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# Value of CMMI High Maturity to Industry

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# Five Operating Sectors

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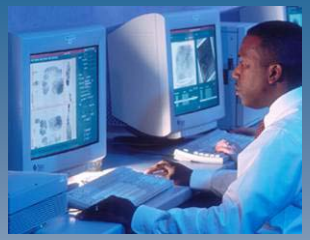
## Aerospace Systems

- Large Scale Systems Integration
- C⁴ISR
- Unmanned Systems
- Airborne Ground Surveillance / C2
- Naval BMC2
- Global / Theater Strike Systems
- Electronic Combat Operations
- ISR Satellite Systems
- Missile Defense Satellite Systems
- MILSATCOM Systems
- Environmental & Space Science Satellite Systems
- Directed Energy Systems
- Strategic Space Systems

## Electronic Systems

- Radar Systems
- C⁴ISR
- Electronic Warfare
- Naval & Marine Systems
- Navigation & Guidance
- Military Space
- Government Systems

## Information Systems



- Command & Control Systems
- Network Communications
- Intelligence, Surveillance & Reconnaissance Systems
- Enterprise Systems and Security
- IT/Network Outsourcing
- Intelligence
- Federal, State/Local & Commercial
- Homeland Security & Health

## Shipbuilding

- Naval Systems Integrator
- Surface Combatants
- Expeditionary Warfare Ships
- Auxiliary Ships
- Marine Composite Technology
- Coast Guard Cutters
- Commercial Ships
- Nuclear Aircraft Carriers
- Nuclear Submarines
- Fleet Maintenance
- Aircraft Carrier Overhaul & Refueling

## Technical Services

- Systems Support
- Base and Infrastructure Support
- Range Operations
- Maintenance Support
- Training and Simulations
- Technical and Operational Support
- Live, Virtual and Constructive Domains
- Life Cycle Optimization
- Performance Based Logistics
- Modifications, Repair and Overhaul (MRO)
- Supply Chain Management
- Lead Support Integrator (LSI)

# Long Legacy of High Maturity

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- Northrop Grumman has a long history of embracing High Maturity
  - 1986 First CMM appraisal
  - 1996 Achieved first High Maturity assessment CMM for Software
  - 2002 Early adopter of CMMI High Maturity in 2 appraisals
- Northrop Grumman currently has 12 CMMI High Maturity Appraisals (26% of all US company CMMI Maturity Level 5 appraisals)
  - The Information Systems Sector currently has 9 of 12 Northrop Grumman High Maturity Appraisals (19.6% of US companies at CMMI Level 5)
  - The Defense Systems Division currently holds 5 of them that cover 27 development sites (11% of US appraised organizations at CMMI Level 5)
  - Another DSD High Maturity appraisal is underway as we speak.
- There is a reason
  - Our Division General Manager has managed High Maturity organizations since 1996
  - We firmly believe that we're better at what we do because of our commitment to high maturity processes

**High Maturity has been a part of our development life for over a decade**

# CMMI Benefits – Often Expressed as ROI

2005 (1)

*Table 2: CMMI Performance Results Summary*

| Performance Category | Median Improvement | Number of Data Points |
|---|---|---|
| Cost | 34% | 29 |
| Schedule | 50% | 22 |
| Productivity | 61% | 20 |
| Quality | 48% | 34 |
| Customer Satisfaction | 14% | 7 |
| Return on Investment | 4.0 : 1 | 22 |

2007 (2)

| Performance Category | Median | Number of Data Points |
|---|---|---|
| Cost | 20% | 21 |
| Schedule | 37% | 19 |
| Productivity | 62% | 17 |
| Quality | 50% | 20 |
| Customer Satisfaction | 14% | 6 |
| Return on Investment | 4.7 : 1 | 16 |

(1) Performance Results of CMMI-Based Process Improvement, D. Gibson, D. Goldenson, K. Kost, Aug. 2006 SEI Technical Report

(2) Performance Results From Process Improvement, SEI and DACS, March 2007, Software Tech News

# Benefits – Often Increased Productivity

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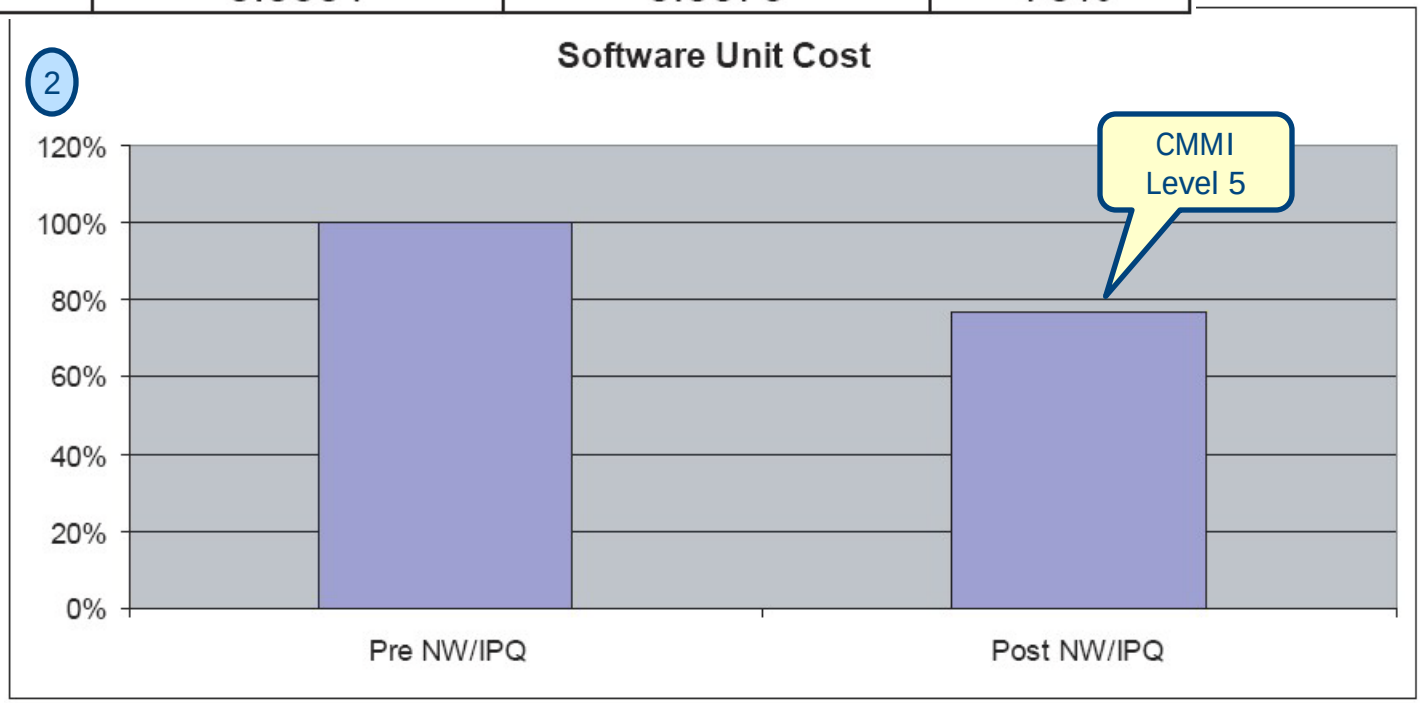
| 1 | Baseline Productivity | CMMI® Productivity Improvements | Impact |
|---|---|---|---|
| Average Project Size | 133 | 133 | |
| Average FP/EM | 10.7 | 24.8 | +132% |
| Average project duration (months) | 6.9 | 3.5 | -50% |
| Average effort/FP | $939. | $467. | -50% |
| Defect Density | 0.0301 | 0.0075 | -75% |

2




1 Performance Outcomes of CMMI Based Processess, P. McNoone & S. Rohde, Lockheed Martin

2 Improved Performance Should be Expected from Process Improvement, D. Garmus & S. Iwaniki, David Consulting Group

# Everybody Does Defect Analysis ...BUT..

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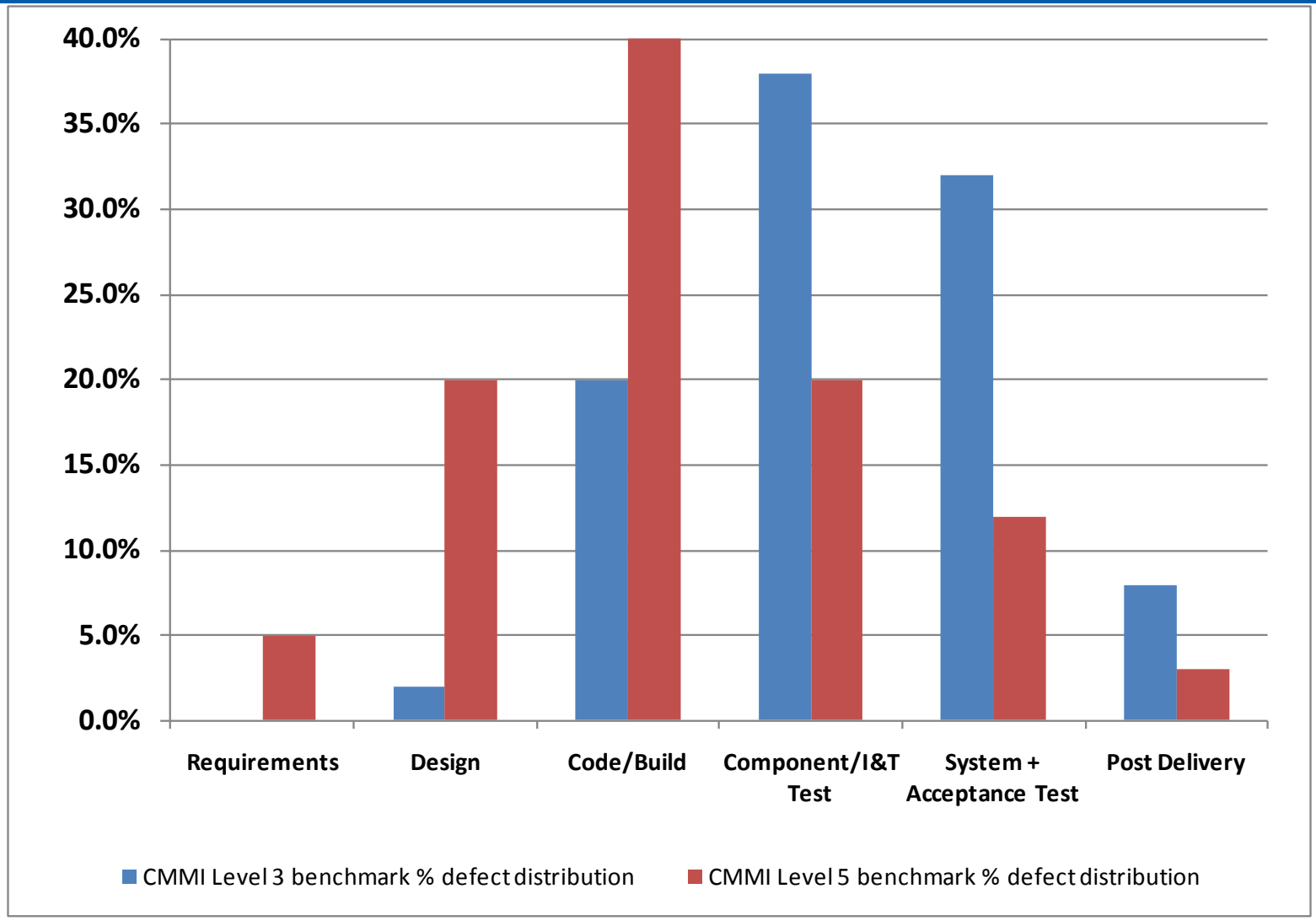
- The cost of correcting defects does vary
- "Cost to correct" depends upon when you find and fix

| Phase | Hours to Fix [1] |
|---|---|
| Requirements through Code / Build | 6 |
| Component / I&T Testing | 37 |
| System & Acceptance Testing | 74 |
| Post Delivery | 123 |

- Level 3 organizations find defects later in the cycle
- Level 5 organizations find defects earlier

[1] Source of Data:
Madachy, Ray. "Quantitative Process Management and Software Quality Management", Department of Computer Science, University of Southern California, February 2000

# Distribution – When Defects Found



# Real Value of CMMI High Maturity

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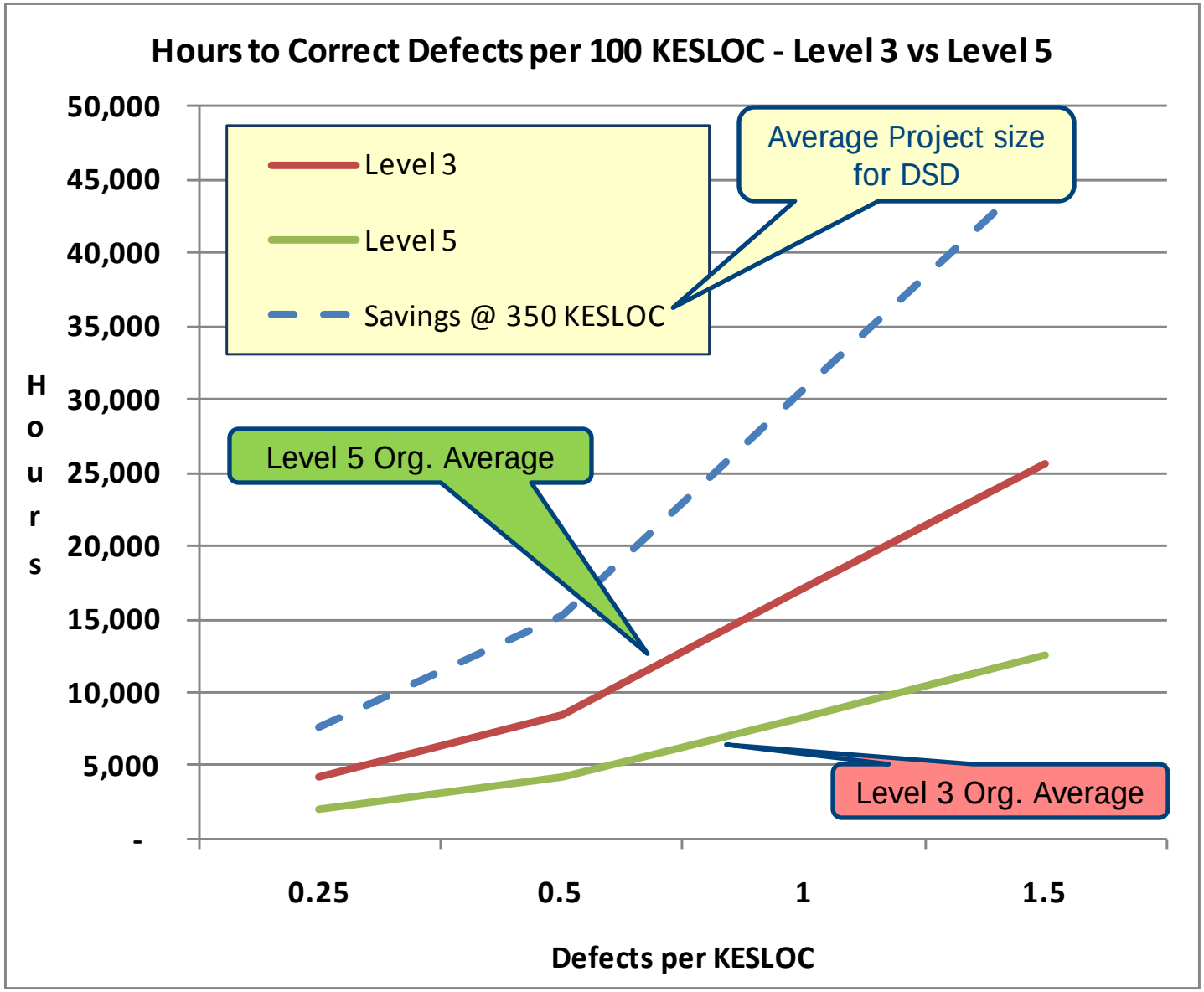
| Cost of 100 Defects Found & Fixed | | | | | | |
|---|---|---|---|---|---|---|
| Phase | Level 3 Org | | Level 5 Org | | Value of HiMAT | |
| | % | Fix Hrs | % | Fix Hrs | Delta Hrs | % Savings |
| Reqs thru Code Build (6 hrs) | 22% | 132 | 65% | 390 | (258) | (5%) |
| Component / I&T (37 hrs) | 38% | 1406 | 20% | 740 | 666 | 14% |
| System & Acceptance Test (74 hrs) | 32% | 2368 | 12% | 888 | 1480 | 30% |
| Post Delivery (123 hrs) | 8% | 984 | 3% | 369 | 615 | 13% |
| Total | | 4890 | | 2387 | 2503 | 51% |

**50 % Savings and Fewer Defects Delivered to Your Customers - Priceless**

# Value Received Varies by Defect Rate



# High Maturity Benefits

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| Benefit | Result |
| --- | --- |
| • Improved Productivity | Reduced Development Cost |
| | Shorter Development Schedule |
| • Fewer Delivered Defects | Better Acceptance Test Results |
| | Better User Satisfaction |
| • Lower Cost of Defect Correction | Reduced Development Cost |
| | Fewer Development Delays |


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