

Carestream

Product Level Information (PLI)

The PLM Journey

Abstract

This presentation outlines the implementation of Product Level Information (PLI) utilizing Aras Innovator at Carestream Health, Inc.

Topics include:

- Snapshot of Carestream Health
- Why implement now? Current state drivers...
- Timelines
- Deployment Strategy
- Challenges
- New Development Plan

ACE Attendees from Carestream Health, Inc.

Chris Kapell

Hardware Commercialization Process Platform Manager
R&D Effectiveness



David Sherburne

Director
R&D Effectiveness, Engineering IT



Eli Tuber

Process Re-Engineering
R&D Effectiveness



Rich Graham

Platform Architecture
R&D Effectiveness

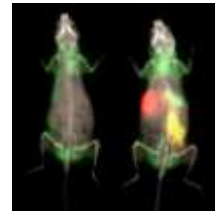


Carestream Health – Who We Are

An independent company with a proven track record and \$2.5 billion in revenue

A world leader in:

- Medical imaging ... digital and film
- Healthcare information solutions
- Dental imaging and dental practice management software
- Molecular imaging
- Non-destructive testing



Who We Are

Approximately 7,300 employees serve customers in more than 150 countries worldwide

We hold more than 1,000 patent for technology and intellectual property

Our products are at work in 90 percent of hospitals worldwide



Where We Are

An independent, **global company** with 17 manufacturing and R&D locations, including three Technology & Innovation Centers...



Technology & Innovation Centers

Rochester, New York
Genoa, Italy
Shanghai, China

R&D and Manufacturing Sites

Paris, France
Rochester, New York
Ronkonkoma, New York
Shanghai, China
Yokneam, Israel

R&D Sites

Atlanta, Georgia
Baltimore, Maryland
London, England
Oakdale, Minnesota
Ra'anana, Israel
Woodbridge, Connecticut

Manufacturing Sites

Berlin, Germany
Guadalajara, Mexico
White City, Oregon
Windsor, Colorado
Xiamen, China

...supporting sales and service teams in 150 countries

Business Challenges

Globalization was required to meet the business needs of our company

- Desired access to global talent
- Needed a balanced cost structure
- Presence in emerging markets



Impact of Globalization

- Collaboration became more time consuming via email; uncontrolled data sharing with partners
- Complexity in the organization increased as projects globalized
- Knowledge-workers' time was drained, impacting innovation
- Productivity of NPD remained roughly flat

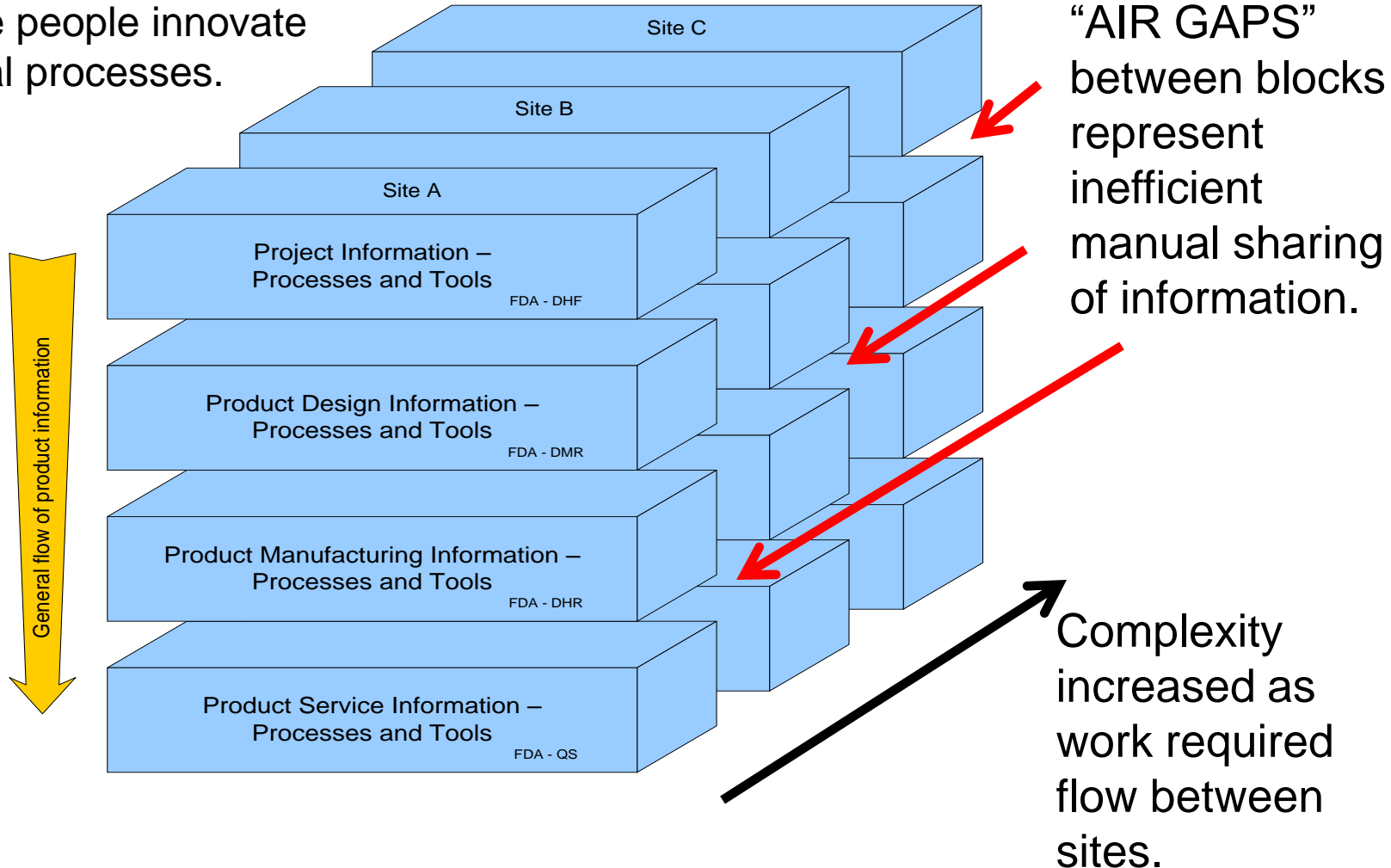
Demands on Staff are Ever Increasing

- **Quality and Compliance must be maintained in our business**
- Project teams are split across several locations
- Platform development adds complexity
- Iterative methods require faster information transfer
- Faster prototyping cycles are needed for hardware
- Design for manufacturability and supplier IP capture are critical as ties to the supplier base weaken
- Access to historical data is needed to improve planning, compare reliability, and drive improvements to the development cycles
- Engineers are required to do deeper analysis to ensure product quality
- Requests for metrics are ever increasing and are difficult to produce
- Disjointed IT and non-standard process environment kills collaboration

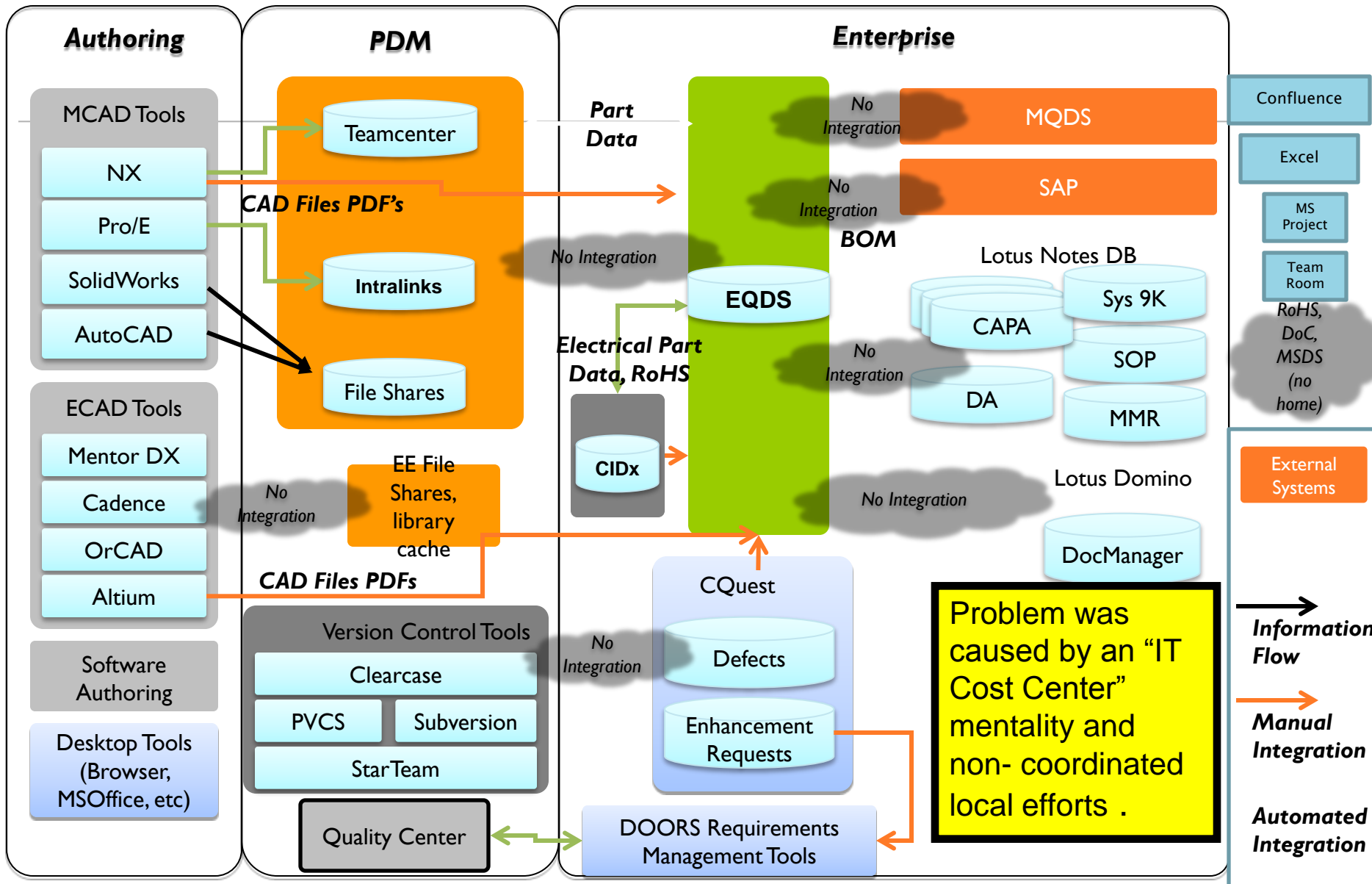
Non-Standard Commercialization Process

Innovative people innovate many local processes.

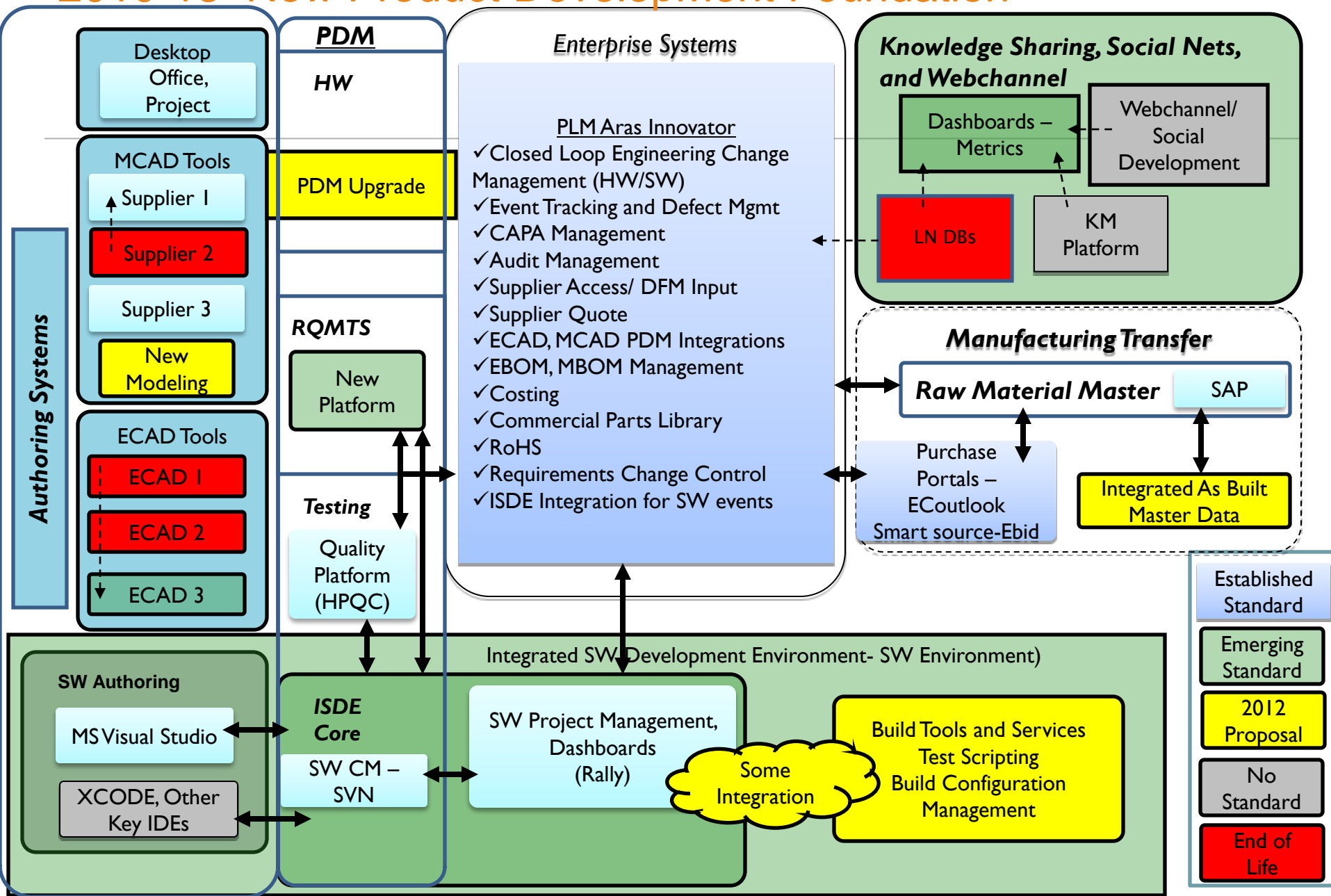
Local resources focus on product families.



Point Solutions worked but lacked proper architecture to enable global productivity



2010-13 New Product Development Foundation



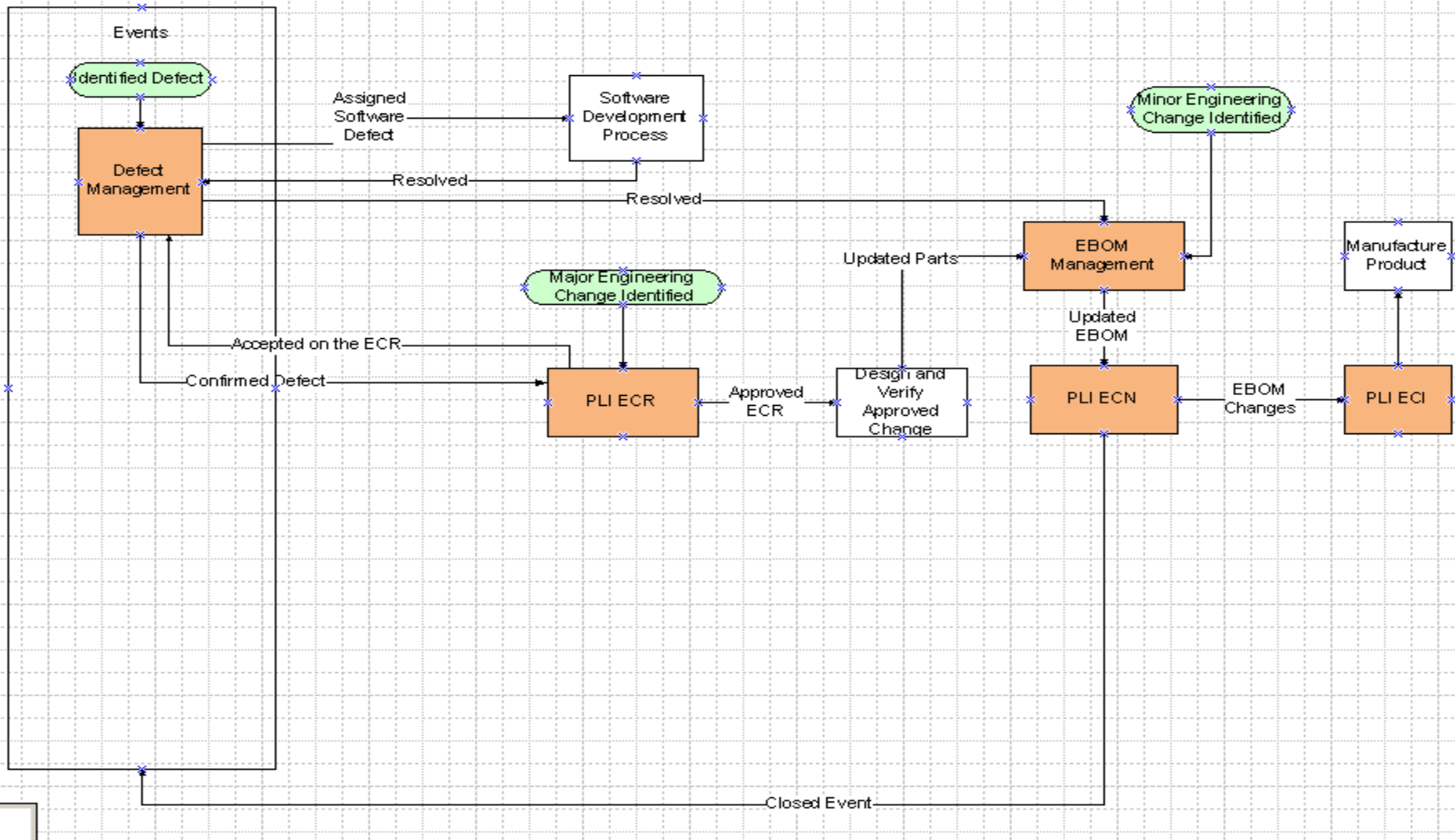
2010-12 New Product Development Foundation

Enterprise Systems

PLM Aras Innovator

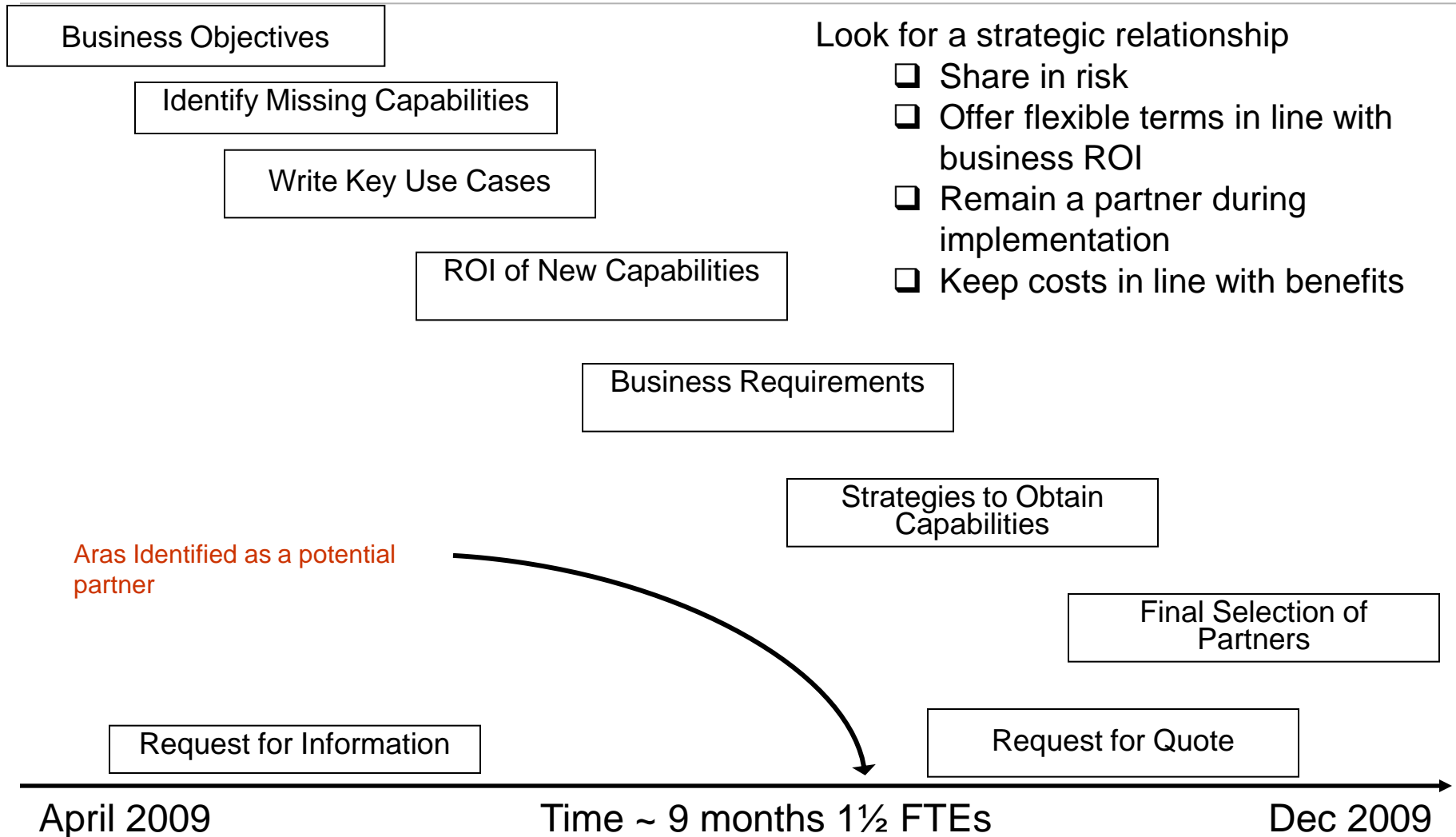
- ✓ Closed-Loop Engineering Change Management (HW/SW)
- ✓ Event Tracking and Defect Mgmt
- ✓ CAPA Management
- ✓ Audit Management
- ✓ Supplier Access/ DFM Input
- ✓ Supplier Quote
- ✓ ECAD, MCAD PDM Integrations
- ✓ EBOM, MBOM Management
- ✓ Costing
- ✓ Commercial Parts Library
- ✓ RoHS
- ✓ Requirements Change Control
- ✓ ISDE Integration for SW events

2009 – Implement a Globally Standard Closed-Loop Change-Management System

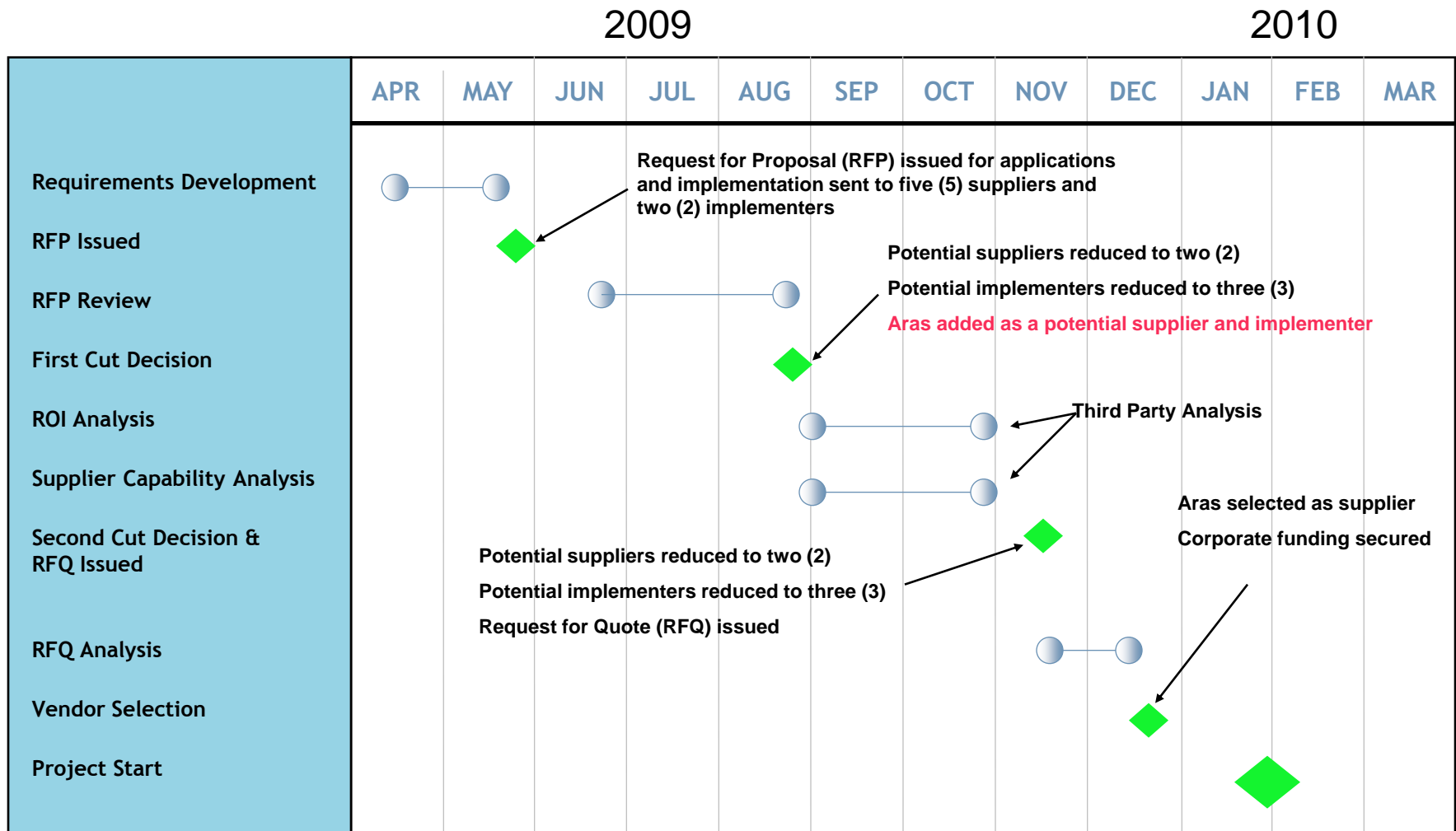


2009 Technology Partner Selection Model

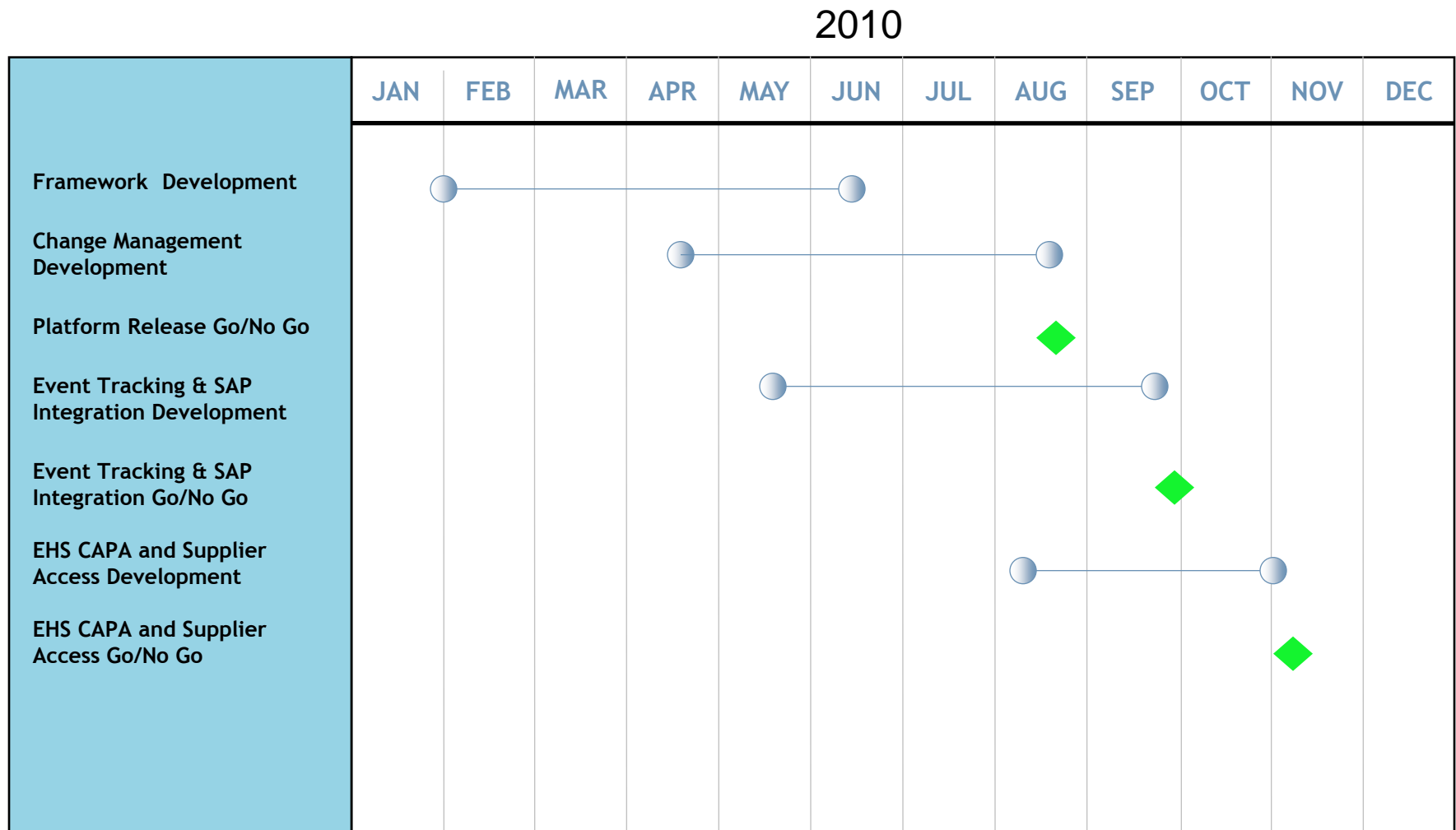
Give Yourself Time



Carestream Health Product-Level Information Timeline



Carestream Health Product Level Information Initial Development and Deployment Timeline



ACE – Spring 2010

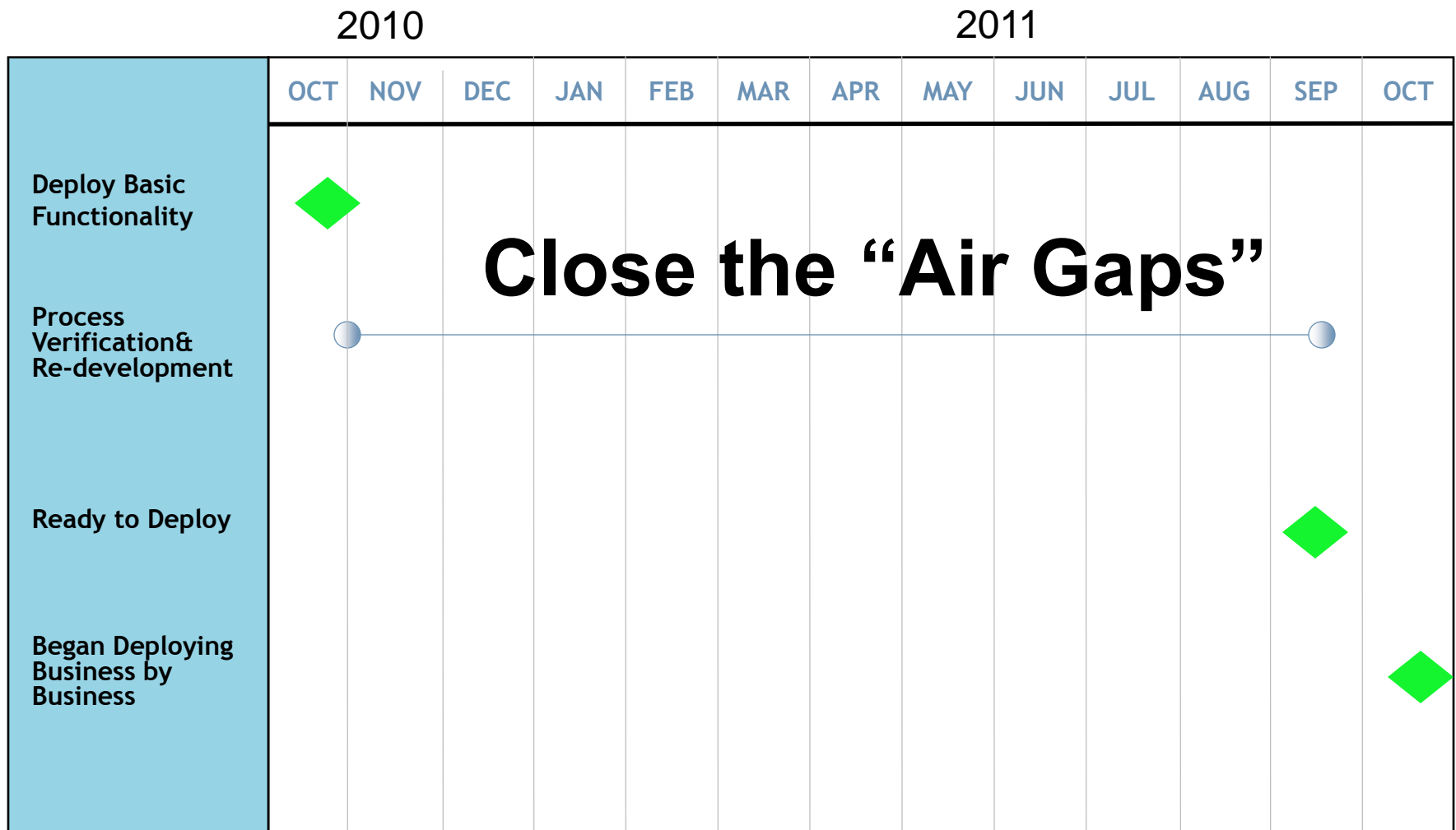
Feedback

- Are you nuts!!!
- That's really aggressive!!
- Good Luck with that!!

Project Realization – June 2010

- Requirements gathering and analysis is difficult
- Deployment planning across a global organization is complicated
 - Some businesses asked us to avoid 4th quarter deployments of major changes
- Underestimated training
- Decided to re-plan project
 - Deploy base functionality in early Q4 2010
 - Retire legacy commercial parts database
 - Socialize the environment
 - Understand deployment issues
 - Deploy core functionality in Q2 & Q3 of 2011

Resulting Timeline



Resulting Time Line

October 2010 – Released commercial parts requests & database including the Mentor Design Library

- Implemented integration to Mentor DX Designer

October 2010 – Sept 2011

- Process Verification & Re-development
 - Defect Management
 - Engineering Change
 - Audit Management System (added module into scope)
- Removed Corrective Action (CAPA) Module
 - CAPA Development was complete but gains did not outweigh the effort of getting people to switch off our Lotus Notes-based system

What Is Deployed

October 2011

- USA & China
 - Full closed-loop change process; Defect Management -> Engineering Change

January 2012

- USA
 - Audit Management System Pilot

February 2012

- USA & China
 - Engineering Change

April 2012

- China
 - Defect Management -> Engineering Change

What's Left

May – June 2012 (Three more business unit deployments)

- USA & China
 - Full closed-loop change process; Defect Management -> Engineering Change
- Total users: Currently 450, Projected 750 -1000 by YE 2012

What Went Right

- Documenting the processes & closing the “Air Gap”
- Sacrificed schedule for quality and completeness
 - Limited impact to Product Development
- First deployed basic functionality
 - Commercial Parts, Mentor Library Integration
 - Allowed us to socialize the environment
 - Resolve accounts, deployment, and workstation issues

What Went Right

- Initially deployed Closed-Loop Change Management to a fairly self-contained group in Shanghai
 - Allowed us to fix any major issues quickly and limited impact
- Concurrent Global deployment went smoothly
- Data migration out of:
 - Mentor DMS (electrical symbols, cells, and commercial parts)
 - ClearQuest (defects)
 - Matrix One (engineering change)
- Training was developed internally and was focused on process

What Went Right

All of the following were equal to or better than the average, as identified by a PLM industry expert.

- Costs (implementation and on-going)
- Schedule
 - We delayed our schedule but it was average for the industry
- Functionality
- Scale and Scope

What Went Wrong

Attempted to utilize Agile development methodology from our consulting partner

- Functionality vs. Schedule was too aggressive
 - Developed functionality faster than we could absorb it
 - Resource conflicts between reviewing and testing development code and developing requirements for other capabilities
 - SMEs did not have enough time to look at iterations

What Went Wrong

- The project became a waterfall-type project, and the following came to light
 - Managing change across four development sites is time consuming
 - Creating the details up front is too complex and was not effective
 - Users not sure what they wanted
 - Users cannot really tell you what they want until they touch and feel something
- So we had to sacrifice schedule for quality and completeness

What's Changed

Created our own development team

- 4 FTEs in Shanghai; 0.5 FTE in USA
 - Still challenges our ability to keep up with testing, utilizing deployment, and supporting resources
- Switched the program management to an Agile and Iterative development methodology
 - Continuing to mature

Waterfall vs. Agile & Iterative

Waterfall

- Release driven, with a defined critical path and sequence for delivery
- Estimates are based on the work required to meet the requirements
- Requires clearly defined requirements upfront
- Customer only sees the final implementation
- Success is measured by the functionality delivered

Agile and Iterative

- Based on short delivery cycles
- Estimates are done based on the amount of work the team can accomplish in a set period of time (“Time Boxing”)
 - The date doesn’t slip; Features slip
 - Time box should not be a deadline and should be easily met; if the pace doesn’t work, do less
- Requirements are expected to evolve, and change is embraced
- Customer sees evolving implementation and can make suggestions/request changes
- Success is measured by business value delivered

Current Development

Six to eight-week release made up of 4 - 2 week iterations (Sprints).

- Maintain a constant pace
- 1-2 weeks planning iteration
 - If a user story is not defined thoroughly, it does not get put into the release
- 2 weeks development iteration
- 2 weeks development/QA iteration
- 1-2 weeks validation testing iteration

Up to now, most of our development has been fixes and point enhancements

- So we release to production at the end of the release
- We still tend to put too much into the box
- It's hard to strip functionality out if it is not ready, without negatively impacting code quality

New functionality, such as the revamped Engineering Change Implementation (ECI) and Supplier Integration, will have multiple time box development iterations before being released into production.

What's Next

Short term

- Enhancement of the Engineering Change Implementation (ECI) with integration with SAP
- Software Development Environment Integration
- Brush off CAPA and add additional features
- Supplier Integration
- Visualization

Long term

- Requirements Management
- Project Management and Design History File (DHF) incorporation
- Standard Operating Procedures
- Manufacturing Work Instructions

Carestream Health, Inc.

Questions?