

Developing a Business Case for RHIO & Interoperability

**Joint HL7 / OMG Workshop on Interoperability
among Healthcare Services Workshop**

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Agenda

1. Challenges in Building an ROI Model for RHIO
2. Interoperability models & tool demonstrations
 - o Disease management model with EMR
 - o E-prescribing model with interoperability
 - o Community perspective RHIO model
3. Conclusions and Next Steps

Surveys of enterprise c-level executives show the importance of ROI

Ernst & Young LLP Report	CIO magazine Survey of Exec	CFO magazine Survey of Execs	Personal Discussions With Sales and Services
<p>79%</p> <p>of the Fortune 1000 IT decision-makers agree that financial justification of IT projects is important.</p>	<p>48%</p> <p>of the senior mgmt said they measure the value of investments based on their impact on: Productivity, Customer Relationship & Financial Payback</p>	<p>71%</p> <p>of the CFO's regularly re-evaluate their technology purchases: 31% Quarterly 24% Six months 16% Yearly</p>	<ul style="list-style-type: none"> ▪ Margins are decreasing business case is important ▪ Decision-makers are more than CIOs (GMs, CEOs & CFOs) ▪ Tough economic environment buy only when convinced ▪ Customers ask difficult financial questions ▪ Customers have to justify proposals internally

Both the enterprises & vendors realize plan to build business case

Enterprises

- Among enterprise IT decision makers and influencers, 70% said their organization require a quantitative business case for IT investments over \$100,000
- 79% of enterprise respondents said they include vendor ROI collateral and analysis in their business case
- More than 50% of the enterprise respondents said that software vendors should be doing more to help them with their business cases
- Almost 60% of enterprises indicated that vendors could do more to help in the development of credible business case
- Many enterprise respondents complain that vendor's ROI and sales and marketing strategies demonstrate a short term mentality, exaggerating the positive and omitting the negative

Vendors

- 70% of the vendors report that they have developed a business case and ROI collateral
- 23% of the vendors judge their existing ROI-based sales and marketing strategy to be extremely effective; most describe as some what effective
- 80% of vendors perceive enterprise customers are increasingly skeptical of vendor claims regarding ROI and payback
- While 76% of respondents have developed ROI collateral, only 55% have trained the sales force in how to discuss, develop, and present an ROI business case during the sales process
- ROI collateral vendors develop: ROI calculators and sales tools, in-depth case studies, technical white papers, industry benchmark data, customer survey data and others ..

* Research report from The Kotler Group

However, building business case is challenging and labor intensive

Complexity

- There are lot of stakeholders and initiatives with competing and complementing objectives
- New business models have several business designs and competing alternatives with uncertainty in a changing environment
- Solutions that maximize business value require the integration of several products and services to obtain the complete impact

Credibility

- In emerging business it is hard to have customer references and success stories to build business cases
- Credibility requires deep domain knowledge to make a compelling business case and eliminate the fear, uncertainty and doubt (FUD) factor in the customer's mind

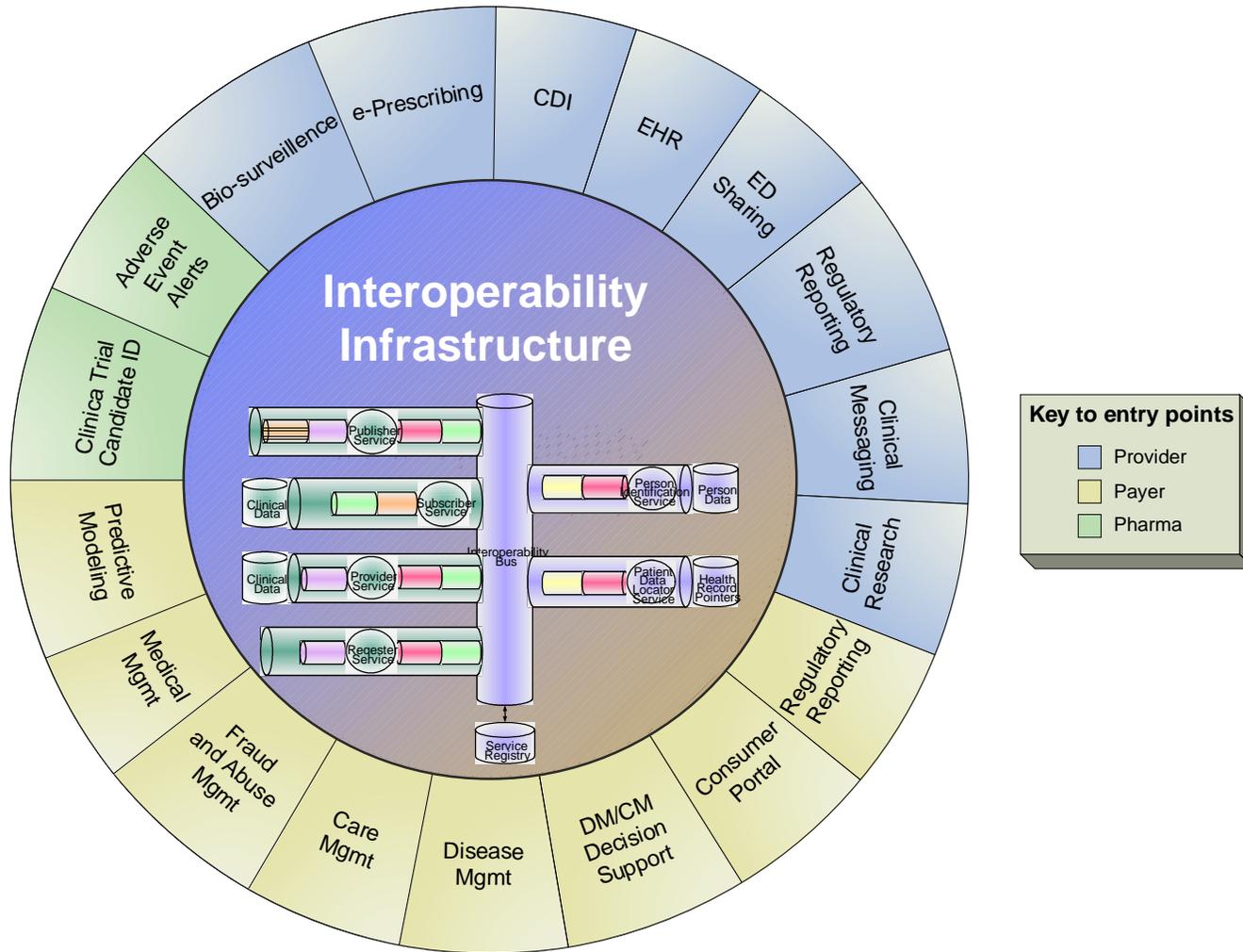
Validation

- In a tough economic environment customers are looking to justify new IT new investments with concrete facts
- Customers at the same time are risk averse especially with technology investments – status quo is better than “riskier” new decision

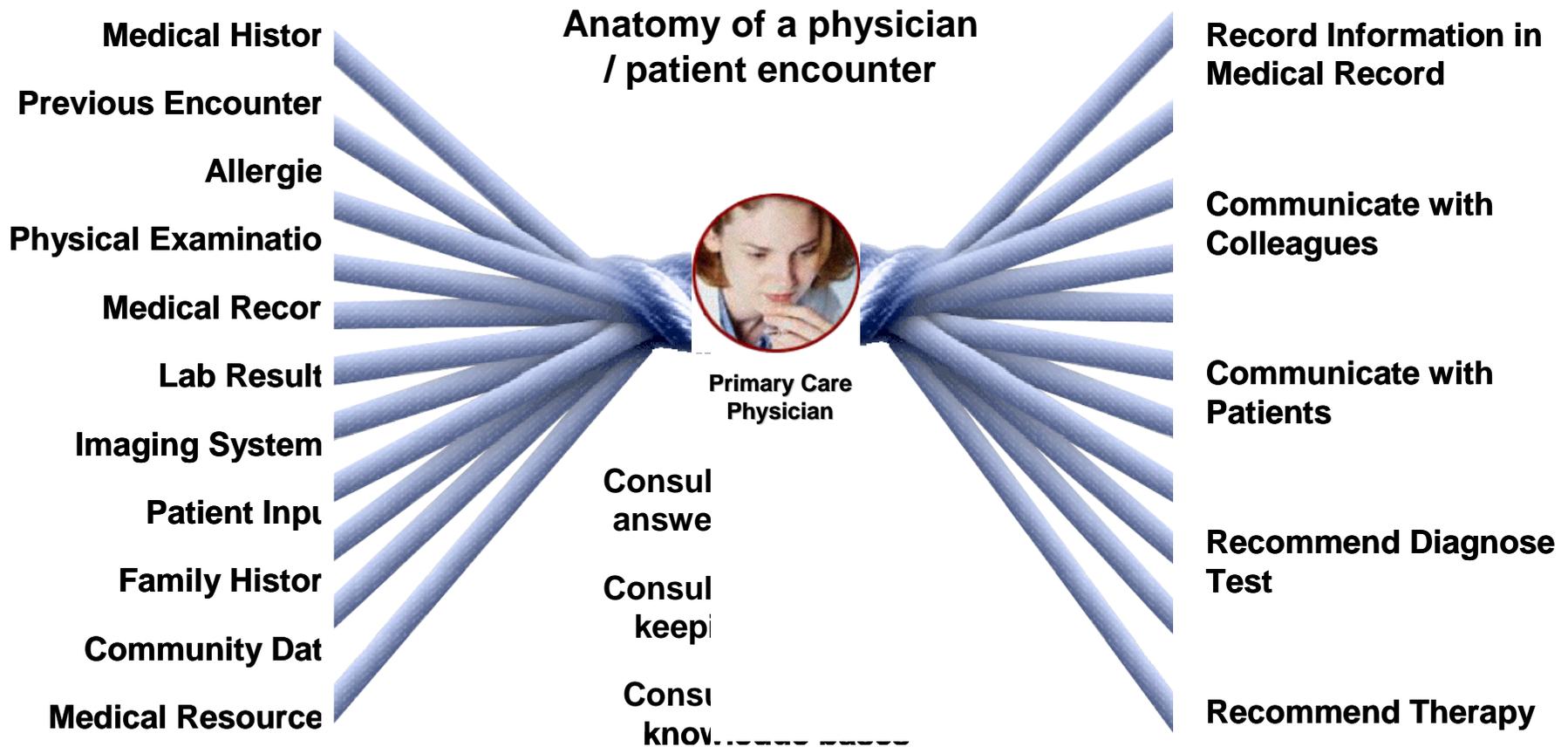
Enablement

- Enablement of RHIO is challenging in the way the benefits and investments are required to complete the model
- Several models – “pay when you need”, pay for the benefits and convenience
- RHIO is just the highway, and the data that is being sent and shared is what brings the value

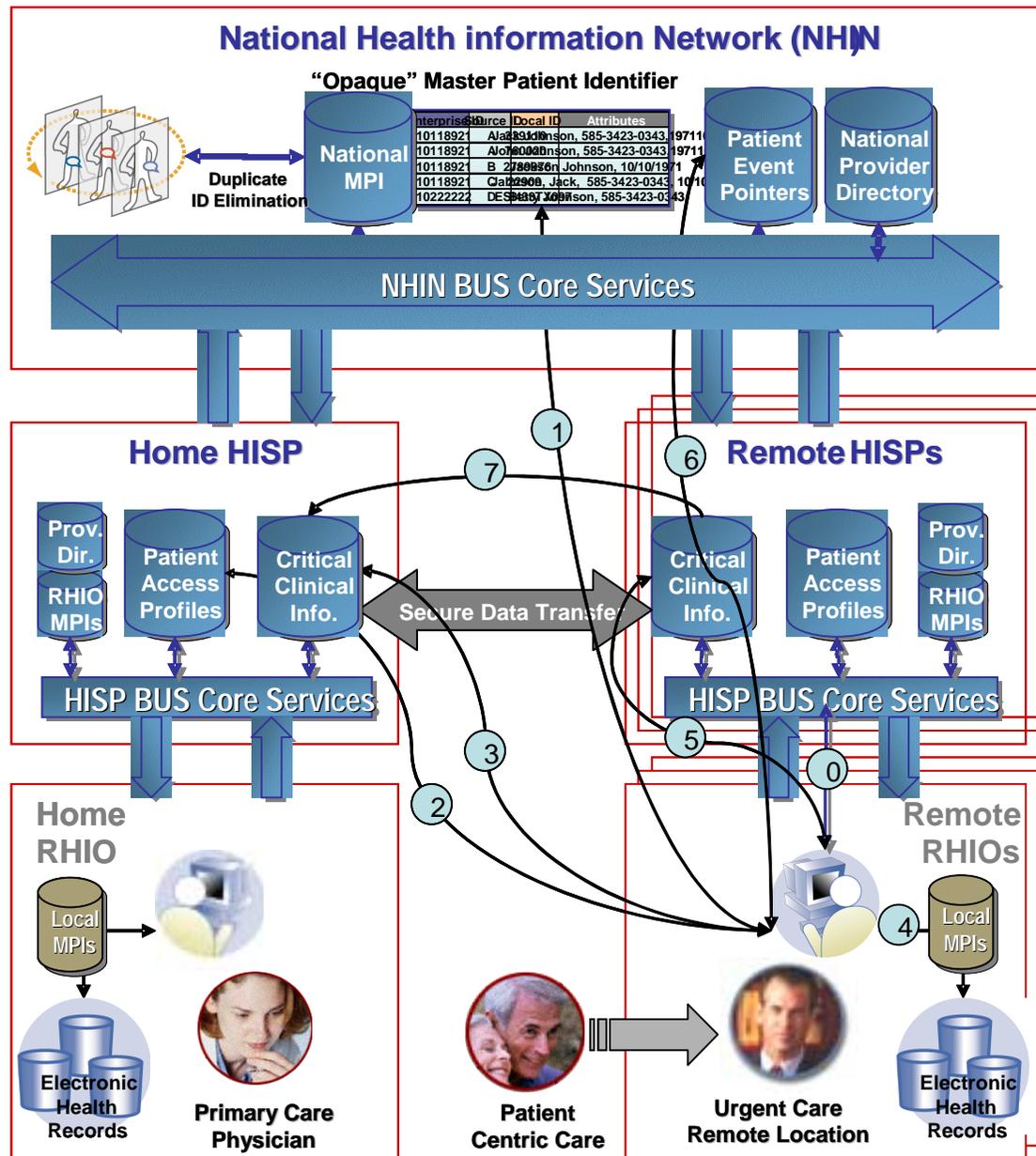
Complex interactions between stake holders and initiatives of a RHIO



Complex physician and patient interactions and decisions

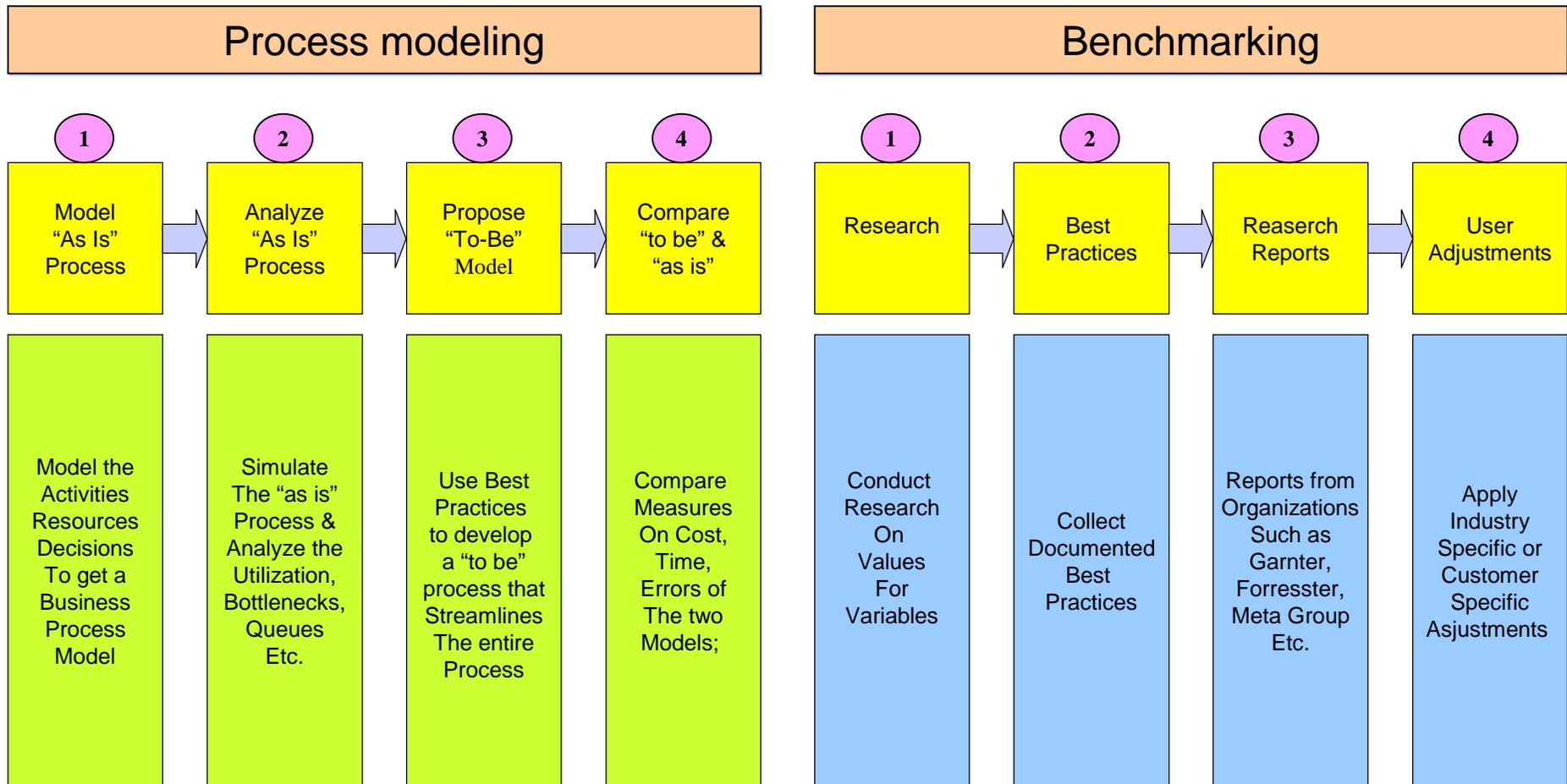


Complex technology implementation and integration is required

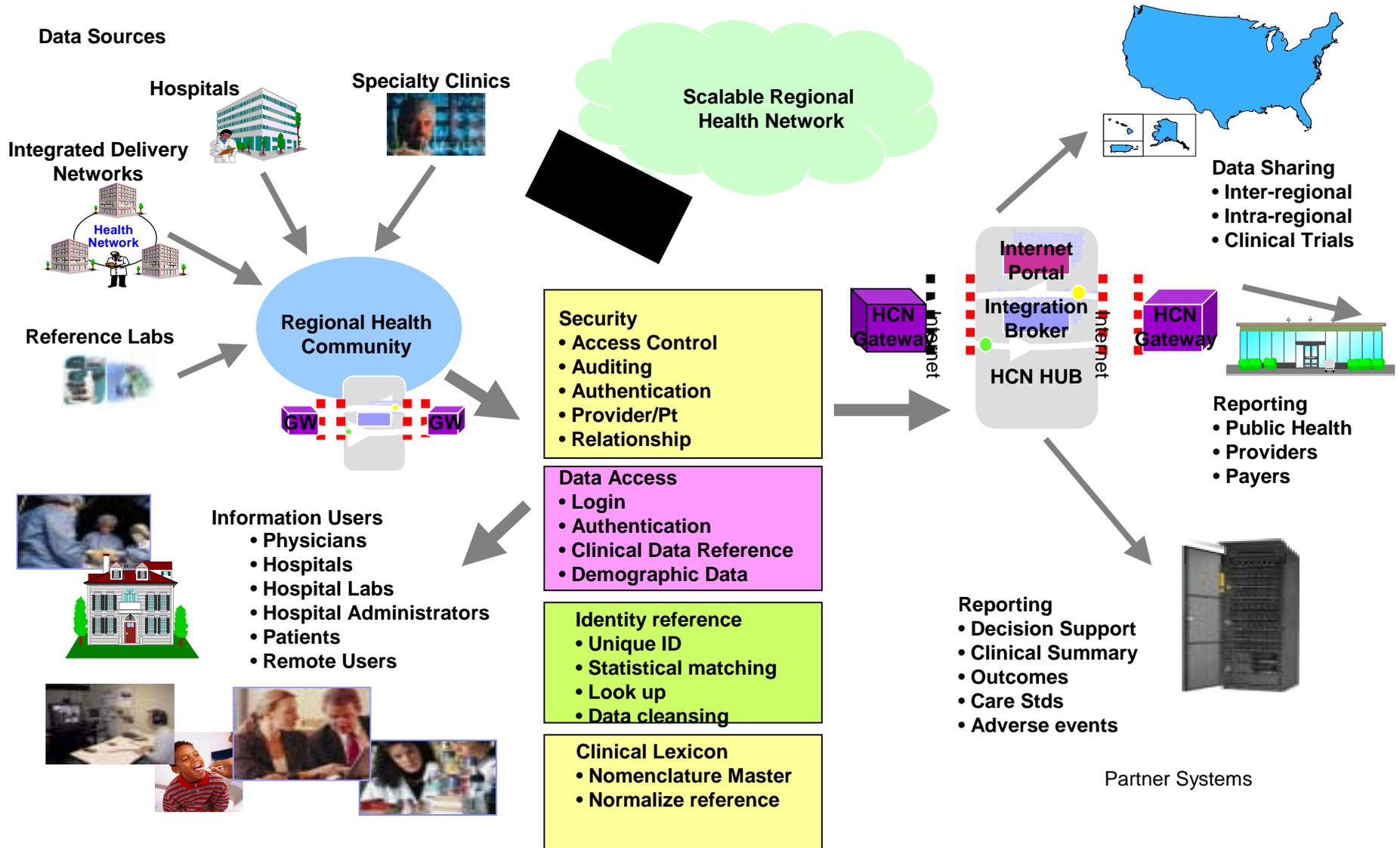


Information traffic should / must conform to standards being worked out by OMG

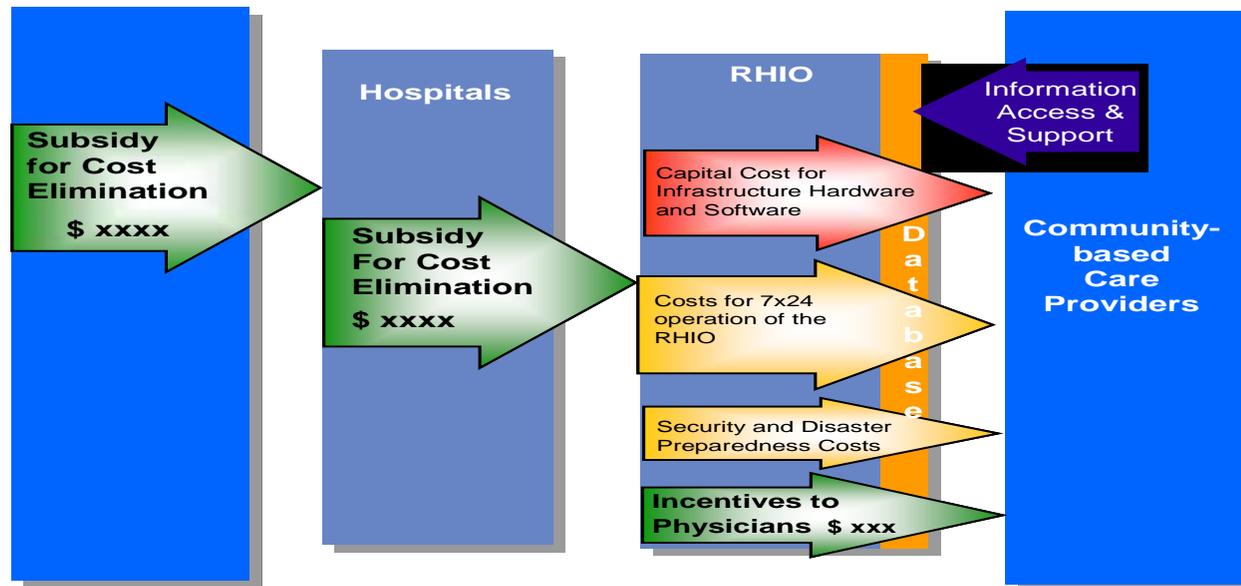
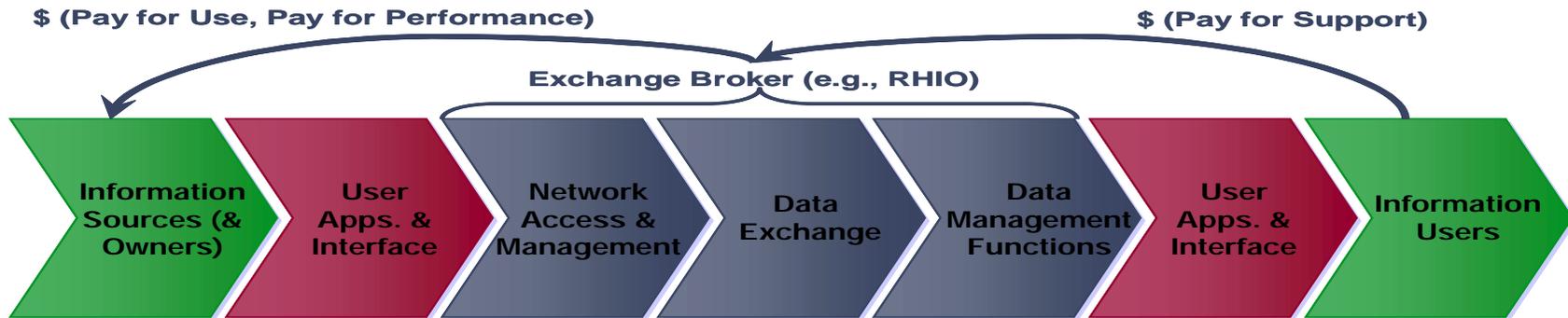
Establishing credibility for the numbers in the model is important



Validation for benefits has occurred only on a diverse subset



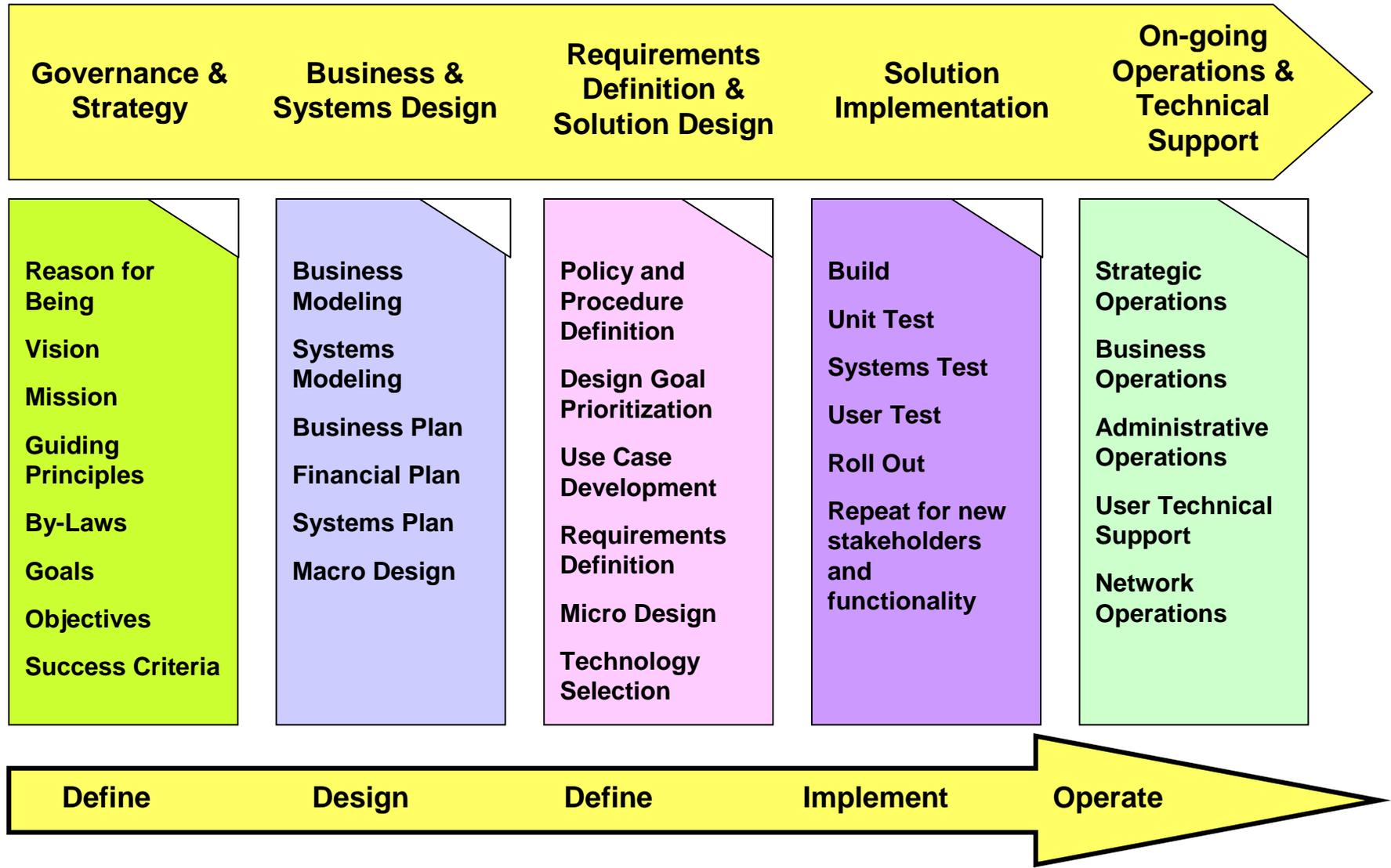
Stakeholder benefits & investments make enablement challenging



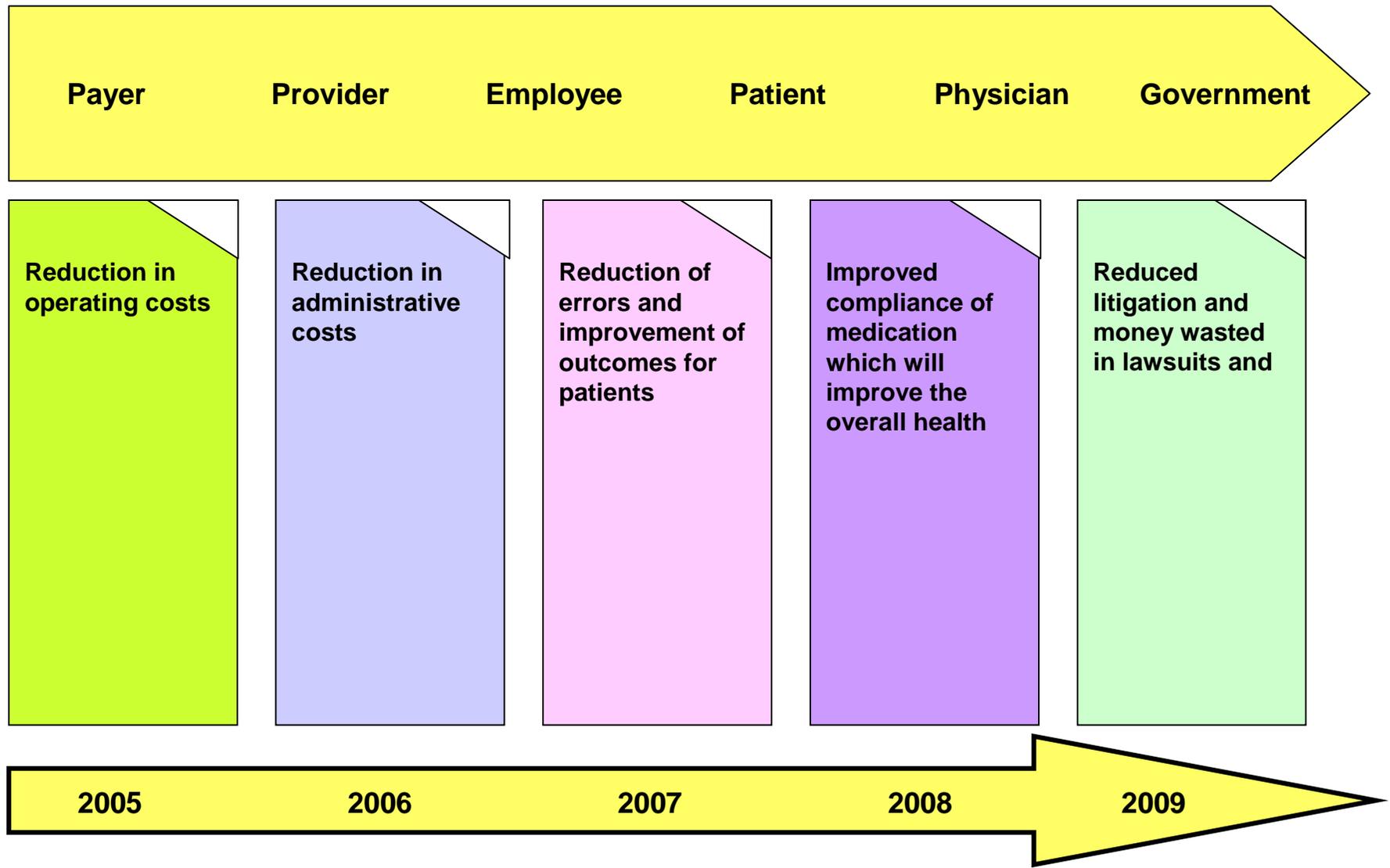
Initial Startup Funding (phased out over x years)

- Adoption Incentives
- Capital Costs
- Operating Costs

Costs associated with establishing RHIO and providing interoperability



Benefit categories from establishing RHIO and providing interoperability



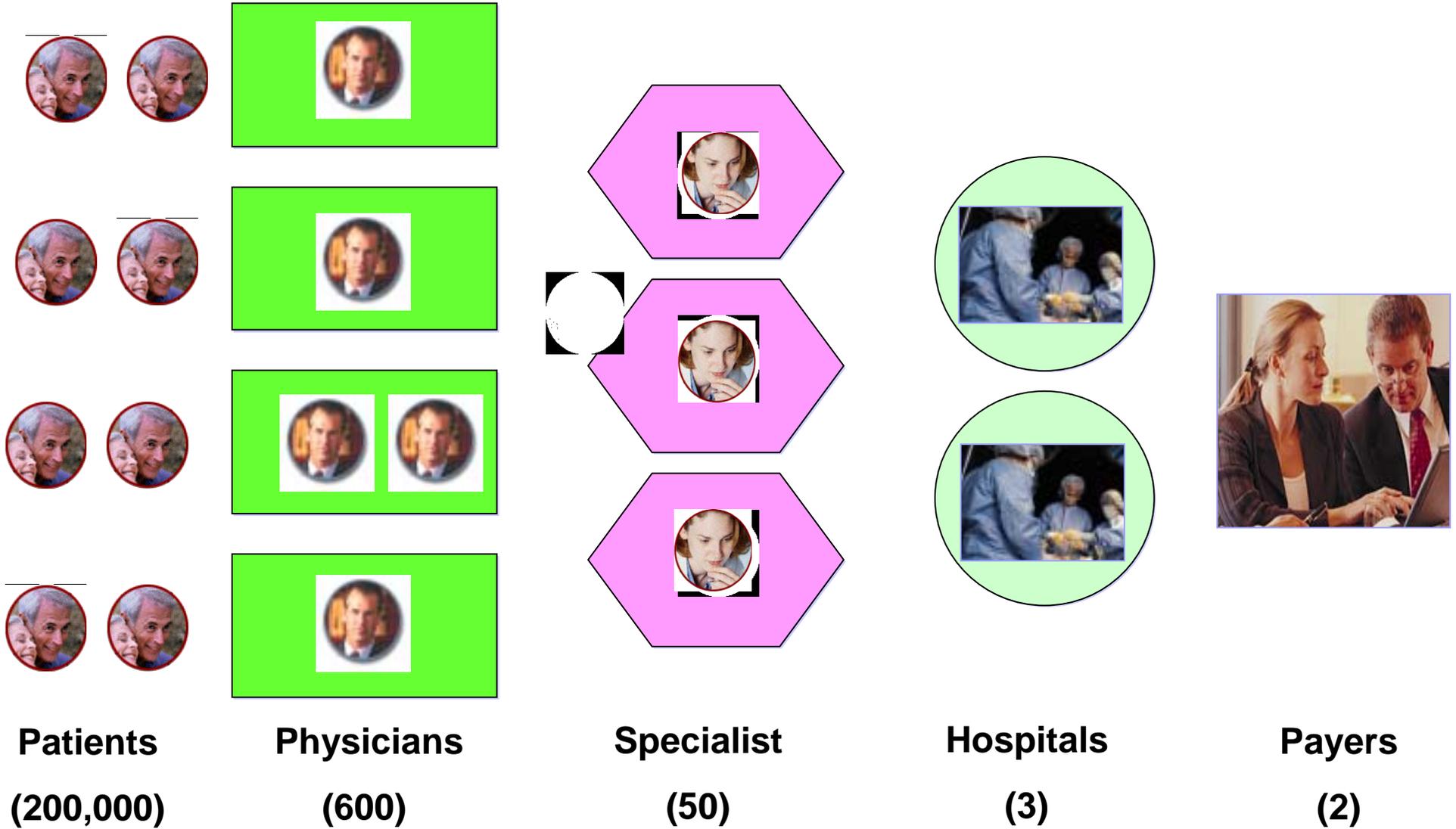
Case 1: The Disease management ROI model

Data from the insured population of an organization was analyzed

Total Population = Approximately 200,000

Congestive Heart Failure	Diabetes	Coronary Artery Disease	Asthma	Depression
Patients = 4.9%	Patients = 4.85%	Patients = 4.72%	Patients = 3.19%	Patients = 1.69%
Tests = 5	Tests = 13	Tests = 9	Tests = 4	Tests = 2
Images = 1	Images = 1	Images = 3	Images = 1	Images = 2
Therapies = 1	Therapies = 1	Therapies = 1	Therapies = 1	Therapies = 1
Prescriptions = 3	Prescriptions = 3	Prescriptions = 3	Prescriptions = 3	Prescriptions = 3

Only physicians, specialists and hospitals are used in the model



Assumptions made in the development of the model

- The population was country wide but was assumed to be in one region and be a realistic sample for a RHIO in that region
- Only a portion of the diseased population gets treated in a given year and the percentages were based on actual data from previous years
- The benefits are assumed to be incurred immediately after the implementation of the RHIO, typically, there is a time lag between completion of project and flow of benefits
- We are assuming that at the physicians level there is no duplication or waste as they are most familiar with the patient and have all information they need to diagnose the patient
- Specialists have little waste as they have the luxury for scheduling an appointment and gathering all the facts before seeing the patient, however, some specialists want to do their own tests
- Hospitals and ambulatory centers have emergency and will not wait to get reports – they will run all tests as soon as the patient arrives

The model was made conservative by including only direct benefits

- Duplicate tests
- Unnecessary test
- Duplicate images
- Unnecessary images
- Duplicate procedures
- Unnecessary procedures
- Adverse drug events
- Lack of compliance
- Administrative costs

Summary sheet of the RHIO investment and expected returns

Costs to the Customer	Year 1	Year 2	Year 3	Total
One-off Hard Costs	5,627,085			5,627,085
Ongoing Hard Costs	0	0	0	0
One-Off Soft Costs	0			0
Ongoing Soft Costs	1,296,413	1,361,234	1,429,296	4,086,943
Total Costs	6,923,498	1,361,234	1,429,296	9,714,028

Benefits to the Customer	Year 1	Year 2	Year 3	Total
On-Off Hard Benefits	0			0
On going Hard Benefits	6,870,809	6,976,198	7,086,857	20,933,863
On-Off Soft Benefits	TBD	TBD	TBD	0
On Going Soft Benefits	0	0	0	0
Total Benefits	6,870,809	6,976,198	7,086,857	20,933,863

Value Measures	
ROI	115.50%
Payback Period	1.009472665
NPV	10,175,193
TCO	9,714,028

Input assumptions on the disease management program

Diagnostic, Procedural, Therapeutic, and Prescription Data	Specialist	Hospital	Source
Congestive Heart Failure			
% of population with CHF	4.87%	4.87%	DM program
% of population that took treatment	27.85%	27.85%	
Number of CHF patients	2,654	2,654	DM program
Number of diagnostic tests per patient	5	5	DM program
Weighted average cost per test	\$10	\$10	Safe Med
Number of diagnostic images per patient	1	1	SME/ejctt %
Weighted average cost per image	\$250	\$250	Safe Med
Number of procedures per patient	NA	1	SME
Weighted average cost per procedure	NA	\$29,679	weighted average
Number of therapies per patient	NA	1	SME
Weighted average cost per therapy	NA	\$500	SME
Weighted average cost per ADE	\$5,000	\$5,000	Safe Med
Number of prescriptions per patient	2	3	DM
Weighted average cost per formulary error	\$5	\$5	Safe Med
Weighted average cost of patient noncompliance	\$1,000	\$23,628	weighted average

Percentage savings at specialist and hospital through RHIO

Benefit of efficiency with RHIO -- CHF			
Value Propositions	As - Is Costs	RHIO Costs	Percentage Savings
Specialist			
Cost of duplicate diagnostic tests	\$63,705	\$21,235	66.67%
Cost of unnecessary diagnostic tests	\$13,272	\$3,318	75.00%
Cost of duplicate diagnostic images	\$53,088	\$26,544	50.00%
Cost of unnecessary diagnostic images	\$99,539	\$16,590	83.33%
Cost of Adverse Drug Events	\$398,158	\$79,632	80.00%
Cost of Formulary errors	\$6,636	\$3,318	50.00%
Cost of lack of patient compliance	\$23,889	\$5,309	77.78%
ASC / Hospital			
Cost of duplicate diagnostic tests	\$10,618	\$5,309	50.00%
Cost of unnecessary diagnostic tests	\$6,636	\$1,327	80.00%
Cost of duplicate diagnostic images	\$13,272	\$6,636	50.00%
Cost of unnecessary diagnostic images	\$46,452	\$6,636	85.71%
Cost of unnecessary procedures	\$787,794	\$157,559	80.00%
Cost of unnecessary therapies	\$26,544	\$5,309	80.00%
Cost of Adverse Drug Events	\$398,158	\$79,632	80.00%
Cost of Formulary errors	\$159,263	\$19,908	87.50%
Cost of lack of patient compliance	\$564,460	\$125,436	77.78%

Only the initial and ongoing costs were considered in the model

		DESCRIPTION	Year 1	Year 2	Year 3	Total
HARD COSTS	One-Off	Hardware Components	159,750			159,750
		Software Components	798,992			798,992
		BCS Services Engagement Costs	4,668,343			4,668,343
		Upfront Training and Knowledge Transfer	TBD			0
	Ongoing	Cycle costs from the WBI Modeler	TBD	TBD	TBD	0
	Call-center Support for maintenance and knowledge	TBD	TBD	TBD	0	
TOTAL HARD COSTS			5,627,085	0	0	5,627,085
SOFT COSTS	One-Off	Time value of the customer Staff for initial installation	TBD			0
	Ongoing	Annual On-going Operations and Technical Support	1,296,413	1,361,234	1,429,296	4,086,943
		Self Training for new users to learn Applications	TBD	TBD	TBD	0
		Peer support and training	TBD	TBD	TBD	0
TOTAL SOFT COSTS			1,296,413	1,361,234	1,429,296	4,086,943
TOTAL ONE-OFF COSTS			5,627,085			5,627,085
TOTAL ONGOING COSTS			1,296,413	1,361,234	1,429,296	4,086,943
TOTAL COSTS			6,923,498	1,361,234	1,429,296	9,714,028

Note: Several other costs were included in the later models

Benefits obtained by reducing duplication and eliminating waste

Total Costs Summary	As-Is	With RHIO	RHIO Benefit
CHF Costs -- Specialist	\$658,287	\$155,945	\$502,342
CHF Costs -- ASC / Hospital	\$2,013,196	\$407,750	\$1,605,445
Diabetes Costs -- Specialist	\$760,949	\$228,114	\$532,835
Diabetes Costs -- ASC / Hospital	\$1,267,394	\$274,633	\$992,761
CAD Costs -- Specialist	\$575,744	\$157,566	\$418,178
CAD Costs -- ASC / Hospital	\$1,185,124	\$253,662	\$931,461
Asthma Costs -- Specialist	\$657,986	\$164,496	\$493,489
Asthma Costs -- ASC / Hospital	\$1,077,119	\$234,352	\$842,767
Depression Costs -- Specialist	\$380,556	\$94,974	\$285,582
Depression Costs -- ASC / Hospital	\$351,582	\$85,635	\$265,947
Total of All Costs	\$8,927,937	\$2,057,129	\$6,870,809

Total Costs -- By Disease	As-Is	With RHIO	RHIO Benefit
CHF Total Costs	\$2,671,483	\$563,695	\$2,107,788
Diabetes Total Costs	\$2,028,343	\$502,747	\$1,525,596
CAD Total Costs	\$1,760,868	\$411,229	\$1,349,639
Asthma Total Costs	\$1,735,105	\$398,848	\$1,336,256
Depression Total Costs	\$732,138	\$180,609	\$551,529

Total Costs -- By Care Facility T	As-Is	With RHIO	RHIO Benefit
Specialists Total Costs	\$3,033,522	\$801,096	\$2,232,426
ASC / Hospital Total Costs	\$5,894,415	\$1,256,033	\$4,638,382

Detailed cash flows indicate that positive flows after one year

	Year 1	Year 2	Year 3	Total
Cash Inflows / Benefits and Gains				
Benefit - Hard - One-Off	0	0	0	0
Benefit - Hard - Ongoing	6,870,809	6,976,198	7,086,857	20,933,863
Benefit - Soft - One-Off	0	0	0	0
Benefit - Soft - Ongoing	0	0	0	0
Total cash inflows	6,870,809	6,976,198	7,086,857	20,933,863
Cash Outflows / Costs & Expenses				
Cost Hard - One-Off	5,627,085	0	0	5,627,085
Cost Hard - Ongoing	0	0	0	0
Cost Soft - One-Off	0	0	0	0
Cost Soft - Ongoing	1,296,413	1,361,234	1,429,296	4,086,943
Total cash outflows	6,923,498	1,361,234	1,429,296	9,714,028
Cash Flow Summary				
Total inflows	6,870,809	6,976,198	7,086,857	20,933,863
Total outflows	6,923,498	1,361,234	1,429,296	9,714,028
Net cash flow	(52,690)	5,614,964	5,657,561	11,219,836

Payback period of one year is industry standard for IT investments

	Year 1	Year 2	Year 3	Total
Total incremental Cumulative inflows	6,870,809	13,847,006	20,933,863	20,933,863
Total incremental cumulative outflows	6,923,498	8,284,732	9,714,028	9,714,028
Net incremental cumulative cash flow	(52,690)	5,562,274	11,219,836	11,219,836

Cell is named "Yr1NetCF"

Cell is named: "Yr1CumCF"

Cumulative Incremental Cash Flow	(52,690)	5,562,274	11,219,836
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Payback Period (years): 1.009

ROI of hundred percent is indeed a investment for payers

				Year 1	Year 2	Year 3	Total
	Total incremental inflows			6,870,809	6,976,198	7,086,857	20,933,863
	Total incremental outflows			6,923,498	1,361,234	1,429,296	9,714,028
	Simple ROI, 3 years:		115.5%				

Net Present Value

Enter an interest rate for discounting (0 - 100%)

	Incremental cash flow in \$			
	Year 1	Year 2	Year 3	Total
Net Cash Flow	(52,690)	5,614,964	5,657,561	11,219,836

Discounting at Year End:

				NPV
Discounted Cash Flow Stream	(50,181)	5,092,938	4,887,214	9,929,971

Discounting at Mid-Year

				NPV
Discounted Cash Flow Stream	(51,420)	5,218,708	5,007,904	10,175,193

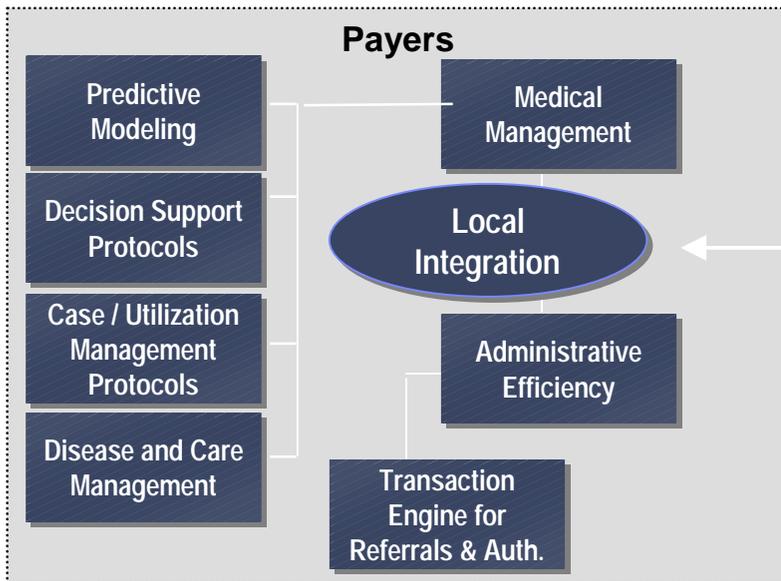
Total cost of ownership

	Year 1	Year 2	Year 3	Total
TCO	6,923,498	1,361,234	1,429,296	9,714,028

Total Cost of Ownership (TCO) \$9,714,028

Case 1: E-prescribing initiative ROI model

A regional implementation of the e-prescribing model



Current Data Flow
Localized by domain or manually driven

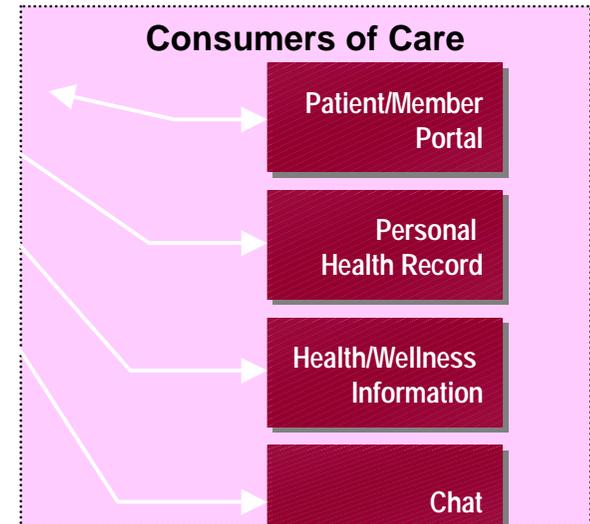
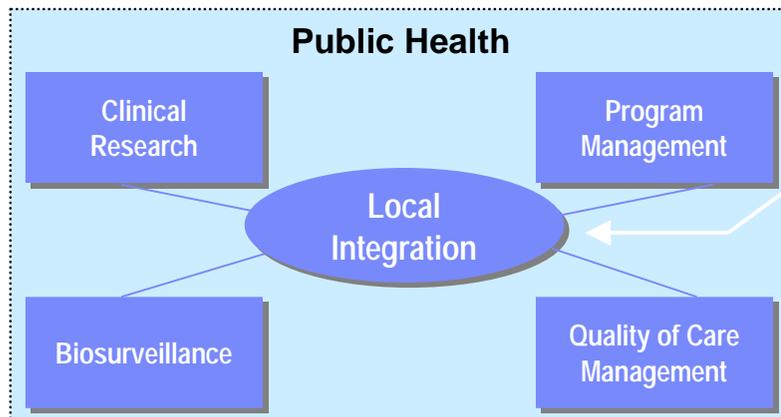
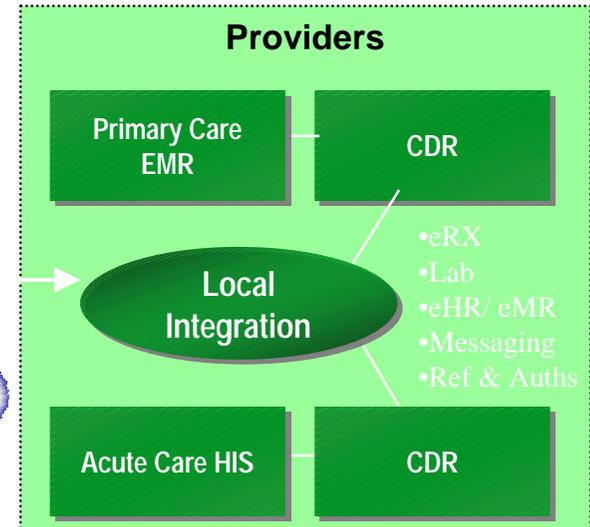


Ecosystem Integration

- Business Services
- Message Handling
- Security
- Data Management
- Application Support

Future Data Flow

- Real time
- Clinical focus
- Aggregated, and
- Automated



The implementation of the project is done in three phases

- **Phase I – Medications Management**
 - Medication history compiled from multiple sources
 - Automate refills
 - Access to formularies
 - e-Rx

- **Phase II**
 - Laboratory orders and results
 - Radiology orders and results

- **Phase III**
 - Electronic Health Records

ROI model notes and assumptions

1. Beneficiaries include employers, health plans, physicians, pharmacies, Pubs, employee/member
2. Quality benefits such as reduced death, better health and improved quality of life are not calculated
3. Employee/member monetary benefits are not calculated
4. Cost of care savings are allocated to the employer (assume that even for underwritten or community-rated, competition among health plans will, over time, drive these savings to the plan sponsor)
5. Administrative savings are allocated to the appropriate stakeholder: physician, pharmacy, PBM, health plan
6. National / published data is used in the model
7. Benefits reflect improvement from current state when known, or from a manual environment.
8. Only eRx benefits have been captured, although Costs reflect a full RHIO clinical data exchange solution cost.

Payer Benefits that were considered for the business case

1. Increased generic dispensing, especially at point of initial prescription
2. Lower incidence of adverse drug interaction
3. Lower call volume - outbound to physician and inbound to PBM customer service center
4. Increased compliance with preferred formularies
5. Fewer dispensing errors from manual key entry
6. Increased volume of mail order prescriptions
7. Lower dispensing fees
8. Automated refills processing; faster turnaround
9. Automated prior authorization and step therapy compliance
10. Increased medication adherence by patients
11. Elimination of duplicate/false prescriptions

Provider benefits from the e-prescribing model

1. Decreased call volume
2. Automated refills
3. Electronic script & signature
4. Pay for performance incentives
5. Fewer errors and improved quality

The return on investment on the e-prescribing model is low

Costs to the Customer	Year 1	Year 2	Year 3	Total
One-off Hard Costs	2,250,000			2,250,000
Ongoing Hard Costs	0	0	0	0
One-Off Soft Costs	0			0
Ongoing Soft Costs	500,000	525,000	551,250	1,576,250
Total Costs	2,750,000	2,100,000	2,205,000	7,055,000

Benefits to the Customer	Year 1	Year 2	Year 3	Total
On-Off Hard Benefits	0			0
On going Hard Benefits	2,148,457	2,255,880	2,351,291	6,755,628
On-Off Soft Benefits	TBD	TBD	TBD	0
On Going Soft Benefits	0	0	0	0
Total Benefits	2,148,457	2,255,880	2,351,291	6,755,628

Value Measures	
ROI	3.67%
Payback Period	1.380242233
NPV	232,463
TCO	7,055,000

Consortium Model – Region based and

Stakeholders model for initiatives to improve healthcare in the region

	Payer	Provider	Hospital	Employer	Public Health	Lab	Patient	Pharmacy
Electronic Health Record (EHR)	Active			Active			Active	
Passive EHR								
E - Prescribing	Active		Active					Active
Core Clinical Data Exchange				Active	Active		Active	
Community Based Registries					Active			
Physician Credentialing						Active		
Denial Documentation		Active						
Case-Based Disease Management	Active		Active	Active	Active			Active
Chronic Disease Management	Active			Active	Active			

Lower ROI in the initial years must not deter developments of RHIO

Benefits	Year 0
Annual benefit flow	(\$13,458,460)
Cumulative benefit flow	(13,458,460)

Discounted benefit flow	Year 0
Discounted costs	13,458,460
Discounted benefits	0
Total discounted benefit flow	(13,458,460)
Total cumulative discounted benefit flow	(13,458,460)

ROI measures	
Cost of capital	11%
Net present value	\$51,316,645
Return on investment	23%
Payback (in years)	2.98

Conclusions and Next Steps

- The business case for RHIO suggests that there is a definite return for the investment in technology and process change. It is our recommendation that the stakeholders must invest this initiative and improve healthcare of all citizens.
- The data that is sent and shared brings value to the whole initiative as RHIOs are just like the highway. Issues related to privacy, security and access are important for stakeholders to invest in RHIOs
- The models are being validated in real world engagements and continued use of them will identify the “true” benefits and costs. The interoperability connections are expected to complete next year and use of them will validate value.

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