



November 16, 2006

The following report was completed by the Quality Corporation and a small team of industry experts to assist the Oregon Business Council (OBC) in advancing the data exchange capability amongst health care providers in the Portland metropolitan area.

Based on this high level report, the Business Council has now commissioned the Quality Corporation to further refine the financial projections and develop a business case and mobilization plan for a demonstration project to create a results and reports viewing and retrieval system.

To complete this next phase of work, Quality Corp. will need assistance from many stakeholders. We hope this report provides you with the background of the preliminary work completed to date and ask for your assistance in this effort.

We will share the results of this next phase of work after completion of the project.

If you have any questions, please contact Nancy Clarke at 503-241-3571 or nancy.clarke@Q-Corp.org for assistance.

Sincerely

A handwritten signature in black ink, appearing to read "Duncan Wyse", is written over a horizontal line.

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Oregon Health Information Exchange Options

Report to the Oregon Business Council

Data Exchange Group

May 15, 2006

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The Problem

While the U.S. health care system is capable of delivering superb medical care, there is also ample evidence of its overall inefficiency and inconsistency. A 21st century approach to effectively sharing electronic health information is a critical part of the solution to improving quality and reducing the costs of health care. Missing clinical information was associated with 15.6% of all reported errors in primary care. Physicians report that information is missing 38% of the time for patients with multiple conditions. The missing information was at least somewhat likely to adversely affect patients in 44% of the situations and to potentially result in delayed care or duplicative services in 59.5%. Simply computerizing medical records will not be enough to address the problem because more than half the time the needed information exists outside the doctors' own organization.¹

Converting from paper medical records to computerized health information that can be securely located and transmitted across delivery settings will not solve all our cost and quality problems. But our problems will not likely be solved without better use of tools for information sharing. We must get the information to where it is needed when it is needed for good decision making.

The Oregon Business Council Vision

Meaningful health information is widely and securely available among authorized providers in a usable form anytime and anywhere it is needed in order to improve the overall safety, effectiveness and efficiency of an individual's care and the public's health.

Options for Action

Identifying incremental steps for building this visionary system is a significant challenge. Each step must be financially sustainable within a community. The technology to securely manage sharing of health information is just now evolving. And only a small handful of communities have surmounted the financial and political barriers that abound.

A team, commissioned by the Oregon Business Council's Leadership Group on Data Exchange and staffed by the Oregon Health Care Quality Corporation, has studied options for surmounting these barriers. Using experience from other communities, national experts, and multiple models, the Team reviewed 19

¹ Peter C. Smith, et al. "Missing Clinical Information During Primary Care Visits," JAMA 293, No. 5 (2005): 565-571.

options and identified the most practical strategy to begin building a financially sustainable approach to a community-wide health information exchange.

Option 1: Results and Reports Viewing and Retrieval System

Make already-computerized information from laboratories, hospitals and imaging centers available for viewing and retrieval by all of a patient's providers.

Lab results, imaging reports, and dictated emergency department and hospital discharge summaries provide essential information for the diagnosis and management of acute and chronic conditions. However, these results, reports, and dictations are generally not available to other “non-ordering” community providers who might need them to make decisions about patient care outside the originating care setting or health system. As a result, care is suboptimal and providers often order unnecessary tests or admit patients to the hospital. Physicians are either not aware of or do not have access to previous lab and radiology results and other key information about the patient.

The ideal solution will offer an online, standardized, widely available and secure means for accessing recent and historical laboratory results, imaging reports, discharge summaries, and emergency department summaries by authorized parties. Results and dictations will be aggregated for the patient, regardless of ordering provider or which medical laboratory was used. Results and dictations will be available across different care settings. The platform will be readily expandable for additional types of information.

Option 2: Community Medication List

Make information about the prescriptions that patient' actually obtain available to all of a patient's providers.

A complete medication list provides key health information and important communication between various health care providers. Clinically, the need to improve medication safety is clear and well-documented. Accurate and complete medication reconciliation can prevent numerous prescribing and administration errors and reduce potential adverse drug events. Medication reconciliation errors are frequently a problem as patient's transfer between care settings and providers.

The ideal solution will offer an online standardized, widely available and secure means for aggregating medications for a single patient from

different pharmacy benefit managers, health plans or commercial hubs that aggregate such information. The system will display medications for the patient in a secure online portal. For a variety of technical and practical reasons, the community medication history is best implemented as an add-on option after results and report retrieval. This solution also provides potential for significant savings when combined with emerging options for retail pharmacy data hubs, e-Prescribing and decision support.

Option 3: Financial Claims Processing

Explore potential for savings that could be achieved through more efficient claims processing in order to use these savings as a sustainable funding source for clinical information exchange.

Two nationally acclaimed models for improving the exchange of clinical information were started by cooperatively addressing a completely different issue: financial claims processing. These systems are noted for creating both a political base for cooperation between plans and providers and a substantial financial base that can underwrite clinical information exchange. Whether or not these create a technical foundation for clinical information exchange is debatable. The Team does not have the expertise to determine how much of the Utah or Massachusetts models could apply in Oregon, though there is merit in exploring this further as a financing mechanism for clinical information exchange.

The Business Case

The Center for Information Technology Leadership (Harvard University and Partners Health Care) has estimated net annual national savings from HIT of about 8% of total health care costs, including \$44 billion for widespread use of sophisticated electronic health records (EHRs)² and an additional \$78 billion from exchange of electronic health information in communities.³ Sources of these efficiencies include reductions in medical errors that lead to expensive

² Johnston D, Pan E, Middleton B, et al. *The Value of Computerized Provider Order Entry in Ambulatory Settings*. Center for Information Technology Leadership, 2003. Executive preview available at http://www.citl.org/research/ACPOE_Executive_Preview.pdf

³ Walker J, Pan E, Johnston D, et al. The Value of Health Information Exchange and Interoperability. *Health Affairs* 19 January 2005;W5 10-18. Available at <http://content.healthaffairs.org/cgi/reprint/hlthaff.w5.10v1>

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and unnecessary care, elimination of duplicate laboratory and imaging procedures that are ordered when prior information is unavailable, and relieving busy medical professionals from the time-wasting burdens of tracking down needed information. HIT also has numerous benefits that are difficult to quantify, both in terms of efficiency and quality of care. Examples include improved adherence to recommended care protocols, decreased waiting times, reduced personnel turnover, increased patient satisfaction, and fewer liability claims related to medical errors.

However, realizing these benefits in communities has been challenging. While anecdotal reports of substantial savings from communities with advanced health information infrastructures (HIIIs), such as Indianapolis, IN, and Spokane, WA, are encouraging, there is a notable lack of rigorous economic evaluations that clearly demonstrate positive ROI for health information exchange. Three recent independent reports from First Consulting Group,⁴ the American Hospital Association,⁵ and the Agency for Healthcare Research and Quality,⁶ have emphasized this point. All three recommended that community stakeholders carefully evaluate the business case for specific HII initiatives to ensure that the proposed project is highly likely to generate a substantial ROI. In addition, they recommended that performance metrics be established from the outset to monitor the progress toward attaining the expected financial results.

In looking at the ROI for health information exchange, both the initial costs to establish the system and the ongoing operational costs must of course be considered. However, it is primarily the relationship of the operational costs to the anticipated benefits that will determine the feasibility and desirability of the project. As long as the ongoing savings are real and substantial, it should be possible to amortize reasonable start-up investments.

At this relatively early stage in the development of community HII systems, the prudent approach to financial estimates is to consistently apply a highly conservative view. This includes both overestimating costs and underestimating benefits. By choosing the most conservative assumptions at

⁴ First Consulting Group: The Myths and Realities of RHIOs: Executive Insights. April, 2006. Available at <http://www.fcg.com/research/login-required.aspx?rid=290> [free registration required]

⁵ American Hospital Association: Health Information Exchange Projects: What Hospitals and Health Systems Need to Know. April, 2006. Available at http://www.aha.org/aha/key_issues/hit/include/AHARHIOfinal.pdf

⁶ Agency for Healthcare Research and Quality: *Evolution of State Health Information Exchange: A Study of Vision, Strategy, and Progress*. January, 2006. Available at http://www.avalerehealth.net/research/docs/State_based_Health_Information_Exchange_Final_Report.pdf

each point, the overall financial model is close to a "worst case scenario." This approach helps to reduce risk and provide a realistic basis for stakeholder decisions.

Two major options were evaluated as first steps toward health information exchange: results reporting and medication profiles. The primary reason for choosing these options is the immediate availability of the information in electronic form. By integrating all the results and/or medications for a given patient and making the information readily available for care, substantial benefits can be anticipated in both quality and efficiency. The major category of savings for the results reporting option is avoiding duplicate testing (including imaging studies). For medication profiles, the key benefit is avoiding medication errors caused by lack of information and their preventable sequelae, including hospitalizations.

In addition to separate estimates of the ROI for results reporting and medication profiles, a combined estimate of sequential implementation of both was developed. Naturally, once the infrastructure for either of these options is established, implementing the other option can be accomplished with substantially less investment since that same initial infrastructure (both technical and organizational) can merely be expanded to accommodate the new application.

The business cases are based in part on eHealth Initiative's *Model for Estimating the Cost of Health Information Exchanges in a Community*⁷ and the Health Affairs article *The Value Of Health Care Information Exchange and Interoperability*.⁸ These were significantly modified based on information from other communities and tailored to the Oregon market and proposed use cases. Using a very conservative approach:

It is highly probable that there is a favorable benefit-to-cost ratio for Option 1, results and reports viewing and retrieval. Benefits accrue from processing savings and from avoided services. In year three the return on investment ratio (ROI) is \$2.09 of benefit to \$1.00 of cost, and cumulative break even point occurs in year four.

⁷ eHealth Initiative. HIE Initiative Cost Model, beta version, January 31, 2006. HIE Initiative Cost Model, version 2 is available at <http://ehr.medigent.com/assets/collaborate/2006/04/21/HIE%20Cost%20Model%20v2%2004%2020%2006.xls>

⁸ Walker J, Pan E, Johnston D, Adler-Milstein J, Bate DWs, Middleton B. "The Value of Health Information Exchange and Interoperability." Health Affairs 24:Supplement 1 January 19, 2005. W5-10-18. Available at <http://content.healthaffairs.org/cgi/reprint/hlthaff.w5.10v1>

It is highly probable that there is a favorable benefit-to-cost ratio for Option 2, community medication list. The costs to build are approximately the same IF the data can be obtained without charge. The benefit begins in year four and results primarily from reduced admissions for adverse drug events. The ROI in year three is 2.30 and break even occurs in year four. If the data cannot be acquired for less than 50 cents per record, the system will not have a positive ROI. If electronic prescribing can be incorporated as part of the system, the return will be substantially larger, resulting from greater use of generic drugs and more sophisticated decision support interactions. If created as an add-on to a results and reports viewing and retrieval system costs will be significantly less.

It is probable that there is a favorable benefit-to-cost ratio for Option 3: financial claims processing. Additional study is needed to determine if the experience from other communities would apply to Oregon now. At least one community's system processes electronic claims for 25% less than the typical rate in Oregon. A cooperative approach may also encourage more providers to switch from paper to electronic submission of claims. It is not clear whether these savings could be achieved in Oregon at this time.

The benefits from options one and two come from cost avoidance for services, which rules out a transactions approach to financing. Though benefits certainly are passed on to purchasers through premiums, engaging the purchasers in financing is not practical except through donations for start-up. Physicians will also gain some efficiencies from systems, but are not likely to have savings that can be captured as a practical source of revenue. After appropriately allocating benefits from improved efficiencies for the uninsured, the results and report viewing option will accrue approximately 47% to hospitals and 53% to plans. The benefits for a community medication list using the existing PBM data will accrue entirely to plans. Option 3 benefits come from per-transaction cost avoidance and may be amenable to funding based on transaction fees. Benefits in another state's project accrued 70% to payers and 30% to providers.

Architecture

Technology architecture options for securely exchange electronic health data are rapidly maturing. The Team considered five options⁹ and concluded that at this time a centralized demographic data base that at least manages patient identity and knows locations for other information is needed. Whether the actual clinical information is centralized, decentralized or a hybrid should be decided based on further evaluation of costs, performance, and integration with emerging national infrastructure. Secure peer-to-peer communications will continue to be a critical adjunct to this model for information exchange. Portable devices that give the patient total responsibility for storing their own information are not feasible. Patient account routing cards may emerge as useful, but are not practical at this time.

Conclusions

Hospitals, health plans and physician groups in the metropolitan Portland area are making enormous investments in health information technology, which is highly desirable. They are making these investments because they know that their organizations' mission requires them to better utilize modern information systems, and that such systems are critical to their competitive position in the market place. Without a concerted effort to overcome political and technical barriers to sharing information, we cannot expect the full benefits of computerization to accrue to the community as a whole. The time to begin building the connecting health information infrastructure is now. The place to begin is with a system for viewing and retrieving readily available reports of laboratory and radiology tests and hospital and emergency department summaries.

⁹ Arzt, N. "Development and Adoption of a National Health Information Network," Department of Health and Human Services National Coordinator for Health Information Technology, HLN Consulting, January 18, 2005, available at www.hln.com/resources/rhio.php.

Recommendations

- ❑ Stakeholders should build a Portland metropolitan area results and reports viewing and retrieval system that begins with laboratory results and quickly adds radiology results reports and hospital and emergency department discharge summaries. The system should anticipate expansion to include medication history and other data as it becomes standardized and available. The system should also anticipate expansion to other communities beyond Portland.
- ❑ The architecture for the system should be designed with a centralized demographic data base that at least manages patient identity and knows locations for other information. Whether the actual clinical information is centralized or decentralized should be decided based on further evaluation of costs, performance, and integration with emerging national infrastructure.
- ❑ The information system must be designed with the highest legal and technical attention to assuring the privacy and security of data in order to earn the confidence and participation of consumers and data suppliers. Implementation must include neutral and independent auditing.
- ❑ At a minimum the information system must provide methods for patients to remove their data from the system at day one. From the earliest stages of planning, implementation must also prepare for patients to see their own data as well as to control and know who else sees it.
- ❑ An appropriate entity should explore options for more efficient claims processing and the potential for savings. Such savings may provide opportunity for a sustainable funding source for clinical information exchange.

Appendix A: Process and Methods for Use Case Selection

The Team used an iterative process to reach its recommendations for potential first step options for health information exchange in Oregon. Following is the sequence followed:

- Generate a list of ideas based on the staff's environmental scan of projects in other communities and national literature
- Organize the list by data types and data users
- Develop criteria for selection
- Independently score the options based on the criteria to create composite scores
- Review the scores and make a final selection for use case development
- Revise the options based on research and development of the use cases and the business case

Following are the results of each step.

Initial List Of Potential Projects

1. Bio-surveillance
 - Detecting/monitoring outbreaks or
 - Epidemiology and surveillance of chronic conditions, e.g. levels of blood pressure control
2. Chronic disease registries support (very difficult)
3. Clipboard: patient information such as demographics and a short set of essential clinical information that should be available everywhere. (very difficult) Note: terminology is evolving:
 - CCR=Continuity of Care Record
 - CDA=Clinical Document Architecture
 - CDA-CRS=Clinical Record Summary
 - CCD=Continuity of Care Document
4. Labs organized a general distribution of results; get lab information easily into EMRs in the patient settings. Consider both push and pull models
5. Uninsured and frequently uninsured patients care in the outpatient setting. For example, create the links in both directions between hospitals and OCHIN, and do it in a way that builds the statewide system of the insured
6. Data Sources - concentrate on specific ones
7. Labs
8. Pharmacy - multiple approaches to getting data to points of care regarding fulfillment, prescribing, reconciliation, safety

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9. Claims clinical summaries- make them more useful and available in consistent ways
10. Insured Patients.
11. Radiology-general distribution of reports so they are available anywhere
12. Chronic Disease data from plans for registry and disease management by clinics
13. Emergency Department: multiple data types for the specific ED use
14. Claims Financial processing efficiencies as a foundation
15. Specialist Report and Referral Summary: manage the referral process and information loop
16. Post Hospital Discharge Compliance and continuity of care, for example to nursing homes
17. Single Data Base EHR: get everyone to simple use the same system
18. Scheduling systems to get voluntary slots to share treatment of the uninsured
19. Views of hospital's existing data that they put out in summaries, with single viewing

Potential Cases Organized by Data Type, Data Source and User

DATA TYPE	DATA SOURCE	USER
Claims for services	Plans	Office Physicians ED physicians
Pharmacy Fulfillment	PBMs Plans Claims Retail Pharmacies	Office Physicians ED physicians
Labs and Images	Health Systems Lab Companies Stand-alone Imaging Centers	Office physicians ED doctors
Clinical Summaries <ul style="list-style-type: none"> ▪ ED and Hospital ▪ EMR summary 	Discharge Summary <ul style="list-style-type: none"> ▪ Hospitals ▪ MD offices 	Office physicians ED doctors
Hospital's EMRs	Hospitals	Office MD ED docs
Clinical Referral/ Request Consultants summary	MD offices EMRs	Office MDs
Appointment Data	MD offices	Office physicians ED physicians
<p><i>All use cases can have a public health / bio-surveillance overlay</i> <i>All use cases can start with a specific population such as the uninsured using OCHIN</i></p>		

Use Case Selection Criteria

- Technically Feasible/doable
- Attractive to the community
- Business case has strong potential
- No stakeholder losers- good distribution of wins
- Ability to complete in one year
- Foundation for future work (a building block for connecting to national efforts)
- Measurable results
- Engages critical stakeholders
- Robust and sustainableClinically meaningful

Use Case Selection

Three use cases were clearly chosen within the top five by all four Team members.

- **Community Medication List**
- **Lab Results and Radiology Reports Viewing** (*Note: These were combined because the issues are so similar for the long-range solutions. The actual recommended first step pilot may only address one of the components.*)
- **Discharge and Emergency Department Summary Exchange** (*Note: These were combined because the issues are so similar for the long-range solutions. The actual recommended first step pilot may only address one of the components.*)

The results did not indicate a clear fourth use case. The Team discussed the next six possibilities based on the rankings and chose a **System for Financial Claims Processing** because:

- It is substantially different from the other options to warrant exploration
- Models are fully functioning in other states/communities
- A clear business case can be made, with claims processing savings financing other functionality
- In places where this functions, it has led to a productive dialogue among stakeholders

The following were discussed and rejected as the fourth use case

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Administrative Claims for Clinical Uses	Although this builds very well on the Clearinghouse pilot, the amount of clinically useful data is too small to warrant the cost of building a clinical application
Electronic Referral Management	Although this builds well on some existing Oregon pilots and has a fairly easy-to-calculate financial return, too few physicians are using EMRs, the substrate engaged in the pilot would be too small, and the focus is too narrow to be a substantial building block for a long-range system
EMR Summary Exchange	Although this will be a good activity when saturation is higher, too few physicians are using EMRs and the substrate engaged in the pilot is too small to be productively pursued now.
Electronic Prescribing	Vendors are aggressively and intensively addressing this problem; it doesn't need a community collective approach of our scale at this time.
Disease Management Tools	Although aggregating all of a patient's information for useful case management is definitely the goal, this is too large a step to take at one time.

After additional study of the technical requirements the two use cases for hospital and emergency department discharge summaries and for lab and radiology results were combined into a single use case for results viewing and retrieval.

The final use cases are for forwarding to the community:

- Results and Reports Viewing and Retrieval
- Community Medication List

Financial Claims Processin

Appendix B: Use Cases

Option 1: Results Reporting System

Good clinical decisions depend on providers knowing specifics about the patient's history and possible chronic conditions. Lab results, imaging reports, and dictations (including discharge summaries and emergency department summaries) are key components of the patient's history, in addition to providing essential information for the diagnosis and management of acute and chronic conditions. However, historical lab results, imaging reports, and dictations for a patient are generally not available to other "non-ordering" community providers, who might need them to make decisions about patient care outside the originating care setting or health system. Fundamentally, patient care occurs today with incomplete information available to non-ordering providers in the community or in the ED. Also, providers often order unnecessary tests because they are either not aware of or do not have access to previous lab results and other key information about the patient.

Today, many providers can place orders to regional or reference labs using online tools, dedicated terminals, or by fax. (This option does not attempt to address the lab ordering process, but rather is confined to viewing historical results.) Lab results are delivered to providers in a variety of ways by the labs. Most labs offer at least some online tools, but also employ remote terminals, remote printer/modems, and fax delivery. In some cases providers may still receive results on paper by courier. In general it falls to the provider to manage the workflow related to results triage, viewing, and decision-making. Trending information is rarely available for a patient unless the provider has an automatic import into EMR or other way of creating "flowsheets." The same is true for imaging reports.

Hospital discharge or ED summaries are clinical documents which often serve a dual purpose of documenting an encounter, and communicating information relevant to the subsequent provision of care to a community provider. In general a copy of this record is sent to the community primary care provider (PCP) as well as other specialist providers that will have ambulatory follow-up care. This process may be complicated by the following conditions:

1. The PCP may be unknown to the hospital or ED.
2. The patient may have no PCP.
3. The patient may switch PCPs prior to followup.

Data flow directly from the lab, hospital or imaging center to the ordering provider, and generally are not distributed anywhere else. Results for a single

patient from different sources are not aggregated for that patient. Labs in particular have to support a variety of electronic interfaces with all of the parties that receive results - health systems, other labs, medical groups, and individual providers. However, the majority of results delivery is done either within mostly closed systems, or using point-to-point interfaces with providers. There is a trend toward labs creating/purchasing their own electronic portals for results delivery. Most labs now see online result delivery as a distinguishing service, and IT services are becoming part of their “core business.” As a result, labs are duplicating efforts, by building interfaces to new clinics as they implement EMRs.

At the end of year 1, the ideal solution will offer an online, standardized, widely available and secure means for accessing recent and historical laboratory results, imaging reports, discharge summaries, and emergency department summaries by authorized parties. Results and dictations will be aggregated for the patient, regardless of ordering provider or which medical laboratory was used. Results and dictations will be available across different care settings. Lab and imaging orders will be placed with an online tool or other method. This solution does not attempt to modify the ordering process. Providers will be able to manage their result document viewing workflows with task lists and other organizing functions in the user interface, and print lab results. At the end of 5 years, the system will allow providers to import structured lab information and unstructured reports directly into the EMR.

Option 2: Community Medication List

Patients, their health care providers, and other authorized parties need access to a complete medication list for a patient. In addition to providing key health information, knowledge of the patient’s medication history will also facilitate important communications between various health care providers, notably the physician and the pharmacy. The data used to create a medication history should contain sufficient information about the patient’s medications to enable the provider to create, update, and view a complete medication history. The medication list should differentiate current medications from relevant past medications. Providers and patient should be able to review and analyze the medication history for compliance, interaction checking and renewals.

Clinically, the need to improve medication safety is clear and well-documented. Accurate and complete medication reconciliation can prevent numerous prescribing and administration errors. Patients are often discharged with inadequate medication instructions. It is possible to reduce potential adverse drug events by obtaining medication histories of patients scheduled for

surgery. Medication reconciliation errors frequently occur during the patient's transition or transfer to another level of care

Hospitals and other providers are required by JCAHO to obtain and document “complete list of the patient’s current medications” upon admission (JCAHO Patient Safety Goal #8). They must also communicate the medication list when a patient is transferred to another setting. Currently each provider must devise its own way to determine the patient’s current medication list. However, medication lists are not shared across clinical settings for a given patient, but rather on an ad-hoc basis upon discharge or transfer from one setting to another. Providers across different care settings for a single patient have no standard way of obtaining medication lists for a patient, if the summaries were obtained in a different setting. Patient care occurs with incomplete information.

The ideal solution will offer an online, standardized, widely available and secure means for accessing current and historical medications for the patient, by authorized parties. JCAHO suggested in February 2006 that “the complete list of medications may be written or communicated via electronic system such as an up-to-date electronic MAR that can be accessed by the receiver.” Medications will be aggregated for the patient from different sources, and made available across different care settings.

Under the proposed scenario, current and historical medications will be acquired from pharmacy benefit managers (PBM). Authorized providers and patients will access the medication history from a single secure access point.

At the end of year 1, the ideal solution will offer an online standardized, widely available and secure means for aggregating medications for a single patient from different PBMs. The system will displays medications for the patient in a secure online portal. At the end of 5 years, the system will allow providers to import medication lists directly to the EMR.

We recommend the community medication history as the SECOND option after results reporting for several reasons:

- PBM data may not be widely available and the financial model has not shaken out. There may be a cost to acquiring the data. There are also concerns over whether PBM data is timely enough or complete enough for this application.
- Other regions have attempted to build a solution and have abandoned the project due to lack of a business model.
- There are likely to be national efforts to solve this problem using standardized approach.

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- The greatest economic benefits come from increased use of generic drugs, which require formulary support and e-prescribing.
- The medication history, to be useful, must incorporate interactive features to manage and update the medication list; this is a relatively complex application that should not be built in “standalone” mode.

Option 3: Claims Clearinghouse

Two nationally acclaimed models for improving the exchange of clinical information were started by cooperatively addressing a completely different issue: financial claims processing. This approach does not immediately provide better access to clinical data for providers. These systems are touted, however, for creating both a political base for cooperation between plans and providers and a substantial financial base that can underwrite clinical information exchange. Whether or not these create a technical foundation for clinical information exchange is under debate.

Claims transactions are the financial engine that drives the business of healthcare. Eligibility, claims submission, claims adjudication payment, remittance advice posting, second party and patient billing are key components of the business processes. Although HIPAA laws standardized the content of financial transactions in healthcare, processes for communicating between entities are still not fully standardized or automated. Clearinghouses assist providers and plans in assuring their bills are HIPAA compliant and can be sent back and forth. A claim may need to go through several clearinghouses before reaching the appropriate payer. And a substantial number of small and rural clinics still rely on clearinghouses to manage their paper claims submission and collection. (A clearinghouse exists to scrub and route claims to the appropriate destination. All providers, large or small use a clearinghouse for some if not all of their electronic submissions).

The Utah Health Information Network (UHIN) uses a central hub to standardize multiple components of financial claims processing to increase control of information flows and to eliminate the redundant effort of connecting multiple trading partners. (note: UHIN doesn't eliminate the need for clearinghouses. UHIN handles information going in and out of the Payers' systems, but the providers may still use a clearinghouse since they may not have control of where these files are delivered. Some may go directly to UHIN but others go to a clearinghouse). The clearinghouses - WebMD, ProxyMed, NDC, and others simply send their claims to UHIN rather than each payer directly. There is no repository for any claims data; data are simply cleaned and organized and passed back and forth. Considerable submission and adjudication has been automated in the process. Utah reports dramatic savings, which accrued 70% to plans and 30% providers. Massachusetts also brought providers and payers

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together for standardization. In this highly consolidated market the problem was addressed through common software without a centralized hub for processing.

The Team does not have the expertise to determine how much of the Utah or Massachusetts models could apply in Oregon. The other states' systems were begun years ago before HIPAA was passed and the Internet was robust. Over the last decade they cooperatively approached automating processes and implementing HIPAA standards. Oregon providers and payers on the other hand, have already made substantial independent investments to move from paper to automated processing. Providers have bought and customized billing systems to submit HIPAA compliant claims without using a chain of clearinghouses. This may be true for only portion of a provider's business. Everyone still uses a clearinghouse to reach ALL payers electronically. Providers would not make these connections directly themselves. Payers with substantial market share have consolidated their clearinghouse choices and processes. Some communications standardization beyond HIPAA has already been achieved through a voluntary privacy and security forum that functions in Oregon and Southwest Washington. It is certain that much of the efficiency regarding automated processing has already been achieved for both providers and payers in Oregon.

Nevertheless

- Multiple clearinghouses function in Oregon with substantial variation and in some unknown proportion of situations, claims go through multiple clearinghouses to reach payers.
- Not all plans have implemented all of the HIPAA transactions, particularly eligibility and claims status.
- Not all providers have implemented processes that promote efficiency, for example automated posting and electronic funds transfer. (Note: this is not the Payers responsibility, it's the Providers who need to buy a product from their Practice Management Vendor to Import this file type - 835 Remittance. Less than 80% of the providers have done this)
- Substantial number of small and rural practices still processing with paper. A statewide cooperative approach to incentives and assistance to modernize may help.
- Utah processes electronic claims for 18 cents. In Oregon payers process electronic claims at 25 cents to one dollar.

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- UHIN health care providers receive payment for commercial claims in 7 days or less, 85% of the time. No commercial plan in Oregon is meeting that benchmark.

A full exploration of the potential efficiencies in claims processing is beyond the scope of this teams' charge. The Team agrees that there is merit, however, in exploring this further as a financing mechanism for clinical information exchange.

Recommendation: An appropriate entity should explore potential for savings that could be achieved through more efficient claims processing in order to use these savings as a sustainable funding source for clinical information exchange.

Appendix C: Business Case

**OREGON HEALTH INFORMATION EXCHANGE
COST - BENEFIT ANALYSIS ASSESSMENT
May 12, 2006**

Prepared by Witter & Associates

PURPOSE

The Oregon Business Council's Leadership Group on Electronic Health Records commissioned a Team to assess options, alternatives and issues to be considered for Oregon to achieve a vision of

***Vision:** Meaningful health information is widely and securely available among authorized providers in a usable form anytime and anywhere it is needed in order to improve the overall safety, effectiveness and efficiency of an individual's care and the public's health.*

The Team with staffing by the Oregon Health Care Quality Corporation has studied options for surmounting these barriers. Using experience from other communities, national experts, and multiple models, the Team identified the most practical places to begin building a financially sustainable approach to a community-wide health information exchange.

The Cost - Benefit Analysis (CBA) assessment reported herein was undertaken with the purpose of estimating of the costs, benefits and return on investment (ROI) for selected project options (or use cases) under consideration by the Team. The CBA was to support the Team process in assessing the alternative projection options. The intent for the CBA was to use the best available methods and data from the literature, presentations and the experiences of others recognizing that such methods are still evolving. In applying the available methods the CBA needs to consider the state of development of health information technologies (HIT) in Oregon and the market and other environment factors that would affect the development of a regional health information organization (RHIO) or health information exchange (HIE).

In developing a CBA, it is important for users to recognize that a CBA is not a business plan or a set of financial statements. While some CBAs may be part of a business planning process or resulting in development of financial statement, such efforts were beyond the scope of this assessment. It is also important to

emphasize that the benefit calculations developed for the project options cannot directly be translated into revenue sources or streams to finance the projects.

COST - BENEFIT MODELING

The purpose of the cost - benefit modeling is to provide a comparative basis for evaluating several alternative use cases that could be the basis for implementing an Oregon Health Information Exchange (OHIE). The costing - benefit modeling assumes that the development, implementation and operation of the OHIE efforts will be conducted through a freestanding self-sufficient organization that will conduct all operations (administrative activities, data centers and information exchange operations) in its own leased space. Some major cost components (e.g., hardware, software, connectivity, and data center operations) are based on global estimates since the specific design and architecture for implementing the use cases are not yet sufficiently defined. Nevertheless, the use cases under consideration appear to be of approximately the same magnitude and would require about the same levels of staffing, essential hardware and software components, data center and other operational costs.

Cost Model: The cost modeling uses a hybrid of approaches to calculate costs. The eHealth Initiative sponsored development of a Model for Estimating the Cost of Health Information Exchanges (HIE) in a Community.¹⁰ The eHI-HIE model was used to provide initial estimates for the several use cases. The model was modified to fit the Oregon use cases under consideration. Information on business plans and modeling from other HIE communities were reviewed for similarity of the use cases, methodologies and of results. The reference list below identifies various sources considered in developing the CBA estimates. Given the several options under consideration, it appeared that the development and operational cost of the cases would likely be of approximately the same magnitude for each option. Therefore a simplifying assumption was made to apply a common, uniform set of cost estimates to each option.

Benefit Modeling: The benefit modeling uses a variety of approaches. No single benefit modeling technique for RHIOs or HIEs was identified that could be applied. The modeling herein uses a variety of methods gleaned from other projects and the medical literature about issues that affect resource utilization, processing costs, or opportunities to avoid the use of medical

¹⁰ eHealth Initiative and Foundation. A Model for Estimating the Cost of HIE in a Community: Background and Technical Specifications. December 2005. and eHealth Initiative. HIE Initiative Cost Model, beta version, January 31, 2006.

services. Estimates were developed for realization of the full (100%) benefits one year following the availability of the services in each option. During the initial year of the service benefits were estimated as 50% of the full benefits.

Conservative: In developing both costs and benefits the intent has been to make the estimates conservative. The guiding principle was to identify all the possible costs that the OHIE might face and be reserved in promising realization of benefits. In particular, the analysis of potential benefits considered the stage of development of electronic information resources in Oregon and the Portland metropolitan area. Some potential benefits identified in other states or regions are not applicable in Oregon or Portland. The returns on investment (i.e. benefits divided by costs or ROI) are therefore considered conservative and defensible.

Alternatives: This analysis does not consider alternative organizational relationships or implementation strategies that might have a significant impact on costs or the speed of implementation. Costs might be reduced significantly if it were possible to contract with an already existing organization to share data center facilities, hardware, system and application software and staffing. The analysis did not consider community-wide acquisition (group purchasing) of major software components such as patient identification management software which many health systems are currently considering. The analysis did not consider the option of contracting with a consulting firm for part or all of the management and/or implementation of the OHIE. While contractors may be able to offer expertise that can accelerate and/or facilitate the implementation process, the costs incurred in other states have been significantly higher than projected herein. Alternative financing strategies for the project costs were not considered in this analysis. Costs are projected as incurred on a cash basis. Vendor financing of hardware and software may be possible with the effect of spreading the large investment in hardware and software over multiple years.

PROJECT PHASES

The CBA considered the following phases for each project option under consideration.

Feasibility Assessment: This report is part of the feasibility assessment undertaken by the Oregon Health Care Quality Corp and the Oregon Business Council to identify project options and priorities for an Oregon HIE.

Commitment Phase: Essential stakeholders need to consider the feasibility assessment recommendations, determine their interests in moving the

recommended projects forward, approve the global financing plan, and make the necessary financing and other commitments necessary to proceed. The duration of the commitment phase is unclear. In order to maintain the momentum of work leading up to this point, some level of continuing effort to facilitate establishing the OHIE organization and developing an OHIE business plan. Costs during the commitment phase are not included in the cost benefits assessment.

Mobilization Phase: The six-month mobilization period (year 0) is contemplated to complete setting up the organization and governing board, secure and collect the necessary funding, recruit a CEO and other key staff, confirm participating organization commitments and convening working groups to consider policies and principles for OHIE operations including privacy/security policies. This phase will also involve securing necessary facilities and office equipment, initiating the process for executing business associate and other agreements with participating organizations, and preparing for the implementation phase (e.g., issue RFIs to vendors, develop hardware and software specifications, develop RFPs).

Implementation Phase: The nine-month implementation phase occurs during the first nine months of year 1. It is expected that key staff have completed sufficient preparatory work during the mobilization phase so that hardware and software specifications are completed and that decisions on RFPs can be made early in this phase (month 2). By month 3 or 4, the data center will be available for installing necessary hardware, software and connectivity. By month 6, initial protocols for information transfer are being piloted tested. By month 7, access and privacy auditing is being piloted and tested. By month 8, (a) selected providers are submitting daily batches of identifying demographic information to the patient master index (PMI) and clinical data records (or alternatively pointers to clinical data records based on the final architecture) (b) selected providers are submitting archival data, and (c) selected providers and physician practices are testing access to the systems. During month 9 additional providers are submitting data, full system integration testing for data submission and retrieval is completed including an outside review or audit of privacy and security safeguards, and additional providers are piloting and testing access to the system.

Operational Phase: The contemplated project will “go live” during the last three months of year 1 and be operational thereafter.

COSTING APPROACH

Initial cost calculations were generated using the eHI-HIE cost model based on time intervals for the phases and the assumed cost factors built into the cost

model. The eHI-HIE model user can modify the cost factors as well as add or delete functionalities for a particular use case. Model users also specify a staffing plan and input their own estimates for general and administrative costs based on local circumstances. Several versions of model calculations were generated as the Team evolved the use cases, feedback was received from local experts and staffing plan evolved. The model proved useful in identifying components/functionalities that would be needed in an HIE applied to the local use case options.

Since the purpose of the CBA was to assist in the evaluation of alternative use cases, costs were treated on a cash basis ignoring depreciation or amortization of costs that would normally be capitalized. A distinction was made between recurring and non-recurring costs as well as cost that were attributable to the mobilization, implementation and ongoing operational phases. One common set of cost estimates are applied to each of the use case scenarios to provide comparability in the estimates.

STAFFING PLAN- PERSONNEL EXPENSES

The staffing plan assumes that the OHIE will be a freestanding self-sufficient organization that relies primarily on its own staff. Minimal use of consultants is contemplated during the mobilization, implementation and operational phases. Staffing levels and salary rates were reviewed with several local CIOs for reasonableness of the staffing levels and Portland area salary market conditions. Some respondents suggested modifications in the mix of staffing or using consultants for some roles but, in general, the feedback was that the overall staffing seemed reasonable. Some respondents provided feedback that the salary rates for highly qualified information technology professionals are too low. This staffing plan is used in each of the three options under consideration.

Staffing is phased in during the mobilization and implementation phases as needed. Some positions may need to be filled on an interim basis or with contracted services from another organization or consultants in order maintain the timetables contemplated for the OHIE. Specifically, the President/CEO/Executive position is budgeted starting in month 1 of the mobilization period. It may take the governing board some time to recruit and hire an appropriately qualified person for the CEO position. The budget for the CEO position could be used to appoint an Interim CEO or to contract with another organization to provide the interim leadership for the OHIE while the recruitment process is underway.

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Position	Hire Date	FTE	Base Salary
President/CEO/Executive	Mobilization month 1	1.00	120,000
Chief Medical Officer	Mobilization month 3	0.50	150,000
CIO/COO	Mobilization month 3	1.00	100,000
CFO	Mobilization month 4	1.00	90,000
Security Officer	Mobilization month 4	0.50	90,000
Privacy Officer	Mobilization month 4	0.50	100,000
Implementation coordinator	Mobilization month 3	1.00	80,000
Implementation specialist	Mobilization month 5	3.00	60,000
Training coordinator	Implementation month 1	0.50	60,000
Help Desk coordinator	Implementation month 3	1.00	50,000
Help Desk reps/Trainers	Implementation month 3	2.00	40,000
Help Desk reps/Trainers	Implementation month 7	2.00	40,000
Admin/audit clerk	Mobilization month 3	1.00	30,000
Billing/accounting clerk	Implementation month 7	1.00	30,000
Network manager	Implementation month 3	1.00	80,000
Database manager	Implementation month 3	1.00	80,000
Programmer analyst	Implementation month 3	1.00	70,000
HR manager/coordinator	Mobilization month 4	1.00	60,000
Interface Data Auditor	Implementation month 7	1.00	50,000
Web Developer	Implementation month 3	2.00	70,000
Total FTE Staffing		23.00	

Fringe benefits are estimated at 28% of salaries.

DATA CENTER COSTS

Any of the possible broad functional service options that might be considered for an HIE requires a data center with significant hardware and software to handle that functionality. This represents a significant fixed cost on any HIE initiative. That initial fixed costs include a data center facility, high band width connectivity, a complement of servers, patient identity management software, document registry, document repository, audit servers and access tracking software, appropriate firewalls and security services, access registration and authentication software, and web services. Once these costs are covered for any initial application, additional functionalities have a much lower marginal cost to implement and operate.

One-time start up costs for hardware and software are estimated to be about \$3.5 million for any of the use case options under consideration. The estimates were consistent with the eHI-HIE cost factors and similar to estimates in other similar projects. While the exact scope of each use case and architecture selected would affect the costs, the overall cost estimate seems appropriate considering costs of other HIEs and feedback from Portland area chief information officers.

On a recurring basis, annual software licenses are estimated at \$600,000 and annual data center facility and operational costs are estimated at \$600,000.

INTERFACE COSTS

The eHI-HIE cost model includes cost factor estimates for the costs that will be incurred for each interface into the HEI given a particular set of functionalities. Given the use cases under consideration for an OHIE, there did not seem to be a rationale for assuming that interfacing costs incurred by organizations to submit data to the OHIE would create a cost burden on the OHIE itself. The expectation is that each organization will finance their costs for interfacing to and from the OHIE. Those costs are not included in the cost model estimates.

GENERAL AND ADMINISTRATIVE COSTS

General and administrative costs (including general administrative facilities) are estimated at \$365,000 for year 1 as the organization is established and about \$315,000 on an annual basis thereafter.

COST SUMMARY

In summary, the estimated costs are:

- Year 0 - 6 months Mobilization: \$572,000
- Year 1 - 9 months Implementation, 3months Operations: \$5,963,000
- Year 2 - 12 months Operations: \$3,571,000
- Year 3 - 12 months Operations: \$3,634,000
- Year 4 - 12 months Operations: \$3,950,000

These estimates include 3% per year inflation in salaries but no inflation adjustments on other costs.

Costs could be different: The cost estimates were developed to be conservative and apply across the various use cases under consideration for a new free-standing and self-sufficient organization. These cost estimates could be reduced, perhaps significantly if alternative arrangements were considered including:

- Sharing space with another data center
- Collaboration with another organization
- Contracting out some services, e.g. human resources
- Sharing common services with another organization
- Receiving in-kind support from other participating organizations
- Financing hardware and software through vendors or others

Parts or all of the implementation and/or operations could also be contracted out to a major consulting firm. A number of firms are entering the RHIO/HIE market space. It is unclear whether sufficient cost saving from the estimates herein to cover contracted implementation. Based on the limited information available an implementation service contract would be in excess of \$500,000 and perhaps in excess of \$1,000,000.

RESULTS AND REPORTS VIEWING USE CASE

The results and reports viewing use case will make already-computerized information from laboratories, hospitals and imaging centers available for viewing by all of a patient's providers throughout the community.

Lab results, imaging reports, and dictated emergency department and hospital discharge summaries provide essential information for the diagnosis and management of acute and chronic conditions. However, these results, reports,

and dictations are generally not available to other “non-ordering” community providers who might need them to make decisions about patient care outside the originating care setting or health system. As a result, care is suboptimal and providers often order unnecessary tests or admit patients to the hospital. Physicians are either not aware of or do not have access to previous lab and radiology results and other key information about the patient.

At the end of year 1, the ideal solution will offer an online, standardized, widely available and secure means for accessing recent and historical laboratory results, imaging reports, discharge summaries, and emergency department summaries by authorized parties. Results and dictations will be aggregated for the patient, regardless of ordering provider or which medical laboratory was used. Results and dictations will be available across different care settings. The platform will be readily expandable for additional types of information.

Benefits - Processing Savings Opportunity: Hospitals incur significant costs to send emergency department (ED) visit summaries and hospital discharge summaries to physicians responsible for the ongoing care of patients and/or other providers (e.g., other hospitals, skilled nursing facilities, home health care, hospice) who need them. Hospitals also receive requests from health plans, workers compensation carriers, accident insurers and other request summaries. Some summaries are distributed as a standard process following an ED visit or hospital discharge. Some summaries are distributed on an as-requested basis. Even though most hospitals have or are integrating these summaries into their electronic clinical record systems many providers that appropriately need access to the information cannot easily retrieve it. Whenever manual processing is required, significant staff time is involved in routine processing, receiving requests, locating records (paper or electronic), preparing the information for distribution (copying, printing, etc.), transmitting the information (mail, fax, or email), and tracking information on the requester or recipient. When a physician office or other provider receives ED or discharge summaries, additional costs are incurred to receive the information (mail, fax or electronic), match the information to the correct patient record (paper or electronic), and get the information entered into the record (scan, enter, or file).

The benefits of the results and reports viewing use case were calculated using estimates of the amount of processing costs that could be saved by hospitals, physician practices, other providers and authorized users if the summaries were available for access based on methodologies identified for similar

projects.¹¹ Similarly, hospital laboratory and radiology services, commercial laboratories and free-standing imaging practices incur significant costs for distributing lab results and imaging reports that could be minimized with a results and ports viewing service.

As an example, the methodology estimated benefits related to distributing ED reports to primary care physicians or other providers. There are approximately 270,000 ED visits per year in nine Portland metropolitan area hospitals that do not result in an admission to the hospital. It was estimated that about 40% of these visits require the distribution of a summary to a physician, outpatient clinic, or other provider for follow-up care that involves some form of manual processing and staff time. A conservative estimate of the cost of the staff time and processing is \$4.00 per report. The product of a \$4.00 cost saving for 40% of 270,000 visits represents \$431,000 of savings benefits from the availability of the results and reporting viewing service. For the providers receiving the reports, an estimate of cost savings of \$3.00 per report yields \$324,000 in saving benefits. Similar calculations of the benefits were made for hospital discharge summaries, lab reports, and imaging study reports.

Benefits from Avoided Services: Nationally it has been estimated that 8.6% to 20% of laboratory tests could be avoided with the most advance stage in deploying health information technologies so that information was always available about the recent lab results for patients when clinicians need the information. An average of these possible reductions in testing rates decrease the average number of lab tests per year per person for the entire United States population from 2.163 tests to 1.869 tests. This reduction of 0.294 tests per person per year is calculated to save \$31.8 billion dollars in health care costs as reported by Walker et al in Health Affairs in January 2005.¹² The results and reports viewing service proposed for the Portland metropolitan area would not be as comprehensive as contemplated in the national estimates. It was estimated that the local effort could only achieve 40% of the national estimated reduction in test would mean 0.069 fewer tests per person per year in the Portland area for a savings of about \$1.73 per person or \$3.0 million in reduced cost. It was estimated that about 60.4% of the Portland area population is covered by Oregon commercial health plans and capitated health plans, 19.3% are uninsured and 20.4% are Medicare, Medicaid fee-for-service or out of state insurance health plans. Benefits of the \$3.0 million per year in avoided tests would reduce the costs of Oregon insurers, capitated plans and

¹¹Russler D, Parisot C Boone K. Pro Forma Business Case: Regional Healthcare Information Organization. April 3, 2006 draft circulated by email.

¹² Walker J, Pan E, Johnston D, Adler-Milstein J, Bate DWs, Middleton B. The Value of Health Information Exchange and Interoperability. Health Affairs 24:Supplement 1 January 19, 2005. W5-10-18.

patient copays of about \$1.8 million per year. Benefits of about \$1.2 million per year would initially accrue to providers for avoiding tests that are covered by fixed or only partial payment. The avoided losses for providers help minimize the burden on uncompensated care costs that are shifted to other health plan payers.

For estimating the benefits of avoided imaging studies, a proportional approach was applied to the national estimates. National estimates for potential savings from avoiding imaging studies ranged from \$8.34 billion with modest improvements in report distribution systems to \$26.2 billion for the most advance systems. Using the proportion of benefits identified for avoided lab tests locally compared to the lowest level of national benefit (\$8.34 billion) as described above, the Portland metro area should expect to avoid about \$800,000 per year. These benefits would similarly be distributed among health plans, patients, providers and the cost shift impact to plans.

Alternative Benefits Approach: To confirm the conservativeness of the avoided service estimates described above, other estimates and methodologies were considered. The most compelling comparison involves results of a study assessing the impact of missing information on visits to primary care physicians published by Smith in JAMA in February 2005.¹³ Smith found that:

- Many primary care visits had missing information. Of total visits that occurred during the study period, 6.1 % were missing lab test results and 4.8% were missing imaging reports. Other types of dictation and reports including ED visit and discharge summaries were missing at varying rates.
- As a result of the missing information added services were provided: 3.0% lab, 2.9% visit, 1.5% imaging study of total primary care visits.
- Physicians and their staff spent an average of five minutes each looking for information that was not found.

If these rates of missing information were applied to the estimated number of primary care visits in the Portland area the impact would be:

- Avoidable testing: \$1.9 million for lab, \$5.5million for imaging studies, or \$7.4 million combined.
- Avoidable follow-up visits: \$2.6 million
- Physician and staff productivity losses unsuccessfully looking for missing information: \$2.7 million

The impact of missing information would also be a comparable issue for specialty physician practices but there is insufficient information to develop an impact estimate.

¹³ Smith PC, Araya-Guerra R, Bublitz C, Parnes B, Dickinson LM, Van Vorst R, Westfall JM, Pace WD. Missing Clinical Information During Primary Care Visits. JAMA, February 2, 2005; 293(5): 565 - 571.

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The combined \$10 million potential impact from the Smith study for avoidable lab test and imaging studies is substantially higher than \$3.8 million estimate using the Walker national estimates. It therefore seemed reasonable to utilize the lower estimate since it was the most conservative.

Combined Estimated Benefits: The following table summarizes the processing saving and avoided test benefits for the Results and Report Viewing service on an annual basis. Full benefits are expected during year three with 50% of the benefits achievable in year 2.

Benefits from Results and Report Viewing (dollars in thousands)

	Year 0	Year 1	Year 2	Year 3	Year 4
Benefit Realization		Minor	50%	100%	100%
BENEFITS – Processing					
Cost Savings to Hospitals, Labs & Practices	-	72	1,083	2,166	2,166
Cost Savings to Physicians Practices	-	39	593	1,186	1,186
Cost Savings to Other Providers	-	9	136	272	272
Cost Savings to Payers	-	5	68	137	137
Subtotal	-	125	1,880	3,761	3,761
BENEFITS - Avoided Services					
Avoided Laboratory Tests - Oregon insurers & capitated plans	-	-	913	1,827	1,827
Avoided Laboratory Tests - Uninsured, Medicare, Medicaid, Foreign Insurers	-	-	600	1,200	1,200
Avoided Radiology/Imaging Tests - Oregon insurers & capitated plans	-	-	240	479	479
Avoided Radiology/Imaging Tests - Uninsured, Medicare, Medicaid, Foreign Insurers	-	-	157	315	315
Subtotal	-	-	1,910	3,821	3,821
TOTAL BENEFITS	-	125	3,790	7,582	7,582

Cost Benefits and ROI for Results and Reports Viewing: The following table summarizes the costs and benefits for the results and reports viewing use case. (dollars in thousands)

	Year 0	Year 1	Year 2	Year 3	Year 4
Benefit Realization			50%	100%	100%
Processing Savings		125	1,880	3,761	3,761
Avoided Services			1,910	3,821	3,821
TOTAL BENEFITS		125	3,790	7,582	7,582
COSTS	572	5,963	3,572	3,633	3,695
NET BENEFITS	(572)	(5,838)	218	3,949	3,887
Cumulative Net Benefits	(572)	(6,410)	(6,192)	(2,243)	1,644
Return on Investment			1.06	2.09	2.05
Cumulative ROI					1.09

The net benefits from the results and reports viewing lists are positive in year two with the benefits slightly exceeding the cost and reflecting a ROI of 1.06. Beginning in year 3, annual benefits significantly exceeds costs with an annual ROI of 2.09. Cumulative benefits exceed the cumulative costs in the middle of year 4. With an annual ROI in excess of 2.0, the cumulative ROI would be expected to climb in subsequent years until it approaches the annual rate.

MEDICATION LIST USE CASE

The medication list use case will make information about the prescriptions that patients’ actually obtain available to all of a patient’s providers.

A complete medication list provides key health information and important communication between various health care providers. Clinically, the need to improve medication safety is clear and well-documented. Accurate and complete medication reconciliation can prevent numerous prescribing and administration errors and reduce potential adverse drug events. Medication reconciliation errors are frequently a problem as patient’s transfer between care settings and providers.

The ideal solution will offer an online standardized, widely available and secure means for aggregating medications for a single patient from different

pharmacy benefit managers, health plans or commercial hubs that aggregate such information. The system will display medications for the patient in a secure online portal.

Compilation of Medication List Data: Lists of medications are compiled based on prescriptions filled through records made available by pharmacy benefit managers (PBM). Commercial insurers, capitated Medicaid organization and the Medicaid fee-for-service program contract with PBMs for processing of claims for prescriptions. This use case does not include e-Prescribing, drug-to-drug interaction on prescriptions written or recommended formularies. The compiled lists of medication will be accessible by to clinicians responsible for the care of individual patients in physician practices, hospital-based clinics or outpatient departments, Emergency Departments and other clinical settings.

Medication lists provide clinicians with more comprehensive prescription information to facilitate interactions with and the care of patients. There is a significant intangible and difficult to quantify benefit in improving the patient-physician interaction. The major tangible benefit from improved medication history information is in the reduction of adverse drug reactions (ADR) and adverse drug events (ADE). Outpatient adverse drug events account for approximately 5% of hospital admissions.^{14,15} The availability of medication lists will assist physicians in the review of medications taken by patients and minimize the potential ADEs leading to hospital admissions. Benefits are calculated assuming a reduction in the rate of non-obstetrical admissions by 1% from the avoidance of outpatient ADEs. ADEs also occur during hospitalizations. The availability of medication lists at the time of admission would also be expected to reduce the length of stay of some patients that have ADEs during hospitalization because their clinicians lack a complete picture of medications taken by the patient. Benefits from reduced length of stay are not estimated since insufficient information is available to make a reasonable estimate.

The benefits in the following table reflects making medication list available to clinicians in multiple settings as a stand alone program of the OHIE. Benefits are computed as a 1% reduction in admissions in the metropolitan Portland area that would be related to patients that have pharmacy benefit coverage with health plans (commercial insurers, capitated and fee-for-service Medicaid) that utilize a PBM (i.e., the PBM has the data from which medication list information can be compiled). Approximately 55.2% of the covered lives in the

¹⁴Einarson TR. Drug-related hospital admissions. *Ann Pharmacother* 1993;27:832-840.

¹⁵Lazarou J, Pomeranz BH, Corey PN. Incidence of adverse drug reactions in hospitalized patients: a meta-analysis of prospective studies. *JAMA*, April 15, 1998; 279(15): 1200-1205.

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Portland metropolitan area are with health plans that are believed to utilize PBM services. It is estimated that about 87.7% of the members in those plans have pharmacy benefit coverage. Therefore about 48.4% of covered lives in the Portland metropolitan (excluding Kaiser members) would benefit from the availability of the medications lists. The benefit estimated for preventable ADE admissions is the estimated average payment (not charges) by health plans and patients per hospital admission times the number estimated number of preventable admissions. Medicare Part D coverage is not specifically addressed in this calculation. To the extent Part D benefits are covered through Medici-gap coverage, some patients may be included in these estimates.

The full level of expected benefits is shown for year 3. Fifty percent of the full benefits to be derived is shown in year two assuming that the realization of benefits from the availability of the medication lists grow from zero at the end of year one when the medication lists first become available to 100% at the beginning of year 3.

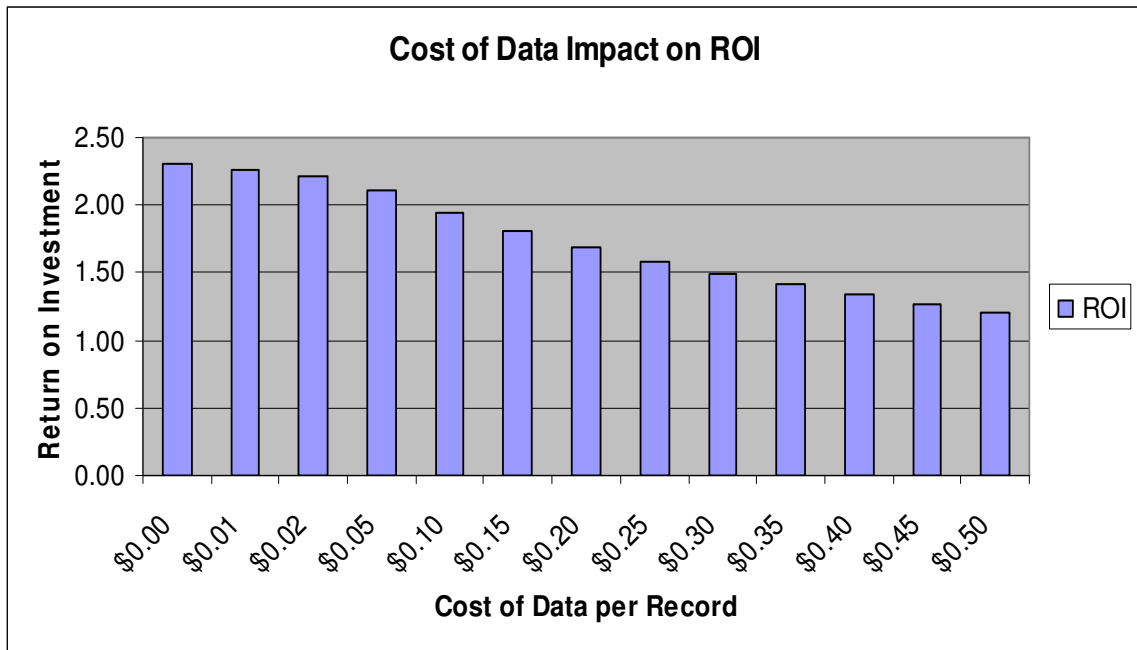
The costs estimated for the Medication Use Case are the common set of estimates used for each use case as described above. It is important however to emphasize that the costs, benefits and ROI assume that there is no cost to the OHIE for acquiring the data from the PBMs. Even though PBMs operate under contractual arrangements in service to the health plans, the PBMs may expect some level of payment for providing the information to the OHIE. If the existing contractual terms between health plans and PBMs do not already include data transfer provisions, health plans should include such provisions requiring the transfer of such data as quickly as possible and establish the financial and other terms for facilitating such transfers to a community HIE.

Medication Use Case - Scenario 1: Full Implementation as a Stand Alone Initiative

	Year 0	Year 1	Year 2	Year 3	Year 4
Benefit Realization			50%	100%	100%
BENEFITS			4,175	8,351	8,351
COSTS	572	5,963	3,572	3,633	3,695
NET BENEFITS	(572)	(5,963)	603	4,718	4,656
Cumulative Net Benefits	(572)	(6,535)	(5,932)	(1,214)	3,442
Return on Investment			1.17	2.30	2.26
Cumulative ROI					1.20

The net benefits from the medication lists are positive in year two with the benefits slightly exceeding the cost and reflecting a ROI of 1.17. Beginning in year 3, annual benefits significantly exceeds costs with an annual ROI of 2.3. Cumulative benefits begin to exceed the cumulative costs in the middle of year 4. With an annual ROI in excess of 2.0, the cumulative ROI would be expected to climb in subsequent years until it approaches the annual rate.

These results assume that no cost for acquiring information from the PBMs, an assumption that cannot be currently validated. If payments to the PBMs will be necessary it depresses the ROI. An impact analysis on the ROI is reflected in the following graph. It demonstrates that with modest payments the ROI is still attractive but if payments are as high as \$0.50 per transaction the annual ROI is dropping close to 1.00 making the project unattractive after consideration of the significant start-up costs.



MEDICATION LIST USE CASE (AS A PHASE II PROJECT)

Given the uncertainty about the possible cost to acquire the necessary data from the PBMs, the impact of phasing the medication list project was considered. If the results and reports viewing project were implemented and operational for a year or two, adding the medications list project as a Phase II project would have a significantly different cost structure. The incremental one time costs for hardware would be substantially less and the staffing and other ongoing costs would also be substantially less as reflected in the following table.

Medication Use Case - Scenario 2: Implementation as a Phase II Initiative

	Delayed Year 1	Delayed Year 2	Delayed Year 3	Delayed Year 4
BENEFITS				
Reduction in admissions due to ADEs	-	4,175	8,351	8,351
Reduced stay on avoided inpatient ADEs	-	-	-	-
Total Benefits	-	4,175	8,351	8,351
COSTS				
Salaries & Fringe	175	201	207	213
One-time Hardware	100	10	10	10
One-time Software	600	-	-	-
Recurring Software	30	120	120	120
Data Center Facilities & Operations	20	60	60	60
Other Facilities & Operations	6	7	7	7
Other General & Admin Expenses	12	9	9	9
Data Acquisition Costs	-	-	-	-
Total Costs	943	407	413	419
NET BENEFITS	(943)	3,768	7,938	7,932
Cumulative Net Benefits	(943)	2,825	10,763	18,695
Return on Investment (ROI)	negative	10.26	20.22	19.93
Cumulative ROI	none yet	3.09	7.11	9.57

The net benefits from the phased medication lists project are highly positive in year two for both the year and cumulatively since the project achieves a cumulative break-even point in the second year even though it is not yet fully realizing all the expected benefits. While these results assume that no cost for acquiring information from the PBMs, the highly favorable ROI allow significant cushion against a significantly higher cost of data. The cost of data would still depress the ROI but probably not enough to make the project unattractive.

COMPARATIVE ASSESSMENT BETWEEN THE RESULTS AND REPORTS VIEWING OPTION AND THE MEDICATION LISTS OPTION

On first consideration, the ROIs and ROI profiles for the two project options appear similar with the medication list project slightly higher. Nevertheless, the results and reports viewing option seems preferable for a first project effort. The medication list project has a significant uncertainty about the cost of acquiring PBM data. While some health plans may have sufficient market

power to acquire the data at low or no cost, it is not clear if all the insurance and capitated plans could achieve such a result. Further, the estimated benefits for results and report viewing are more defensible from the available literature than the reduced ADE-admissions rate estimated for the medication list project. The results and reports viewing project would also cover nearly all patient in the community whereas the medications list project would only cover the 48% of covered lives the have pharmacy benefits with PBM-based data. The current state of technologies, data standards and protocols, and number of organizations requiring data interfaces also favors the results and reports viewing project over medication lists.

FINANCING

The CBA was developed to determine if sufficient benefits existed to recommend one or more projects for implementation. The mechanisms to finance either the results and reports viewing use case or the medication list use case were not definitively part of the scope of CBA assessment.

Financing should follow benefits: The Team recognizes that any financing strategy would need to consider the flow of benefits that result from the projects. In addition, it would be desirable to relate revenues for financing the projects as directly as possible to activities of the organization make payments to support the projects. In an ideal world it would be possible to rely on transactions fees that are established in relation to services provided and other demonstrable benefits. Unfortunately, costs avoided from fewer lab tests, fewer imaging studies or fewer visits do not lend themselves to transactions fees. Similarly, in some circumstances levying transaction fees on certain types of services will be contrary to achieving the goals of the initiative. With a goal to improve the interoperability and timely flow of information between providers about patients (e.g., ED and discharge summaries, lab and imaging reports) transaction charges for distributing or receiving the information seems counterproductive. The only mechanism then remaining is some type of global financing strategy whereby the major beneficiaries agree on some mechanism to support the required project development investment and operating costs. Such a global financing mechanism may be required for four to five years until it is possible to develop other financing strategies that may more directly relate to identifiable benefits.

Benefits Recapitulation - results and reports viewing option: the identified benefits involve:

- Lower processing costs to distribute information primarily accrues benefits to hospitals and to a lesser extent physician imaging practices

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- Lower processing costs for receiving and utilizing information primarily accrues benefits to physician practices and other providers and to a lesser extent payers.
- Avoided services are a direct benefit to health plans that cover insured or capitated patients through a health plan.
- Avoided services are a direct benefit to providers when the care for unsponsored patients since they frequently are unable to recover their billings for services.
- Avoided services are a benefit to providers when services are covered by Medicare and Medicaid and the provider payments are limited and/or at below the cost of providing services.
- Avoided services to uninsured, Medicare, and Medicaid patient create an indirect benefit to health plans in lower cost shifting from the under recovery of costs for services.

Given that it does not seem to make much sense to charge physician practices and other miscellaneous providers for the processing benefits they can achieve from the results and reports viewing service, the remaining split of benefits accrues approximately 47% to hospitals and 53% to health plans,

Benefits Recapitulation - medication list option: the benefits from fewer ADE related hospital admissions will apply only to patients in health plans using a PBM that can provide the necessary data for the lists and for those patients of the health plan with pharmacy benefits. The cost of the admissions that will not occur lowers the inpatient claims cost to plans. Plans derive all the benefits estimated in this CBA. :

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Appendix D: Architecture Problems to Be Solved

Technology architecture options for the infrastructure to securely exchange electronic health data are rapidly maturing. The list of issues to be addressed includes high level policy concerns, for example, “Who physically houses the data?” as well as the practical, “Which standards will be used?” Numerous details for system development will require more study in order to make the best decisions for Oregon in this unsettled environment.

There are many proposed options for different types of architecture to support regional health information exchange¹⁶. The Team is singling out two high level architecture parameters for discussion in this report that are important in framing Oregon’s next steps. These have been chosen because they will require CEO-level championing and backing if the effort is to succeed. Obtaining participation from data suppliers and data users, securing sufficient financial support, fairly managing large-scale vendor procurement, legal concerns regarding privacy, and politician involvement are some of the critical issues that leaders will face. The leaders for this effort must be prepared to explain how these three/four factors will guide development.

The results reporting system for lab or radiology results or hospital summaries described as Option 1 can be designed a number of ways:

One architecture design consists of a health record bank containing patient results organized into a single record for each patient, which is maintained and updated by the system (Figure 1). Information is uploaded from the provider, and authorized providers retrieve information from the bank.

¹⁶ Arzt, N H (2005). Development and adoption of a national health information network. <http://www.hln.com/noam/ONCHIT-RFI-HLNCConsulting.pdf>.

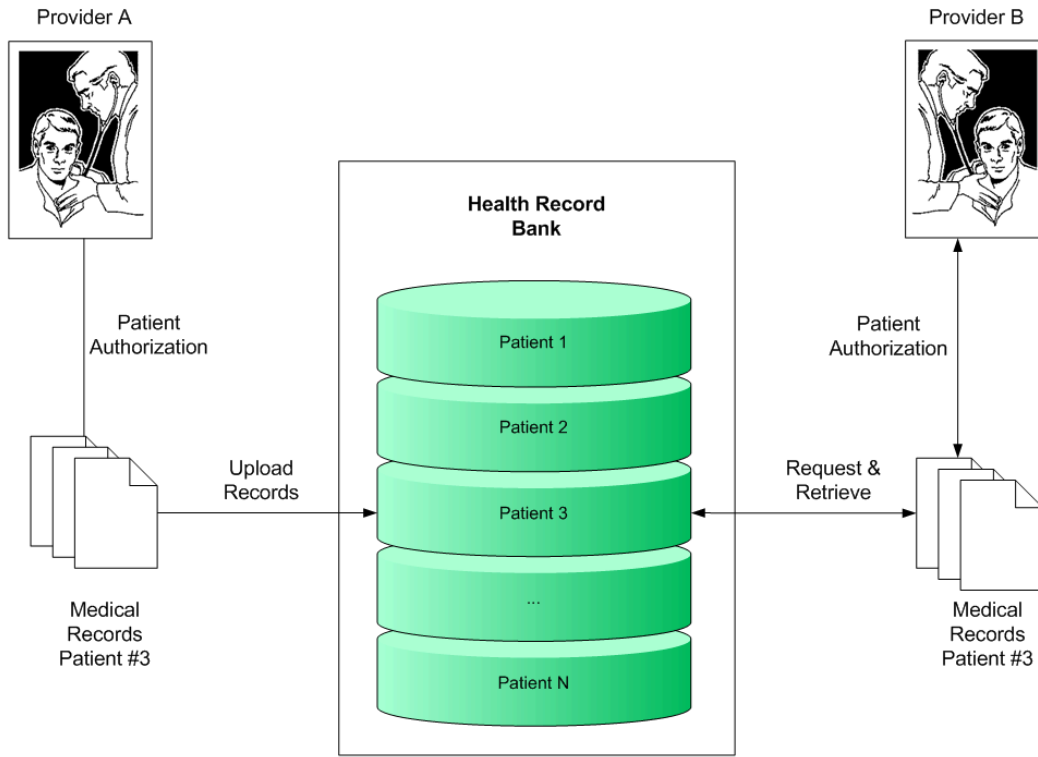


Figure 1: Health Record Bank Architecture. A centralized database hosts the records of each patient that participates in the regional system.

A second architecture design is based on a community system that can “know” a piece of information exists for a patient and where it is kept, and create a virtual report any time it is needed (Figure 2). In this dispersed or virtual record alternative, there are several options for where the data actually reside.

- Results can be kept at the originating institution in a place that makes retrieval for a virtual report readily available when needed.
- Alternatively the results can be uploaded to separate sections of a community record bank, but managed by the organization that produced the information.

Figure 2 shows a “hybrid” of both types of data storage in the virtual record alternative.

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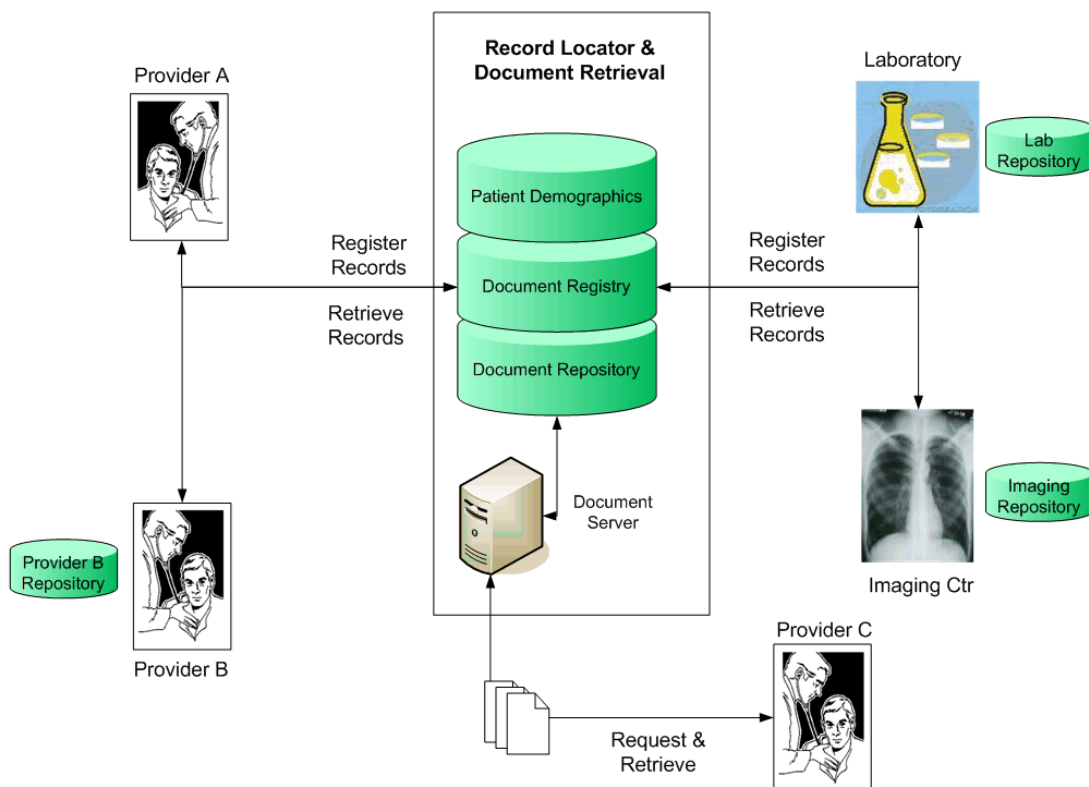


Figure 2: Dispersed or Virtual Architecture. The system retrieves documents and assembles a virtual record in response to a provider's query. The patient's shared data can be housed either at the originating institution or centrally, or both (hybrid model, as shown).

Tables 1 and 2 summarize the strengths of a centralized record bank versus a virtual model. In all of the options, efficiency is achieved because the producers of test and radiology results and discharge summaries only produce one standard report, and that report is available whenever and wherever it is needed. The primary difference in the designs is how the responsibility for keeping the information ready for retrieval is split between the institution that creates the report and the shared community institution. Nationally, each of the approaches are in the process of implementation in various different regions. An industry-wide consensus on the "best" solution to regional health information exchange is still emerging.

Unlike an historical lab result, a patient's medications list is constantly changing. Although the historical medication could be organized with any of the above models, the most feasible approach would be an interactive

database that can be reconciled and updated. The reconciliation will also require the involvement of the most knowledgeable person regarding which medications are actually being taken - the patient.

Two other architectural models were explored by the Team:

Portable devices: As a starting place, the Team does not recommend architecture options that rely entirely on patients to physically transport their data on a portable device such as a “smart card” (Figure 3). Though the model may have future possibilities, this is impractical for a one-year starter project. (Reasons...every site needs reader/writer. Standards not ready. Sites with most data of interest to patient are the least ready to participate. Most critically, patients will need help to become engaged.) In the not too distant future, patients may well have means to route data to their preferred record bank, either with account numbers like an ATM card, a website URL or a portable storage device. Employers, health plans, delivery systems and vendors are all aggressively pursuing technology to empower patients to manage their own health, which can include managing their clinical data from doctors and hospitals and labs and pharmacies. Although beginning Oregon’s architecture design with the patient as the primary storer of his or her information is not recommended, it is important that Oregon’s first step not preclude this future evolution.

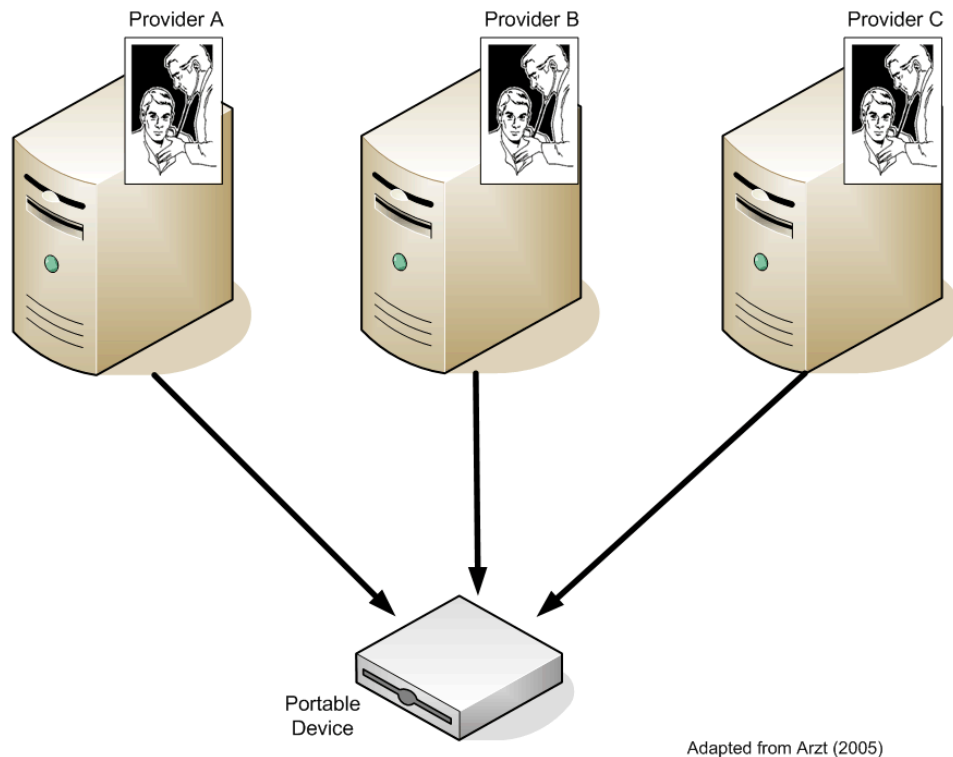


Figure 3: Portable Device Architecture. The patient possesses a “smart card”, USB Key, or other portable device and uses it to store their own information. Each provider copies information to the device for the patient.

“Point-to-Point” with no central hub: The Team also does not recommend pursuing a community-wide architecture design that functions without any central hub to organize exchanging information. Peer-to-peer communication that securely exchanges electronic information between two physicians regarding a patient, for example with secure e-mail, is vitally important and growing rapidly. As more clinicians become adept at incorporating electronic tools in their workflow and have more electronic information to share, having secure mechanisms to perform detailed exchange will become even more vital. However, without creating some sort of central hub that “knows” what data exist and how to obtain them without human intervention, the scale will become unmanageable. Encouraging clinics to adopt secure mechanisms for communicating with peers is critical and should be part of all electronic medical records installations. But it is the creation of the central hub that must

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be the focus of a community solution if we are to address finding the millions of pieces of information when they are needed to treat individual patients.

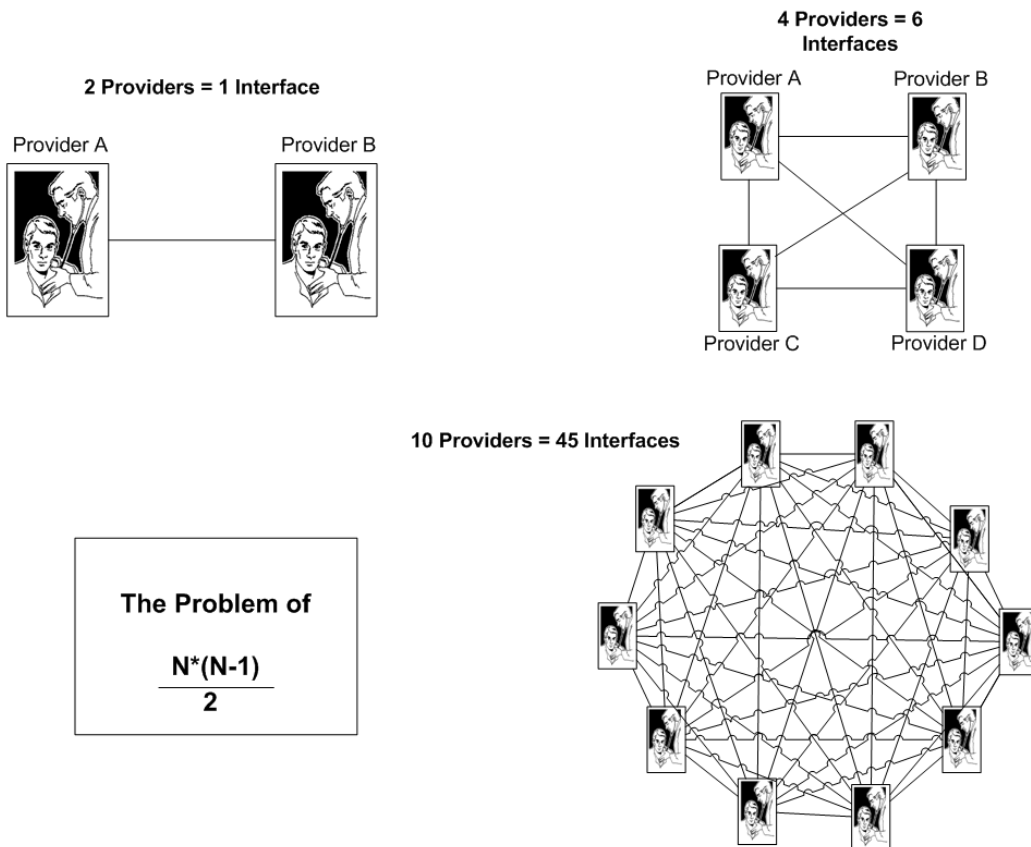


Figure 3: Point to Point Architecture. Each provider must set up a unique trust relationship and an interface to exchange data with any other provider. For 5,000 providers in the Portland Metro area, 12,497,500 interfaces would be required.

Table 1: Central Database vs. Virtual Models

<p style="text-align: center;"><u>Pros - Database</u></p> <ul style="list-style-type: none"> • Control of access may be easier • Can tune performance, we know how to scale • We know how to interface. • Strong supply of human capital & expertise - engineers and system integrators • May be easier to derive value by cleaning & aggregating data • Better platform for queries -- public health and research • Auditing is built in/security is built in easily • Can become a source system if the RLS model becomes dominant • Off loads performance, scalability, and availability demands from the provider systems to the RHIO • Databases are a commodity/potentially lower cost for purchasing 	<p style="text-align: center;"><u>Pros-Virtual</u></p> <ul style="list-style-type: none"> • Addresses fears of the database and database control • No need to maintain a potentially vulnerable single system • It's easier for the provider to control what gets published • Real-time rapid response may be easier • Better at object management • No single point of failure • In line with NHIN efforts
<p style="text-align: center;"><u>Cons-Database</u></p> <ul style="list-style-type: none"> • Requires large complex data model, that has to be generally accepted • Designed for discreet data; not as good for objects such as documents • Expensive to replicate for failure protections 	<p style="text-align: center;"><u>Cons - Virtual</u></p> <ul style="list-style-type: none"> • Newer: Specifications are written on future standards that are not necessarily really ready today • Recurring revenue model for vendors which could be expensive • Maintaining up to date repositories & registries is difficult • Typically operate as document exchanges - unstructured data may not be as valuable • Difficult to use for public health, research or query for population management or quality performance measurement • Large multi-system implementation • Data model - when finally needed is extremely difficult

Table 2: Summary of Strengths

Strength	Central	Virtual
Easy to control & audit access	+	
No single point of failure or intrusion		+
Availability and connectivity	+	
Proven technology, expertise available	+	
Low cost, & software commodity	+	
Fast response time	+	
Easy to query for populations and research	+	
Corresponds to national trends		+
Makes good use of structured data	+	
Easily manages unstructured information		+
Minimal infrastructure burden on participants	+	

Appendix E: Privacy, Security and Patient Engagement

Concerns for protecting the privacy and security of medical information has always been a high priority for those who hold such information. HIPAA was passed precisely to help medical care organizations do a better job of making information available when it is needed to meet patients' needs and securely protecting it when it was not. The addition of computers to the management of health information has not changed the issue, but has significantly increased the risk for large scale inappropriate disclosures. Consumers fear not only commercial, government and criminal misuse, but also the potential for discrimination or social embarrassment from disclosure. Assuring privacy and security must be the highest concern as systems for making health information available are built. Protections must be incorporated in every step of planning.

The medical community is not alone in radically ramping up its attention to how electronic medical information is and is not shared. Consumer groups are rapidly asserting rights and expectations as they engage both the public and policy makers in building awareness of emerging issues. In fact, at least one medical community's electronic data sharing initiative was brought to a halt by consumers who felt their needs were not being adequately addressed.

Fourteen very large national consumer organizations have identified 24 principles regarding information access and control, disclosure and accountability, functionality and governance. These principles express consumers' desire to support systems that will result in better care, for example by designating proxies and allowing patient to add their own data to a community record. These are heavily countered, however, with a detailed list of expectations for assuring that information is protected from unauthorized access, destruction, use, modification, or disclosure. Patients also expect to be able to easily see and manage the information about themselves. Addressing all consumers' concerns will require a system that is considerably more sophisticated than is envisioned for first year implementation. For the immediate purpose the system must at least provide opportunity for consumers to remove their data from the system. But with thoughtful attention to incorporating patients' access and control as early as possible in system design, Oregon's emerging electronic sharing infrastructure will be built in a way that assures nearly all consumers will choose to include their data because of the support it provides for higher quality personal care.

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Unless the Oregon community is ready to engage the patient in organizing his or her information through a unique identifier or account, all proposed architecture approaches will require creation of a Master Patient Index (MPI). This approach uses matching algorithms based on demographic information to make the best guess at linking information to the right person. This is a substantial component of the cost and activity of the data center and introduces some inevitable false matches and incidental disclosures.

Both technological and legal strategies will be required to protect medical information. The vendor industry has made substantial investments in sophisticated and effective systems that manage data. Access control to specific data, authentication and authorization processes and audit logs are but a few of the techniques employed to manage and enforce restrictions on who can see data. Secure transmission of data and browser encryption have advanced capacity to keep information secure as it is sent back and forth across the web.

Legal agreements are equally important in assuring both consumers and data suppliers that issues of data ownership and use are responsibly managed and enforced. Principles contained in model agreements include such things as control, data integrity and quality, security safeguards and controls, accountability and oversight and remedies

Oregon has been awarded a one year contract to study and remedy privacy and security issues related the exchange of health information. By participating with other states in identifying best practices, Oregon will be able to build state of the art privacy and information security approaches in all its operations.

Appendix G: Evaluation

Projects of the magnitude envisioned in this proposal must not proceed without thorough attention from the beginning for incremental evaluation of performance metrics. Progress should be thoroughly evaluated at specific milestones to assure that financial and technical targets are met. An evaluation plan that addresses system functioning, participation by data suppliers and users, and financial returns should be developed and funds identified for independent auditing and evaluation. Following are a list of measures that may be useful for evaluating the Oregon Health Information Exchange:

1. Physician satisfaction
2. Physician use
3. Patient satisfaction
4. Patient participation (not opting out)
5. Patient usage
6. Press coverage
7. Privacy groups cooperation and opposition
8. Financial savings and sustainability
 - a. Physician Revenue
 - b. Patient revenue
 - c. Lab revenue
9. Total lab test volume & trend (too much noise?)
10. Total radiology volume and trend (too much noise?)
11. Number of EHRs interfaces
12. Percent of labs providing timely data
13. Pay for performance/quality improvement activities.
14. Public health use for quality surveillance & epidemiology