



# Mission Assurance

*within the framework of*

# CMMI



# Contents

---

- Mission Assurance Approach
- Mission Assurance and Risk
- Mission Assurance Model Elements
- The CMMI Framework
- Using the CMMI Model as the Framework for Mission Assurance
- The CMMI Extensions
- Integrating Mission Assurance With CMMI
- Questions?



## Why Do We Need Mission Assurance?

---

Here's what would happen if we were able to achieve a mission rate of 99% for air travel.

This would mean

99% in Spec  
(3.8 Sigma)

99.9997% in Spec  
(6 Sigma)

2 Abnormal Landings  
at most airports each  
day

1 abnormal landing  
every 5 years



## The Mission Assurance Approach

---

- Promotes mission success and reduces technical and mission risks
  - Reliance on independent reviews
  - Subject Matter Experts
  - Disciplined application of best practices



# The Mission Assurance Approach

---

- All companies have business challenges
  - Workforce constraints
  - Budget constraints
  - Schedule constraints
  - Stakeholders and customers to satisfy
  - Competition of which to be aware



## The Mission Assurance Approach

---

- Meeting customer defined mission objectives without defects is a product of mission assurance



## The Mission Assurance Approach (cont'd)

---

- In today's challenging and competitive world, the status quo won't cut it. There must be a continuous effort to improve performance
  - Everyone should be working together towards a defined end goal
  - Improvement efforts need to be tailored to mission success criteria
  - Safety and risk management play important roles in achieving mission assurance.



## Mission Assurance and Risk

---

- Mission Assurance is an engineered process performed over the life-cycle of a program to identify and mitigate design, production, test and field support deficiencies that could impact mission success
- Mission Success is the achievement of program/product requirements designed to meet customer needs while maintaining corporate values





## Mission Assurance and Risk (cont'd)

---

- Operational risk is the possibility of direct or indirect loss resulting from failed or inadequate internal processes or from failures caused by people technology or external events
- Mission assurance ensures that operational risk is reduced to a mission acceptable level and that there is a systematic methodology for identifying and analyzing operational risks

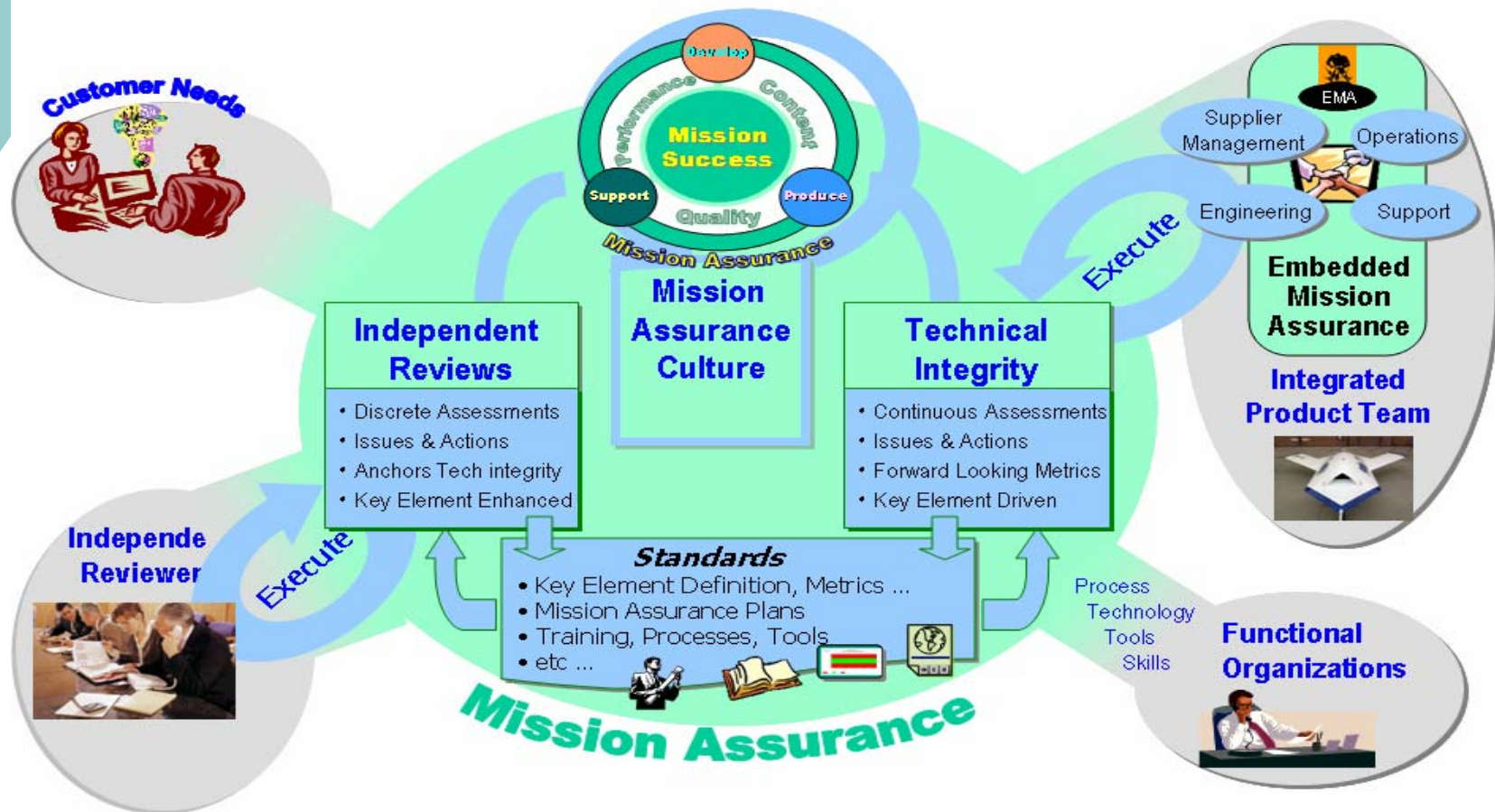


## Mission Assurance Model Elements

---

- Mission assurance requires total infrastructure integrity
- It needs to reflect more than design quality of technical aspects of the design
- Should make customers and suppliers part of the solution

# Mission Assurance Operational Concept



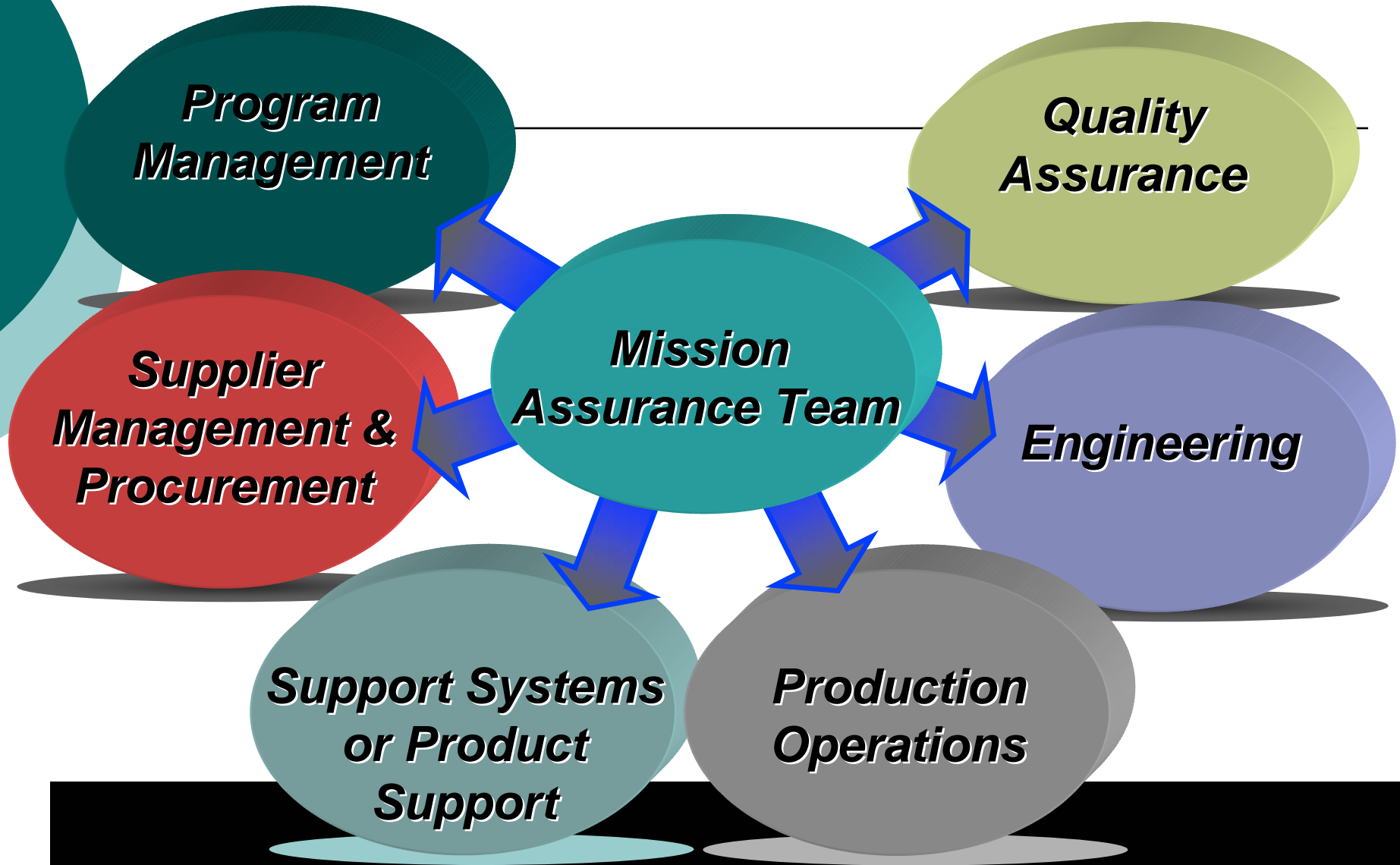


## Design Centric vs. Enterprise Centric Architecture Approach

---

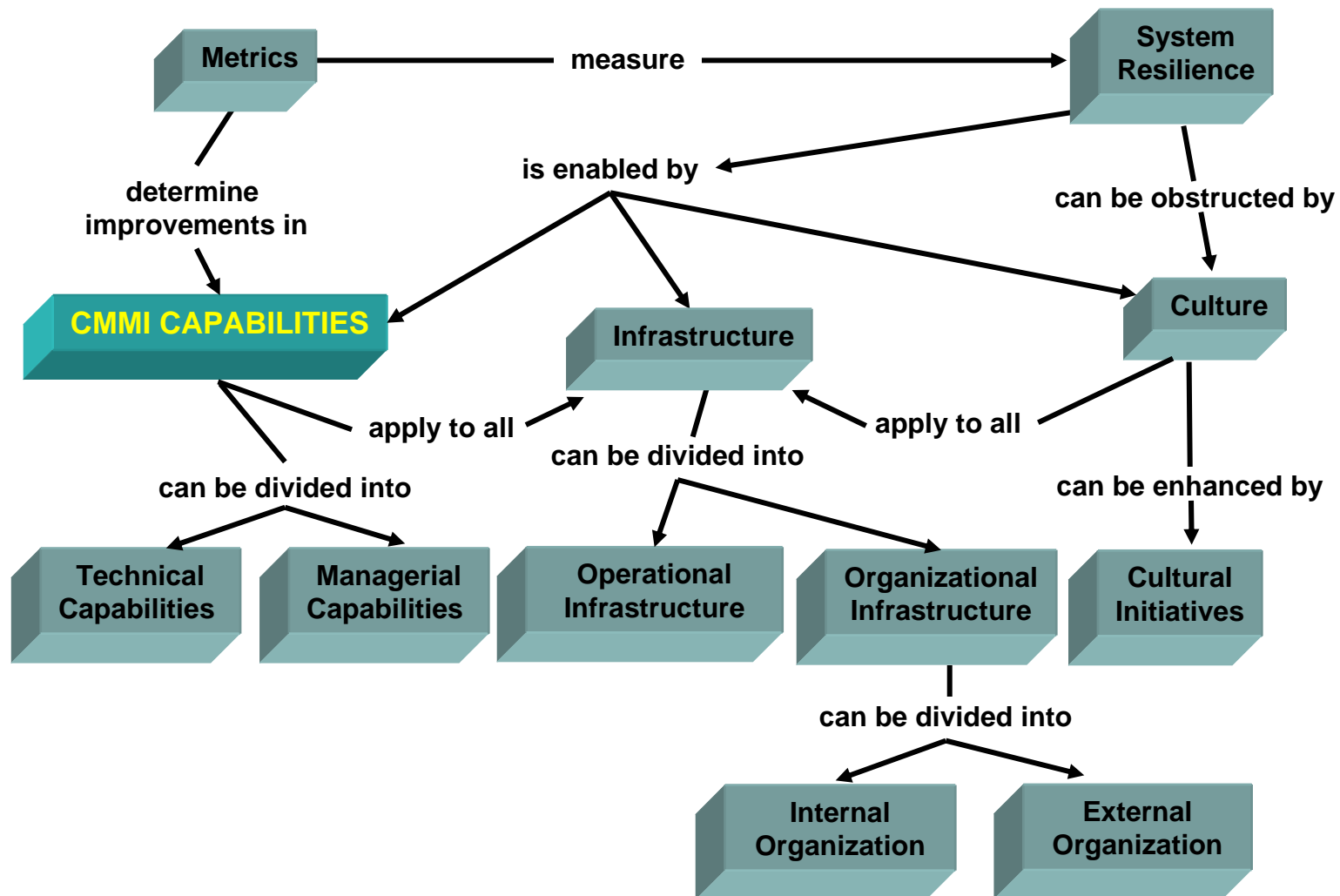
- Design centric approach allocates requirements directly to enterprise systems and subsystems.
  - No process where enterprise-wide trade-offs are addressed.
- Architecture centric approach includes an enterprise model which includes all the stakeholders visions and concerns

# Example of Enterprise Wide Approach



**Mission Assurance is a “cradle-to-grave” process with independent technical assessment as the cornerstone throughout the life-cycle**

# Integrating the Enterprise Approach into the Mission Assurance Model



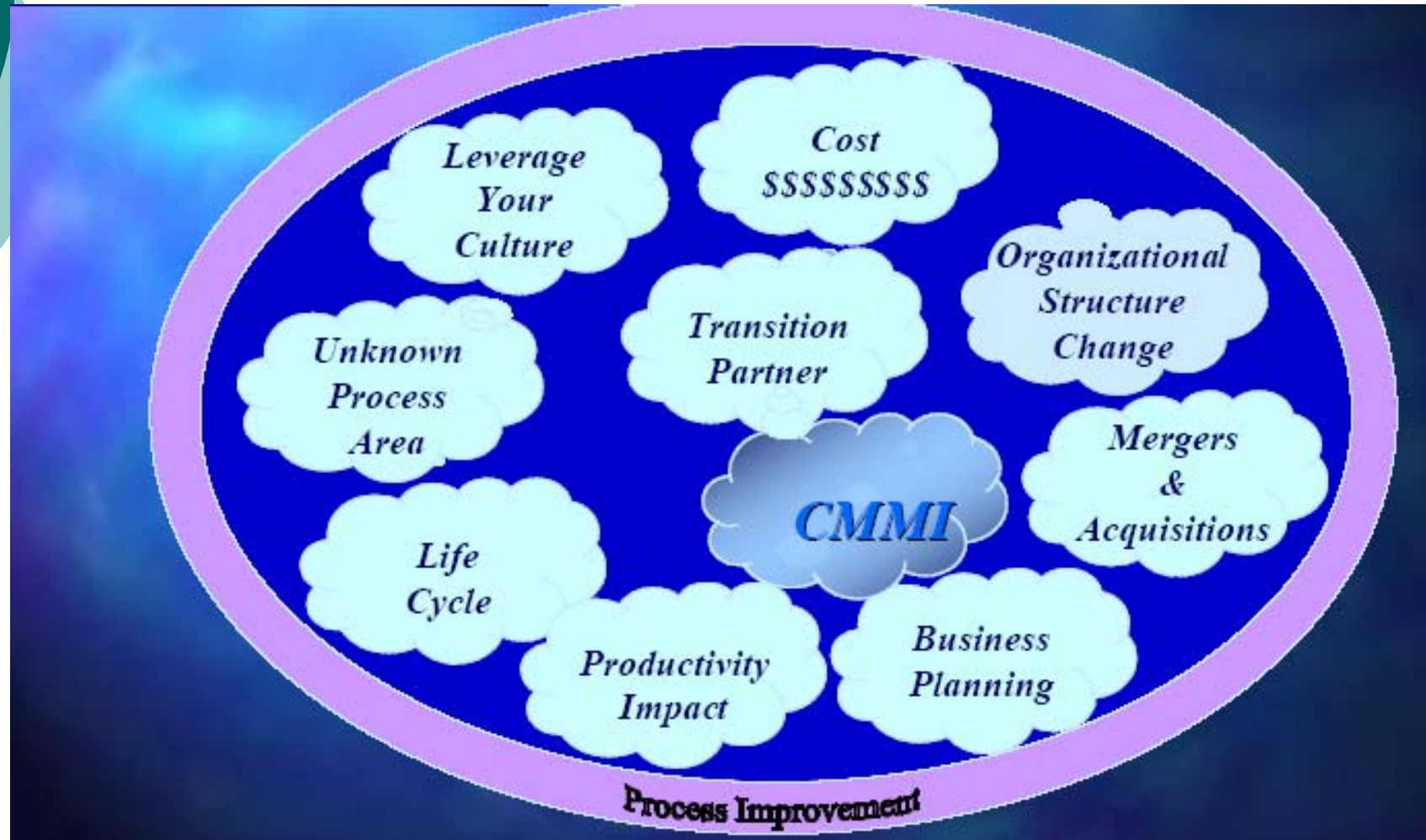


---

# **CMMI CAPABILITIES FOR MISSION ASSURANCE**



# CMMI Capabilities – The Problem Space







# The CMMI Framework

---

- Developed to provide a consistent set of common elements to apply to any discipline
- Designed to support process improvement activities, including assessments and training
- 4 Parts: Input Process, Repository, Control Process and Output Process
- Capture a product wide architecture

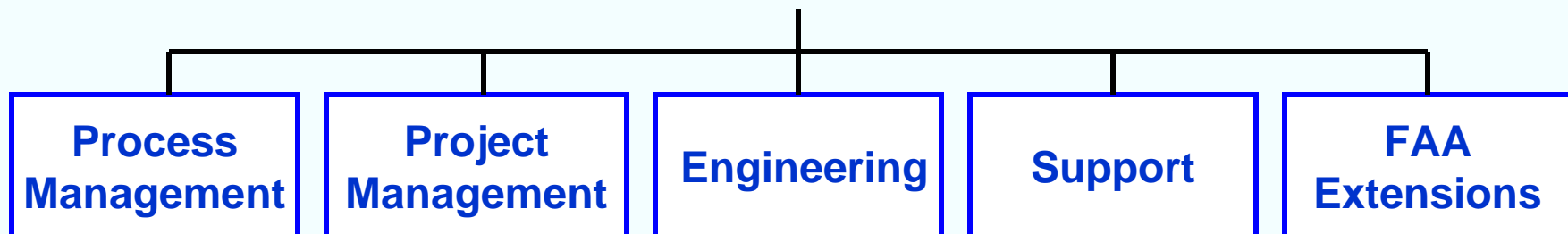
# Business Assurance Life Cycle

## KEY ELEMENTS THAT APPLY TO ALL PHASES ACCORDING TO PROGRAM NEEDS

- Independent Non-Advocate Reviews
- Independent Communication
- Interface Management
- Conscience
- Culture
- People, Processes, Tools Qualification, & Use
- Root Cause and Corrective Action
- Risk Management
- Lessons Learned



## CMMI Process Areas



# CMMI Process Areas

## Organizational Process Management

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

## Project Management

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

## Engineering

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

## Support

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

## FAA Extensions

- Safety
- Security



# The CMMI Extensions

---

- The Federal Aviation Administration and the Department of Defense (FAA/DoD) collaborated to include safety and security in the FAA's integrated CMM model
- Best practices were selected from recognized standards
- Participation included NASA & DoD contractors
  - Experts from government and industry



## The CMMI Extensions (cont'd)

---

- CMMI provides flexibility for organizations to incorporate specialized critical systems engineering areas
- CMMI extensions help to provide the safety and security capabilities to enhance the model



## Perspectives

---

- Safety and security are critical to both DoD and FAA
- Both CMMI and iCMM provide a framework for safety and security activities
- Can be harmonized with CMMI to support practices to guide process improvement and capability

# Integrating Mission Assurance With CMMI

## Mission Success

### Business Optimization

*Common Causes of Variation  
Insert New Technology/Processes  
Optimize Goals*

### Effectiveness & Efficiency

*Special Causes of Variation  
Bottlenecks*

### Consistency

*Historical Data  
Common Processes*

### Discipline

*Documented  
Trained  
Implemented*

### Chaos

*Informal Processes*

**MISSION ASSURANCE**

### Optimizing - Level 5

Causal Analysis & Resolution  
Organizational Innovation & Deployment

### Quantitatively Managed - Level 4

Organizational Process Performance  
Quantitative Project Management

### Defined - Level 3

Requirements Development	Organizational Process Focus
Technical Solution	Organizational Process Definition
Product Integration	Organizational Training
Verification	Integrated Project Management
Validation	Risk Management
	Decision Analysis & Resolution

Safety & Security

### Managed - Level 2

Requirements Management	Supplier Agreement Mgmt.
Project Planning	Quality Assurance
Project Monitoring & Control	Configuration Management
	Measurement & Analysis

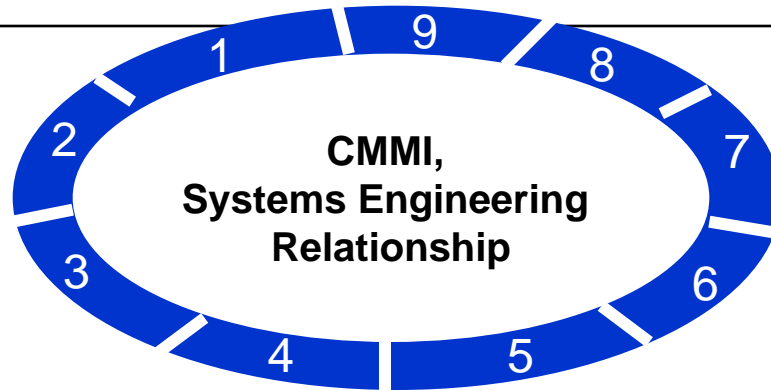
Risk

### Initial - Level 1

CMMI v1.2



# Process Improvement Methodology for Developing Products and Services



Basic CMMI Areas

Advanced CMMI Areas

- Organizational Training
- Organizational Process Focus
- Organizational Process Definition

- Project Planning
- Project Monitoring & Control
- Supplier Agreement Management

- Measurement & Analysis
- Configuration Management
- Process & Product Quality Assurance

**Process Management**

**Project Management**

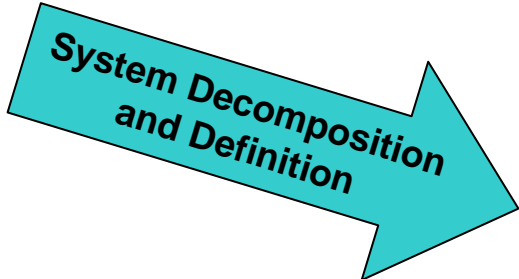
**Support**

**Engineering**

- Organizational Innovation & Deployment
- Organizational Process Performance

- Integrated Project Management
- Risk Management
- Quantitative Project Management
- Safety Management
- Security Management

- Decision Analysis & Resolution
- Causal Analysis & Resolution



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





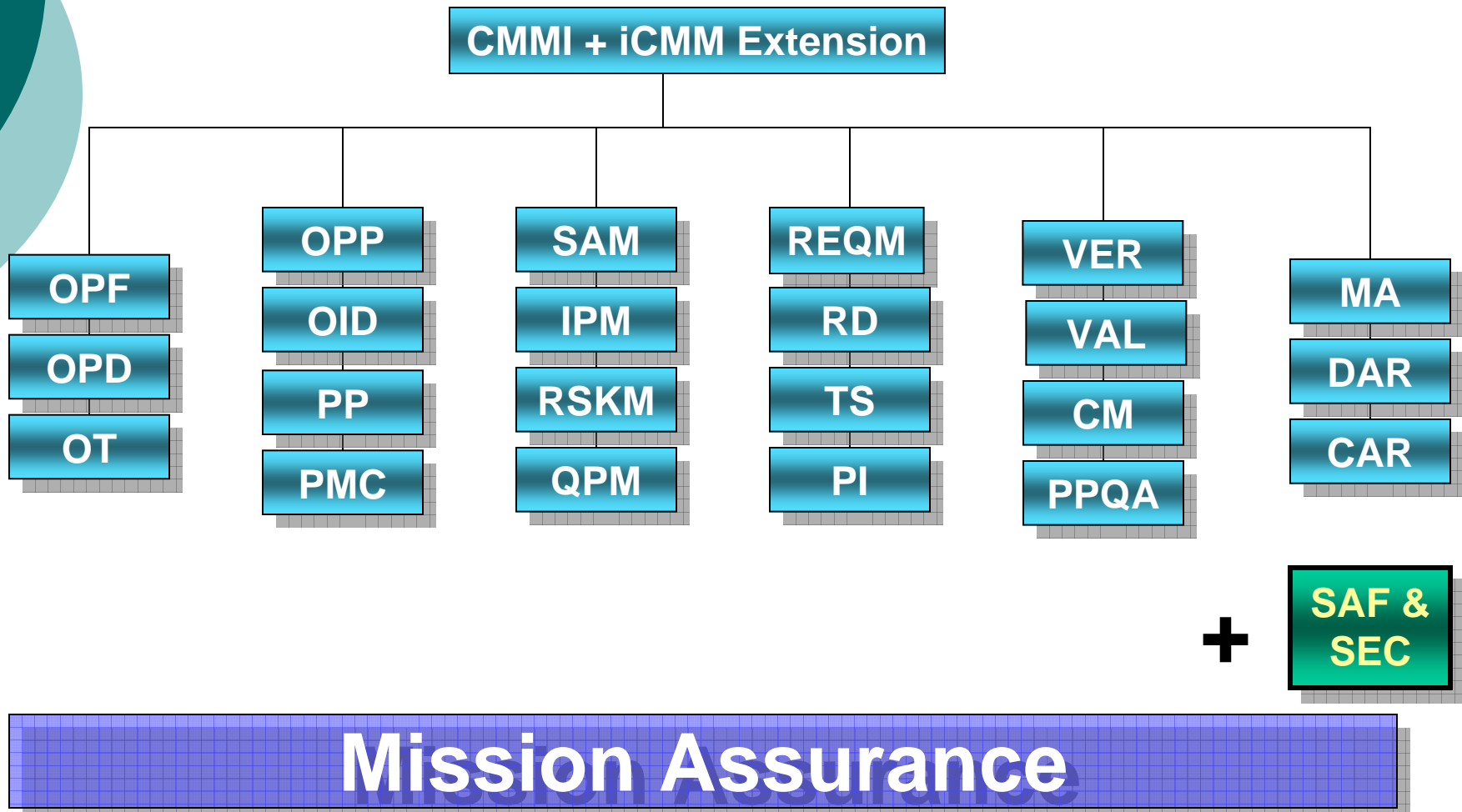


# Conclusion

---

- The mission assurance model can be enabled with the CMMI model
- Will develop a traceable methodology to clarify relationships
- Can be structured to help an organization become highly integrated and effective when implementing mission assurance

# CMMI + the iCMM extensions = Mission Assurance





---

**ANOTHER WAY TO SPELL**

**MISSION SUCCESS**



# QUESTIONS?



## Contact Information:

email address:

[kathleen.m.kukulcastone@boeing.com](mailto:kathleen.m.kukulcastone@boeing.com)

Tel.: 562-982-2157