NORTHROP GRUMMAN
Information Technology

A Process Improvement Plan for a High Maturity (and Diverse) Organization

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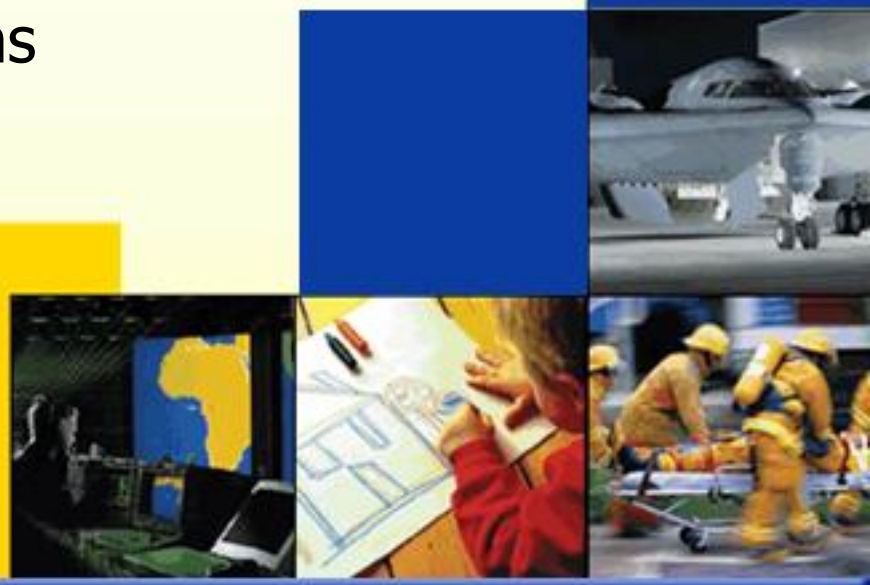
Defense Enterprise Solutions



Purpose and Agenda

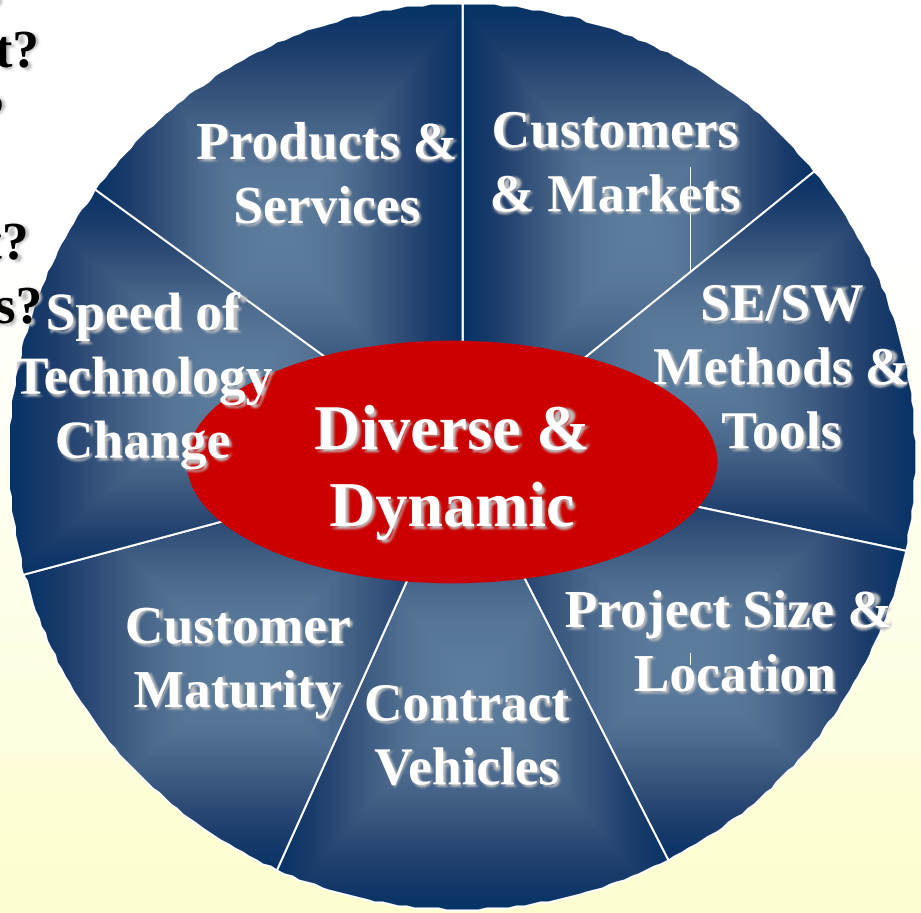
- **Purpose**
  - To describe the strategic and tactical process improvement plans of a diverse organization that has achieved a CMMI SE/SW Level 5 Rating
- **Agenda**
  - Organizational Scope & Process Improvement Approach
  - 2002 Situation
  - Strategic (2010) and Tactical (2003) Goals & Plans
    - Applicability
    - Performance
    - Infrastructure
    - Compliance
  - Effectiveness of Plan

Organizational Information

- **Northrop Grumman**
  - $26 B in revenue; 120,000 employees; 50 states; 25 countries
- **Information Technology (IT) Sector**
  - $4 B in sales; 22,000 employees; 48 states; 15 countries
- **Defense Enterprise Solutions (DES) Business Unit**
  - $548 M in sales; 3,045 employees, 23 states, 3 countries
- **DES provides enterprise-wide technology solutions to the Defense marketplace**
- **Major Application Areas:**
  - Logistics
  - Mission Support
  - Science & Technology
  - Simulation, Analysis, and Training
  - Communications & Infrastructure

Introduction: Diversity of Engineering Environments

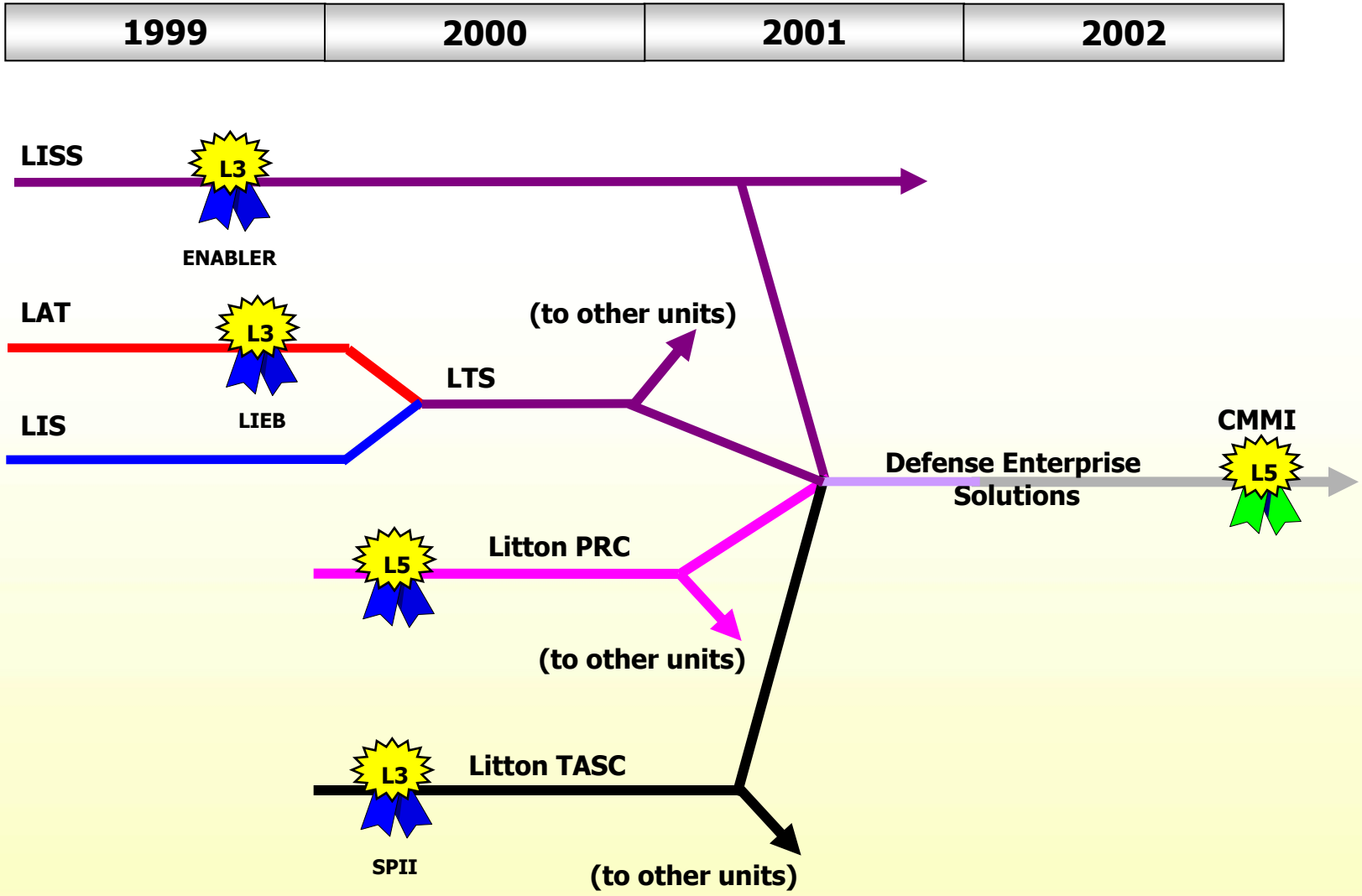
COTS Integration?
System Development?
System Migration?
Maintenance?
Operations Support?
IT Managed Services?
Etc.



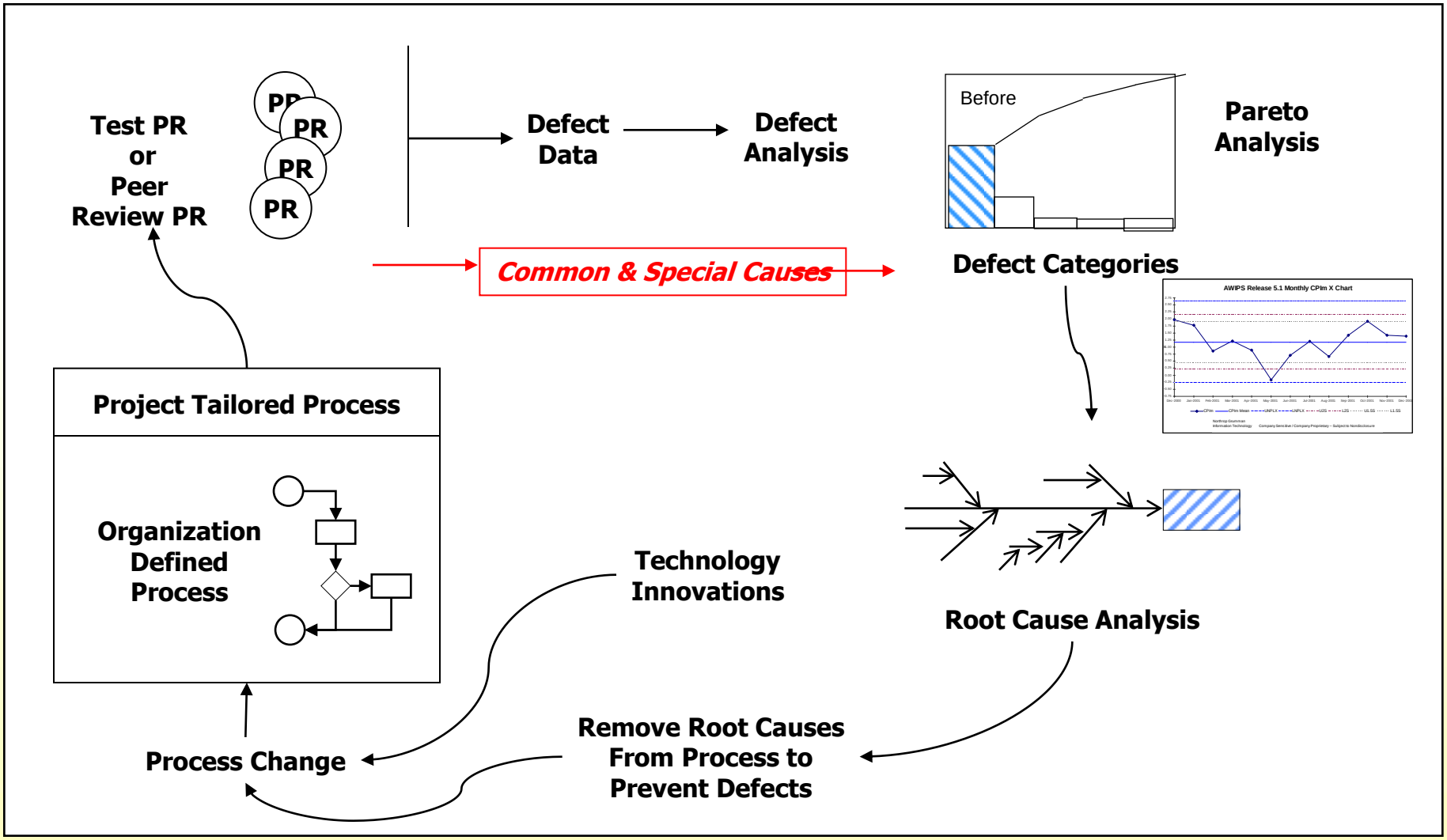
Repeatable and Defined Organizational SW/SE Processes

Management	Engineering	Organizational

2002 Situation: DES Process Legacy Integration



Strategic Optimizing Process



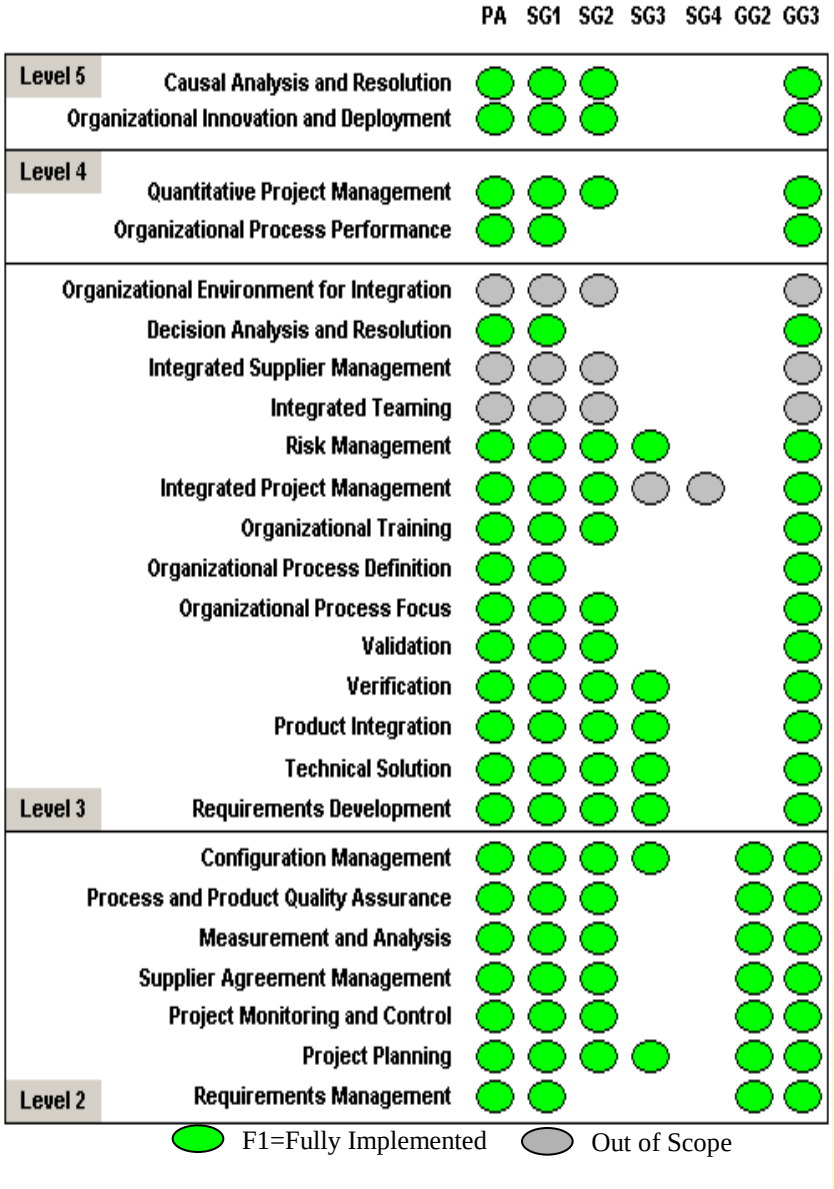
2002 Situation: DEC. 2002 CMMI SW/SE Appraisal

Process Maturity

- CMMI SE/SW Level 5 for Staged and Continuous Representations
  - Software CMM Level 5 also
- Organizational Process Strengths
  - Integrated SE and SW Eng
  - Sharing & reusing process assets
  - Data driven corrective action
  - Technology Change Management
- Global Best Practices
  - Requirements Elicitation
  - Quantitative Data Management

Cost, Schedule and Quality Performance

- JEDMICS exceeds software quality goals (.0156 vs .06 defects/KSLOC)
- PERMS exceeds revenue goals by 11%
- AIT has 100% on-time delivery
- Only 2% of total defects found in delivered SIGS product
- ITS is on cost and schedule (CPIm = .965 & SPIm = .985, target = 1.0 +/- .1)
- SIGS averages a customer satisfaction of 98.5% over last four years



2003 Plan Table of Contents

- **Executive Summary**
- **Introduction**
  - **Purpose**
  - **Motivation for Improvement**
  - **Vision and Mission**
- **Approach**
  - **NGIT Quality Management System**
  - **Quality System and Policy**
  - **EPG Operations and Planning**
  - **EPI Implementation**
  - **Current Situation**
- **2003-2010 Long-Range Strategic Plan (EPIC)**
  - EPI Applicability Goals
  - Performance Goals
  - Infrastructure Goals
  - Compliance Goals
- **2003 Tactical Plans**
  - Master Schedule
  - Applicability
    - Audit/Appraisal Entity Catalog
    - Additional High Maturity Projects (Full LC)
    - Partial Life Cycle Project Process Improvement
    - Service Project Process Improvement
    - Analysis of Quality Programs
    - IPPD Survey & Pilot
  - Performance
    - EVMS for Small Projects
    - Peer Review Process Upgrades
    - SWEEP Pilot
    - TSP/PSP Pilot
    - Customer Satisfaction Survey Analysis
  - Infrastructure
    - Process Infrastructure
    - OU Support
    - PAL Upgrades
    - EPI Project/Proposal Startup
  - Compliance
    - Quality Management System
    - QA Class C Appraisals
  - Master Budget
  - Risks (TBD)

EPI Long Range Strategic Goals

1. EPI Applicability Goals

- Goals related to the application of EPI policies and procedures to DES projects

2. Performance Goals

- Goals related to process performance and product quality at the DES business unit and project levels

3. Infrastructure Goals

- Goals related to the cost, schedule, and quality of EPI Infrastructure

4. Compliance Goals

- Goals related to ratings against industry standards and models

Each Category described in terms of the Current Situation, the 2003-2010 Goals, and the 2003 Tactical Plans

2003 Strategic Goals

Type of Work	EPI Applicability Goals	Performance Goals	Infrastructure Goals	Compliance Goals
Full Product Development or Maintenance Life Cycle	Apply to all strategic (& non-strategic?) projects	All programs participate in metrics program Meet Updated QM goals Implement Customer Satisfaction Pilot EVMS for small projects Select Quality program	Baseline project startup cost & time Update processes and artifacts for TSP pilots Upgrade PAL (Pilot turn-key processes)	Maturity L5 for all applicable
Partial Product Development or Maintenance Life Cycle	Pilot Eng, PM, & Support PAs	All programs participate in metrics program Pilot EVMS for small projects	Baseline project startup cost & time for pilots Update processes and artifacts for Partial LC pilots Upgrade PAL	Capability >= L2 in Eng, PM, & Support PAs
Services	Pilot PM & Support PAs	All programs participate in metrics program Pilot EVMS for small projects	Baseline project startup cost & time Update processes and artifacts for Service pilots Upgrade PAL	Capability >= L2 in PM & Support PAs

2003 Tactical Plans

Type of Work	EPI Applicability Plans	Performance Plans	Infrastructure Plans	Compliance Plans
Full Product Development or Maintenance Life Cycle	Audit/Appraisal Entity Catalog L5 SCAMPI Reload TSP/PSP Pilots IPPD Survey & Pilot EPI Proposal Support	Expanded Metrics Support Process Infrastructure (L4WG, MLT, L5WG) EVMS for Small Projects PR Process Upgrades SWEEP Pilot Customer Satisfaction Survey Analysis of Quality Programs	OU Support EPI Project Startup PAL Upgrades Process Infrastructure (DES EPG, PALT, PA Owners, Training, WGs) EPI IR&D (Distributive Environment)	QA Class C Appraisals
Partial Product Development or Maintenance Life Cycle	Audit/Appraisal Entity Catalog Partial LC Pilots EPI Proposal Support	Expanded Metrics Support EVMS for Small Projects	OU Support EPI Project Startup PAL Upgrades Process Infrastructure (DES EPG, PALT, PA Owners, Training, WGs)	QA Class C Appraisals (Phoenix Team?)
Services	Audit/Appraisal Entity Catalog Service Pilots EPI Proposal Support	Expanded Metrics Support EVMS for Small Projects	OU Support EPI Project Startup PAL Upgrades Process Infrastructure (DES EPG, PALT, PA Owners, Training, WGs)	QA Class C Appraisals (Phoenix Team)

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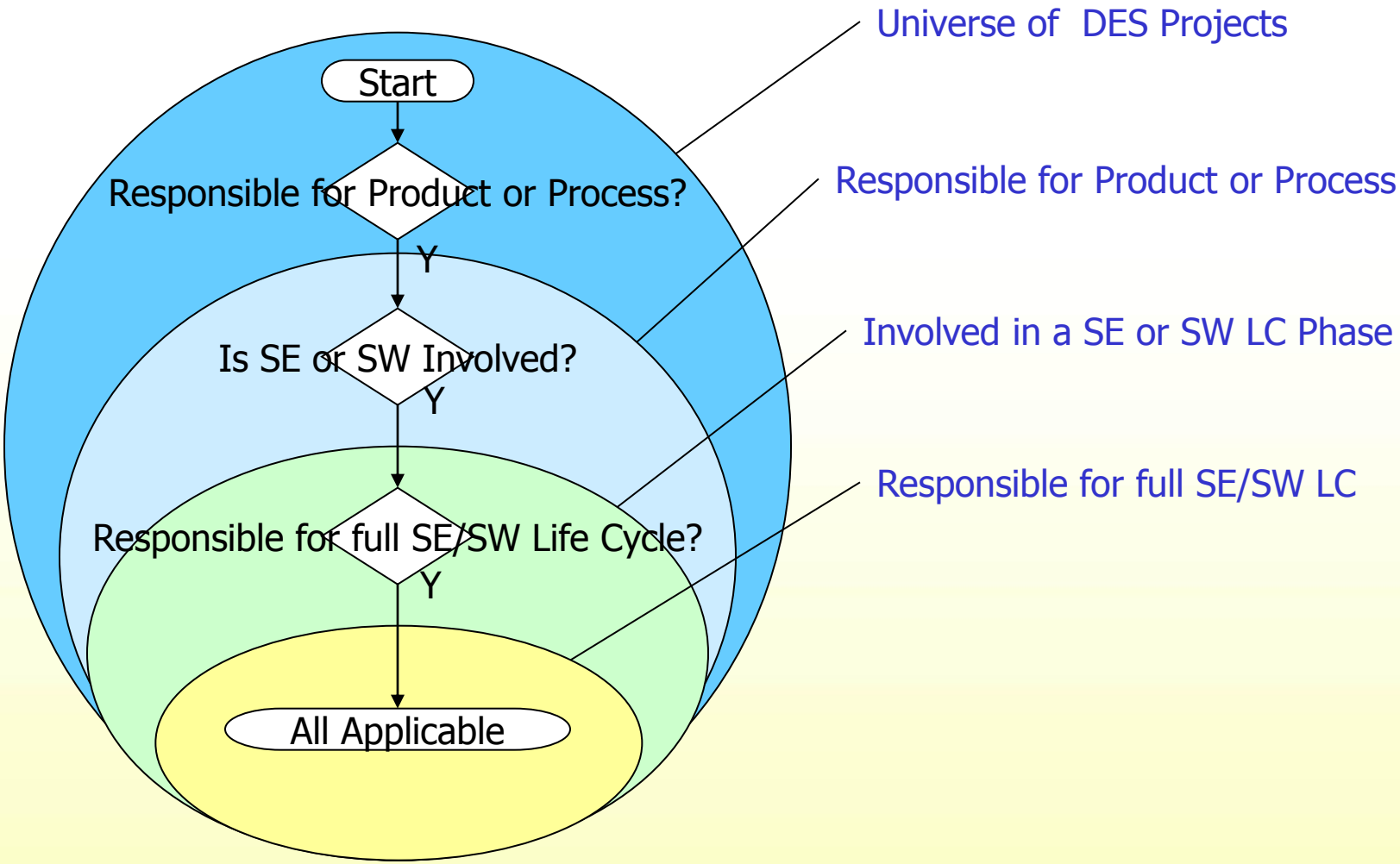
Tactical Plans – Master Schedule

Tactical Improvements	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
EPI Applicability												
Analysis of Audit/Appraisal Entity Applicability												
Additional High Maturity Projects (Full LC Projects)												
Partial Life Cycle Project Process Improvement												
Service Project Process Improvement												
Analysis of Quality Programs												
IPPD Survey & Pilot												
Performance												
EVMS for Small Projects												
PR Process Upgrades												
SWEEP Pilot												
TSP/PSP Pilot												
Analysis of Customer Satisfaction Survey Options												
Infrastructure (EPI)												
Process Infrastructure (LOE)												
PAL Upgrades												
OU Support												
EPI Project Startup												
Compliance (QA)												
Quality Management System Implementation												
QA Class C Appraisal												

EPI Applicability

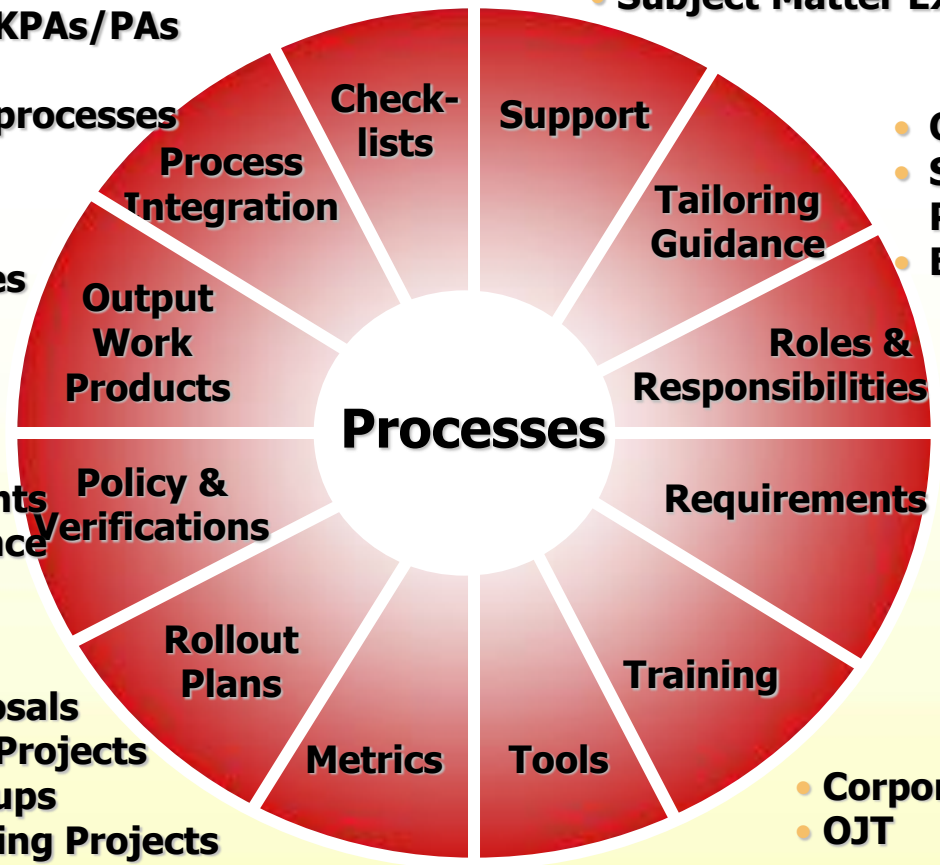


2003 Goals for Performance

Cost and schedule performance, product quality, service quality, and customer satisfaction are statistically significantly better than competitors

DES Business Goals	DES Process & Quality Performance Objectives
Achieve Customer Satisfaction rating (CPAR or equivalent) of Blue or Green on 90% of contracts over $5 million annual revenue or deemed to be of significant strategic value. The percentage of contracts with a Blue rating will be at least 33%.	1. Achieve Cost Perf. Index = 1 ± 0.1 (monthly) 2. Achieve Schedule Perf. Index = 1 ± 0.1 (monthly). 3. Achieve Est-To-Complete-Variance = 1 ± 0.1 (monthly) 4. Achieve 10% improvement in Defect Density for each life cycle phase (from previous baseline) Objectives are monitored on a monthly basis for the projects; organizational baselines are evaluated on semi-annual basis.

Approach: Process Implementation



- Process
- Product

- Process Champion
- Internal Consultant
- Subject Matter Experts

- Links to other KPAs/PAs
- Links to SIM
- Links to other processes

- One Per Domain
- Shows Variations in each Process/ Asset
- Expert Knowledge

- Templates
- Samples

- Per Process, Asset

- Policy Statements
- Quality Assurance
- Audits

- CMMI
- ISO
- Customer Stds

- Proposals
- Pilot Projects
- Startups
- Ongoing Projects

- Corporate
- OJT

- Corporate
- Customer
- Internal

- COTS & "Glue"
- Support
- Compatible Formats

2003 Plan Effectiveness

1. EPI Applicability Goals

- Expanded into Enterprise IT Managed Services and Advanced Weapon Research and Testing

2. Performance Goals

- Improved Error Estimating – positive impact on schedule performance
- Improved Earned Value plans and tools – positive impact on cost performance
- Improved Peer Reviews with detailed checklists – positive impact on defect removal

3. Infrastructure Goals

- Process built-in to project planning and startup – positive impact on "time to high maturity"

4. Compliance Goals

- Improved accuracy of quicklooks/QA policy audits – positive impact on maturity and ISO readiness

On track to exceed ALL 2003 organizational business objectives!