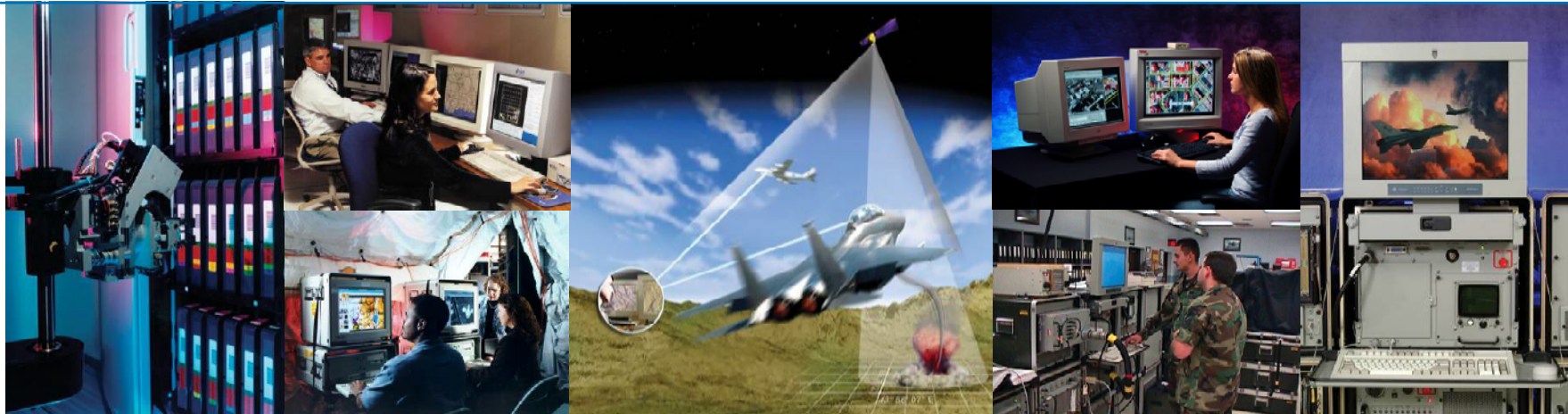
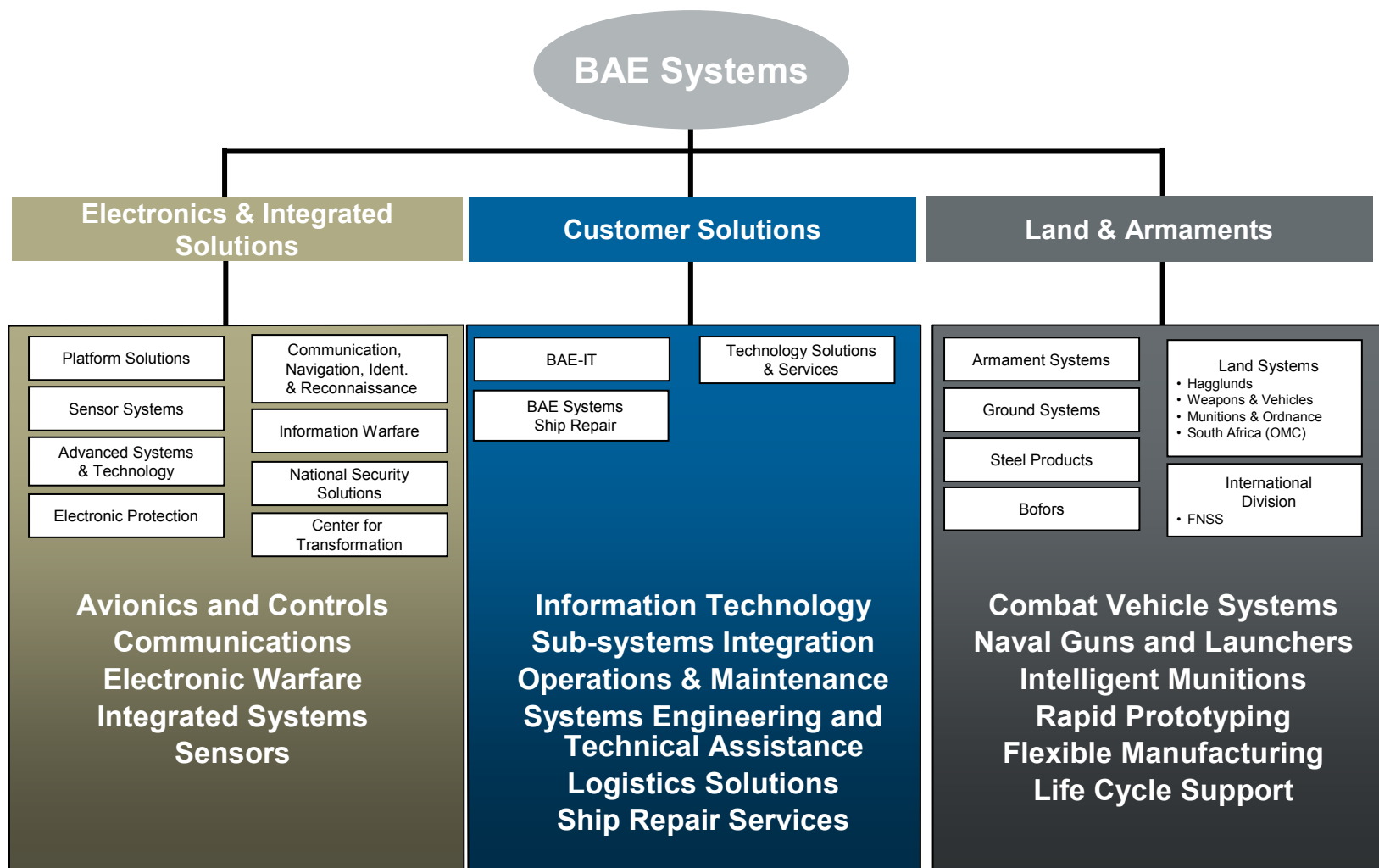


The Road to Process Improvement Successes: CMMI Level 5/ISO 9001:2000 Business Model



BAE Systems Lines of Business



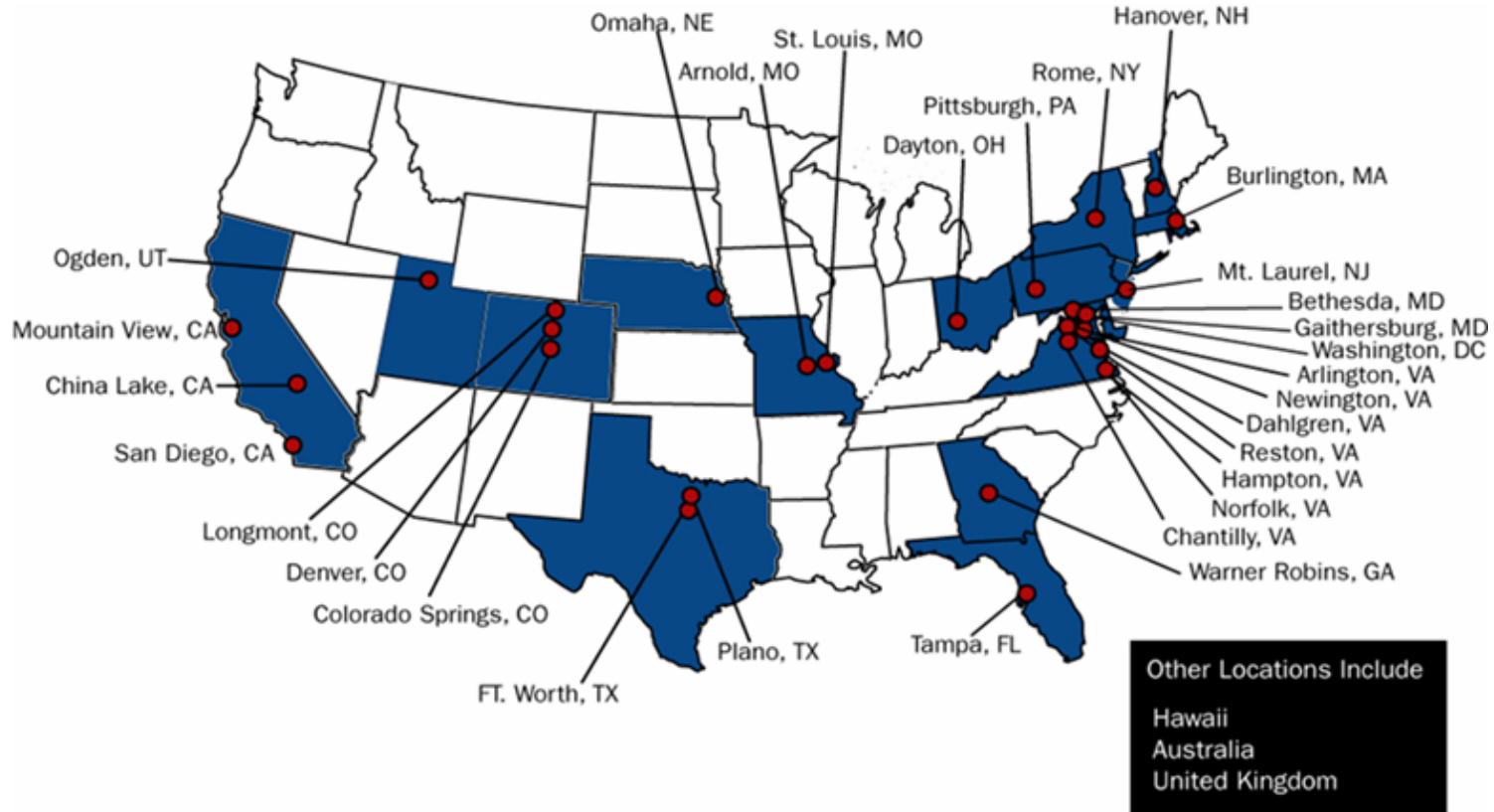
National Security Solutions



National Security Solutions Employees and sites

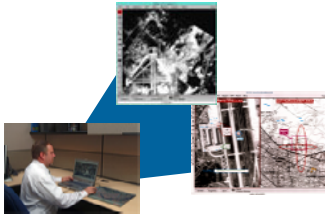


- 56 sites across the US
- Nine sites in other countries



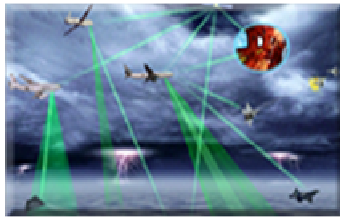
National Security Solutions Business Areas

BAE SYSTEMS



Systems Integration

Large-scale system-of-systems integration of information systems for the defense and intelligence community



Intelligence Systems

Image management and exploitation systems for mapping, charting, geodesy, and intelligence applications

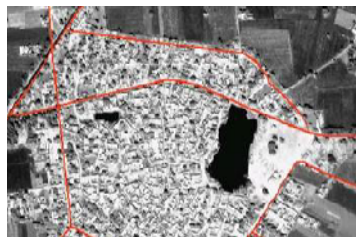


Defense Systems

Image processing, mission management, and C4ISR technologies for end-to-end mission performance, targeting and test solutions for advanced defense electronic systems

Geospatial Products and Solutions

Commercial Software for Photogrammetry, Mapping & GIS, Imagery Exploitation, C4ISR, Targeting, Visualization & Simulation, Natural Resource Management, and Vertical Obstruction Identification



Advanced Information Technologies

Developing advanced technology solutions that provide integrated, high performance capabilities for the entire information chain.

Road to Process Improvement (PI) Successes

CMMI Level 5 / ISO 9001:2000 Business Model

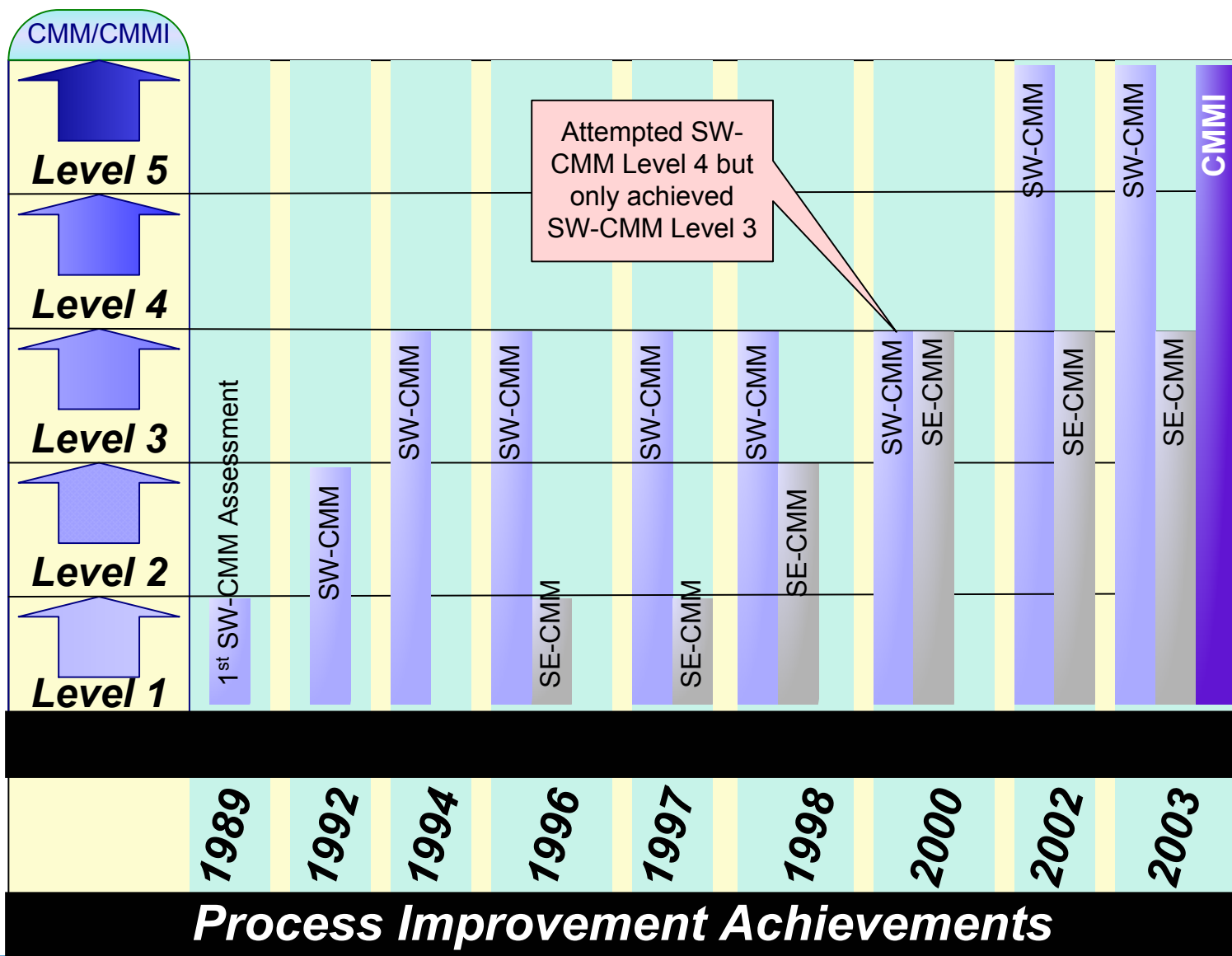
BAE SYSTEMS

Topics Covered

- PI Evolution Roadmap
- PI Expansion
- PI and Business Impacts/Value Realized

PI Evolution Roadmap

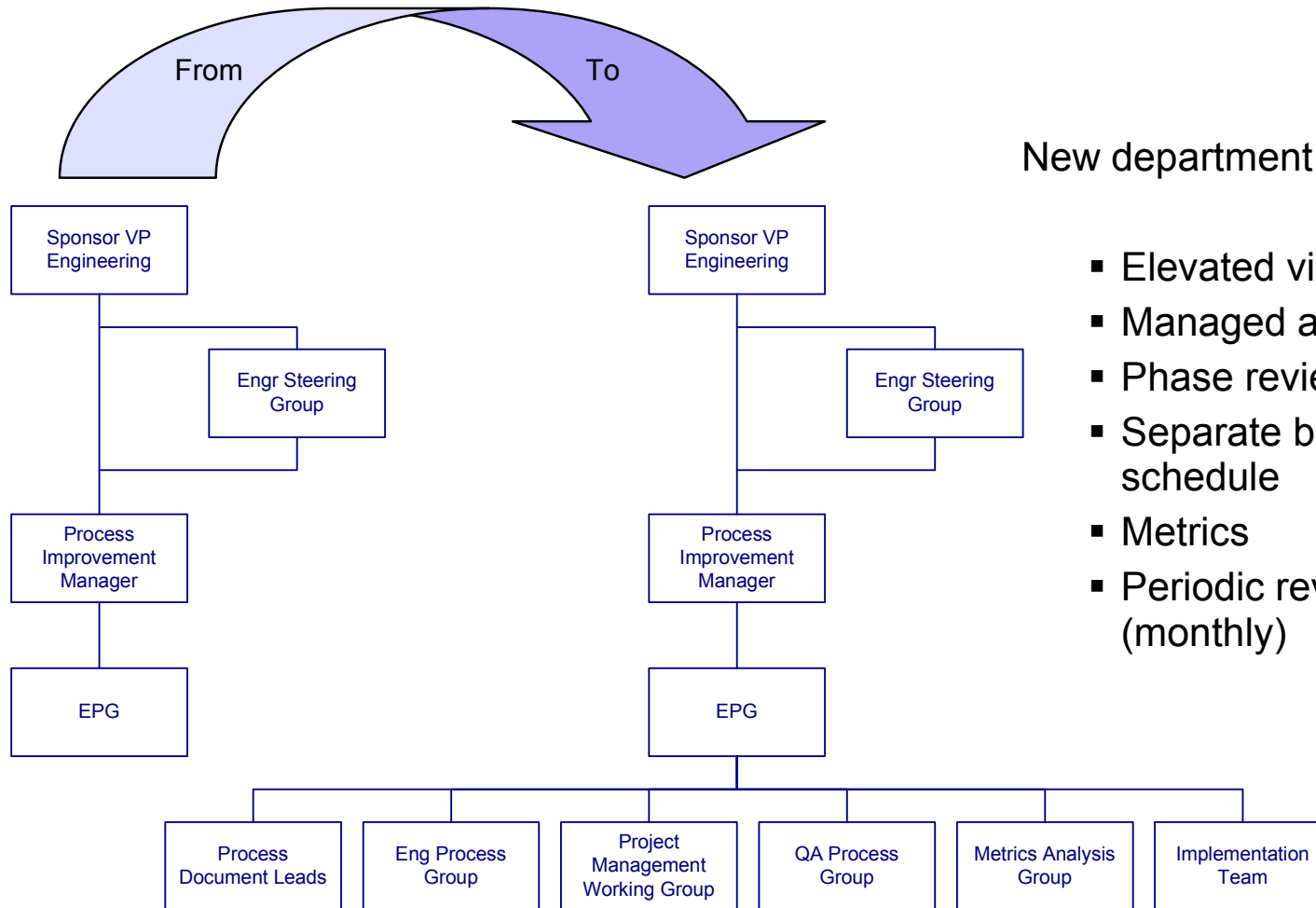
NSS Process Improvement History: CMM/CMMI



Process Improvement Achievements

PI Evolution Roadmap

Process Improvement Organization Elevated and Broadened

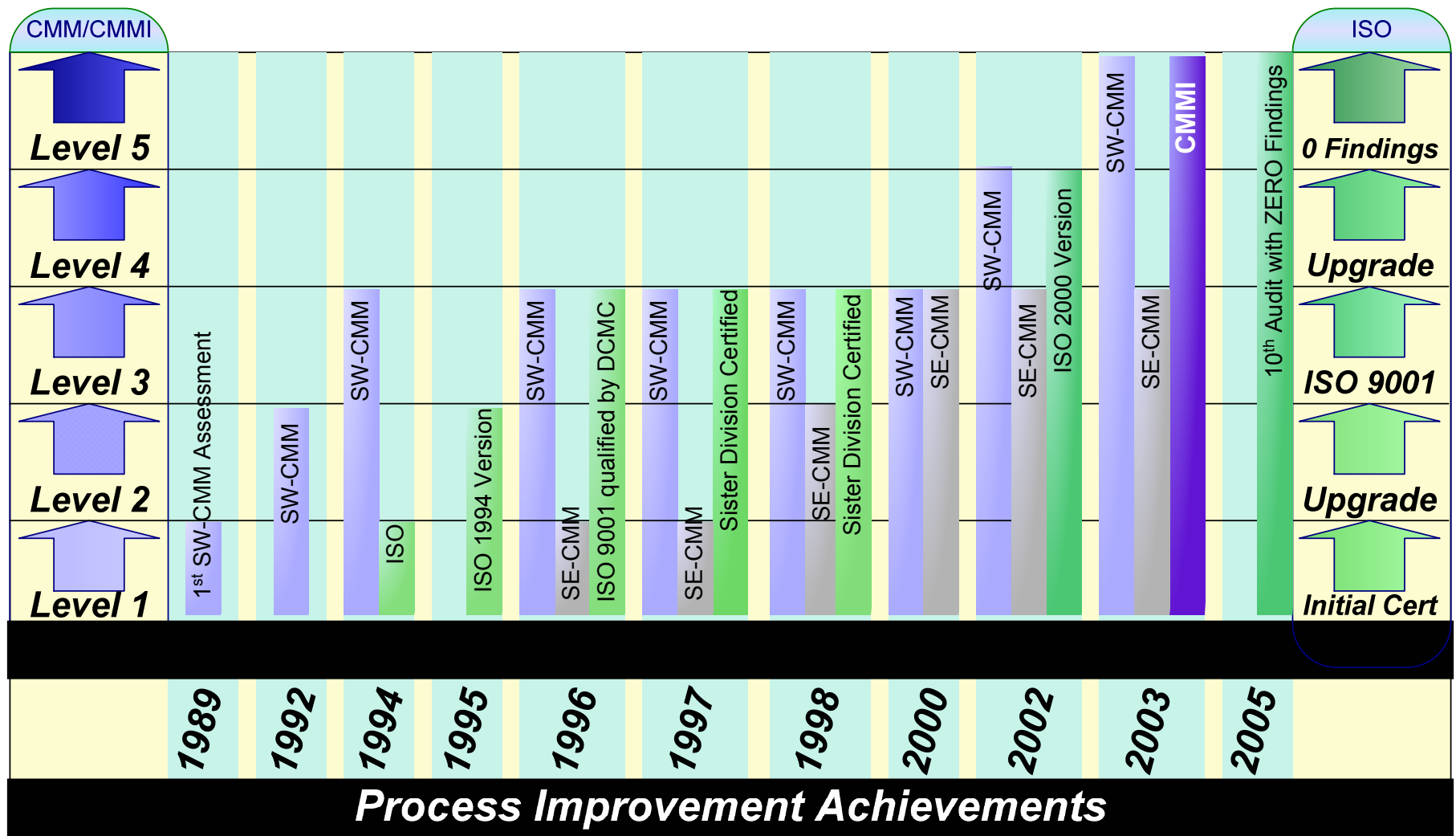


New department provides focus

- Elevated visibility
- Managed as a project
- Phase reviews
- Separate budget, resources, schedule
- Metrics
- Periodic reviews with Exec Mgt (monthly)

PI Evolution Roadmap

NSS Process Improvement History: CMM/CMMI and ISO



PI Evolution Roadmap

ISO 9001 – Quality Management System Evolution

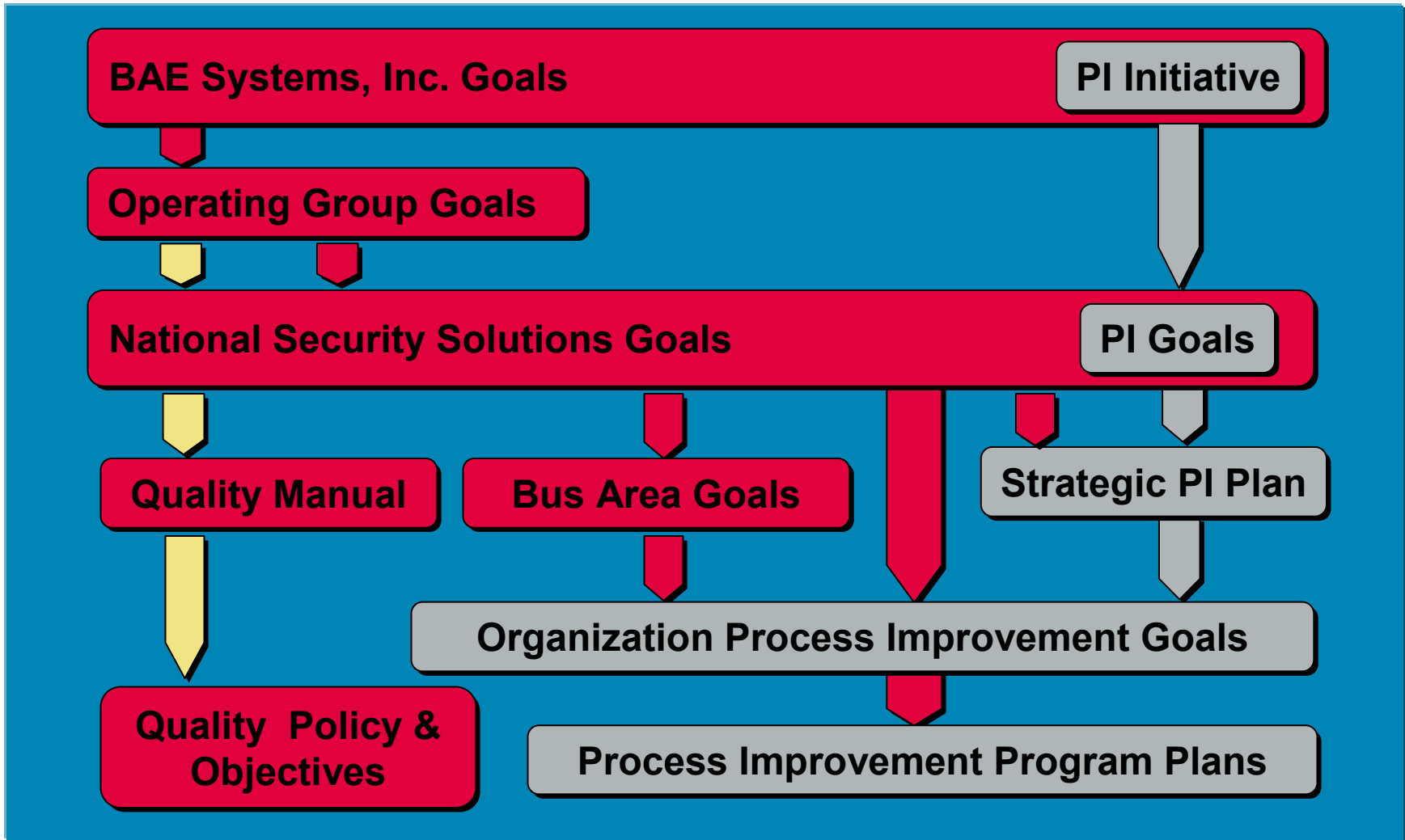
- Prior to September 1994
 - Approved to Military Standards
 - Changing DoD initiatives for procurement reform

- Issues
 - Given 12 months to achieve initial ISO 9001 certification (typically took 18 months, and 70% failed assessment the first time)
 - Documentation overkill and no time to re-architect
 - Lack of engineering-specific process documentation
 - Poor control and management of records and training needs

- Improvements
 - Selected personnel to receive formal ISO Implementation and Auditor Training
 - Established multi-disciplined ISO Steering Committee
 - Conducted company-wide ISO Awareness Training
 - Generated requirements-to-document trace mechanism
 - Developed and implemented required process documentation with increased focus on engineering practices
 - Strengthened the commitment to training
 - Implemented company-wide mechanism for control of records
 - Achieved ISO Certification in 8 months and passed the first time

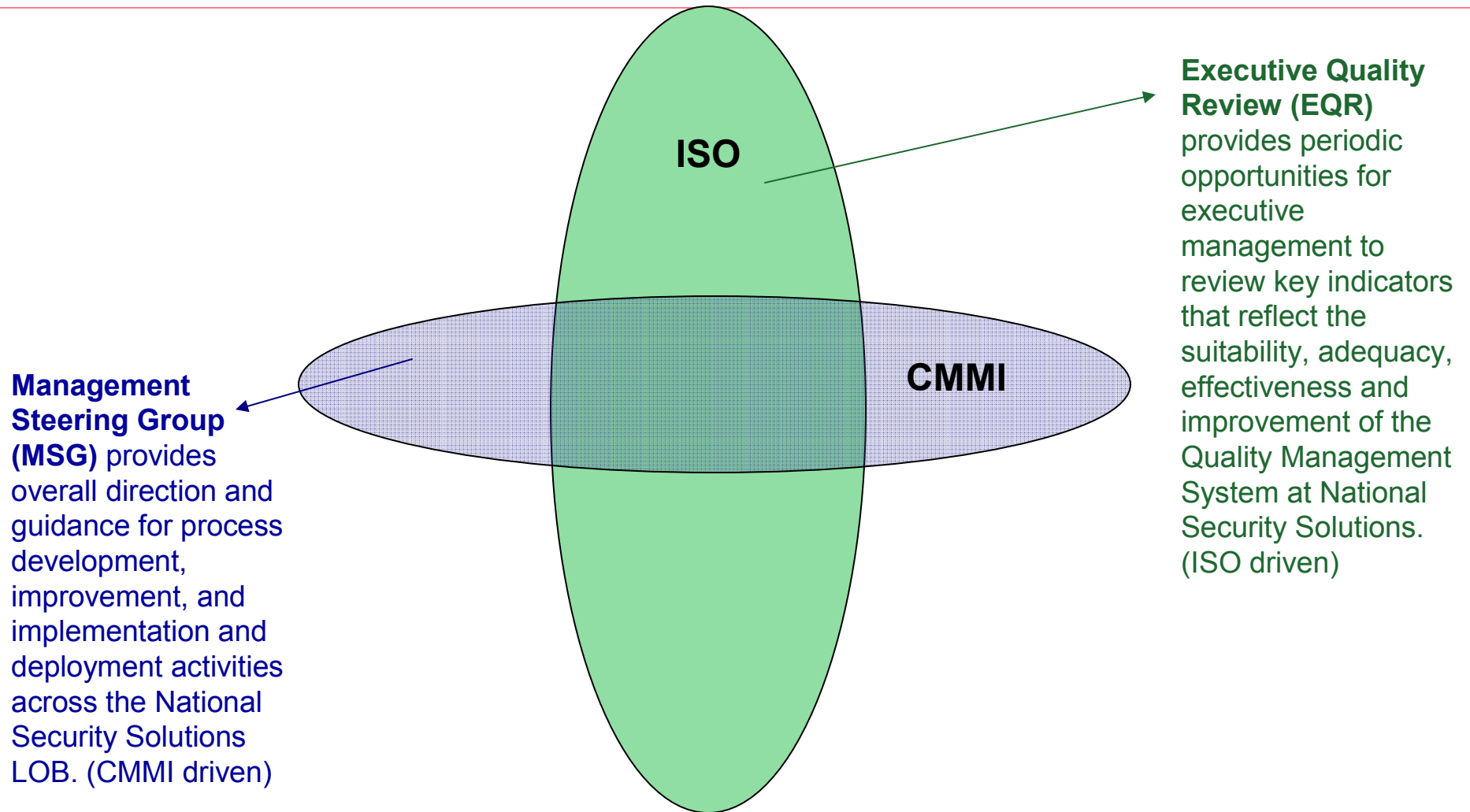
PI Expansion

Flow Down of Goals



PI Expansion

Entire Management System



PI Expansion

Membership

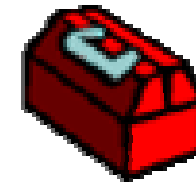


| Organization/Function | EQR | MSG |
|---|-----|-----|
| President (EQR Sponsor/MSG Co-Sponsor) | ✓ | ✓ |
| Organizational Group VP Performance Excellence (MSG Co-Sponsor) | ✓ | ✓ |
| VP & Deputy GM | ✓ | ✓ |
| Chief of Staff | ✓ | |
| Director Performance Excellence (EQR/MSG Chair) | ✓ | ✓ |
| VP Systems Integration | ✓ | ✓ |
| VP Intelligence Systems | ✓ | ✓ |
| VP Defense Systems | ✓ | ✓ |
| VP Geospatial Products & Solutions | ✓ | ✓ |
| VP & GM Advanced Information Technologies | ✓ | ✓ |
| VP Engineering | ✓ | ✓ |
| VP Operations | ✓ | ✓ |
| VP Business Development | ✓ | ✓ |
| VP AIT Strategic Growth | ✓ | |
| Director Integration | ✓ | |
| VP Legal | ✓ | |
| VP Contracts | ✓ | |
| VP Finance | ✓ | |
| Director Human Resources | ✓ | ✓ |
| Director Communications | ✓ | |
| Director Security | ✓ | |
| Director Information Technology | ✓ | ✓ |
| Organizational Process Group Chair | | ✓ |
| Organizational Process Group Expansion Chair | | ✓ |

PI Expansion

Entire Management System – Shared Tools/Mechanisms/Enablers

- Process Change Request (PCR)
- Document Restructure Team (DRT)
- Sector-Wide Integration of Requirement Mapping (SWIRM)
- Corrective/Preventive Action
- Quality Audit System (QAS) and Process Health
- Customer Satisfaction



PI Expansion

Process Change Request (PCR)

- Employees provide feedback (changes and additions) on processes, tools, and training material
 - Web based PCR form implemented
 - Easy use resulted in increased visibility and involvement
- Document PCRB decisions
- PCRs assigned to process owners for evaluation and implementation

Process Change Request

[PCR Home](#)

[PCR Users Guide](#)

Hint: Place cursor over red text to reveal hints

From:

| last name | first name | email address | phone number |
|----------------------|----------------------|----------------------|----------------------|
| <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> |

@baesystems.com

Source: **Criticality:** **Criticality Description:**

Topic:

Regarding: **Subject:**

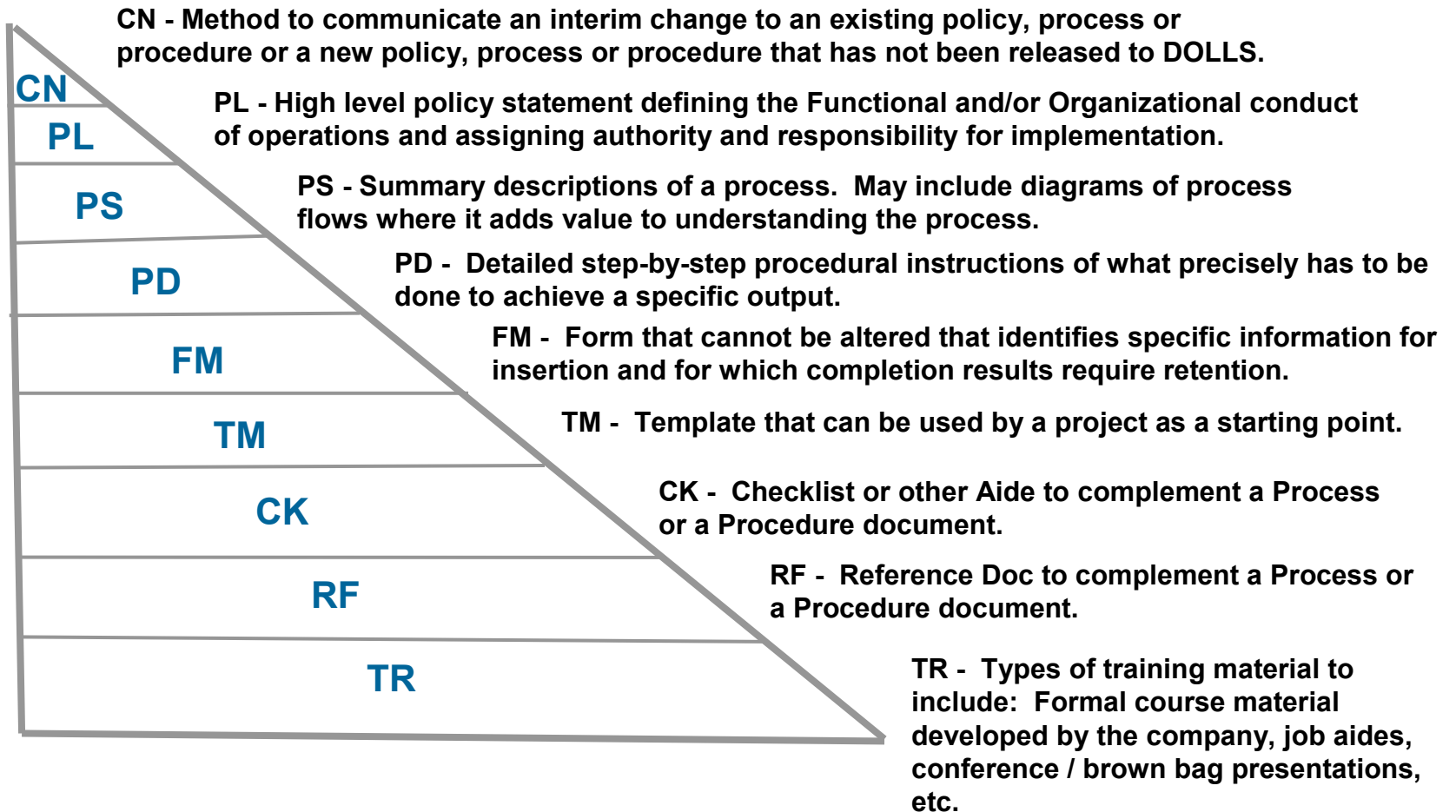
Request:

Notify Additional Persons:

Process Ideas

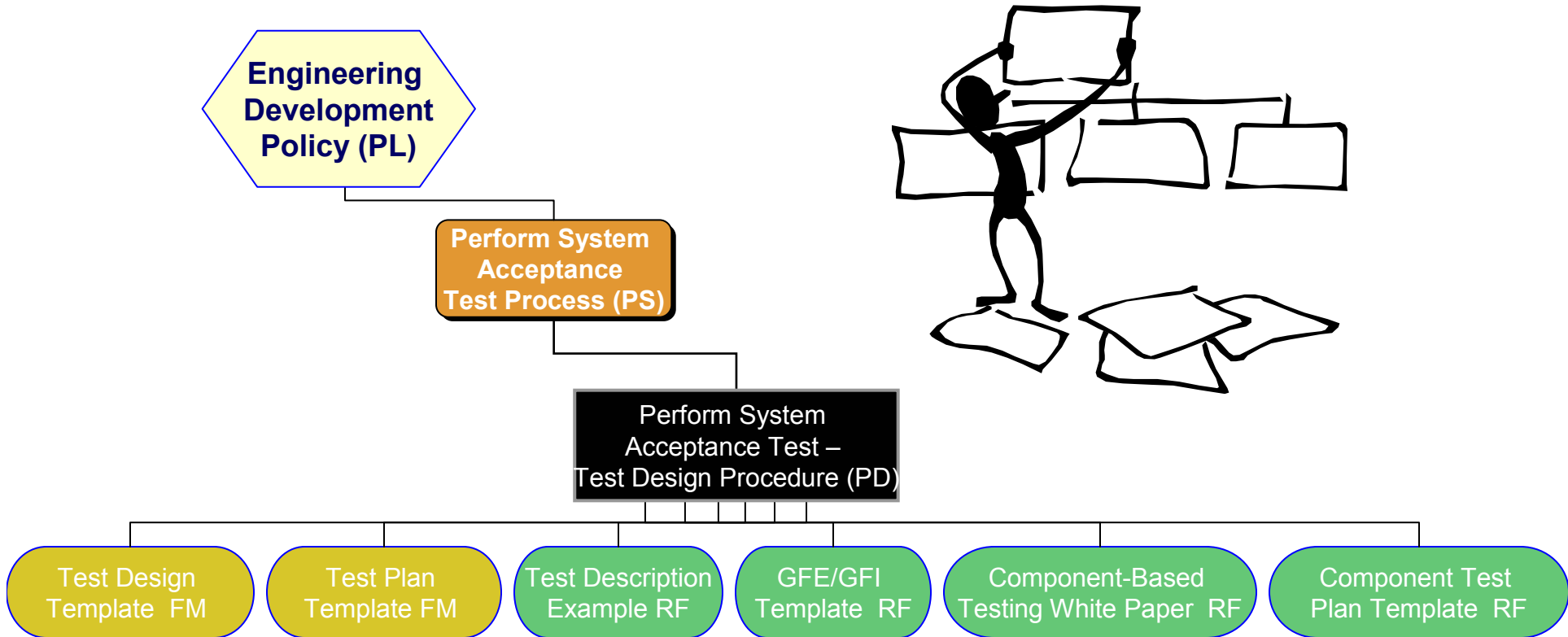
PI Expansion

Process Document Structure



PI Expansion

Sample Branch of the Integrated Engineering Process Document Tree



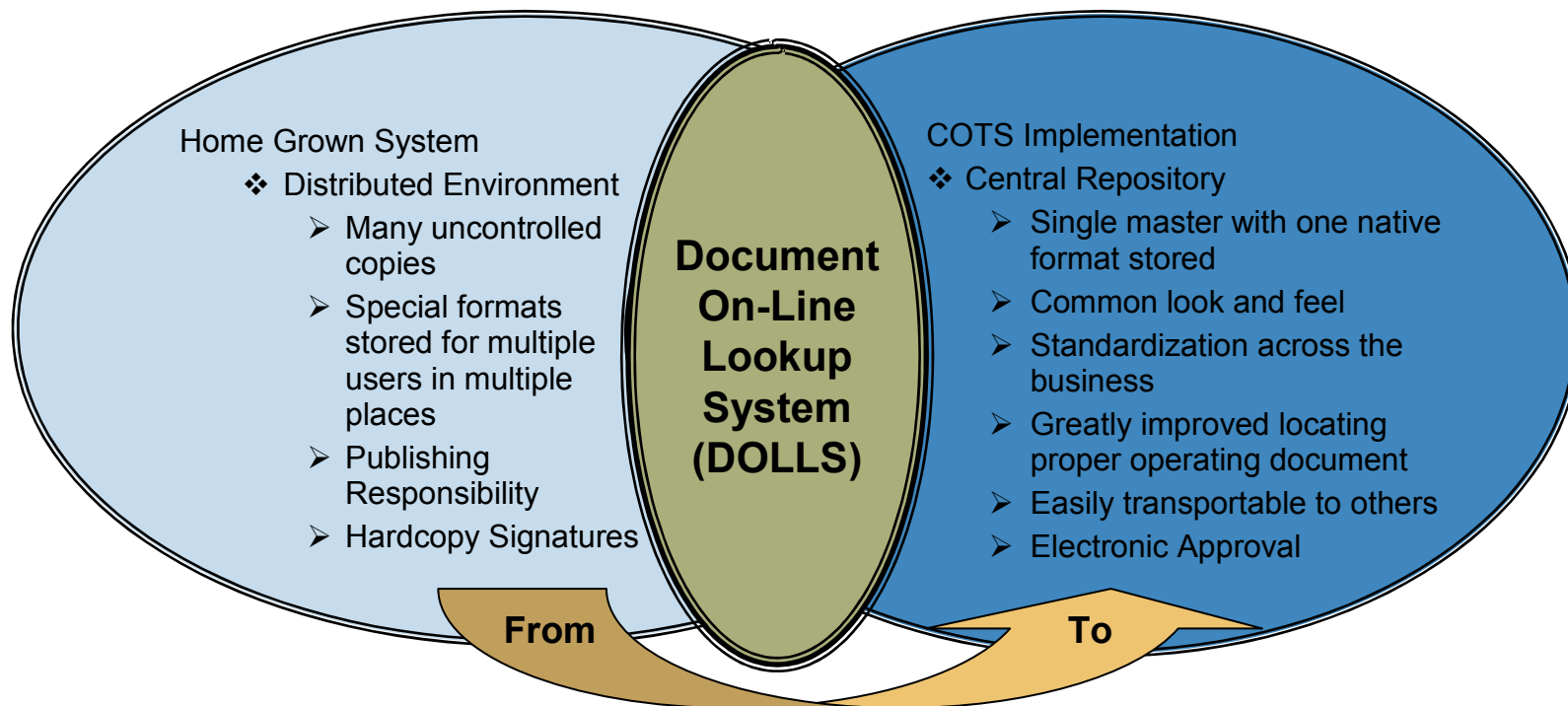
FM = Form
RF = Reference

PI Expansion

Process Document Structure

Company-wide Directives Restructure

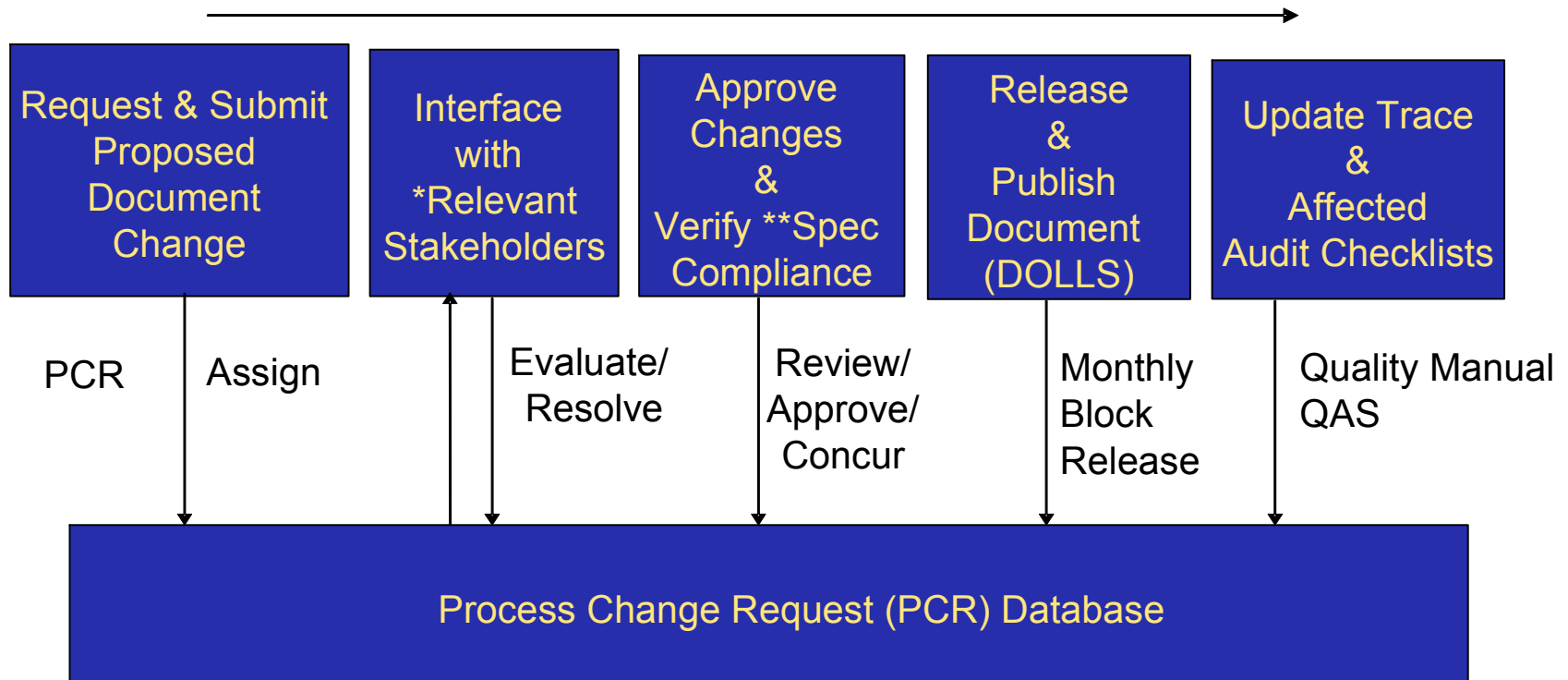
Established a Document System that Fosters and Promotes Continuous Improvement



PI Expansion

Sector-Wide Integration of Requirements Mapping (SWIRM)

Maintain Document Compliance and Trace



- * Relevant Stakeholders:
- Process/Document Owners
 - Compliance Authority/Coordinators

- ** Specification (Spec) Requirements:
- CMMI
 - ISO 9001
 - Corporate/Management Directives
 - Contractual/Regulatory Requirements

PI Expansion

Quality Audit System (QAS) and Process Health



Goal: Exceed 90% health.

Goal Status: All Process Areas exceeded 90%.

PROCESS HEALTH PROGRAM LEVEL AUDITS -- BY PROCESS AREA

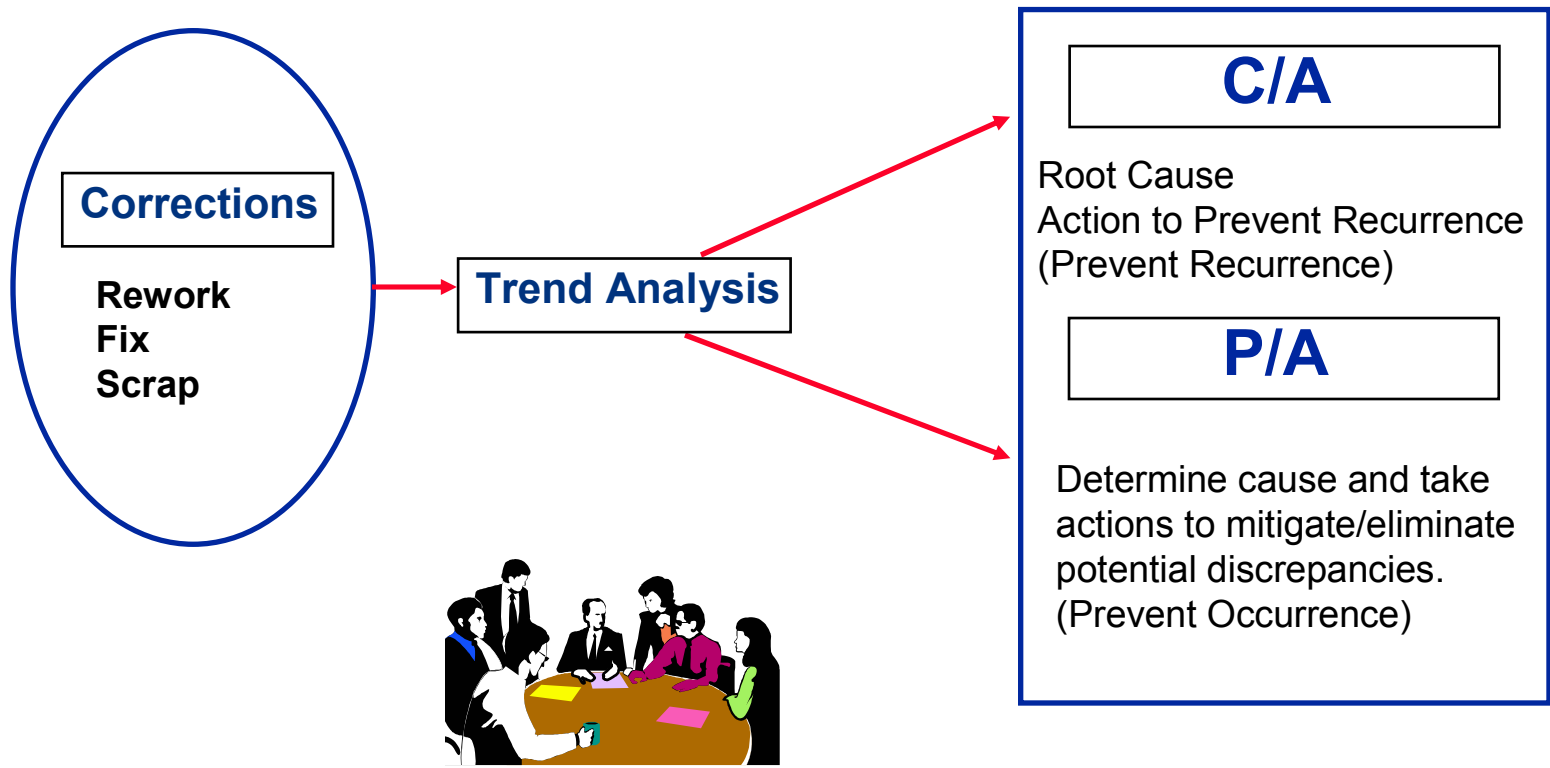
| PROCESS AREA | 12 MONTH PROCESS HEALTH '01-JUN-04 thru '31-MAY-05 | | | | | | | 3 MONTH PROCESS HEALTH '01-MAR-05 thru '31-MAY-05 | | | | | | |
|--------------------------------------|---|-------------|------------|---------------|-----------|-----------|--------------|--|------------|------------|---------------|-----------|----------|--------------|
| | OBSERVATIONS | | | DISCREPANCIES | | | Health | OBSERVATIONS | | | DISCREPANCIES | | | Health |
| | High | Med | Low | High | Med | Low | | High | Med | Low | High | Med | Low | |
| KEY PRACTICE - QUICK CHECK | 22 | 629 | 0 | 2 | 22 | 0 | 96.1% | 12 | 314 | 0 | 2 | 16 | 0 | 94.1% |
| PROJECT PLANNING | 59 | 83 | 46 | 1 | 0 | 0 | 99.1% | 13 | 24 | 14 | 0 | 0 | 0 | 100.0% |
| PROJECT MONITORING AND CONTROL | 61 | 199 | 25 | 2 | 0 | 4 | 98.4% | 0 | 0 | 0 | 0 | 0 | 0 | n/a |
| SUPPLIER AGREEMENT MANAGEMENT | 21 | 25 | 9 | 0 | 0 | 0 | 100.0% | 9 | 15 | 7 | 0 | 0 | 0 | 100.0% |
| INTEGRATED PROJECT MANAGEMENT | 52 | 147 | 66 | 0 | 0 | 2 | 99.8% | 0 | 0 | 0 | 0 | 0 | 0 | n/a |
| RISK MANAGEMENT | 68 | 99 | 0 | 0 | 1 | 0 | 99.6% | 13 | 26 | 0 | 0 | 0 | 0 | 100.0% |
| QUANTITATIVE PROJECT MANAGEMENT | 19 | 87 | 67 | 0 | 4 | 0 | 97.3% | 5 | 21 | 14 | 0 | 0 | 0 | 100.0% |
| REQUIREMENTS MANAGEMENT | 93 | 45 | 13 | 0 | 0 | 2 | 99.7% | 24 | 10 | 2 | 0 | 0 | 0 | 100.0% |
| REQUIREMENTS DEVELOPMENT | 91 | 105 | 51 | 0 | 0 | 0 | 100.0% | 0 | 8 | 0 | 0 | 0 | 0 | 100.0% |
| TECHNICAL SOLUTION | 138 | 213 | 54 | 0 | 3 | 1 | 99.3% | 16 | 12 | 0 | 0 | 0 | 0 | 100.0% |
| PRODUCT INTEGRATION | 143 | 140 | 185 | 0 | 1 | 8 | 99.2% | 26 | 32 | 27 | 0 | 0 | 0 | 100.0% |
| VERIFICATION | 230 | 180 | 179 | 1 | 0 | 0 | 99.7% | 50 | 33 | 39 | 0 | 0 | 0 | 100.0% |
| VALIDATION | 95 | 14 | 110 | 1 | 0 | 2 | 98.9% | 11 | 0 | 12 | 0 | 0 | 0 | 100.0% |
| CONFIGURATION MANAGEMENT | 40 | 54 | 23 | 1 | 1 | 0 | 97.9% | 18 | 17 | 11 | 1 | 0 | 0 | 96.5% |
| PROCESS AND PRODUCT QUALITY ASSURANC | 182 | 126 | 40 | 7 | 3 | 2 | 96.5% | 0 | 0 | 0 | 0 | 0 | 0 | n/a |
| MEASUREMENT AND ANALYSIS | 84 | 110 | 34 | 2 | 0 | 0 | 98.6% | 11 | 12 | 5 | 1 | 0 | 0 | 94.4% |
| DECISION ANALYSIS AND RESOLUTION | 34 | 22 | 29 | 0 | 0 | 0 | 100.0% | 0 | 0 | 0 | 0 | 0 | 0 | n/a |
| CAUSAL ANALYSIS AND RESOLUTION | 18 | 14 | 18 | 0 | 0 | 0 | 100.0% | 3 | 10 | 15 | 0 | 0 | 0 | 100.0% |
| GENERIC PRACTICES | 12 | 31 | 39 | 0 | 0 | 0 | 100.0% | 0 | 0 | 0 | 0 | 0 | 0 | n/a |
| TOTAL | 1462 | 2323 | 988 | 17 | 35 | 21 | 98.6% | 211 | 534 | 146 | 4 | 16 | 0 | 97.6% |

QAS Query Date '01-JUN-05

Data Source: Quality Audit System. Includes completed audits performed during time period indicated only. A completed audit is one with all audit questions completed and the date the last question was audited occurred during the indicated time period.

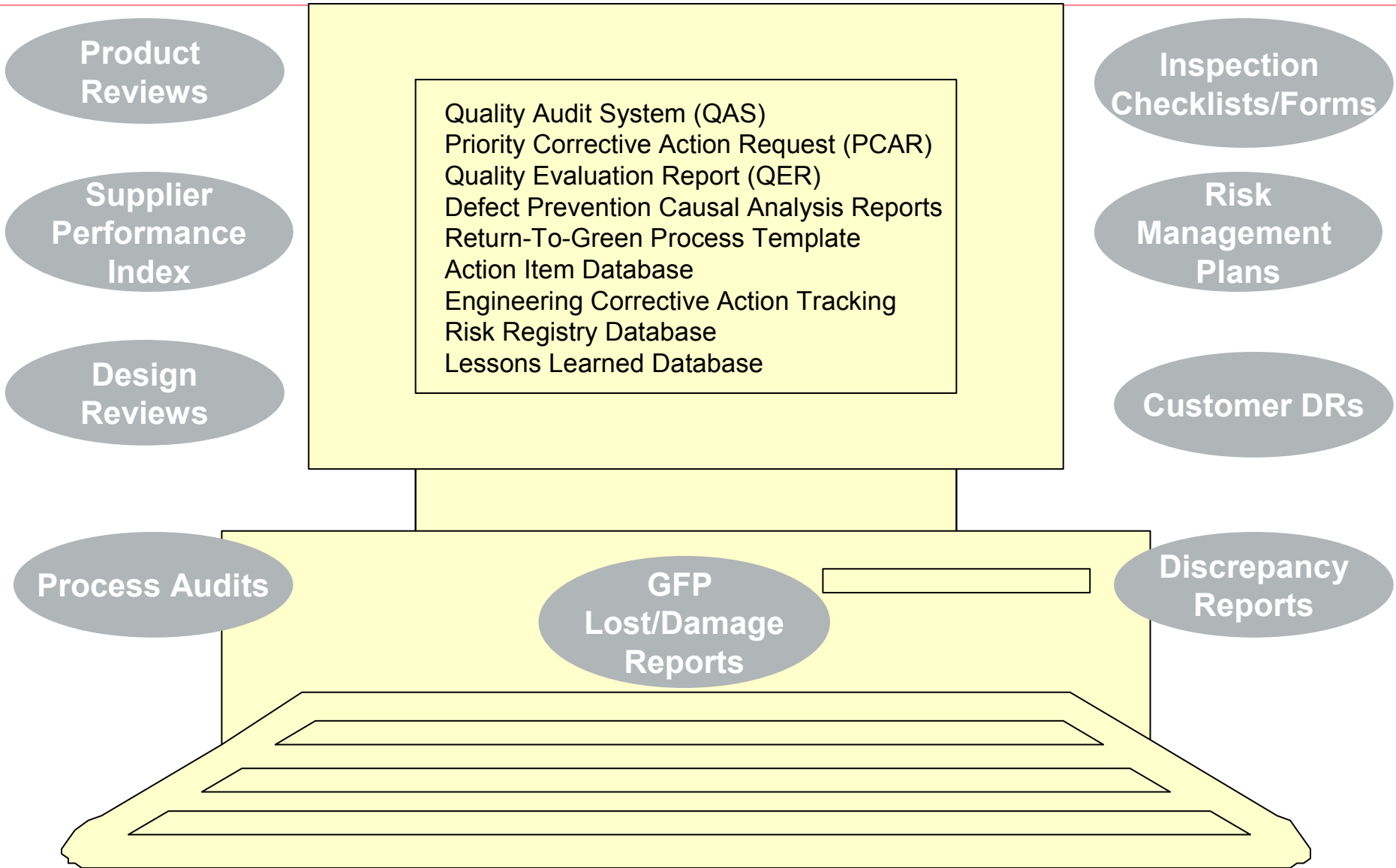
PI Expansion

Corrective Action (C/A) and Preventative Action (P/A)



PI Expansion

Corrective/Preventive Action Reporting/Tracking Systems

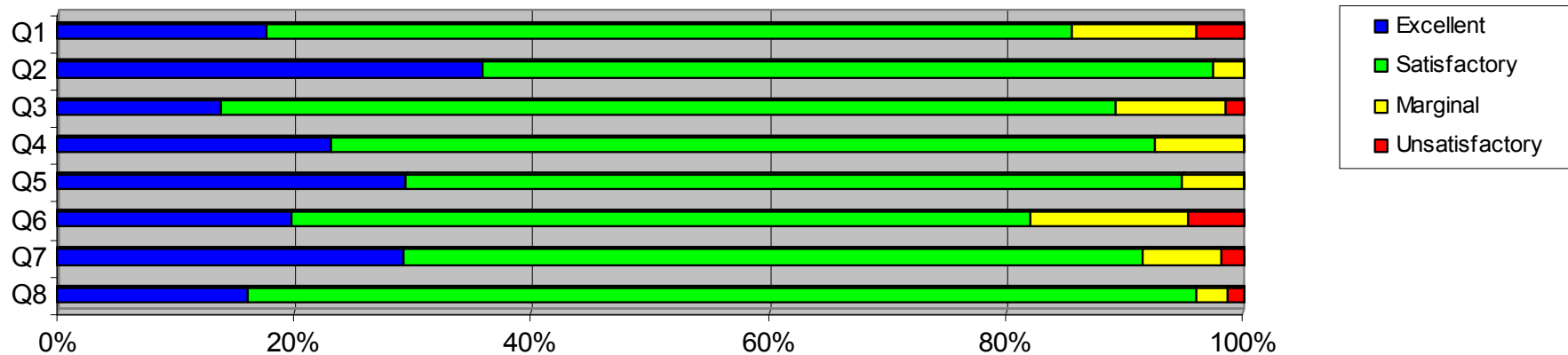


PI Expansion

Internal Customer Satisfaction



Information Technology Customer Satisfaction Survey: Common Company Services



- Q1 Centralized reprographics services.**
- Q2 Phone services (telephone, voicemail, teleconferencing, pagers).**
- Q3 Electronic presentation room (EPR) and video teleconference (VTC) services.**
- Q4 On-site desktop computer support (installs, moves, adds, changes).**
- Q5 Corporate application services (Time Reporting, Employee Self Service, Travel)**
- Q6 How well the IT investments supported the business goals you defined this year.**
- Q7 IT extended services (computer sales/purchase/reimbursement program).**
- Q8 Access to Internet and company facilities.**

Overall Survey Stats
1473 survey requests
320 respondents
(Return Rate: 22%)

PI Expansion

External Customer Satisfaction

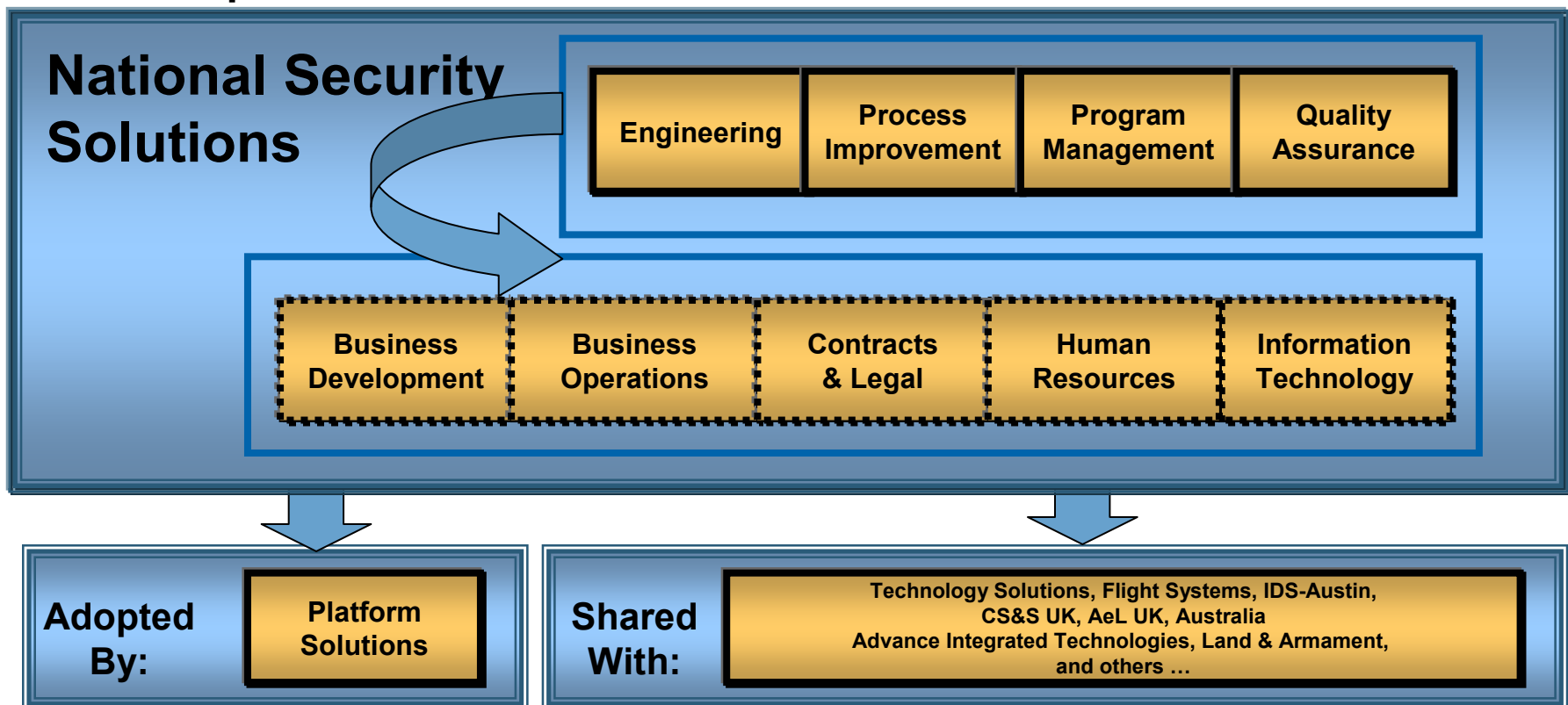


| CUSTOMER/ PROGRAM | RATING BY CATEGORY | | | | | | | | | | | PROG |
|--|--------------------|------------|------------|---------------|------------|------------|-------------|------------|------------|------------|------------|---------------|
| | PROD PERF | SYS ENG | SOFT ENG | LOGIST SUPPRT | PROD ASSUR | SCH | COST CONTRL | MGMT RESP | SUBCN MGMT | PROG MGMT | COMM | 12 mo run avg |
| DEFENSE SYSTEMS | | | | | | | | | | | | |
| S XXX | G | G | P | B | G | P | G | P | G | P | B | 3.8 |
| S XXXXXXXX | B | B | N/A | N/A | N/A | B | B | B | N/A | B | G | 4.7 |
| S XXXXXX | B | N/A | N/A | B | B | B | P | B | B | B | P | 4.4 |
| S XXXXXXXXXXXX | B | B | B | B | B | B | N/A | B | N/A | B | B | 4.9 |
| S XXXXXXXXXXXXXX | B | B | B | P | B | B | B | B | N/A | B | B | 4.8 |
| S+ XXXXXXXXXX | G | P | P | P | G | P | B | P | G | P | P | 3.8 |
| S+ XXXXXXXXXXXXXX | P | P | P | G | P | B | P | B | G | B | P | 4.2 |
| S XXXXXXXXXXXXXXXXXXXX | B | P | B | B | B | B | P | B | N/A | B | B | 4.6 |
| S XXXXX | P | N/A | N/A | N/A | G | G | P | B | B | P | P | 4.0 |
| C XXXXX | B | B | B | P | B | B | B | B | N/A | B | B | 5.0 |
| S XXXXX | B | B | B | B | B | B | B | B | N/A | B | B | 5.0 |
| C XXXXX | B | B | P | N/A | B | B | B | B | N/A | B | B | 4.6 |
| S XXXXXXXX | B | B | B | B | B | B | B | B | N/A | B | B | 4.9 |
| C XXXXXXXXXXXXXXXXXXXX | B | P | P | P | G | P | P | B | N/A | B | B | 4.3 |
| C XXXXX | B | G | G | G | G | G | B | G | N/A | B | G | 3.6 |
| S XXX | N/A | B | B | N/A | P | P | P | P | N/A | P | P | 4.2 |
| S XXXX | G | P | N/A | N/A | G | G | N/A | G | N/A | G | G | 3.0 |
| S XXXX | P | P | P | B | P | P | G | P | P | P | P | 4.2 |
| C XXX | G | P | P | P | G | B | P | B | N/A | B | B | 4.1 |
| C XXX | P | P | P | N/A | N/A | P | N/A | B | N/A | B | P | 4.0 |
| C XXX | P | B | B | N/A | B | B | P | B | N/A | B | B | 4.1 |
| C XXXXXXXXXXXXXXXXXXXX | P | P | P | P | G | B | P | B | N/A | B | B | 4.2 |
| C XXXXX | G | P | G | N/A | G | N/A | P | B | N/A | B | B | 4.0 |
| INTELLIGENCE SYSTEMS | | | | | | | | | | | | |
| C XXXXXX | N/A | P | B | N/A | P | B | P | P | N/A | P | P | 4.3 |
| S XXXXXXXX | G | P | B | G | G | B | P | P | N/A | P | G | 3.8 |
| C XXX | P | P | P | P | P | P | P | P | N/A | P | P | 4.1 |
| C XXXX | P | P | B | N/A | N/A | P | B | B | N/A | P | P | 4.3 |
| C XXXX | N/A | G | G | N/A | G | P | G | G | N/A | G | G | 3.1 |
| C XXXX | P | B | P | B | P | P | P | B | B | B | B | 4.5 |
| C XXXXX | G | P | P | G | N/A | G | G | P | N/A | P | P | 3.7 |
| Process Summary - Customer Rating | | | | | | | | | | | | |
| B | Percentage | 33.3% | 35.3% | 31.0% | 36.7% | 28.5% | 46.1% | 37.8% | 68.0% | 41.6% | 55.5% | 57.5% |
| P | 12 Month | 40.7% | 50.8% | 57.1% | 48.6% | 36.8% | 35.8% | 49.7% | 24.6% | 10.1% | 40.3% | 31.8% |
| G | Running | 25.9% | 13.9% | 11.9% | 14.7% | 34.7% | 18.1% | 12.5% | 7.5% | 48.3% | 4.1% | 10.5% |
| Y | Average | | | | | | | | | | | 0.3% |
| R | | | | | | | | | | | | |
| Overall Average | | 4.1 | 4.2 | 4.2 | 4.2 | 3.9 | 4.3 | 4.3 | 4.6 | 3.9 | 4.5 | 4.5 |

PI Expansion

Transferring Best Practices

- Collaborated Architecture within the Organization
- Shared proven Organizational Standard Set of Processes Across Enterprise



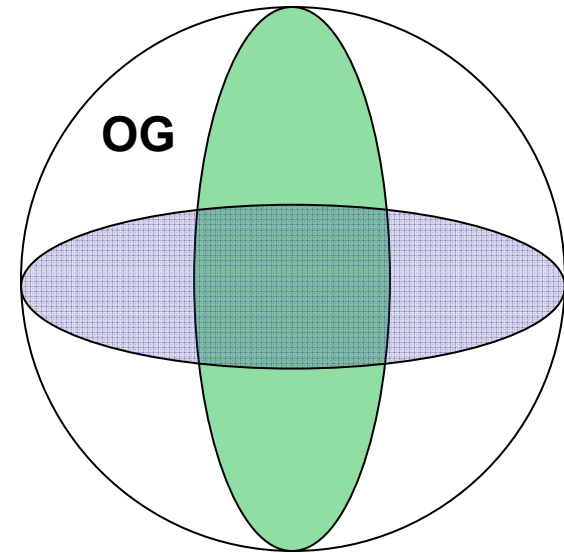
PI Expansion

Operating Group (OG) Regulatory Panels

- Regulatory Panels
 - ISO 9001 and AS 9100
 - ISO 14001 Environmental
 - CMMI

- Representative from each Line of Business

- Purpose:
 - Remove walls that may have existed between sites
 - Benchmark and share best practices within each site and leverage on them
 - Harmonize and integrate regulatory requirements
 - Establish and implement OG level policies to operate as a borderless enterprise



PI and Business Impacts/Value Realized

Improvements Over Past 10 Years



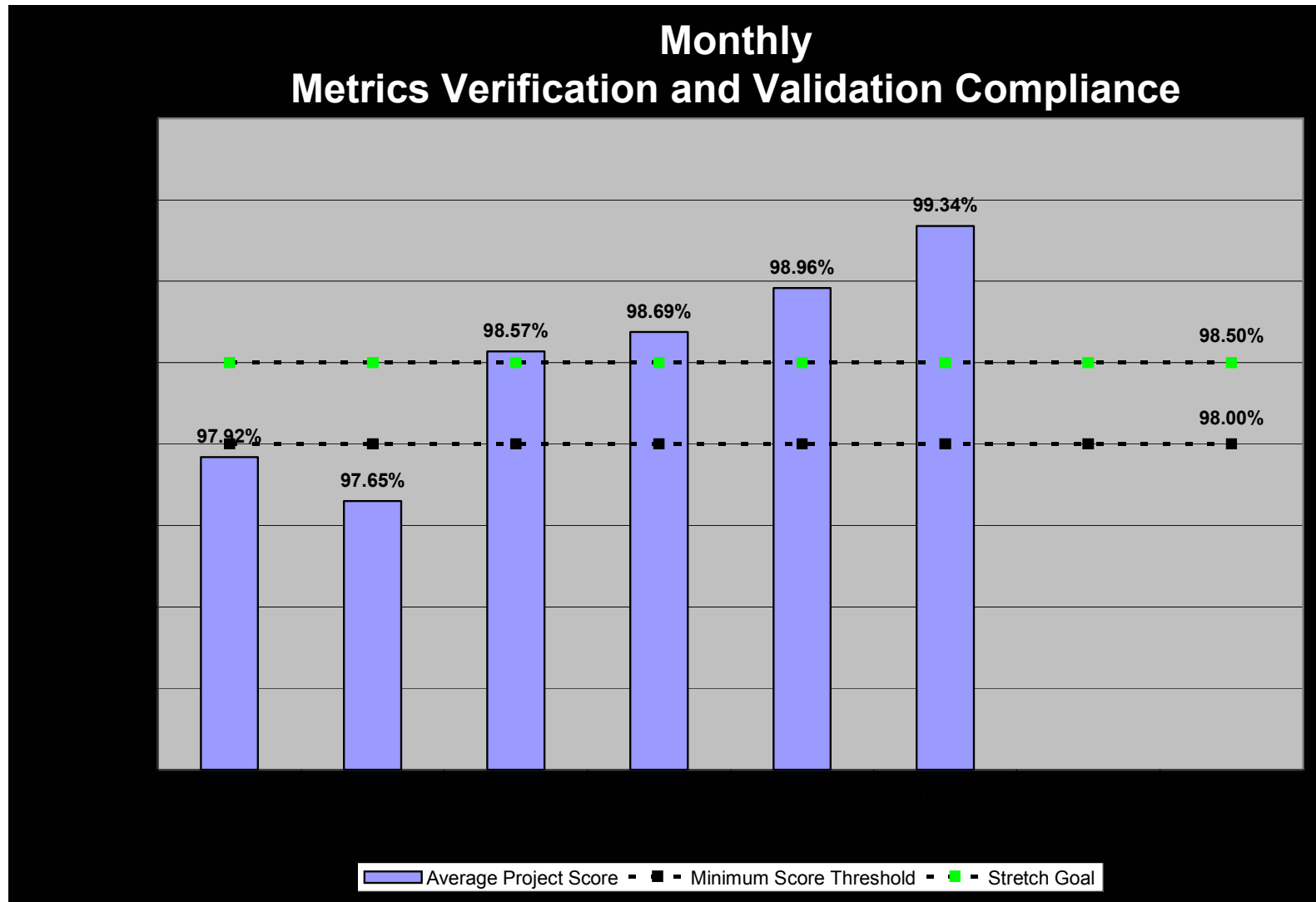
| <u>Project Measure</u> | <u>Then</u> | <u>Now</u> |
|--------------------------------|-------------|------------|
| Actual vs. Negotiated cost | +/- 40% | +/- 7% |
| Cost Performance Index | unknown | 1.03 |
| Schedule Performance Index | unknown | 0.99 |
| Average Award Fee | 90% | 98.10% |
| Greens on Customer Sat. Survey | 90% | 100% |

Process Measure

| | | |
|---------------------------------------|---|---|
| Capability Maturity Model Int. (CMMI) | 1 | 5 |
|---------------------------------------|---|---|

PI and Business Impacts/Value Realized

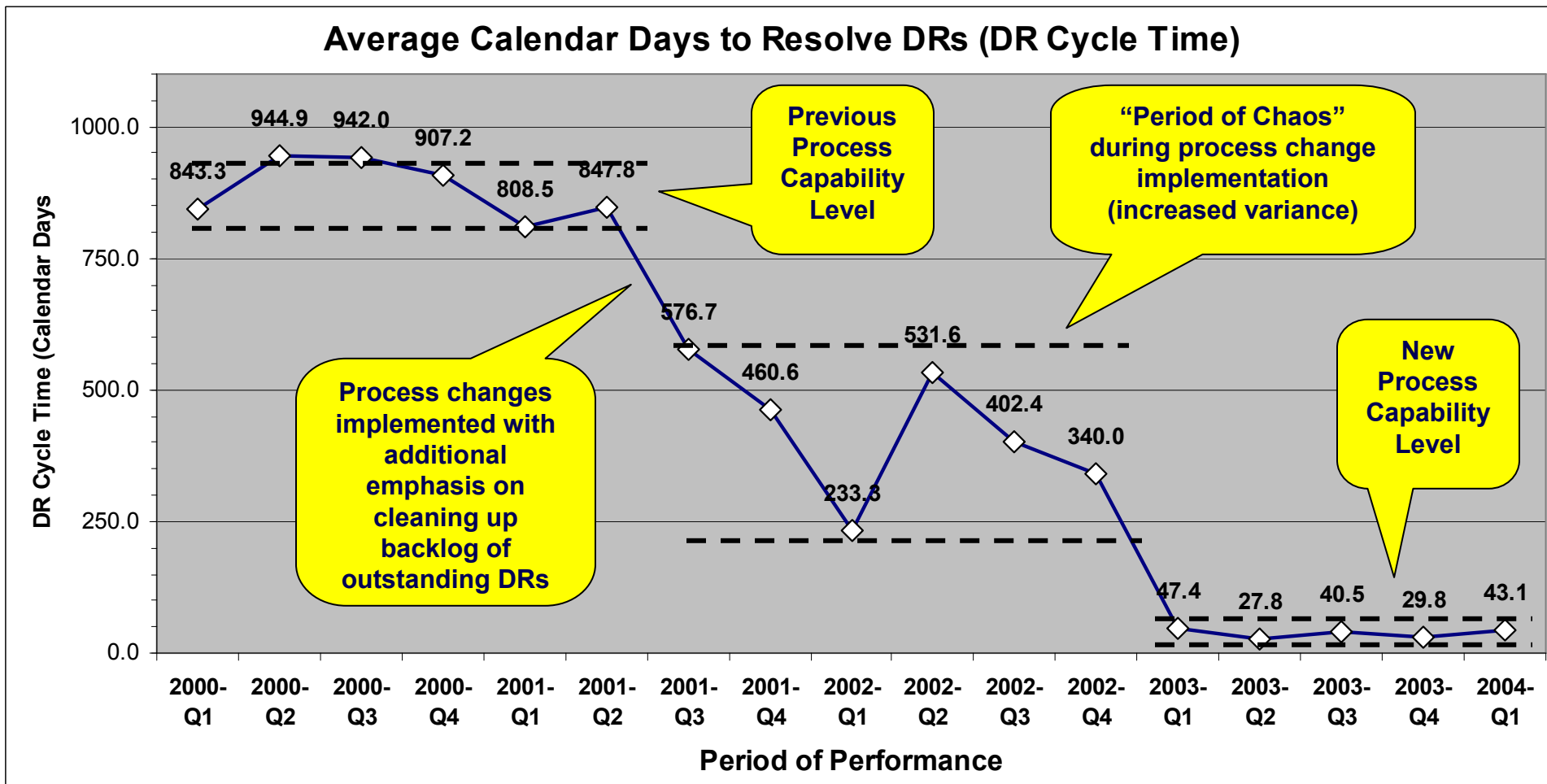
Improved Measurement Reliability



PI and Business Impacts/Value Realized



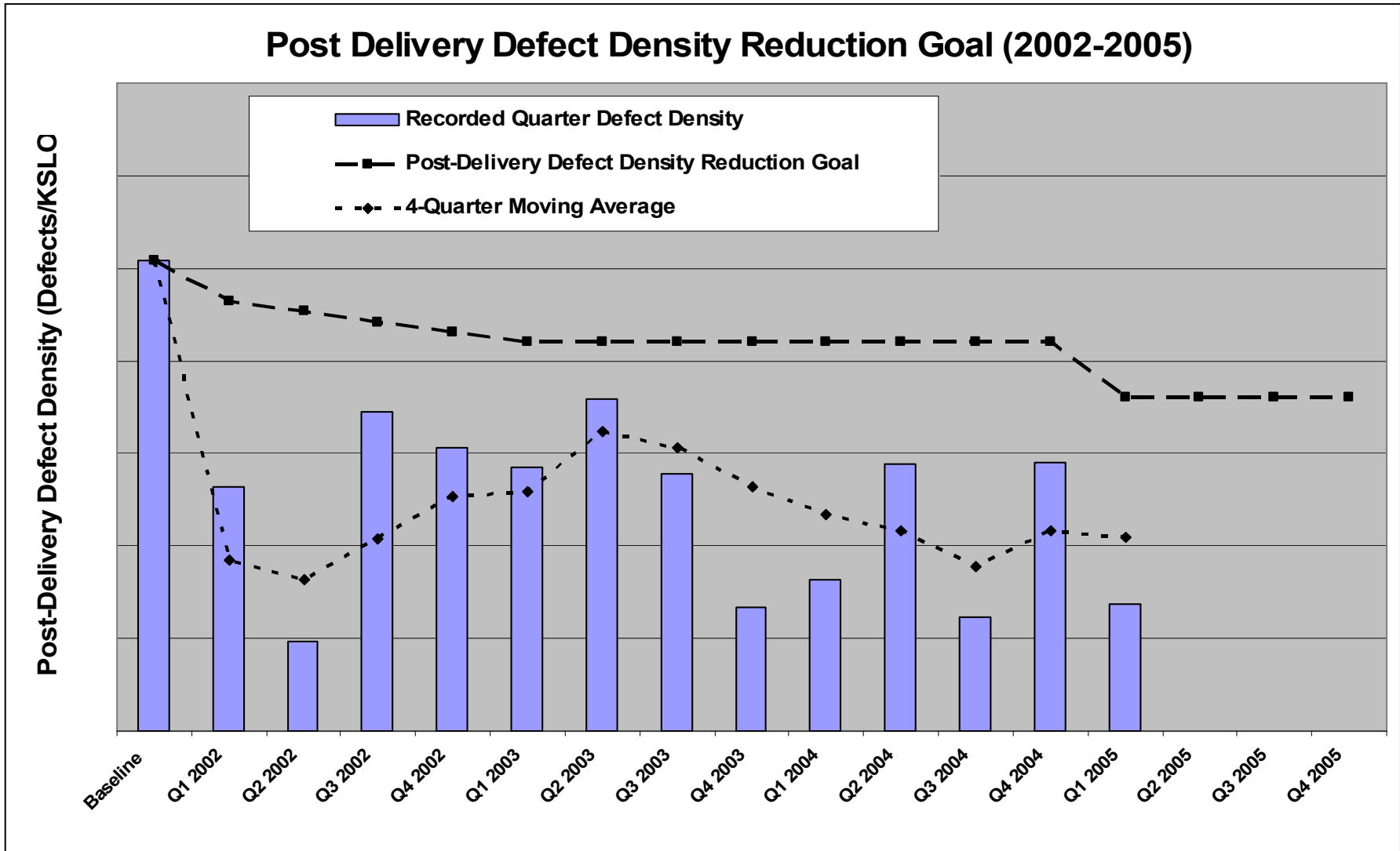
Less Variability & Increased Predictability



PI and Business Impacts/Value Realized

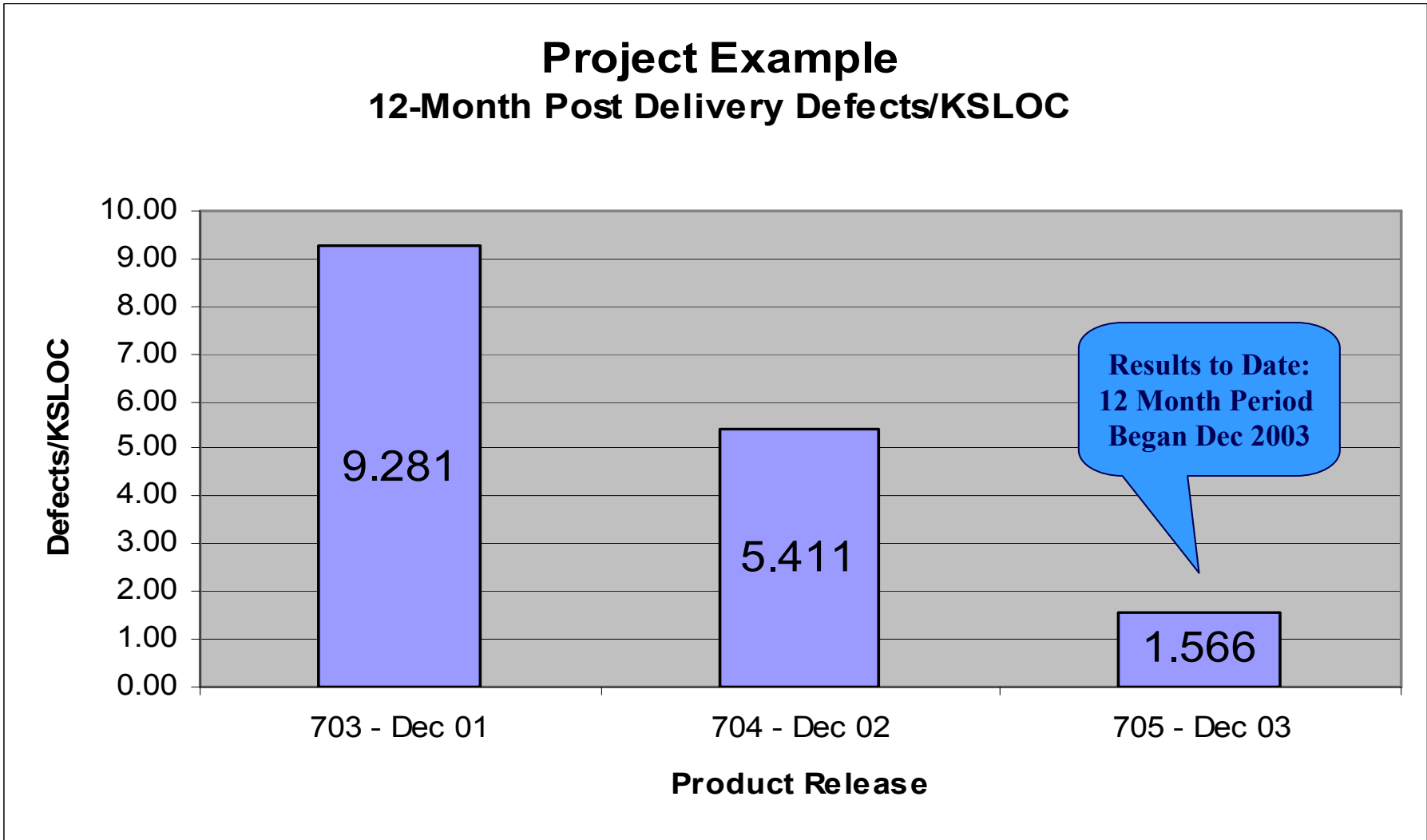


Defect Reduction



PI and Business Impacts/Value Realized

Project Example - Defect Reduction



PI and Business Impacts/Value Realized

– Functionally

- Integrated end-to-end project procedures
- Aligned Business Drivers and Program Supports more closely
- Established a process framework for internal projects throughout the organization
- Improved internal customer relationships and teamwork

– Organizationally

- Established a common architecture framework
- Identified commonalities while maintaining unique Business model supports
- Provided the opportunity for Organizational Business Areas to work together more effectively on common projects
- Reduced Customer oversight in daily and annual review, audit, and product inspection activities
- Reduced time spent preparing for audits due to customer audit avoidance and reduction in audit scope
- Increased our competitive edge and market opportunities

– Across the Enterprise

- Shared best practices implementations and lessons learned
- Adopted a mature/proven Organizational Standard Set of Processes (OSSP) as the basis for continuous process improvement
- Broadened the scope of continuous improvement communications

-
- **Learned from failures to emerge with an even stronger focus on continuous improvement**
 - **Elevated process improvement importance/focus across organization/enterprise**
 - **Recognized the need for a unified system for process improvement and quality management using CMMI for depth; using ISO for breadth**
 - **Established an Organizational Process Group - Expansion (OPGE) that involves all Business Areas and OG relevant stakeholders**
 - **Established ISO/CMMI regulatory panels at the OG to maintain the focus on continuous improvement**
 - **Recognized both the qualitative and quantitative value leading to more efficient functional and project performance**
 - **Improved our competitive edge and increased value to our customers**

The Road to Process Improvement Successes:

CMMI Level 5/ISO 9001:2000 Business Model

BAE SYSTEMS

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email: debra.roy@baesystems.com