Agenda

- ❑ **Crossing the Chasm**
- ❑ **Disruptive Innovation**
- ❑ **Packaging for Clinical Transformation**
- ❑ **Our Strategic Direction**
- ❑ **Anything you want us to address?**

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Legislation and Initiatives

- ❑ **10/2008 "Never Events"**
  - – Starting 10/2008 Medicare & Major Payors will not reimburse for serious preventable events (E.g.Infections, embolisms, pneumonia)
  - – Being adopted by 23 States with payers planning to not reimburse and/or hospital associations planning to not charge for these events.

- ❑ **08/2008 - Mass "Healthcare Reform Act"**
  - – Implementation of EHRs in all provider settings,
  - – By 2015. statewide interoperable Heath Information Exchange
  - – A first year funding of $25 million, projected eight year $200 million investment.

- ❑ **09/2008 - The Stark Law**
  - – The proposed bill would direct that EMR/EHR open-source technology be developed and made available to health care providers at "a nominal cost."

Never Events States-to-Date: 23

http://www.msnbc.msn.com/id/26140511
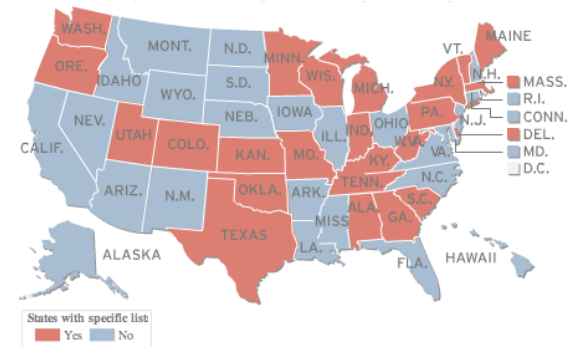
" By 2012 for statewide adoption of CPOE would be required for hospital licensure."

" …provision of an open source health information technology system that is either new or based on an open source health information technology system, such as VistA…."

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In 2008, 85% of health care organizations have not fully implemented electronic health records

Why?

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Crossing the Chasm

Proprietary SW model has not served the market well e.g. clinical transformation

Open Source business model is the needed disruptive innovation

- ❑ 1
- ❑ N
- ❑ C
- ❑ T
- ❑ V
- r
- ❑ Vendor lock and fatigue

enable customer
- ❑ Partner for results
- ❑ Transparent

Non interoperability and complexity is key to the proprietary vendor lock model. And it is our opportunity.

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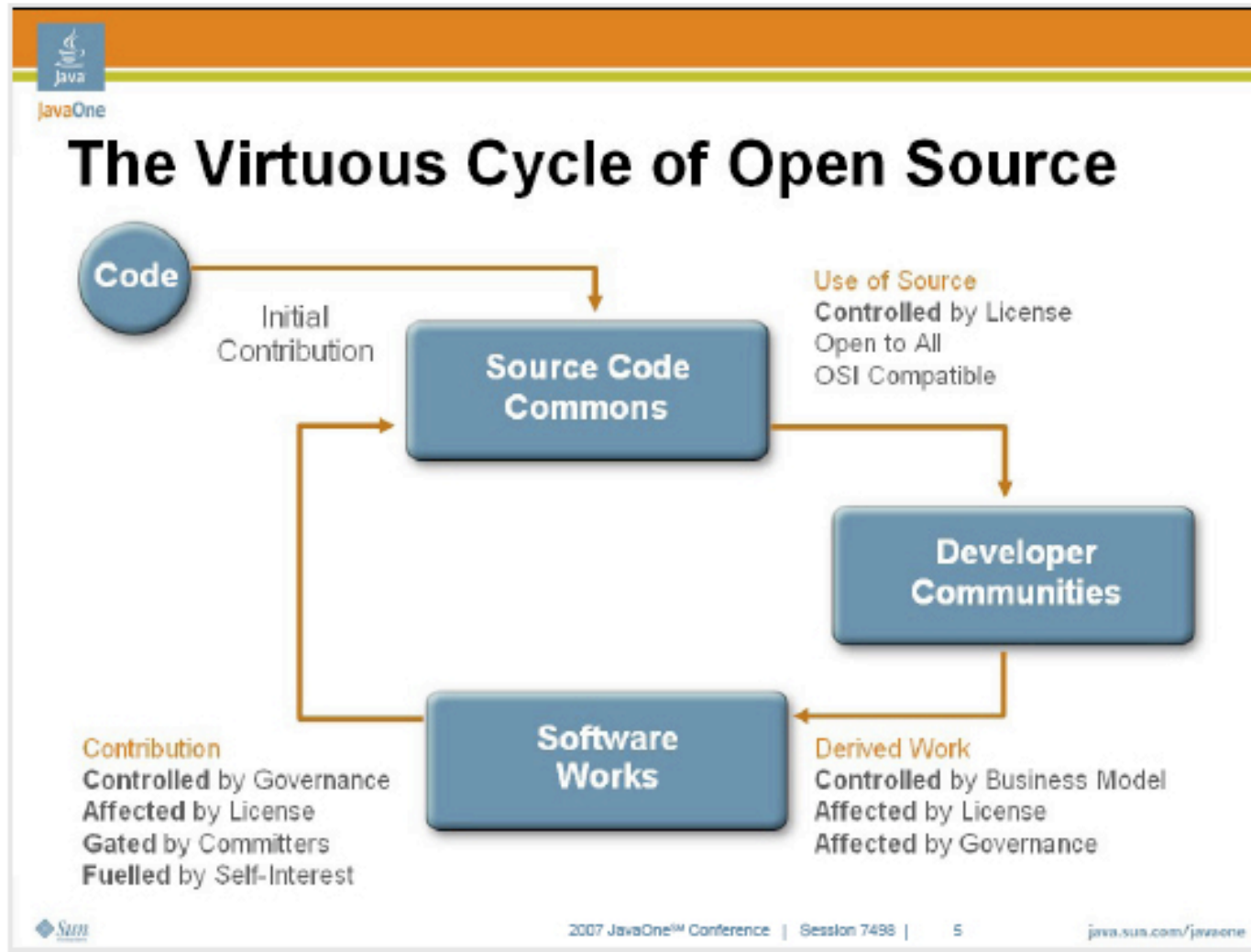Transforming Healthcare Through Open Source

Open Source & Health Care
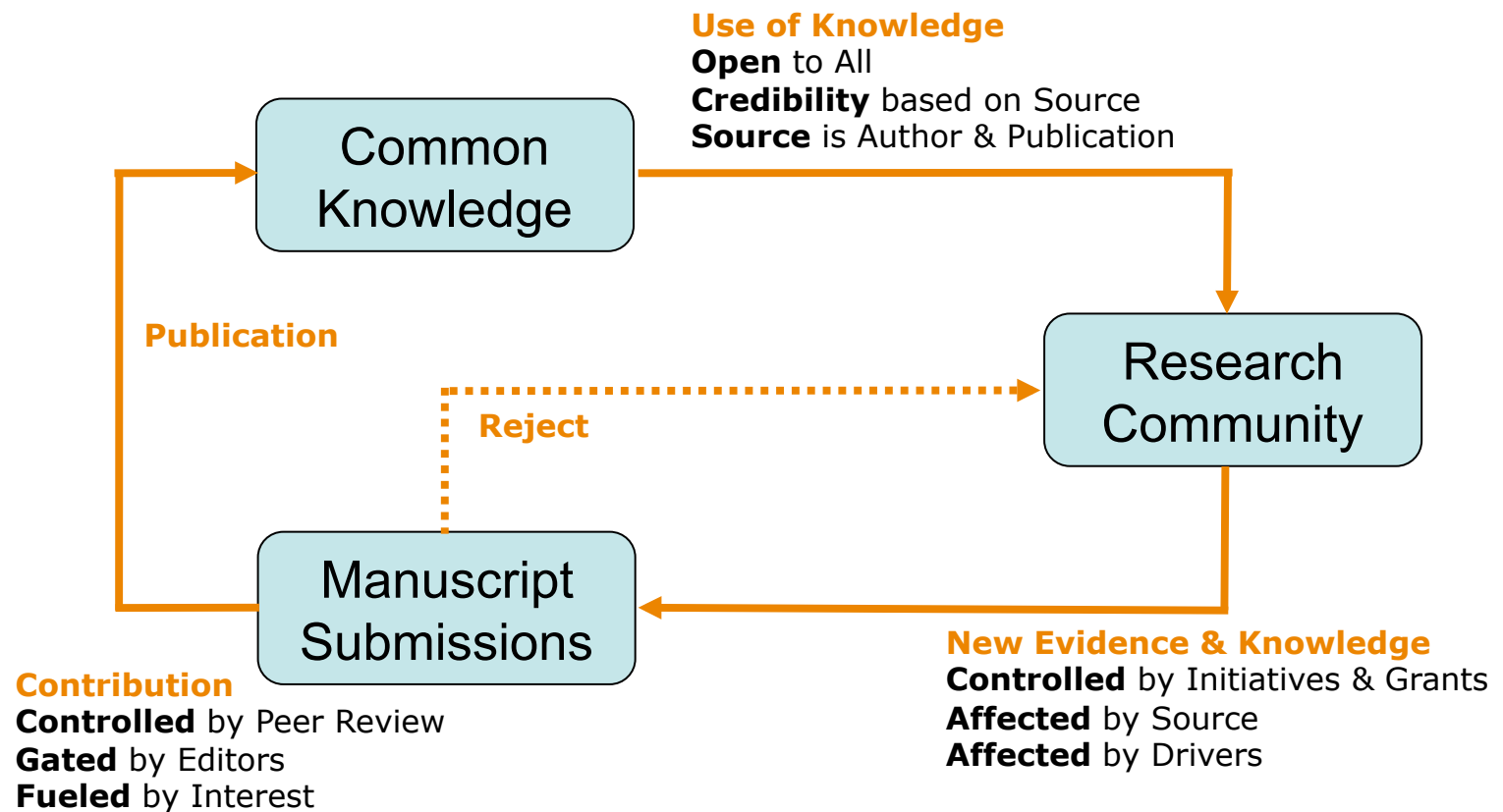
HEALTH CARE IS
COLLABORATIVE.

"OPEN SOURCE SOFTWARE
IS WELL SUITED FOR
HEALTH CARE, AS IT
MIMICS THE EVIDENCE-
BASED HEALTH MODEL; IT,
TOO, ENGENDERS BETTER
OUTCOMES AND
CONTINUAL
IMPROVEMENT."

Forrestor/CHCF 2006

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The Virtuous Cycle of Open Source

Evidence-based Medicine Cycle

Common Knowledge

Use of Knowledge
Open to All
Credibility based on Source
Source is Author & Publication

Research Community

Publication

Reject

Manuscript Submissions

New Evidence & Knowledge
Controlled by Initiatives & Grants
Affected by Source
Affected by Drivers

Contribution
Controlled by Peer Review
Gated by Editors
Fueled by Interest

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Health Care Collaboration Stack

Layers		Collaborative Arenas
Best Practices	⇒	Never Events, P4P, Disease Management, Physician Adoption, Change Management, Core Measures
Content	⇒	Templates, Order Sets, Clinical Reminders, Care Plans, Rules, Protocols, Business Processes Workflows, Reports, Analytics, Benchmarks
Applications	⇒	Functionality, Extensions, Plug-ins, Enhancements (SugarCRM, Pentahoe, DimDim, Tolven, Care Mgmt)
Application Server	⇒	Web Services, Rule Engines, Messaging, Workflow Mgmt, Reporting
Interoperability	⇒	Interfaces (Mirth), Tolven (Clinical Datatype Definitions
Hardware	⇒	CHIP Design, Mobile Computing Devices

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Who refers to their clients as "users"?

DRUG DEALERS & SOFTWARE DEVELOPERS

CLIENTS SHOULD BE COLLABORATORS
NOT JUST USERS.

USE THE SYSTEM TO IMPLEMENT AND ENABLE CHANGE.

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Proof Points

❑ **Midland**

❑ **Lutheran**

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Clinical Transformation

The Stage 6 EHR Big Bang Effect

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Midland Memorial Hospital, Texas

midland memorial hospital
Your **home** for **healthcare**

- ☐ Population – 101,000

- ☐ 320 Beds, 2 Facilities

- ☐ ~200 Affiliated MD's

- ☐ Avg Census ~ 150

- ☐ Admissions ~11,000/year

- ☐ OpenVista=Edith EHR Implemented 2/05

- ☐ Adoption: Stage 6

- ☐ Transformation: IHI 5 Million Lives Data

- ☐ Commissioned independent study: Perot Systems

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Industry Recognition

EMR Adoption Model[SM]

Stage	Cumulative Capabilities	% of US Hospitals
Stage 7	Medical record fully electronic; CDO able to contribute to EHR as byproduct of EMR	0.0%
Stage 6	Physician documentation (structured templates), full CDSS (variance & compliance), full PACS	0.8%
Stage 5	Closed loop medication administration	1.4%
Stage 4	CPOE, CDSS (clinical protocols)	2.2%
Stage 3	Clinical documentation (flow sheets), CDSS (error checking), PACS available outside Radiology	25.1%
Stage 2	Clinical Data Repository, Controlled Medical Vocabulary, Clinical Decision Support System (CDSS) Capability	37.2%
Stage 1	Ancillaries – Lab, Rad, Pharmacy	14.0%
Stage 0	All three Ancillaries not installed	19.3%

Source: HIMSS Analytics™ Database (derived from the Dorenfest IHDS+ Database™).   N = 5,073

Why Stage 6 is Critical?

❑ **Supports Clinical Transformation**
- "positions them to successfully address many of the upcoming industry transformations we will be experiencing in the near future"
    - HIPAA Claims Attachment
    - Never Events
    - Pay for Performance
    - Government quality reporting programs

❑ **Share Data with Stakeholders**
- "positioned to provide data to key stakeholders (e.g. payers, the government, physicians, consumer and employees)
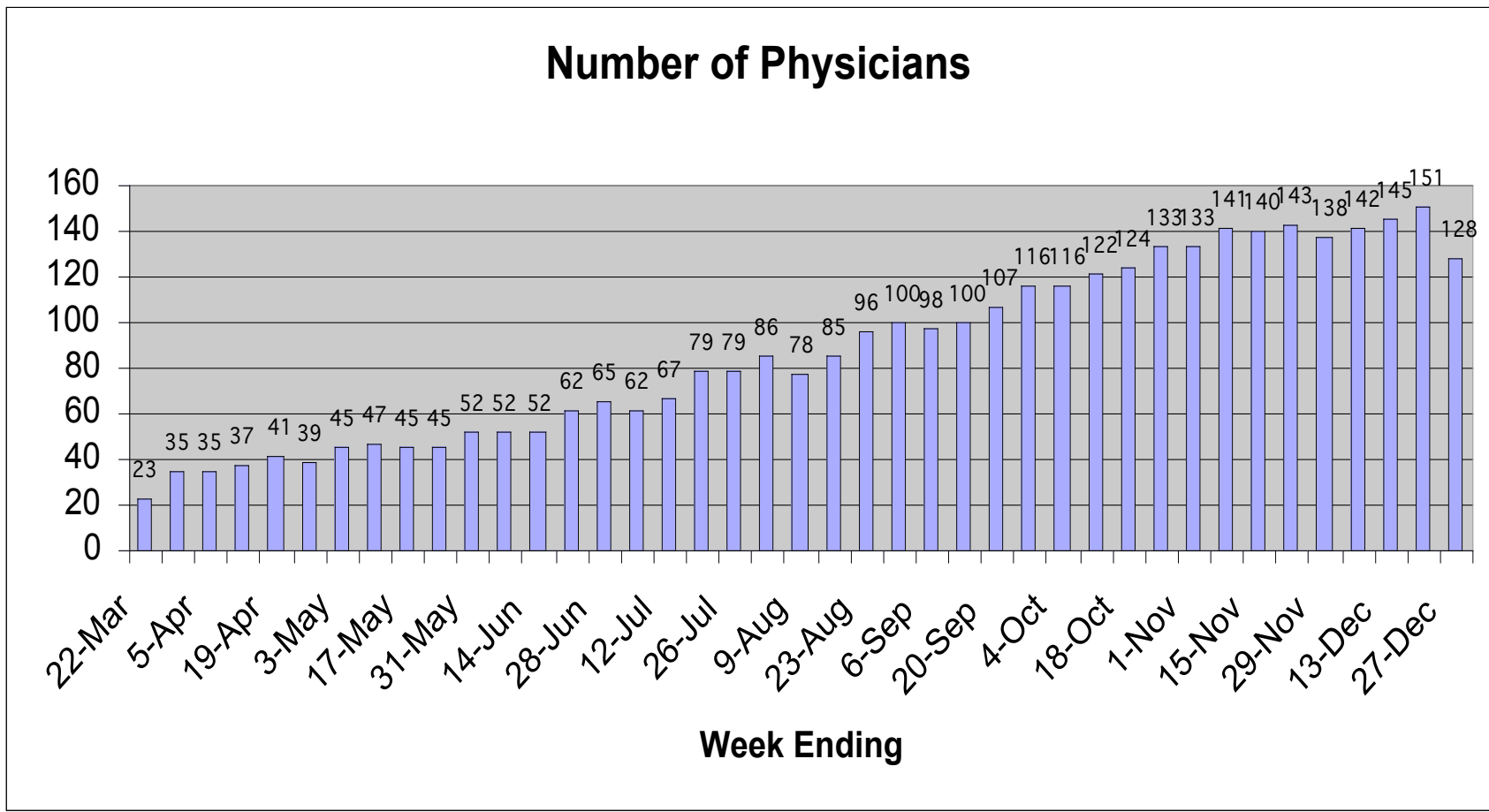- "to support electronic health record (EHR) environments and regional health information organizations (RHIO's)."

Stage 6 Hospitals: The Journey and the Accomplishments, Mike Davis HIMSS Analytics, 2007.

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Project Budget

OpenVista Software License	$0
Consulting (primarily Medsphere)	$5,126,000
Replacement of financial systems	$700,000
Hardware	$801,000
Wireless infrastructure	$226,000
Interfaces, etc.	$140,000
Remodeling	$100,000
Total	$ 7,093,000*

*One third of McKesson price tag before their services

Physician Adoption

Number of Physicians

Week Ending values (Number of Physicians):
- 22-Mar: 23
- 5-Apr: 35
- 19-Apr: 35
- (next): 37
- 3-May: 41
- 17-May: 39
- (next): 45
- (next): 47
- 31-May: 45
- (next): 45
- 14-Jun: 52
- (next): 52
- 28-Jun: 52
- 12-Jul: 62
- (next): 65
- 26-Jul: 62
- (next): 67
- 9-Aug: 79
- (next): 79
- 23-Aug: 86
- (next): 78
- 6-Sep: 85
- (next): 96
- 20-Sep: 100
- (next): 98
- 4-Oct: 100
- (next): 107
- 18-Oct: 116
- (next): 116
- 1-Nov: 122
- (next): 124
- 15-Nov: 133
- (next): 133
- 29-Nov: 141
- (next): 140
- 13-Dec: 143
- (next): 138
- 27-Dec: 142
- (next): 145
- (next): 151
- (last): 128

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Why it works…. "It's Straightforward"

Category	Commercial	Vista
Overall Reaction	3.27	7.08
Screen Design		7.68
Terminology		7.22
Learning		7.08
System Capabilities	3.89	7.08
Overall Mean Scores	3.67	7.21

"It's Straightforward"

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Industry Recognition Stage 6: Time and Cost to Value

	1996	1998	2000	2002	2004	2006	2008	2010
Midland Memorial						3 years -6 Million		
St.Clair				5 years - 15 Million				
University Health Systems				6 years - 25-35 Million				
Carle Foundation				6 years - 15-20 Million				
Clarian North Medical Center				6 years - 20-30 Million				
Evanston Northwestern				7 years - 35-40 Million				
Memorial Health Univ.				7 years - 25-30 Million				
Citizens Memorial				7 years - 8-10 Million				
St Agnes			8 years - 9-12 Million					
Our Lady of the Lake		10 years - 40-50 Million						
New Port Hospital		10 years - 15-20 Million						

- Midland Memorial is one of the 13 Stage 6 facilities; spent $7M dollars to achieve Stage 6
- Roughly 1/3 the time, 40% of next lowest investment ($15M) and 8x the most invested ($50M)

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Stage 6: Total Cost per Bed
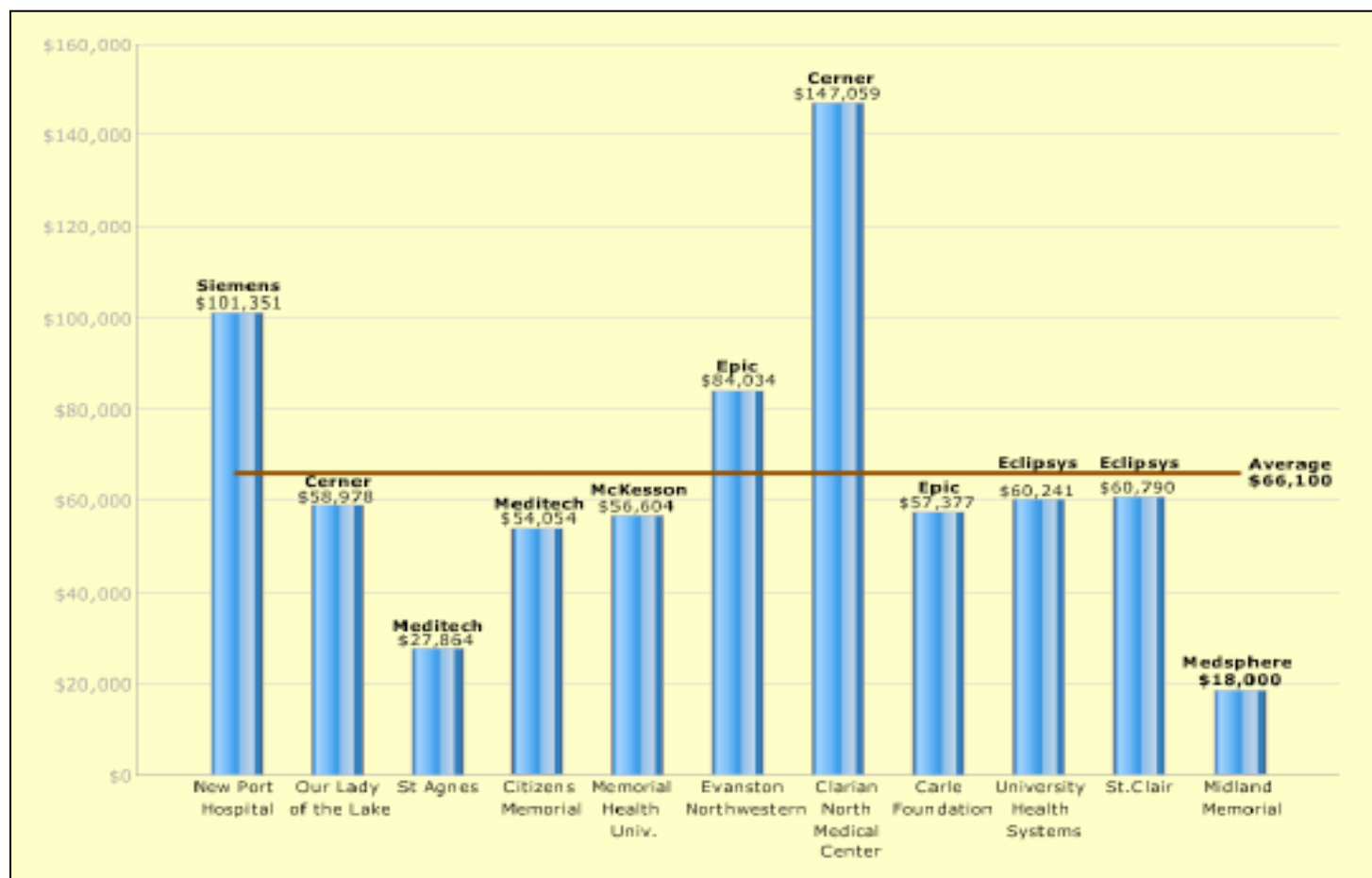
– Total cost per bed was 18k, roughly 1/3 the average (66k)

Why VistA works?

Built to be deployable and usable

Not built with a business model in mind

Simple, less complex, not laden with bells and whistles

65% of MD's have trained on VistA over the last 15 years

Built to support transformation and quality

Strength is integrated closed loop management

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November 2002

State of MMH
- Lost $6.3 million FYE 9/30/02
- $24 million cash on hand (~ 60 days)
- Pharmacy, lab, overall HIS sun-setting
- Massive capital needs
- New CEO

IT Strategy
- Head-off coming crisis with very limited capital funding
- Option: McKesson assessment project – mid-2003
  - Comprehensive system replacement
  - Minimum of $20 million (hardware & software only)
  - Not including service or consultation
- Conclusion – Identify less expensive alternative

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Why Did MMH Do It?

1. **System obsolescence required action**

2. **Financial condition limited options**

3. **VistA was opportunity to leap forward at low cost**

    -   Patient safety enhancement

    -   Support of quality initiatives

    -   Tying to our MD's via superior info access

    -   Many physicians familiar with it, ~65%

4. **Become Technology Innovator**

    -   Meaningful contribution to the industry

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Transformation

ADOPTION IS NECESSARY BUT INSUFFICIENT

Value is shared goal, now the steps:

1. Implement to assure the technology is deployed and configured to support work processes.

2. The technologies enable the people to "use" the technology effectively.

3. Now, the people can use the system to change their processes and realize value.

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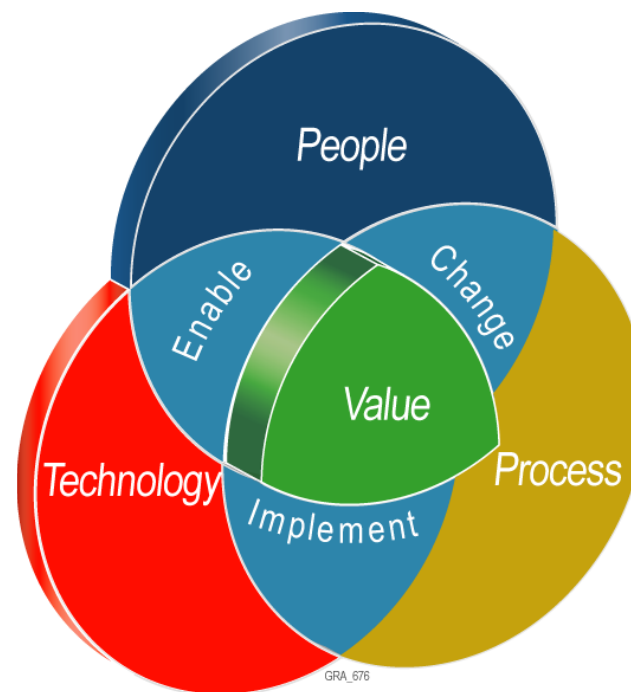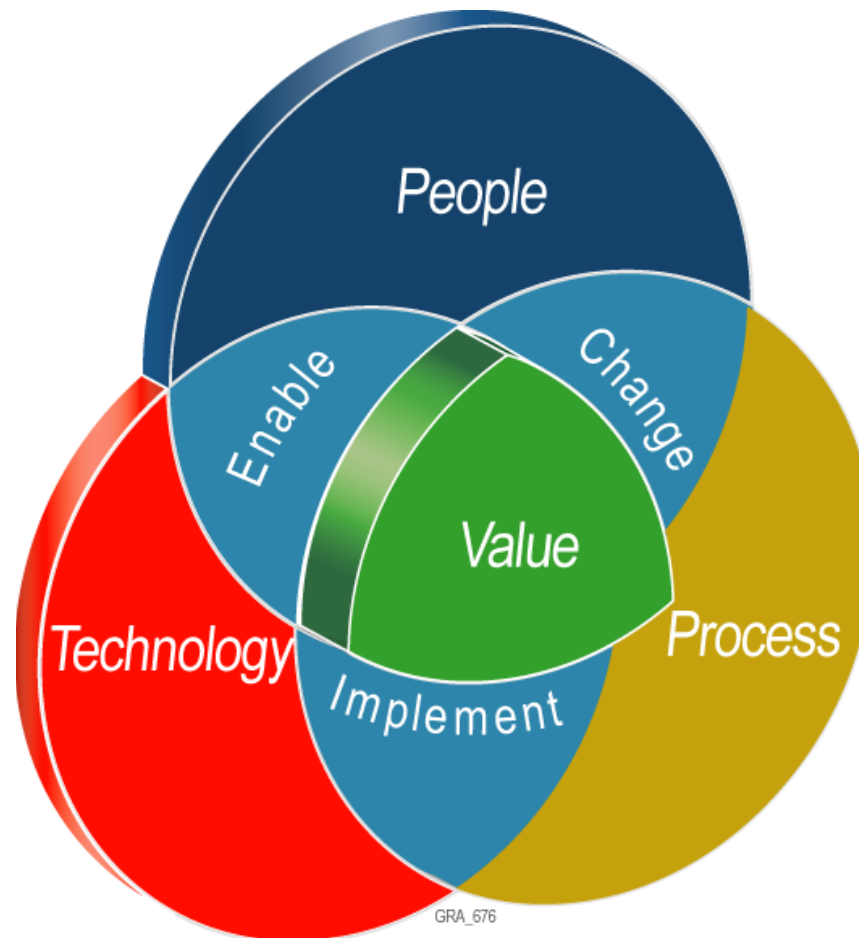
Transformation

ADOPTION IS NECESSARY BUT INSUFFICIENT

3 Transformation Steps

1. **Implement > Adoption**
    1. Departmental automation - orders management - CPOE
    2. Clinical usage
    3. Necessary but not sufficient

2. **Enable > Operational Transformation**
    1. System itself is closed loop and fills holes
    2. Efficiencies, information access and accountabilities

3. **Change > Clinical Transformation**
    1. Use clinical content to address specific patient safety and clinical guidelines
    2. Target specific outcomes with order sets, templates, clinical reminders

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Implement > Adoption

Physician Adoption

Number of Physicians

Week Ending

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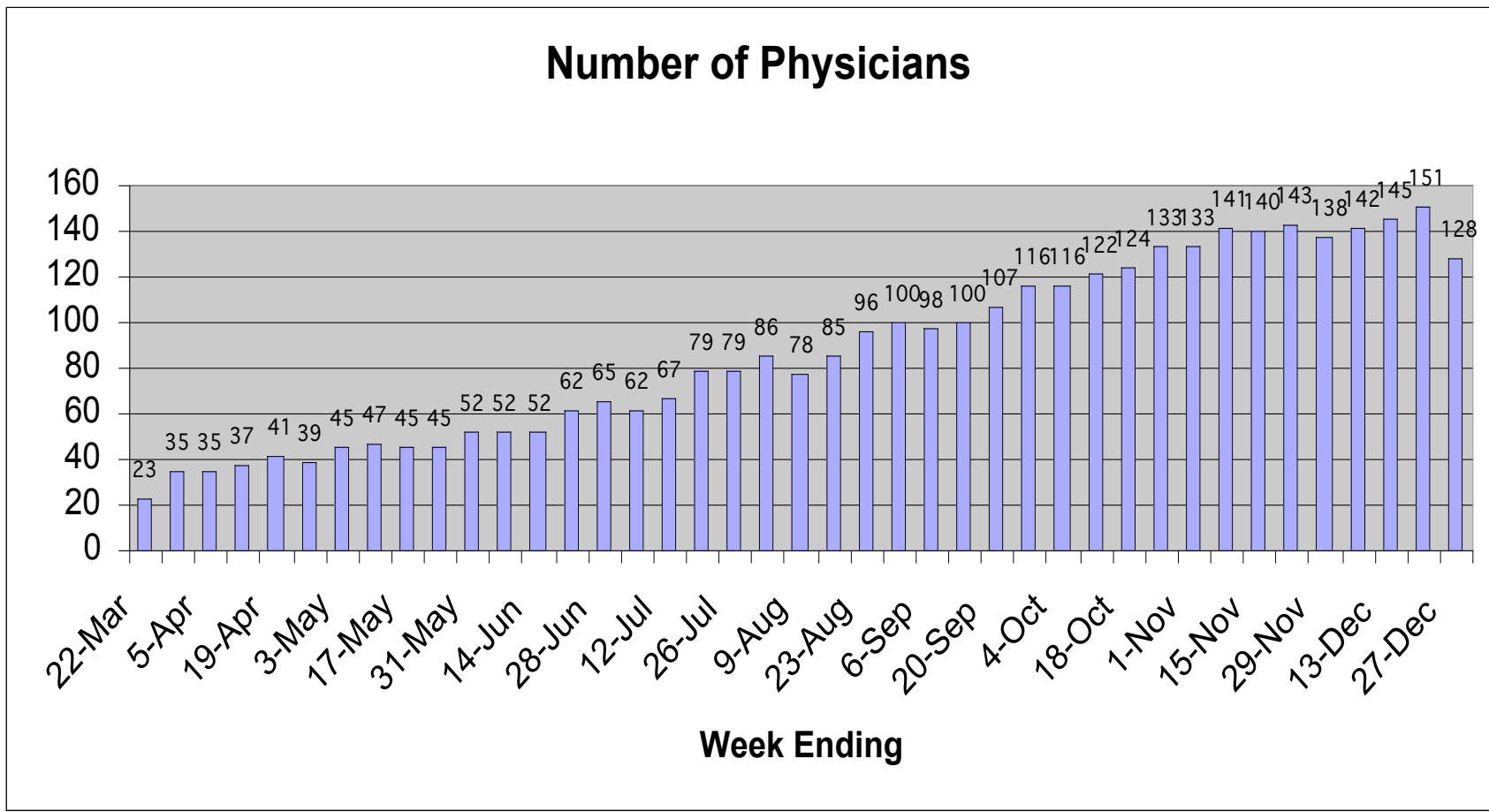
Physician buy-in was hard

- ❑ Significant time commitment
- ❑ Remote access was vital
- ❑ Remote electronic signature winner
- ❑ Natural resistance to change
- ❑ One-on-one attention was necessary
- ❑ Enthusiastic support from leaders a must
- ❑ Considered paying MDs to train/develop
- ❑ Did not skimp: More computers

$avings on software costs allow investment in adoption

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Clinical Adoption

Stats ~200 MD's

- ❑ Use of remote access is high and in high demand.
- ❑ Reduced count of physician complaints received
- ❑ An estimated 109 offices have remote access installed
- ❑ An estimated 81 homes (including laptops) have remote access
- ❑ There an estimated 433 total installs of remote access

Impact

- ❑ Access anywhere/anytime
- ❑ No more chart and paper chasing
- ❑ Decrease time on rounds come prepared w/data
- ❑ Record access: one week to immediate accessible
- ❑ Simultaneous access to the same record by different roles
- ❑ Signing charts remotely 50 charts in 20-30 minutes
- ❑ Once they do, they never go back.

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Enable > Operational Transformation
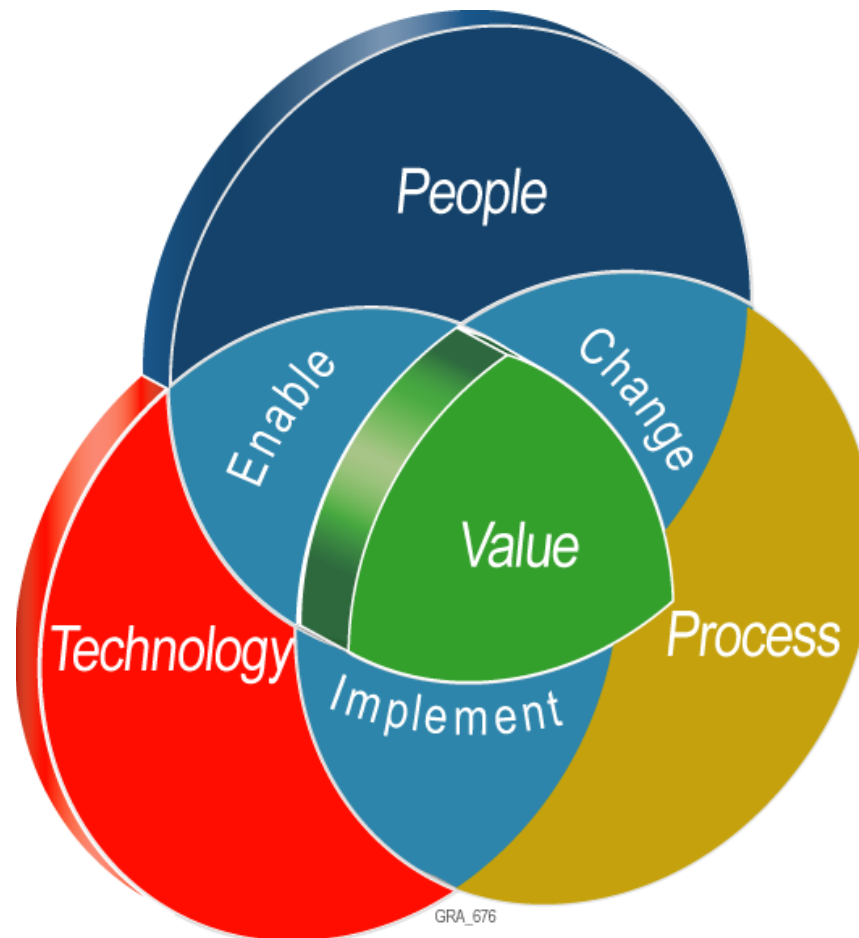
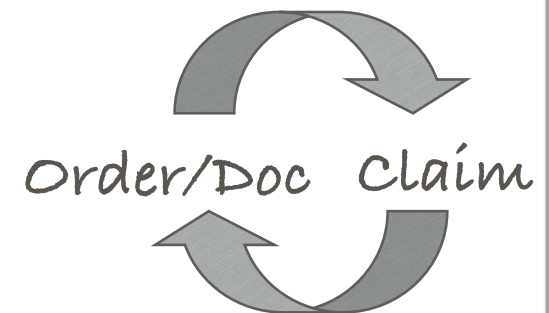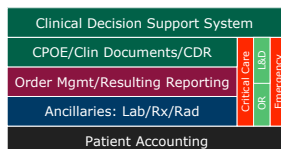# Medication Administration: CPOE & BCMA
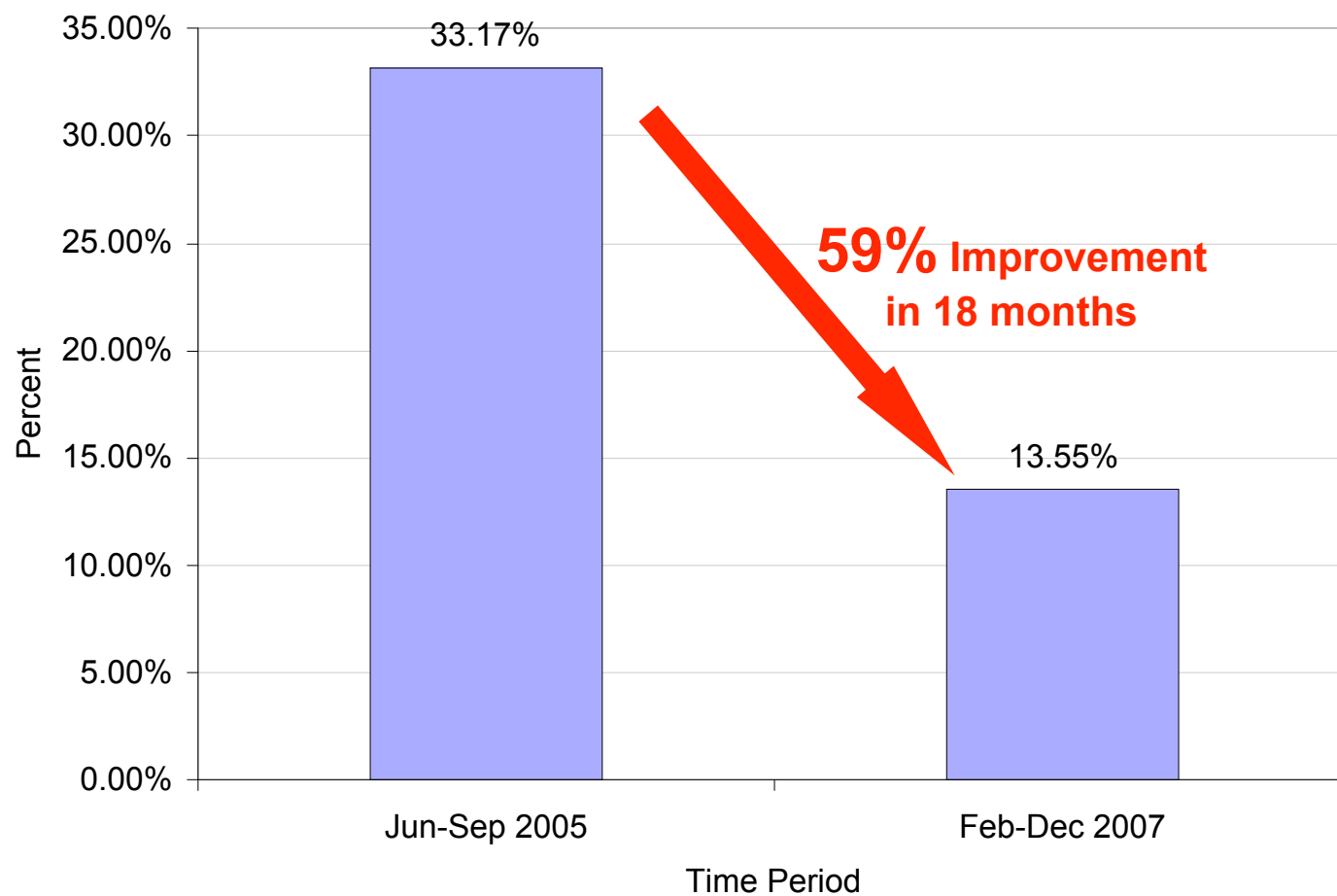
After
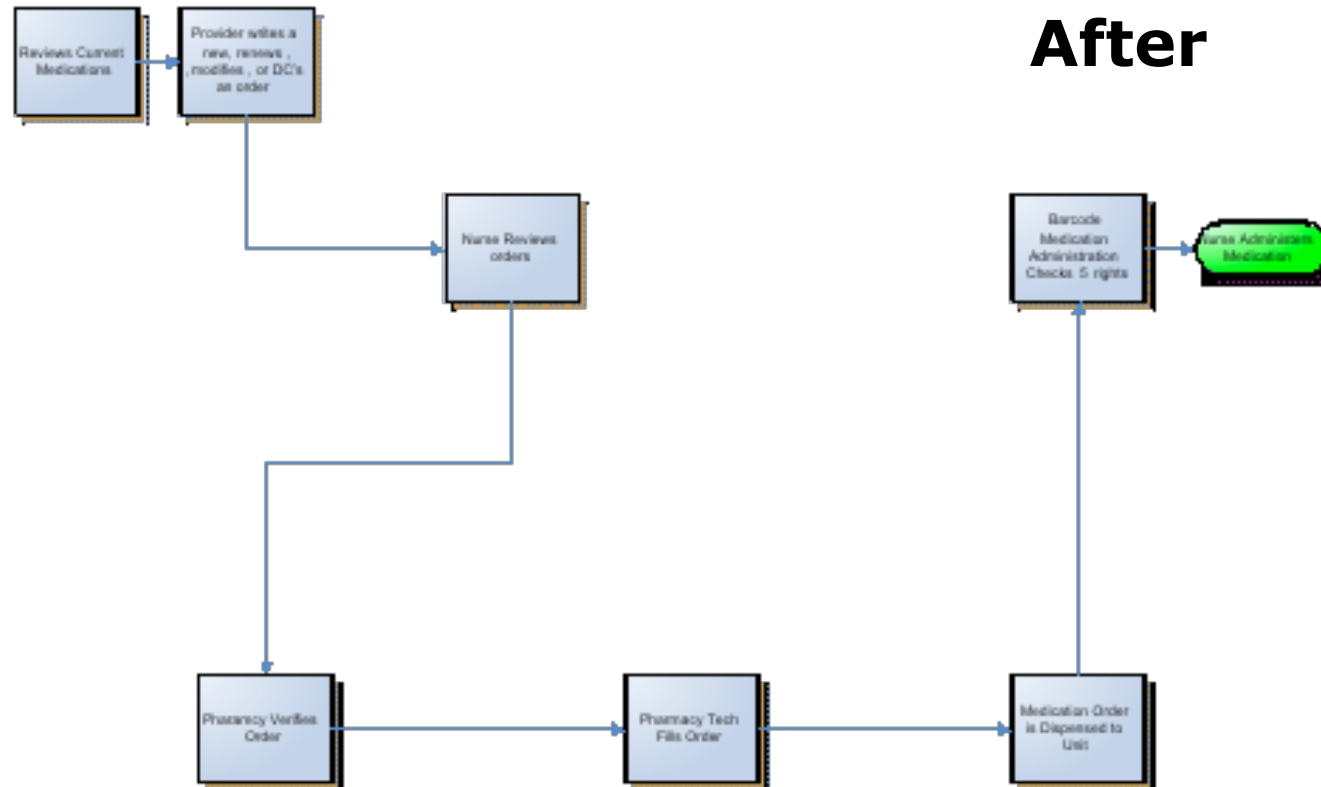
Operational Transformation

Care

- Decrease time from Rx order to dispensing: 15-20 minutes
- Decrease Dx report turnaround: minutes, not hours
- Decrease Rx order errors and duplicate tests (Lab/Rad)
- Shift of RN time from documentation to patient care
- Dec worked hours per unit of service by dept
- Decrease length of stay

Charge Capture & Claims

- Increase in charge capture
- Inc coding compliance (CMI appropriateness)
- Reduction in uncoded account days
- Improved Case mix index improvement
- Discharged-Not-Final-Billed (DNFP): Dec AR days
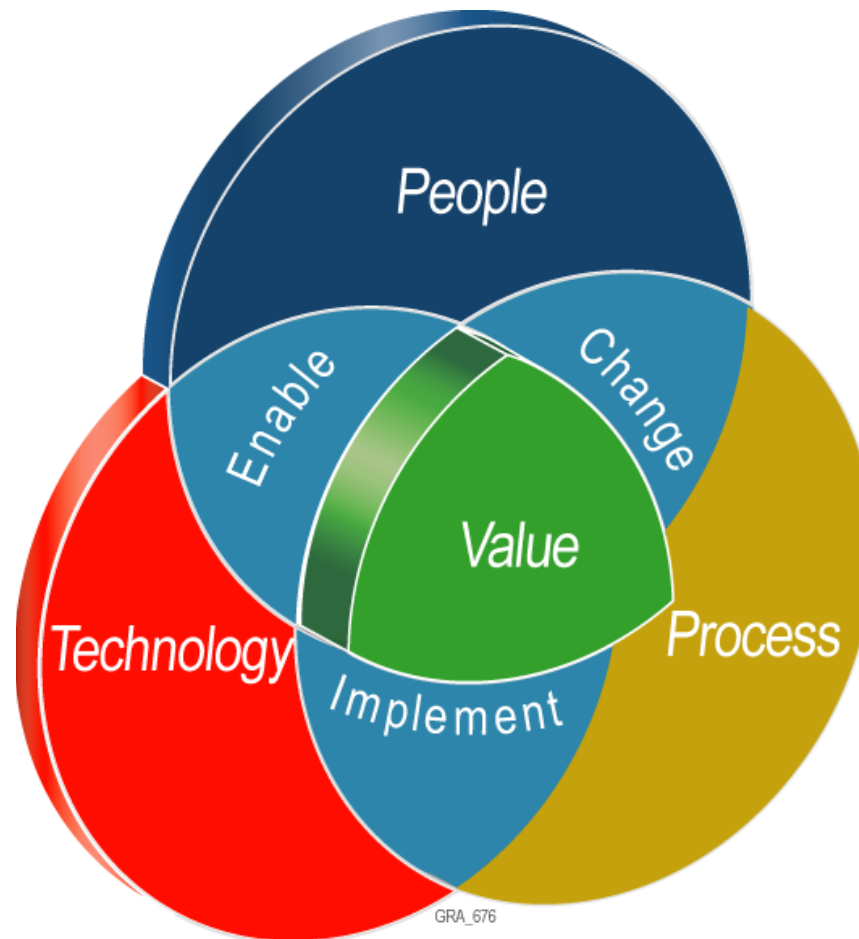- Decrease coding denials
- HIPAA Attachments

Order   Result

Order/Doc   Claim

Clinical Decision Support System
CPOE/Clin Documents/CDR
Order Mgmt/Resulting Reporting
Ancillaries: Lab/Rx/Rad
Patient Accounting

Critical Care
OR
L&D
Emergency

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Percent of Unreconciled Medications

59% Improvement in 18 months

Medication Reconciliation has been endorsed as an effective strategy at reducing Adverse Drug Events. The Percent of Unreconciled Medications improved from a mean of 33.17% (276 of 832 Jun-Sep 2005) to 13.55% (302 of 2,229 Feb-Dec 2007).

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# Change > Clinical Transformation

How does it support clinical transformation?

1. Establish RN and MD usage
2. Plan: prompt for standard of care
   – Order Set
   – Template
   – Clinical Reminders
3. Measure outcomes
   – Midland 5 million Lives
   – Never Events
   – Core Measures
   – Safety Checklists
   – Big Seven Chronic Diseases
   – Oncology Regime Tracking
4. Benchmark & Scoreboard
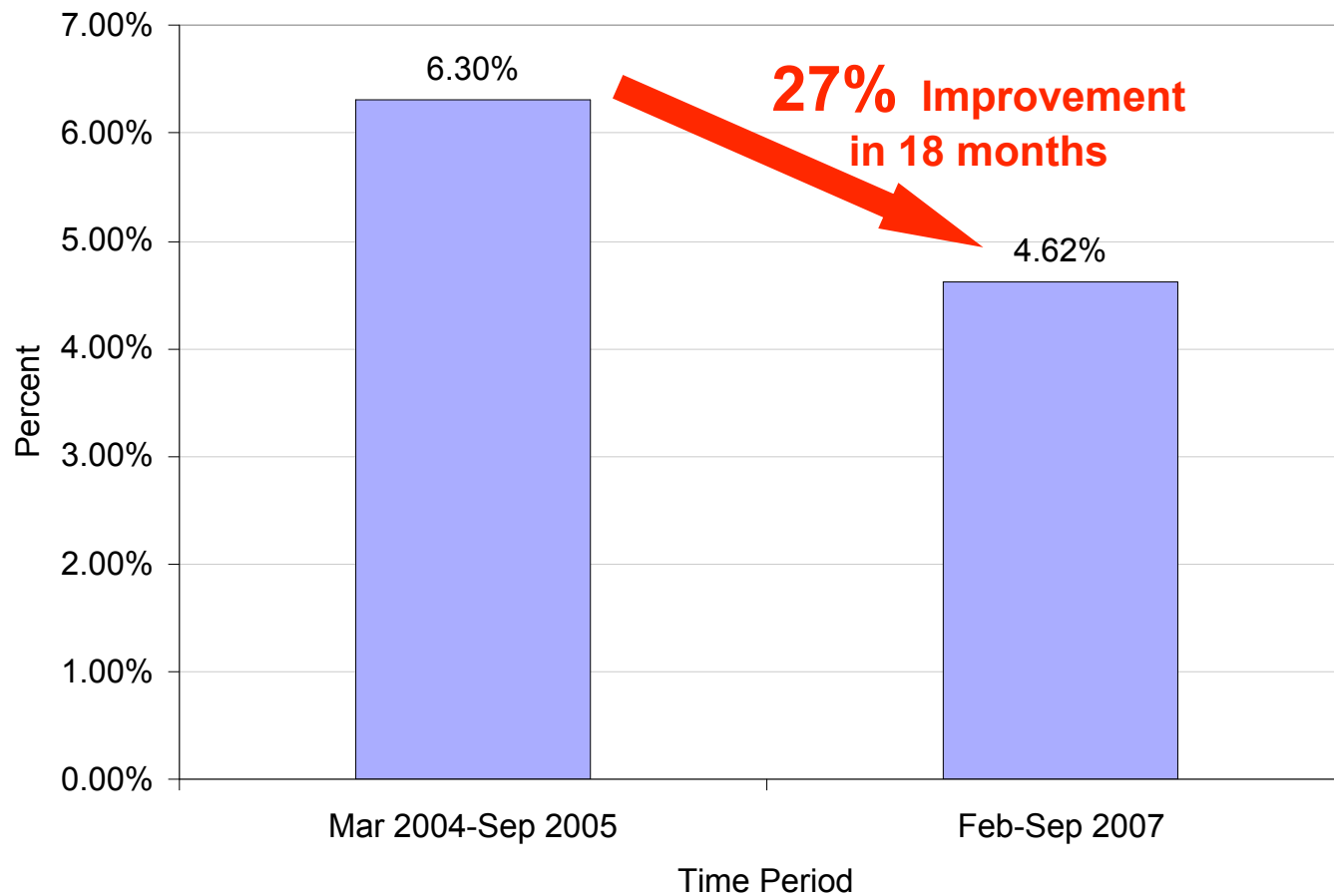5. Iterate

Acute Care Inpatient Mortality Rate

## Acute Care Inpatient Mortality Rate
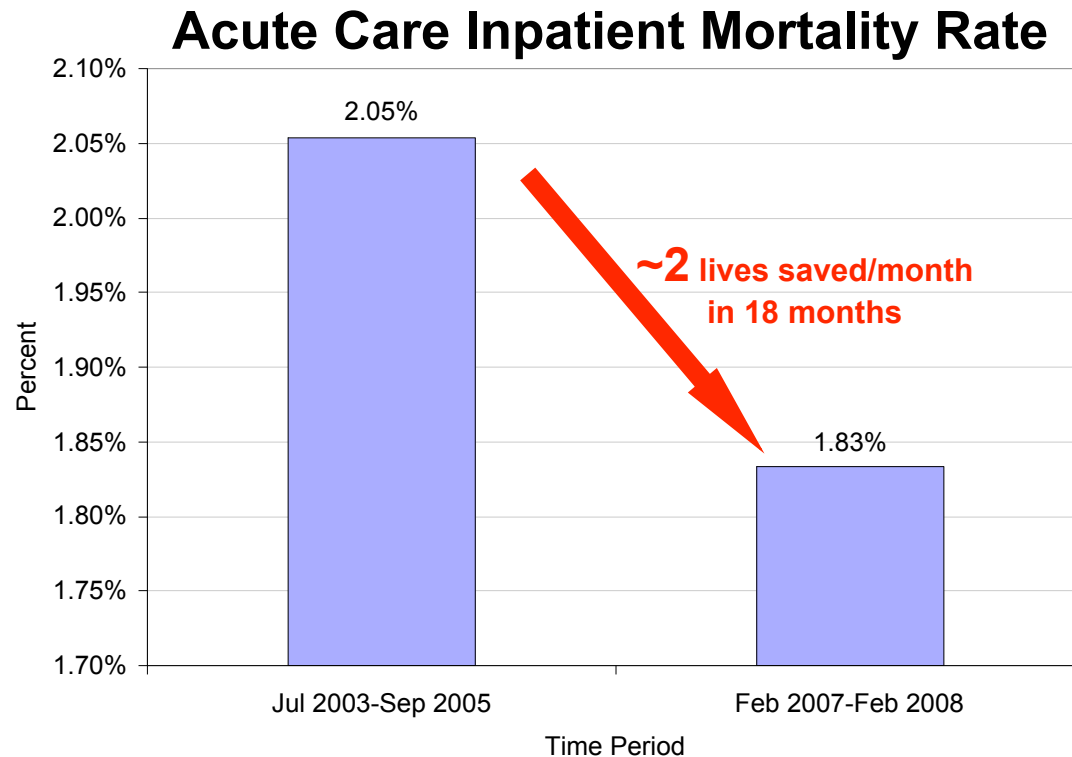
The mortality rate for acute care patients improved from a mean of 2.05% (516 of 25,119 Jul 2003-Sep 2005) to 1.83% (217 of 11,837 Feb 2007-Feb 2008).

AMI Inpatient Mortality

The percentage of patients with AMI who died during hospital stay improved from a mean of 6.30% (29 of 460 Mar 2004-Sep 2005) to 4.62% (6 of 130 Feb 2007-Sep 2007).

Central Line-Associated Primary Bloodstream Infection Rate

Central Line Primary Bloodstream Infection Rate

88% Improvement in 18 months
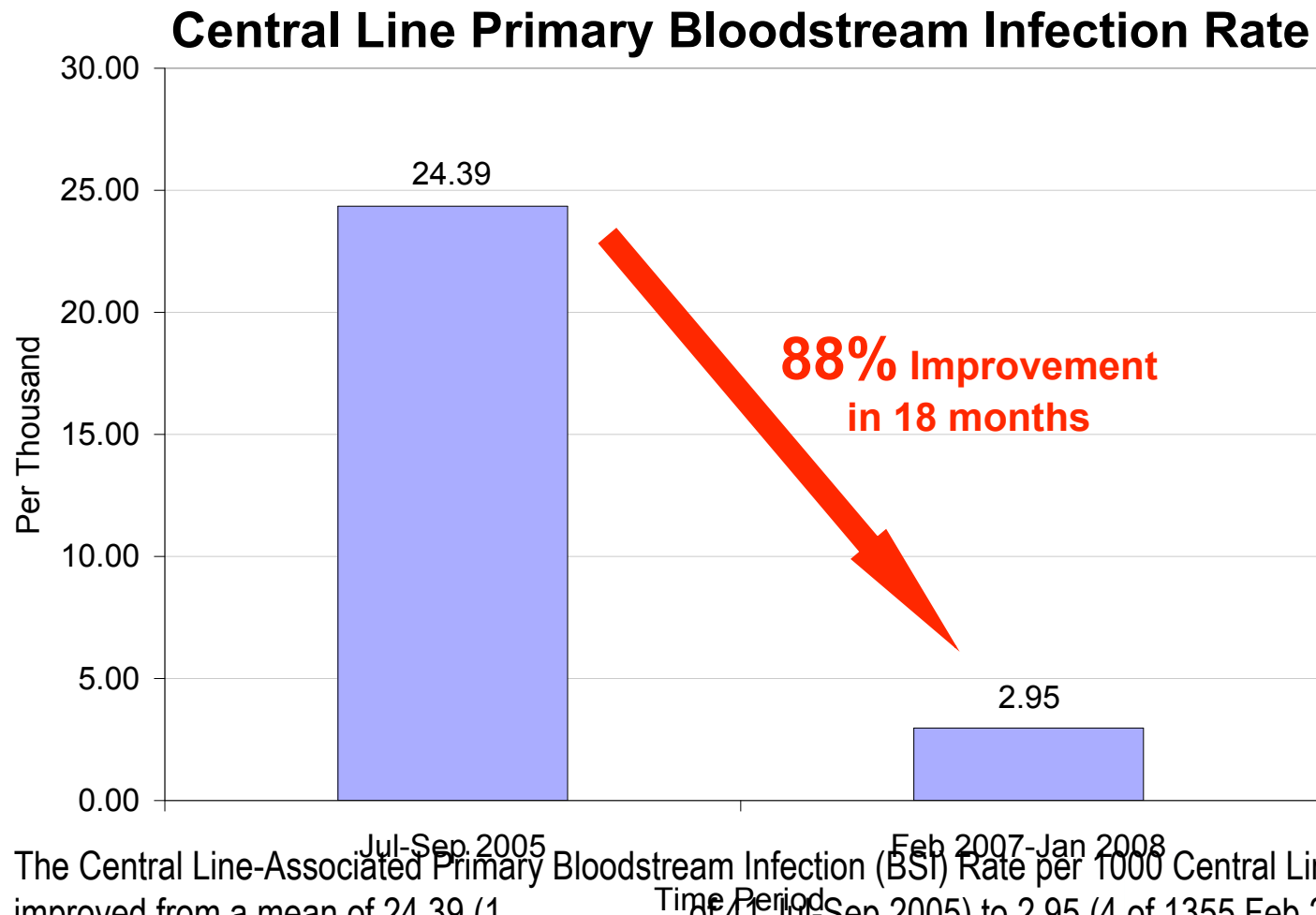
The Central Line-Associated Primary Bloodstream Infection (BSI) Rate per 1000 Central Line-Days improved from a mean of 24.39 (1 of 41 Jul-Sep 2005) to 2.95 (4 of 1355 Feb 2007 – Jan 2008).

Ventilator Associated Pneumonia (VAP) Bundle Compliance

77% Improvement in 18 months

85.26%

20.00%

Jun-Sep 2005

Feb 2007-Mar 2008

Time Period
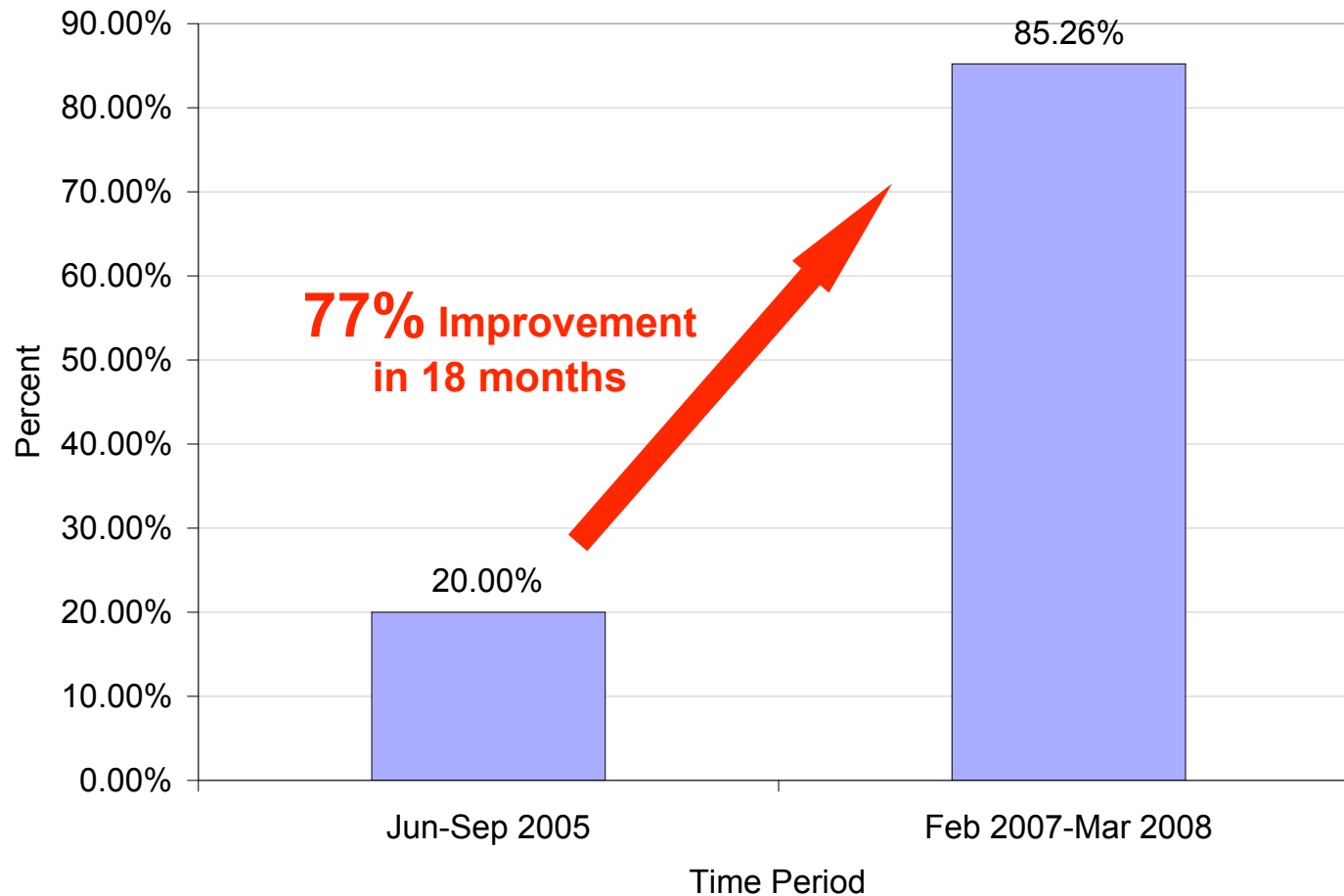
Percent

The percentage of intensive care patients on mechanical ventilation for whom all four elements of the ventilator bundle are implemented and documented on the daily goals sheet and/or elsewhere in medical record improved from a mean of 20.00% (13 of 65 Jun-Sep 2005) to 85.26% (81 of 95 Feb 2007-Mar 2008).

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Key Transformation Components

Today

- ☐ Integrated EHR
- ☐ No interoperability excuses
- ☐ CPOE
- ☐ Closed loop orders and BCMA
- ☐ Clinical documentation
- ☐ Content
    - – Order Sets
    - – Templates
    - – Clinical reminders
- ☐ CDSS: Rx Error Checking

"Its integrated and it works"

Roadmap

- ☐ Richer CDSS at Point of Care
    - – EBM Care Protocols
    - – Rules-based activity monitoring
    - – Interruptive alerts
    - – Passive recommendations
    - – Contextual access to references
- ☐ Clinical Dashboard
    - – Population Management
    - – Benchmarking
    - – Scoreboarding
- ☐ Community Collaboration
    - – Sharing content
    - – Sharing best practices
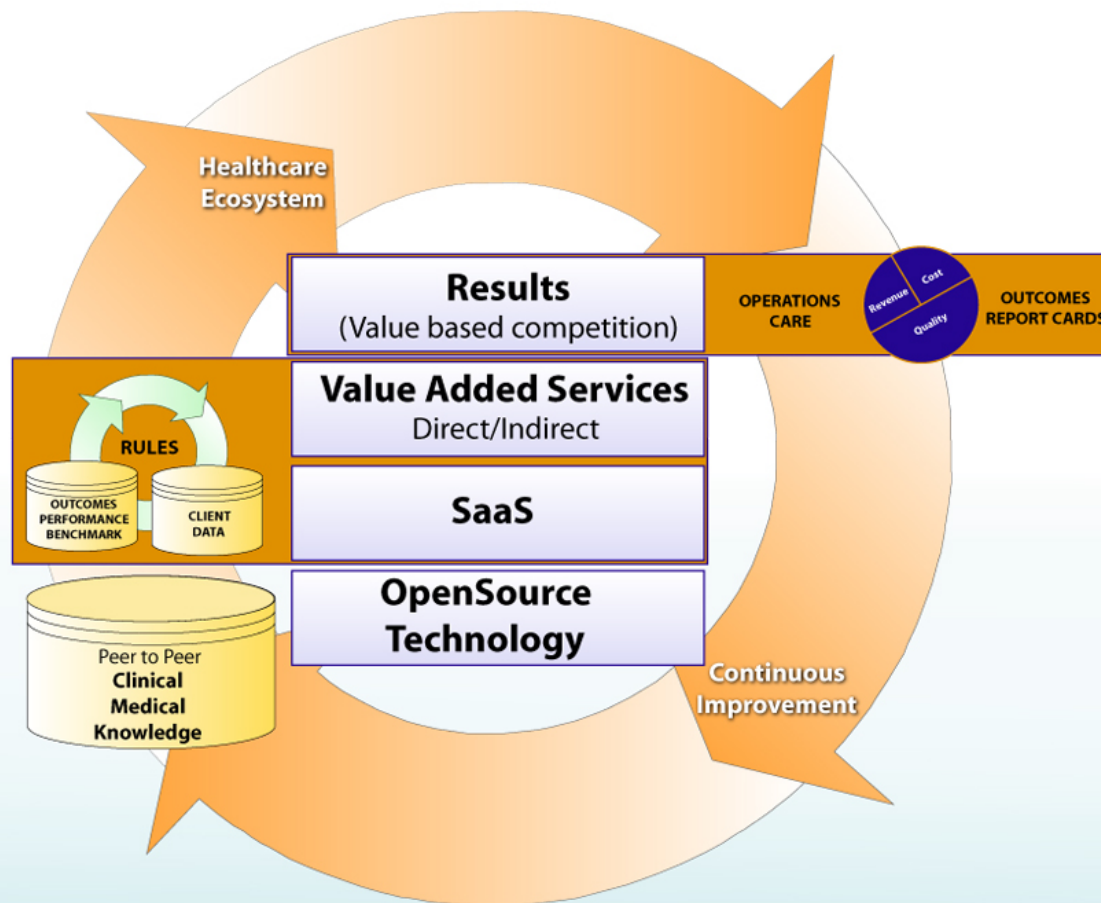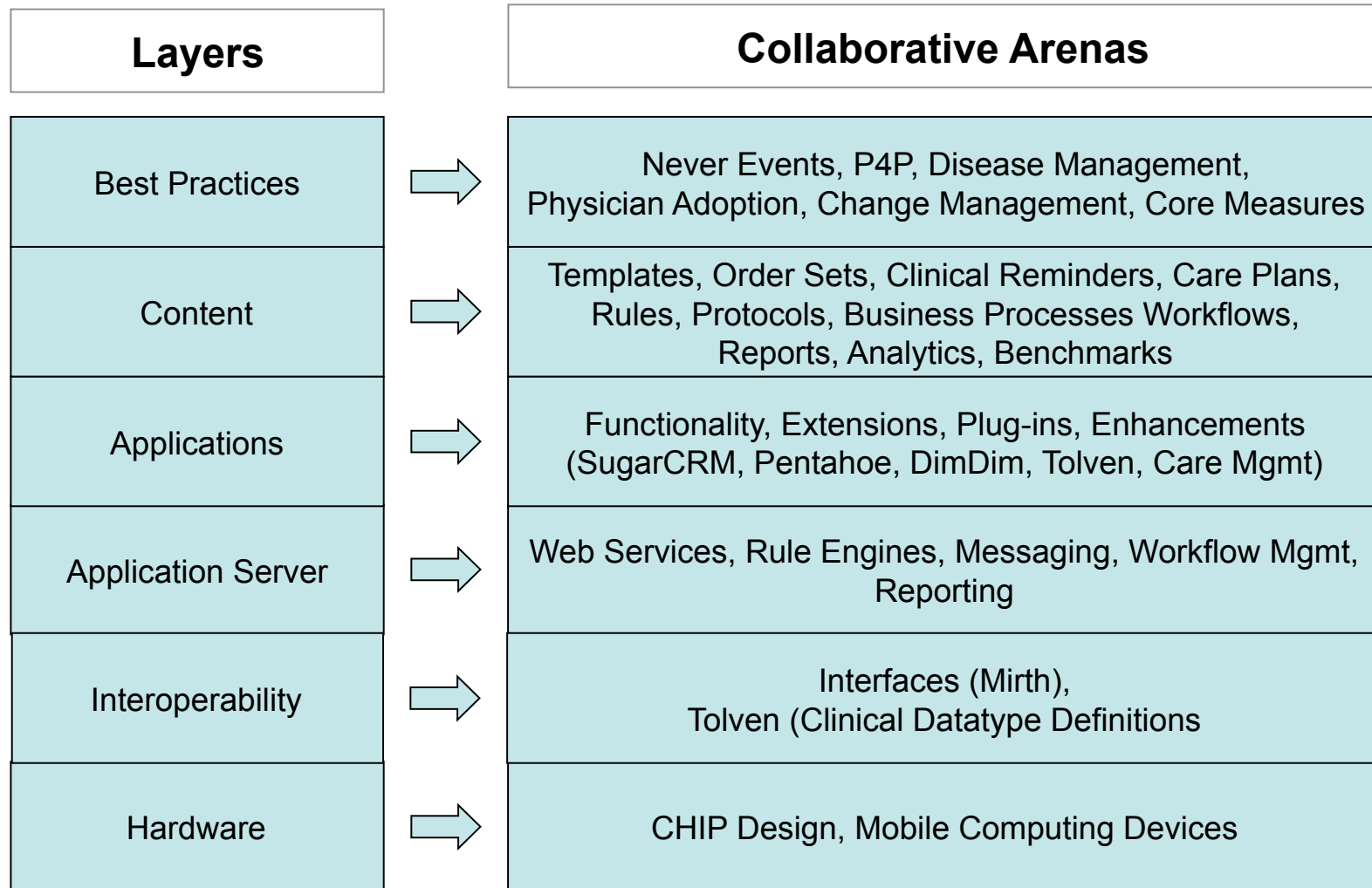   - – Proving standards of care

"Health Improvement Technology"

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Questions

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Health Care Collaboration Stack

Layers		Collaborative Arenas
Best Practices	⇒	Never Events, P4P, Disease Management, Physician Adoption, Change Management, Core Measures
Content	⇒	Templates, Order Sets, Clinical Reminders, Care Plans, Rules, Protocols, Business Processes Workflows, Reports, Analytics, Benchmarks
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Interoperability	⇒	Interfaces (Mirth), Tolven (Clinical Datatype Definitions
Hardware	⇒	CHIP Design, Mobile Computing Devices

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www.medsphere.org

Medsphere.org is a community gathering place where healthcare administrators, clinicians, developers and enthusiasts can interact, share, and collaborate in the largest ecosystem in healthcare.

Just as Medsphere.org is community, so are the individual spaces within the site. Medsphere.org documents, discussions, and blogs are associated with these communities, each of which focuses on a particular project, such as development of ☺ OpenVista CIS; medical specialty, like the ☺ Laboratory; or administrative topic, such as ☺ Regulation. You're welcome to participate in any community that interests you. The organization of the site is an effort to delineate concepts so you're less likely to be distracted by things you're not interested in.

Administrators

What does Medsphere.org offer administrators and how can they contribute? The detailed answer to that question will certainly demonstrate the tantalizing potential of the community. OpenVista presents many opportunities for administrators with regard to practice and financial management, grants, and state and federal regulations. Administrators will also want to exchange data on healthcare information technology beyond OpenVista. What other Open Source applications might interface with the core OpenVista clinical tools to enhance quality of care? The Medsphere.org tool set enables administrators to start a blog on federal grants, post a document detailing new state regulations, or ask a question about effective cost-cutting measures, among myriad topics in the ☺ Administrative area.

Clinicians

As all hospital employees know, these are complex and unique facilities, each guided by local norms and workflow processes. A lack of standardization, often identified as an industry weakness, becomes a strength on Medsphere.org as clinicians use the ☺ Specialties community to compare information. A hospital in Texas uses OpenVista to improve its emergency room triage process. Where that information might have remained in a silo previously, now the clinicians in Texas can share their development with other healthcare providers; the information benefits more patients than it could have otherwise. Blogs, documents, and discussions will enable clinicians to disseminate more broadly the valuable insight gained from daily process improvement.
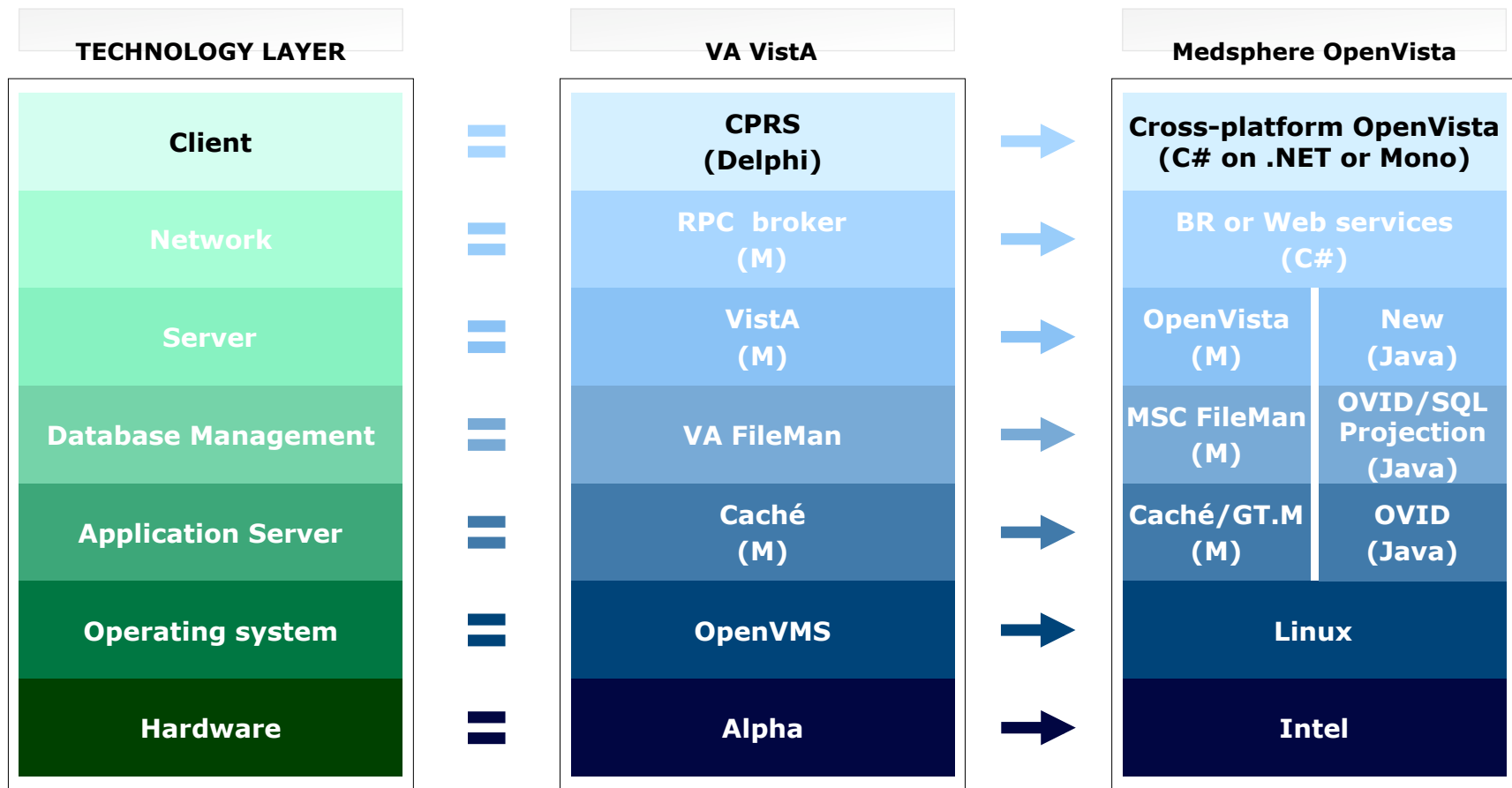
Developers

Software developers will naturally gravitate to the ☺ Projects area of Medsphere.org. By clicking on a project name, developers can drill down into the community and a typical Open Source project home page: a description of the project, language and license; release notes; feature lists; screenshots; and a link to downloads. As the community develops, each space will provide the interested developer with all the information necessary to understand and make a contribution to ongoing development. As with any other community on Medsphere.org, each Project space contains documents, discussions, and a project blog. In the future, also look for direct access to project bug trackers and source code repositories.
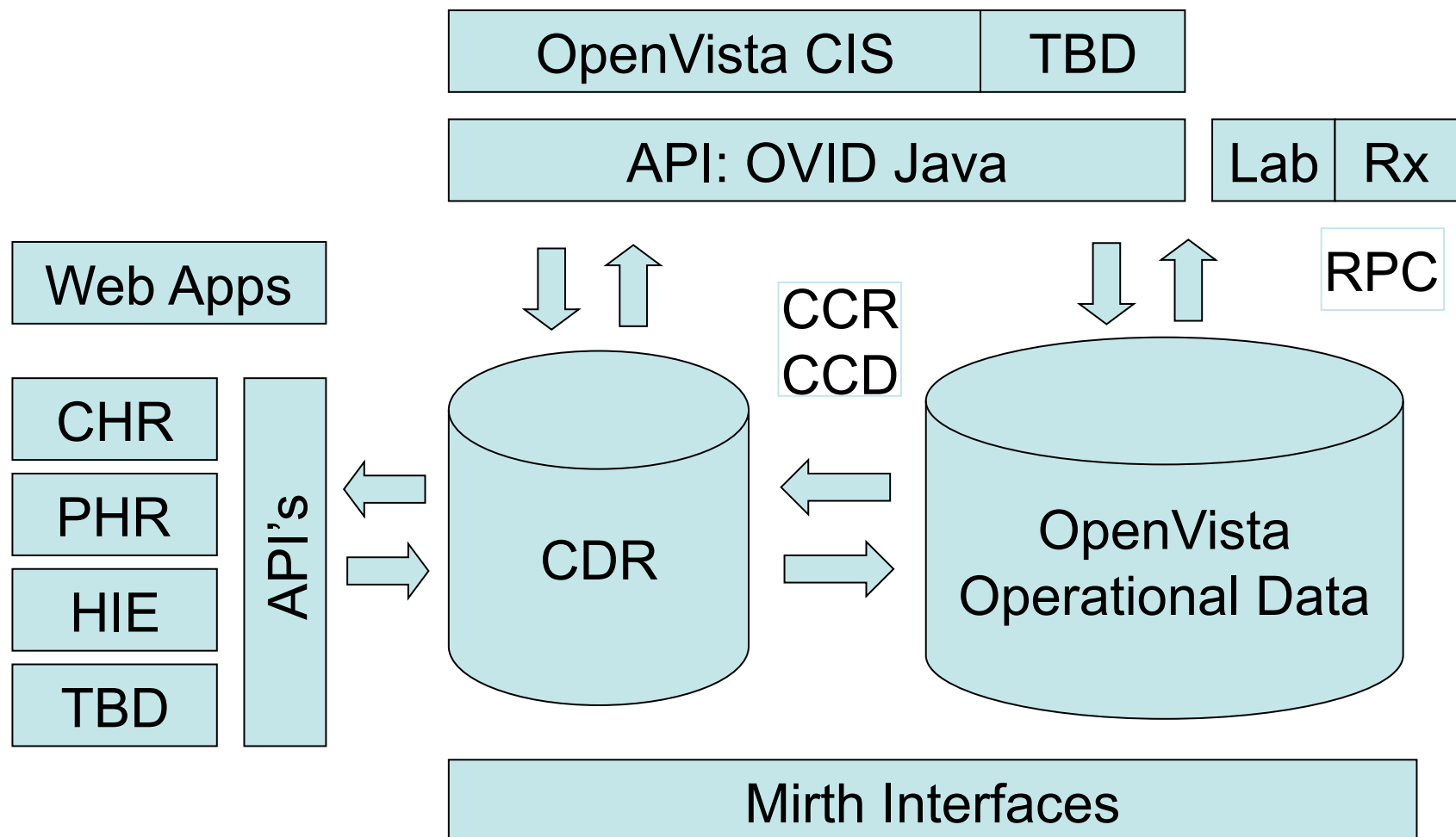
Enthusiasts

New to healthcare, software, or Open Source and unsure about where to start? Early confusion is no long-term obstacle to participation! The best initial approach is to pick a community focused on what interests you and start a discussion. If you need information, you can mark your discussion post as a question and a special icon indicates that you are awaiting a response. If you ever get stuck, the ☺ Help and Feedback area will point you in the right direction and get you involved more quickly. Medsphere.org is an organic community that values experiences and perspectives of all stripes. You may not know how you will contribute in the beginning, but the opportunity will soon present itself.

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OpenVista: Technology Stack

TECHNOLOGY LAYER		VA VistA		Medsphere OpenVista
Client	=	CPRS (Delphi)	→	Cross-platform OpenVista (C# on .NET or Mono)
Network	=	RPC broker (M)	→	BR or Web services (C#)
Server	=	VistA (M)	→	OpenVista (M) / New (Java)
Database Management	=	VA FileMan	→	MSC FileMan (M) / OVID/SQL Projection (Java)
Application Server	=	Caché (M)	→	Caché/GT.M (M) / OVID (Java)
Operating system	=	OpenVMS	→	Linux
Hardware	=	Alpha	→	Intel

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Collaborative API Architecture

Renal Flowsheet

File   Edit   View   Help

JONES,CHRISTOPHER
Age/Sex: 56 (Male)
MRN: 1111112001

Wt: 117.027 kg
Ht: 15.2cm
BMI/BSA: 5065.2 (0.7)

ICU 3N302-1
Provider: Not Selected
Admit Dx: chest pain

Admitted: 5/6/2007 8:00:00 AM
Acct #:

Postings: A

Alerts:

Care Team
Admitting MD: KETCHERSIDE,JOE
Attending MD: KETCHERSIDE,JOE

Retrieve Data

Multi-System | Renal | Hemodynamic | Respiratory | Neurological | Gastrointestinal

Last 8 hours ▼   From 8/5/2007 8:00 AM   To 8/5/2007 4:00 PM   Change View   Resolution 1:00

		Cardiology Office							
		09:00	10:00	11:00	12:00	13:00	14:00	Sunday - 8/5/2007 15:00
⊟ ☐ Intake	Volume Total							
☐ Oral	440	100		240			100	
☐ D5 ½ NS	430	25	25	25	25	30	100	100
☐ PRBC	240							240
☑ **Total Intake**	**1110**	**125**	**25**	**265**	**25**	**30**	**200**	**340**
⊟ ☐ Output	Volume Total							
☐ Urine	2725	20	35	40	60	40	30	1000
☐ Emesis	200			200				
☐ Chest Tube	104	5	15	8	20	30	10	6
☑ **Total Output**	**3029**	**25**	**50**	**248**	**80**	**70**	**40**	**1006**

⊟ Chart

1110

0

■ Total Intake
■ Total Output
■ Net Fluid Balance

-3029

-1919

Graph Type: Summary ▼

Patient Summary | Clinical Flowsheets | Medications | Orders | Clinical Notes | Consults/Procedures | Discharge Summary | Vital Signs | Lab Results | Chart Inquiries

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Bringing it Together

OpenVista CIS Client	VueCentric	Other

OVID Java

OpenVista CIS Server	RPMS	Other

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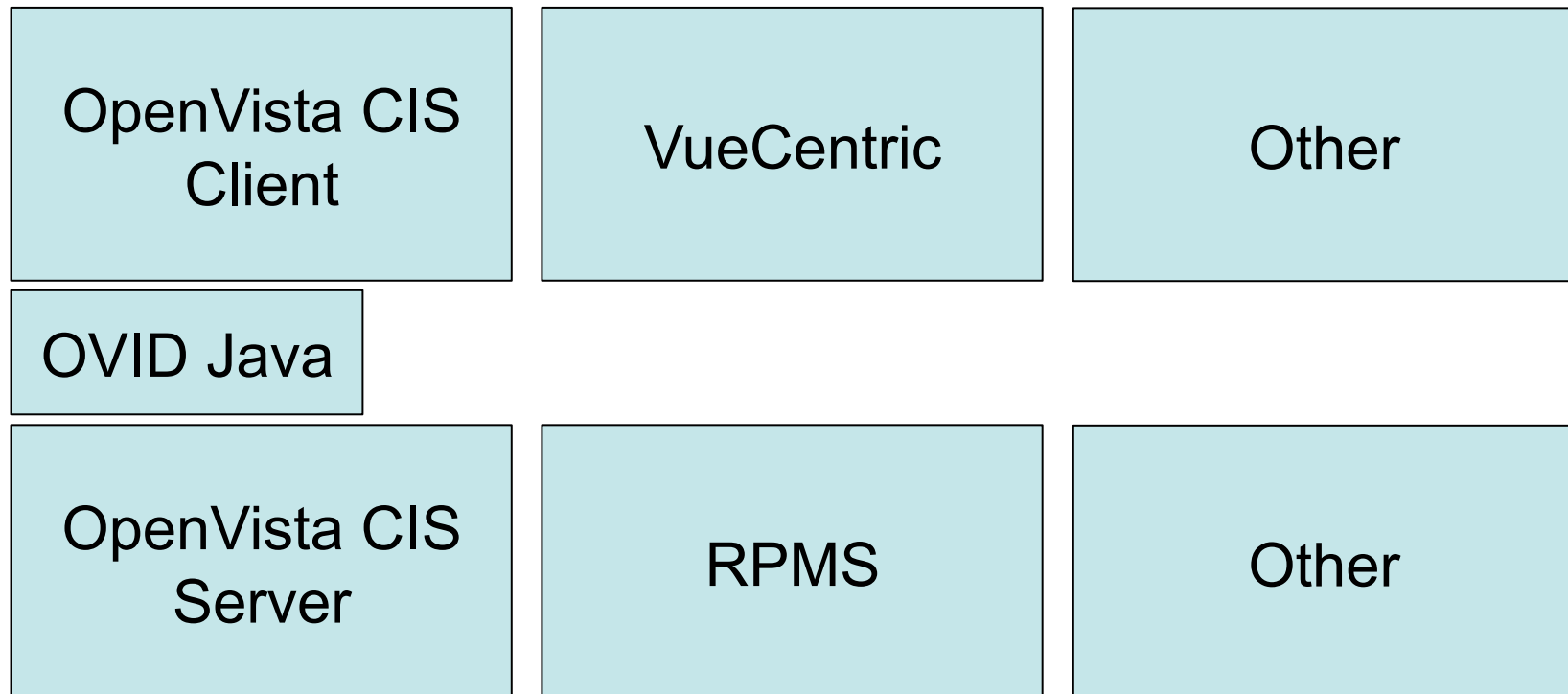
From Community to Enterprise

Community Code Flow

Contribution posted to Medsphere.org

Not for Enterprise Remains on .org site

Distributed in OpenVista Release and .org

Roadmap posted to Medsphere.org

Contribution Delivered to Medsphere

Contribution Reviewed & QA'd?

No

Yes

Documented requirements and coding standards

Contribution Accepted

Contribution Agreement Signed

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Working on Now

☐ .Org Community

☐ CCR/CCD

☐ EDU Collaborative

Questions