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Use of an Organizational Process for Corporate-Wide Process Improvement via CMMI®

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Customer Success Is Our Mission

One Company integration through a common program

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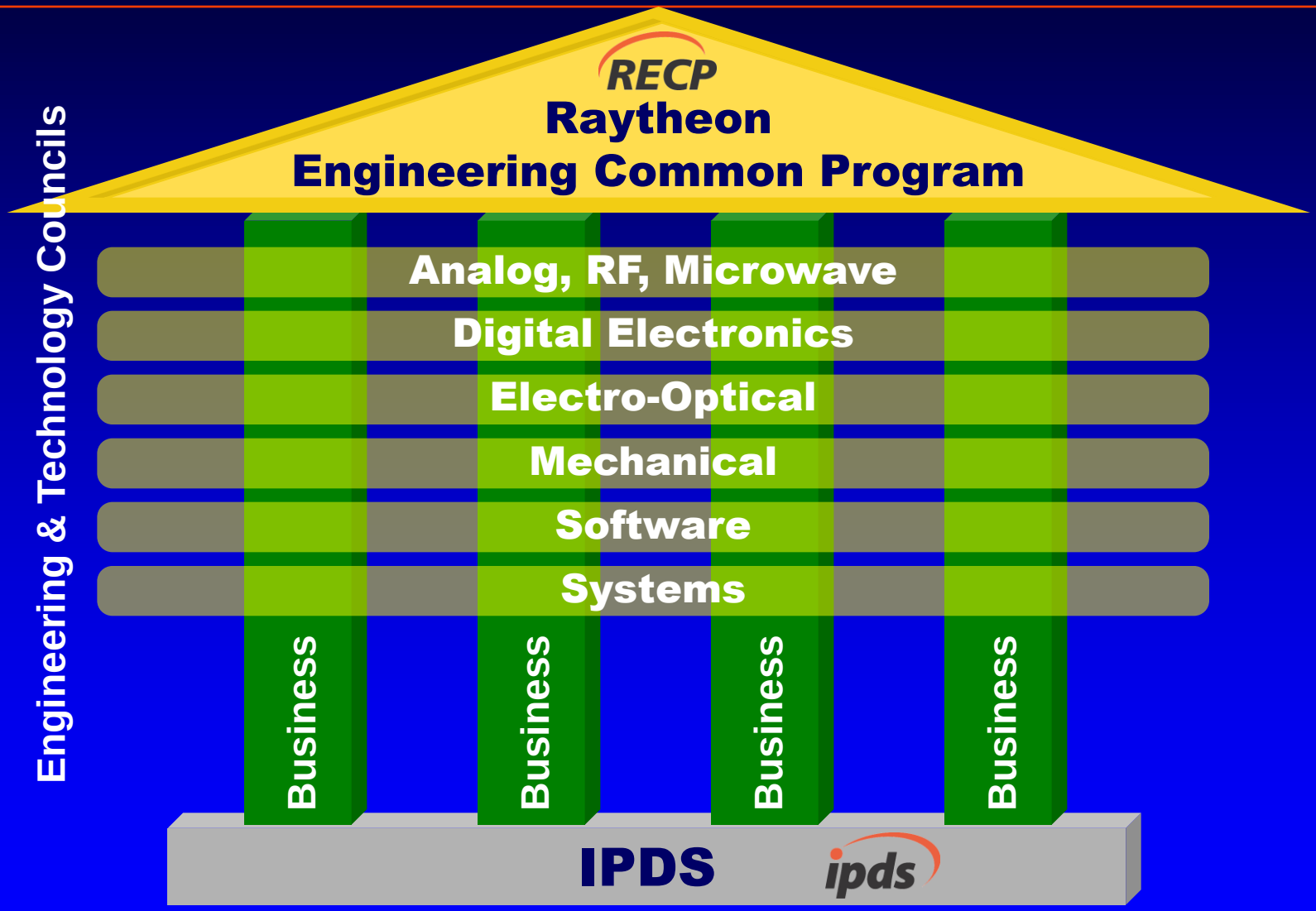

RECP – Recipient of AFEI's 2003 Industry award for Excellence in Enterprise Integration

Raytheon's Common Process Culture

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Integrated Product Development System (IPDS) provides an integrated set of best practices for the entire product development life cycle using a program tailoring process.

Raytheon Six Sigma guides us to use CMMI® and IPDS as tools to deliver value to customers and integrate industry best practices.

Capability Maturity Model Integration (CMMI®) provides the requirements for creating, measuring, managing, and improving specific processes.

Raytheon Engineering Common Program is the enterprise enabler for these initiatives

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Executing Enterprise CMMI® Strategy

- Incorporated changes to bring IPDS into Level 3 compliance with CMMI®
- Update IPDS to Level 5 compliance using incremental releases
- Upgrading support infrastructure in conjunction with IPDS upgrades (web sites, Process Asset Libraries, tools…..)
- Supporting Raytheon businesses in their CMMI® deployment, training, appraisals, and improvements
- Continuing involvement in external activities with CMMI®
- Teaming with the Software Productivity Consortium (training, assessment, consulting…)

Building on successful (IPDS) process deployment and usage expedites CMMI® deployment

The Vision

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Leveraging R6σ improvements corporate-wide

Driven by R6σ

Past Reality

- **Focus: Fix Problems**
  - High Variability
  - Lack of discipline
  - Can't move work around
  - Diverse Processes
- **"Multiple" Raytheons**

To-Be State

- **Focus: Prevent Problems**
  - Predictable Performance and Reduced Variability
  - Disciplined Execution
  - Common Processes
  - Ability to collaborate and move work to available resources
- **One Raytheon**

Captured in IPDS - Validated by CMMI®

History of IPDS

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Legacy Company Consolidation

Based on Industry and Commercial Standards

EIA 632
Processes for Engineering a System

ISO 12207
Information Technology: Software Life Cycle Processes"

IEEE 1220
Standard for Application and Management of the Systems Engineering Process

RES - EDP/TTP

RESYS - IPDP

RTIS - IPDP

RHAC - IPA/PDP

Four Separate Product Development Systems (Processes, Tools, Training, Information Management)

SYNTHESIS
Capture and embed expert knowledge

SYNTHESIS
Use existing strengths to close gaps

SYNTHESIS

Establishing Legacy "Best Practices"

- Discipline Processes
- Product Processes
- Unifying Process
- Tools
- Training
- Information Management

for the RSC common Product Development System

Raytheon - IPDS

Integrated Product Development System (IPDS)

- Business Units drive IPDS development / improvement through RECP and CRs
- > 2000 CRs submitted since April 1998; led to 10 improved releases of IPDS

Goals
Reduced Cycle Time, Defects/Unit and Cost

Integrated Product Development System

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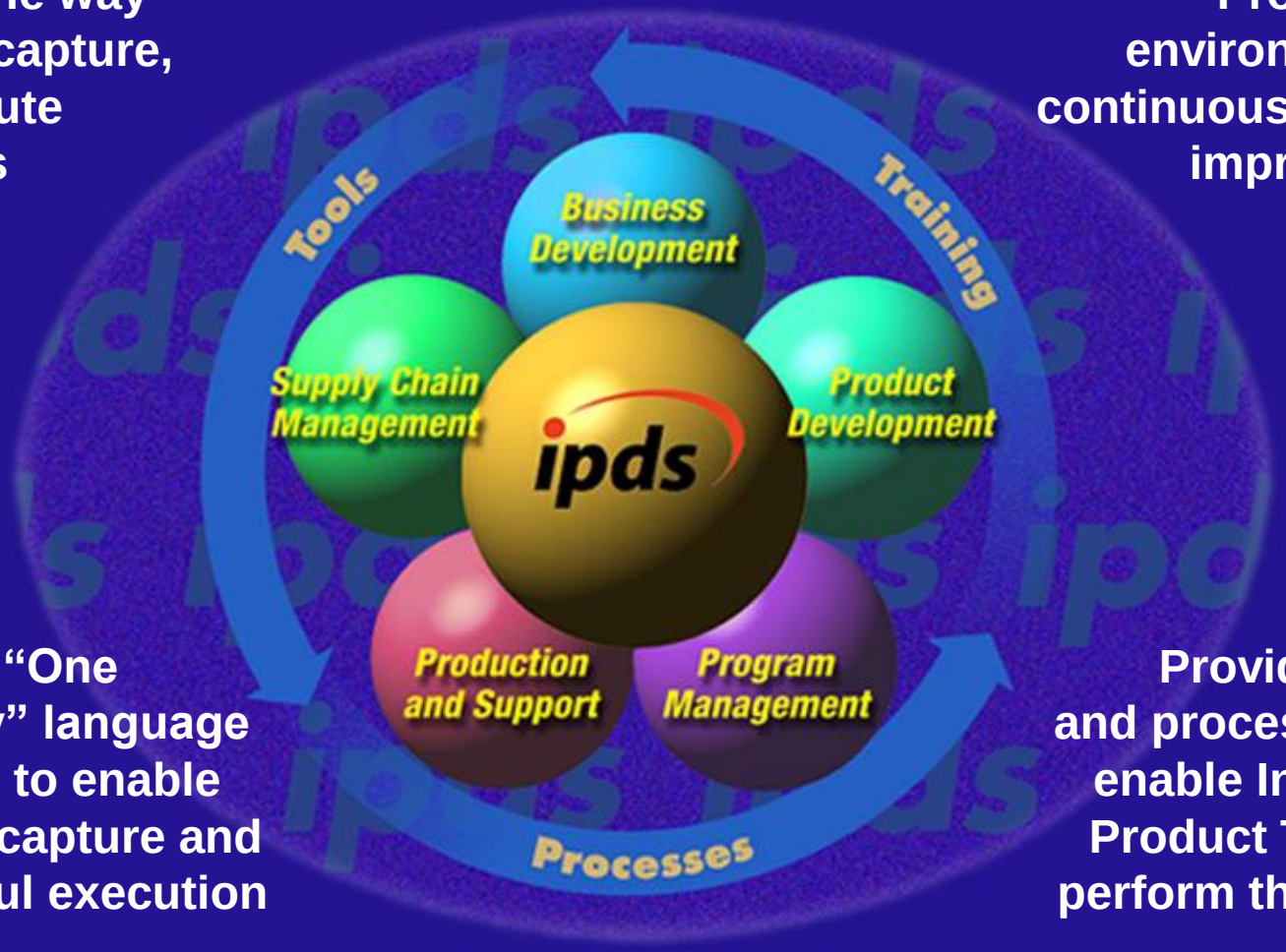
Defines the way we plan, capture, and execute programs

Provides an environment for continuous process improvement



Provides "One Company" language and tools to enable program capture and successful execution

Provides tools and processes that enable Integrated Product Teams to perform their tasks

Building a Process Culture Requires Discipline

Web Shot of IPDS

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Return to Home Page (shown)

Access to Main and Sub-Process Info

Access to Supporting Process Info

Access to Gates Info

Access to Deployment Info

Access to Site Search Engine

Access to IPDS Processes and Policies

Access to Contact Info for IPDS

Access to IPDS Help Desk

Access to Enablers

Access to IPDS Glossary/ Acronym List

Access to Version Description

Access to IPDS Change Process

Access to Global View of IPDS

Access to Process Asset Libraries (PALs)

Access to Related Websites

Deployment Methods Are Integral to IPDS

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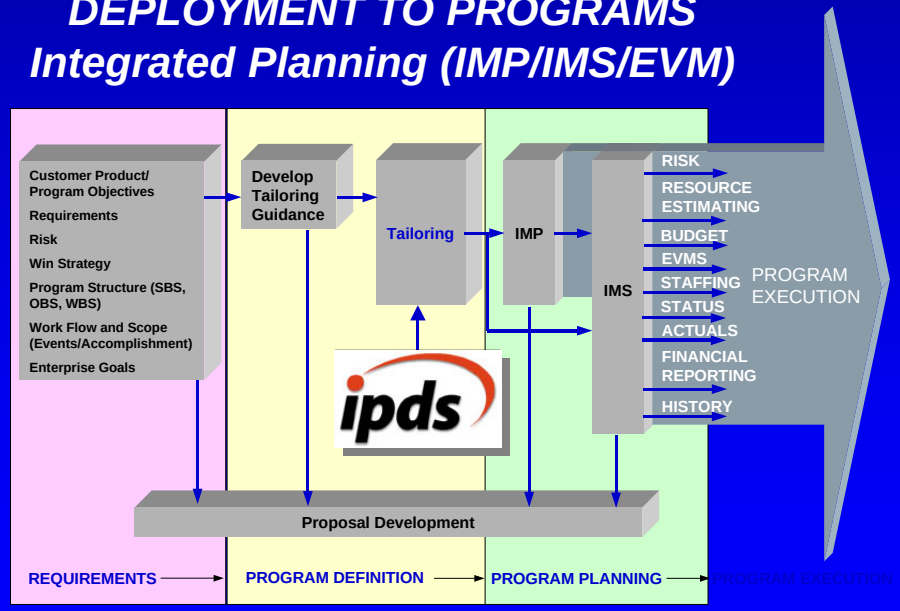
PROCESS DOCUMENTATION AND ENABLERS

- *PROCESSES*
  - *TASK DESCRIPTORS*
  - *GUIDELINES & REFERENCES*
  - *METHODS / PROCEDURES*
  - *CHECKLISTS*
  - *TEMPLATES*
- *TOOLS*
  - *PRODUCIBILITY / DFMA*
- *MEASURES*
- *TRAINING*

DEPLOYMENT TO PROGRAMS
Integrated Planning (IMP/IMS/EVM)



Aligned
- Product Structure
- WBS
- Program Organization

ORGANIZATIONAL DESIGN
Multidiscipline, Customer Focus

- *INTEGRATED PRODUCT TEAMS*
- *TEAM BUILDING*

Integrated Product Development Process Is the Overarching Process

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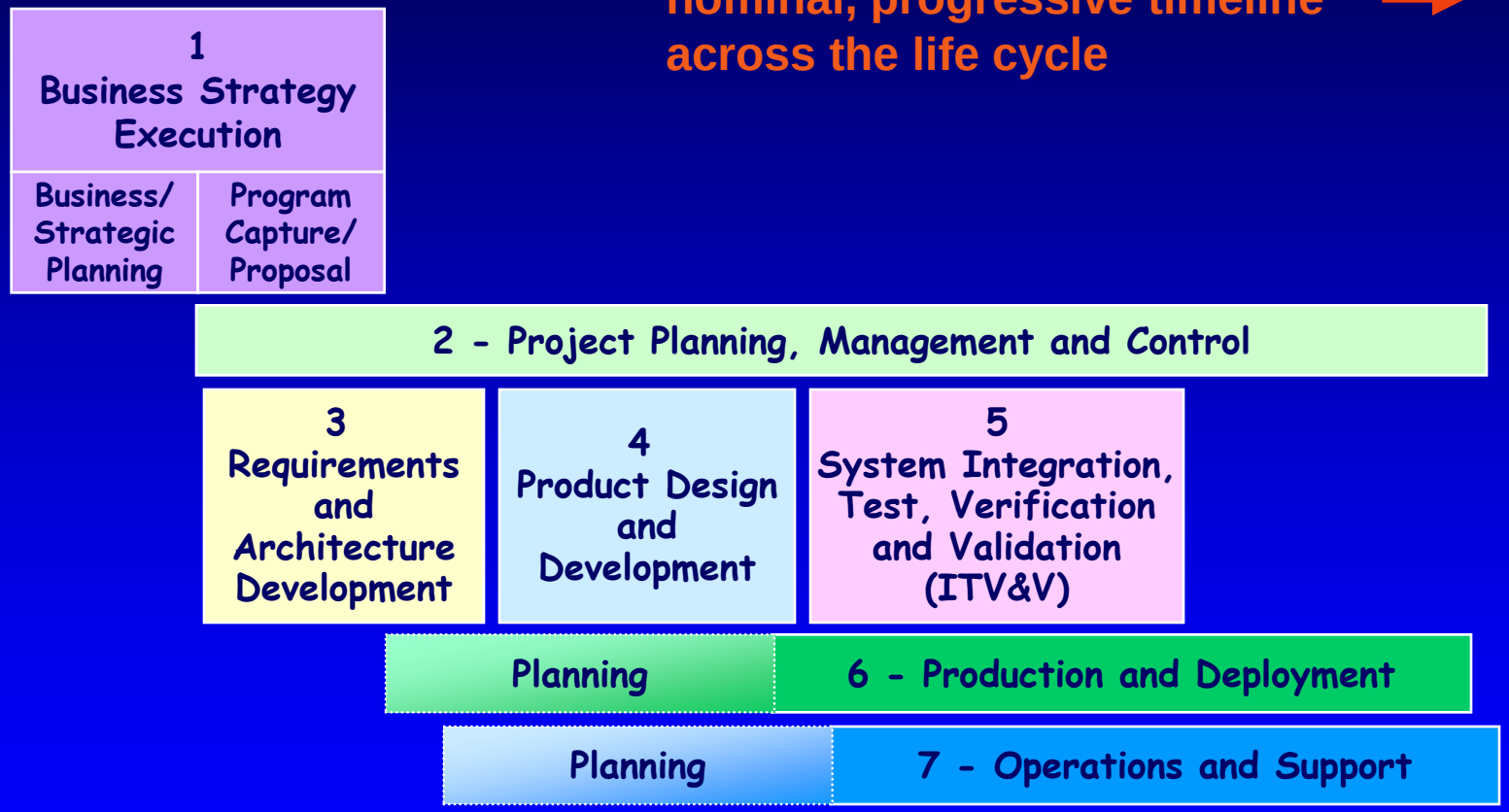
Horizontal navigation follows nominal, progressive timeline across the life cycle →



IPDP Documentation Hierarchy

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Vertical hierarchy reveals successive levels of detail

TOP

3 REQUIREMENTS AND ARCHITECTURE DEVELOPMENT

3-01 System Requirements Definition → 3-02 System Preliminary Design → 3-03 Product Requirements Definition → 3-04 Product Preliminary Design → 3-05 Component Requirements Definition

LEVEL 1 FLOWCHART

LEVEL 2

INT

3-04 PRODUCT PRELIMINARY DESIGN

3-04.01 Define Product Functions → 3-04.02 Analyze Functional Behaviors / 3-04.03 Identify Physical Product Alternatives / 3-04.04 Define Standardization Opportunities → 3-04.05 Establish Product Architectures → 3-04.06 SRR/SDR → 3-04.07 Establish Product Baselines

DET

3-04.05 ESTABLISH PRODUCT ARCHITECTURES

3-04.05.02 Establish Functional Architecture → 3-04.05.04 Define Verification Procedures → 3-04.05.06 Conduct Verification Evaluation → 3-04.05.08 Establish Physical Architecture → 3-04.05.09 Perform Product Rollup / 3-04.05.10 Assess Safety & Environmental Hazards / 3-04.05.12 Assess Product Testability & FMEA

LEVEL 3

TASK DESCRIPTORS

IPDP Includes Program Check Points Called Gates

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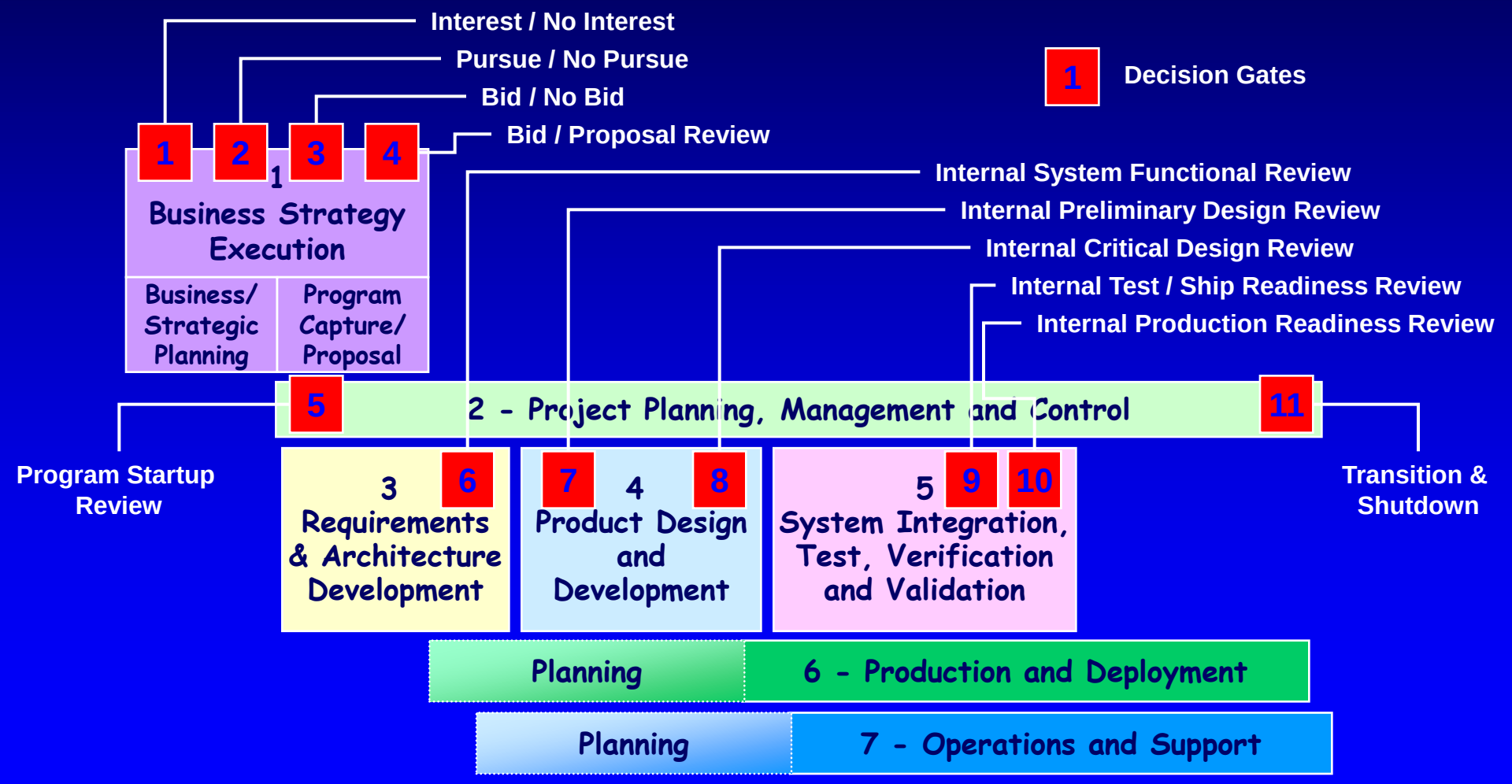
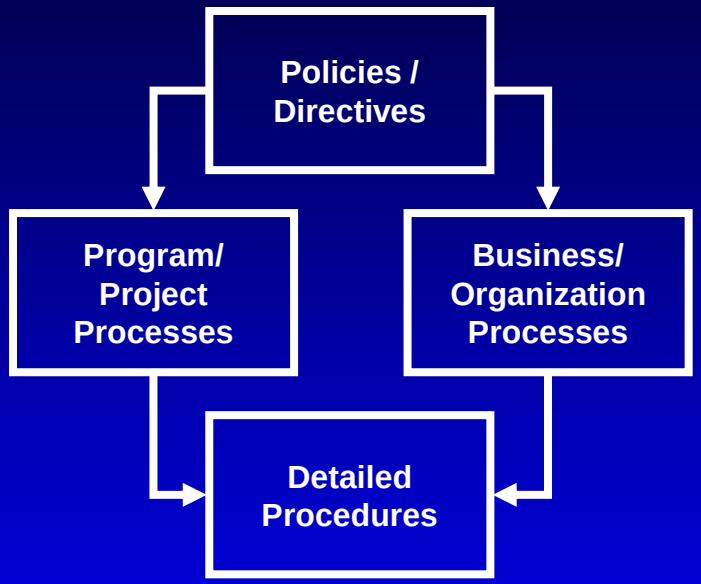
Asking the right questions... at the right time... by the right people



What Is the Effect of CMMI®?

- CMMI® addresses policies & directives, organizational processes, and detailed procedures in addition to project processes
- CMMI® imposes additional requirements on organizations
  - E.g., IPDS is based around and encourages use of IPTs but does not require them. CMMI® IPPD makes them a requirement.
- CMMI® provides a yardstick for process improvement



Programs are Using CMMI®-Aligned Processes (IPDS) – Organizational Integration and Documentation are Needed

Process Architecture

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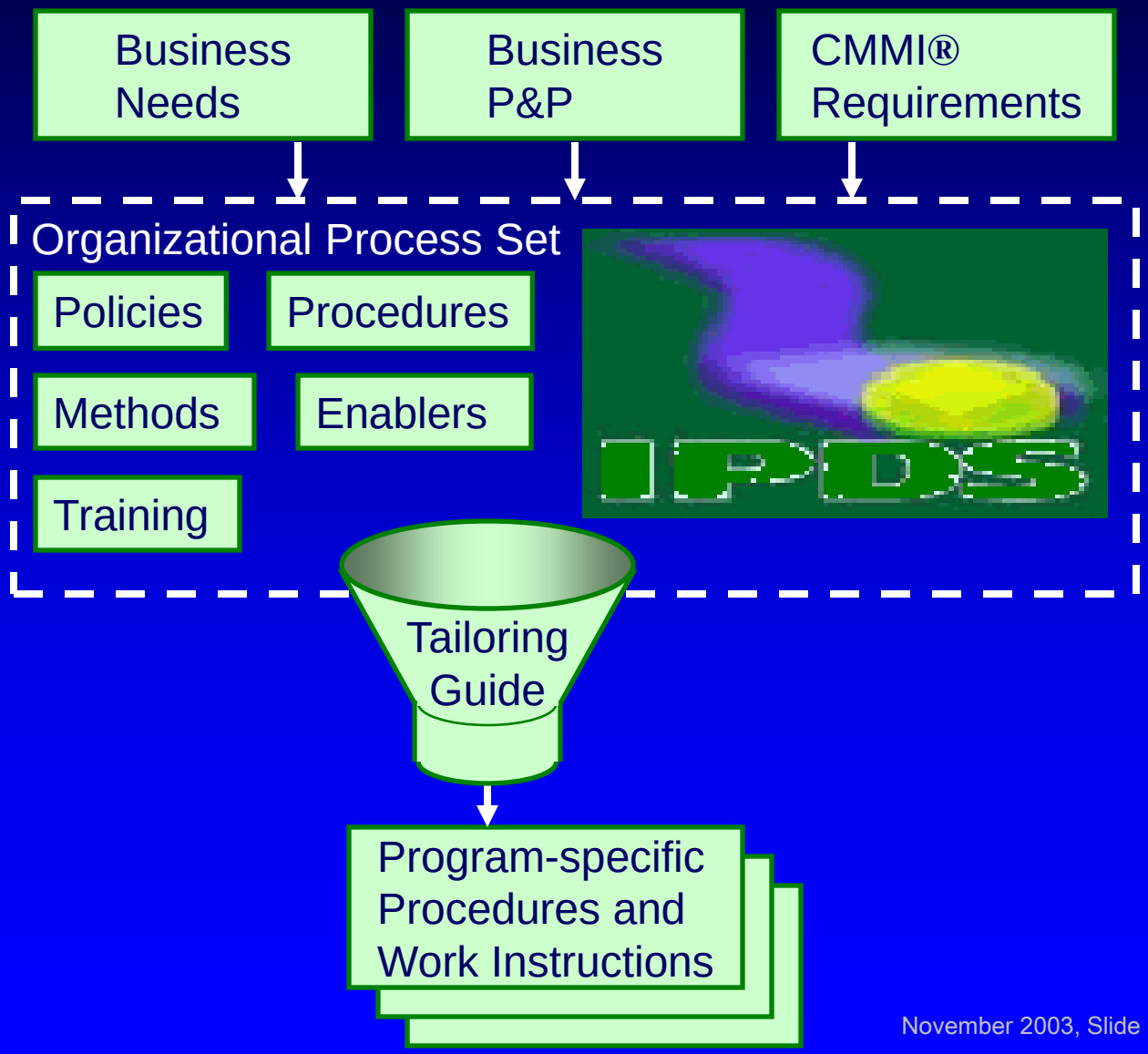
Local Materials augment and provide detailed "how to" for businesses at Raytheon sites



Process Asset Library Architecture

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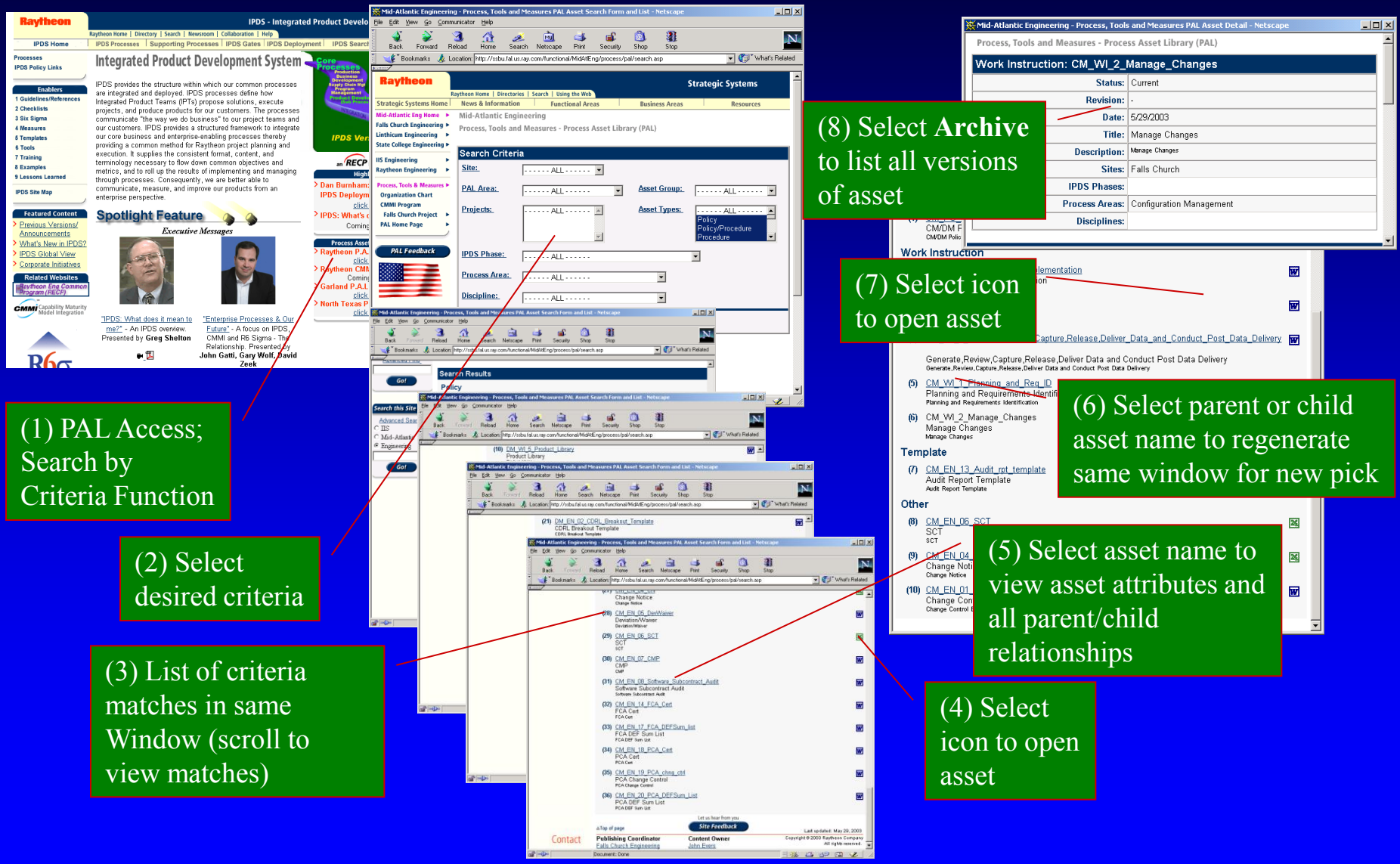

(1) PAL Access; Search by Criteria Function

(2) Select desired criteria

(3) List of criteria matches in same Window (scroll to view matches)

(4) Select icon to open asset

(5) Select asset name to view asset attributes and all parent/child relationships

(6) Select parent or child asset name to regenerate same window for new pick

(7) Select icon to open asset

(8) Select **Archive** to list all versions of asset

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Lessons Learned

- Process deployment model and method are as important as process documentation
- Organizational behavioral changes are primary factors critical to success
- Site engagement is critical to success against CMMI®
- Early program engagement is critical to realize benefits from integrated planning using common processes
- Closed, tightly coupled processes (low coherence, high dependence) can hinder improvements
  - Consistent top-level flow can synchronize processes
  - Think open process architecture
  - Important to identify and address common subprocesses, such as risk management and requirements management, as well as other supporting (call-able) subprocesses, such as decision analysis

IPDS, CMMI®, and R6σ Support Each Other

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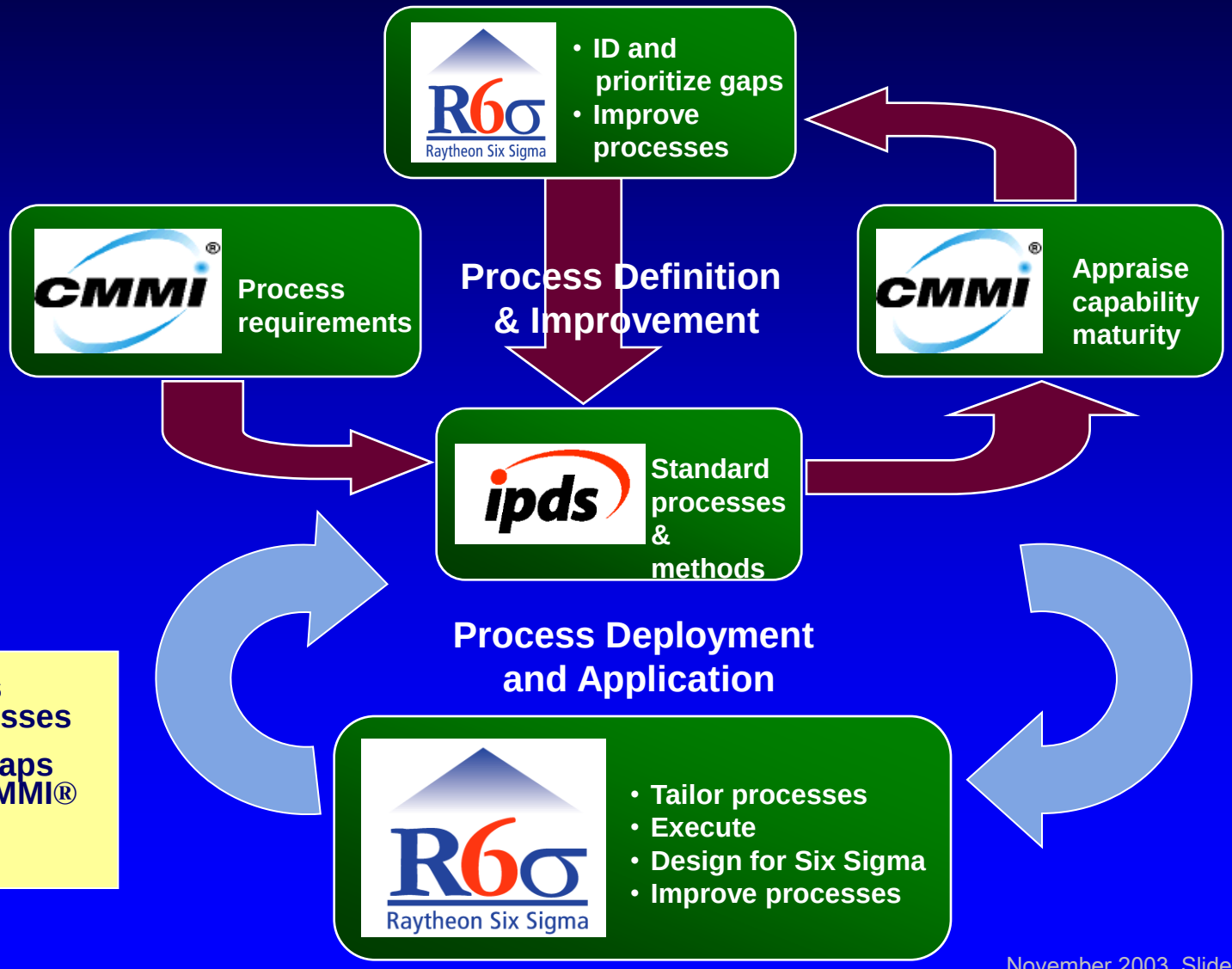

- R6σ Improves Program Processes
- R6σ Closes Gaps Identified by CMMI® Appraisals

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Questions

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