Areas of IT Strategic Emphasis at Partners HealthCare

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How should we support our disease management initiative?

- Develop and publish best practices
- Monitor costs, quality and care activity of a cohort
- Guide documentation
- Remind providers and patients of steps to be taken
- Critique specific care decisions
- Monitor and manage a specific patient

Themes as the basis for IT strategy development

- **Themes are broad organizational goals that endure over many years**
  - **Improving care quality**
  - **Reducing care costs**
- **The mix of theme directed projects will vary from year to year**
- **Development of theme competency becomes a critical strategic undertaking**
- **Research has found significant theme use in organizations that have had exceptional IT effectiveness**
  - **Earl, M. (1993). Experiences in strategic information systems planning. *MIS Quarterly, 17*(1), 1–24.**
  - **Weill, P., & Broadbent, M. (1998). *Leveraging the new infrastructure.* Boston: Harvard Business School Press.**

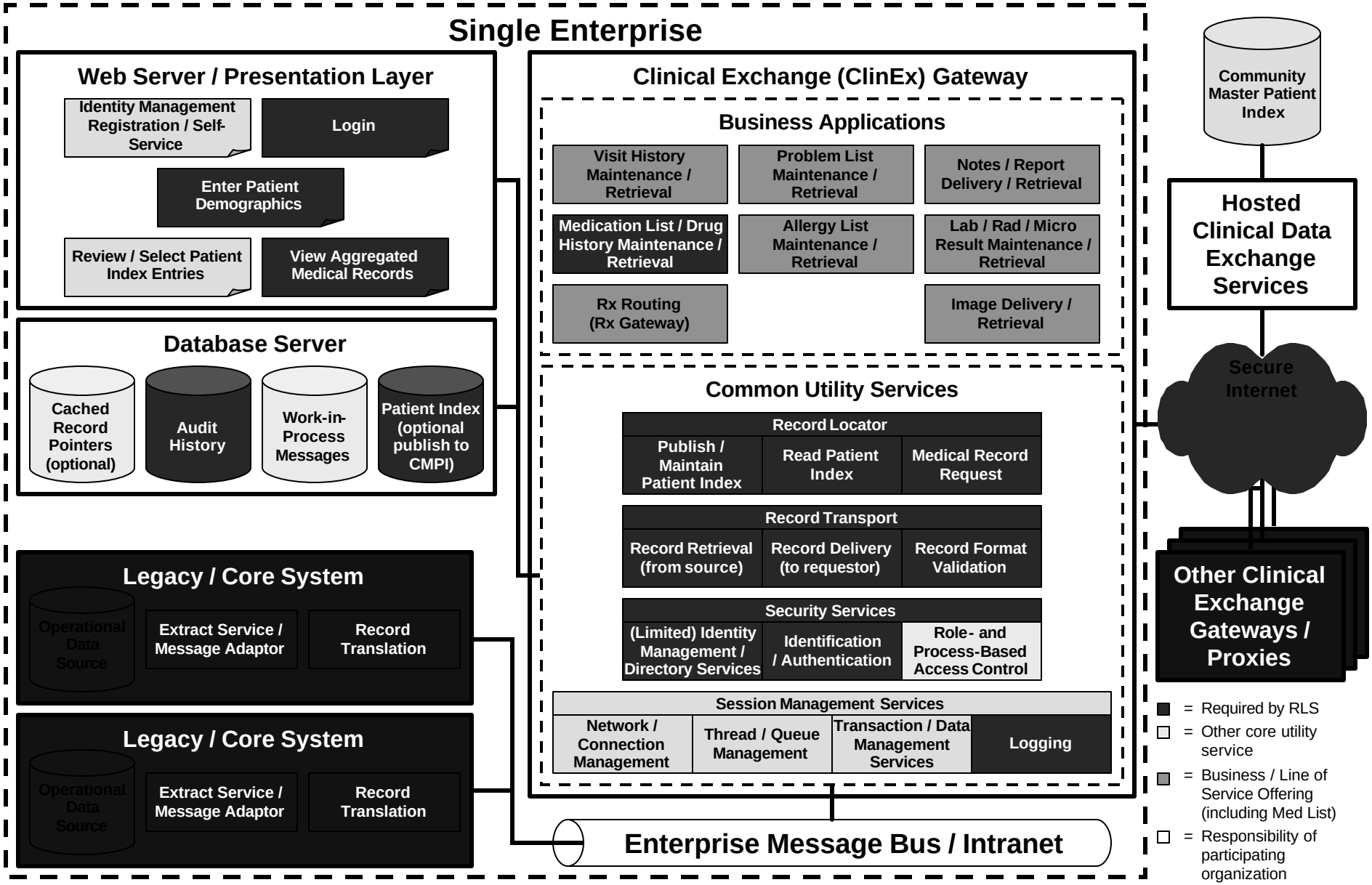
Themes as the basis for IT strategy development

- **Themes require:**
  - **A critical mass of IT and user talent and competency**
  - **A sustainable source of funds**
  - **A governance structure to define an ongoing initiative and project agenda**
  - **A research and development capability**
- **The IT strategy can have themes that traverse organizational goals and strategies**

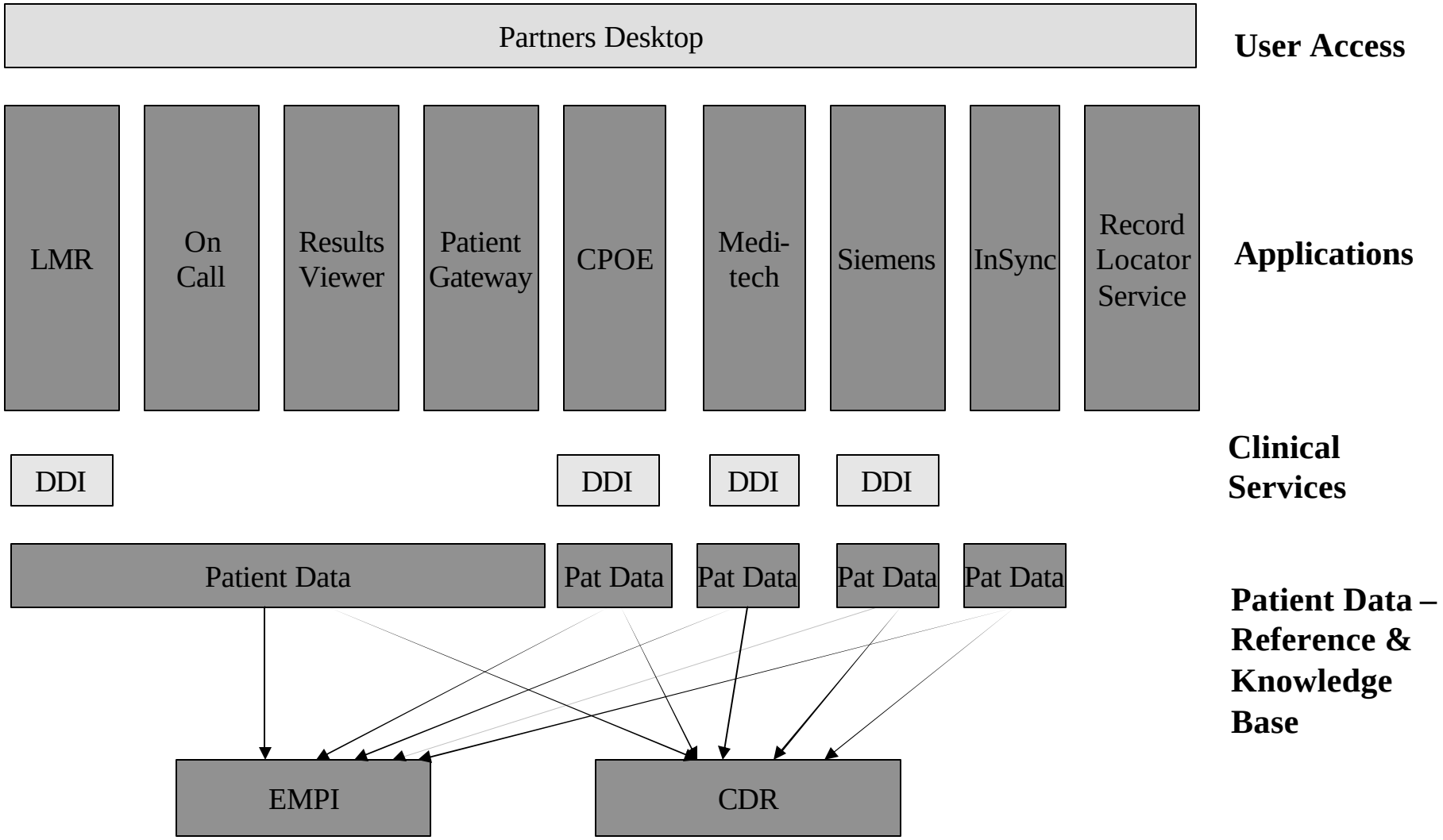
Partners IT strategic “themes”

- **Create a high performance infrastructure**
- **Improve ambulatory care**
- **Increase patient safety**
- **Support clinical research**
- **Manage medical knowledge**
- Address medical imaging
- Optimize patient care workflow
- Support remote provision of care
- Establish payer-provider integration

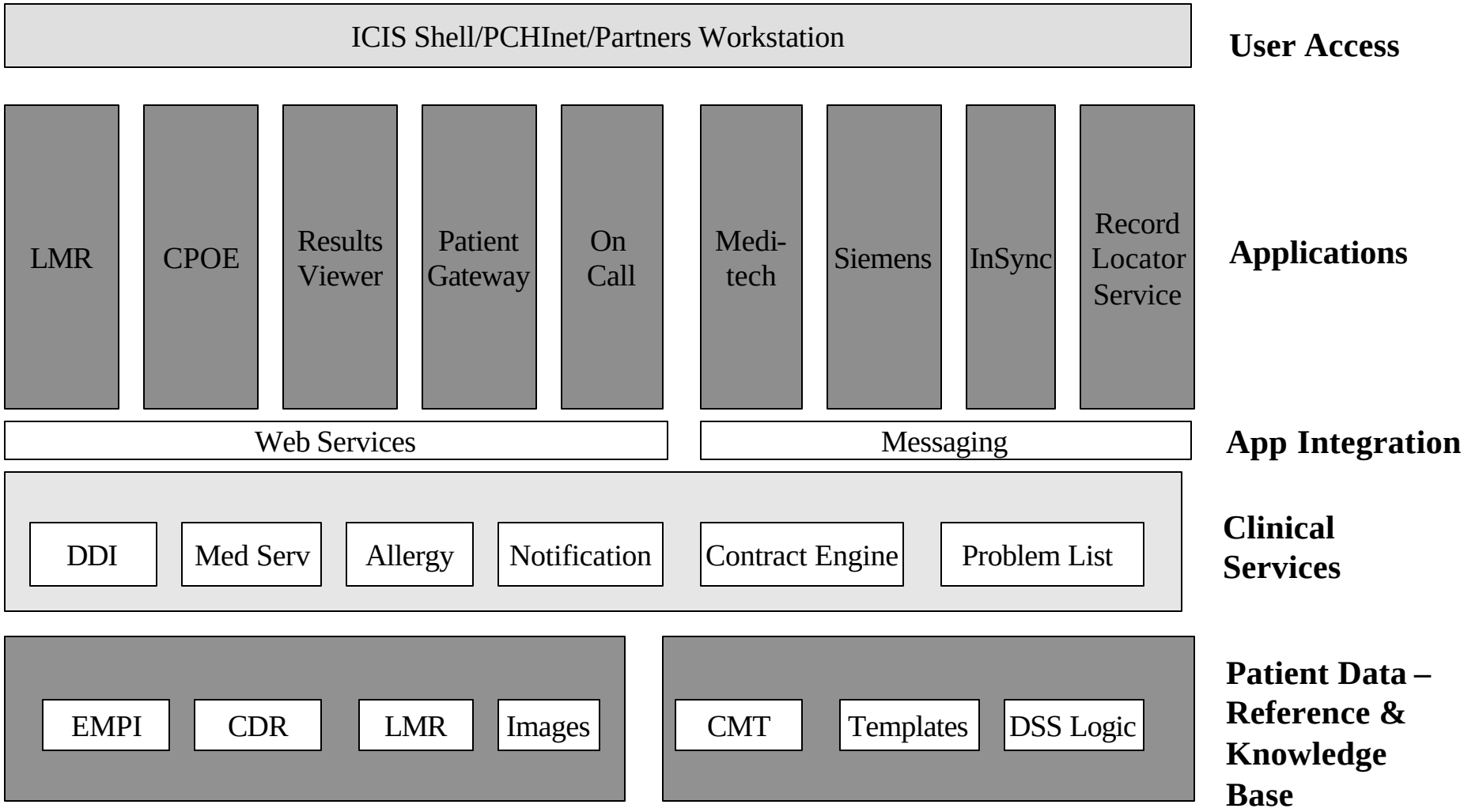
RLS and gateway components



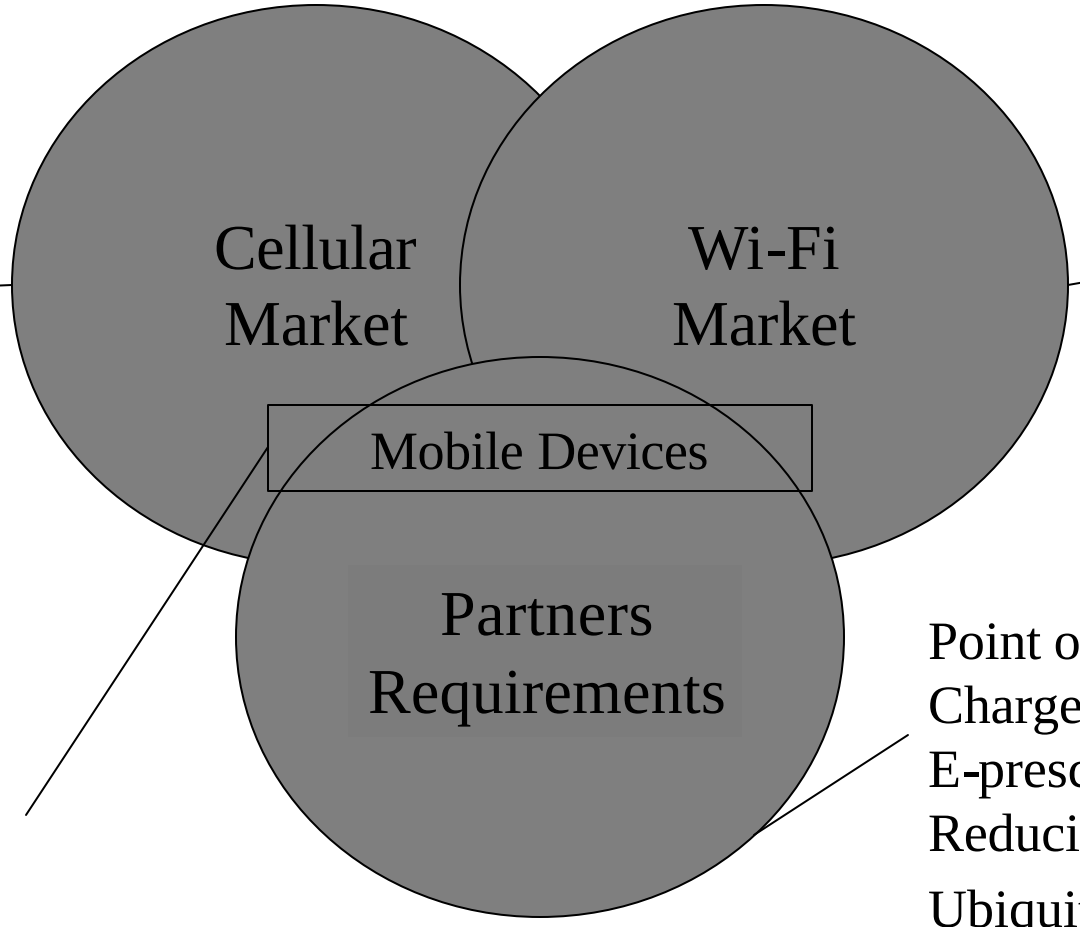
Clinical information systems architecture



Clinical information systems architecture



Mobility – trying to put the pieces together



AT&T Wireless
Cingular
Verizon
Nextel
T-Mobile

802.11b
802.11a
802.11g
802.16
Bluetooth
Hot Spots
Zigbee

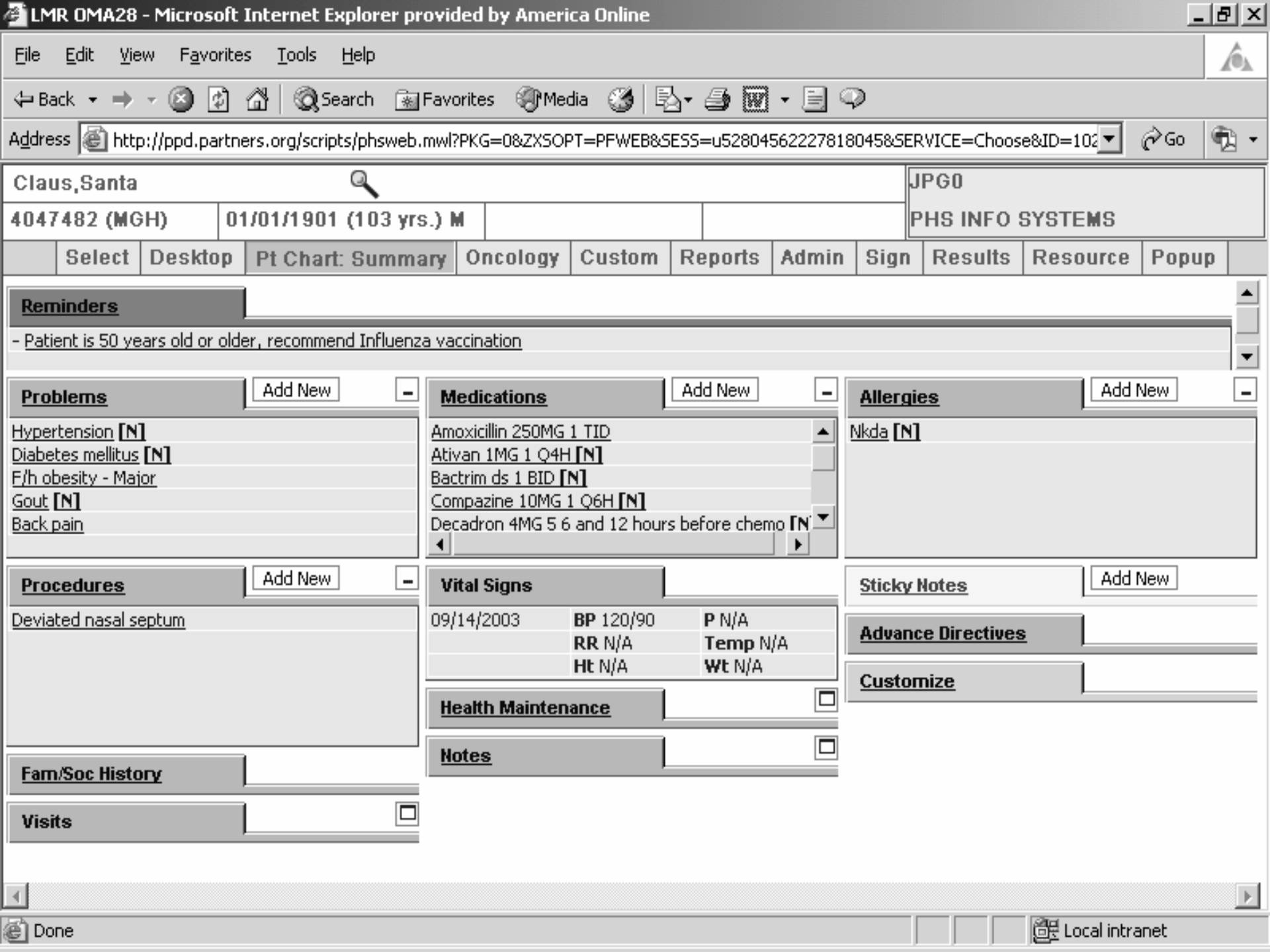
PDAs
Tablet PCs
Smart Phones
Blackberry
RFID
BioMed Devices

Point of care delivery
Charge capture – coding
E-prescriptions
Reducing medical errors
Ubiquitous wireless -connectivity
Extending the clinical -portfolio

Summary of the scope of the outpatient care problem

(1) Gandhi T et al. Adverse drug events in primary care, under review, NEJM. (2) Gandhi T et al. Drug complications in outpatient settings J Gen Int Med 2000. (3) Gandhi TK et al. Adverse drug events in primary care, under review, NEJM. (4) Poon E, et. al. Failure to follow mammographers recommendations on marginally abnormal mammograms: determination of associated factors [abstract]. J Gen Intern Med 2001. (5) Gandhi T et. al. Communication breakdown in the outpatient referral process J Gen Intern Med 2000. (6) Maviglia SM, et.al. Using an electronic medical record to identify opportunities to improve compliance with cholesterol guidelines J Gen Intern Med 2001

For Every:	There Appear to Be:
1000 patients coming in for outpatient care (1)	14 patients with life-threatening or serious ADEs
1000 outpatients who are taking a prescription drug (2)	90 who seek medical attention because of drug complications
1000 prescriptions written (3)	40 with medical errors
1000 women with a marginally abnormal mammogram (4)	360 who will not receive appropriate follow-up care
1000 referrals (5)	250 referring physicians who have not received follow-up information 4 weeks later
1000 patients who qualified for secondary prevention of high cholesterol (6)	380 will not have a LDL-C, within 3 years, on record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PHS INFO SYSTEMS
Select Desktop Pt Chart: Summary Oncology Custom Reports Admin Sign Results Resource Popup
Reminders
- Patient is 50 years old or older, recommend Influenza vaccination
Problems
Add New
Hypertension [N]
Diabetes mellitus [N]
F/h obesity - Major
Gout [N]
Back pain
Medications
Add New
Amoxicillin 250MG 1 TID
Ativan 1MG 1 Q4H [N]
Bactrim ds 1 BID [N]
Compazine 10MG 1 Q6H [N]
Decadron 4MG 5 6 and 12 hours before chemo [N
Allergies
Add New
Nkda [N]
Procedures
Add New
Deviated nasal septum
Vital Signs
09/14/2003
BP 120/90
P N/A
RR N/A
Temp N/A
Ht N/A
Wt N/A
Sticky Notes
Add New
Advance Directives
Customize
Health Maintenance
Notes
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Done
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Provider Patient Panel Summary - Microsoft Internet Explorer
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Address :sortby=DBP&top:sortheader=top:dbp&top:shownull=NO&top:nulldef=MISSOLDVAL&top:otherdef=EYE_EXAM&top:num_pmi=0&top:days_last_pmi=99998&focus_pcp=cnn&bottom:showall=
Pop-Up Stopper Hotlinks On/Off Options

Provider Type 2 Diabetes Population Summary For All Providers

Return back to Population Manager

Distribution of HbA1c values

% at goal (< 7%)	45.5 %
% between 7-8%	21.1 %
% between 8-9%	15.3 %
% between 9-10%	7 %
% > 10%	10.9 %
% missing HbA1c	0 %

Distribution of LDL values

% at goal (< 100mg/dl)	49.6 %
% between 100-130	33.3 %
% between 130-160	12.5 %
% > 160	4.4 %
% missing ldl	0 %

Distribution of Systolic BP values

% at goal (< 130mm hg)	100 %
% between 130-150	0 %
% between 150-170	0 %
% between 170-190	0 %
% > 190	0 %
% missing sbp	0 %

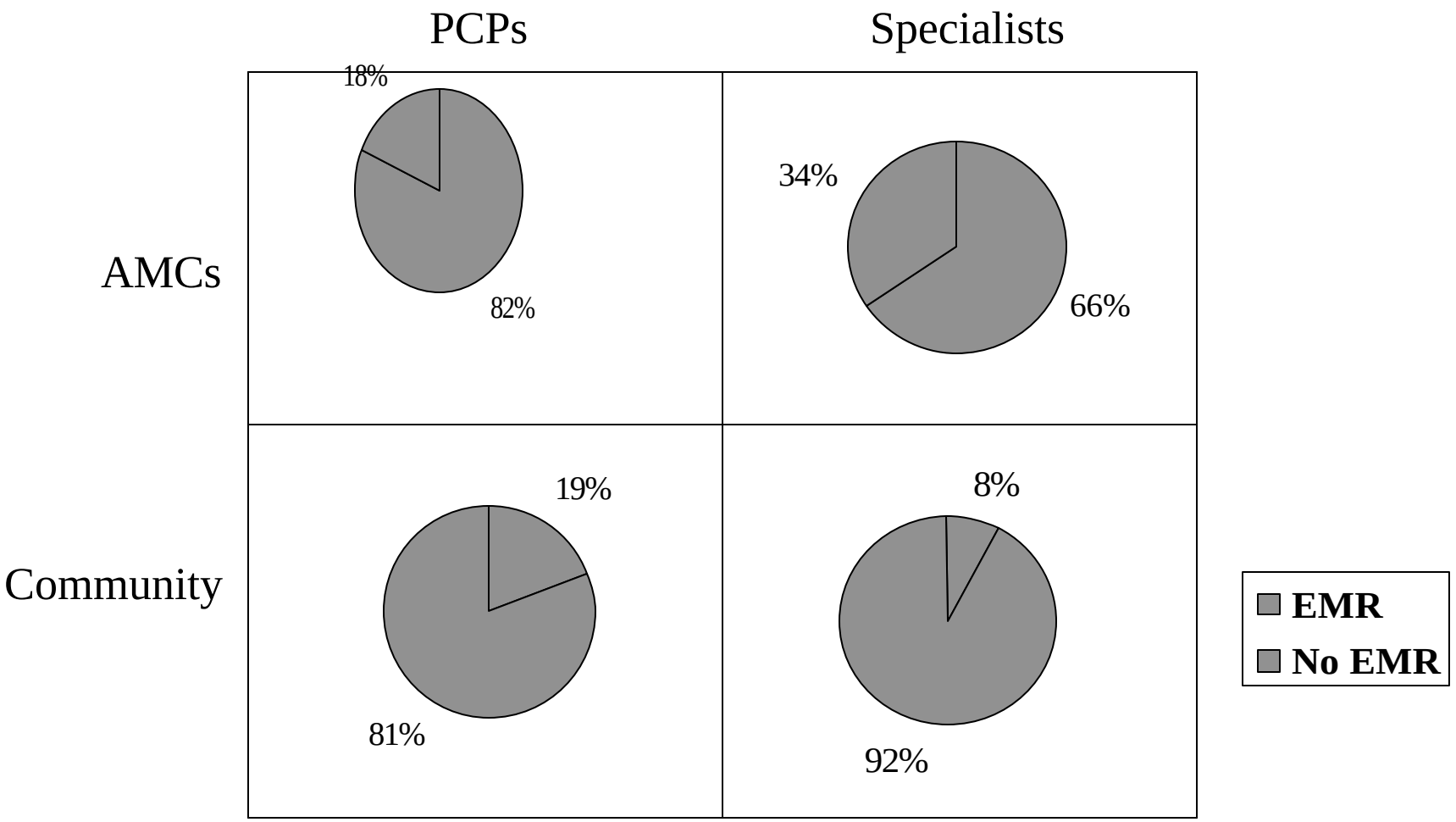
Distribution of Diastolic BP values

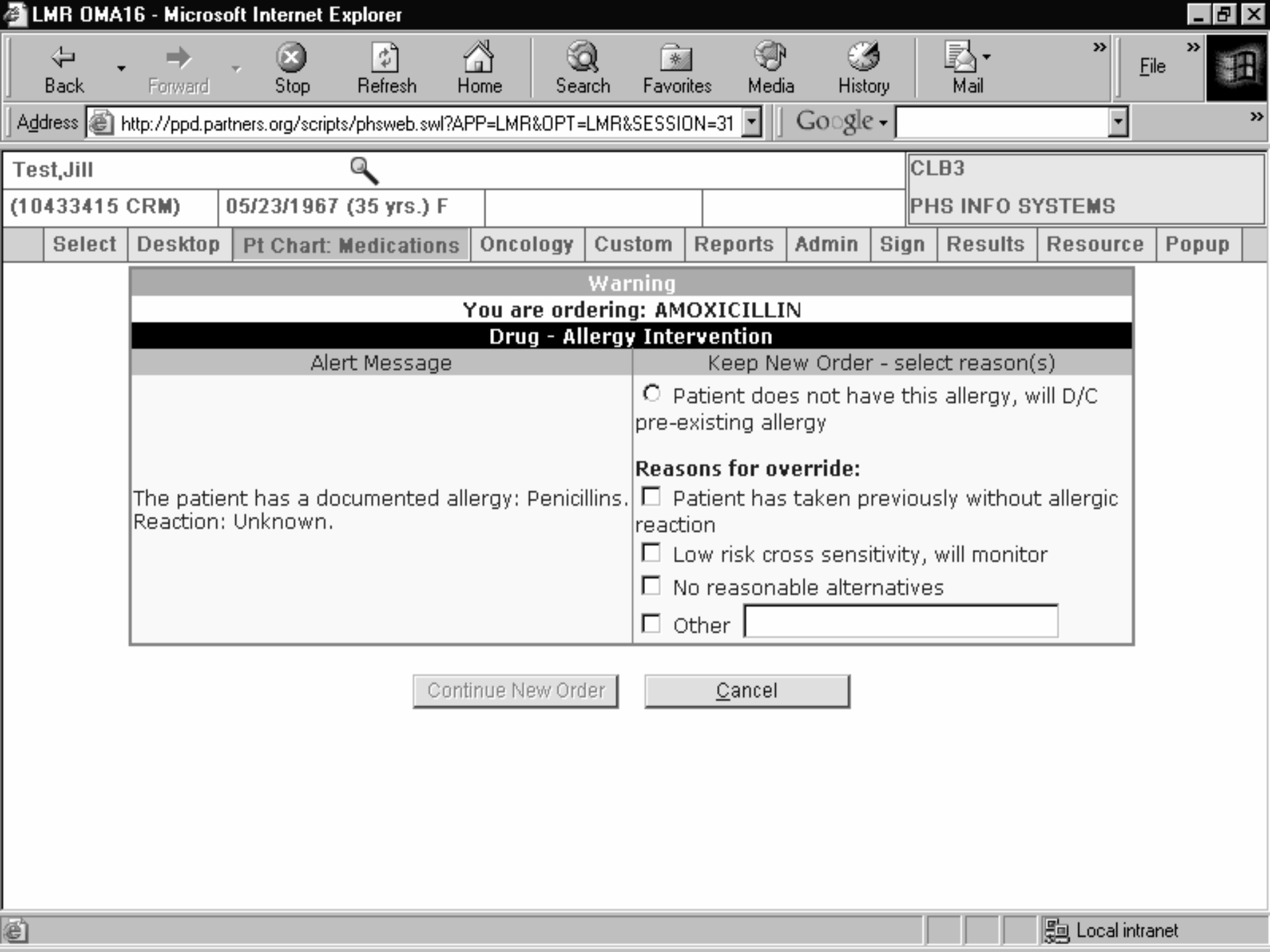
% at goal (< 85mm hg)	96.4 %
% between 85-90	2.8 %
% between 90-100	0.6 %
% between 100-110	0 %
% > 110	0 %
% missing dbp	0 %

SUMMARY OF PATIENTS MEETING CARE GOALS # of patients = 312

% pts meeting goal of hba1c < 7%: 45.5%	% pts meeting missing hba1c values: 0%
% pts meeting goal of ldl < 100mg/dl: 49.6%	% pts meeting missing ldl values: 0%
% pts meeting goal of sbp < 130mm: 100%	% pts missing sbp measurements: 0%
% pts meeting goal of dbp < 85mm: 96.4%	% pts missing dbp measurements: 0%

EMR adoption

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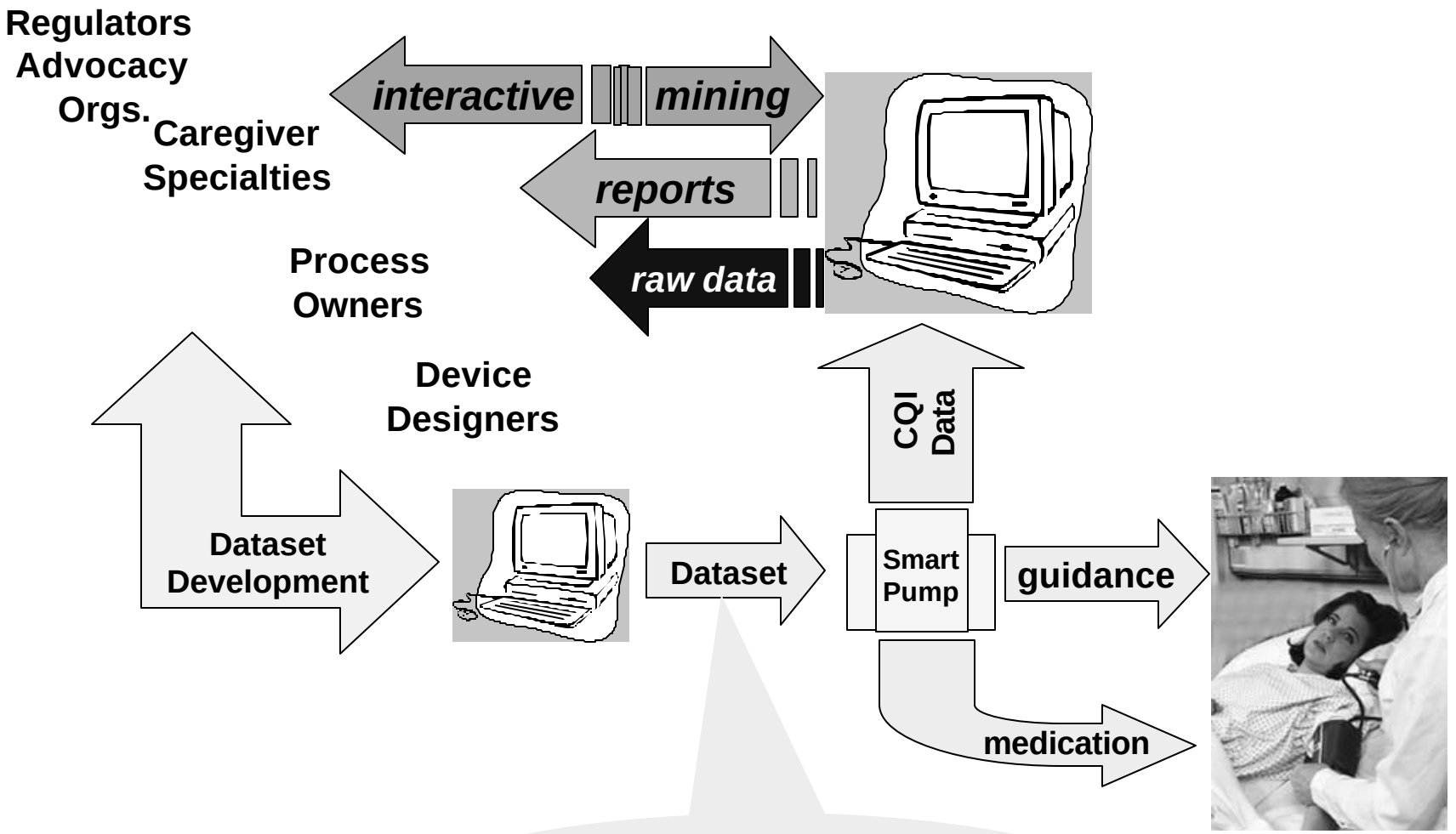
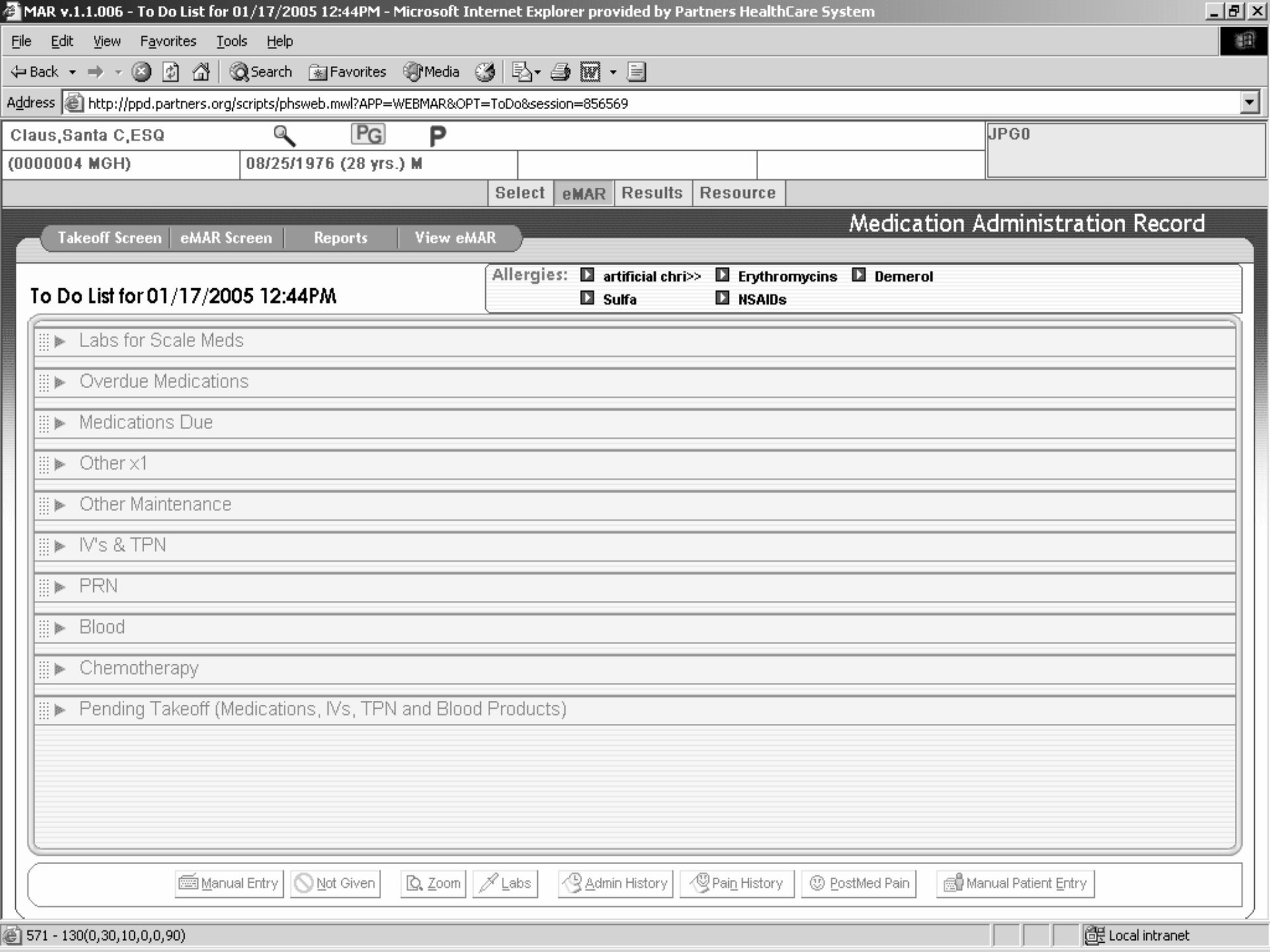
Pt Chart: Medications
Oncology
Custom
Reports
Admin
Sign
Results
Resource
Popup
Warning
You are ordering: AMOXICILLIN
Drug - Allergy Intervention
Alert Message
Keep New Order - select reason(s)
The patient has a documented allergy: Penicillins. Reaction: Unknown.
Patient does not have this allergy, will D/C pre-existing allergy
Reasons for override:
Patient has taken previously without allergic reaction
Low risk cross sensitivity, will monitor
No reasonable alternatives
Other
Continue New Order
Cancel
Local intranet

Infusion safety process

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Labs for Scale Meds
Overdue Medications
Medications Due
Other x1
Other Maintenance
IV's & TPN
PRN
Blood
Chemotherapy
Pending Takeoff (Medications, IVs, TPN and Blood Products)
Manual Entry Not Given Zoom Labs Admin History Pain History PostMed Pain Manual Patient Entry
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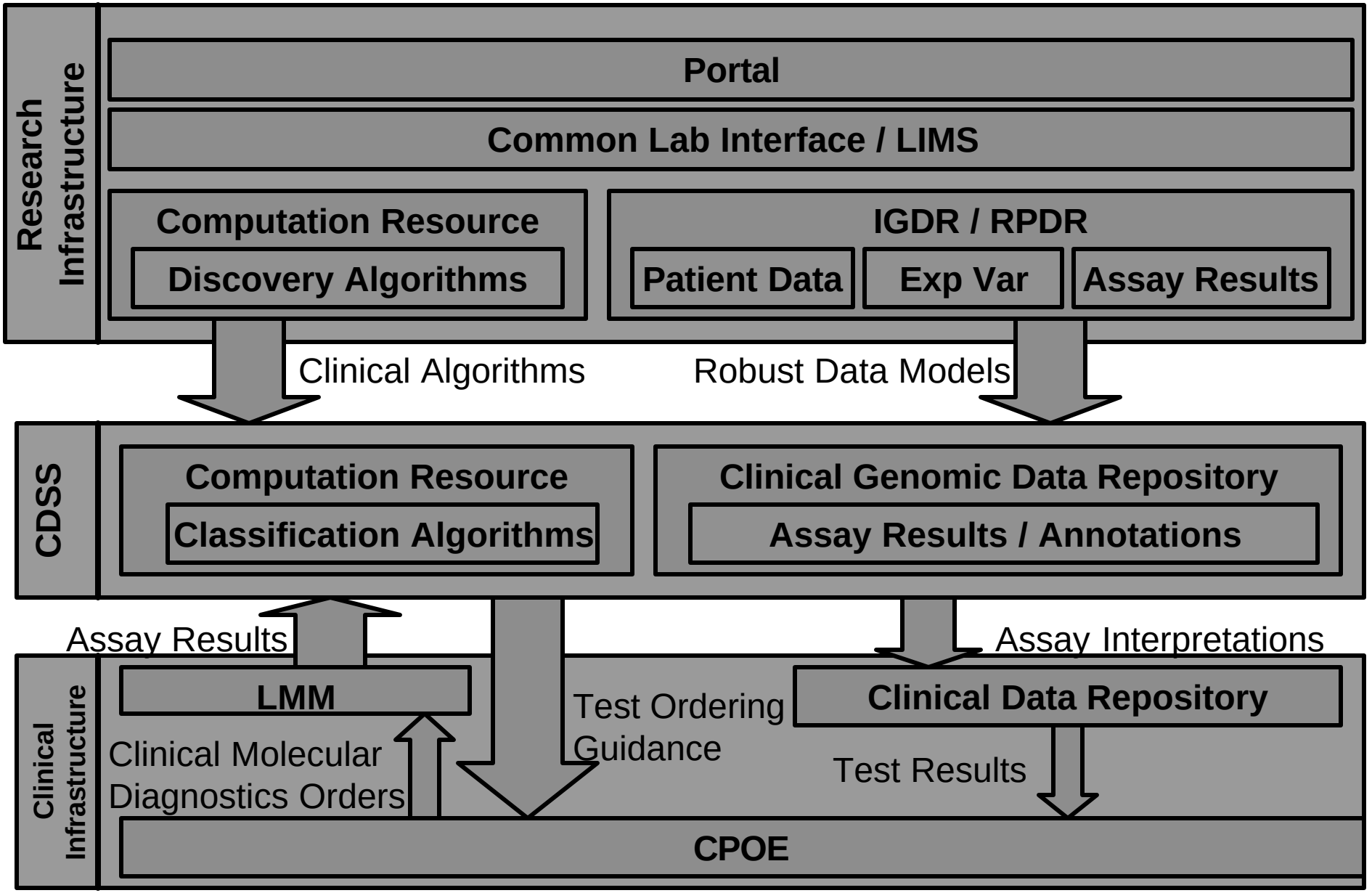
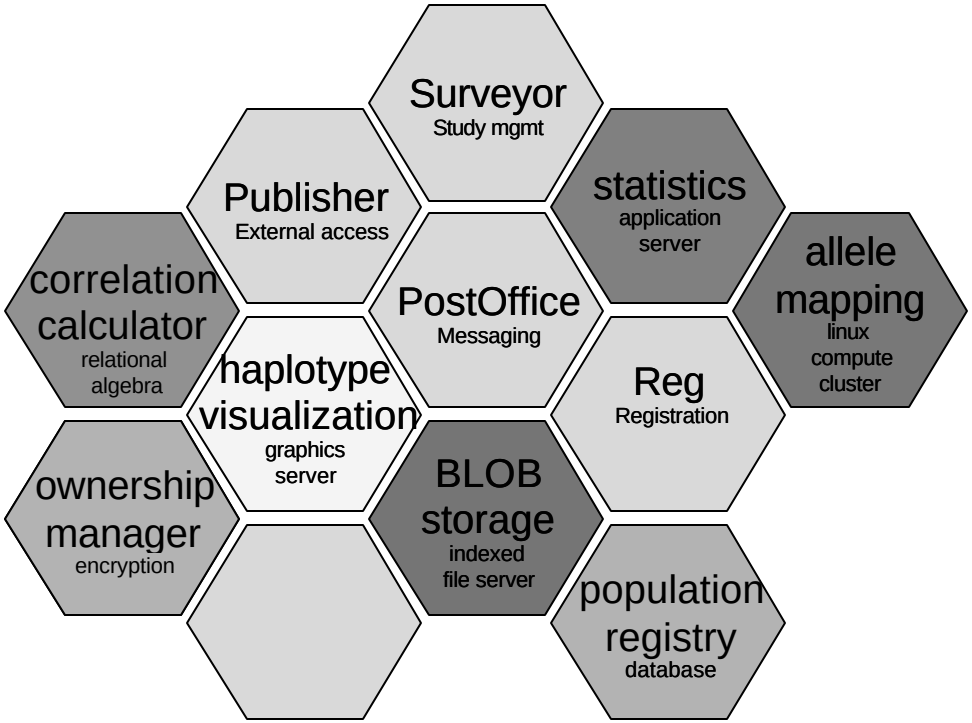
Local intranet

IT platform to support genomic research and clinical care



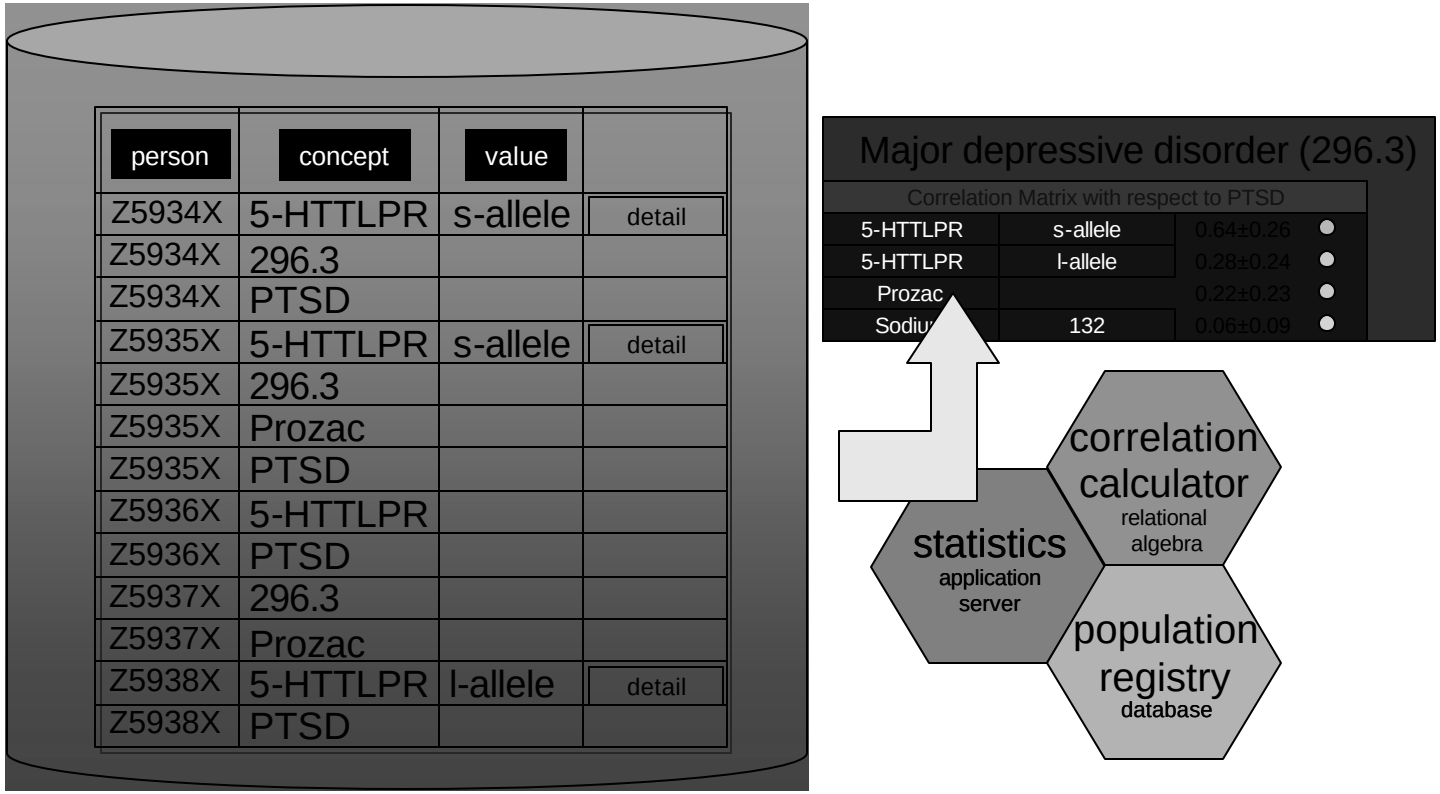
Modular computational system

Aggregates of software modules to support knowledge discovery



Discovering correlations

Finding clinical and research facts associated with a patient that correlate with their diagnoses



I2B2 specific goals

- Acquiring sufficiently high quality phenotype data on large enough patient populations to ensure that genomic-clinical studies are robust
- Extraction of annotations from textual databases where structured databases do not exist. Recognition of clinical progression/disease over time and heterogeneous data types
- Principled and high-throughput knowledge-based leverage of different genomic and clinical data types to update causal and associational hypotheses at the clinical and basic biological level
- Facilitation of distributed collaboration

Knowledge management practices

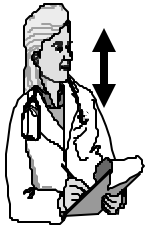
Attributes of Knowledge	Knowledge Management Practices	Dissemination of Content Across Sites	Estimated Rows of Knowledge
KNOWLEDGE ASSETS REQUIRING DEVELOPMENT AND MAINTENANCE			
Medication Services			
Drug-Drug Interactions			2000
Allergies			4000
Gerios			100
Nephros			250
Pediatric Content			2000
Chemo Content			500
Drug Dictionary			8000
Other Medication-related Decision Support			
Consequent Lab Display			60
Consequent Orders			60
Indication Screened Orders			20
Antibiotic restriction/decision support			40
Drug-Lab prescribing error decision support			350
Drug-Problem prescribing error decision support			700
Pharmacy ADE/potential ADE notification alerts			80
Physician ADE/potential ADE notification alerts			150
Ambulatory Care Knowledge Bases			
Preventive Reminders			100
Results Manager			100
Specialty Views of Data	To Be Developed		200
Clinician Population-Management Dashboards	To Be Developed		200
Clinical Documentation Templates			1000+
Physician Order Entry Knowledge Bases			
Inpatient Order Sets/Templates			500+
End of Visit Order Templates	To Be Developed		200+
Problem List Database			1000+

KEY	
Knowledge Management Practices for Existing Databases:	
Purely Ad-hoc Updating	
Primarily Adhoc Updating with Some Active Updating	
Actively Scheduled Updating	
Dissemination of Knowledge Across MGH/B&W/LMR	
1 site	
2 sites	
> 2 sites	

Knowledge management cycle

KNOWLEDGE ASSET MANAGEMENT

Committee
Vetting & Sanctioning



Clinical Knowledge Champions work with Subject Matter Experts

KNOWLEDGE APPLICATION

Applications for Virtual, Asynchronous Collaborative Authoring, Inventory, Updating and Maintenance

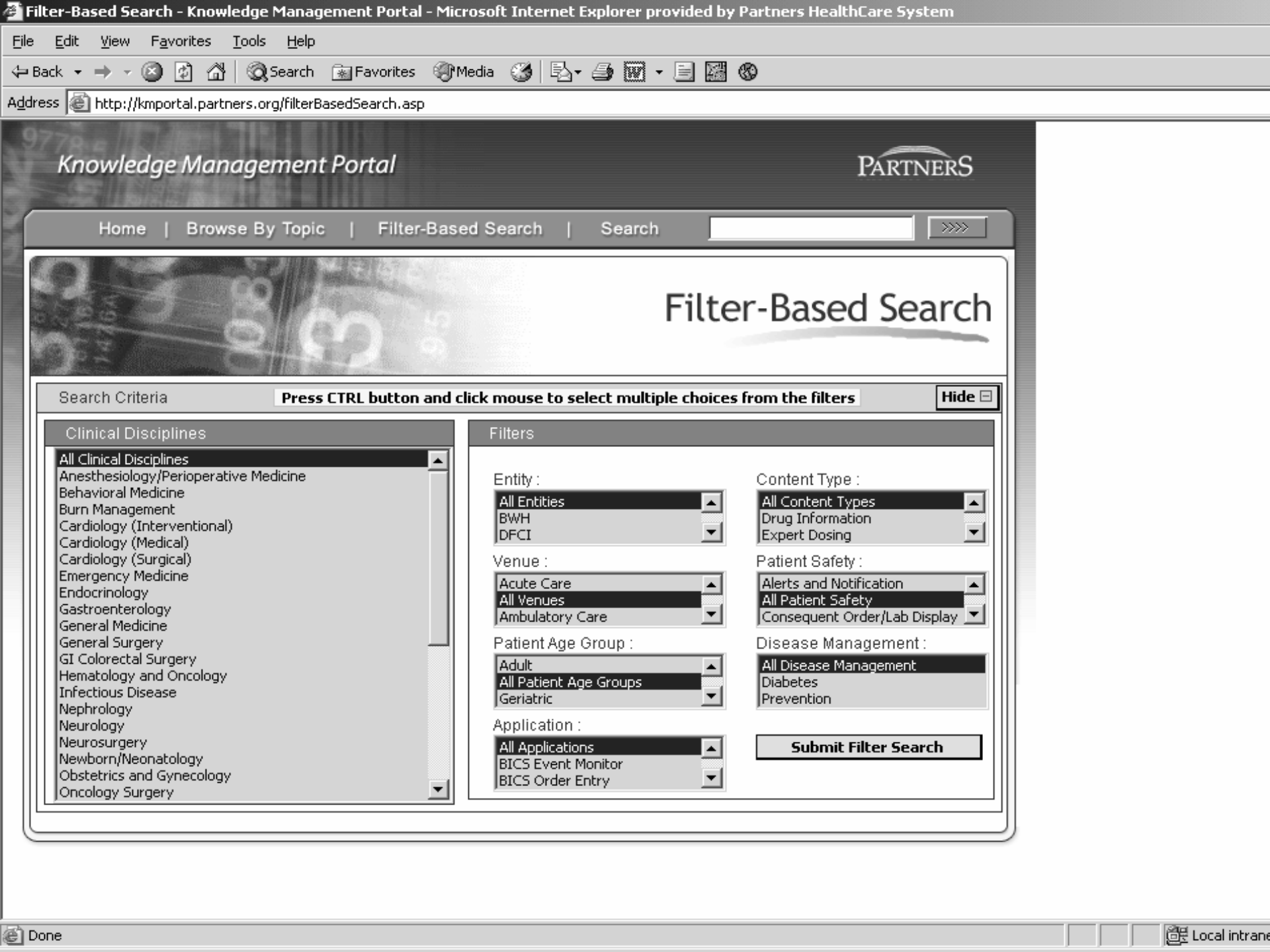
KNOWLEDGE EDITORS

WORKFLOW APPLICATIONS

Knowledge Repository:
Human Readable Specifications, Screen Shots, Process Flow Diagrams, References, and Data/Reports on Clinical Outcomes and Usability Organized by Clinical Discipline, Role, Venue, Process, and Mode of Application

ANALYTIC DATA WAREHOUSE

KNOWLEDGE DISCOVERY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Filter-Based Search
Search Criteria
Press CTRL button and click mouse to select multiple choices from the filters
Hide
Clinical Disciplines
All Clinical Disciplines
Anesthesiology/Perioperative Medicine
Behavioral Medicine
Burn Management
Cardiology (Interventional)
Cardiology (Medical)
Cardiology (Surgical)
Emergency Medicine
Endocrinology
Gastroenterology
General Medicine
General Surgery
GI Colorectal Surgery
Hematology and Oncology
Infectious Disease
Nephrology
Neurology
Neurosurgery
Newborn/Neonatology
Obstetrics and Gynecology
Oncology Surgery
Filters
Entity :
All Entities
BWH
DFCI
Content Type :
All Content Types
Drug Information
Expert Dosing
Venue :
Acute Care
All Venues
Ambulatory Care
Patient Safety :
Alerts and Notification
All Patient Safety
Consequent Order/Lab Display
Patient Age Group :
Adult
All Patient Age Groups
Geriatric
Disease Management :
All Disease Management
Diabetes
Prevention
Application :
All Applications
BICS Event Monitor
BICS Order Entry
Submit Filter Search
Done
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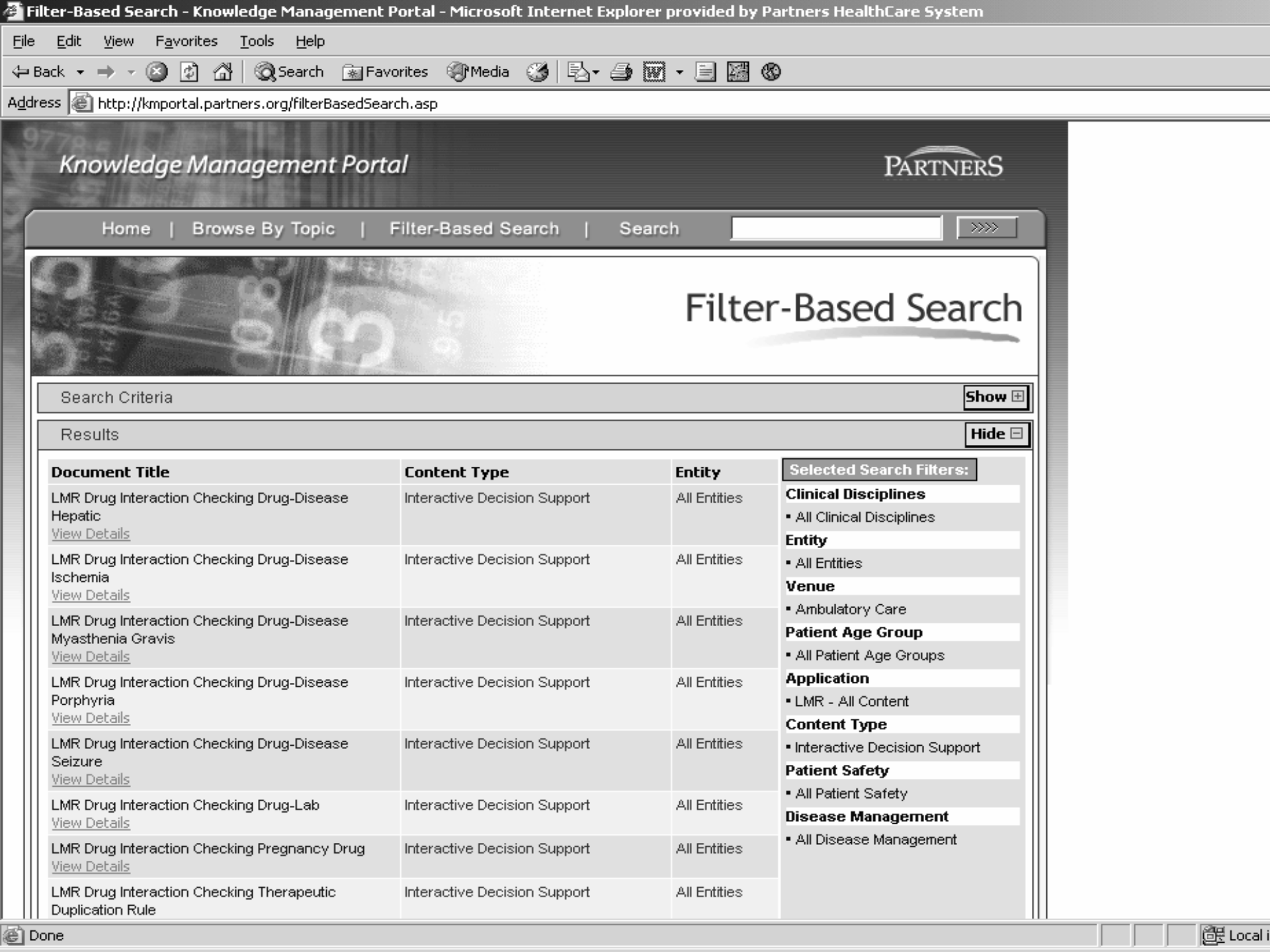
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View Details
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All Entities
LMR Drug Interaction Checking Drug-Disease Ischemia
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LMR Drug Interaction Checking Drug-Disease Porphyria
View Details
Interactive Decision Support
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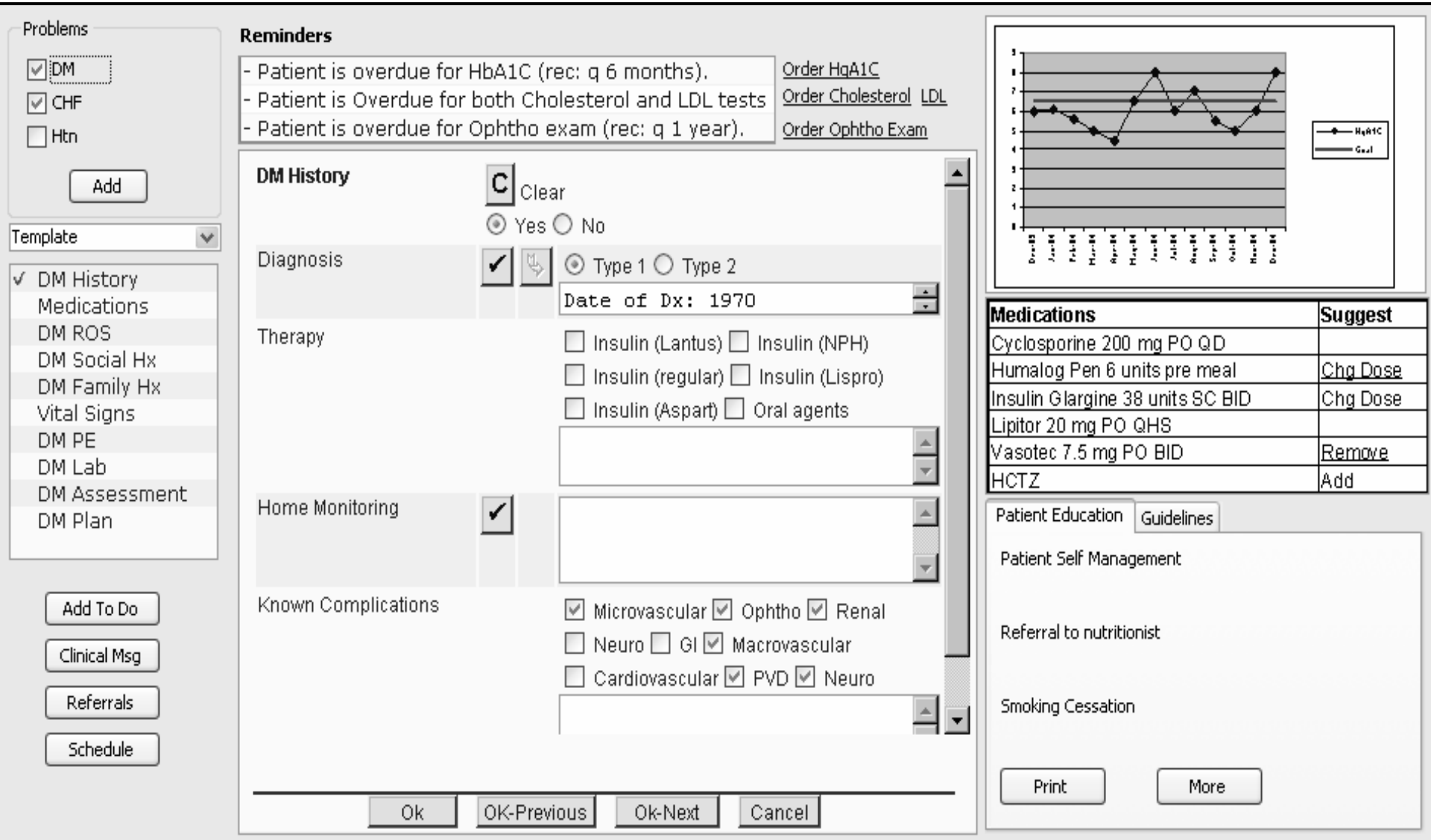
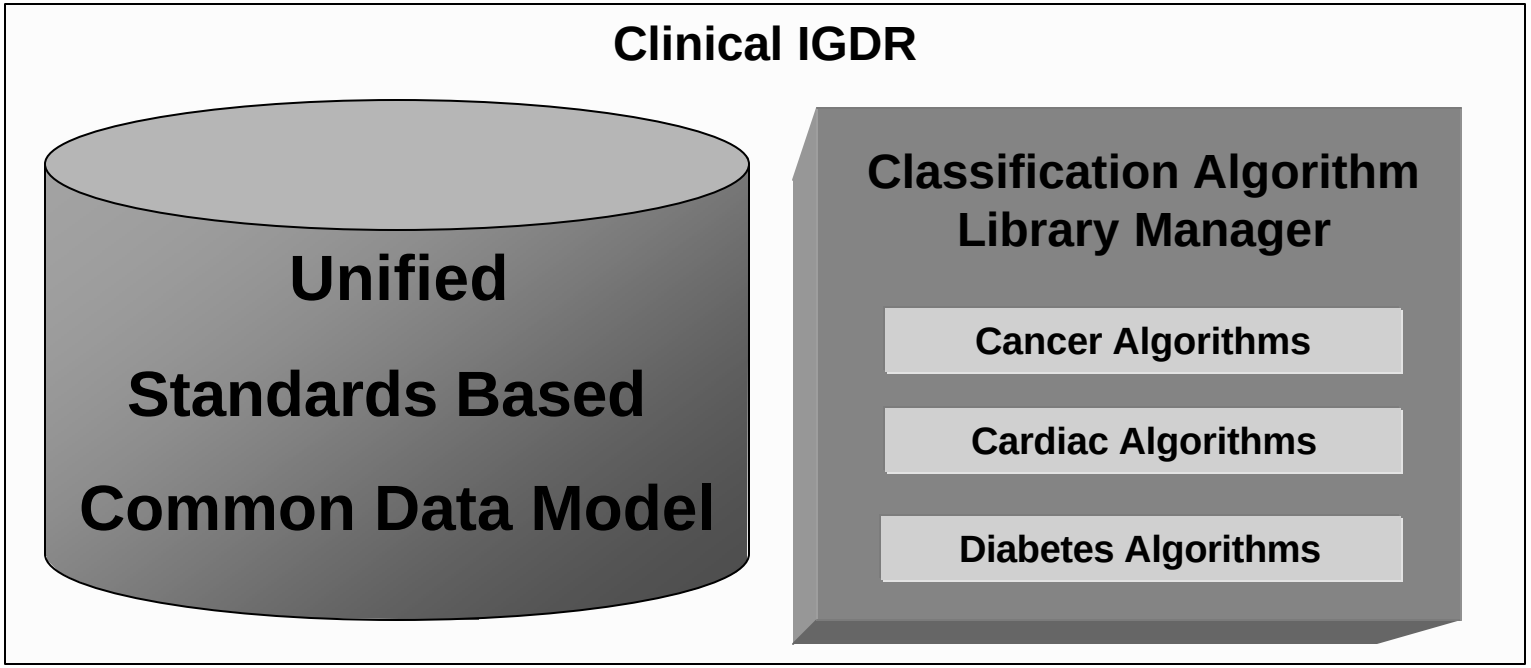
LMR Drug Interaction Checking Drug-Disease Seizure
View Details
Interactive Decision Support
All Entities
LMR Drug Interaction Checking Drug-Lab
View Details
Interactive Decision Support
All Entities
LMR Drug Interaction Checking Pregnancy Drug
View Details
Interactive Decision Support
All Entities
LMR Drug Interaction Checking Therapeutic Duplication Rule
Interactive Decision Support
All Entities
Selected Search Filters:
Clinical Disciplines
▪ All Clinical Disciplines
Entity
▪ All Entities
Venue
▪ Ambulatory Care
Patient Age Group
▪ All Patient Age Groups
Application
▪ LMR - All Content
Content Type
▪ Interactive Decision Support
Patient Safety
▪ All Patient Safety
Disease Management
▪ All Disease Management
Done

LMR “smart form” that displays relevant info, provides decision support, supports template-driven documentation and order capture



Possible EMR Infrastructure Change



Every provider that intends to leverage genomic medicine will require this platform

Example IT Research Council projects

- **Context-sensitive information retrieval (“KnowledgeLink”)**
- **A trial of home-based monitoring in the care of congestive heart failure patients**
- **Requirements analysis for research imaging databases and viewers at Partners Healthcare**
- **Capturing family history in the LMR to support genetics related decision support**
- **Knowledge management for clinical decision support**
- **A clinical decision support tool to improve the provision of cardiac preventive services**
- **Assessing the frequency of failure to adhere to black-box warnings in outpatients**
- **Using information technology to describe and improve the content of residency practice**
- **An architecture to support inter-operabiltiy of key data**
- **Requirements analysis for medical records oriented analytical tools and databases**

Current externally funded IT research

- NIH National Center for Biomedical Computing
- Boston University/Army care delivery in the home
- AHRQ
  - EHR tools for clinical documentation and quality measurement
  - Evaluation of advanced CDSS: Results manager and ACPOE
  - Evaluation of impact on IT in nursing homes
- Foundation for ehealth initiative
  - Evaluation of mass adoption of EHR in MA
  - Resource center for regional clinical integration efforts

Summary

- **The Partners HealthCare IT strategy is driven, to a large degree, by themes**
- **Themes require:**
  - **A critical mass of IT and user talent and competency**
  - **A sustainable source of funds**
  - **A governance structure to define an ongoing initiative and project agenda**
  - **A research and development capability**
- **Nine themes have been defined:**
  - **Infrastructure**
  - **Ambulatory care**
  - **Patient safety**
  - **IT support of clinical research**
  - **Managing medical knowledge**
  - **Medical imaging**
  - **Optimizing patient care workflow**
  - **Remote provision of care**
  - **Payer-provider integration**