Integrated Processes for CMMI® Compliance

Gary Natwick
Harris Corporation

Government Communications Systems Division

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- $1.5B in Sales
- > 6,500 Employees
- ISO 9001:2000
- SEI CMM Level 4

DoD Programs

Civil Programs

National Programs

Strategic Management and Business Development

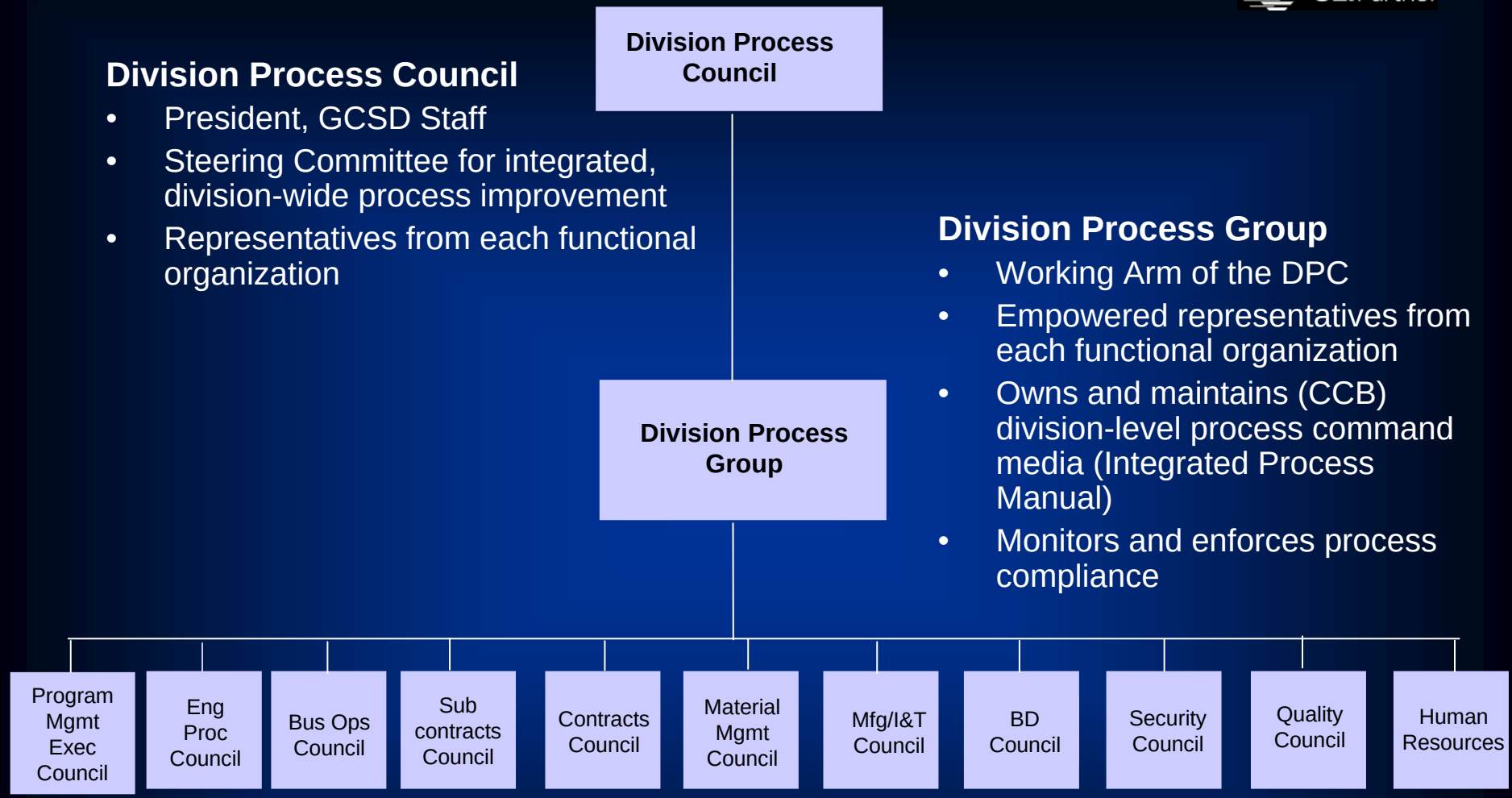
Homeland Security Programs

Harris Technical Services Corporation

Division Process Integration

- *Division Level Integration*
  - *Processes where integration and collaboration are required across functional organizations*
  - *Minimum division requirements to ensure process integration (and CMMI compliance)*
- *Mandatory Compliance*
  - *All Qualifying Programs*
  - *All Functional Organizations Supporting Qualifying Programs*

Improvement Organization



Division Process Council

- President, GCSD Staff
- Steering Committee for integrated, division-wide process improvement
- Representatives from each functional organization

Division Process Group

- Working Arm of the DPC
- Empowered representatives from each functional organization
- Owns and maintains (CCB) division-level process command media (Integrated Process Manual)
- Monitors and enforces process compliance

Integrated Compliance Approach

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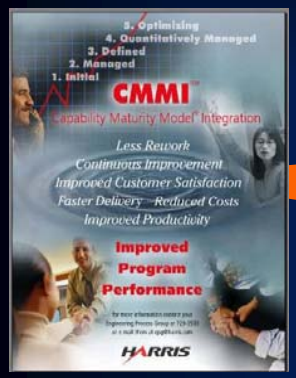
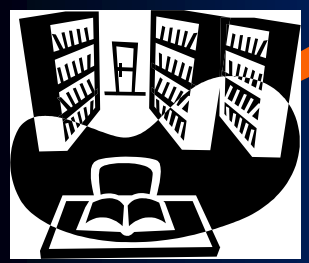
CMMI®





Command Media

Division

IPM

Tailoring

Programs

XYZ PROGRAM PLAN

Compliance Evidence

Program's Compliance Metric

Improve

Reuse

Submit

Organizational Learning

- Historical Data
- Best Practices
- Example Assets
- Improvement Requests

CMMI®-SE/SW Staged Representation

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Maturity Level	Focus	Process Areas
5 Optimizing	*Continuous Process Improvement*	Organizational Innovation and Deployment Causal Analysis and Resolution
4 Quantitatively Managed	*Quantitative Management*	Organizational Process Performance Quantitative Project Management
3 Defined	*Process Standardization*	Requirements Development Technical Solution Product Integration Verification Validation Organizational Process Focus Organizational Process Definition Organizational Training Integrated Project Management Risk Management Decision Analysis and Resolution
2 Managed	*Basic Project Management*	Requirements Management Project Planning Project Monitoring and Control Supplier Agreement Management Measurement and Analysis Process and Product Quality Assurance Configuration Management
1 Initial		

Model-Based Process Improvement

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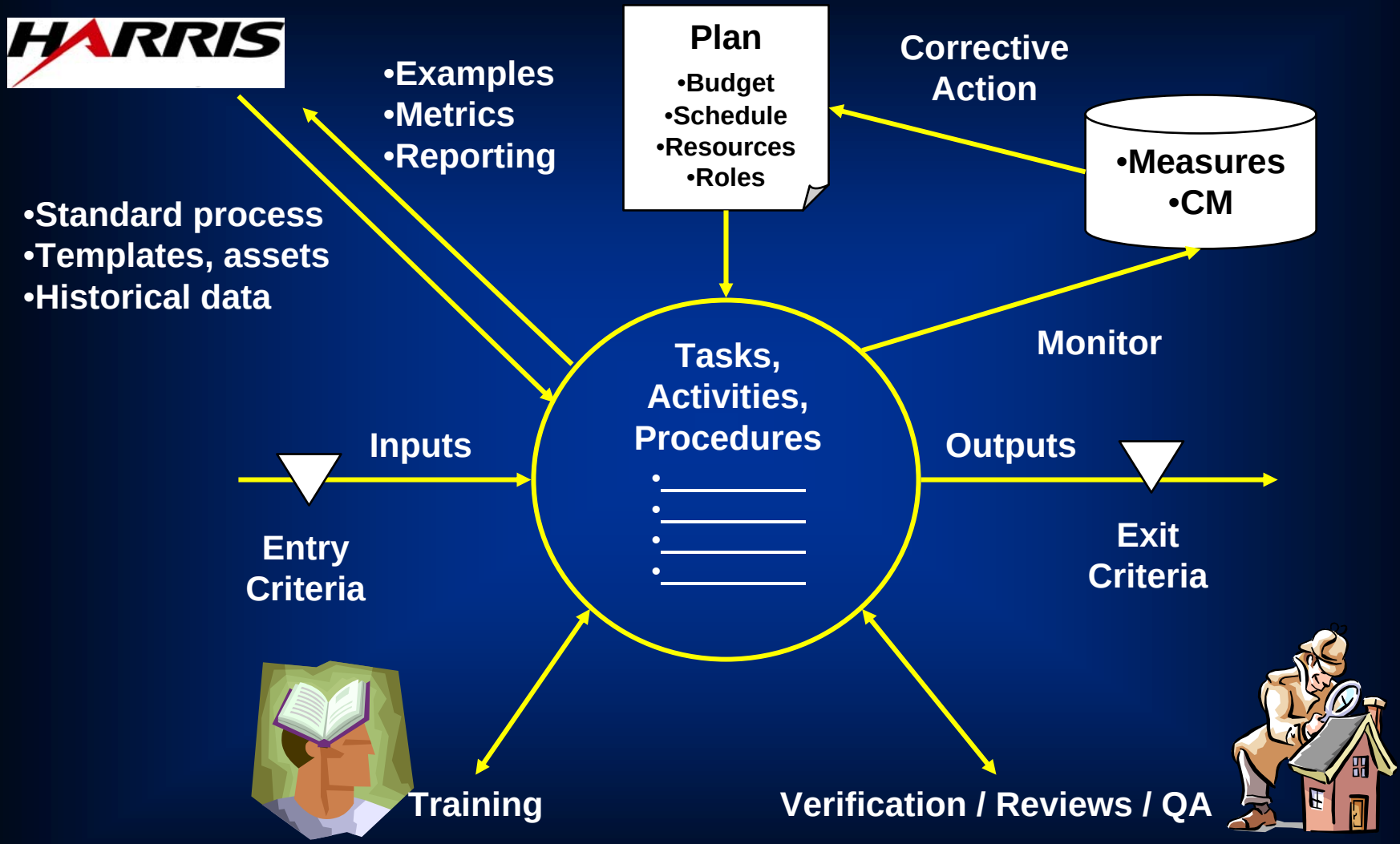
The quality of a product is largely determined by the quality of the processes used to develop and maintain it.

- Disciplined repeatable processes with objective criteria
  - Inputs, outputs, entry/exit criteria, verification, measures
- Planning each process, and tracking against plan
  - Budgets, schedules, resources
- Managing changes to established baselines
- Stakeholder involvement (integrated management)
- Standardized processes and assets, tailored onto programs
- Measurable progress and improvement
- Institutionalization

What is a Process?



Integrated Process Format

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Overview
A brief description of the process intent

Entry Criteria	**Exit Criteria**
State, Prerequisites, Criteria	State, Prerequisites, Criteria
Inputs	**Outputs**
Required work products	Resulting work products

Required Activities
Mandatory tasks to implement the process

Measures
Process performance against plans

Organizational Improvement Information
Metrics, reusable work products

Verification
Process compliance oversight

Tailoring
Approved tailoring, process specific

Implementation Guidance
Common implementation descriptions

Supporting Documentation and Assets
Applicable GCSD references.

CMMI® Process Area Categories

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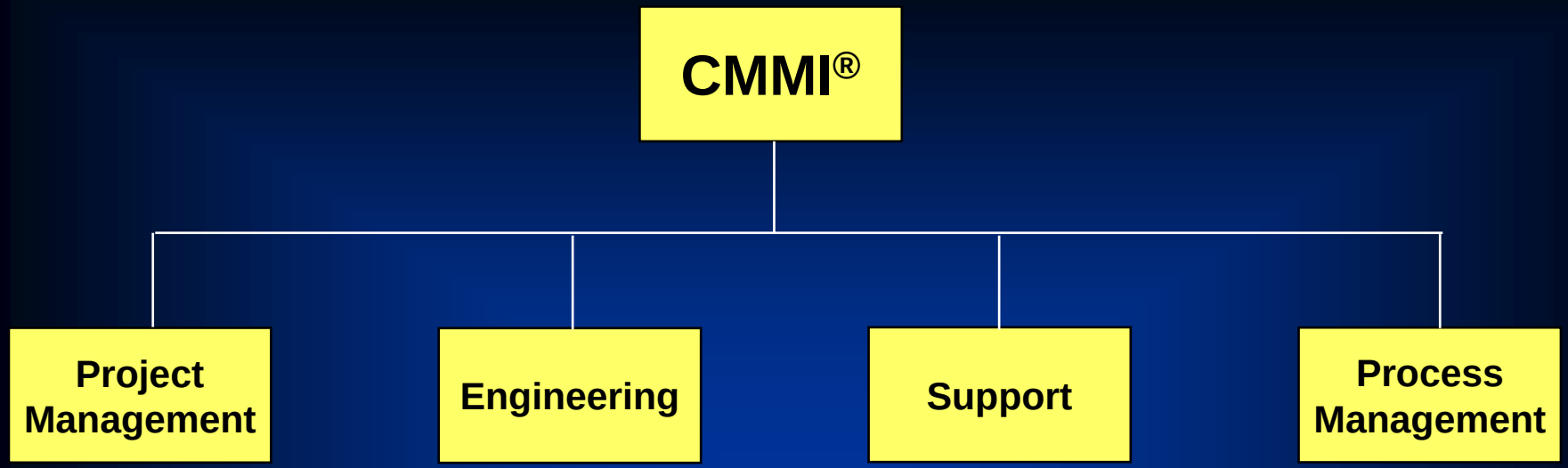


- Project Planning
- Project Monitoring and Control
- Supplier Agreement Management
- Integrated Project Management
- Risk Management
- Quantitative Project Management

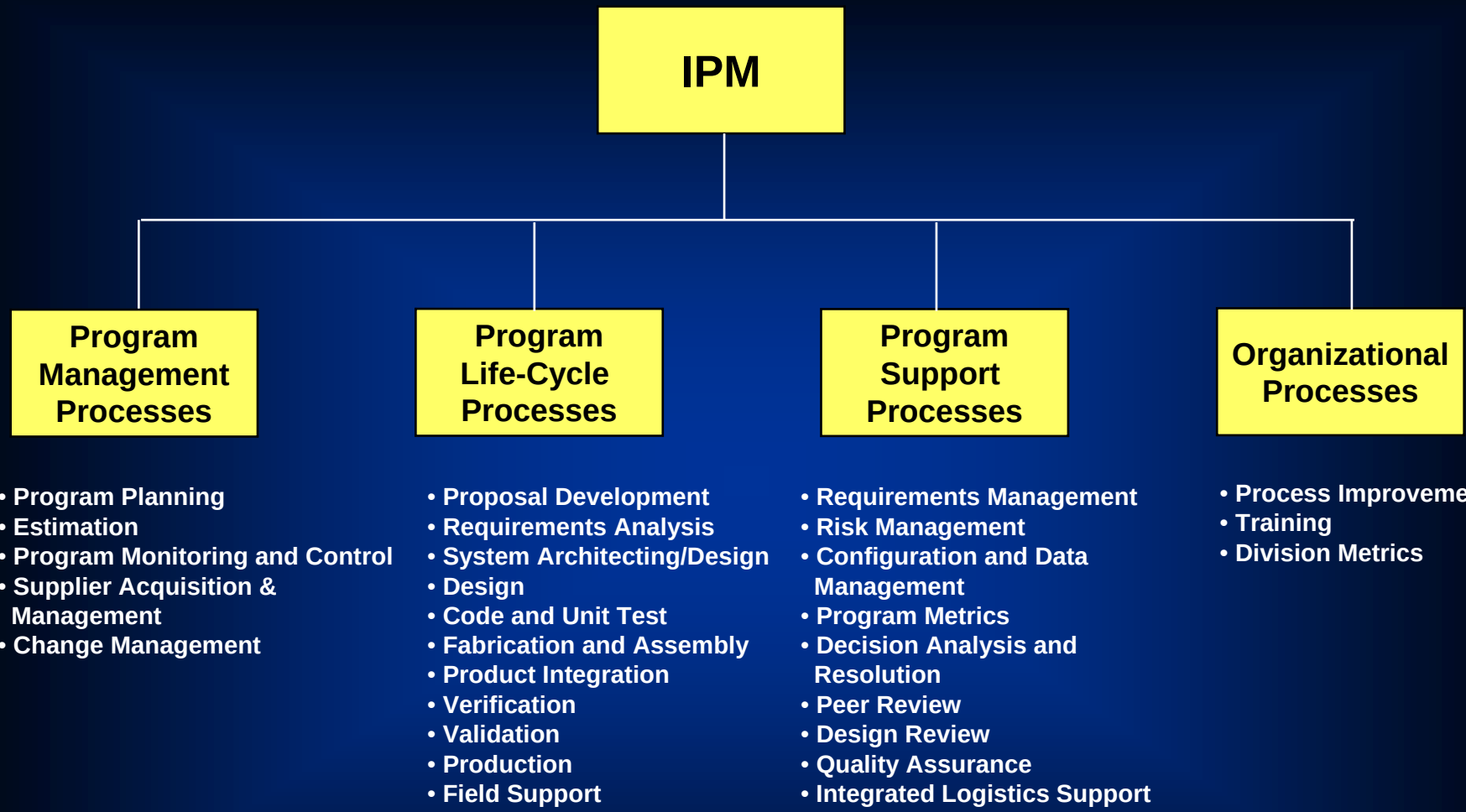
- Requirements Management
- Requirements Development
- Technical Solution
- Product Integration
- Verification
- Validation

- Configuration Management
- Process and Product Quality Assurance
- Measurement and Analysis
- Decision Analysis and Resolution
- Causal Analysis and Resolution

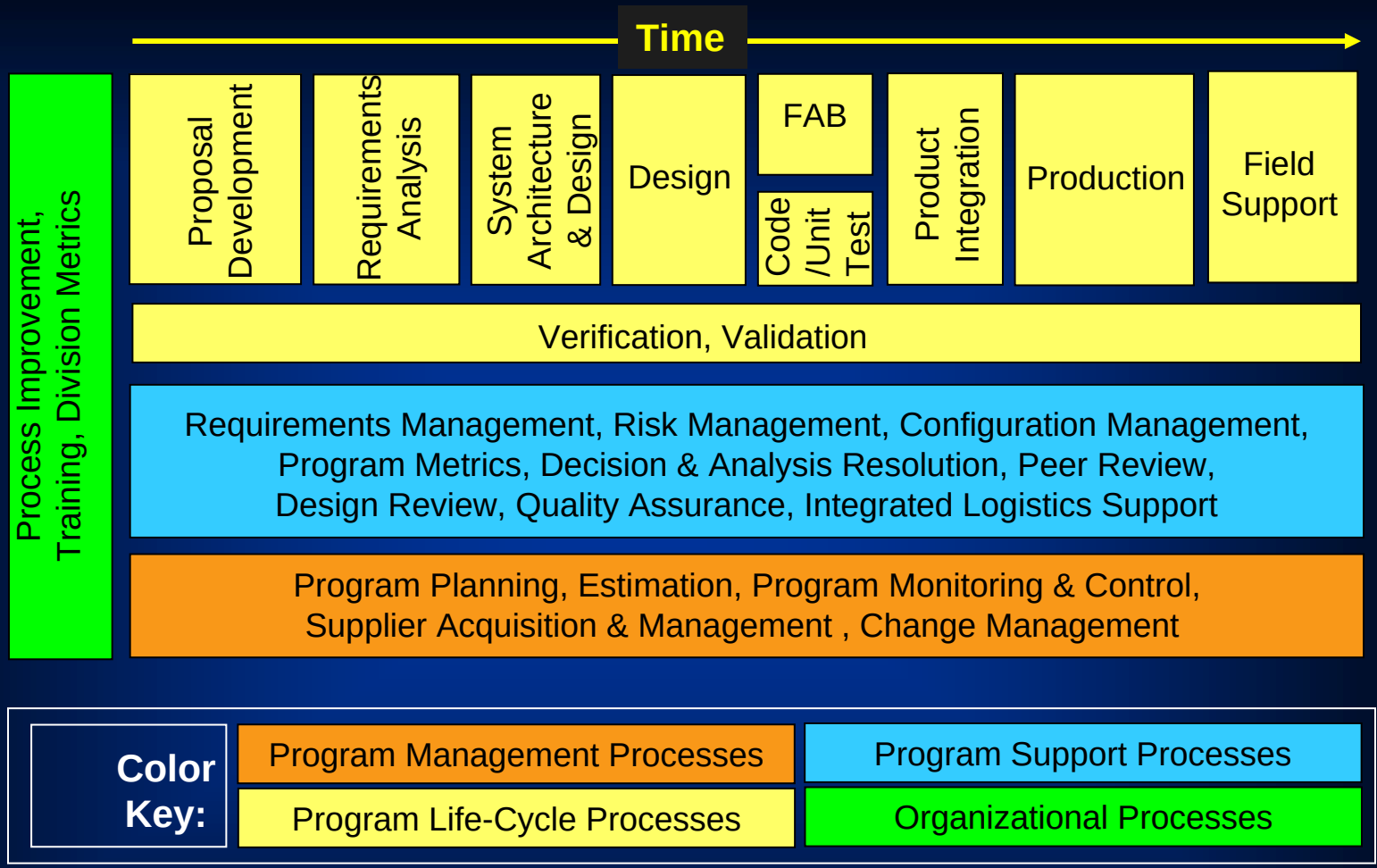
- Organizational Process Focus
- Organizational Process Definition
- Organizational Training
- Organizational Process Performance
- Organizational Innovation and Deployment

- Maturity Level 2
- Maturity Level 3
- Maturity Level 4
- Maturity Level 5

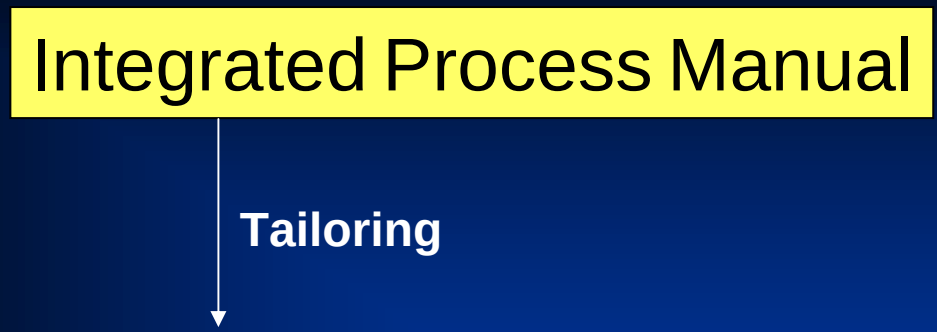
Integrated Process Manual



Process Interrelationships



Process Compliance



1. Program Plans
2. Program process baseline
3. Program execution
4. Compliance evidence
5. QA verification
6. Non-compliance mitigation

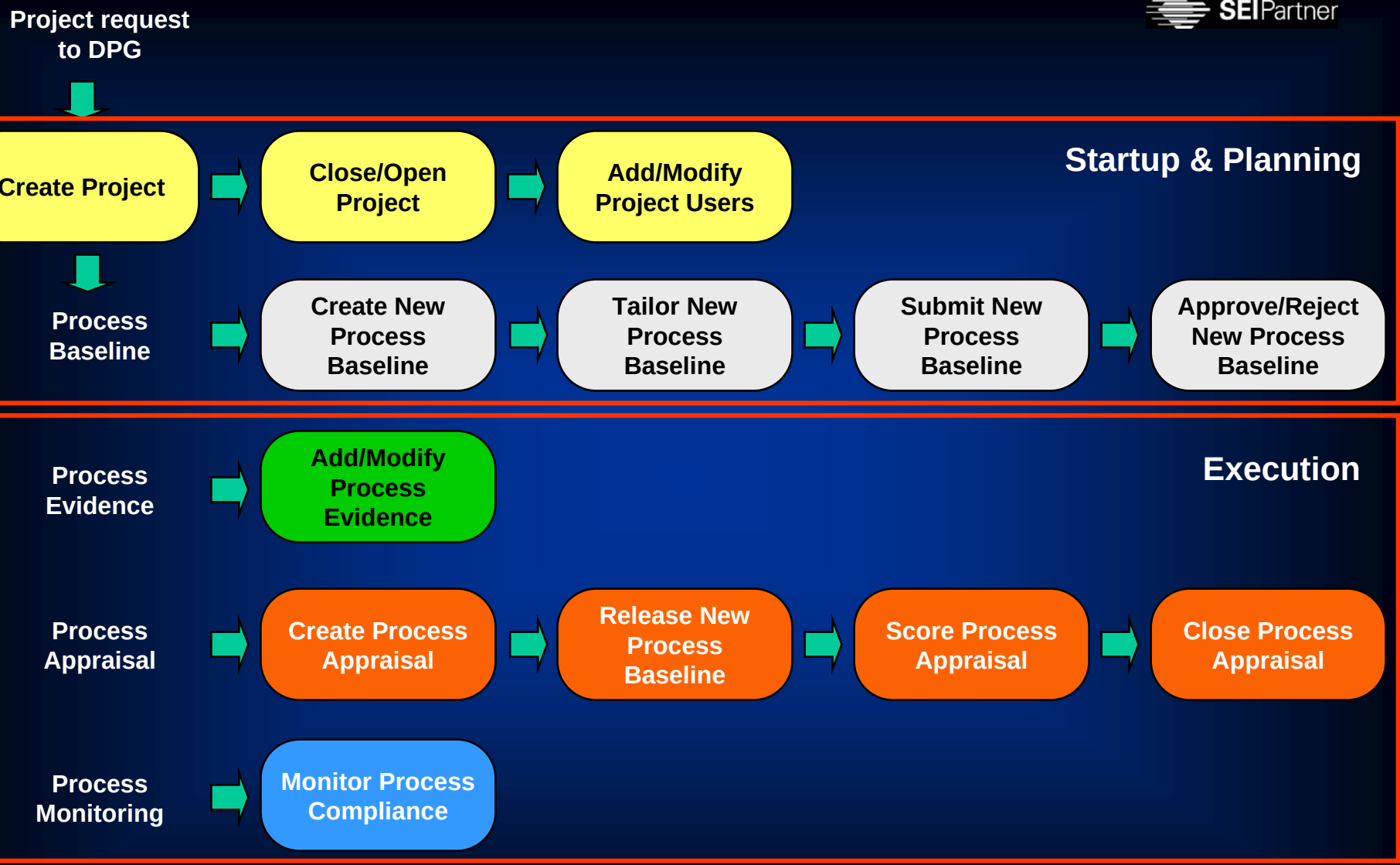
Program Start-up

Program Phase Execution

Program Appraisals

Process Compliance Monitor (PCM)

PCM Project Workflow



Recording Tailored Processes

- IPM tailoring is documented in the PCM tool during initial program planning
  - Specify the planned compliance and implementation of each IPM statement and expected artifacts (optionally)
  - Tailoring codes:

Code	Description
A	Accept IPM statement as written (no changes)
T	Tailored; description of tailoring must be specified (e.g., modifications meeting intent of IPM statement)
D	Deviation; program alternative to IPM statement(s), or not implemented
N	Not applicable; specify rationale

Waiver approval required (T, D)

  - The documented tailoring is called the program's "defined process", establishing the approved baseline against which process compliance audits are performed

Approving Tailored Processes

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- IPM tailoring approved by Program Director (Division Approver)
- IPM deviations beyond acceptable tailoring guidelines requires approval of an Integrated Process Waiver
- Functional plans (SEMP, SDP, etc.) are reviewed and approved by cognizant functional manager. Integrated plans including functional content are encouraged.

Process Compliance Evidence

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- *Direct Artifacts*
  - *Tangible outputs resulting directly from implementation of a practice*
    - *e.g., plans, documents, products*

Required for:
- ***every applicable IPM practice***
- ***every applicable program***

- *Indirect Artifacts*
  - *Artifacts that are a side-effect or indicative of performing a practice*
    - *e.g., meeting minutes, reviews, logs, reports, metrics*
- *Affirmations*
  - *Oral or written statements confirming or supporting implementation of the practice*
    - *e.g, interviews, questionnaires*

- ***Optional for IPM compliance (expected, but not required).***
- ***In formal CMMI® appraisals (e.g., SCAMPI℠), these are required to corroborate direct artifacts.***

Program Process Evidence

Overview
A brief description of the process intent

Entry Criteria
State, Prerequisites, Criteria

Exit Criteria
State, Criteria

Inputs
Needed work products, resources

Outputs
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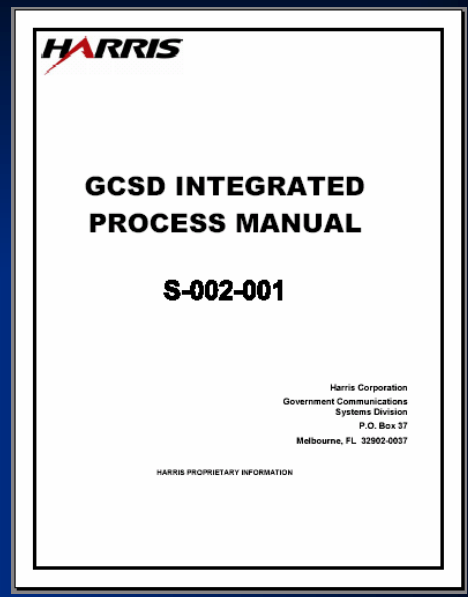

Program evidence needed to demonstrate IPM process compliance

Evidence Collection across the Program Life Cycle

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Program Phases									
IPM Processes	Business Acquisition	System Rqmts	System Design	Preliminary Design	Detailed Design	Fabrication, Code and Integration	Verification	Production	Field Support
Program Planning	X	X	X	X	X	X	X	X	X
Estimation	X	X	X	X	X	X	X	X	X
Program Monitoring & Control		X	X	X	X	X	X	X	X
Supplier Acquisition Mgmt	X	X	X	X	X	X		X	X
Change Management	X	X	X	X	X	X	X	X	X
Proposal Development	X								
Requirements Analysis	X	X							
System Architecting & Design	X	X	X						
Design	X			X	X				
Code and Unit Test						X			
Fabrication and Assembly						X			
Product Integration						X			
Verification	X	X	X	X	X	X	X	X	X
Validation	X	X	X	X	X	X	X		X
Production								X	
Field Support									X
Requirements Management	X	X	X	X	X	X	X	X	X
Risk Management	X	X	X	X	X	X	X	X	X
Configuration and Data Mgmt	X	X	X	X	X	X	X	X	X
Program Metrics		X	X	X	X	X	X	X	X
Decision & Analysis Resolution	X	X	X	X	X	X	X	X	X
Peer Reviews	X	X	X	X	X	X	X	X	
Design Reviews	X	X	X	X	X				
Quality Assurance	X	X	X	X	X	X	X	X	X
Integrated Logistics Support	X	X	X	X	X	X	X	X	X

Process Compliance Scores

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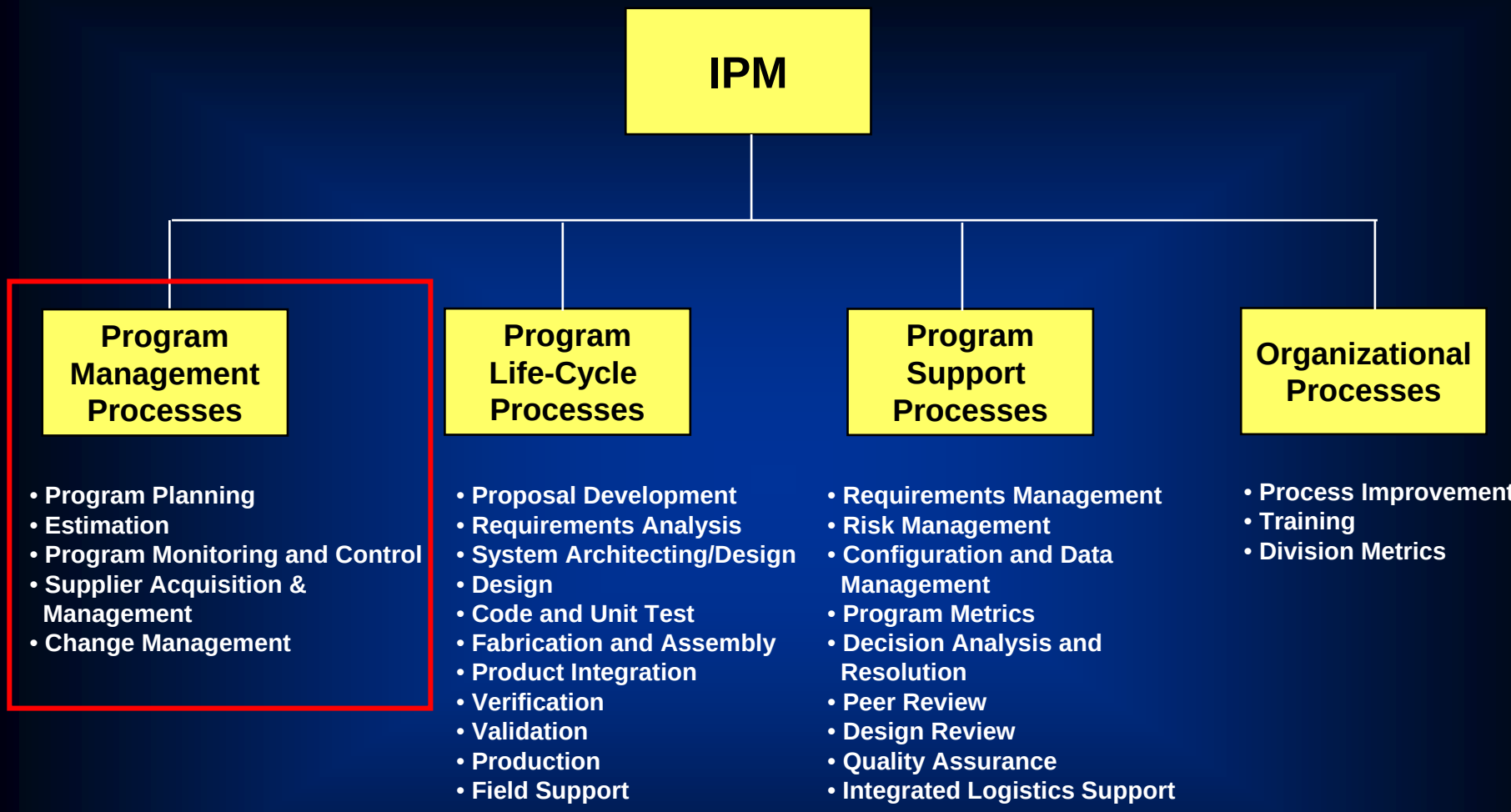
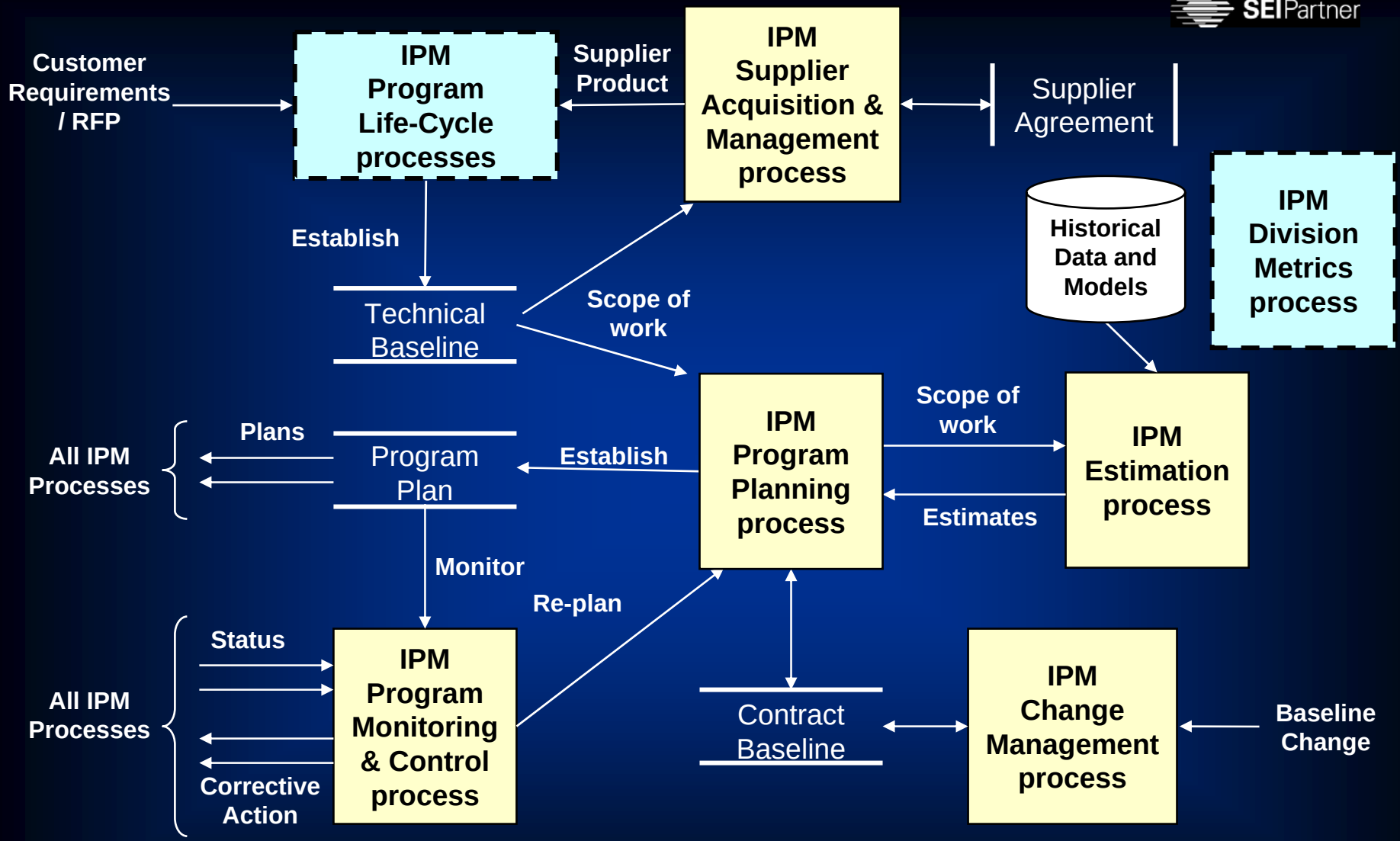
ASSESSMENT STATUS COLORS	NY	**Not Yet**	• To be appraised at a later date (i.e., the process has not yet been executed by the process and cannot be appraised)
	NA	**Not Applicable**	• Not applicable to the project (e.g., Code and Unit Test Process is not applicable to a production-type program)
	NS	**Not Scored**	• Pending an appraisal
PROCESS COMPLIANCE COLORS	FI	**Fully Implemented**	• Direct artifacts are present and appropriate • No substantial weaknesses
	LI	**Largely Implemented**	• Direct artifacts are present and appropriate • One or more substantial weaknesses
	PI	**Partially Implemented**	• Direct artifact is absent or inadequate • Substantiated by indirect artifact/affirmation • One or more substantial weaknesses
	NI	**Not Implemented**	• Any situation not covered by the above

Integrated Process Manual



Program Management Processes



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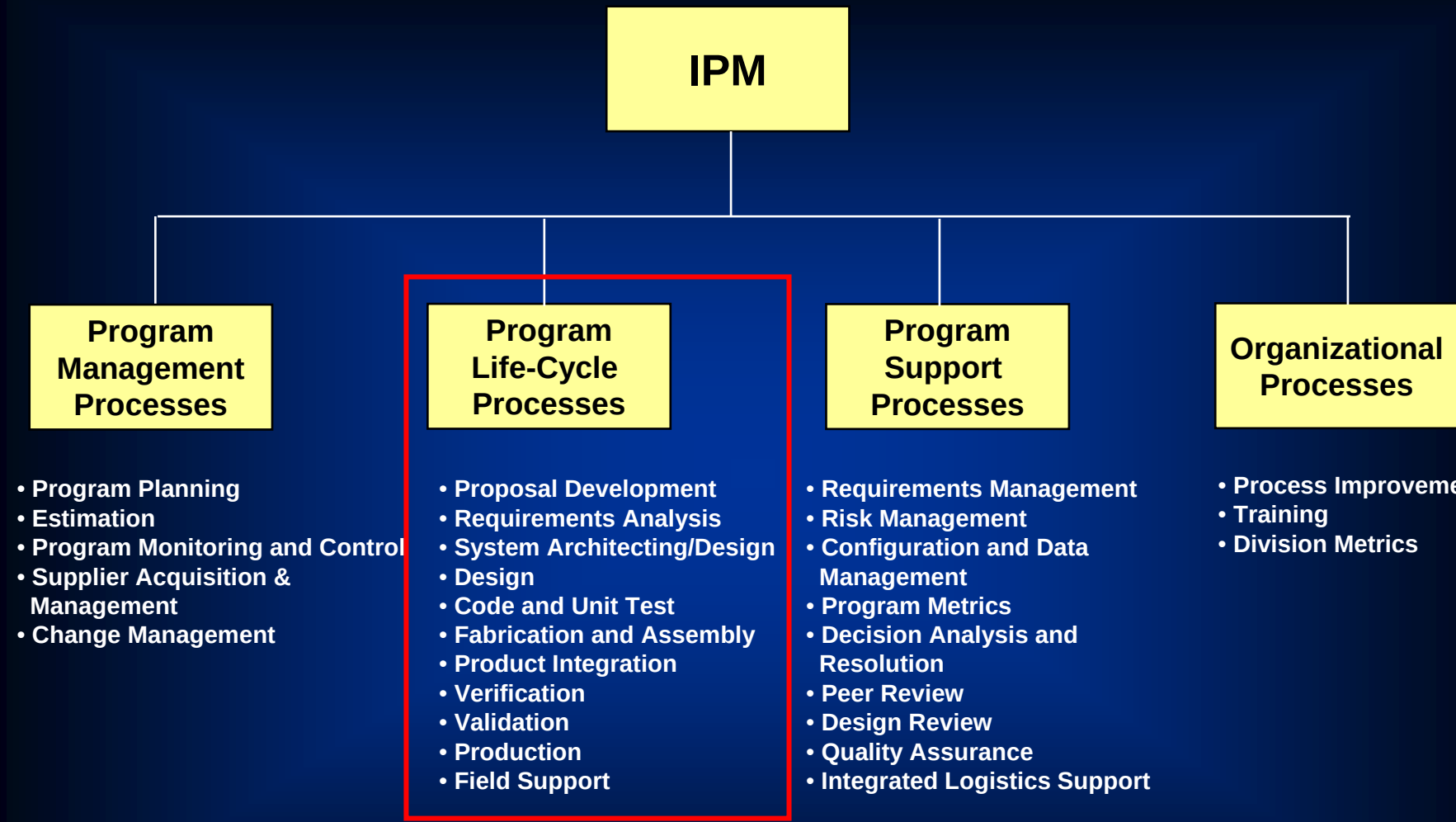

Program Life-Cycle Processes - 1

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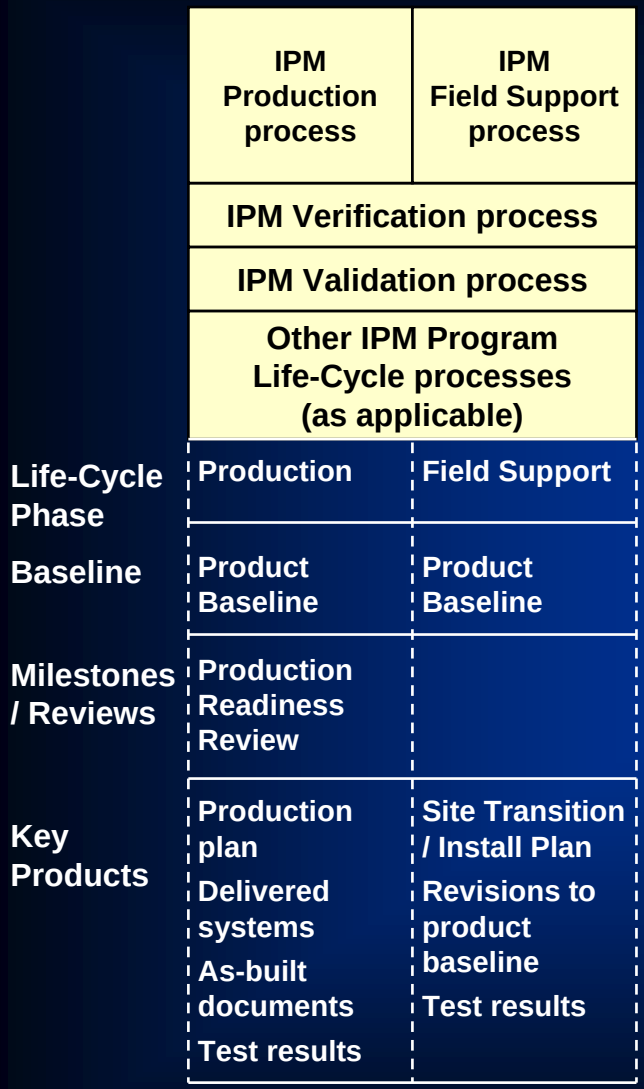
IPM Proposal Development process	IPM Requirements Analysis process	IPM System Architecting/ Design process	IPM Design process	IPM Fab/Assembly process IPM Code and Unit Test process	IPM Product Integration process
IPM Verification Process					
IPM Validation Process					

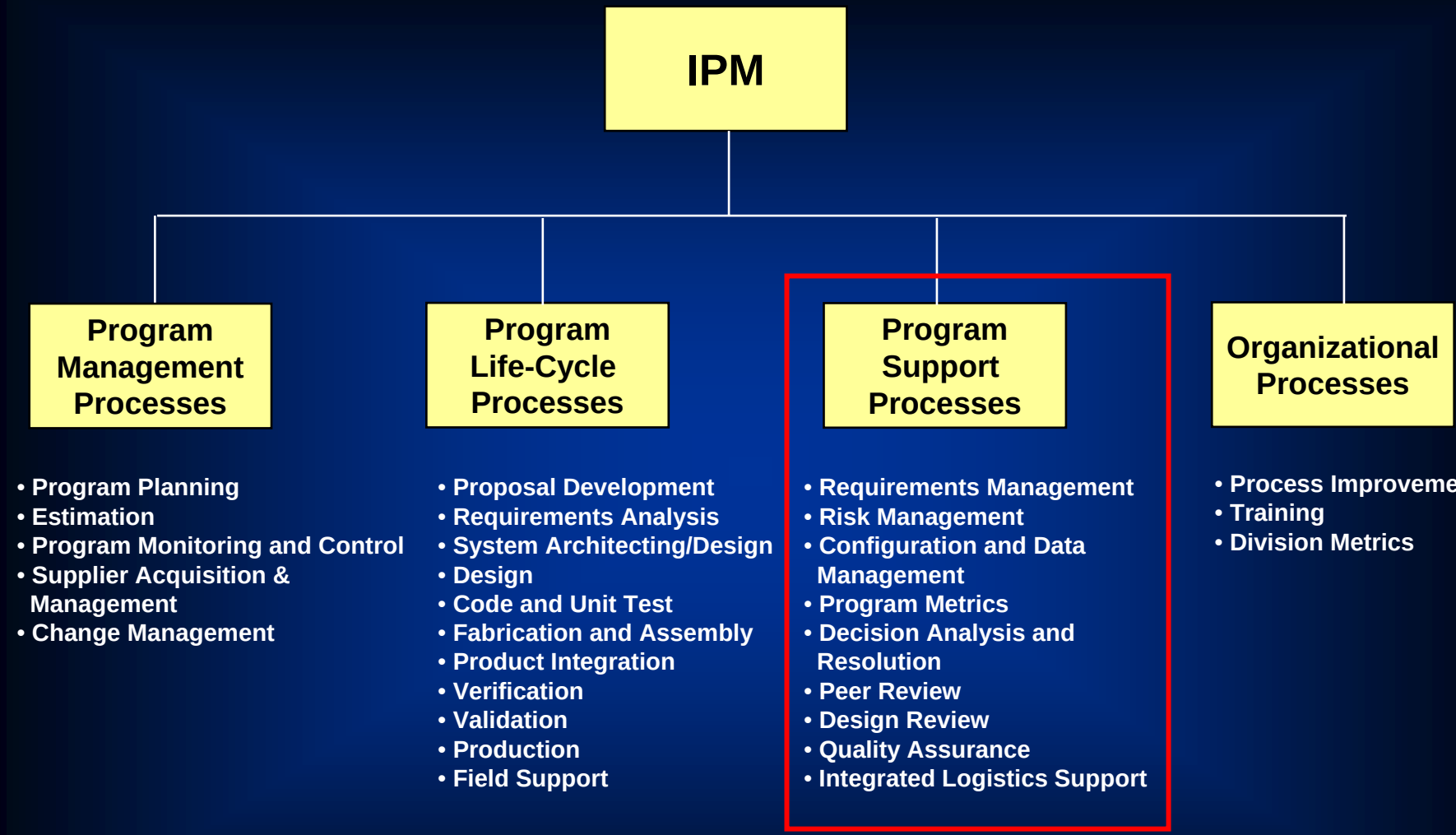
Life-Cycle Phase	Business Acquisition	System Requirements	System Design	Prelim Design Detail Design	Fab, Code, Integration	Verification
Baseline	Proposal Baseline	Requirements Baseline	Functional Baseline	•Allocated •Design	Developmental Configuration	Product Baseline
Milestones / Reviews	TBR PCR	SRR	SDR	PDR CDR	TRR	System Test PCA, FCA
Key Products	Proposal Prog Plans (P) Sys Arch (P)	Prog Plans Requirements CONOPS Operational Threads / Use Cases	Sys Arch Sys Design Interface Defn Technical Data Package Traceability	Prelim Design Detail Design Design docs Test cases / descriptions Traceability	Assembled Components Component test procs / results	Integration plan (F) Integration procedures Integration results Test procedures Test results Traceability Delivered systems

Program Life-Cycle Processes - 2

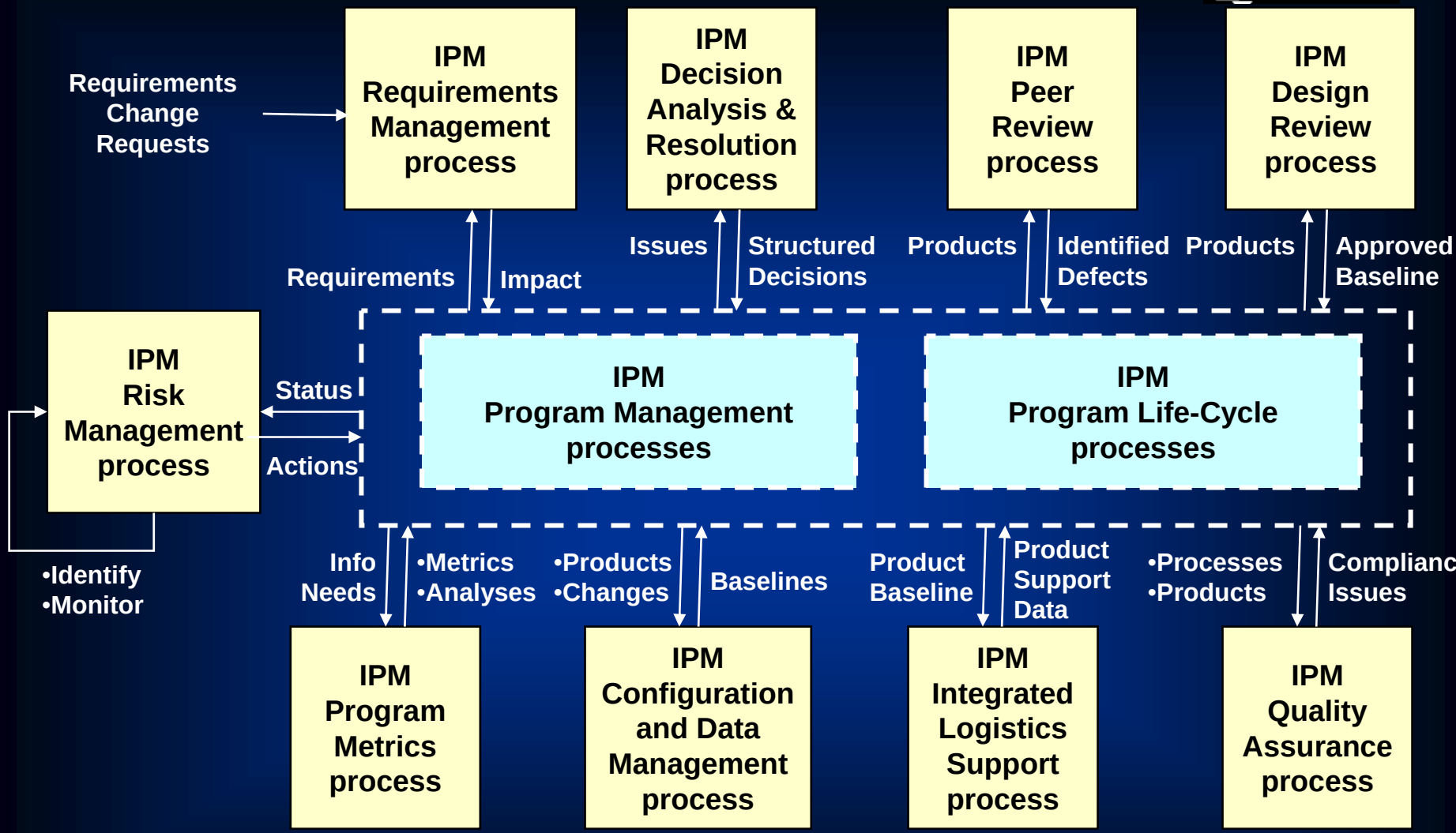


- IPM Production and Field Support processes apply only to the extent required by contract
  - May be not applicable
  - May implement revisions to the baseline products
  - May involve other life cycle processes
    - Requirements, design, implementation
- IPM Production Process
  - Produce and deliver multiple systems
- IPM Field Support Process
  - Site installation
  - Operations support
  - Engineering services

Integrated Process Manual



Program Support Processes



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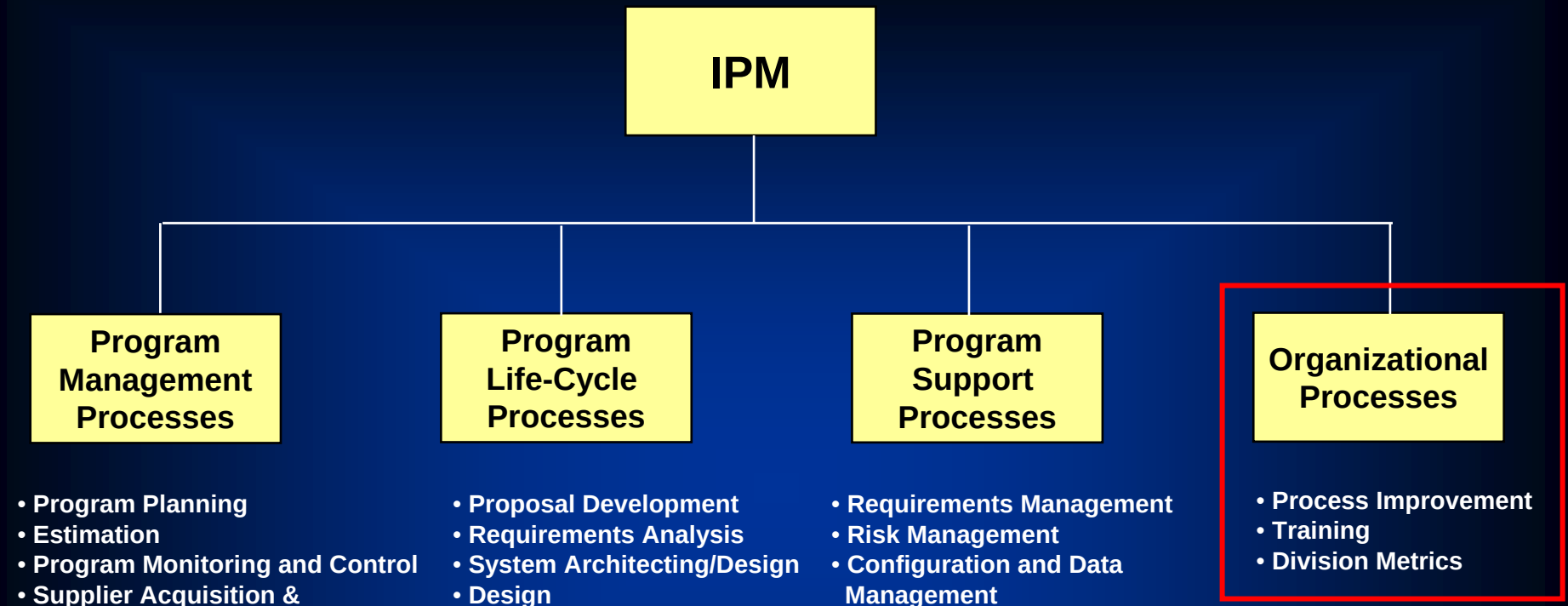
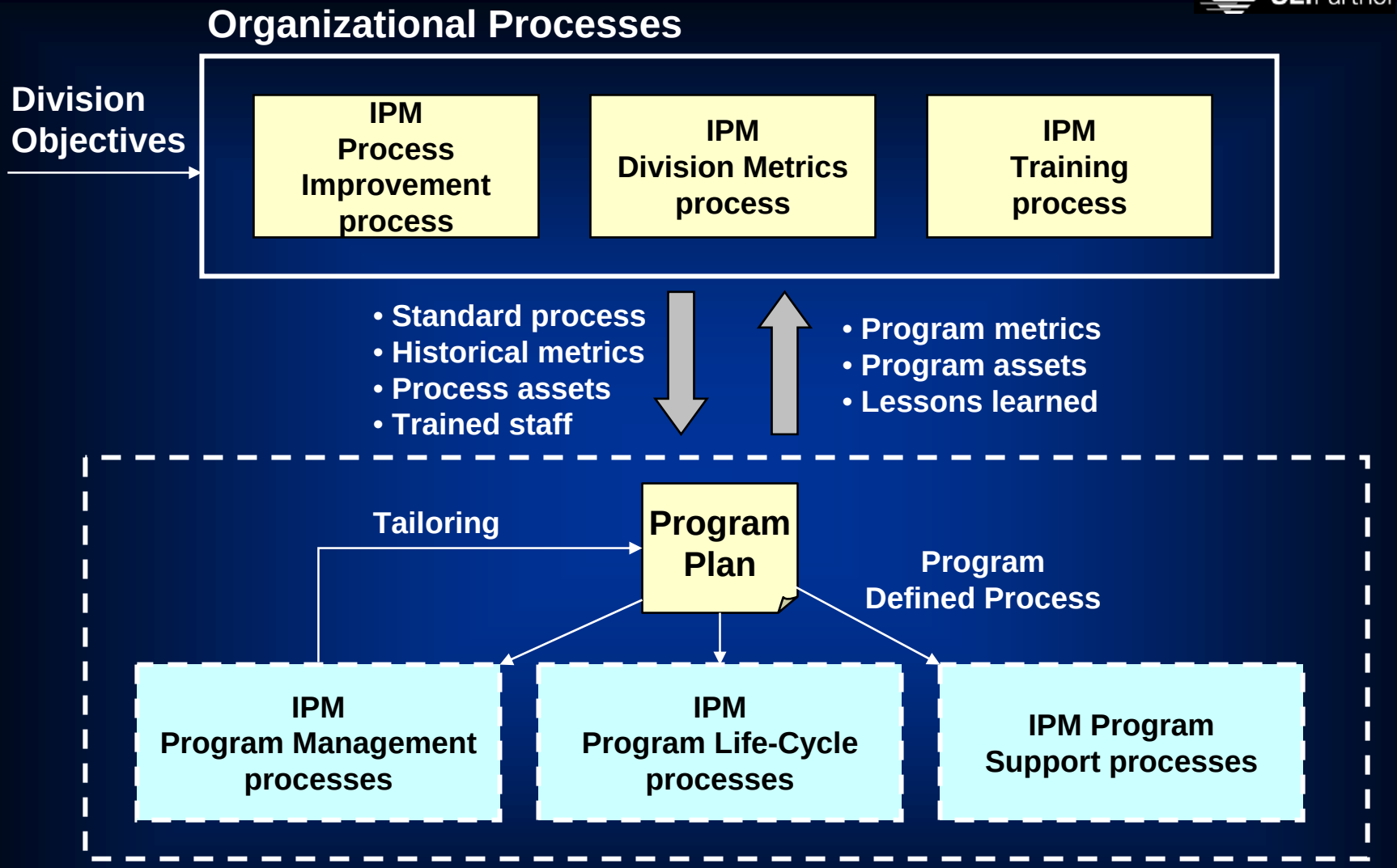


Organizational Processes



Lessons Learned

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- Establish an implementation guide for how the CMMI® is implemented in organizational/project processes
  - Internal users (projects, managers, DPG/EPG)
  - External users (customers, appraisal teams)
- Trade-off how much projects must understand CMMI® details
  - Organization/project process knowledge vs. model knowledge
- Facilitate efficient on-line access and review
  - Process baseline tailoring
  - Evidence entry and appraisal
  - Compliance monitoring
- References to evidence must be very specific
  - Expected evidence
  - Project evidence and location (hyperlinked files/directories)

Contact Information

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