



# A New Approach Expanding SOA in Healthcare

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# Agenda

- ▶ Introduction – Eric Leader
- ▶ The Call for Change
- ▶ Is There a Third Option?
- ▶ Becoming Agile: **Re**invent, **Re**purpose, **Re**use
- ▶ Everyday SOA
- ▶ SOA Solution Examples
- ▶ Open Discussion / Q&A

# Introduction

## ▶ Eric Leader

VP Technology Architecture and Product management  
Carefx Corporation

- ▶ Former Chief Technology Architect for Catholic Healthcare West.
- ▶ Experienced implementing Portal and SOA solutions in healthcare.
- ▶ Advisor to healthcare and technology companies.
- ▶ Thought leader in using collaborative technologies in healthcare.
- ▶ Participant in several Healthcare Information Exchange Initiatives.

# The Call for Change ...

***“...provide solutions that attract more patients and physicians...connect all parties so the organization can provide stellar care, bill for services easily and optimize revenue collection...be clinically centered, not technology centered.”***

Shahid Shah, “The Healthcare IT Guy”

***“...provide process integration that ‘bridges the information chasms’ that currently exist between patients, hospitals and other care settings.”***



***“ ... support the cognitive functions of all caregivers, including health professionals, patients, and their families.”***

NRC report on IT Effectiveness





# Evolutionary Change- Becoming Agile

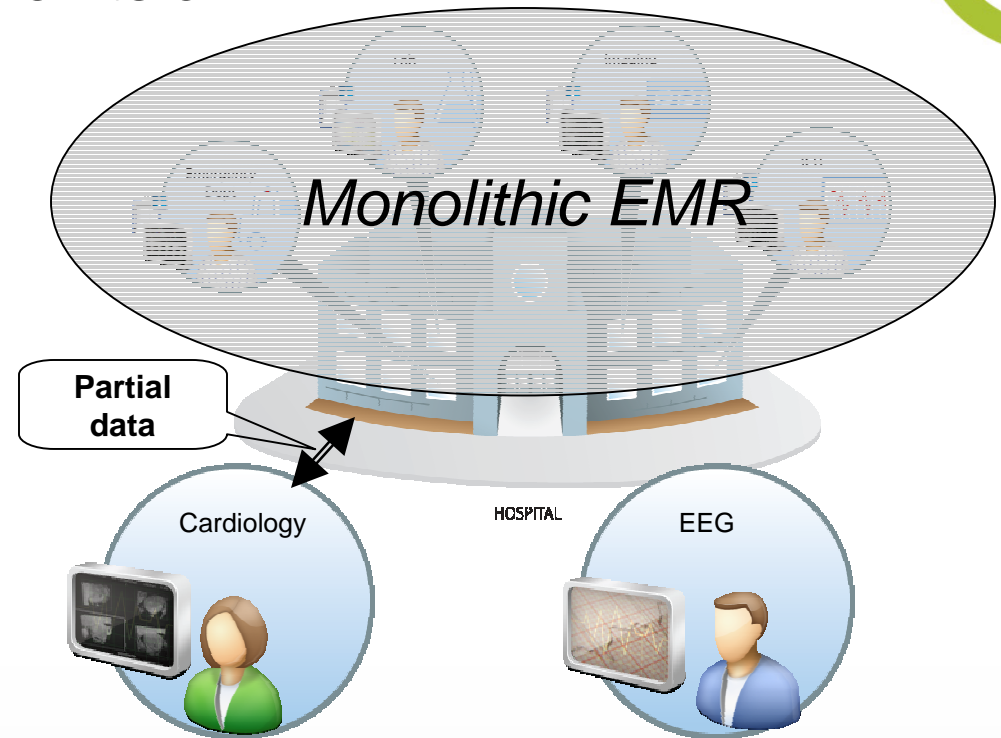
## NRC – Computational Technology for Effective Health Care: Immediate Steps and Strategic Directions

- ▶ Accommodate changes in roles
- ▶ Adapt to shifts in process
- ▶ Support clinical workflow and cognitive tasks
- ▶ Present data in the context of a user's role
- ▶ Embrace potentially disruptive change
- ▶ Serve up data from multiple departments facilities and systems
- ▶ Deliver more highly intuitive user interfaces

# Two Traditional Approaches

## 1) Monolithic EMR – one size fits all

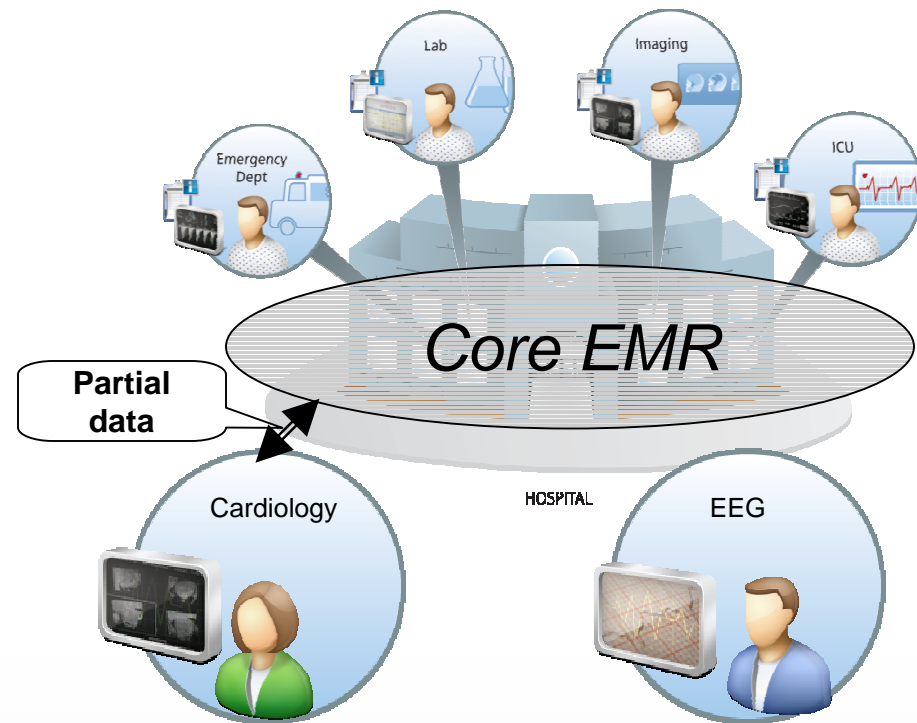
- ▶ One system tries to do many things
- ▶ Most are done well
- ▶ Some not so good
- ▶ Some are missing
- ▶ But what about?



# Two Traditional Approaches

## 2) Best of Breed

- ▶ Core EMR strategy
- ▶ Service Lines
- ▶ Partial Integration
- ▶ Some still missing
- ▶ But what about?

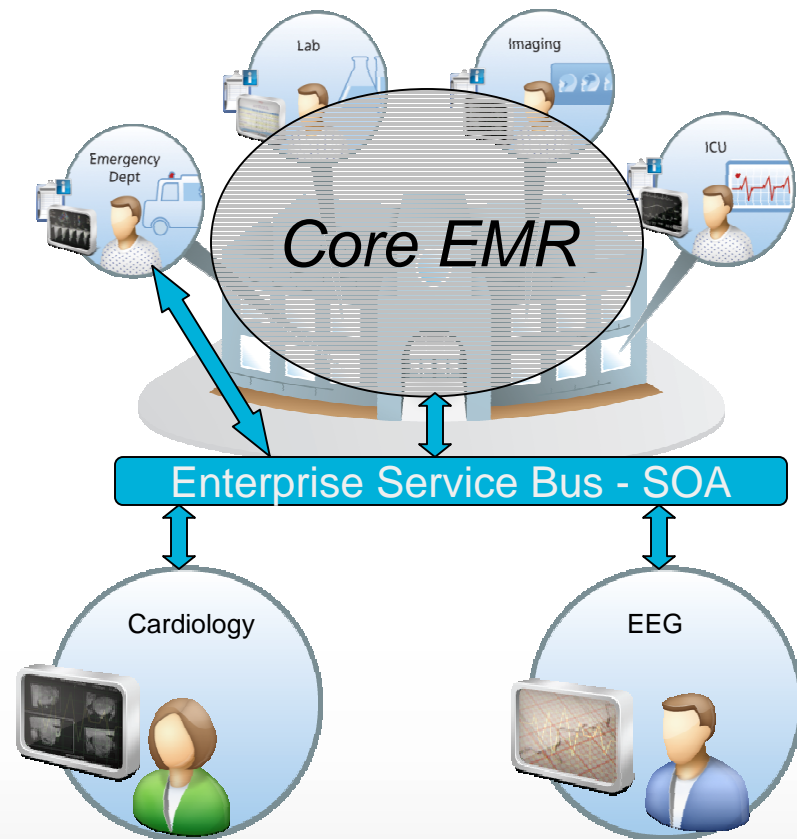
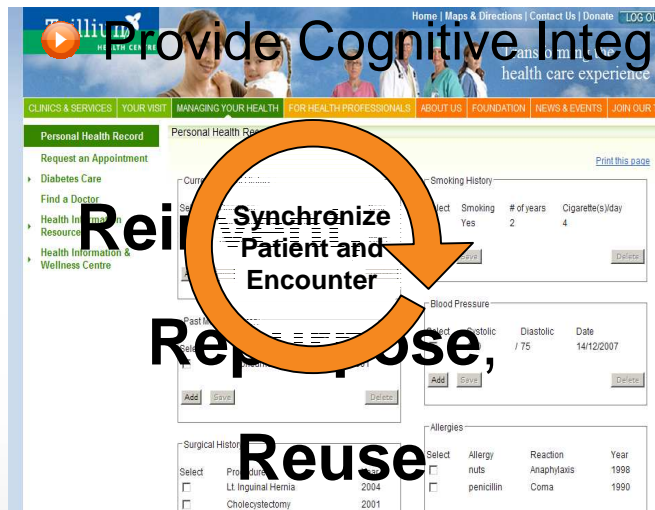


# Reinvent, Repurpose, Reuse

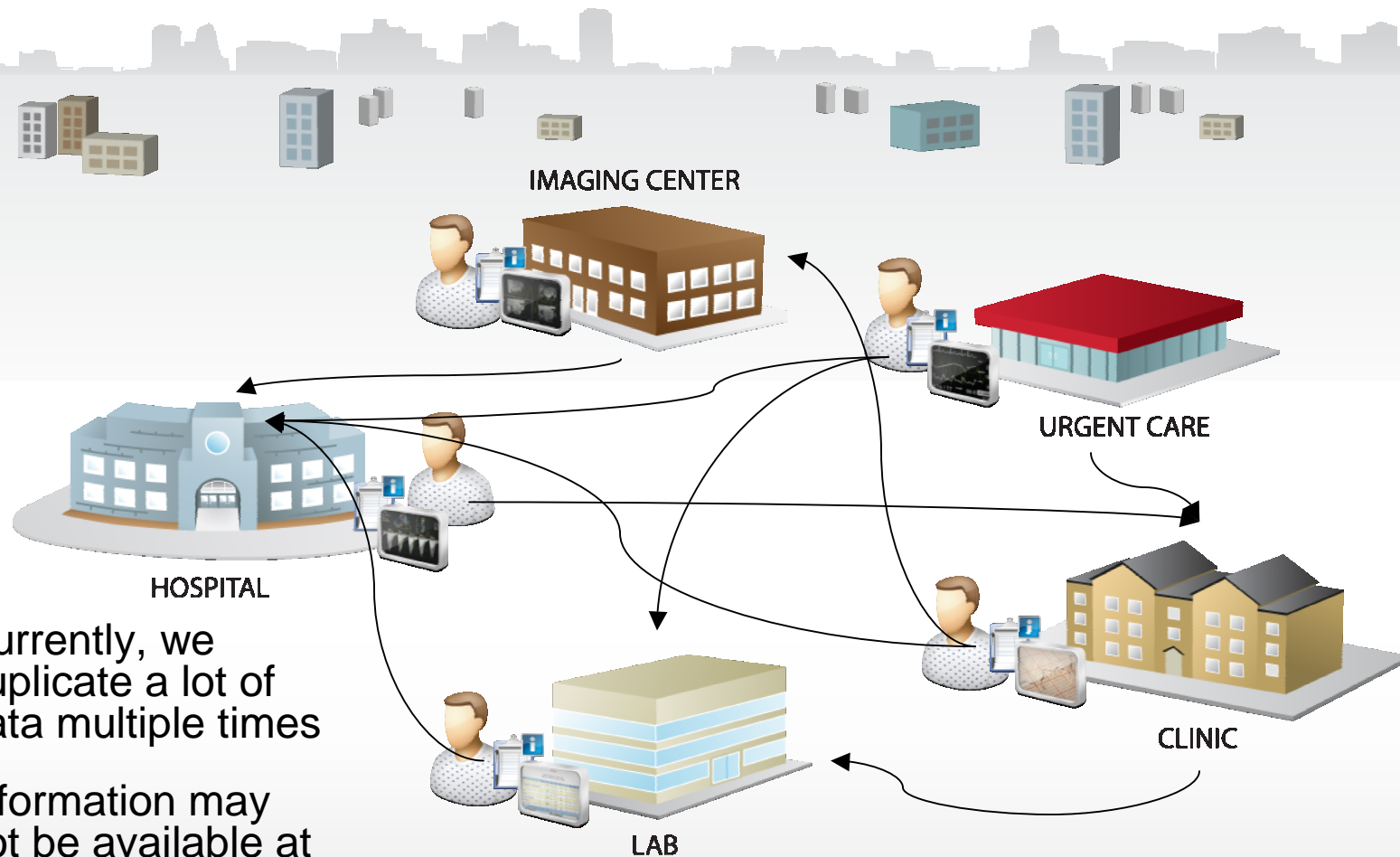
## 3) The Third Option - SOA

- Establish Strategic Core EMR
- Provide BOB where appropriate
- SOA Enable the enterprise
- Agile Reuse of SOA

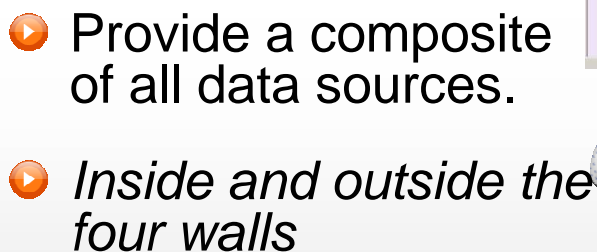
Provide Cognitive Integration



# Beyond the Facility Walls...



- Currently, we duplicate a lot of data multiple times
- Information may not be available at POC



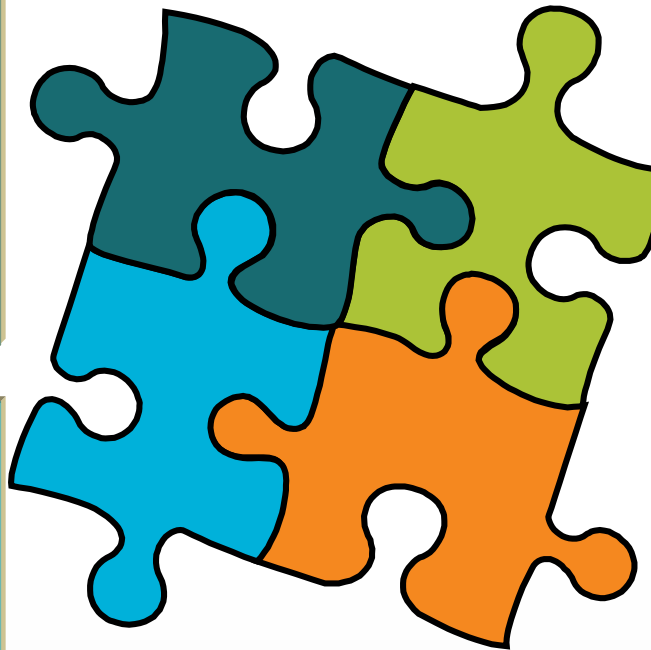
# Everyday SOA – How the Pieces Fit

## A service?

A **repeatable business task** – e.g., register a patient, reconcile medications, generate invoice

## Service oriented architecture?

An IT **architectural style** that supports service orientation



## Service orientation?

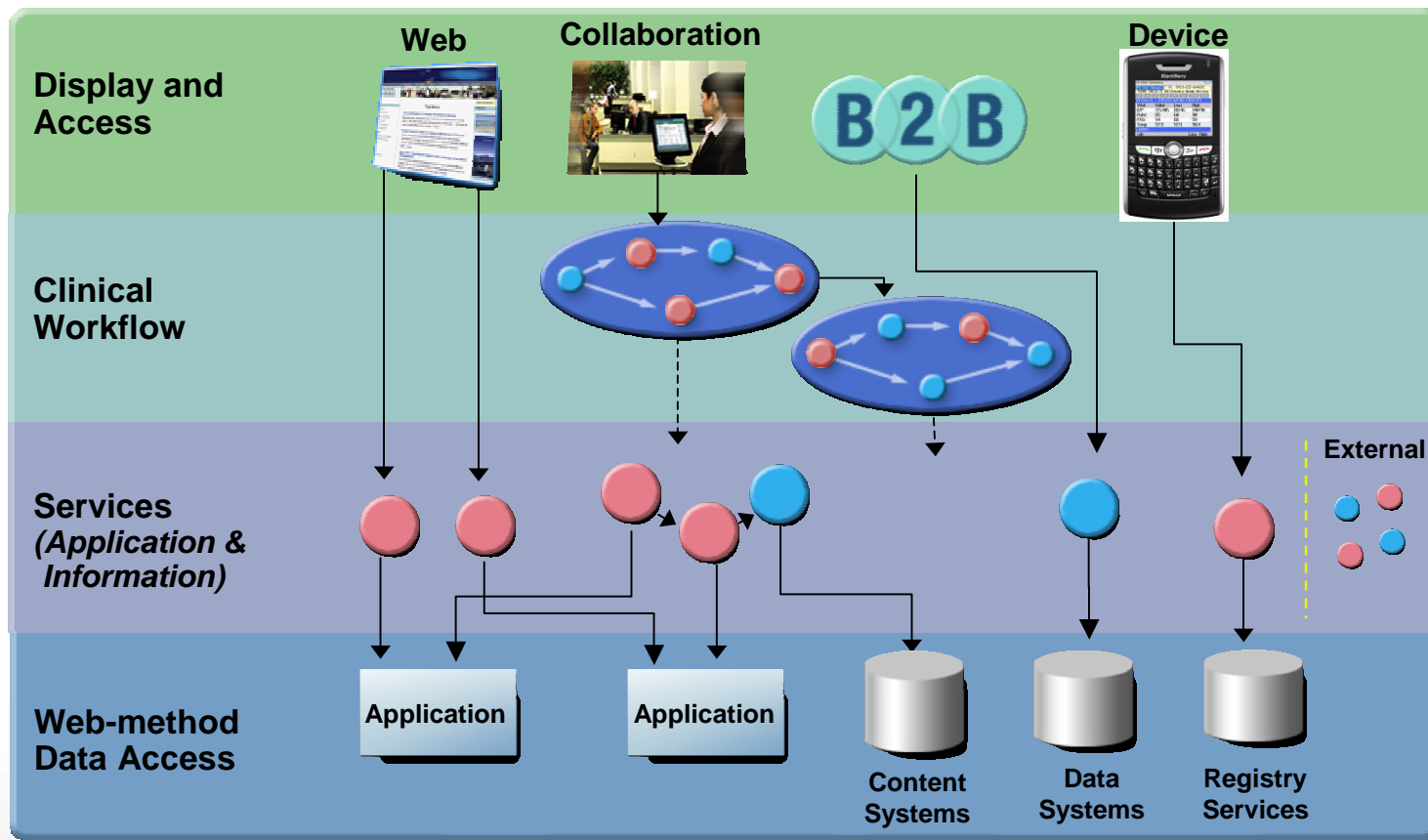
A way of integrating your **business as linked services** and the outcomes that they bring

## A composite application?

A set of **related & integrated** services that support a business process built on an SOA



# SOA Architecture

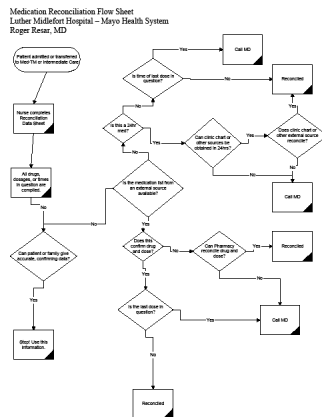




# Example: Medication Reconciliation

## Joint Commission – National Patient Safety Goal #8

A process exists for comparing the patient's current medications with those ordered for the patient while under the care of the organization.



What applications?

What process?

Who does what?

How do you monitor?

Are the systems helping or getting in the way?

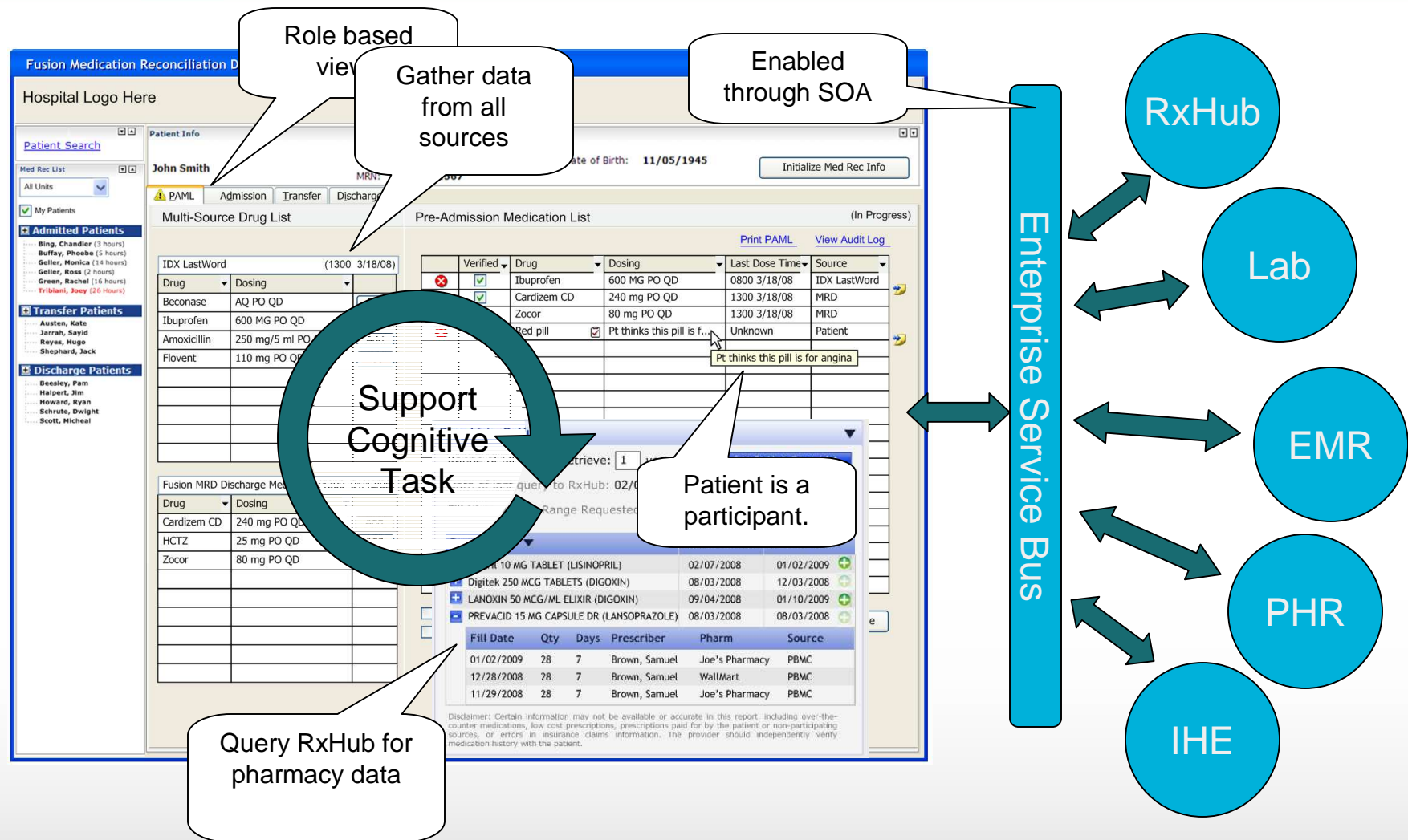
*"I was very good at triage, usually I could triage someone with a complicated medical history and a lot of meds in about 5 or 10 minutes. Now, thanks to the computer and medication reconciliation, it takes me 2 to 3 times as long. The more we try to streamline, the slower things move."*

- ER Nurse Blog

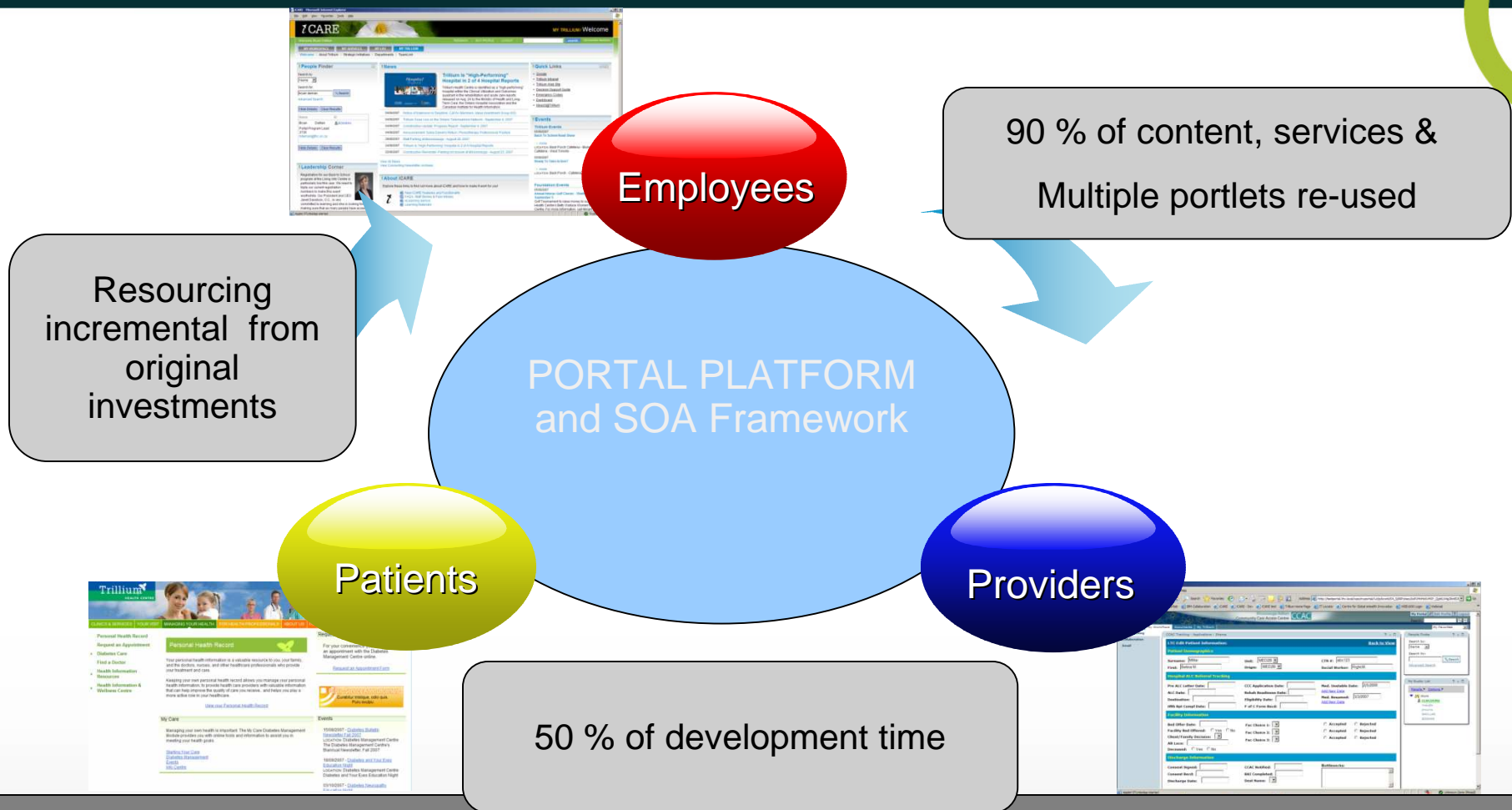
# Example: Medication Reconciliation

- ▶ Med is appropriately prescribed at initial state of care.
- ▶ Changes in treatment process make it such that initial med no longer applies or is detrimental.
- ▶ Caregivers don't have a way to communicate to subsequent caregivers.
- ▶ Subsequent caregivers have no visibility into prior phases of care.
- ▶ Patient may get frustrated by changes in course, getting conflicting info from different caregivers, repeating tests / procedures, etc.
- ▶ Patient's health suffers increased risks.

# Example: Medication Reconciliation



# Trillium Healthcare



Portal software connects all stakeholders enabling communication, collaboration, process efficiency, orchestration and workflow optimization and information sharing using SOA framework.

iCARE - Microsoft Internet Explorer

File Edit View Favorites Tools Help

MY WORKSPACE MY LIFE MY SERVICES MY TRILLIUM

Patient Care | Formal Leaders | Consultant Support | Admin Services | Communication | Information Resources | Developers Page

» Patient Care Applications

» Clinical Viewer

- Patient List
- Lab Results
- Lab Flowsheet
- Microbiology Results
- Radiology Exams
- Reports
- Medication List

» Patient Care Documents

» Patient Care Tools

### Demographics

**Patient Context**

Age: 71 Unit #: 2424721 Loc: M-CSICU Room: MCS86  
 Sex: M Acct #: AT017383/07 DOB: 11/21/1935 Bed: 1  
 Med allergies:

Select Encounter  
 11/01/07 - ADM IN  
 Print face sheet

### Lab Results

< Show Older Show Newer> Show Results between 2007-10-31 19:35 and 2007-11-05 18:34 Go

Date-Time	Test	Result / Report	Flag	Reference	Units	Status
11/05/2007 15:50	ARTERIAL BLOOD GASES					COMP
11/05/2007 15:50	GLUC/BUN/CREAT/LYTES					COMP
11/05/2007 15:50	COULTER BLOOD COUNT					COMP
11/05/2007 13:00	ABG CRITICAL CARE					COMP
11/05/2007 11:20	ARTERIAL BLOOD GASES					COMP
11/05/2007 09:45	ARTERIAL BLOOD GASES					COMP
11/05/2007 05:05	ARTERIAL BLOOD GASES					COMP
11/05/2007 05:05	GLUC/BUN/CREAT/LYTES					COMP
	GLUCOSE	6.2	H	4.0-6.0	mmol/L	COMP
	UREA	10.0	H	3.2-7.1	mmol/L	COMP
	CREATININE	86		71-115	Umol/L	COMP
	SODIUM	140		135-145	mmol/L	COMP
	POTASSIUM	4.5		3.6-5.0	mmol/L	COMP
	CHLORIDE	108	H	98-107	mmol/L	COMP
	TOTAL CO2	26		22-31	mmol/L	COMP
	ANION GAP	6	L	8-16	mmol/L	COMP
11/05/2007 05:05	CALCIUM	2.03	L	2.10-2.55	mmol/L	COMP
11/05/2007 05:05	MAGNESIUM	1.06		0.80-1.20	mmol/L	COMP
11/05/2007 05:05	CBC MORPHOLOGY					COMP
11/05/2007 05:05	PT/APTT					COMP
11/05/2007 00:45	ARTERIAL BLOOD GASES					COMP
11/04/2007 22:55	ARTERIAL BLOOD GASES					COMP
11/04/2007 22:55	GLUC/BUN/CREAT/LYTES					COMP
11/04/2007 22:55	CALCIUM	2.04	L	2.10-2.55	mmol/L	COMP
11/04/2007 22:55	MAGNESIUM	1.16		0.80-1.20	mmol/L	COMP

Because of the portlet driven presentation layer, and separate SOA-based business logic layer, "Mashing" up pieces of functionality to create new composite applications and workflows.



Personal Health Record

Request an Appointment

Diabetes Care

Find a Doctor

Health Information  
Resources

Health Information &  
Wellness Centre

Personal Health Record

Current Medical Conditions	Year
<input type="text" value="Enter Medical Condition"/>	<input type="text" value="Year"/> <input type="button" value="Add"/>

Diabetes	2007	<input type="button" value="Edit"/>	<input type="button" value="Delete"/>
Mitral regurgitation (moderate) requires Amoxil for dental procedure	1998	<input type="button" value="Edit"/>	<input type="button" value="Delete"/>
Cholesterol high for diabetes	2007	<input type="button" value="Edit"/>	<input type="button" value="Delete"/>

Current Medical History	Year
<input type="text" value="Enter Medical History"/>	<input type="text" value="Year"/> <input type="button" value="Add"/>

TIA	2004	<input type="button" value="Edit"/>	<input type="button" value="Delete"/>
Pneumonia	2001	<input type="button" value="Edit"/>	<input type="button" value="Delete"/>

Surgical History	Year
<input type="text" value="Enter Surgical Condition"/>	<input type="text" value="Year"/> <input type="button" value="Add"/>

Lt. Inguinal Hernia	1991	<input type="button" value="Edit"/>	<input type="button" value="Delete"/>
Cholecystectomy	2001	<input type="button" value="Edit"/>	<input type="button" value="Delete"/>

Do you smoke? Y ☐ N ☒

Blood Pressure

Last 3 BPs: 140/80, 130/75, 120/70

Allergies	Year
<input type="text" value="Enter Medical Allergy"/> <input type="text" value="Select Reaction"/>	<input type="text" value="Year"/> <input type="button" value="Add"/>

new - Hives	2000	<input type="button" value="Edit"/>	<input type="button" value="Delete"/>
nuts - Anaphylaxis	1998	<input type="button" value="Edit"/>	<input type="button" value="Delete"/>
Penicillin	1990	<input type="button" value="Edit"/>	<input type="button" value="Delete"/>
Sulpha - rash	2007	<input type="button" value="Edit"/>	<input type="button" value="Delete"/>

Current Medications	Dosage
<input type="text" value="Enter Medication"/>	<input type="text" value="Dosage"/> <input type="button" value="Add"/>

Coumadin - 4 mg	once daily	<input type="button" value="Edit"/>	<input type="button" value="Delete"/>
Atacand - 8 mg	once daily	<input type="button" value="Edit"/>	<input type="button" value="Delete"/>
Lipitor - 20 mg	once daily	<input type="button" value="Edit"/>	<input type="button" value="Delete"/>

A patient can access a personal health record that can be used to manage their health information and can be shared across the health continuum.

# Boston Medical Center's Community Information Exchange (CIE)



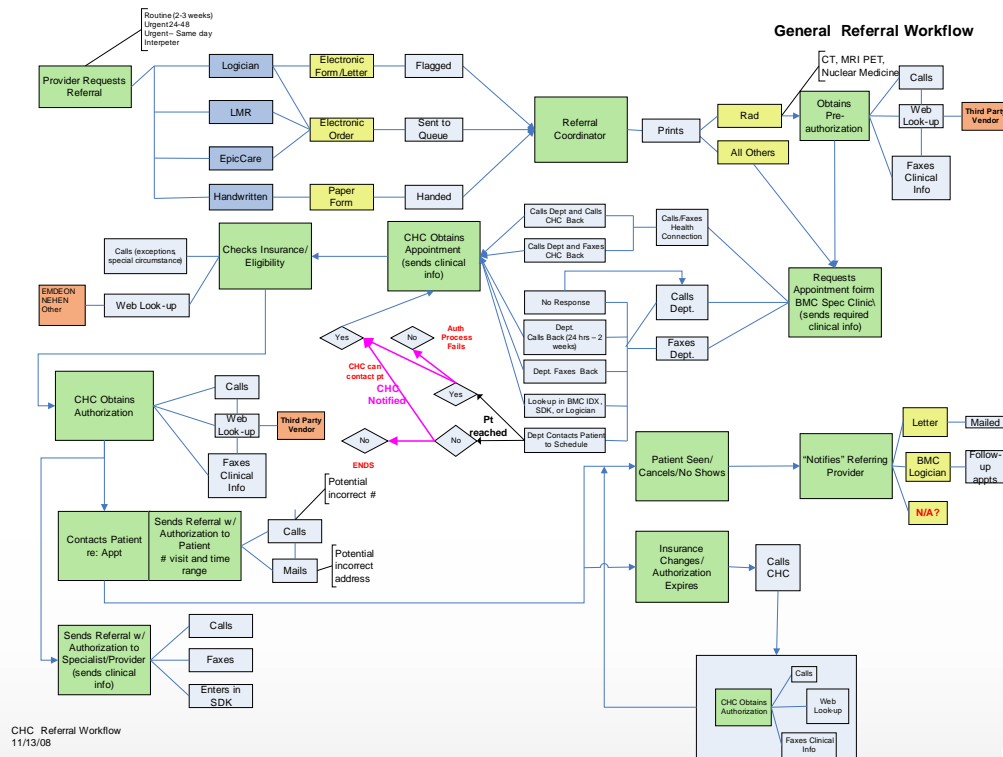
EXCEPTIONAL CARE. WITHOUT EXCEPTION.



# Dis-Integrated Manual Referral Process

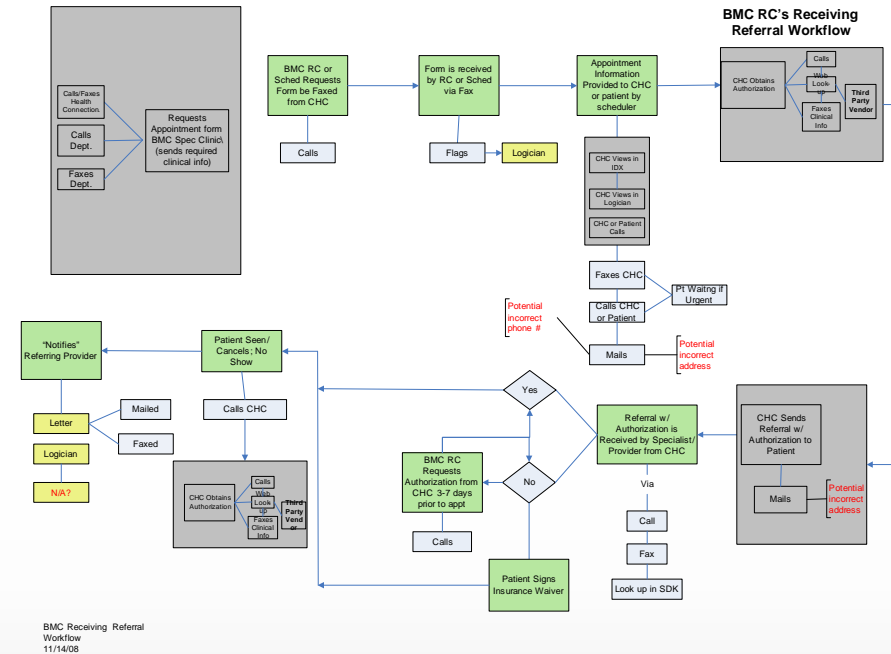
## CHC

### General Referral Workflow



## BMC

### BMC RC's Receiving Referral Workflow

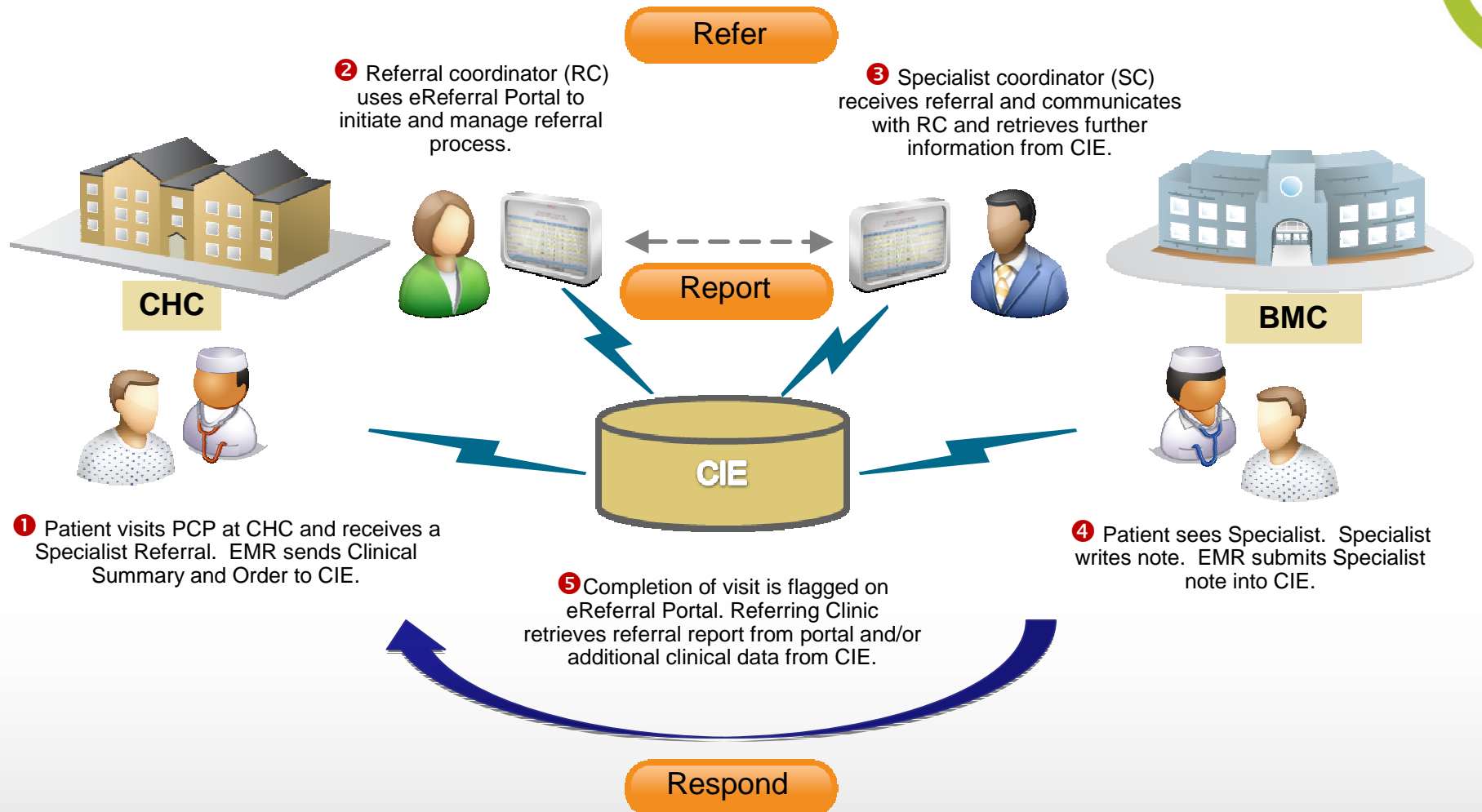




# Inefficient Referral Process: Impacts Volume & Community Satisfaction

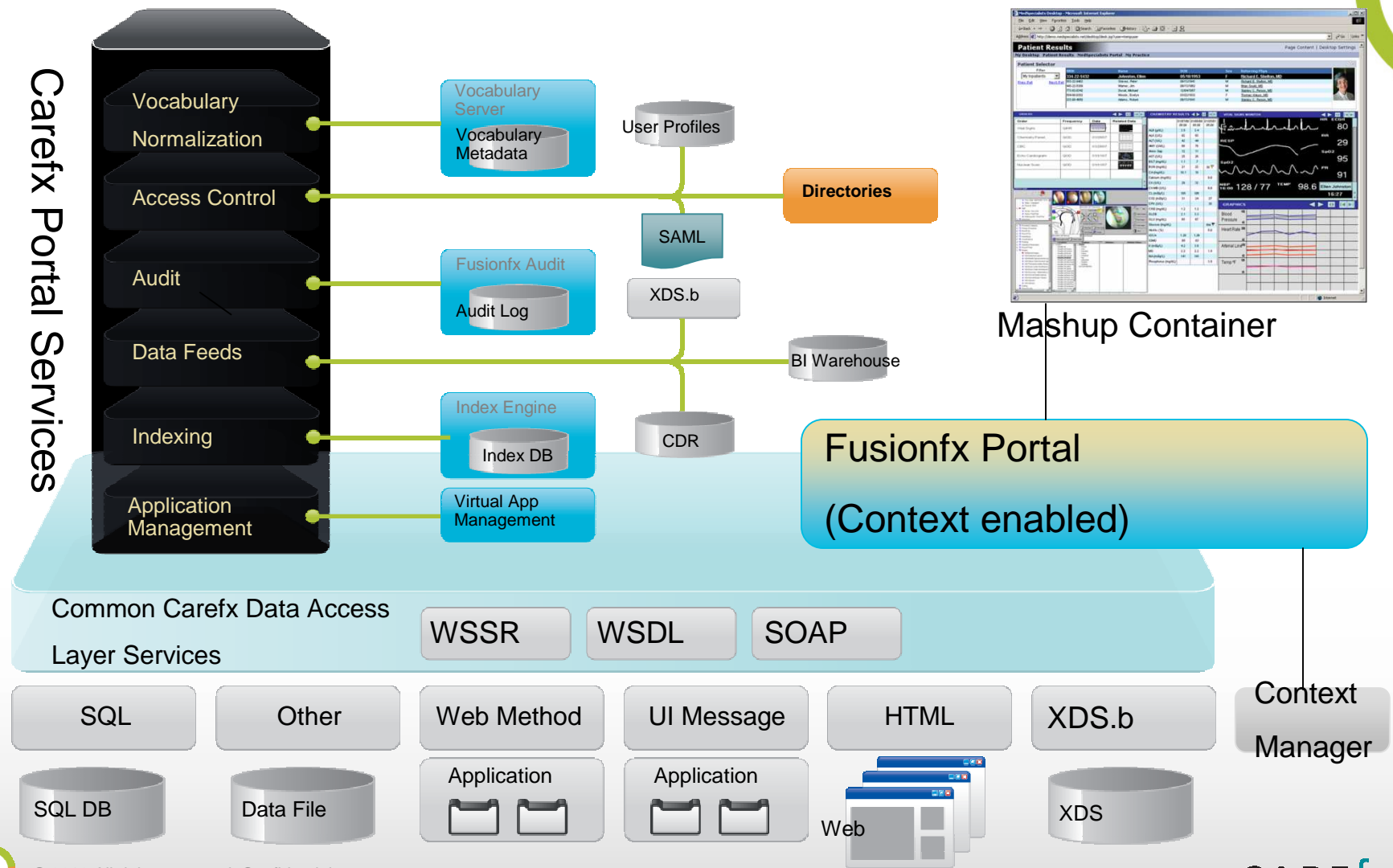
- ▶ 30% of referral orders get scheduled
- ▶ 25-30% appointments 'no show'
- ▶ Minimum of 4 weeks between Referral Order and Scheduling of Appointment
- ▶ Referring provider does not always receive the final visit documentation

# eReferral Work Flow – SOA Enabled



# Fusionfx Architecture

Composite Application  
SOA Framework



# SOA Architecture - Closing the Gaps

- ▶ Reusable SOA solution
- ▶ Work-flow specific
- ▶ Support Cognitive Tasks
- ▶ Role Specific
- ▶ User customization
- ▶ Context enabled
- ▶ Integrated SSO
- ▶ Real-time SOA data access
- ▶ Don't duplicate data
- ▶ Multiple data sources

# Summary: Key Benefits

## ▶ With a SOA solution, you will:

- ▶ Not be faced with the challenges of duplicating data (yet again!)
- ▶ Provide a consistent and informative view for caregivers.
- ▶ Support Clinical Workflow and Cognitive tasks
- ▶ Serve up data from multiple departments, facilities and sources.
- ▶ Facilitate transitions without adding complexity.
- ▶ Deliver more highly intuitive user interfaces.
- ▶ Establish a service-oriented architecture that adds modernity, flexibility, and scalability.

# Thank You from Carefx

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▶ Visit [www.carefx.com](http://www.carefx.com) for additional info.

