical Group ◆ Hospital Based Physician Affiliates ◆ Bellingham Surgical Consultants ◆ Group Health Cooperative ◆ Whatcom Coalition for Healthy Communities (HINet) ◆ Whatcom County Health Department

Stakeholders Active in Shaping RHIO

Stakeholders	INPC	INHS	SBCCDE	Whatcom
Hospital systems	High	High	Med	High
Physicians (hospital based)	High	High	Low	High
Payors (public)	None	None	High	None
Payors (private)	None	None	None	Low
Pharmacists (hosp)	Low	Med	None	Low
Patient advocacy groups	None	None	None	High
PBMs	None	None	None	None
Public health	High	Low	High	Med
Physicians** (ambulatory)	Med	Low	Low	High
Local Government	Low	Low	Med	Low

High Med Low None

**Only includes physicians from large group practices

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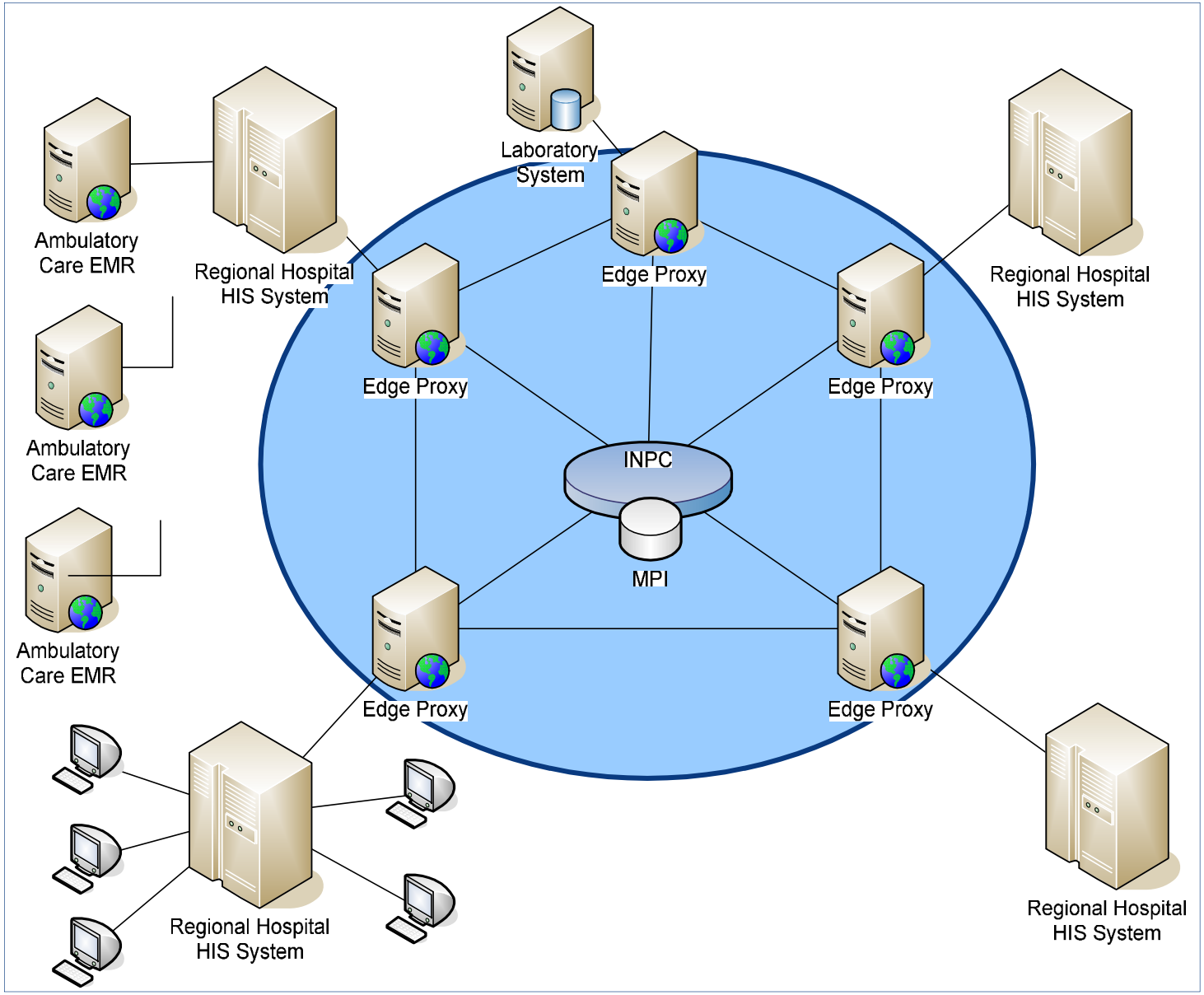
Categorization of Visited Organizations

Centralized System Single Data Repository	Federated System Centralized Database	Peer-to-Peer, Indexed Data Exchange
■ INHS (Spokane) ■ Peace Health (Whatcom) (Hospital EHR info)	■ INPC (Indianapolis)	■ SBCCDE (Santa Barbara)

RHIO Characteristics: Federated (Centralized) Model (INPC)

- Goal: share data, research, cost effective patient care, evidence-based medicine
- Multiple healthcare systems
- Multiple computing systems (at least 4 major HIS systems on network exchanging data)
- Database using HL7 messaging
- Edge Proxy Server(s) create Normalized Data views
- Currently grant funded, sustainable business model pending
  - Secondary business starting to support primary work through IHEI
- Global MPI and matching scheme for patients
- Decision support tools in place
- Single consent system (HIPAA)
- Ambulatory care in system only for hospitals and EDs – not independent offices (yet)
  - Not felt to be “where the key data is” therefore not a primary objective
- Population care, bio-terror preparedness

Federated (Centralized) Model: Schematic of INPC (Indianapolis)



Federated Databases: General Advantages

- Data ownership can be managed by defining business policies and access rules
- Individual organizations able to control their own data.
  - They keep their own data in addition to it being submitted to the centralized system for normalization
- Benefits of scale
- Builds on existing infrastructure – doesn't necessarily require institutional computer change, easier transition
- More opportunities for creativity (within the specified architecture)

Source: Mark Overhage, June 2004

Federated Databases: General Disadvantages

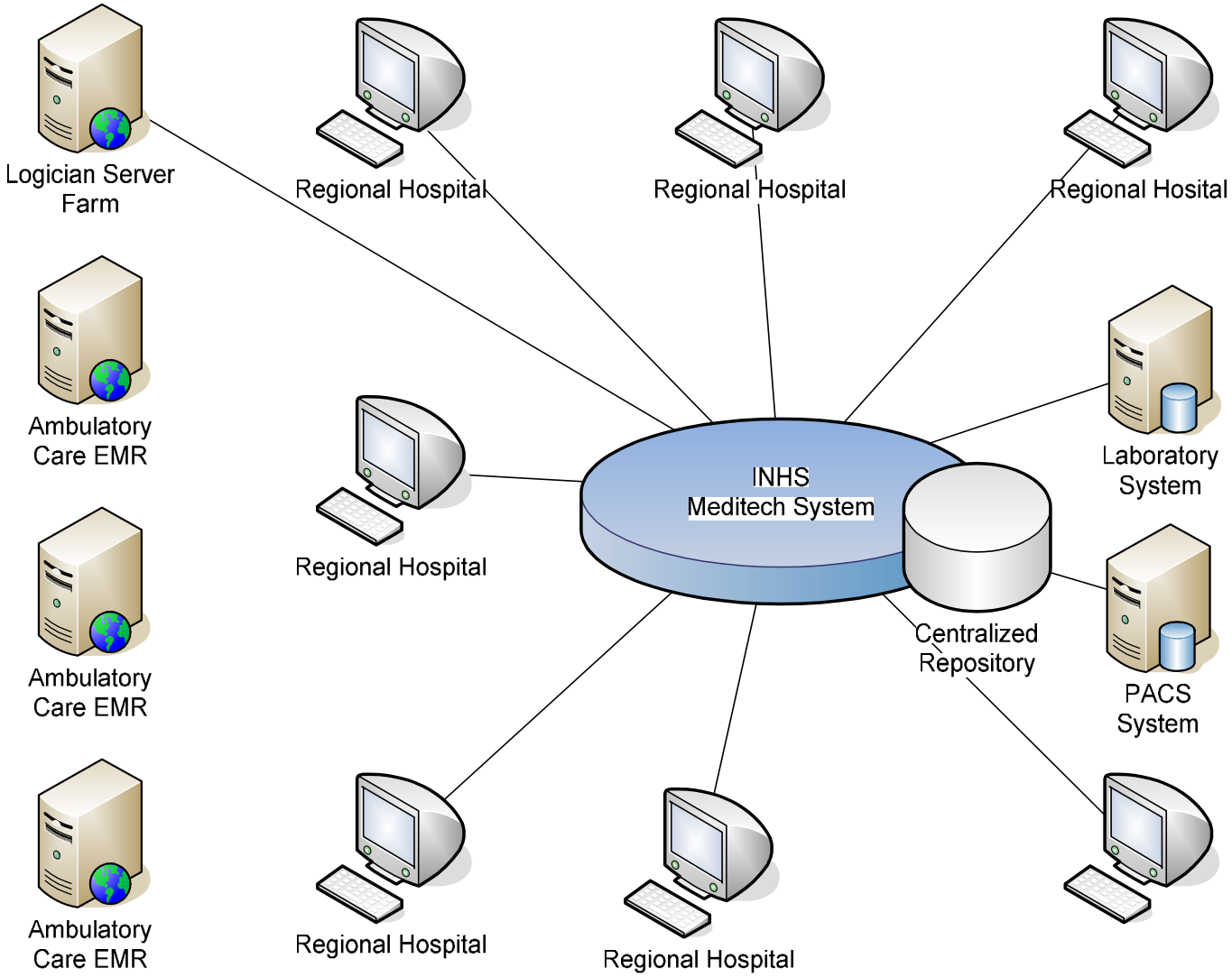
- Requires more coordination
  - Politics can be challenging
- Because standards are not implicit, work around technologies such edge proxy servers are necessary for data normalization
- Have to solve the patient identifier problem across multiple institutions with the MPI

Source: Mark Overhage, June 2004

RHIO Characteristics: Centralized Model (INHS)

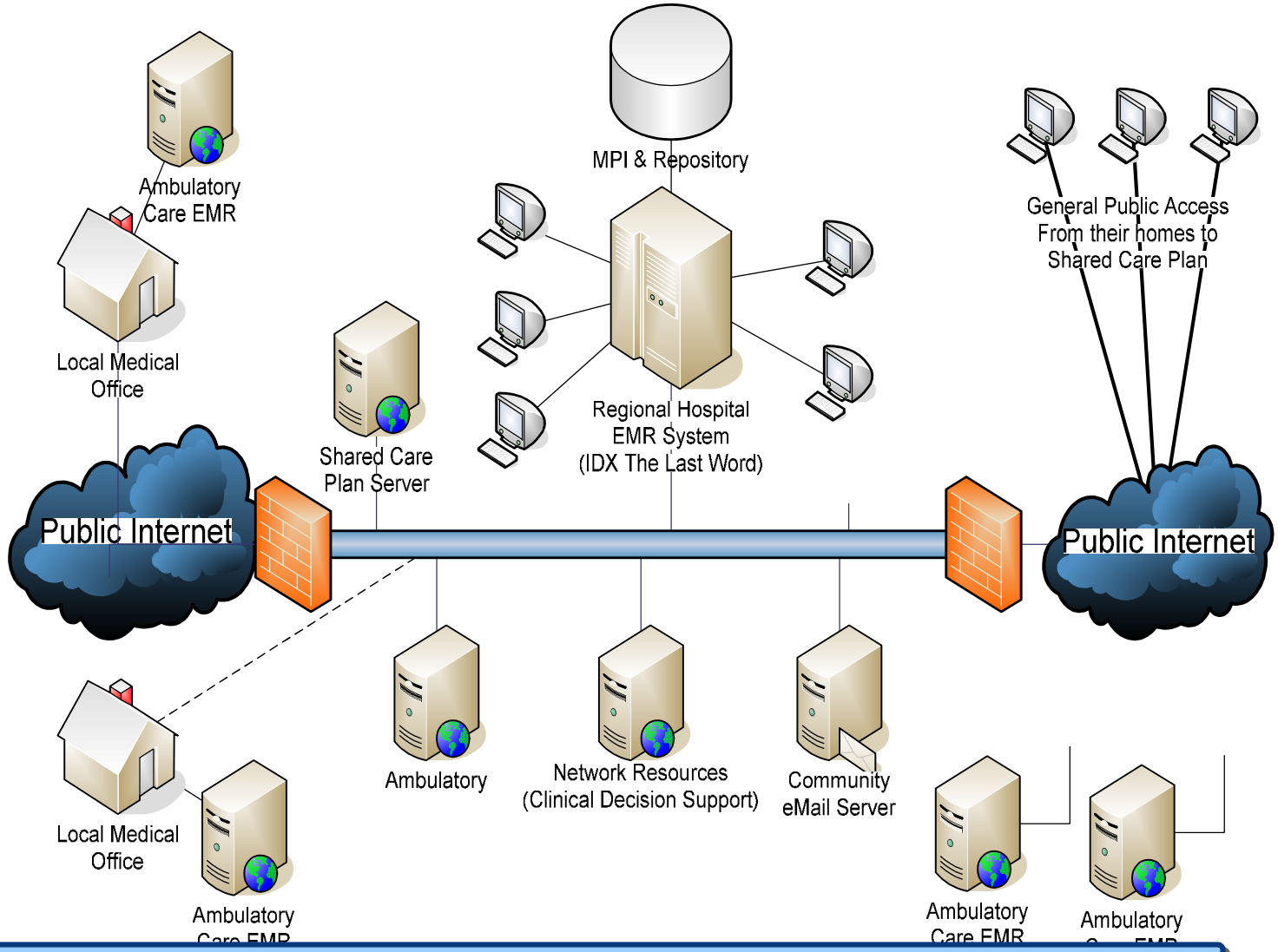
- Goal: IT efficiency, patient care
- Unified IT services for whole community/region
  - Back office, EMR, Radiology and pharmacy
- Run by trusted 3rd party
- No competition over IT/data among participants/competitors
- Governance by BoDs, Reps from constituent agencies
- One complete environment for hospitals
  - Multiple interfaces for EMRs (ambulatory care) (Spokane has 3)
- No payor involvement in IT systems, decisions, or payments
- Economics of Scale in action, Costs for group <<< Costs individually
- Single, database, standard-compliant (HIS) system
- Self-funded (all constituents pay as they go)
- Global MPI and matching scheme
- HIPAA-Single consent

Centralized – Single Data Repository Model Schematic of INHS



Despite central DB, individual hospitals can shield contracting & financial data

Centralized — Single Data Repository Model
Peace Health/Whatcom County HInet Schematic



Dark fibers connect core constituents; community has net access

Centralized Database: General Advantages

- Simplicity
- Benefits of scale
- Data are consistent
- Efficient
- No patient linkage issues – everyone has to accept the same identifier
- Standards adherence is implicit in the system

Source: Mark Overhage, June 2004

Centralized Database: General Disadvantages

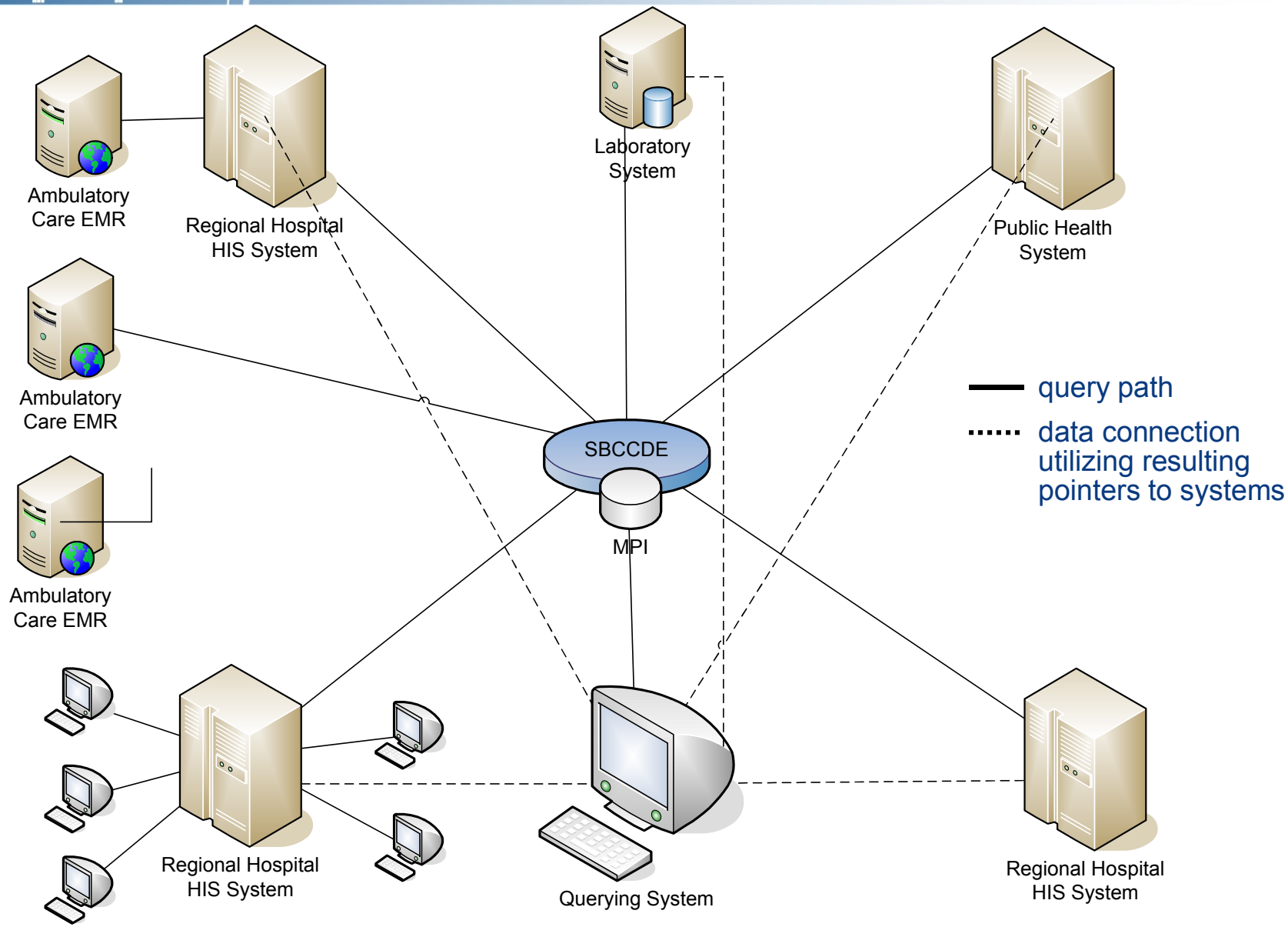
- May not scale well in many communities (INHS exception)
- Single point of control (could be a +)
  - Must trust the custodian
- Requires exceptional leadership
- Interoperability through out a single system is intrinsic
  - However, interoperability with other systems in region not necessarily assured

Source: Mark Overhage, June 2004

RHIO Characteristics: Peer-to-Peer, Indexed Data Exchange (SBCCDE)

- Goal
  - Improve the quality of care by aggregating patient data from multiple sources at the point of care, thus also improving both safety and efficiency
- CDE does not have a central repository , it has a centralized index to information
  - Not intended for post-visit analysis
- Based on a look and leave approach
- Designed to allow healthcare providers and physicians access to data with clear privacy protections
- CDE participants
  - Multiple county hospitals
  - Single payor
  - Public health
  - Labs
  - IPA

Peer-to-Peer, Indexed Model Schematic of SBCCDE



Peer-to-Peer, Indexed Model: General Advantages & Disadvantages

General Advantages

- Patient Privacy (Look & Leave Data)
- May be easily reproduced

General Disadvantages

- Different patient identifiers
- Different data models (basic way to organize the data)
- Different identifiers for observations in different systems (e.g. hemoglobin, Hgb) may create problems in accessing information
- If the peer-to-peer, indexed model is adopted, speed may become a bigger issue, could compromise scalability

Source: Mark Overhage, June 2004

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Observations

- Systems have evolved over a LONG time (5-14 years)
  - Biggest hurdle is community trust and cooperation—no shortcuts!
  - Trusted 3rd party needed in many cases to ease competitive threat between organizations
- Cost to develop systems beyond hospital IT requires multi-million dollar investments with limited sustainable business models at present
- Community involvement is a critical success factor
  - Usage compromised if solution is imposed by third party without community buy-in, especially when value not immediately obvious
  - Ambulatory care providers and payors are noticeably absent in large numbers
    - Only large ambulatory practices are connected—missing majority
- Choice of technical model often dictated by existing operations
- Must have strong leadership from and a commitment to deliver higher quality health care

Future of Each Organization

INPC	INHS	SBCCDE	Whatcom
■ Continued focus on in patient services ■ Widen covered area in Indiana ■ Link to other systems in Indiana, nationally ■ Less focused on ambulatory care ■ Data analysis for outcomes & better population health management	■ More of the same ■ Improve clinical care at cost effective price points ■ Implement ambulatory care for local practices ◆ Integrate two way messaging between systems ■ Diagnostic messaging ■ Diagnostic decision support ■ Data analysis & reporting ■ Link to other major systems in WA, nationally	■ Major launch/rollout planned for 1Q05 ■ If no dramatic uptake by MD users in Santa Barbara, system may discontinue in < 1 yr	■ Expansion of PHR (Shared Care Plan) and Disease Management ■ Adding more ambulatory practices to the network. ■ Studying success of DM and Shared Care Plan ■ eHi-CCBH Grant ◆ Provide eRx software for all prescribers ◆ Check for allergies, interactions, duplicate drugs, and contra-indications ◆ Provide formulary info at POC

More Research Is Needed In Several Key Areas

- Testing and evaluating financial incentives that are needed to support the use of HIT
- Exploring ways to link patient data from multiple sources (particularly amassing data from entire healthcare team *e.g.*, GP, specialists, labs, and hospital)
- Sharing information between two or more RHIOs
- Providing consumer access to PHRs which compile data from healthcare team
- Leveraging data that is collected for retrospective analysis; broader population health management.
- Examining the costs & challenges associated with training & workflow changes (change management)

Question: How do You Compare or Measure How Complete One RHIO is vs. Another?

- Wanted to find objective measures that were comparable among RHOs
- Needed a multi-dimensional instrument
- Needed objective endpoint for “done” or “complete”

Key Requirements for Complete Functionality of Community Health Information Infrastructure

- Completeness of information
  - All medical information on everyone in the community is in the system and accessible at all points of care.
- Degree of usage
  - Relevant parties in the community are using the system - providers and patients alike.
- Type of usage
  - The information is used for the entire spectrum of health care needs: patient care, public health, clinical research, quality improvement and healthcare operations.
- Financial sustainability
  - The implementation of the information infrastructure is financially sustainable, funded by an ongoing permanent source of operational revenue.

The Instrument

I. **What Information is Available (1-5)**
   1. In patient (hospital)
   2. Out patient (clinical)
   3. Long term Care
   4. Home Health/PHR
   5. Labs
   6. Out Patient Medications
   7. Imaging
   8. Claims

II. **Who's Using It (1-5)**
   1. Doctors
   2. Patients

III. **What is it being used for? (Binary 0/1)**
   1. Patient Care
   2. Public Health
   3. Clinical Research
   4. Quality Improvement
   5. Health Care Operations

IV. **Financial Sustainability (1-5)**

Highlights

	Spokane	Whatcom	Indianapolis	South Bend
Total Section I: What Information is Available	19 (48%)	21 (53%)	20 (50%)	16 (40%)
Total Section II: Who's Using it?	5 (50%)	6 (60%)	4 (40%)	4 (40%)
Total Section III: What is it being used for?	5 (100%)	5 (100%)	5 (100%)	3 (60%)
Total Section IV: Financial Sustainability	5 (100%)	5 (100%)	3 (60%)	5 (100%)

Results: Weighted Scores

	Spokane	Whatcom	Indianapolis	South Bend
Weighted Score (25%/Section)	74%	78%	63%	60%

Implications

- Study needs to be repeated on other sites and by other people
- Meant to be a first step
- While it is clearly not necessary to have a “complete” HII infrastructure in order to provide value, it may be important later in the evolution of these communities to provide additional services to their citizens and clinicians.

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