Electronic Health Record

Implementation Issues and Strategies

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The HIT Symposium at MIT, July 18, 2006

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Strategies for the digital future of healthcare information

- **Information management and systems consultant, focusing on electronic health records and their value proposition**
- **Adjunct faculty, College of St. Scholastica; former positions with CPRI, AHIMA, Univ. of Ill., IEEI**
- **Active participant in standards development, HIMSS BOD**
- **Speaker and author (numerous books and articles on EHR and HIPAA; HIMSS Book of the Year 2006; ASHPE Awards)**

- Strategic IT planning
- Compliance assessments
- Work flow redesign
- Project management and oversight
- ROI/benefits realization
- Training and education
- Vendor selection
- Product/ market analysis

Steve Lazarus

Boundary Information Group

Strategies for workflow, productivity, quality and patient satisfaction improvement through health care information

- **Business process consultant focusing on electronic health records, and electronic transactions between organizations**
- **Former positions with MGMA, University of Denver, Dartmouth College; advisor to national associations**
- **BOD and Past Chair, Workgroup for Electronic Data Interchange (WEDI)**
- **Speaker and author (books on HIPAA Security and EHR; HIMSS Book of the Year 2006)**

- Strategic IT business process planning
- ROI/benefits realization
- Project management and oversight
- Workflow redesign
- Education and training
- Vendor selection and enhanced use of vendor products
- Facilitate collaborations among organizations to share/exchange health care information

Agenda

- EHR Half Life:
  - Importance of Getting to Adoption
  - Planning is Key to Success
- Implementation Strategies:
  - Who Does What, When?
- Change Management Strategies:
  - Achieving EHR Goals

Electronic Health Record
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EHR Half Life

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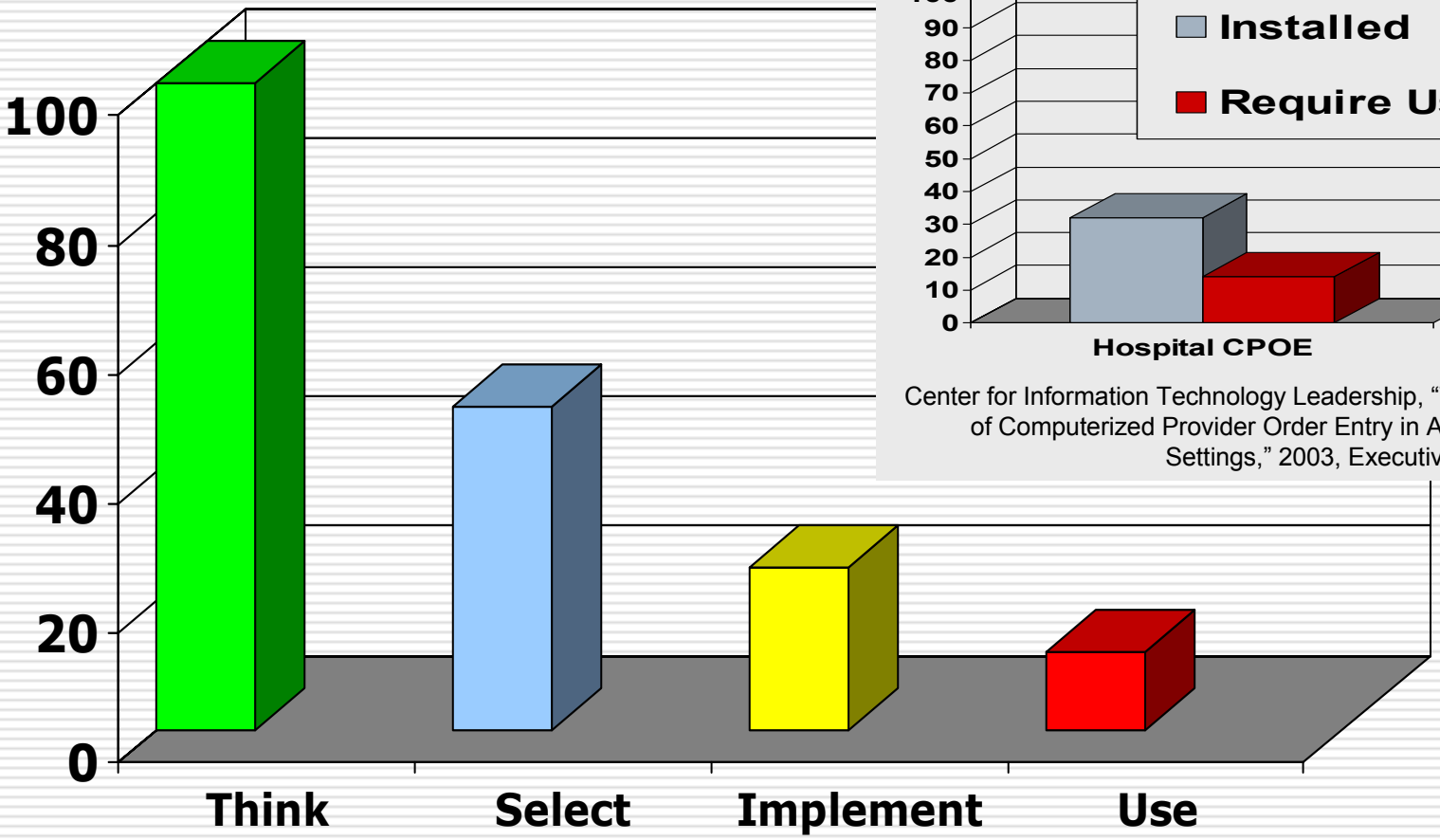
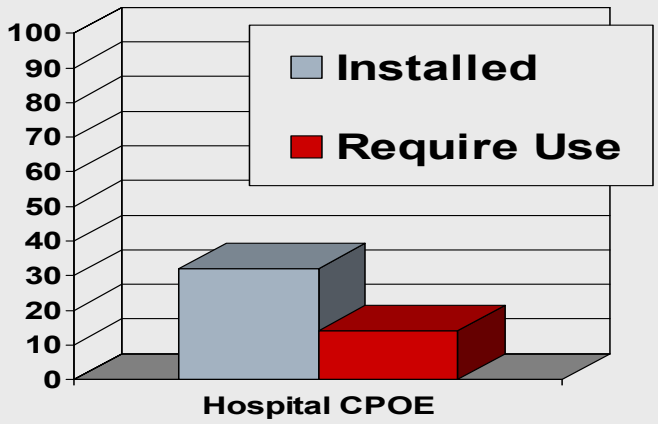
The Sad Story





Center for Information Technology Leadership, "The Value of Computerized Provider Order Entry in Ambulatory Settings," 2003, Executive Preview

Why Is Adoption So Difficult?

- It's not the product,
- It's . . .
  - Planning
  - Communicating
  - Engaging
  - Change management
  - Process improvement
  - Overcoming resistance
  - Building trust
  - Designing it right
  - Being flexible
  - Being forthright
  - Testing
  - Training
  - Nurturing
  - Rewarding

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OFFICIAL JOURNAL OF THE AMERICAN ACADEMY OF PEDIATRICS
PEDIATRICS Vol. 116 No. 6 December 2005, pp. 1506-1512 (doi:10.1542/peds.2005-1287)

Unexpected Increased Mortality After Implementation of a Commercially Sold Computerized Physician Order Entry System

Yong Y. Han, MD[*,†], Joseph A. Carcillo, MD[*,†,‡,§], Shekhar T. Venkataraman, MD[*,†,‡,§], Robert S.B. Clark, MD[*,†,‡,§], R. Scott Watson, MD, MPH[*,†,‡,§,‖], Trung C. Nguyen, MD[*,†], Hülya Bayir, MD[*,†] and Richard A. Orr, MD[*,†,‡,§]

Post-publication Peer Review (P³R)

The issue with CPOE is usually not in the software, but in the **process change** that is required to successfully implement such a complex system. These challenges were well documented in the article . . . But **rather than conclude that work process and infrastructure issues must be completely understood, investigated, and resolved prior to implementation**, the authors conclude that hospitals should monitor mortality rates after CPOE implementation.

Don Levick, M.D., MBA President Medical Staff Physician Liaison Information Services Lehigh Valley Hospital

EHR Definition

- **System that . . .**
  - **Collects data from multiple sources**
    - Ideally organized in a data repository
    - Ideally integrated across continuum
  - **Is used by clinicians as the primary source of information at the point of care**
    - Ideally with minimal document management and optimal structured data
    - Ideally also supporting the legal medical record
  - **Provides evidence-based decision support**
    - Ideally clinically and professionally context-sensitive

"Point of Care"

- Human-computer interfaces
- Work flow
- Customizable screens
- Ergonomics
- Value proposition
- Communication strategies

"Decision Support"

- **Active**
  - **Reminders**
  - **Alerts**
- **Passive**
  - **Structured data entry templates**
  - **Order sets**
  - **External resources**

Document rationale for overriding alert?

Yes, metadata exists to identify that a rule fired so a reason for overriding the rule should also be available

No, CDS is no different than referencing a textbook, which is rarely documented

"System"

- **Hardware**
  - Computers, workstations, printers, other devices
- **Software**
  - Programs that provide instructions for how the computers should work
- **People**
  - Users, administrators, technicians, vendors, etc.
- **Policies**
  - How the system will be used, what benefits are to be achieved
- **Processes**
  - Procedures, screen designs, report layouts, workflow changes, etc.

Many are saying, . . .

- Just like "What vendor do I buy from?" should not be your first selection question, "Just do it and I'll use it" should not be your users' attitude
- The amount of value gained is directly proportional to the level of effort spent in planning
- There is no perfect system, but proper planning can produce good results
- The element of change in people, policies, and processes is enormous and must be managed well

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Implementation Strategies

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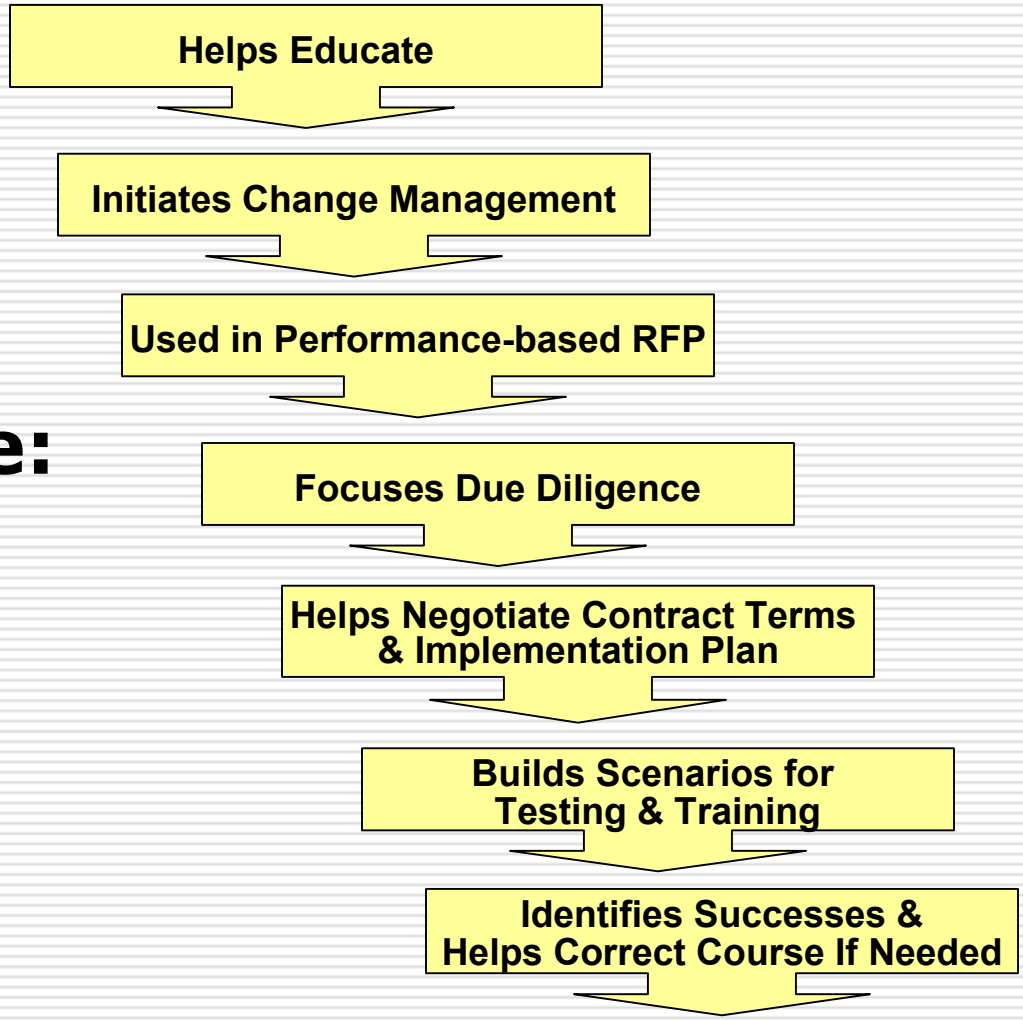
Planning for Implementation

- Starts prior to selection
- With setting goals for EHR
- Goals should be:
  - Specific to results
  - Measurable
  - Measured
  - Celebrated



Establishing Expectations for Use of EHR in Key Clinical Processes

Current Processes	EHR Impact Function	Benefits	Metrics	Expectations/Goals
Visit Specific Processes				
1. Pre-Visit - Appointment scheduling - Diagnostic studies scheduling - Insurance verification - Chart preparation	- Patient portal for scheduling visit - Automated self history & symptom assessment - ASC X12N 270/271 - Paperless	- Context-specific scheduling of diagnostics studies prior to visit - Check eligibility - Reduce/eliminate filing	# FTE scheduling # FTE pulling/filing charts and loose sheets $ in collections # days in A/R # FTE prepping charts Patient satisfaction	- Reduce clerical staff 75% through attrition - Check eligibility on 95% of patients, reducing A/R days by 5 & cutting bad debt by 50% - Increase patient satisfaction survey scores by 3%
2. Check in	- Workflow - Wait times calculated	- Reduce wait time - See more patients - Increase revenue	# minutes wait time # patient visits/hour/ physician $ average revenue/ patient	
3. Patient intake - Documentation of vitals, HPI, etc. - Check on health maintenance - Patient preparation	- Context-specific template-based charting - Health maintenance reminders	- Compliance with health maintenance	# records identifying flu shot status # DM foot exams	- Obtain flu shot data from 100% of patients & provide flu shots to 98% of patients
4. Review chart - Review results (incl. images) - Review past encounter data - Review other provider & patient-supplied data	- Integrated provider EHR and patient PHR - Inter-disciplinary, multi-media, and remote access - Continuum of care			
5. Clinical documentation - Validate history data - Record physical exam - Document encounter notes				
6. Care planning - Develop care plan consistent with guidelines				

Preparation

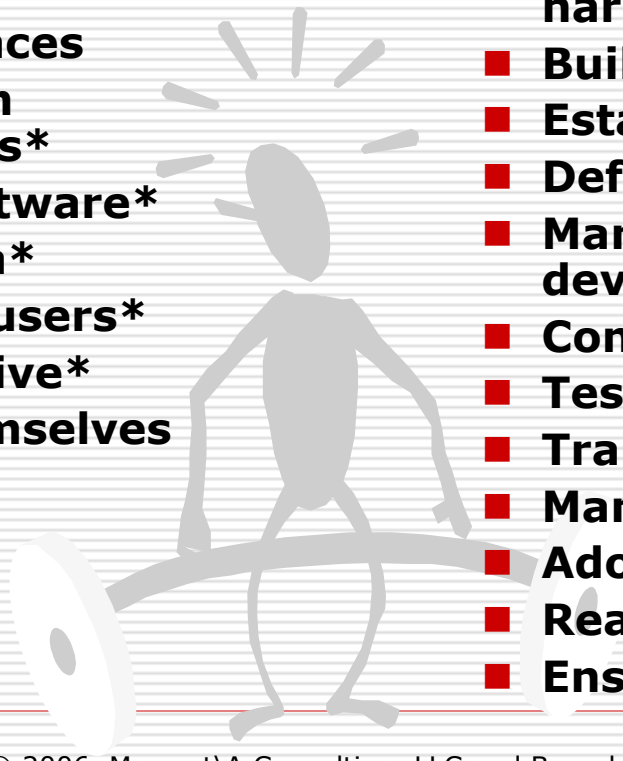
- **Prior to selection, begin**
  - **Process mapping (e.g., workflow, forms and reports inventories, process improvements, standardize procedures)**
  - **Clinical transformation (e.g., standardize documentation, introduce practice guidelines, establish benefits expectations, identify metrics, revise policies)**
  - **Use of electronic systems (e.g., e-mail, results access, electronic drug lookup)**
- **Prior to contract signing**
  - **Outline high level implementation plan, especially turnover strategy, paper-chart conversion plan, standards adherence, payment schedule tied to milestones**
  - **Computer skills training, device evaluation, third-party support, staff recruitment, job descriptions**

After Contract Signing

- Organize implementation teams
- Vendor introductions
- Receive documentation from vendor
- Plan
  - Review contract with vendor, including requirements specifications, project goals and benefits metrics, implementation plan
  - Finalize turnover strategy (i.e., deployment/ rollout), training plan, testing plan
  - Determine any pre-requisite projects

Who Carries the Weight?

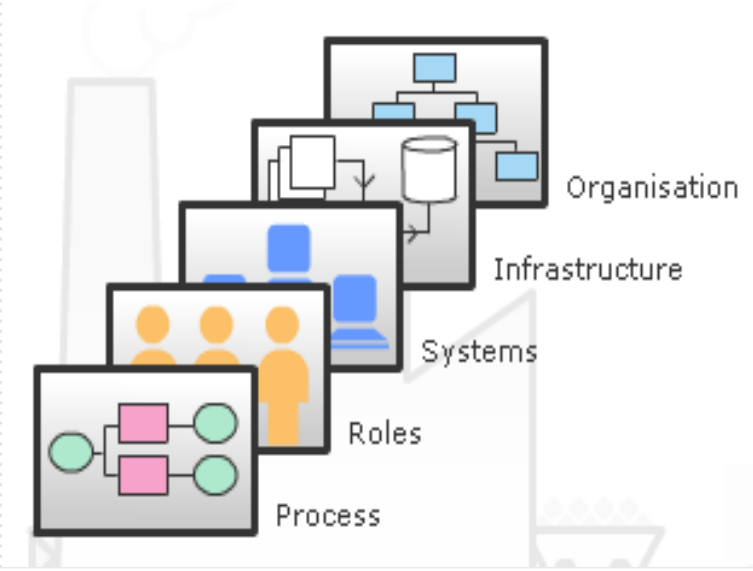
- **Vendor Responsibilities**
  - Provide, install, and configure hardware*
  - Provide and install software
  - Build master files and tables*
  - Write interfaces
  - Make custom modifications*
  - Unit test software*
  - Convert data*
  - Train super users*
  - Support go live*
  - Manage themselves
- *** Or not!**



- **Organization Responsibilities**
  - Manage project
  - Coordinate all vendors
  - Make decisions
  - Identify process changes
  - Buy, install, and configure hardware*
  - Build master files and tables*
  - Establish preferences
  - Define custom needs
  - Manage interface development
  - Convert charts
  - Test system and interfaces*
  - Train end users*
  - Manage go live
  - Adopt system
  - Realize benefits
  - Ensure system kept current

Project Documentation

- Communication plan
- Project plan
- Budget
- Issues log
- Change control
- Meeting agendas and minutes



- User manuals
- Training manuals
- Technical diagrams
  - Information model
  - Data models
  - Data dictionaries
- Worksheets for table building
- Use case scenarios for testing
- Process maps
- Facility layouts & movement diagrams

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Change Management Strategies

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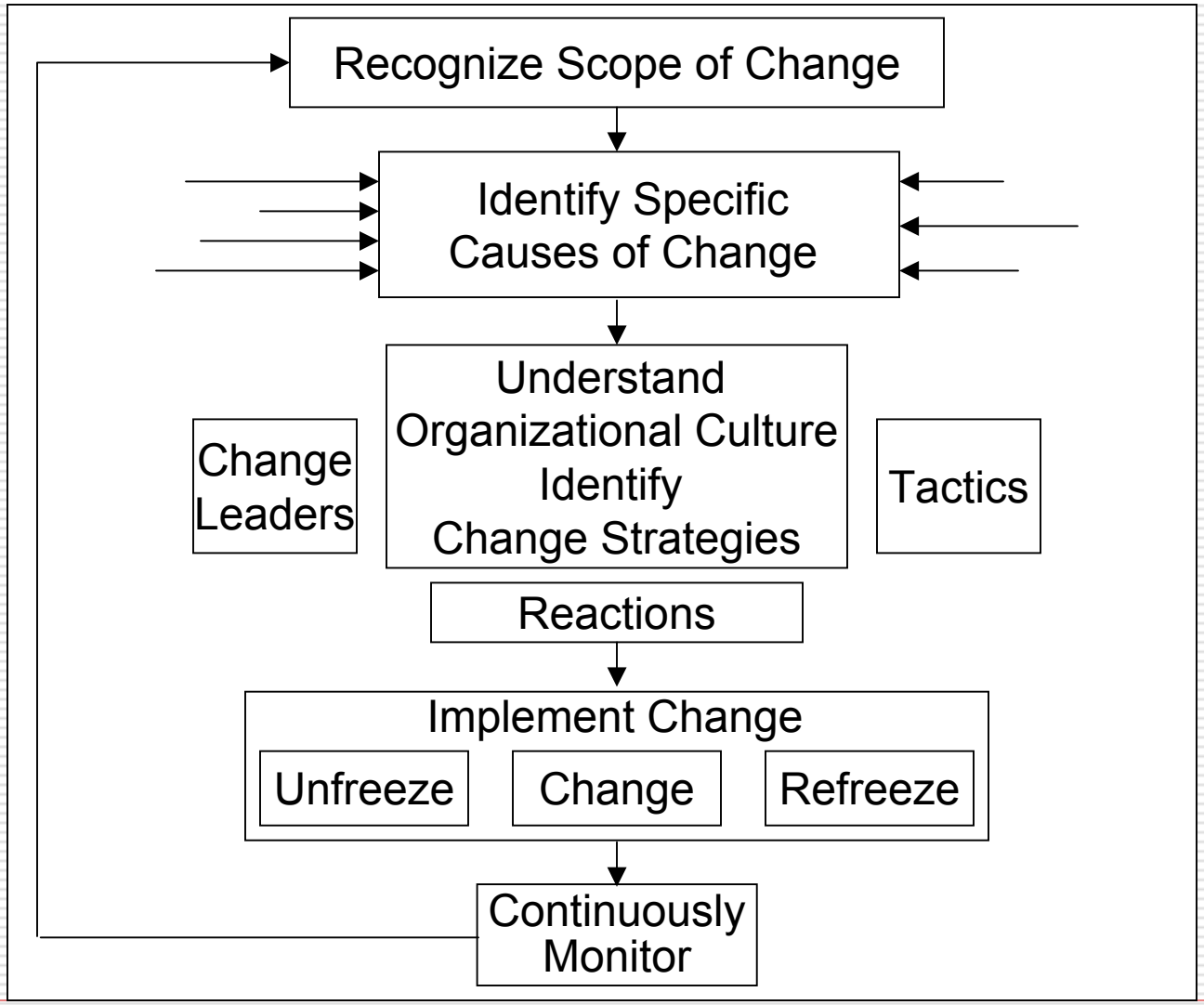
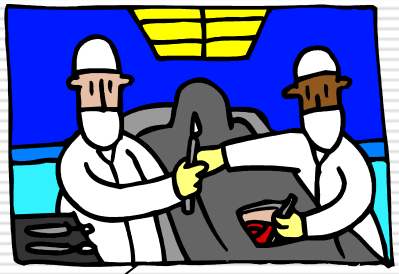
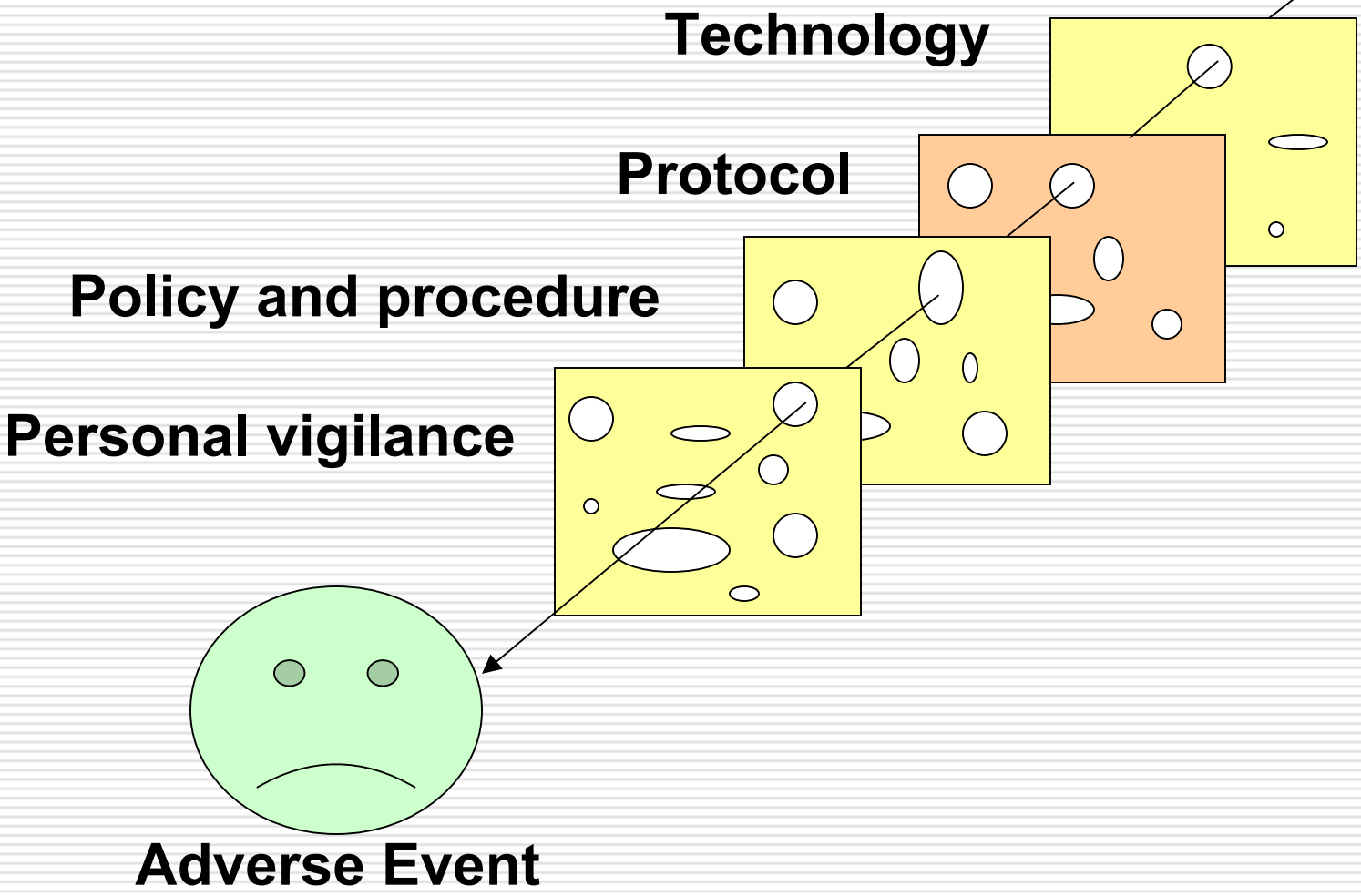
Change Management Theory



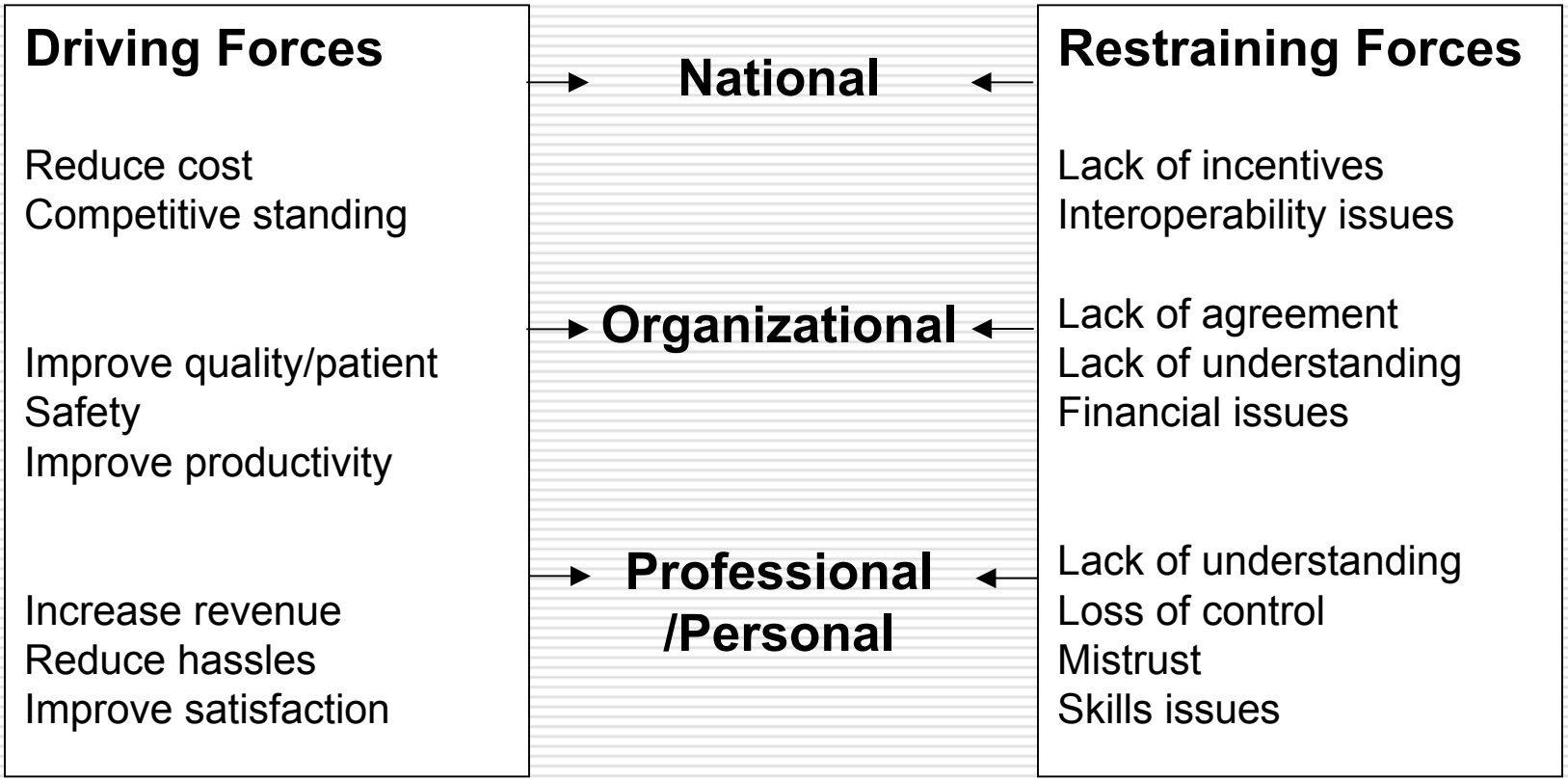
Scope of Change





Causes of Change

Force Field Analysis



Healthcare Culture

- Tensions are created by dual governance of administrative and clinical leadership
- Care teams are comprised of knowledge workers:
  - Highly educated
  - Trained to work autonomously
  - But in a very well-defined hierarchy
- Norms of denial, blame, cover-up regarding stress, fatigue, and errors
- Typical organizational structures often do not work

Leadership Styles
Dictator
Parent
Developer
Enabler
Collaborator
Partner
Visionary

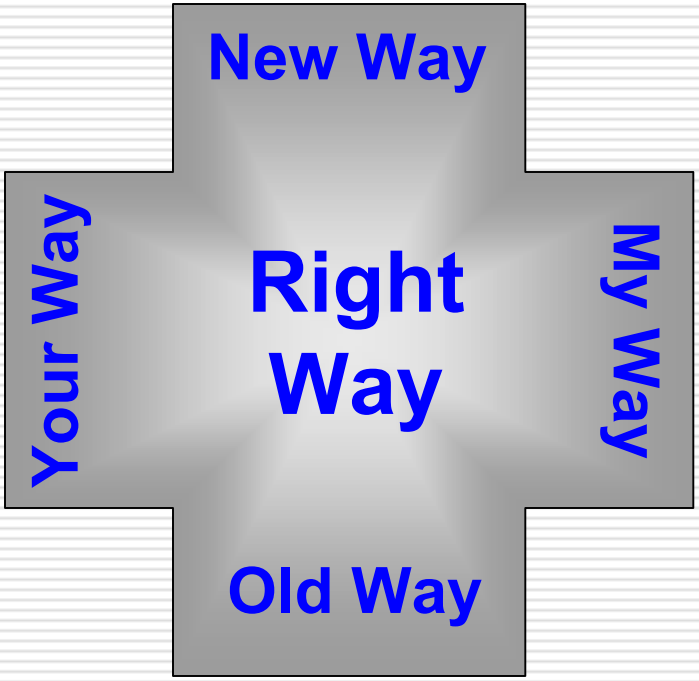
- Adoption-based
- Norm-based
- Incentive-based
- Sanction-based

Change Strategies

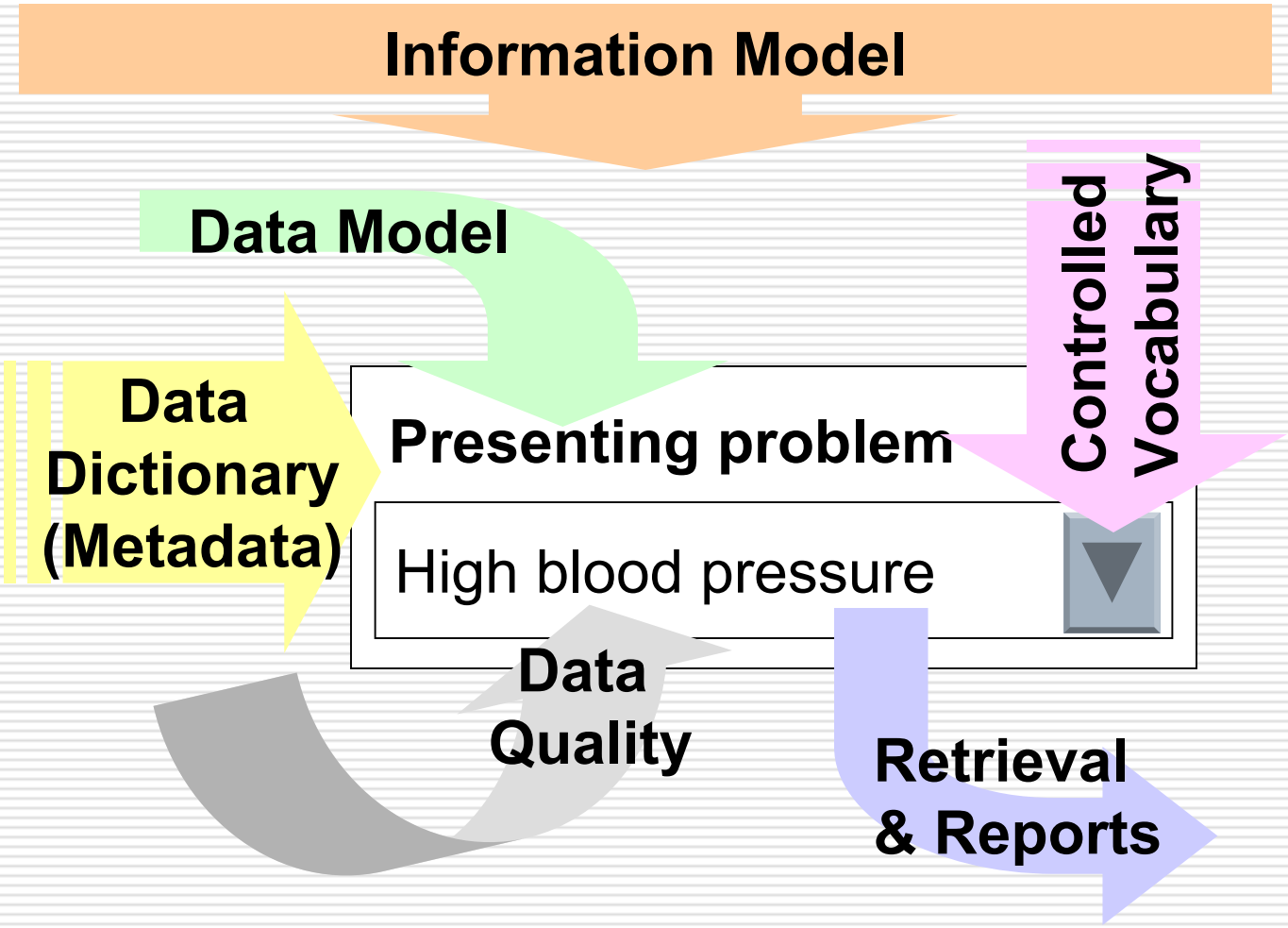
Technique	Advantages	Disadvantages	Common Uses
Education & communication	After being convinced, people often assist	Costs time & money	When knowledge would alleviate fears due to lack information
Participation & involvement	People become supportive when involved	Time costs; disillusionment if ideas not followed	When change initiators need information & especially if resistance is high
Facilitation	Enhances success of change	Costs time & money for support materials & training	When people lack skills or tools to be effective following change
Emotional support	Low cost; helps individuals	May not remedy organization issue	When people have personal anxiety about change
Incentives	Can "head off" major resistance	Expensive; can encourage resistance	When key people will resist change unless they benefit
Manipulation & co-optation	Works rapidly without substantial cost	Unethical & destroys trust	When change is essential and other techniques ineffective
Coercion	Fast	Increases resentment	When change must occur quickly & initiators have more power than resisters

Five Rights of EHR

- Right clinical data
- Right presentation
- Right decision
- Right work processes
- Right outcomes

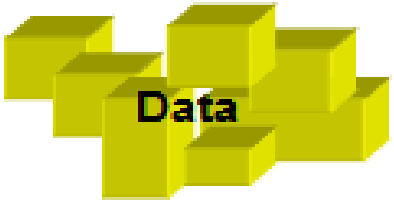


Right Data



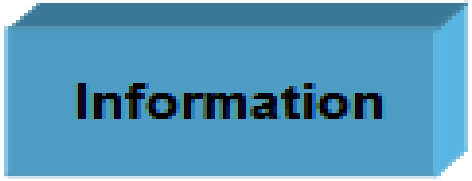
Metadata
Name of entry
Table in which entry occurs
Physical name in database
Synonyms
Definition
Reference
Source of data
Derivations
Valid values
Conditionality
Default
Lexicon
Relationship
Access restrictions
Process rules

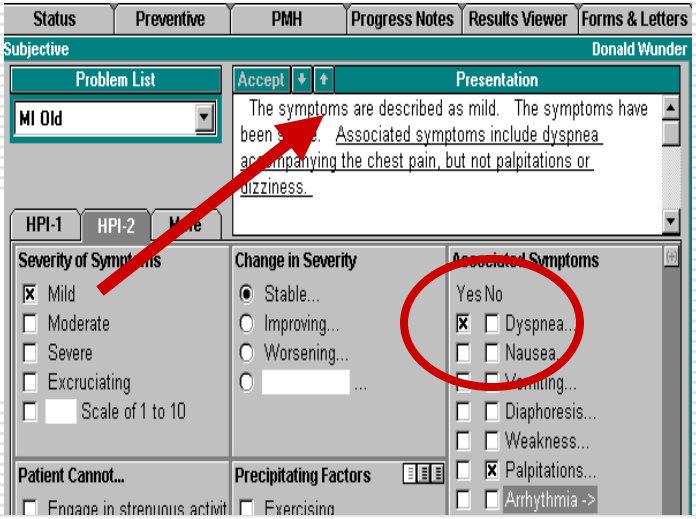
Right Presentation



Ultimate goal:

- **C**apture clinically specific data
- **O**nce at the point of care, ***and***
- **D**erive information there from for
- **E**very other legitimate use

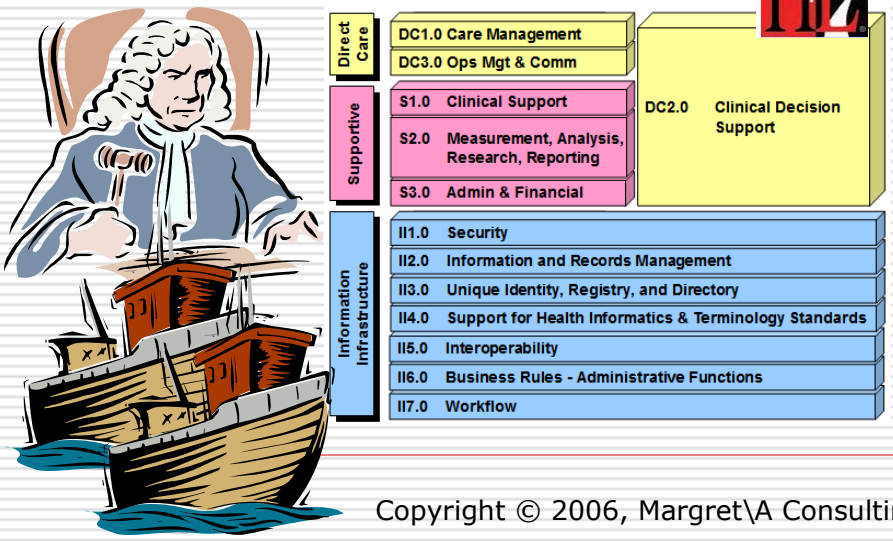




Right Decision

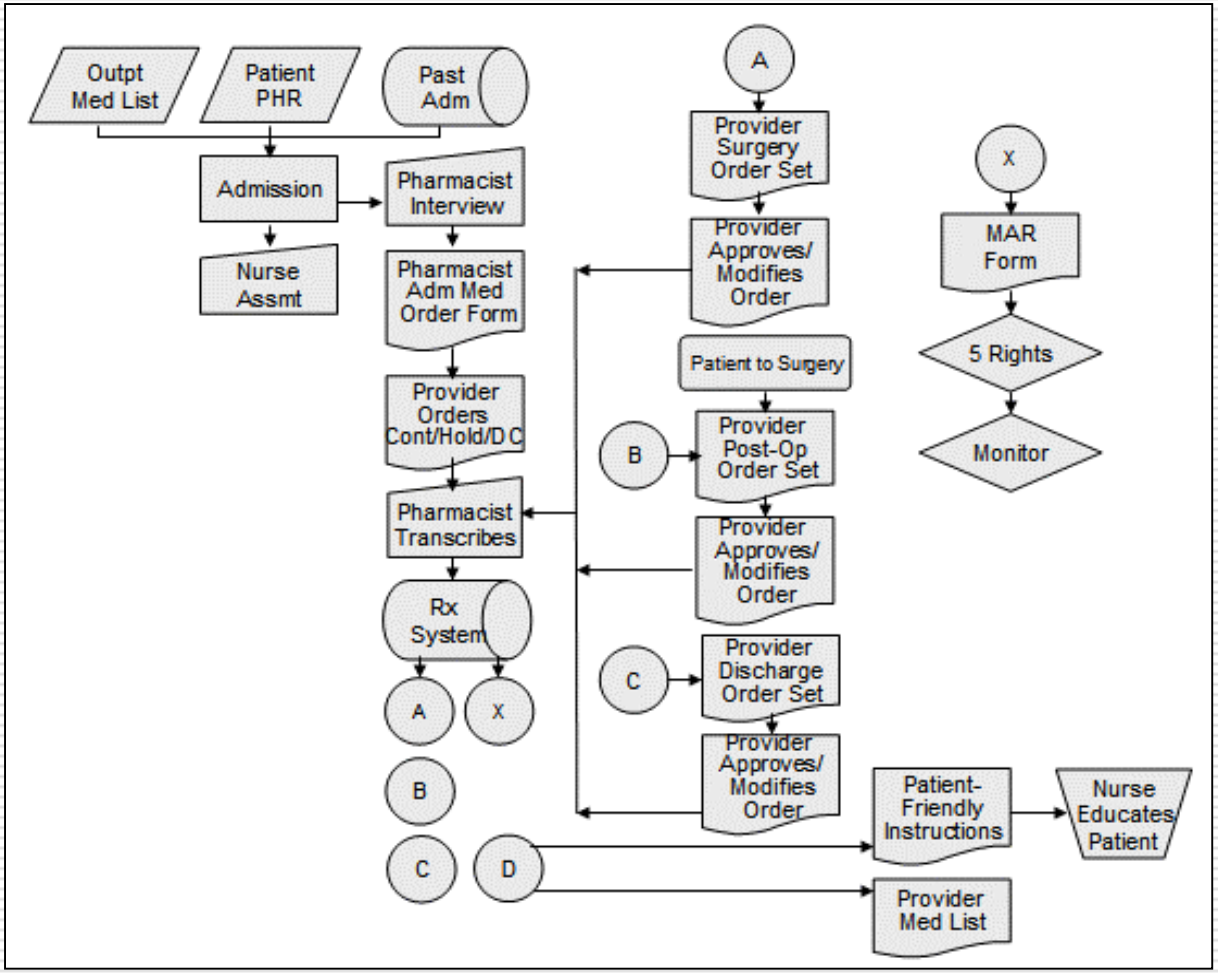
- **Use case scenarios for testing**
- **Physicians are legally obligated to practice in accordance with the standard of care**

EHR System Functional Model, Draft **Standard** for Trial Use



Provider	System
Primary Success Scenario: Receive appropriate D-D, D-L, D-A, D-W, and D-Dose	CPOE with interface from ADT, Problem List, Medication List, Allergy Documentation, Laboratory, Pharmacy, and Referral systems
Secondary Success Scenario: Retrieve list of patients who may be pregnant, become pregnant, or nursing to advise them of birth defect warning	Data mining capability
Basic Flow: 1. Provider *enters* order for Paxil 2. D-D contraindication *alert* if patient taking MAOIs or thioridazine 3. D-L *alert* if patient has severe renal or hepatic impairment 4. D-A *alert* if patient has a hypersensitivity to paraxetine (active ingredient in Paxil) or any inactive ingredients 5. D-W (obtain psych consult *reminder*) if patient is at risk for suicide 6. D-dose *recalculation* for starting dose in pediatric patients	1. System finds structured product label (SPL) information from drug knowledge base 2. System compares D-D contraindications from SPL to active medication list 3. System compares most recent creatinine clearance with SPL warning of <30 mL/min 4. System compares ingredients in Paxil to drug allergy information on SPL 5. System checks patient problem list for suicide risk 6. System recalculates starting dose for patients under specified age, height, and weight
Extensions (or alternative flows): 2-a: Alert with respect to MAOIs or thioridazine fires 1. Cancels order 2. Requests to see detailed SPL 3. Selects alternative antidepressant 4. Overrides alert and retains for Paxil 2-b: Override presents list of potential rationales required for order to be accepted 1. Selects rationale 2. Cancels order	1. System deletes order for Paxil 2. System supplies content of SPL 3. System performs checks as above on alternative order 4. System accept override request and supplies rationale requirement per organizational policy
Secondary Flow: 1. Request system to search for all patients for whom Paxil was ordered AND who are women between 12 and 50 years old. . . 2. Produce mailing labels of all patients on report	
Sources: WebMD Article 112/110504, RxList (www.rxlist.com) Accessed 02-04-06	

Right Processes



Right Outcomes

Clinical Processes	Intervention	Purpose	Metrics	Goals	Achieved	
					1st	2nd
Patient intake and documentation of vitals, chief complaint	Context-specific template-based charting	- Match skills to task for productivity	# missed entries on audit	< 1 missed entry for every 5 patients	< 2	Yes
			# procedures repeated via process mapping	0 unjustified repeats on quarterly mapping	Yes	No*
		- Patient satisfaction through fewer repetitive questions & procedures	% satisfaction on survey	98% score	97%	99%
Diabetes management	- Proactive F/U - EHR prompts	- Quality care - P4P goals	A1c SBP T. Chol	< 6.5 <130 <175	< 7.0 <150 <180	<6.8 <140 Yes

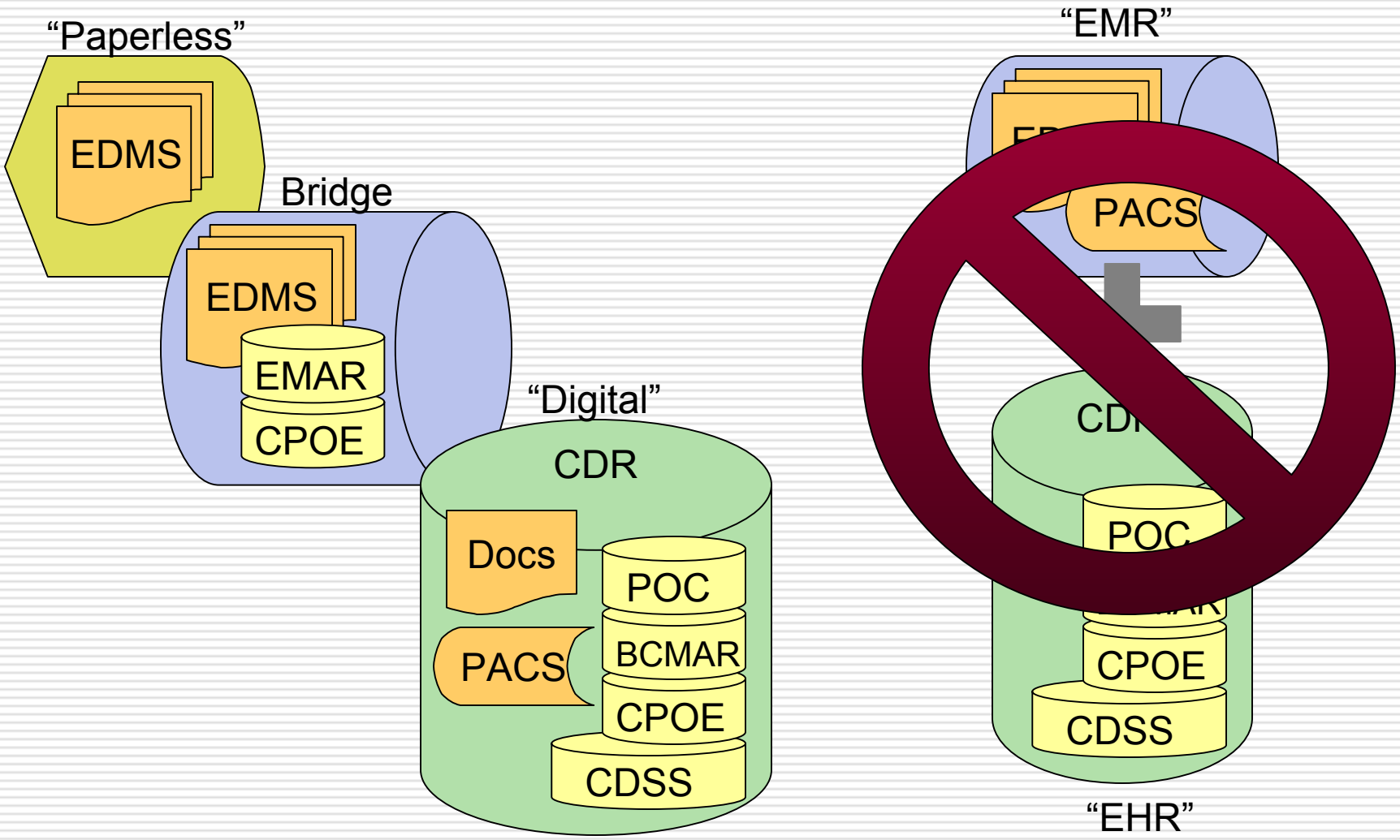
Right Migration Path

Timeline	Current	Phase I	Phase II	Phase N
Goals				
Applications: - **Financial/ Administrative** - **Operational** - **Clinical**				
Technology - **Database** - **Network & Infrastructure** - **Interfaces**				
Operations - **People** - **Policy** - **Process**				

E-MAR or BC-MAR?
BC-MAR with CPOE?
BC-MAR before CPOE?
BC-MAR after CPOE?

Bandwidth for portal, PACS?
Full redundancy for EHR?
Does lab generate:
- Discrete data for D-L?
- Print file for legal medical record?

Migration Strategies for Hospitals



Tools for Physician Practices

- **Chart conversion =**
  - **Making data in paper charts accessible/usable in EHR**
  - **Examples: Last two visit notes are available in EHR; most recent hospital discharge summary is accessible through EHR; medication record can be processed by EHR**
- **Data conversion =**
  - **Making data already in electronic form in one system available to another system in electronic form**
  - **Examples: demographic data in practice management system is copied to EHR**
- **Transition strategy =**
  - **Determining sequence of go-live for users, potentially based on components of EHR or all of EHR**
  - **Example: All sites will go live first on results retrieval; then site A will go live on EHR documentation, then site B, etc.**

Chart Conversion Plan

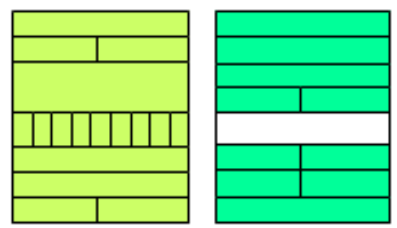
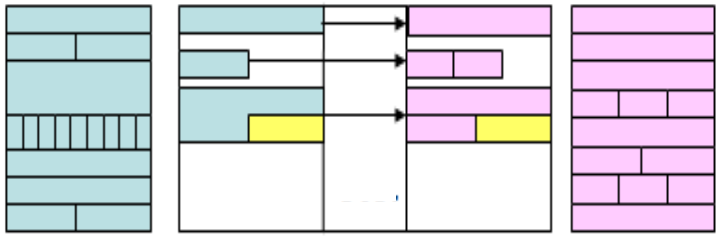
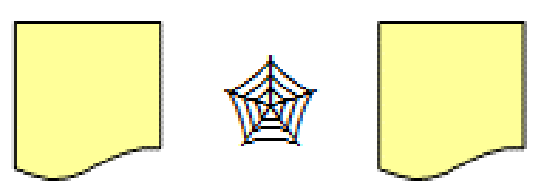
1. Current Chart Content	2. Source: ▪Internal ▪Hospital ▪Lab ▪Etc.	3. Current Format: ▪Hand-written ▪Dictated ▪Faxed ▪E-mail	4. EHR Requirements			5. Backfill Period of Time Consider: ▪ Revisits ▪ Reporting ▪ Referrals	6. How: ▪In advance ▪Just-in-time ▪Concurrent with visit ▪After-the-fact
			Electronic (Can be imaged)	Digital (Needs to be discrete)	Archive (Not req'd for day-to-day pt care)		

Transition Strategy

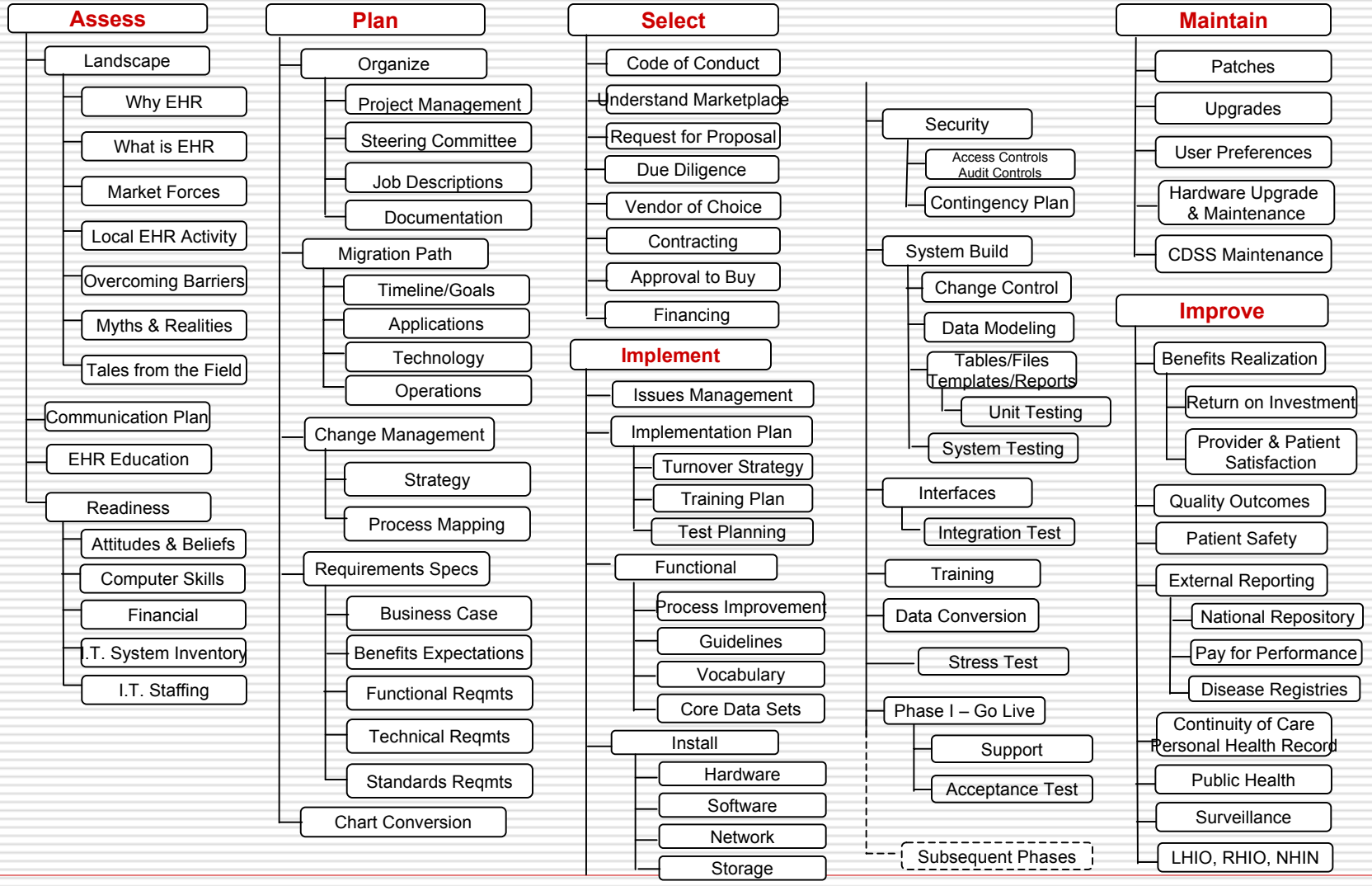
What Component	Who		Strategy: ▪Trade ▪Ease ▪Slow ▪Decrease ▪Extend	Adoption Rates			
	Site	Providers		+ 1 week	+ 2 weeks	+ 1 month	+ 3 months

- Providers "**trade**" reduced patient load with one another until all on EHR
- Providers "**ease**" into EHR by using it just for the number of patients they are comfortable with, increasing number each day
- Select "**slow**" time to implement
- "**Decrease**" number of patients seen for short period of time
- "**Extend**" clinic hours so same number of patients can be seen in longer periods of time

Interoperability Issue

Method	Interoperability Achieved?	Example
Integrated: - Developed from the same source code - Components work seamlessly together	**Mostly**	
Interfaced: **-** Requires middleware (Message format standards, e.g., HL7, NCPDP, X12) for exchange of data	**Barely**	
Connected: -Communications are XML-based -Secure Web portal	**Differently**	

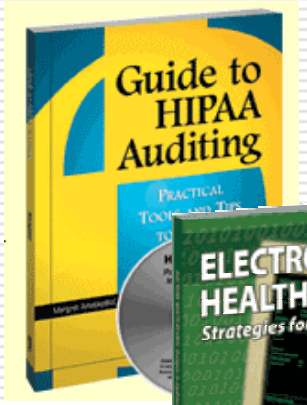
In Summary, No Small Task!



Critical Success Factors

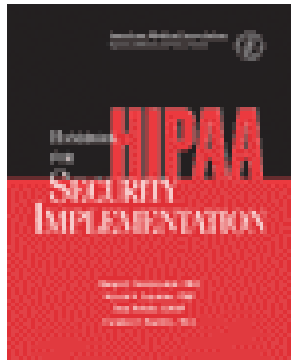
- Identify and engage all key stakeholder groups, especially clinicians
- Train leadership in multidisciplinary common body of knowledge
- Utilize formal project management discipline
- Conduct process mapping and workflow analysis to determine and carry out future state changes
- Focus on achieving goals that align with organizational imperatives
- Measure results, correct course as necessary, celebrate achievement of benefits

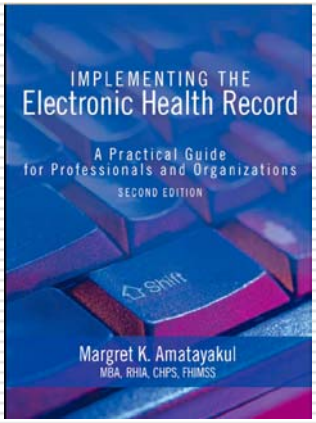
References & Resources



www.hcpro.com

https://catalog.ama-assn.org





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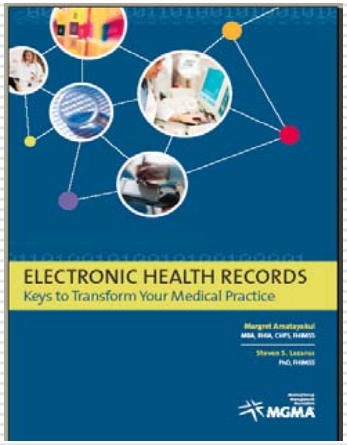

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