A Highly Successful Cancelled Project

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Here Be Ye Welcome!

Outline

- Background
- Directives
- Activities
- Results
- Lessons Learned

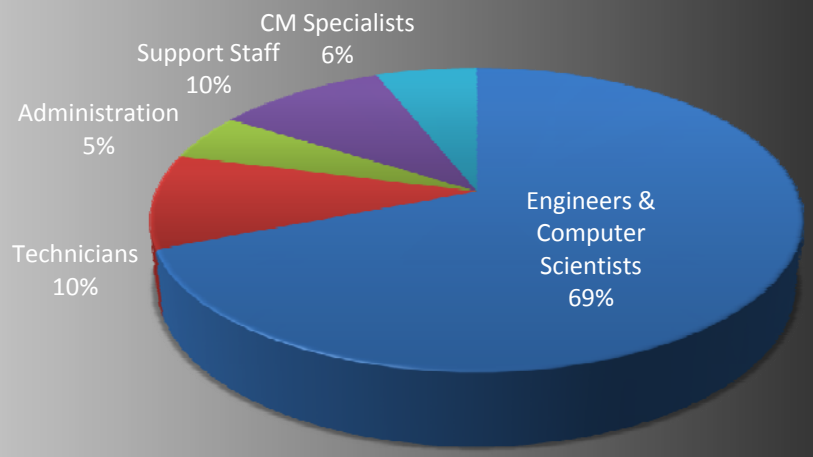
Part I

Background

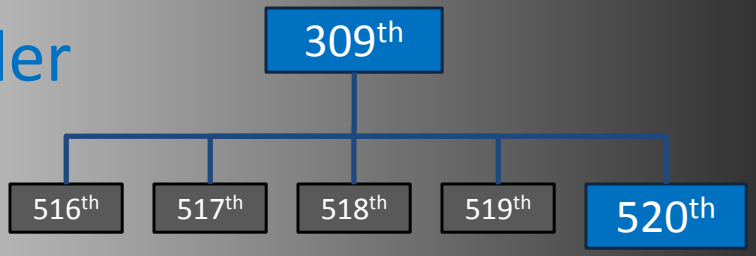
Who Are We?

- Large Cadre of Talent
  - 1,000 personnel
  - Average over 8 years of technical experience
  - Low overhead

309th Software Maintenance Group



- Process Improvement Leader
  - CMMI
  - AS9100 / ISO 9001
  - PSP[SM] / TSP[SM]

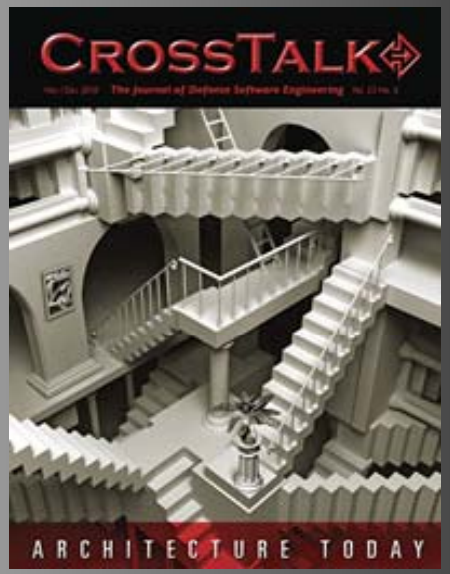


520th Software Maintenance Squadron

[SM]TSP and PSP are service marks of Carnegie Mellon University

We Are Discovered

- 2002
  - Discovered in CrossTalk
  - IV&V activities
    - Review existing vehicle code
    - Review older UML-based code
    - Make recommendations



- 2003 - 2004
  - "Make this team Level 5"
  - PSP training – not customer funded
  - TSP training – reluctantly customer funded
  - TSP results – customer ecstatic … agreed to fund all future TSP efforts

Friendly Hostiles

- 2005-2007
  - Lifecycle maintainer
  - Project reset
  - Software provider
- 2008
  - PDR & CDR
  - Setup labs
  - Requirements

To The Boats!

- 2009-2011
  - Software, software, software!
  - New platform
  - Reliability growth testing
    - No software reliability issues
    - TSP results: a very happy customer
  - Project meets expectations
  - Project cancelation

Part II

Directives

Customer Directives

- Save Us From Ourselves
- Code Must Be Maintainable
- ‘C’ Level Quality Acceptable

- Flexibility Matrix

	Most Flexible	Moderately Flexible	Least Flexible
Schedule			
Resources			
Scope			

→

Save Us

- Work Performed Based On….
  - CMMI Level 5,
  - AS9100,
  - ISO 9001,
  - Earned value management,
  - Integrated master schedule,
  - AND cost data reporting

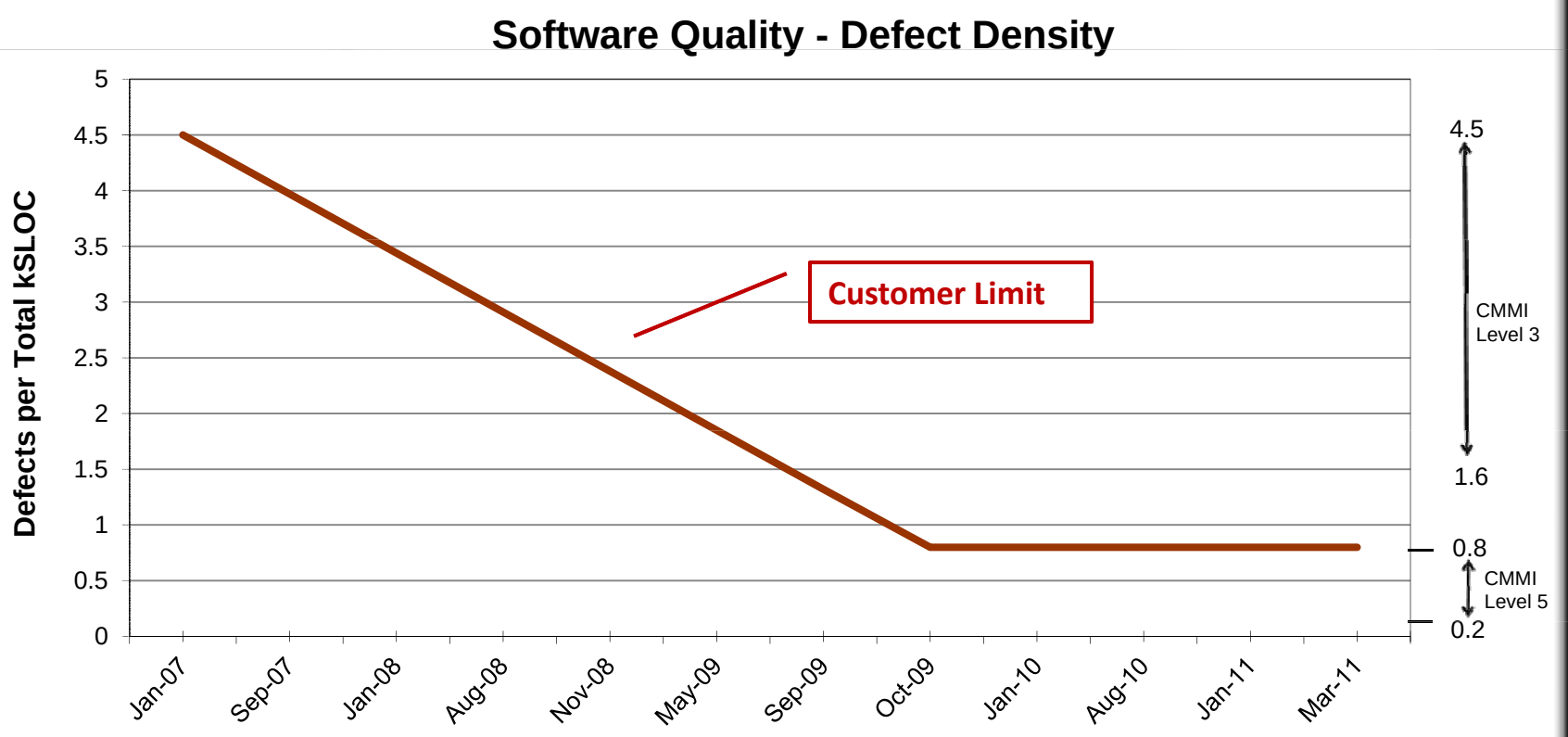
… Practices!

Maintainable

	Projected
Product Life	40 Yrs
Platform Configurations	2
Requirements	82
Source Lines Of Code (SLOC)	400K
Annual Software Updates	1
Software Configured Items	4
System Integration Labs	2

Operations & Sustainment
> 60% Lifecycle Cost

'C' Quality


Software Quality - Defect Density
Defects per Total kSLOC
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
Customer Limit
4.5
CMMI
Level 3
1.6
0.8
CMMI
Level 5
0.2
Jan-07
Sep-07
Jan-08
Aug-08
Nov-08
May-09
Sep-09
Oct-09
Jan-10
Aug-10
Jan-11
Mar-11

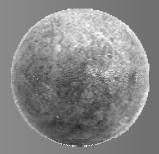
Flexibility Matrix

	Most Flexible	Moderately Flexible	Least Flexible
Schedule			
Resources			
Scope			

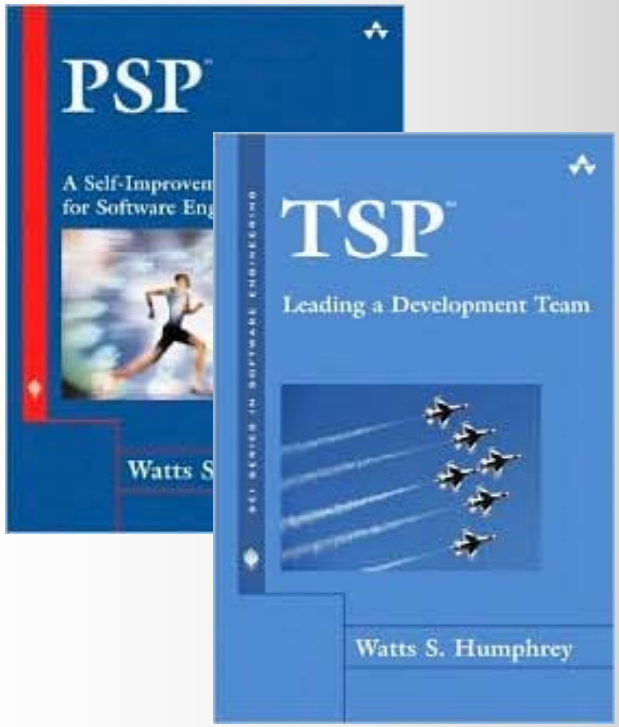
520th (Internal) Directives

- Deliver Quality Software
  - Do not break our processes
  - Must use PSP and TSP
  - Fired for the right reason is acceptable
- Build Team Leadership
- Delight The Customer

- Given ONE Silver *Patch* Bullet



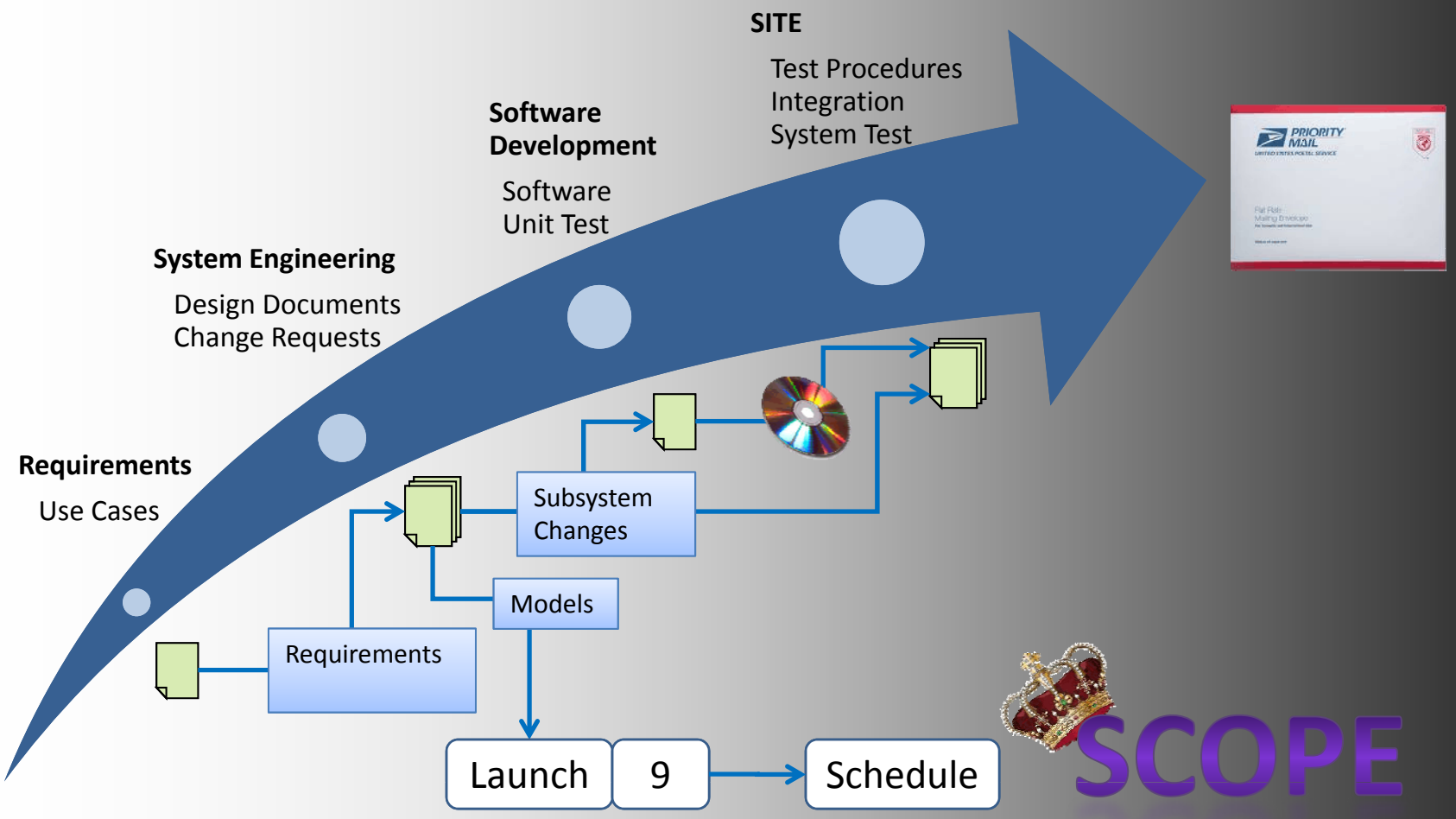
PSP &TSP Directive



Our Code

Our Mentor

520th Process Flow



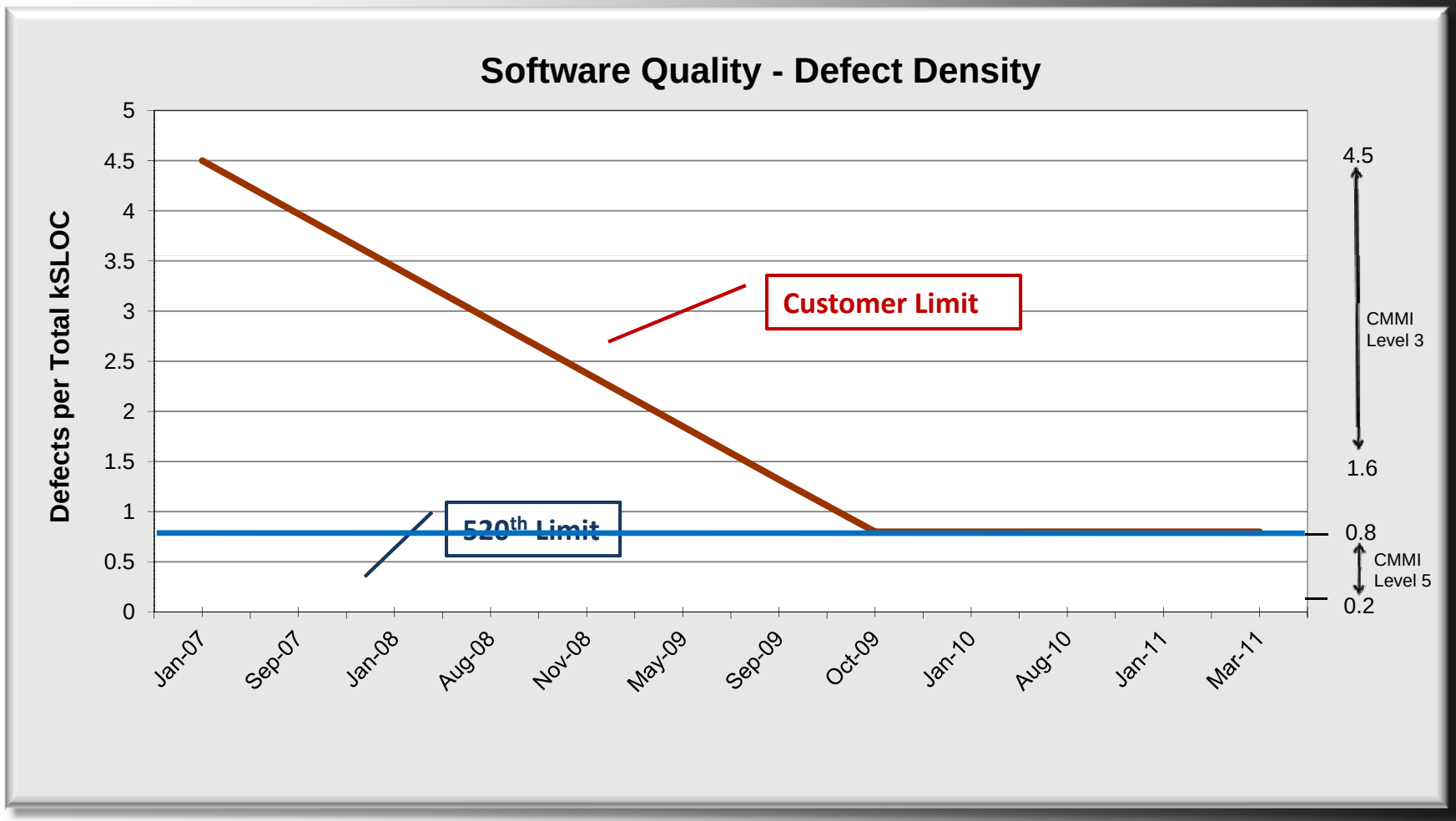
Part III

Activities

Flexibility Matrix

	Most Flexible	Moderately Flexible	Least Flexible
Schedule			X
Resources		X	
Scope	X		

Software Quality - Planned

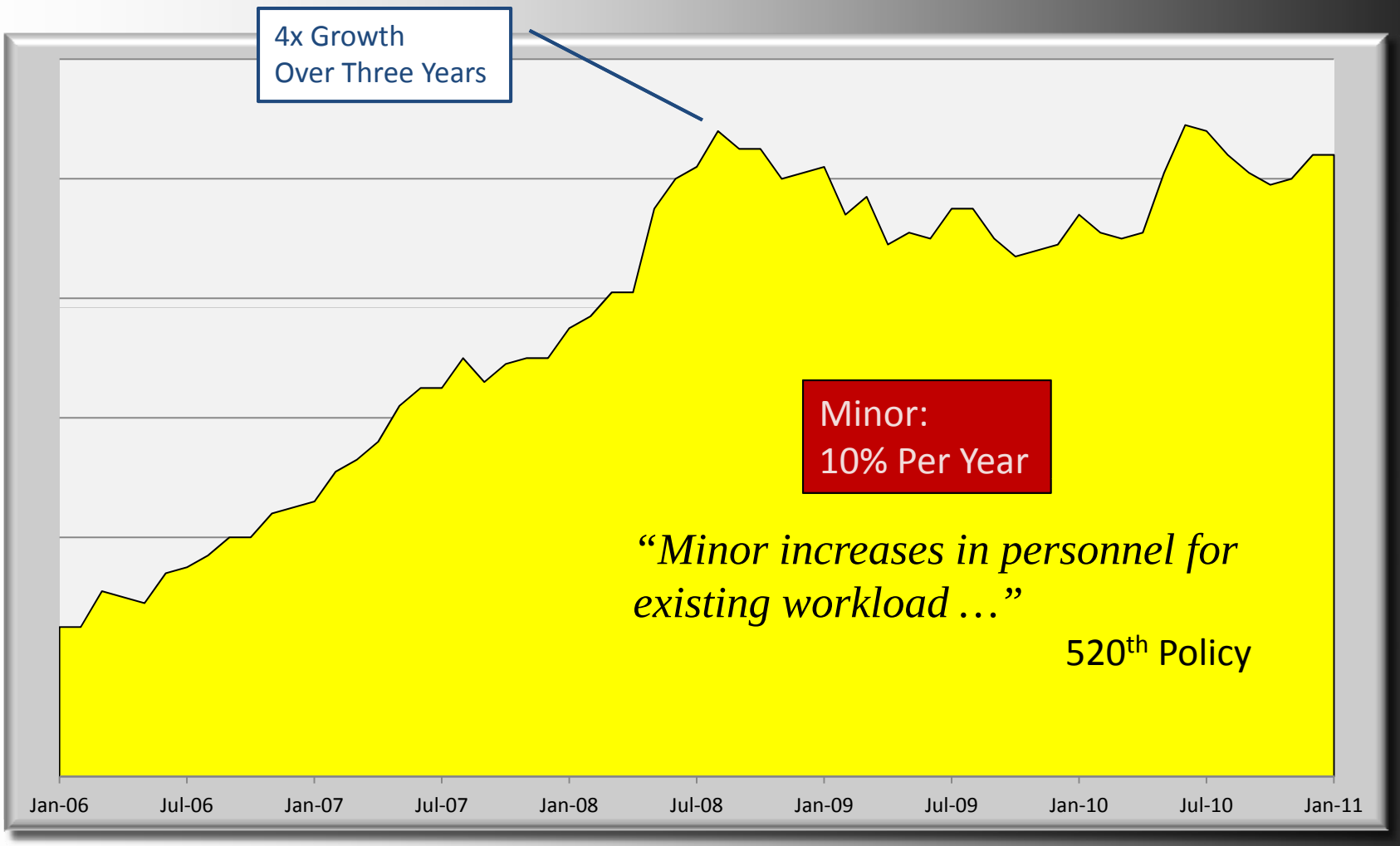


Size

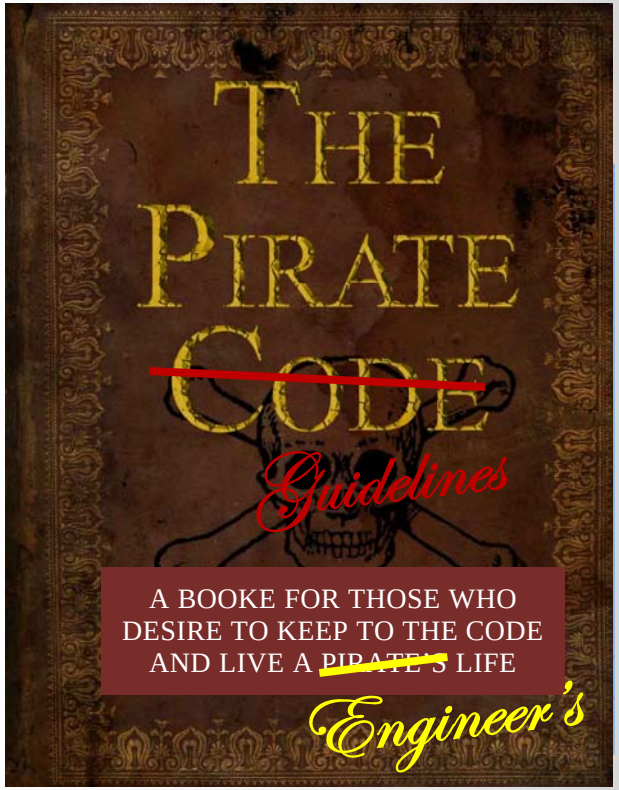
	Projected	Actual
Product Life	40 Yrs	☠
Platform Configurations	2	2 + 5
Internal Requirements	82	24K
External Requirements	-	16K
Source Lines Of Code (SLOC)	400K	1M+
Annual Software Updates	1	3+
Software Configured Items	4	5
System Integration Labs	2	5
Plans/Processes	Released	60
	In Progress	13

Certification Focus Team

Growth


4x Growth
Over Three Years
Minor:
10% Per Year
"Minor increases in personnel for existing workload …"
520th Policy
Jan-06
Jul-06
Jan-07
Jul-07
Jan-08
Jul-08
Jan-09
Jul-09
Jan-10
Jul-10
Jan-11

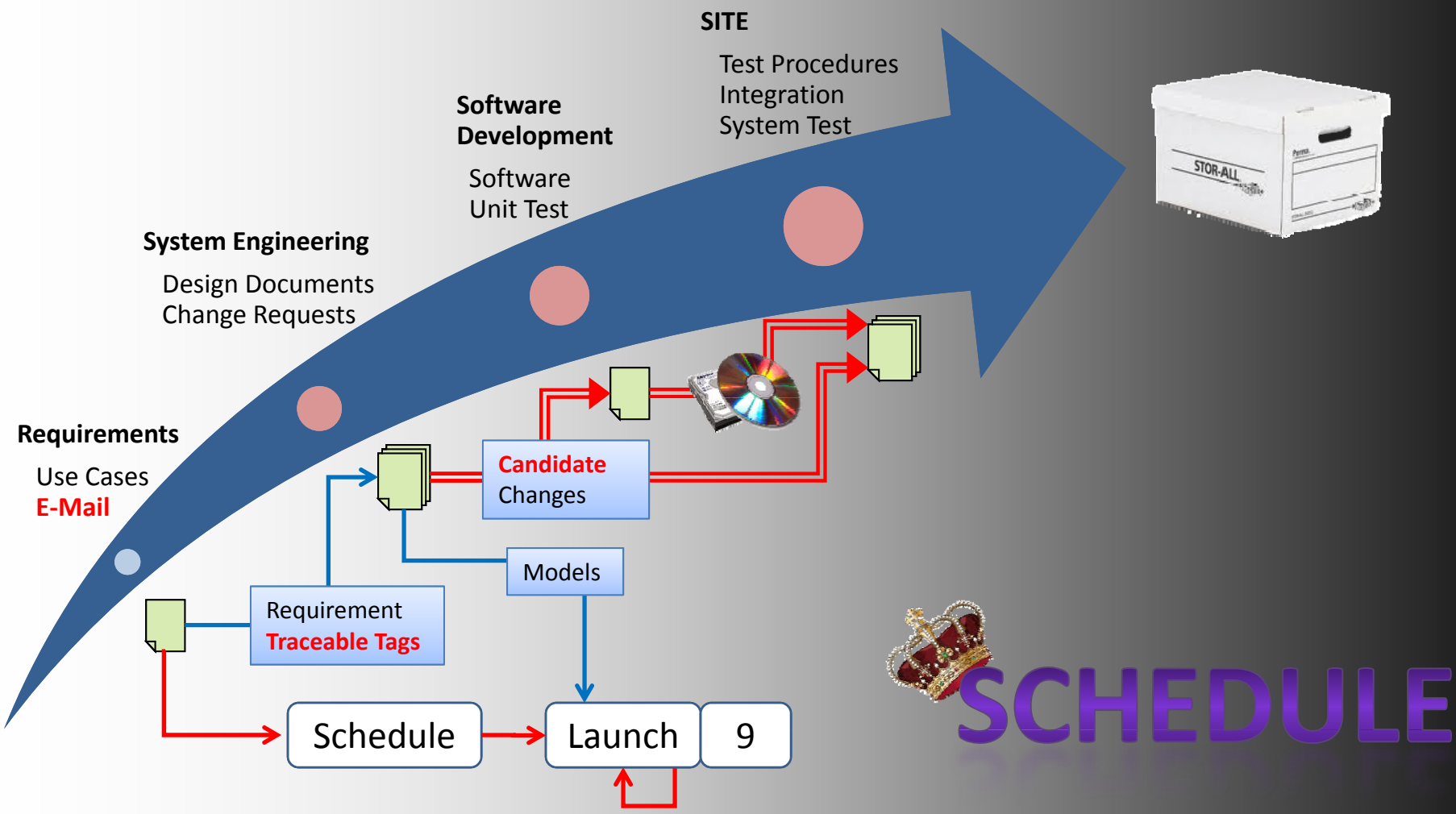
PSP & TSP Implementation



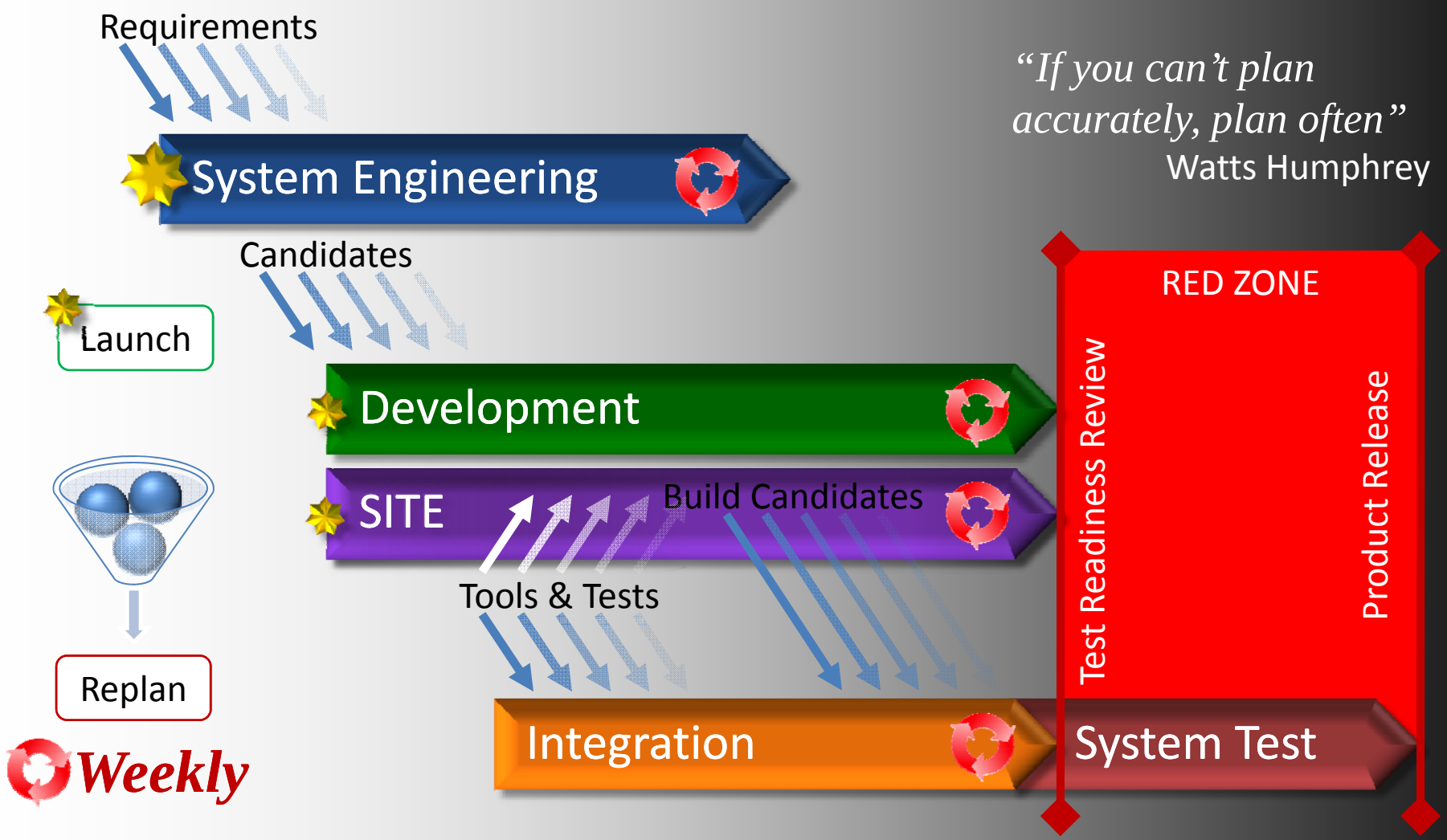
Our ~~Code~~
Guidelines

Our ~~Mentor~~
Boss!

520th Modified Flow



Pipeline Management



"If you can't plan accurately, plan often"
Watts Humphrey

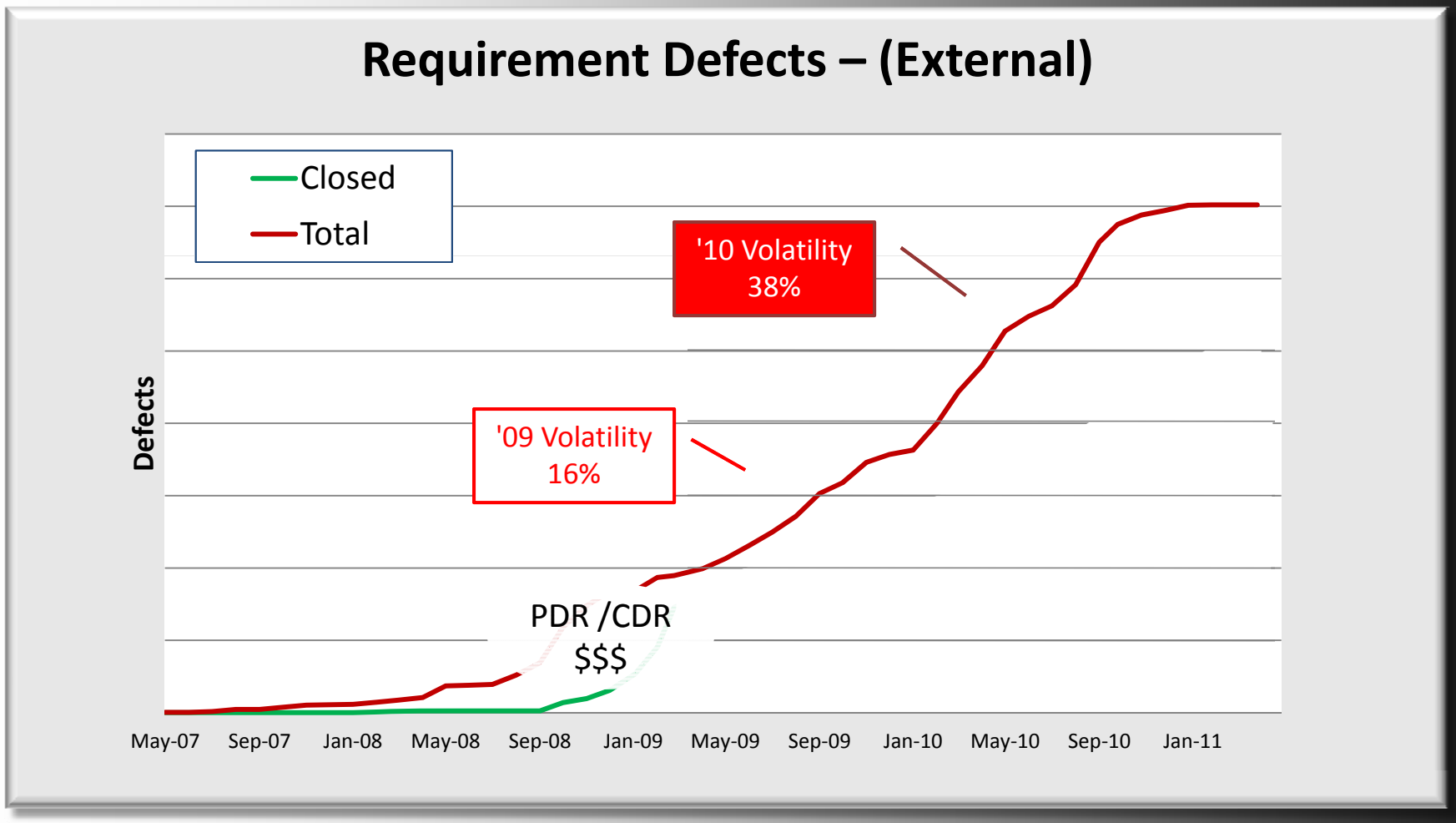
Part IV

Results

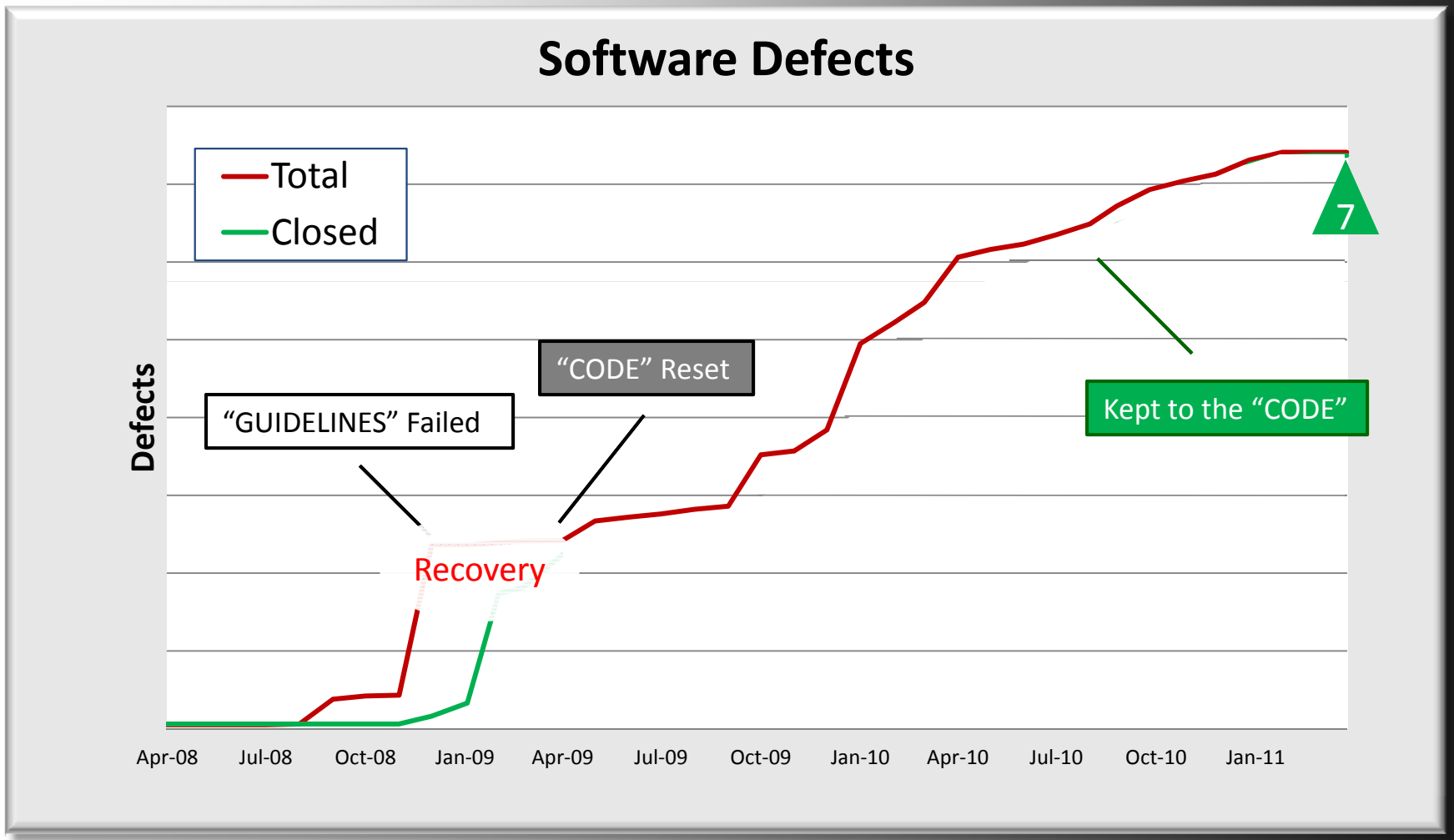
Requirements

"We'll know what the requirement is once we see it work."

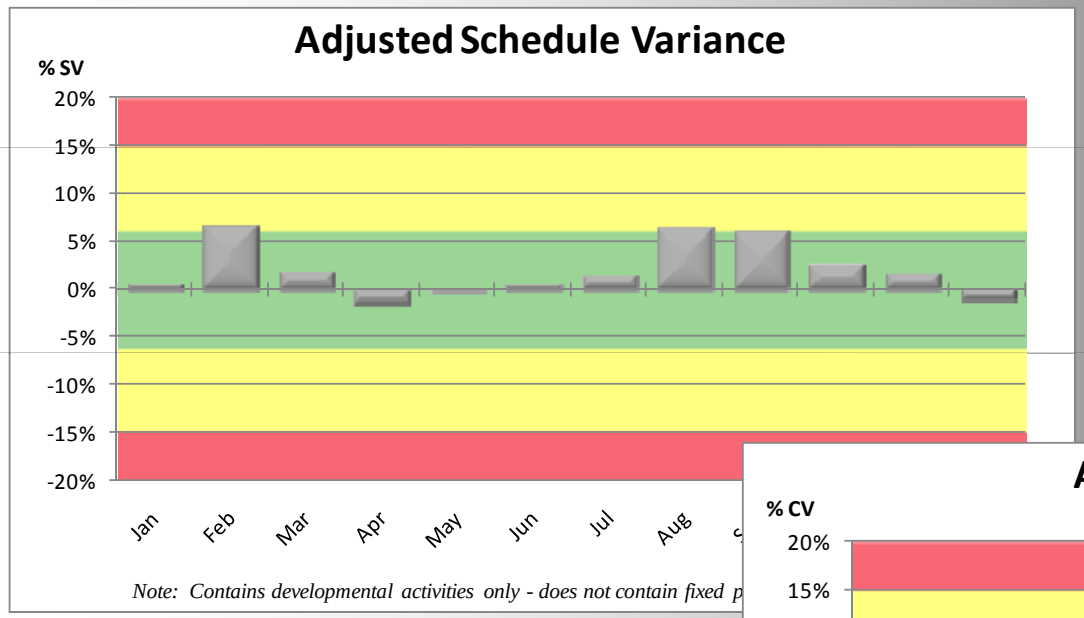
Contractor

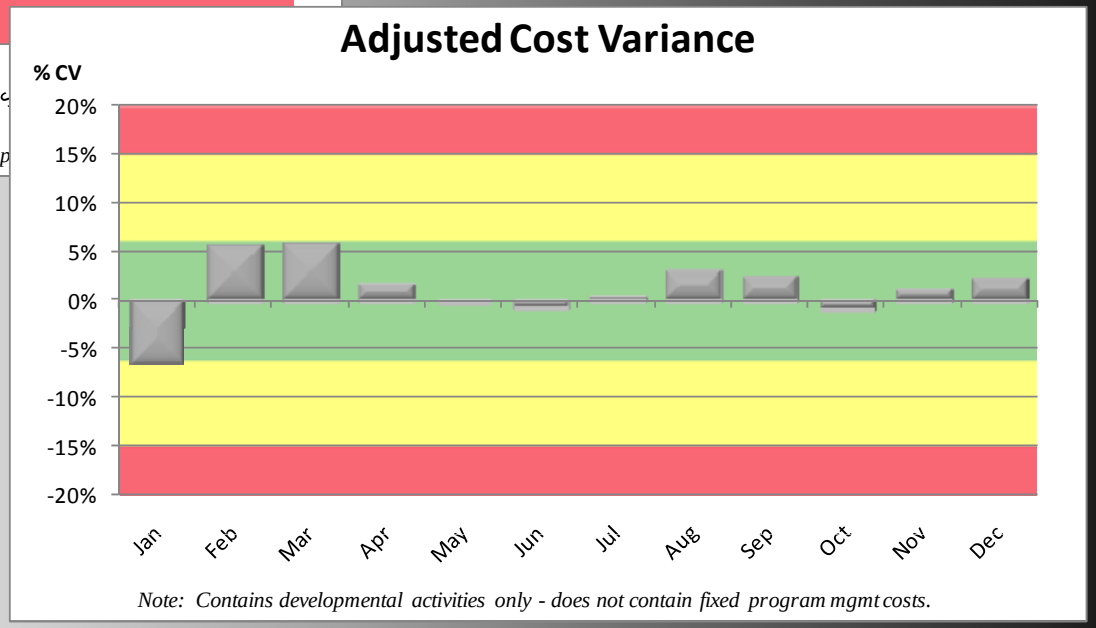


Software


Software Defects
Total
Closed
Defects
"GUIDELINES" Failed
"CODE" Reset
Recovery
Kept to the "CODE"
7
Apr-08
Jul-08
Oct-08
Jan-09
Apr-09
Jul-09
Oct-09
Jan-10
Apr-10
Jul-10
Oct-10
Jan-11

Cost & Schedule Variance





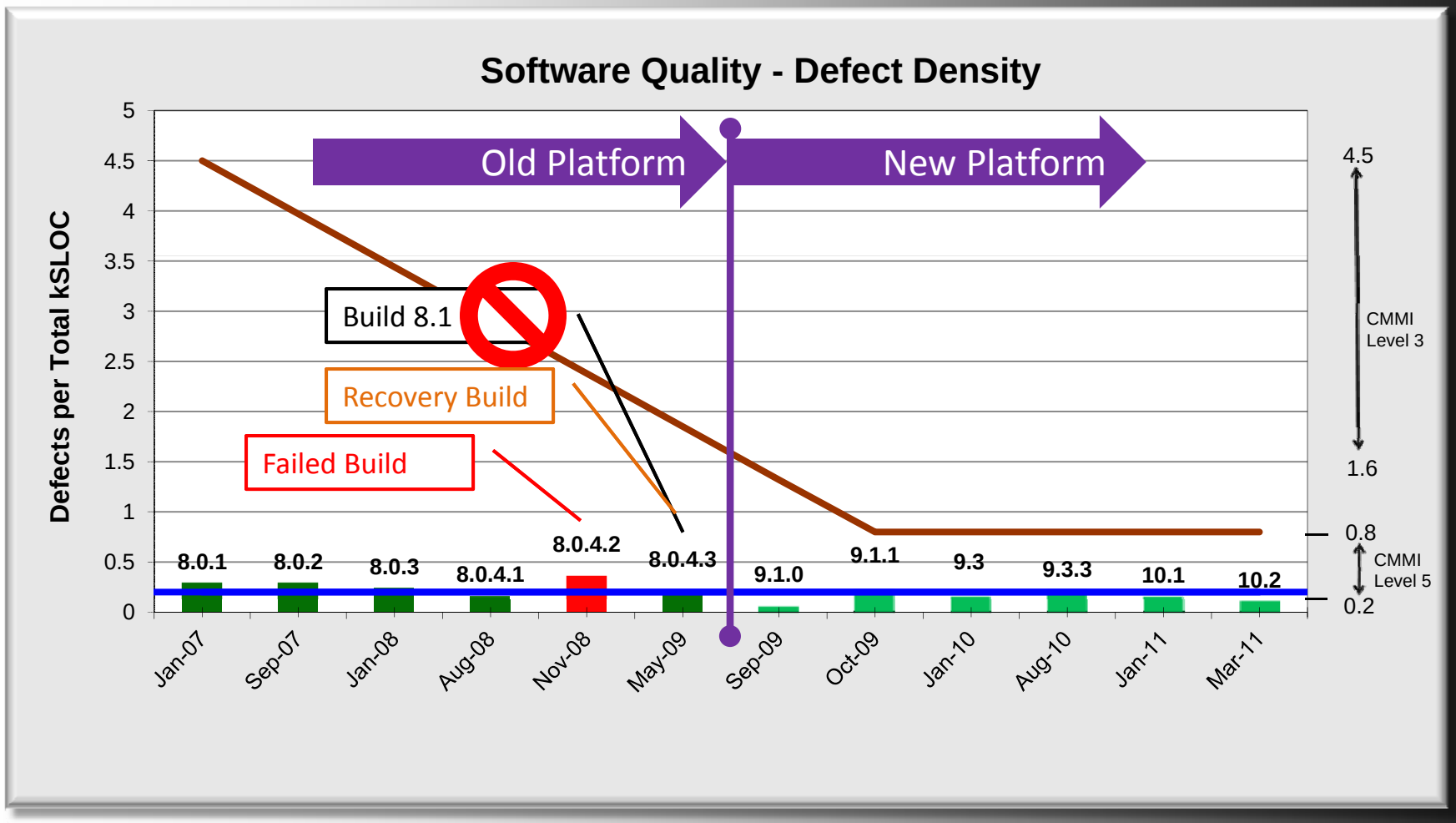
Maintainability

- Independent Study
  - 2005 vs. 2010 Code Comparison
  - Analysis and Assessment of Quality and Maintainability

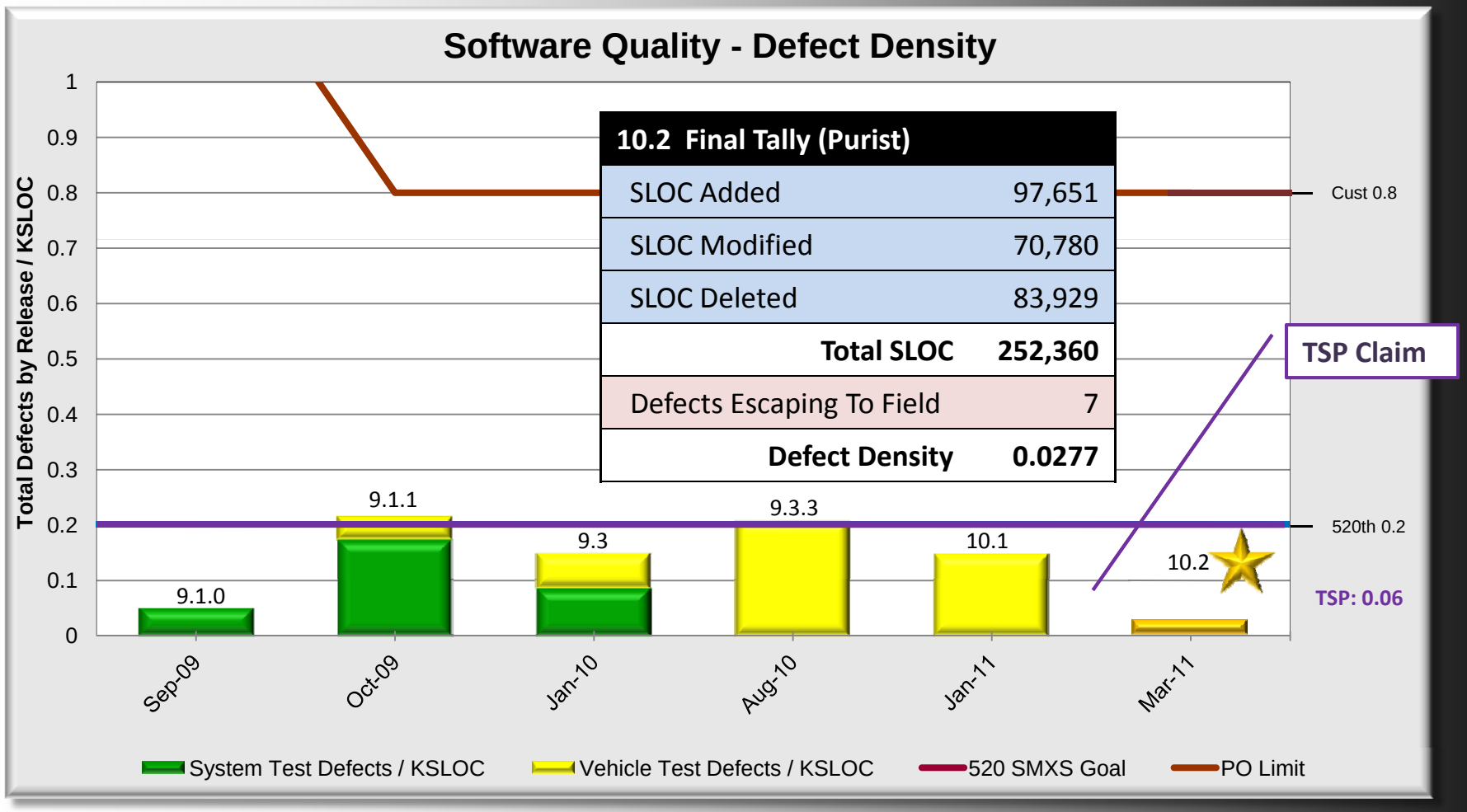
"the size of the software has increased by order of magnitude"

" Overall quality of coding (complexity, cohesion, coupling) is better, and as a result, the expectations regarding number of faults and maintenance costs are also better."

Software Quality - Actual

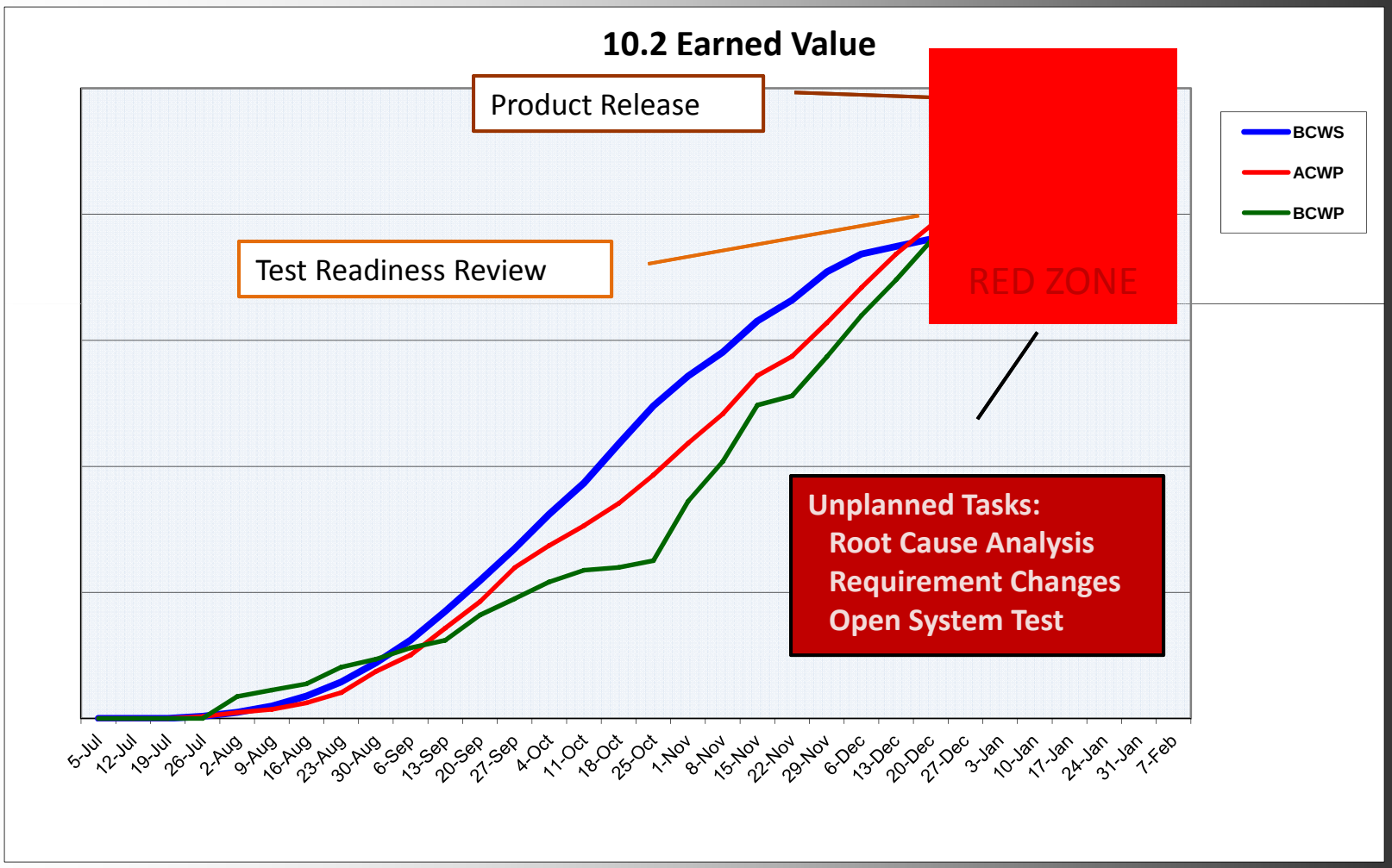


Software Quality Close-Up



10.2 Final Tally (Purist)	
SLOC Added	97,651
SLOC Modified	70,780
SLOC Deleted	83,929
Total SLOC	**252,360**
Defects Escaping To Field	7
Defect Density	**0.0277**

10.2 EVMS


10.2 Earned Value
Product Release
Test Readiness Review
RED ZONE
BCWS
ACWP
BCWP
Unplanned Tasks:
Root Cause Analysis
Requirement Changes
Open System Test
5-Jul
12-Jul
19-Jul
26-Jul
2-Aug
9-Aug
16-Aug
23-Aug
30-Aug
6-Sep
13-Sep
20-Sep
27-Sep
4-Oct
11-Oct
18-Oct
25-Oct
1-Nov
8-Nov
15-Nov
22-Nov
29-Nov
6-Dec
13-Dec
20-Dec
27-Dec
3-Jan
10-Jan
17-Jan
24-Jan
31-Jan
7-Feb

Delight The Customer

"Working with you is like working with a bunch of lawyers."

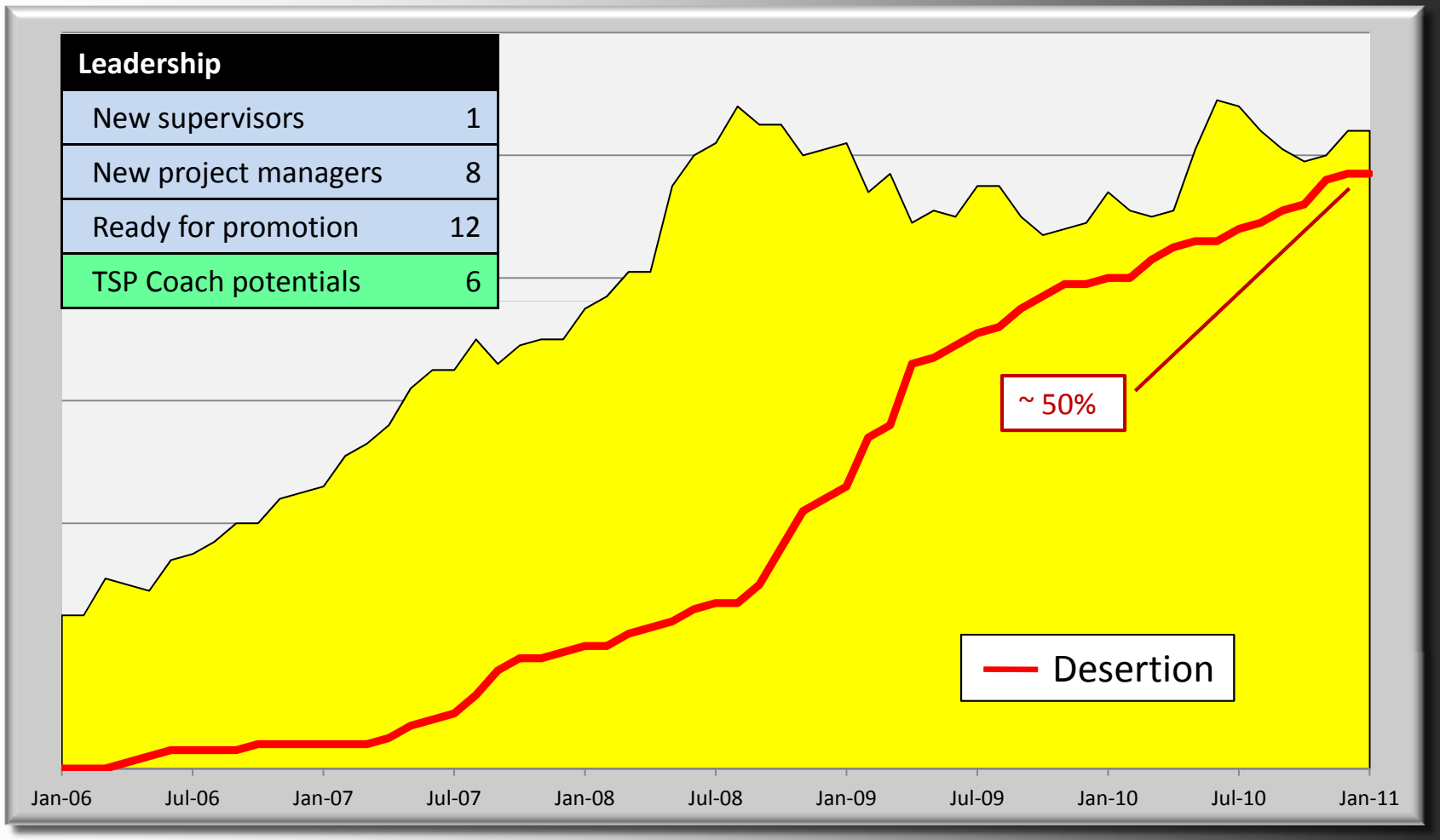
"What kind of cool-aid are you drinking out there?"

"We love your software…
… we just want more of it sooner."

"From analysis, to implementation, to test, delivery, and loading – the leadership and initiative… were crucial in the execution of this plan."

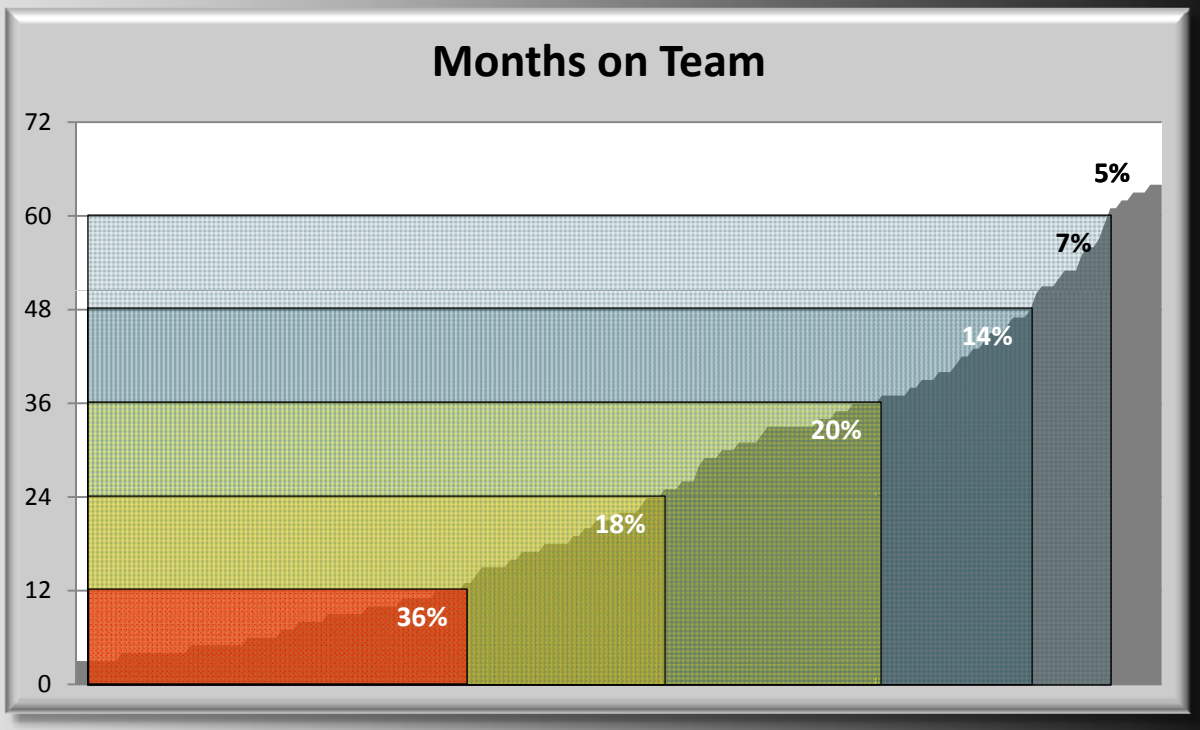
"You are all doing a fantastic job. Thank you."

Cost Of Perfection



Reasons For Deserting

- Opportunity
- Job Security
- Stress
- Compatibility



Gently Persuaded To Leave

Part V

Lessons Learned

Lessons Learned

- Trust Your TSP Instincts
  - Customer estimates always optimistic
  - Patience, gentle persuasion & long suffering
  - Data is not always convincing

- Data Has Its Place
  - Nothing spoils a good argument like data
  - Timely… Consistent… Pertinent… Accurate…
  - … UNDERSTOOD

Lessons Learned

- Hope Is NOT A Planning Tool

  - Stick to the CODE
  - Cultivate your DATA

- Embrace TSP Team Culture
  - **Must have top down support**
  - Mentorship, discipline & rewards
  - Teams will adjust assigned resources

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We Thank Ye All!