Extreme Programming (XP)
Six Sigma
CMMI

How they can work together –
A JPMorgan Chase case study

Bob.Jarvis@chase.com
Stephen.P.Gristock@chase.com

Disclaimer

Any statements made do not necessarily represent the views or opinions of JPMorgan Chase.

Agenda

- Introductions
- Exercise 1
- Six Sigma Overview
- XP Overview
- CMMI Overview
- Case Study – Six Sigma
  - <Break>
- Case Study – XP
- Exercise 2
- Case Study – CMMI
- Lessons Learned
- Parting Thoughts
- Q&A

Introductions

Who Are We?

Why Did We Try XP?

Who Are We?

Steve Gristock

- CMMI Lead Appraiser & Instructor
- Proven Process Improvement Leader and Consultant

Bob Jarvis

- Six Sigma Coach
- Development Manager

JPMorgan Chase

Retail Financial Services

- Home / Auto / Consumer / Small Business

Card Services

Investment Bank

Commercial Banking

Asset & Wealth Management

Treasury & Security Services

- Treasury / Investor / Institutional Trust Services

Corporate

- Private Equity / Treasury

Why Did We Try XP?

Typical Environment

- Project estimate accuracy
- Business – Technology working relationship
- Defect levels
- Overtime

Improvement Desired

- Better
- Cheaper
- Faster
- Work – Life Balance

Exercise 1: XP/CMMI: SURVIVOR!

- Can you survive the tribulations of the Six Sigma/CMMI/XP Survivor contest?
- Will you wail in anger and gnash your teeth if you're voted off the island?
- Or- will you rise to the occasion and become Process Queen/King for the day?
- Do you care?
- Let's play... and find out!

Six Sigma Overview

A Very Brief Overview

What is Six Sigma?

It’s an approach to managing a business

- Focus on clients, facts, measurement

It’s a process improvement methodology

- Improve existing processes
- Build new processes

It’s a calculation

- Allows us to measure quality consistently

Who's Using Six Sigma?

$1.45 Billion since 1998

$5 Billion in 2000

Average of $600MM/year since 1995

$3 Billion in savings since 1995

$1.5 Billion in 1999

$1.16 Billion (¥130 B) in 2000/2001

$85MM early 2000

$2.5 Billion in 1999

Numbers through 2001

Publicly traded companies that strategically highlight quality (Six Sigma / Baldridge Quality award winning companies) outperformed the S&P 500 by 4.8 to 1.[1]

1. American Society for Quality, Quality Progress, April 2000.

Key Drivers

Voice of the Customer (VOC)

- **Critical to Quality (CTQs)**
- **CTQ Measures**
- **Voice of the …**
  - Business
  - Employee

Statistical Tools

- **Analyze current state**
- **Verify results**

Tollgates

- **At every phase**

Terminology

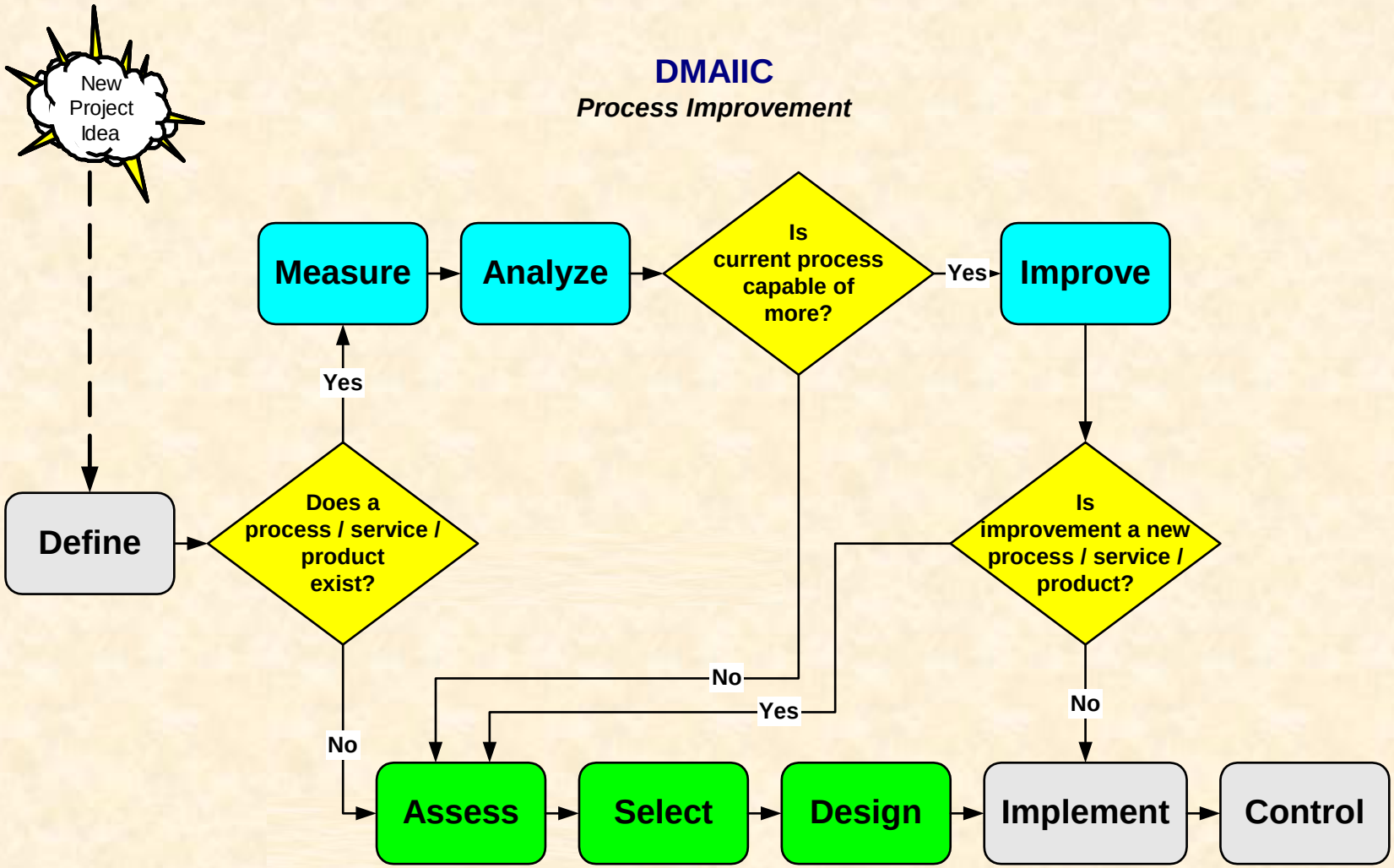
Process Improvement (DMAIC)

- Define
- Measure
- Analyze
- Improve
- Implement
- Control

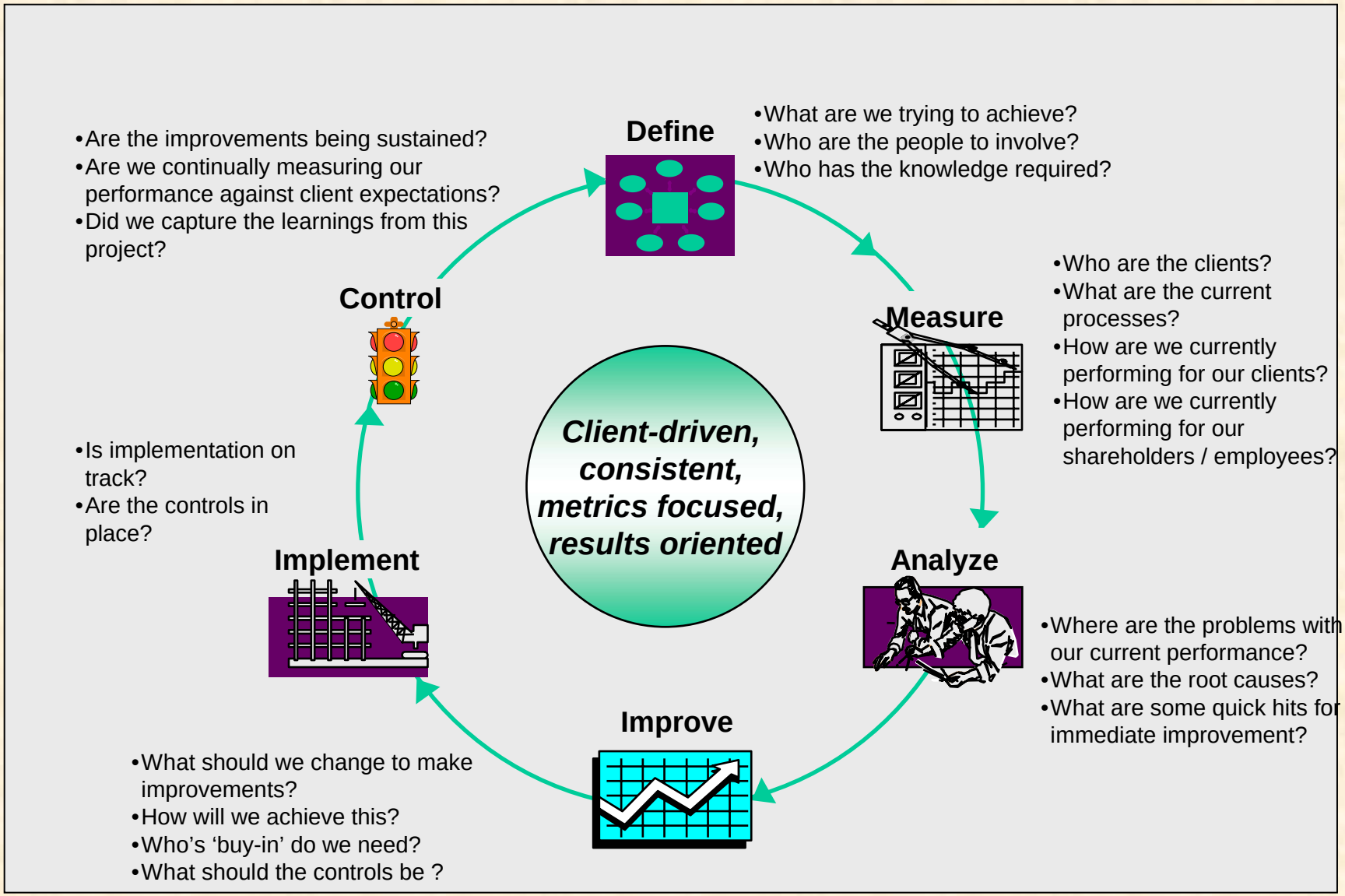
Process Design (DFSS – DMADVE)

- Define
- Assess
- Select
- Design
- Implement
- Control

Process Synergy and Transition Points



A DMAIIC Overview



XP Overview

XP Context

What is Agile?

- An adaptive approach to solving business problems that focuses on communication, collaboration, delivery and change.
- "Outside the room."

What is Extreme Programming?

- One of several agile methods.
- An innovative, deliberate and disciplined approach to software development.
- Developers, QA and Business in the same room (where applicable)
- "Inside the room."

The Agile Manifesto

We are uncovering better ways of developing software by doing it and helping others do it. Through this work we have come to value:

Individuals and interactions	**over**	**processes and tools**
Working software	**over**	**comprehensive documentation**
Customer collaboration	**over**	**contract negotiation**
Responding to change	**over**	**following a plan**

That is, while there is value in the items on the right, we value the items on the left more.

Agile Distilled

What are the characteristics of an Agile process? An agile process …

… seeks to satisfy the customer through **early and continuous delivery** of valuable software as its highest priority.

… **welcomes changing requirements**, even late in development. Agile harnesses change for the customer's competitive advantage.

… delivers **working software frequently**, from a couple of weeks to a couple of months, with a preference to the shorter time scale.

… requires that **business people and developers work together daily** throughout the project.

… builds around **motivated individuals**. Give them the environment and support they need, and trust them to get the job done.

… **promotes face-to-face conversation** as the most efficient and effective method of conveying information to and within a development team.

Agile Distilled (continued)

An agile process …

… uses **working software** as the primary measure of progress.

… promotes **sustainable development**. The sponsors, developers, and users should be able to maintain a constant pace indefinitely.

… pays continuous attention to **technical excellence** and leverages good design to enhance agility.

… **demands simplicity**--the art of maximizing the amount of work not done.

… relies on **self-organizing teams** to generate the best architectures, requirements, and designs.

… asks the team to **reflect at regular intervals** on how to become more effective, then tune and adjust its behavior accordingly.

XP Values, Principles and Practices

“Anyone can make the simple complicated.

Creativity is making the complicated simple.”

Charles Mingus

Why “Extreme”?

XP is a highly disciplined approach to software development that places quality at its core, and takes quality practices to the “extreme”:

- **Testing**
  - ➔ Failed unit tests = entry criteria for coding
  - ➔ Unit tests = 100%
- **Peer reviews**
  - ➔ Pair programming
- **Customer involvement**
  - ➔ On-site, daily
  - ➔ Customer-driven iteration content

Why “Extreme” (cont.)

- **Component integration**
  - ➔ Often / Continuous
- **Time to market**
  - ➔ Small releases
- **Refactoring**
  - ➔ Continual
  - ➔ Collective code ownership
- **Simplicity**
  - ➔ “The simplest thing that could possibly work”

XP – Values

- Communication
- Feedback
- Simplicity
- Courage
- Respect (new)

XP – Basic Principles

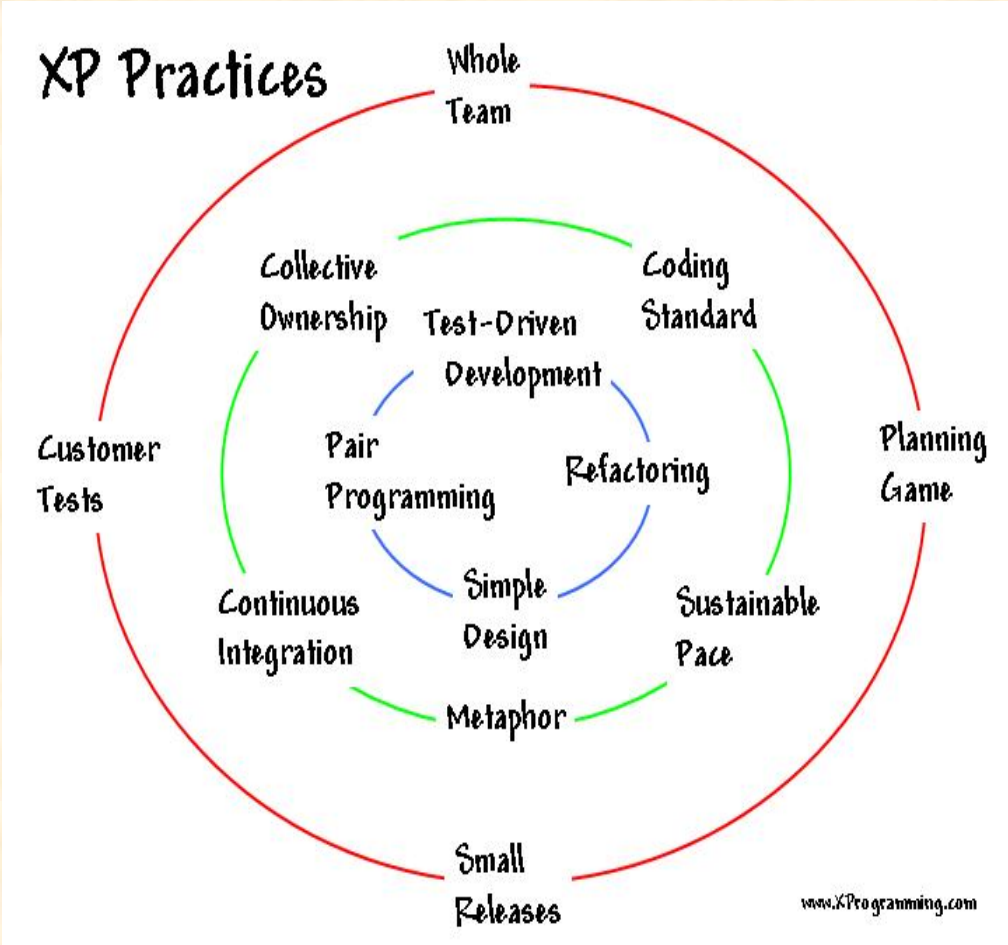
- Rapid feedback
- Assume simplicity
- Incremental change
- Embracing change
- Quality work

XP Practices

XP is expressed through ~13 key disciplines (practices):

Practice	Addresses
The Planning Game	Priority, sequence, scope
Small releases	Time to market
Metaphor	Design context
Simple design	Incremental value delivery
Testing	Quality "baked in"
Refactoring	Code quality
Pair programming	Peer reviews, cross training
Collective ownership	Team culture
Continuous integration	Iterative build & test
Sustainable pace	Work / life balance
On-site customer	Immediate feedback
Coding standards	Code quality
Whole Team	Teamwork

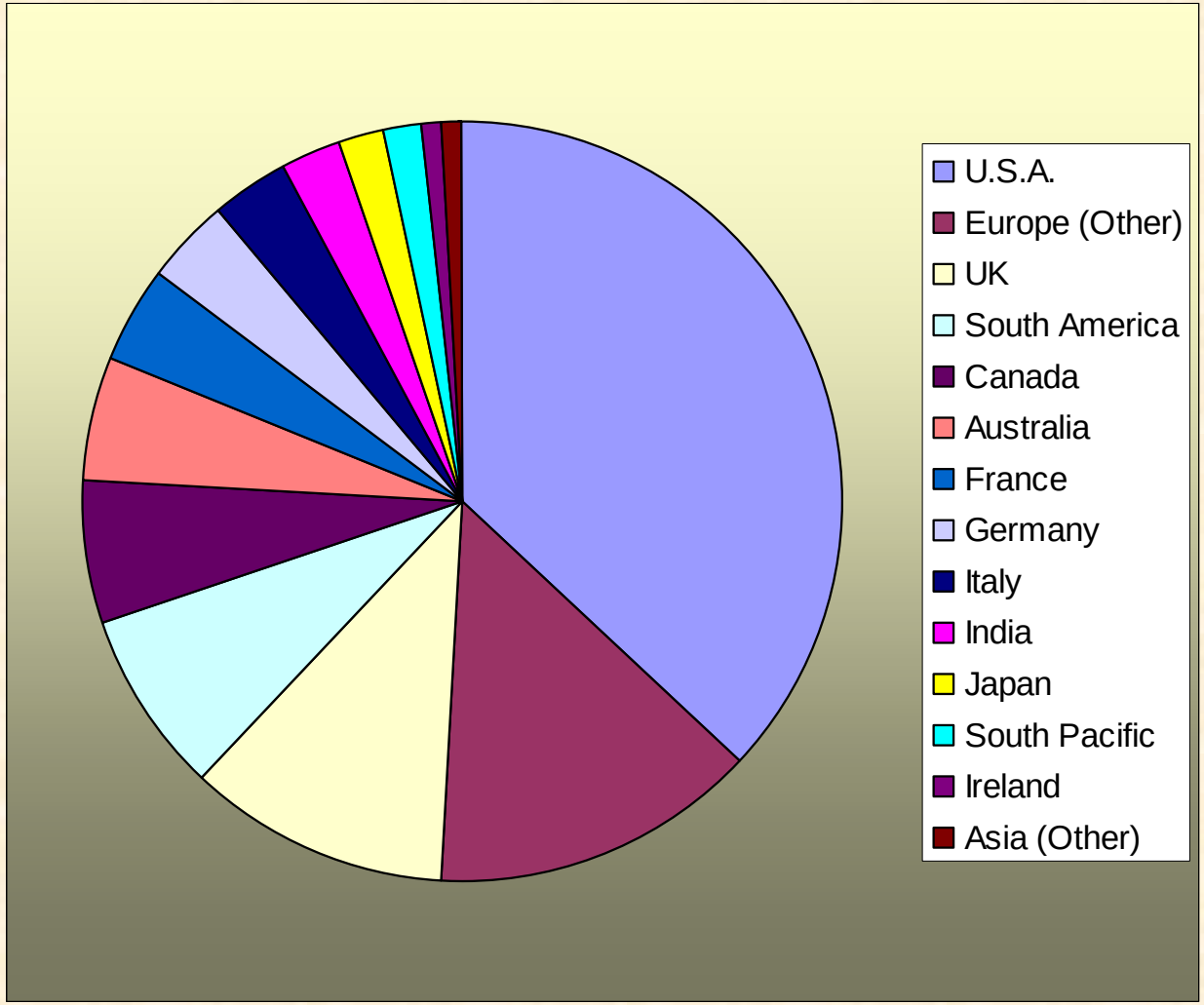
Practice “Rings”



Key

- Blue Ring: Developer practices
- Green Ring: Development team practices
- Red Ring: Entire team practices

XP – Global Presence



Source:
extremeprogramming@yahoogroups.com

Simple Rules

“Simple, clear purpose and principles give rise to complex, intelligent behavior.”

“Complex rules and regulations give rise to simple, stupid behavior.”

Dee Hock
Founder and CEO emeritus, Visa International

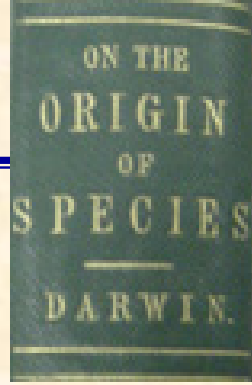
XP/CMMI

When in doubt...

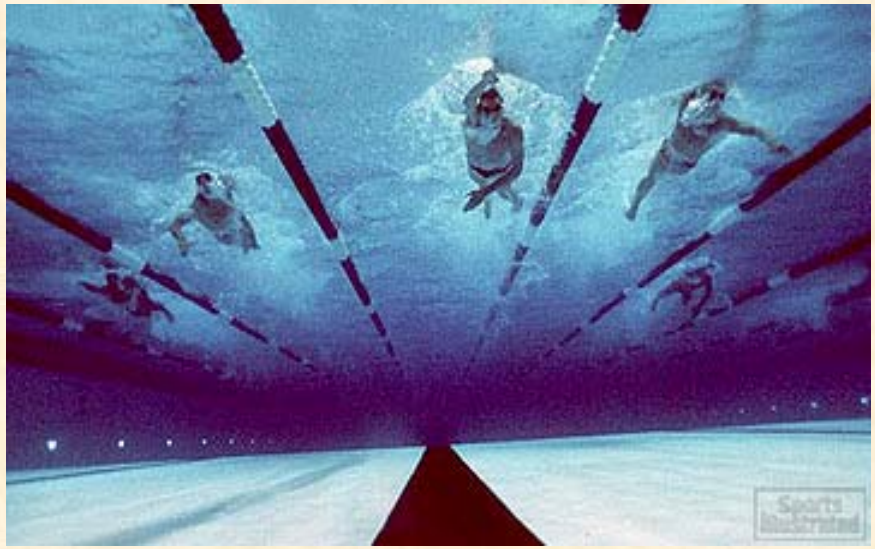
ACT STUPID!

Process Improvement & CMMI: Overview

Dealing With Process



- **Process exists whether we acknowledge it or not. The only question is- do we take a structured and systematic approach to managing it, or do we allow it to develop organically?**



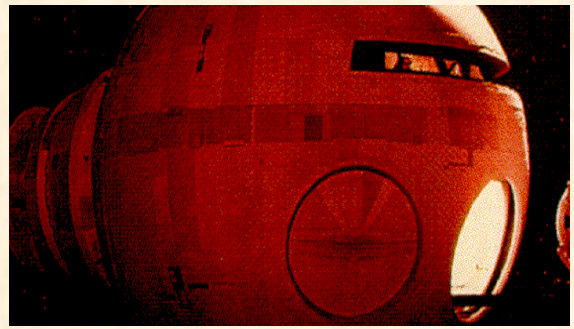
CMMI Process Areas

CATEGORY	PROCESS AREA
Process Management	• Organizational Process Focus • Organizational Process Definition • Organizational Training • Organizational Process Performance • Organizational Innovation and Deployment
Project Management	• Project Planning • Project Monitoring and Control • Supplier Agreement Management • Integrated Project Management • Risk Management • Quantitative Project Management
Engineering	• Requirements Management • Requirements Development • Technical Solution • Product Integration • Verification • Validation
Support	• Configuration Management • Process and Product Quality Assurance • Measurement and Analysis • Causal Analysis & Resolution • Decision Analysis and Resolution

CMMI Representations

Staged

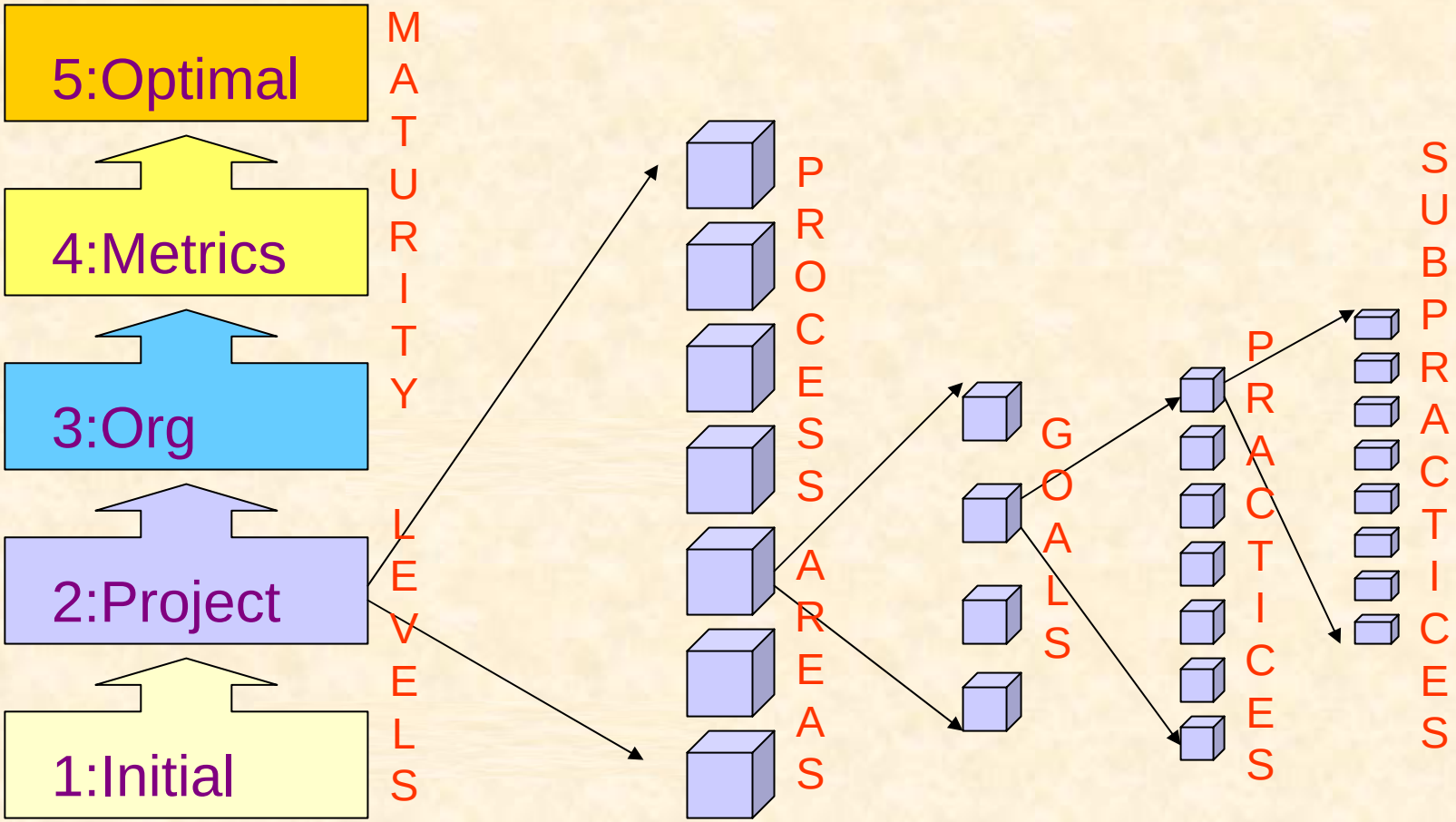
- Goals-Process Areas-Practices
- PA's pre-selected
- Maturity levels (1-5)



Continuous

- Goals-Process Areas-Practices
- Select PA's
- Capability levels within PA's (0-5)

Staged CMMI Structure:



CMMI Continuous Structure:

5:Optimizing

4:Quantative

3:Defined

2:Managed

1:Performed

0:Incomplete

CAPABILITY LEVEL

PROCESS AREAS

GOALS

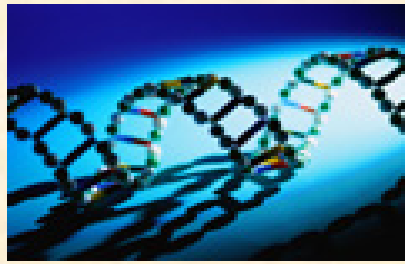
PRACTICES

SUBPRACTICES

GENERIC

SPECIFIC

CMMI & eXtreme Programming: Synergies



Conflicting Perspectives?

CMMI

- CMMI is an interpretive model
- At a Macro level, CMMI provides a framework for developing an end-to-end perspective for product development
- At a Micro level, CMMI provides process and practice solutions for controlling work

XP

- XP is a more specific set of prescribed methods
- XP provides the process and techniques required to deliver a collaboratively developed set of solutions in rapid succession
- XP is (necessarily) development-centric

CMMI/XP Alignment

CMMI

Organizational

- OPF — Org Proc Focus
- OPD — Org Proc Definition
- OT — Org Training
- OID — Org Innovation
- OPP — Org Performance

Project

- IPM — Integrated Mgmt
- RSKM — Risk Mgmt
- PP — Planning
- PMC — Monitoring & Control
- SAM — Supplier Mgmt
- QPM — Quant Mgmt

Engineering

- RM — Requirements Management
- TS — Technical Solution
- Ve — Verification
- RD — Requirements Development
- PI — Prod Integ
- Va — Validation

Support

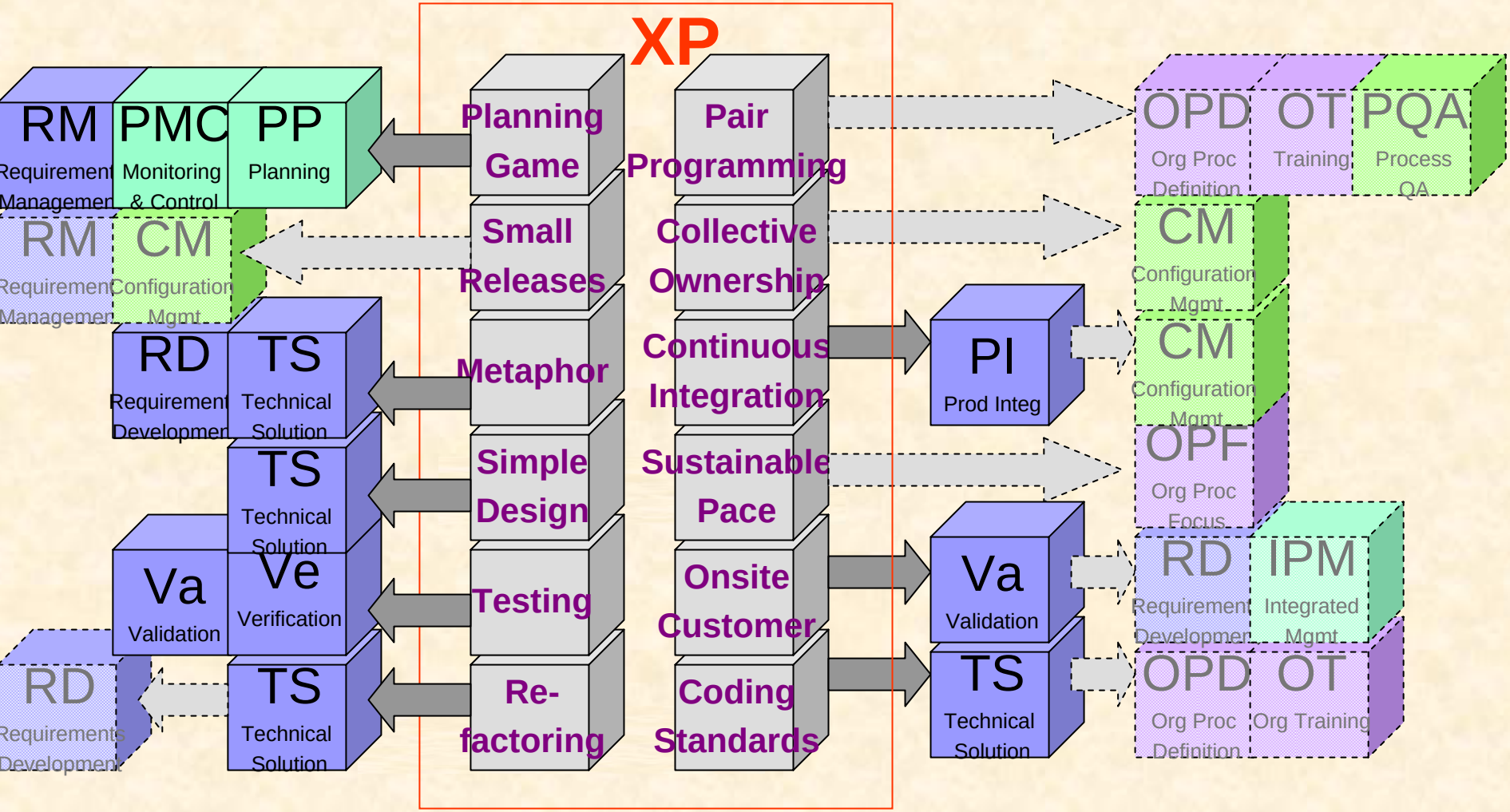
- DAR — Decision Analysis
- CM — Configuration Mgmt
- CAR — Causal Analysis
- MA — Measurement & Analysis
- PPQA — Process QA

XP

- Sustainable Pace
- Onsite Customer
- Planning Game
- Small Releases
- Refactoring
- Metaphor
- Simple Design
- Continuous Integration
- Testing
- Pair Programming
- Collective Ownership
- Coding Standards

XP/CMMI Alignment

OUT OF SCOPE: SAM, RSKM, QPM, CAR, MA, DAR, OPP, OID



CMMI & XP: The Stupid Seven

Misconceptions

- **CMMI is too bureaucratic to coexist with XP**
  - They're definitely compatible if CMMI is interpreted and deployed appropriately
- **CMMI requires a linear approach to software development**
  - Use of CMMI is absolutely conducive to iterative development
- **CMMI is only suitable for large organizations and projects**
  - If scaled properly, CMMI may be deployed in large or small enterprises
- **CMMI is incompatible with a collaborative development approach**
  - CMMI is inherently compatible with integrated product development
- **CMMI is a method and/or a standard**
  - CMMI is a model, it should be used as a framework
- **XP requires no documentation**
  - Effective XP requires minimal, but consistent, documentation
- **Agile development is creative and open with little or no real structure required**
  - XP is a highly structured and disciplined method

JPMorgan Chase Case Study

Six Sigma Findings

XP Implementation

Results

Lofty Goals

Better

- Fewer defects

Cheaper

- Reduce project effort

Faster

- Reduce project duration

Quality of Life

- Enjoy work life better
- Do less of it

Executive Sponsorship

Business

- SVP – Internet Channel
- Senior Product Manager

Technology

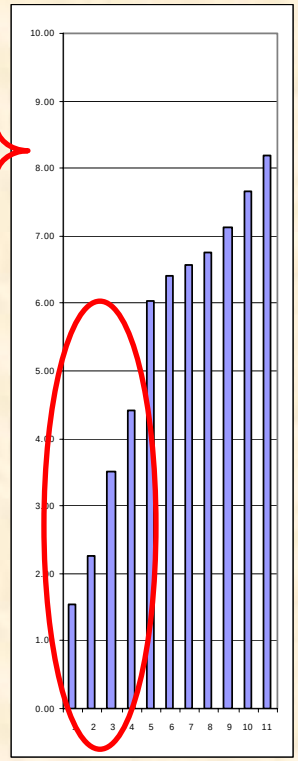
- SVP / CTO – Regional Bank
- CTO – Internet Technology

Six Sigma Findings

VOC - Business

For business: better, on-time delivery of agreed functionality (stories) are most important.

#	Wtd	Voice of the Customer (VOC)	Critical to Quality (CTQ)	CTQ Measures
1	1.54	Quality product	Minimum defects	# defects found in QA / UAT / production per unit of functionality # defects found in user sign-off per unit of functionality
2	2.26	On-time delivery	All agreed stories delivered on time	% stories delivered for each iteration
3	3.52	All scoped functionality delivered	All committed iteration stories delivered	% stories delivered for each iteration
4	4.42	Faster time to market	Reduce time from story delivery to production	# days / unit of functionality
5	6.04	Sound architecture Best in class technology	Applications are scalable, secure	# hours of technology-driven rework
6	6.40	On budget	No cost overruns	$ variance
7	6.58	Accurate project scoping	All committed stories included in release	# committed stories not included
8	6.76	Technical input on alternatives	Business understand technical trade-offs that may impact their decisions	# unapproved technical / infrastructure stories requested by development
9	7.12	Business understands about technology / infrastructure / application limits	Informed business decisions are made	# hours of technology-driven rework
10	7.66	Technology works within the business structure	Business can ensure their other touch-points are included as needed	# hours waiting for business dependencies
11	8.20	Development activities fit in business resource constraints	Eliminate redundant documents / activities Decrease distractions (bus & tech)	# hours spent on redundant docs # hours / week distractions



CTQ Data

Top CTQs / CTQ Measures from VOC / VOB / VOE were combined to eliminate overlap (particularly around defect measures).

- **Committed Features**
  - % stories delivered
- **Defects**
  - # total defects / unit of functionality
  - # TRs related to requirements mis-match (WAD)
- **Costs**
  - $ / unit of functionality
  - # XP resources – deployment
- **Duration**
  - # days duration / unit of functionality
- **Miscellaneous**
  - # missed communication plan events
  - # manual steps - deployment

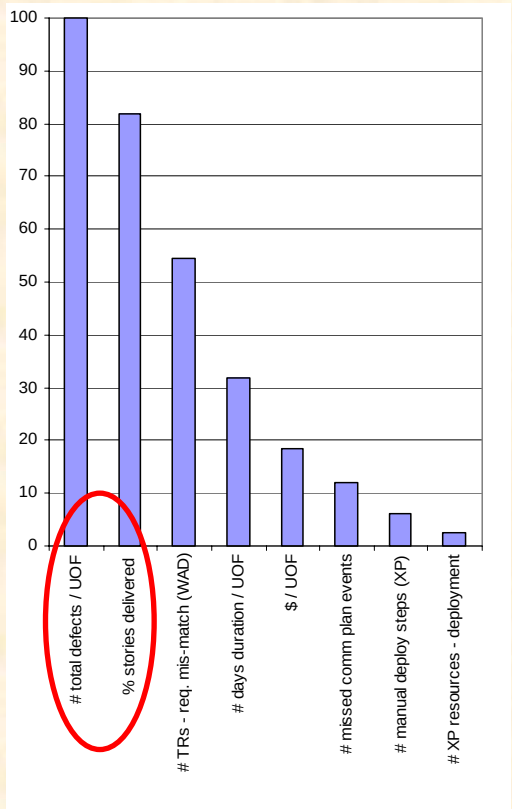
QFD – House 1

High quality and delivery of committed functionality (on time delivery) are top priority.

Symbol	Meaning	Score
H	High	9
M	Medium	3
L	Low	1

Critical to Quality (CTQs)	# total defects / UOF	% stories delivered	# TRs - req. mis-match (WAD)	# days duration / UOF	$ / UOF	# missed comm plan events	# manual deploy steps (XP)	# XP resources - deployment	VOC Score	Importance
Minimize defects	H		H						1.54	4.46
Deliver project success criteria	H	H	M	M	L		L		1.61	4.39
Committed stories delivered on time	M	H		L					2.26	3.74
Correct code delivered	M	M						L	3.67	2.33
Shorten duration - story to production				H			L		4.42	1.58
Maximize development ROI / effort					H				4.48	1.52
Communication plan executed						H			4.68	1.32
Importance	100	82	54	32	18	12	6	2		
Target	0	100	0	*	*	0	2	1		
Specs	*	95 100	*	*	*	0 1	1 2	0 1		

Key: * - Still to be defined
UOF - Unit of Functionality (size metric)
CTQ Importance = 6 - VOC Score (rank)

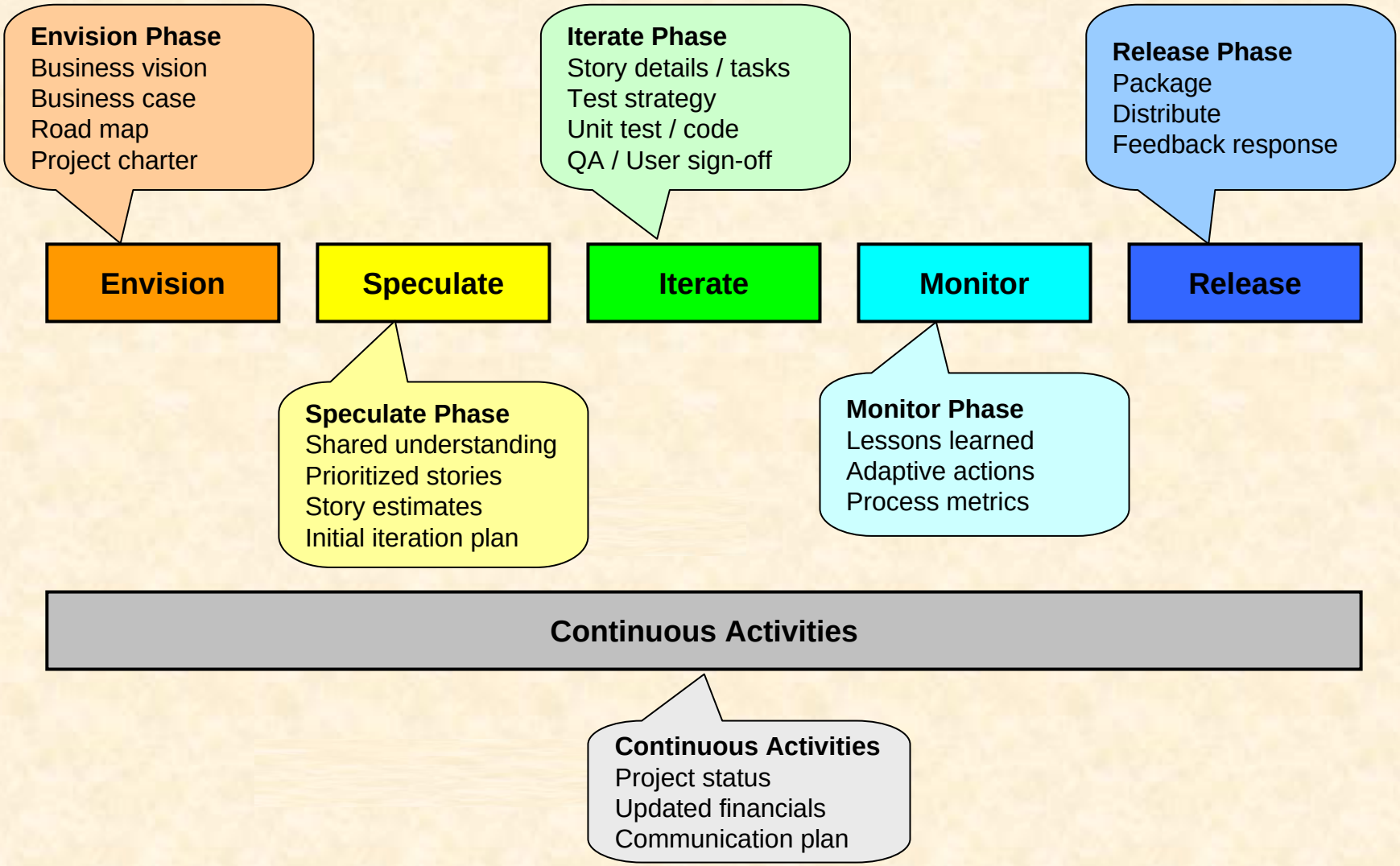


Break

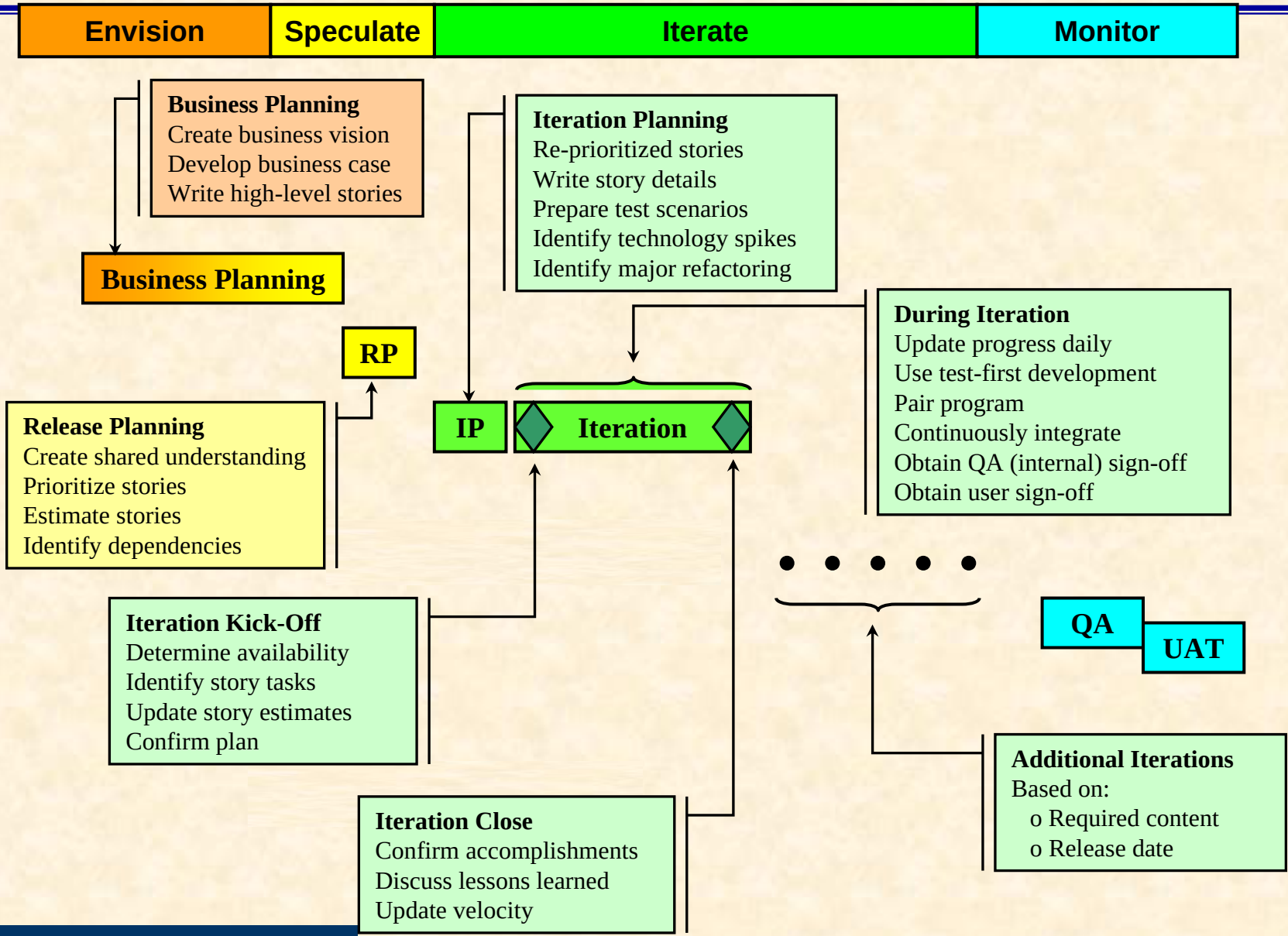
JPMorgan Chase Case Study (continued)

XP Implementation

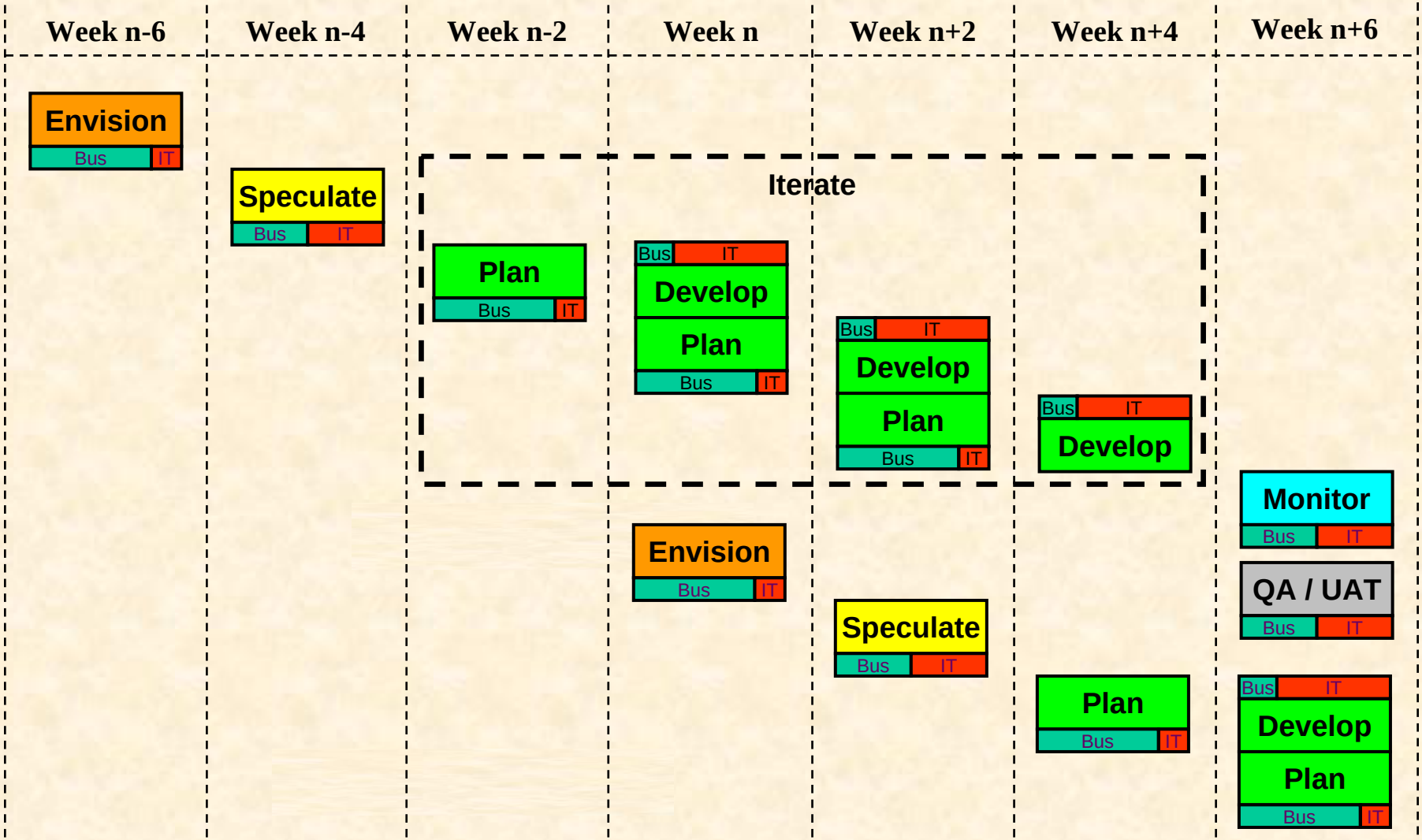
High Level Process



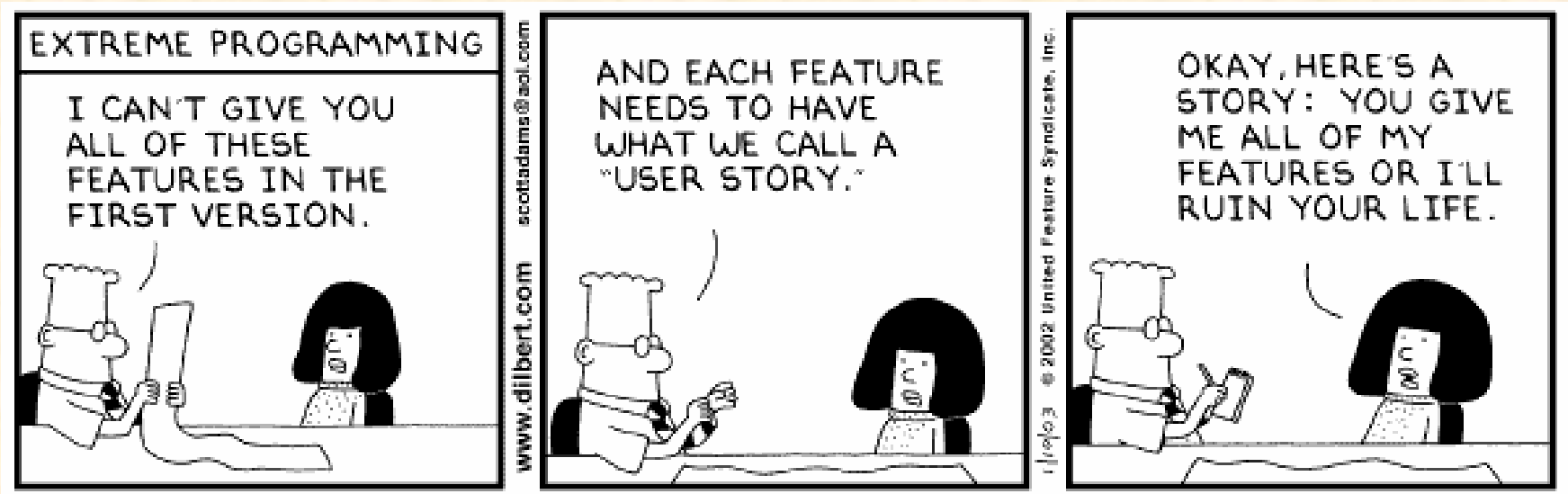
Anatomy of an Iteration



Parallel Activities



XP Stories



The Story

The story is a unit of functionality in an XP project. We demonstrate progress by delivering tested, integrated code that implements a story.

Story Evolution

- **Business Vision**
  - Long-term functionality view (6-18 months)
- **High-level Stories**
  - Functionality that delivers value
  - Small enough to estimate
  - Prioritized
- **Story Details**
  - “Just enough” detail
  - Use cases work well
  - Includes high-level test scenarios
  - Updated to reflect reality

Story Tracking

Future

Ready

Active

User Ready

QA Ready

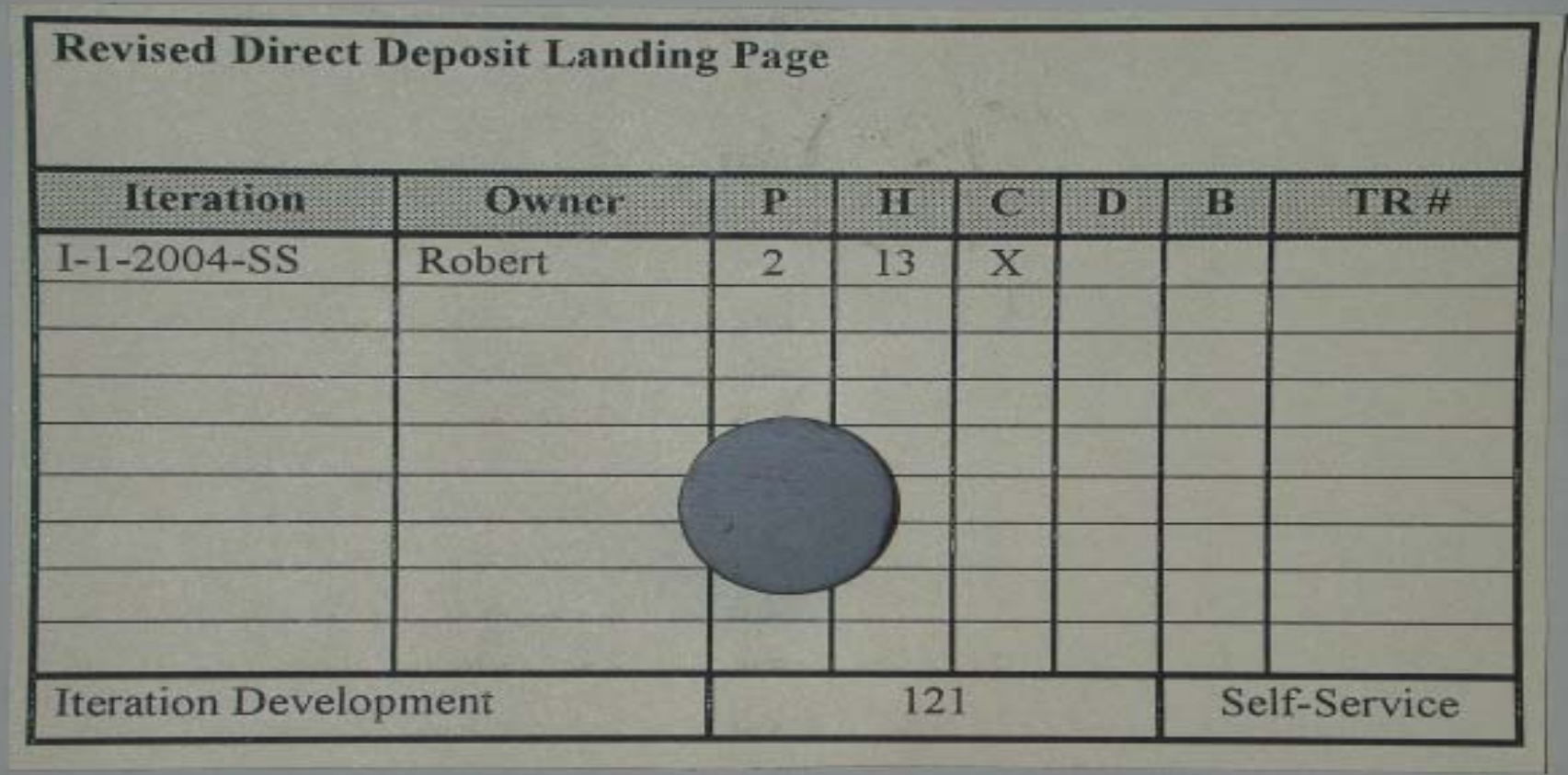
Done

Release Ready

External QA

Real World

Sample



Revised Direct Deposit Landing Page

Iteration	Owner	P	H	C	D	B	TR #
I-1-2004-SS	Robert	2	13	X			
Iteration Development		121				Self-Service	

User Sign-Off

Wiki Wiki

(Hawaiian for quick quick)

Repository Contents

- **Wiki Overview**
- **Iteration Management**
  - Time Tracker
  - Current Iteration
  - Iteration Details
  - JOE Awards
- **Development**
  - Test Coverage
  - Interesting Items
- **QA**
  - Functional Testing Rules
  - CFT Knowledge Transfer
    - ✓ XP QA Automation Matrix

Front Page

Results

“In God we trust.

All others must provide data.”

W. Edwards Deming

Results - Metrics

Defects

- Total — Include all severities
- Critical — Only the highest severity
- Working as Designed — Points to business / technology disconnect

Effort & Duration — Cost & calendar time

Size - QA test cases — Best size metric

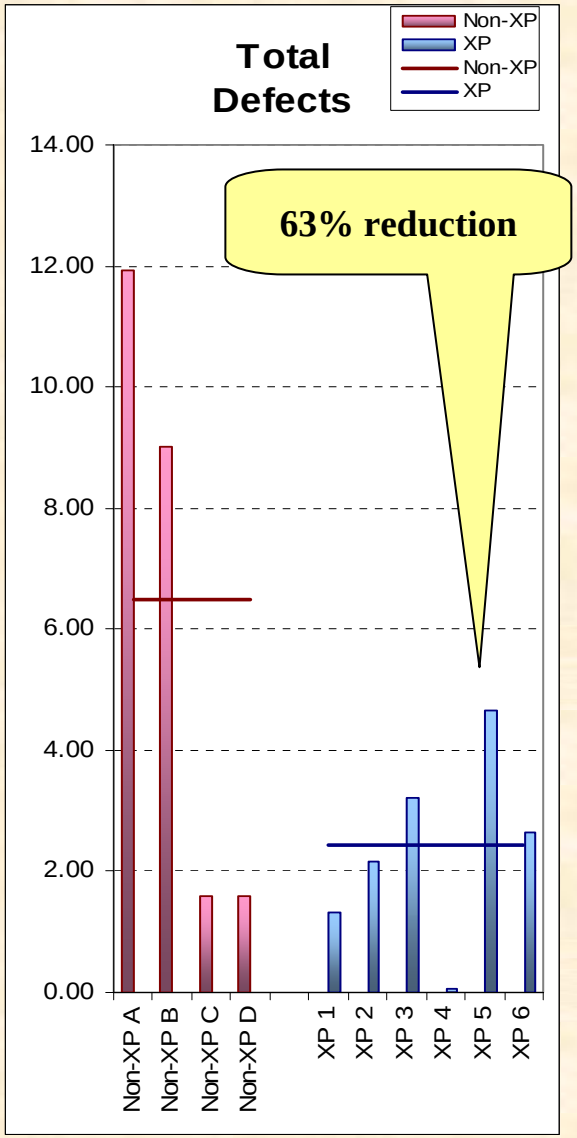
Quality of Life

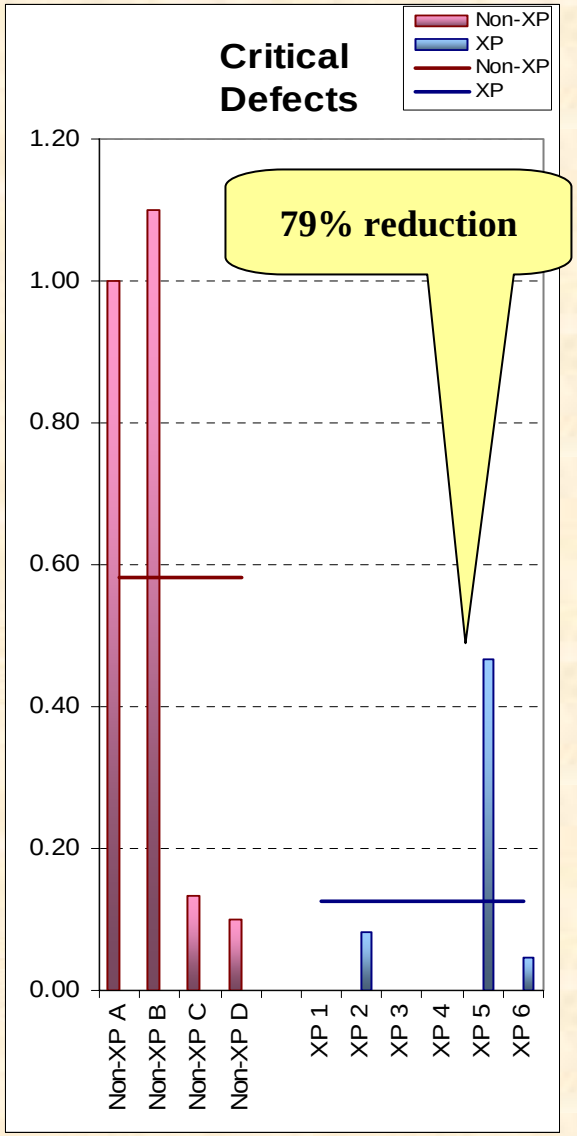
- Business — 81% better / much better
- Technology — 77% better / much better

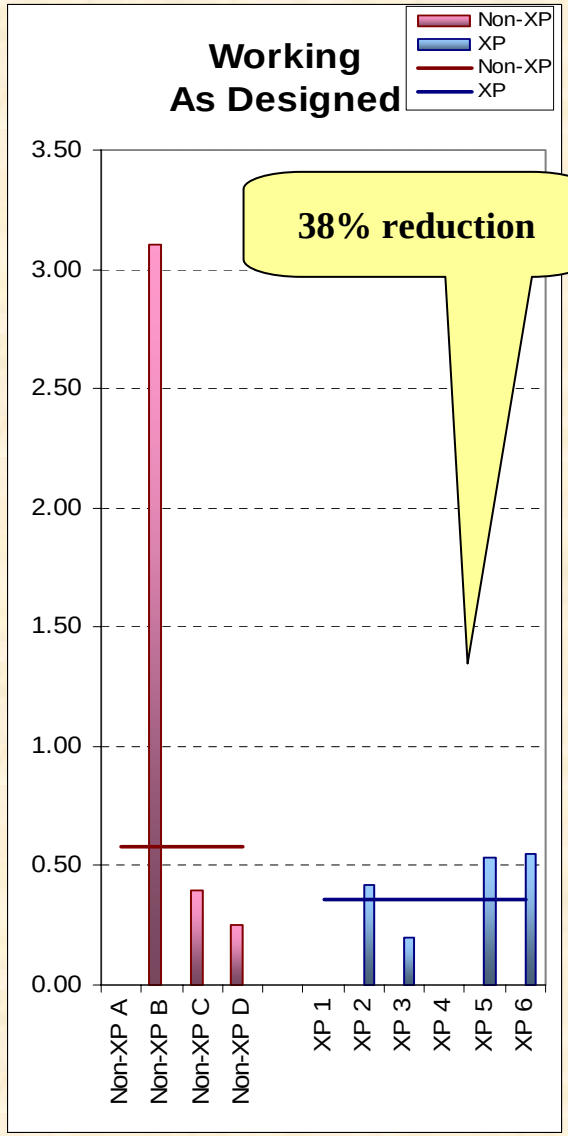
Satisfaction Categories

- Overall job satisfaction
- Work / life balance
- Quality of work environment
- Teamwork
- Relationship with bus / tech counterpart
- Quality of tools
- Feel valued by the company
- Effectiveness at your job
- Level of accomplishment

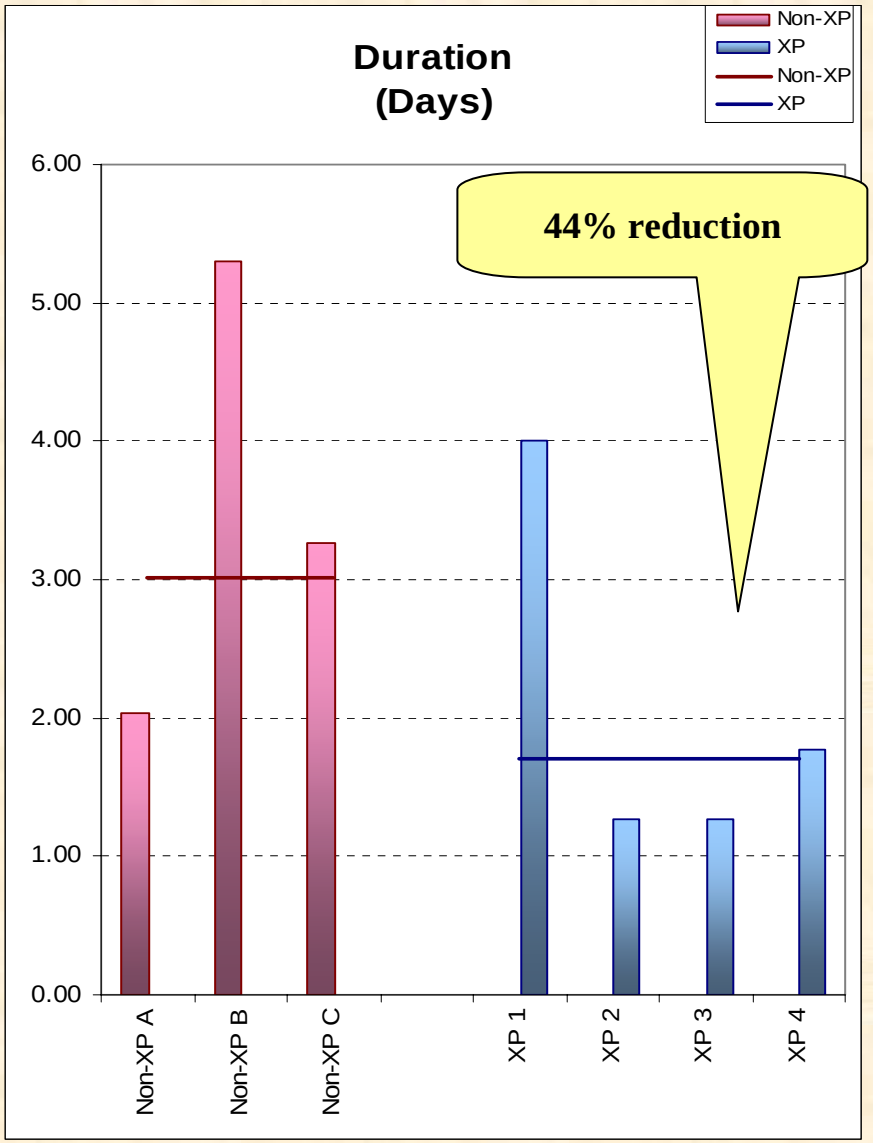
Metrics – Defects

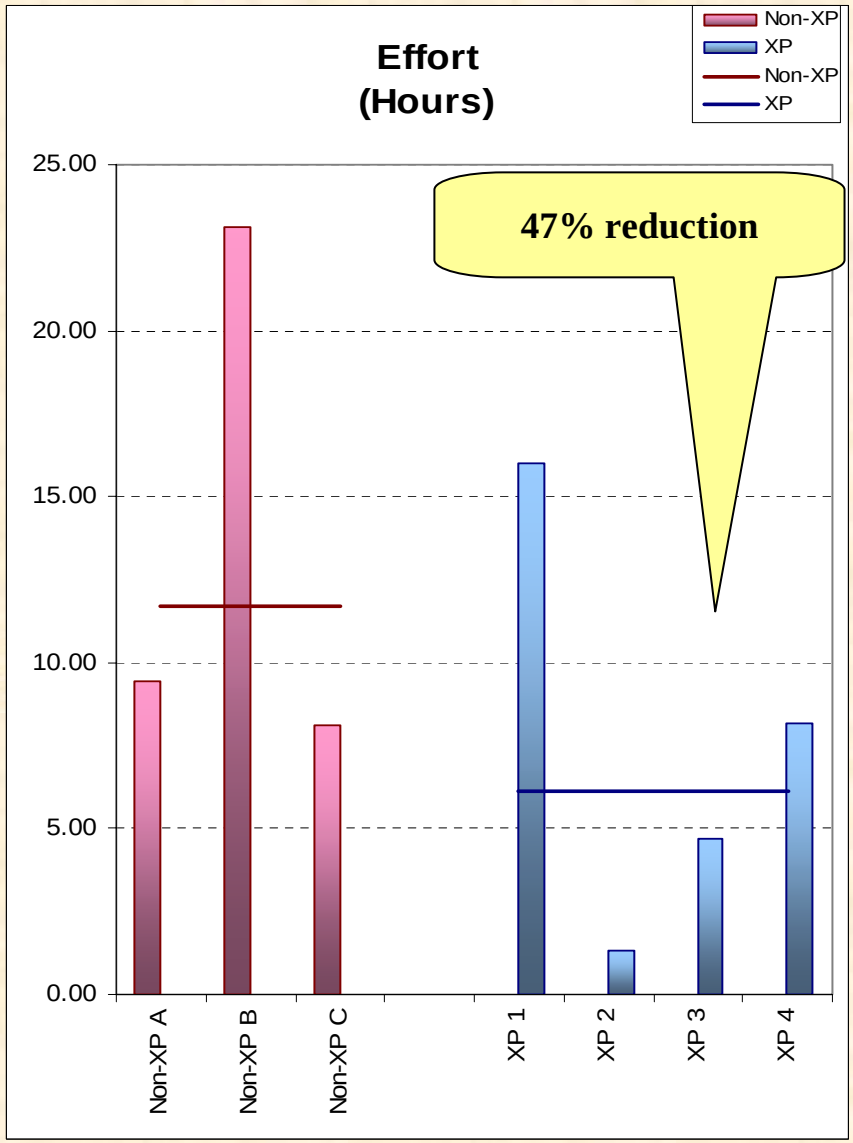






Metrics – Effort / Duration





Other XP Metrics

How We Measure Ourselves

Metrics Categories

Release Level

- **Defects**
  - Total
  - Critical
  - Working as Designed (WAD)
- **Effort / Duration**

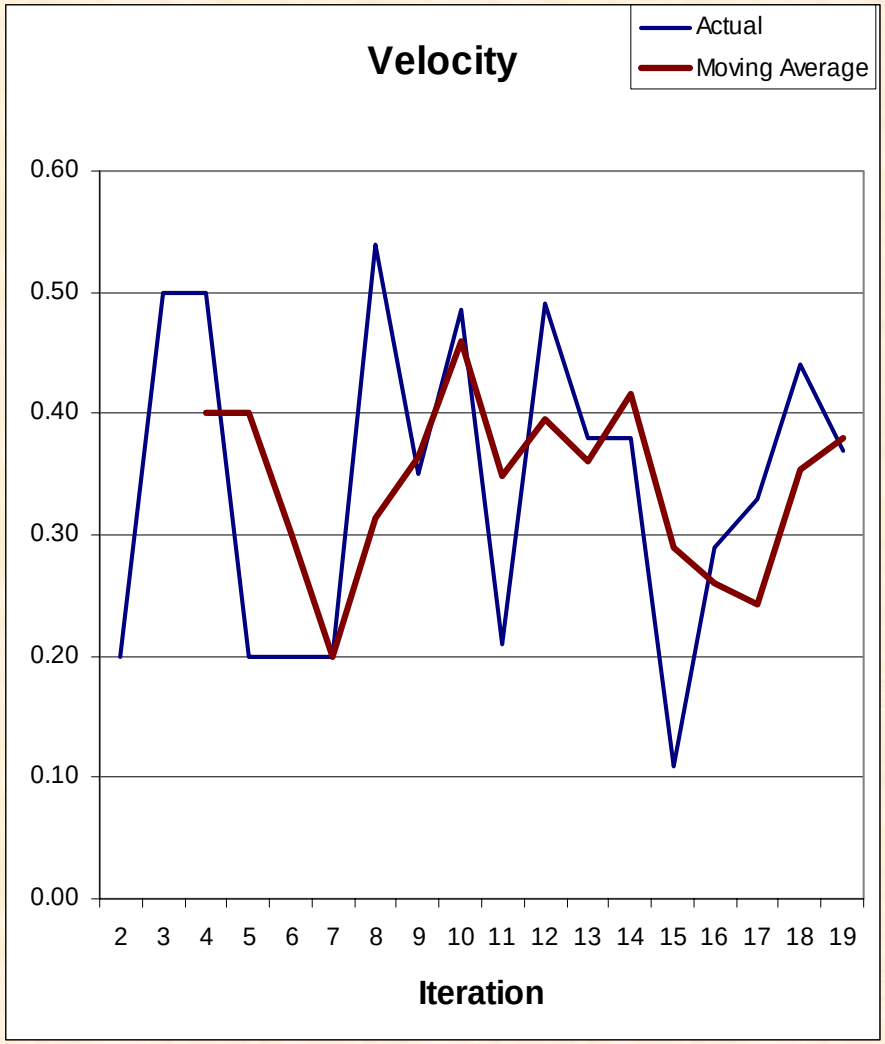
Iteration Level

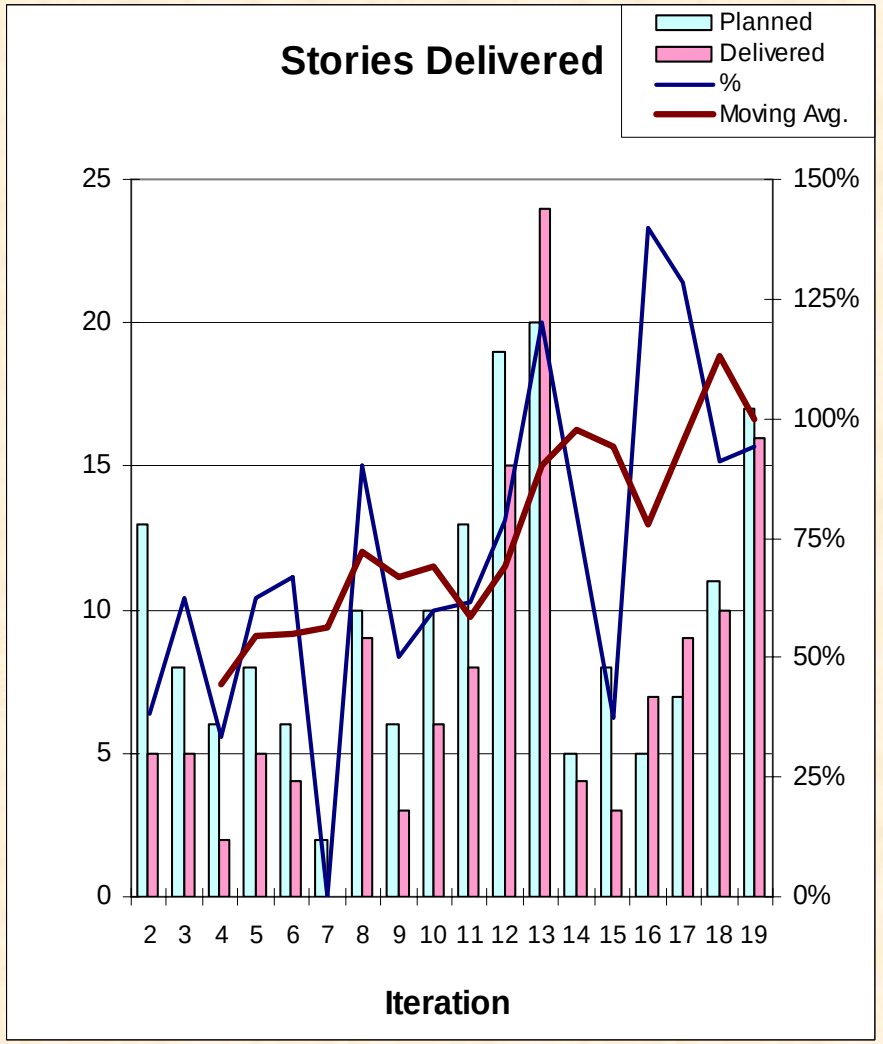
- **Velocity**
- **Stories Delivered**

Daily

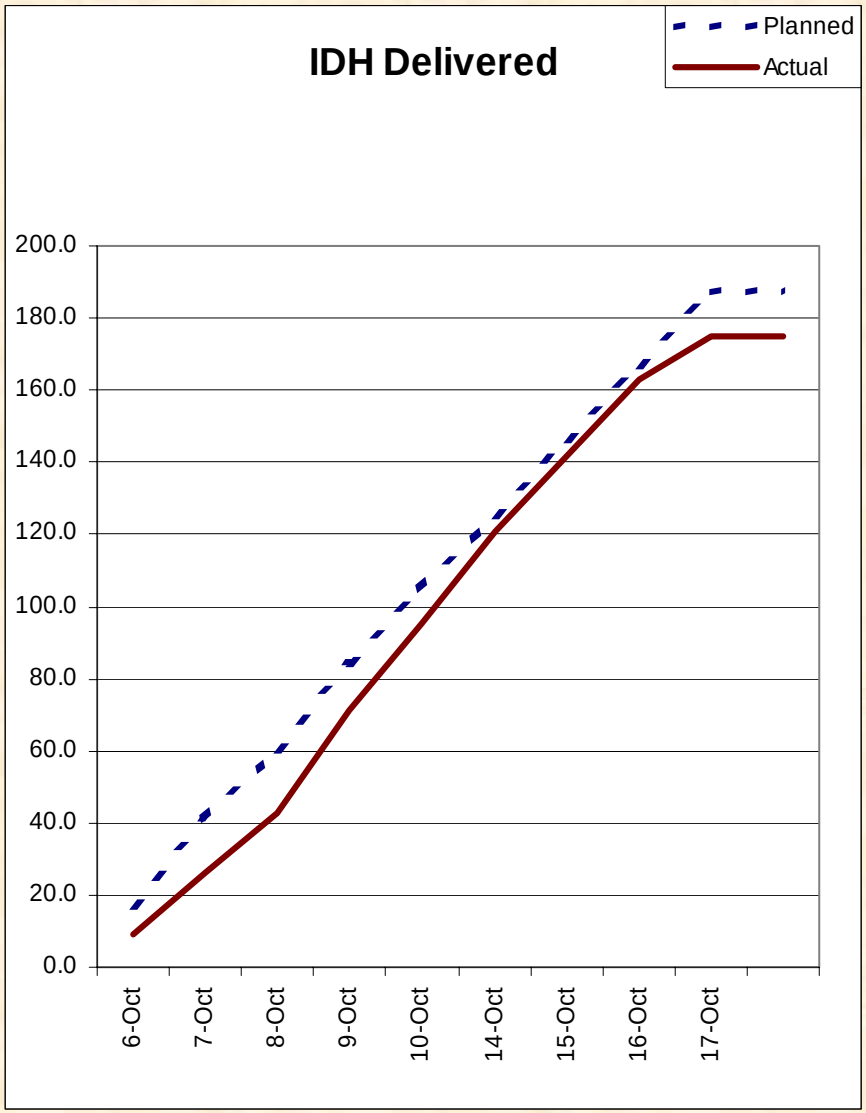
- **IDH Delivered**
- **IDH Remaining**

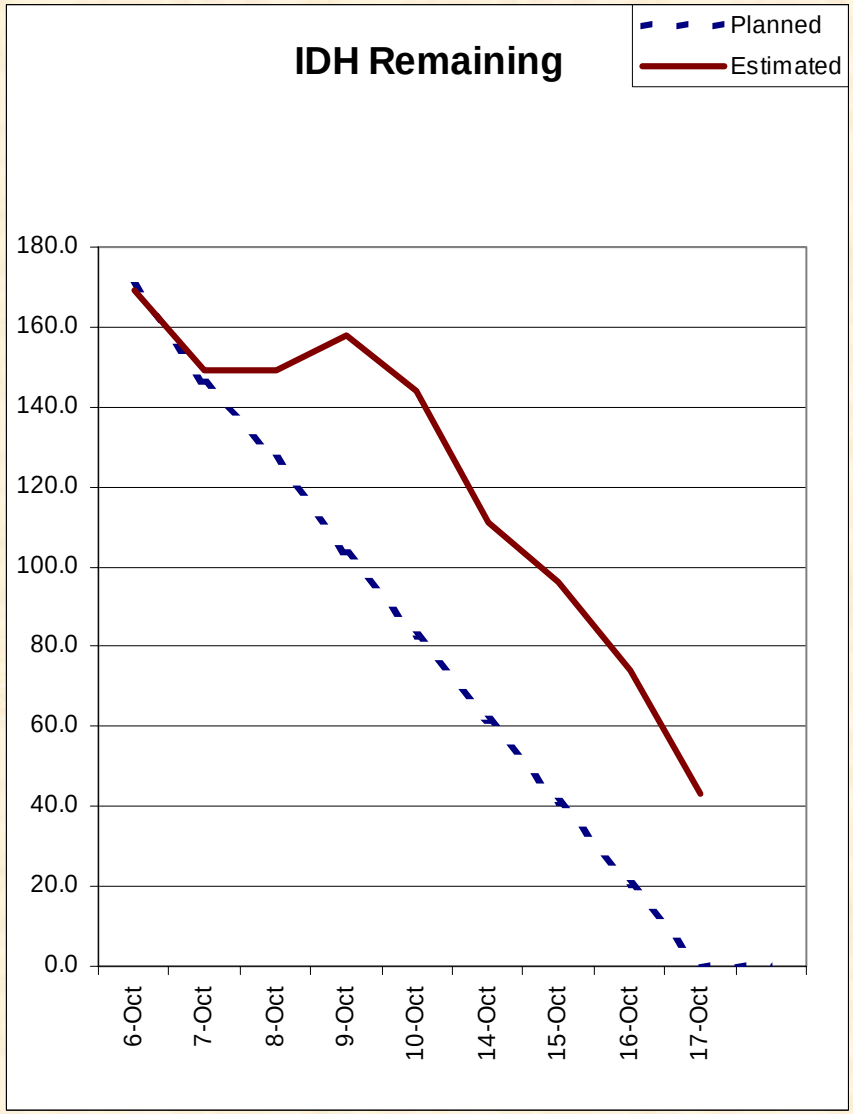
Metrics – Iteration





Metrics – Daily





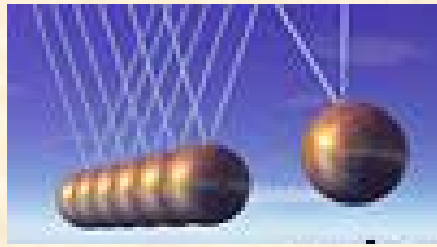
Exercise 2: XP/CMMI Cliché Combat

- Our goal is to invite, and capture, as many misinformed "pearls of wisdom" related to Six Sigma/CMMI/XP.
- Whether they are direct quotes or simple anecdotes, we invite you to approach the mic and share.
- In order to get the "juices flowing" and the "ball rolling", here are some of our favorites…

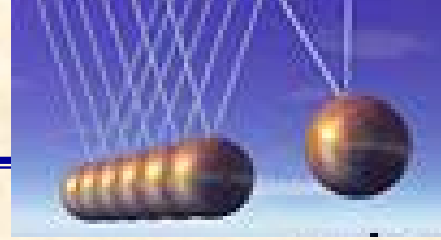
XP/CMMI

JPMorgan Chase Case Study (continued)

The CMMI Perspective



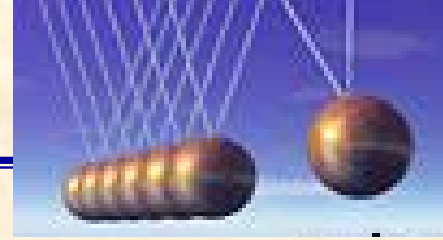
JPMC Strategy



Roadmap:

- **Baseline Assessment**
- **Implement:**
  - Address Gaps
  - Establish PAL
  - Deploy & Train
  - Upgrade
  - Interim Assessment
- **Measure (Assess/metrics)**

Starting Point

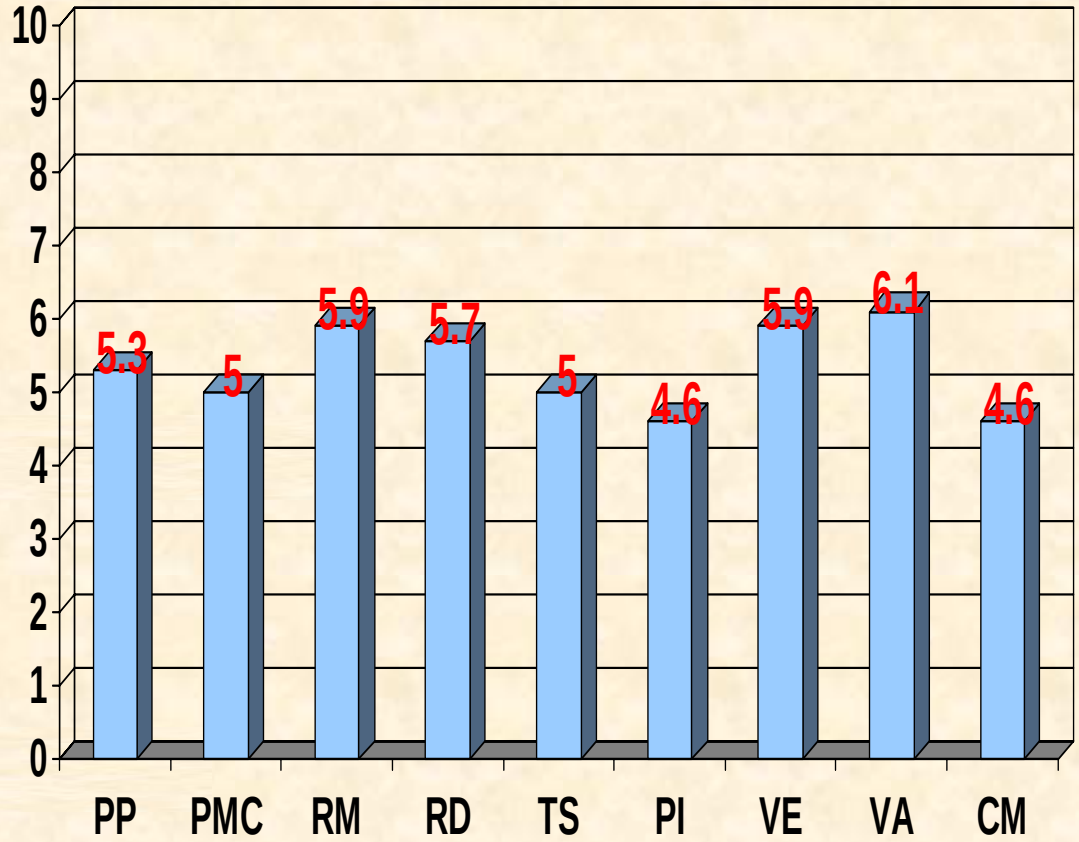


CMMI Class C: Baseline Assessment

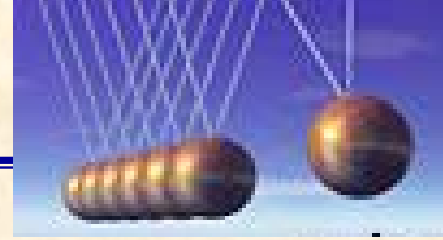
Performed a 2-day CMMI Class C (Mini Assessment), based upon very limited scope and sample set

Indicator Scores:

1-3	Weak
3-5	Progressing
6-7	CL 2
8-10	CL 3



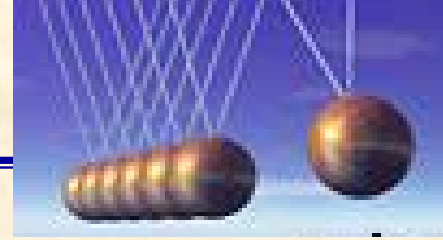
Baseline Findings & Target Profile



- **The Baseline Assessment indicated that the XP program was on the cusp of satisfying CMMI Capability Level 2 across the in-scope Process Areas (PA)**
- **By leveraging infrastructure and assets from the existing PI program, and because of the relatively fast XP cycle-times, it was feasible to set an aspirational goal of attaining a CMMI Capability Level (CL) 3 profile within 9 months**

Process Area	CL Target	Comments
OPF	3	This was covered in the wider context by the organization's Process Initiative
OPD	3	This is covered by the organizational Process Initiative's Process Library Tool- ESP Plus
PP	3	Establish basic (light weight) project management processes with due consideration to effective estimation and the establishment of artifacts that support tracking
PMC	3	Establish basic (light weight) project tracking processes that enable adequate levels of governance, reporting and support corrective action
RM	3	Establish a robust method for eliciting, defining and baselining, tracing and managing requirements
RD	3	Establish a method for iteratively refining and reworking requirements (an innate feature of XP)
TS	3	Establish a design methodology fully supported by internal standards and conventions
PI	3	Establish a process for supporting an integration strategy covering the entire project lifecycle
Ve	3	Establish and deploy a set of standard QA methods encompassing Peer Reviews through QA Testing
Va	3	Establish and deploy a method for ensuring that client/end-user needs are addressed (VOC, Client surveys)
CM	3	Establish a standard means for identifying, storing and controlling artifacts (code, documents, environments)
PPQA	3	This is covered was the wider context by the organization's Process Initiative
MA	3	This is covered was the wider context by the organization's Process Initiative

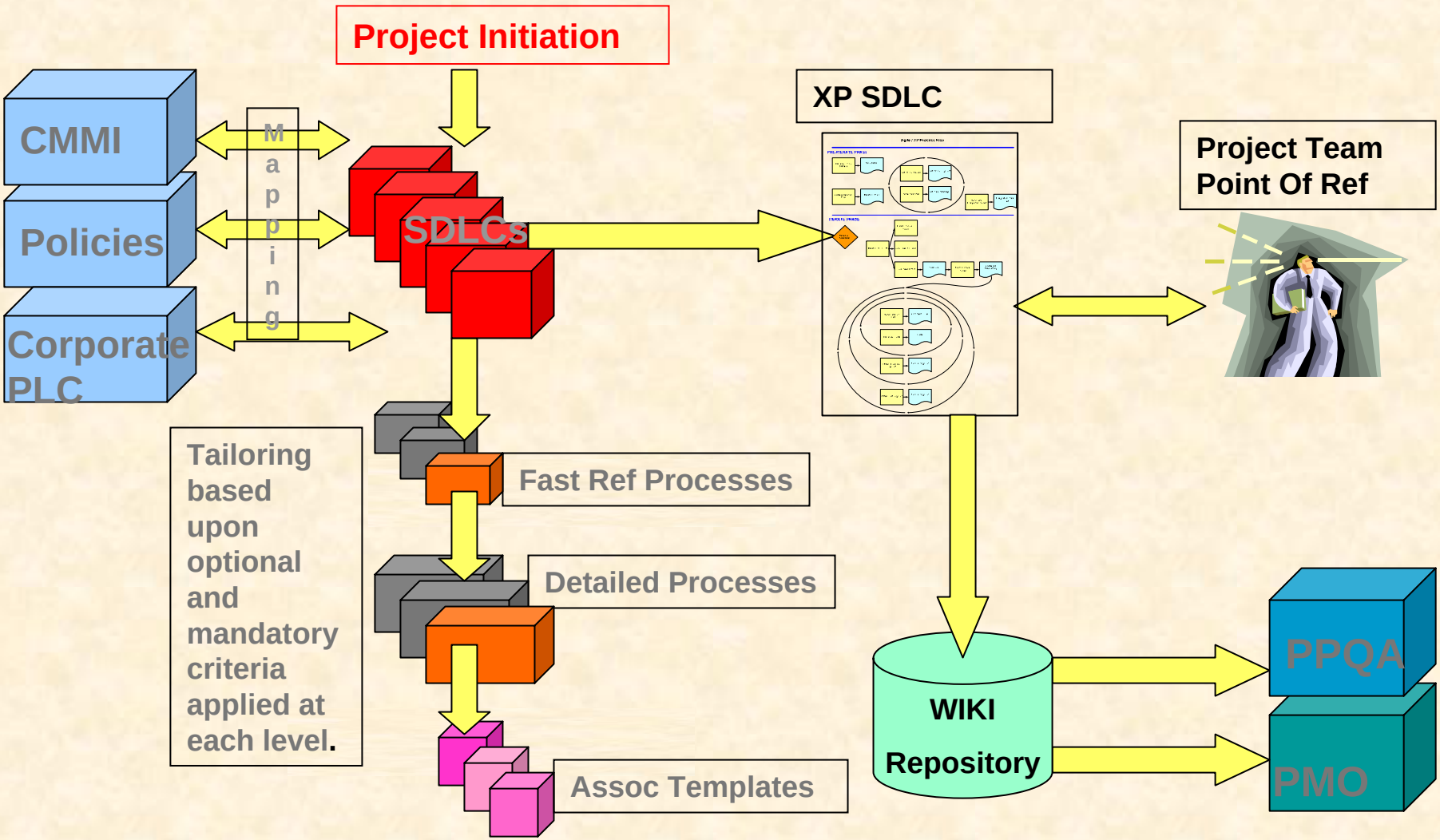
Roadmap



Developing & Implementing The XP/CMMI Process

- Performed a series of workshops with the entire team to capture and define XP practices in standard SDLC format
- Integrated XP SDLC within organization's online Process Asset Library
- Promoted awareness and conducted briefings and OJT across team
- Captured feedback and adjusted XP SDLC
- Performed an interim CMMI Class B Assessment

Organizational Process Library



Conclusions:

XP/CMMI Working In Concert!

- Deployment of CMMI can provide a framework for implementing a more robust XP-based method
- The rapid cycle times associated with XP enable correspondingly quick development, piloting and deployment of a CMMI aligned process
- CMMI contains a robust definition of engineering practices
- Because of the emphasis on product development, CMMI provides a useful framework for engaging non-development groups (i.e. the business, operations, governance, support etc.)
- If deployed as part of an organizational initiative, CMMI can help promote awareness and propagate XP practices

Lessons Learned

“The first step towards getting somewhere is to decide that you are not going to stay where you are.”

John Pierpont Morgan

Summary

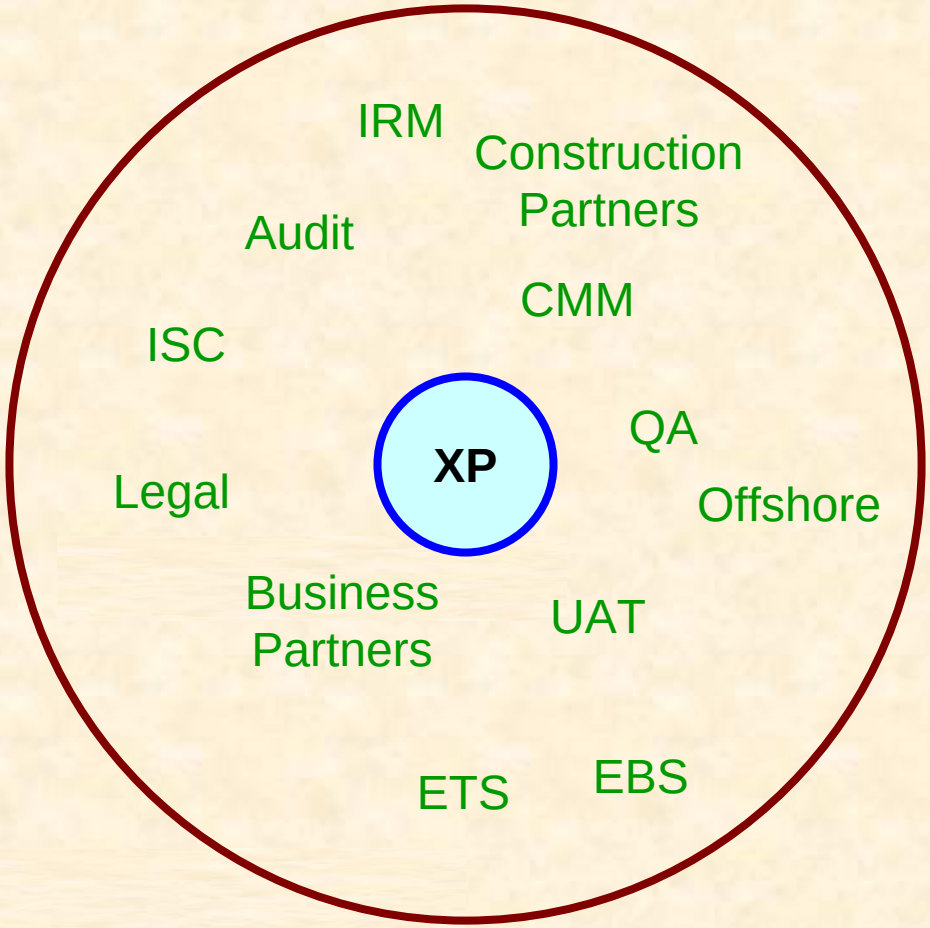
- **Strategic Initiatives**
  - Six sigma excellent for introducing XP
  - XP highly compatible with CMM / CMMI
- **Organizational**
  - Throughput is closely tied to organizational agility
  - Barriers are stronger in minds than in reality
  - Success is directly tied to level of business / technology collaboration & availability
- **Project Preparation**
  - Infrastructure setup required before development starts
- **Business ready for collaborative planning**
- **Training**
  - Business & technology should be trained together
- **Consultants Speed Adoption**
  - Business
  - Technology

Challenges

- **Reduce Time-to-Value**
  - "Fast track" for project subset?
- **Team distractions**
  - "Distraction-free zone"
- **Reduce principle on current "debt"**
  - Automated UT / IT scripts for existing code base
- **Environment testing (OS / browsers)**
  - VMWare
- **Keep enthusiasm in check**
  - There's much to learn
- **Decision-Making**
  - Empowered, risk-accepting
- **Managing Change**
  - Finding the balance

XP Alone

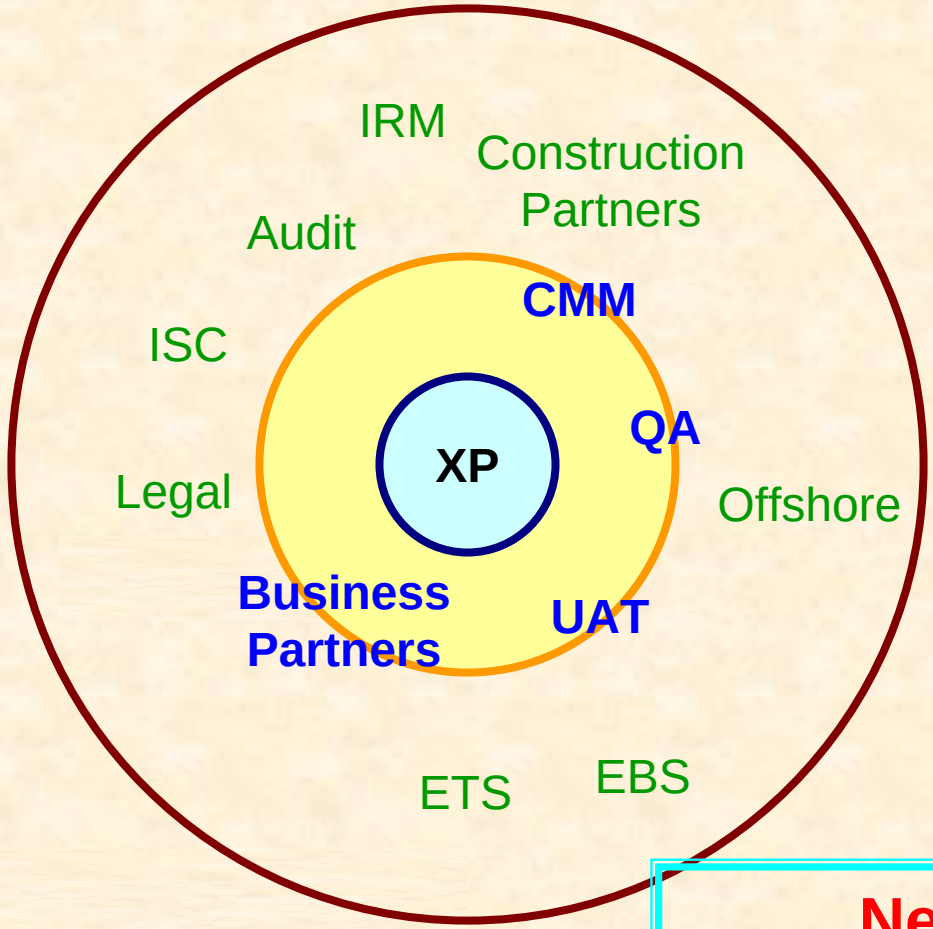
Does XP work? … Yes



Is XP optimized? … No

XP Optimized

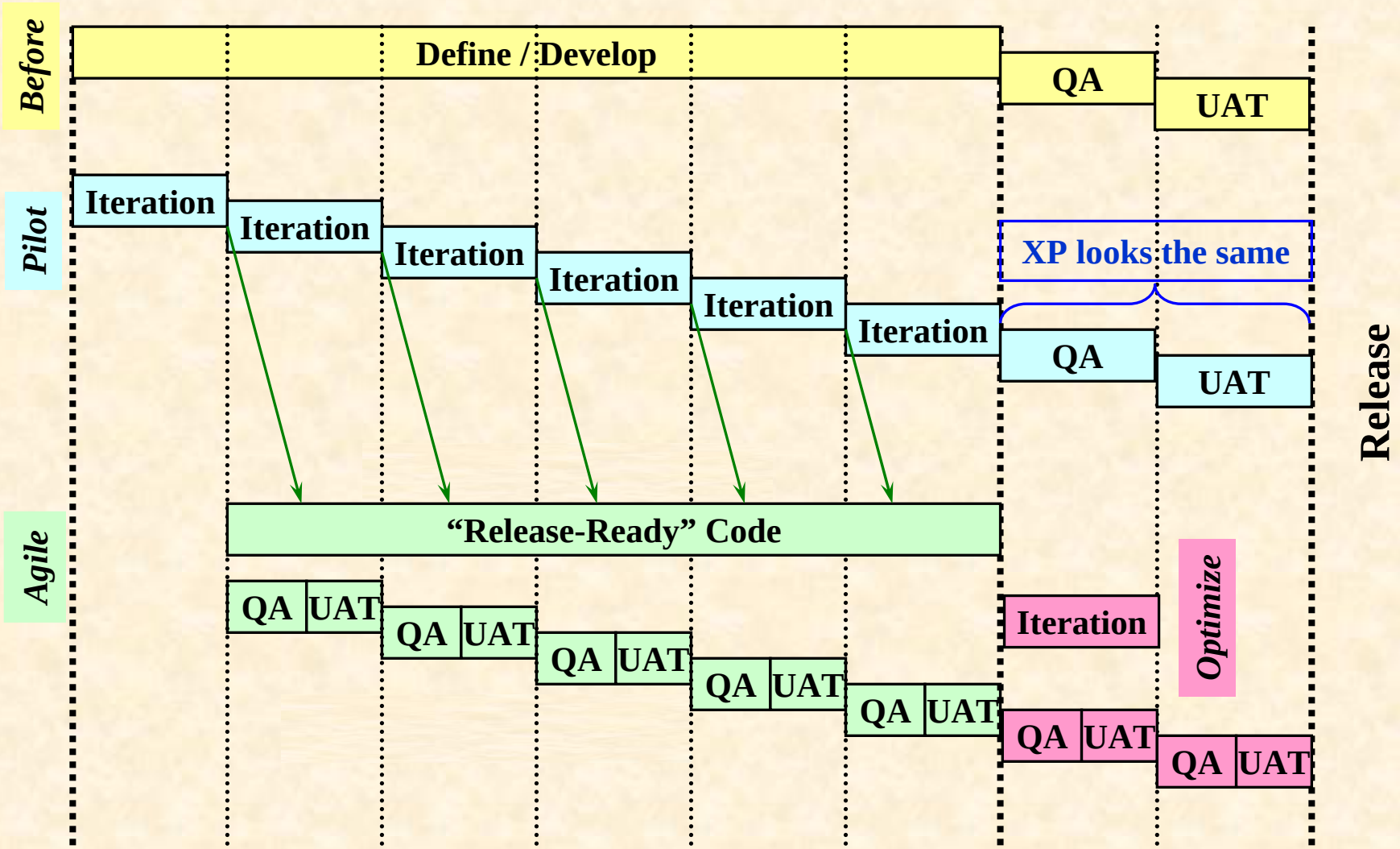
Sphere of Influence



As more development partners become agile, both they and the XP team gain efficiency and effectiveness.

Net effect = increased throughput

Sphere of Influence - Example



Parting Thoughts

Complementary Approaches

Six Sigma

- Driven by business needs
- Disciplined implementation
- Results verified through metrics

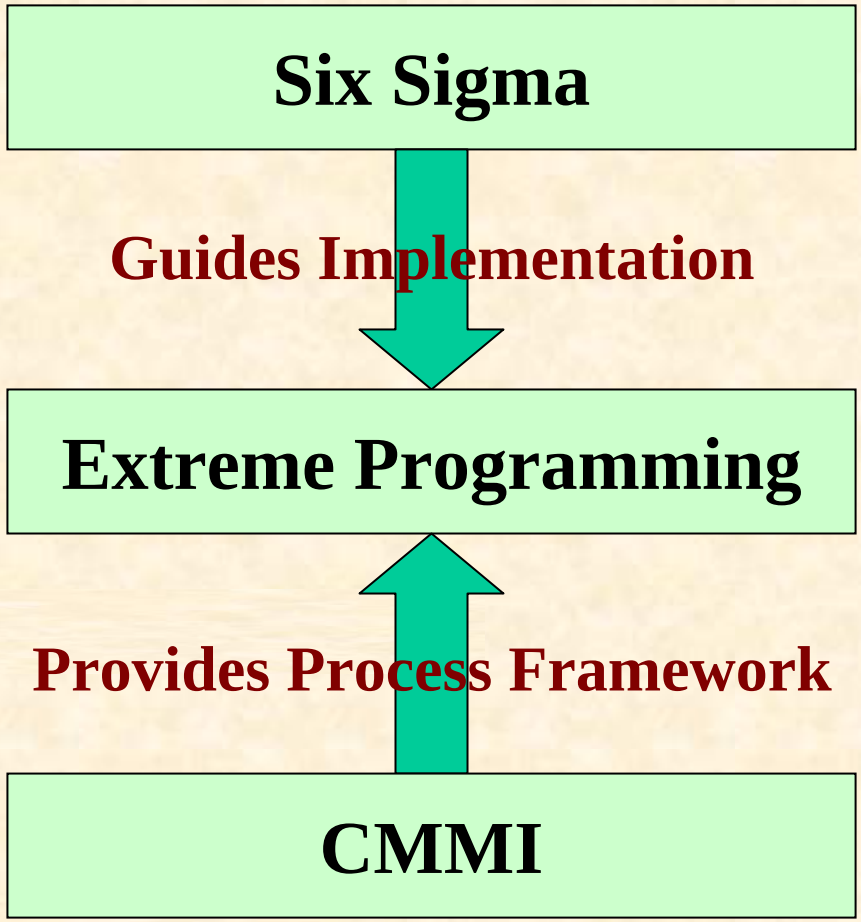
Extreme Programming

- Better / cheaper / faster
- Improved quality of life

CMMI

- Recognized framework
- Lends legitimacy

Complementary Approaches



Q&A

Audience Participation Encouraged

Where are you today?

Contact Info

Bob Jarvis

- Bob.Jarvis@chase.com

Steve Gristock

- Stephen.P.Gristock@chase.com