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Not Just for Software Anymore

Lessons Learned from a CMMI™ Appraisal on Projects in a Nuclear Weapons Facility

Dan Fritts, Program Lead & Appraisal Sponsor
Phone: 816-997-4634
Email: dfritts@kcp.com

Jeanie Kitson, SCAMPI Lead Appraiser
Phone: 412-889-5918
Email: kamolkj@mindspring.com

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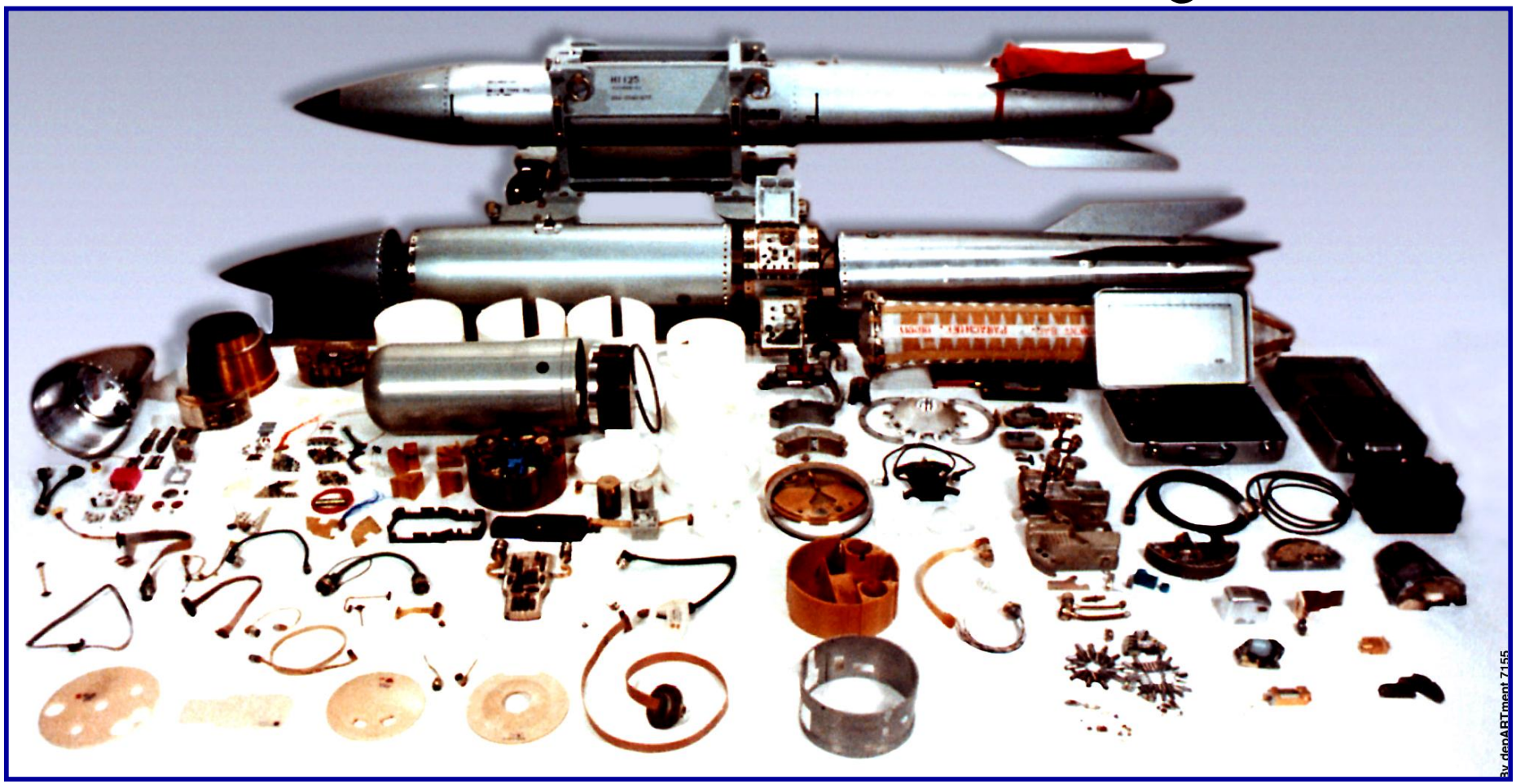
CMMI for Construction Projects

- Organizational Overview
- Why CMMI?
- CMMI Implementation
  - Methodology
  - Tools
  - Unique Challenges
- Appraisal Results

Complex Products



Responsible for 85% of nuclear weapon components

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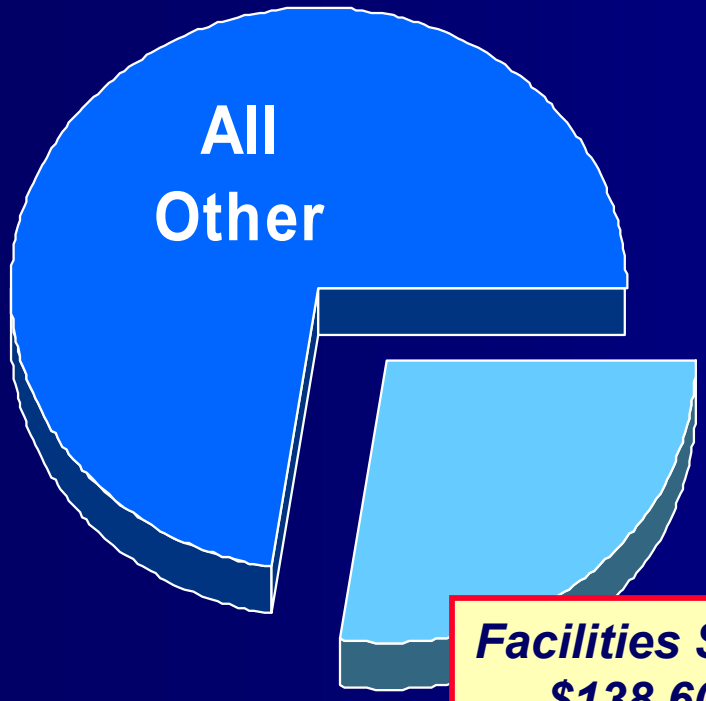
KCP Funding



Facilities Spending
$138,600,000

Readiness in Technical Base & Facilities (RTBF)

- Construction Projects
- Production Capital purchase and install
- Maintenance
- Infrastructure
- Utilities

Everything from Semiconductors to Semi-trailers

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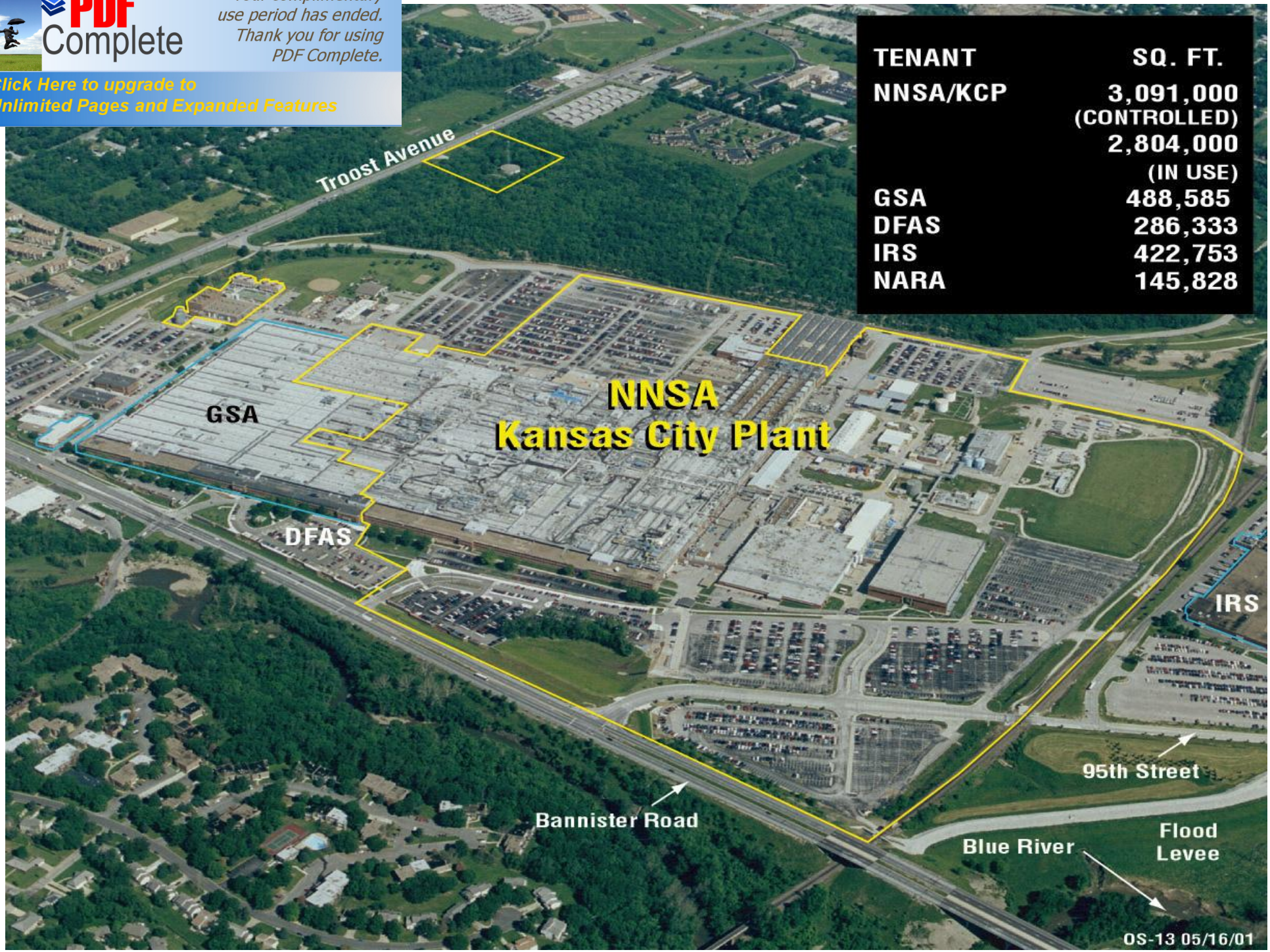
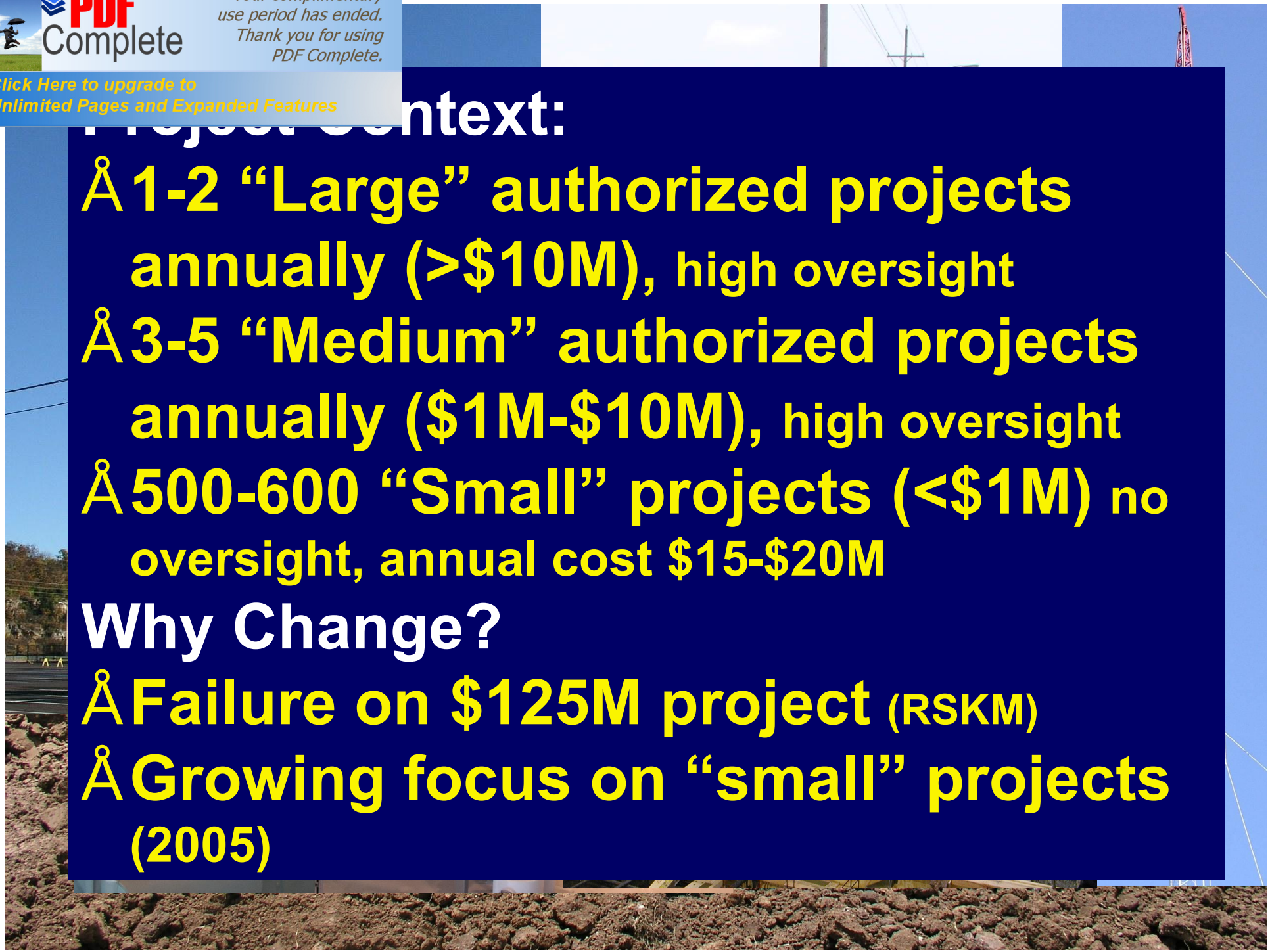
Infrastructure Overview

- 140 Acres of a 300 Acre Federal Complex shared with GSA, IRS
- 40 Buildings (3.1 Million square feet under 30 acres of roof)
- 13 Acres of Parking Lots and 16 Miles of Roadways
- Over 600 air handling units
- Over 27,000 pieces of Capital Equipment
- Mechanical, Electrical, and Special Manufacturing





Project Context:

- 1-2 “Large” authorized projects annually (>$10M), high oversight
- 3-5 “Medium” authorized projects annually ($1M-$10M), high oversight
- 500-600 “Small” projects (<$1M) no oversight, annual cost $15-$20M

Why Change?

- Failure on $125M project (RSKM)
- Growing focus on “small” projects (2005)

Why CMMI?

- Evaluated 4 competing project evaluation models . . .
  - ISO (base case)
  - OPM3 (published by Project Management Institute – PMI)
  - CMMI ver 1.2
  - Kersner[1] (proprietary published model)

- . . . Against 5 criteria:
  - Credibility and wide-use in industry
  - Identifies crisp and actionable items
  - Holistic and systematic
  - Cost to evaluate and maintain
  - Proven correlation to business improvement

[1]Using the Project Management Maturity Model, 2nd edition, 2005, Harold Kerzner, PhD, ISBN 0-471-69161-5

Alternative Analysis

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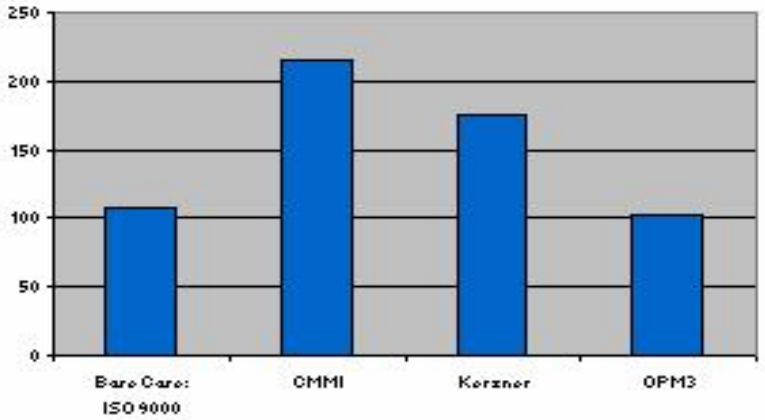

Goals \ Concepts	WF	Base Case: ISO 9000	CMMI	Kerzner	OPM3
1. The model is accepted and credible and used widely in commercial industry	10	3	3	3	1
2. The model identifies crisp and actionable improvements	8	3	9	7	5
3. The model drives a holistic and systematic approach to driving enterprise improvements	7	3	9	5	1
4. Cost to evaluate/implement/sustain	6	3	1	5	5
5. The model has a proven/demonstrated correlation to improved enterprise results.	5	3	9	5	3
Totals		15	31	25	15
Wghted Totals		108	216	176	102

Appraisal Scope using Continuous Representation

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Risk Management was important to the NNSA customer and had been a focus of the organization for the previous years.

The Continuous Representation allowed the flexibility to include RSKM in the appraisal.

Category	Process Areas
Process Management	Organizational Process Focus Organizational Process Definition Organizational Training Organizational Process Performance Organizational Innovation and Deployment
Project Management	**Project Planning** **Project Monitoring and Control** **Supplier Agreement Management** Integrated Project Management **Risk Management** Quantitative Project Management
Engineering	**Requirements Management** Requirements Development Technical Solution Product Integration Verification Validation
Support	**Configuration Management** **Process and Product Quality Assurance** **Measurement and Analysis** Causal Analysis and Resolution Decision Analysis and Resolution

tegrated Process Flow

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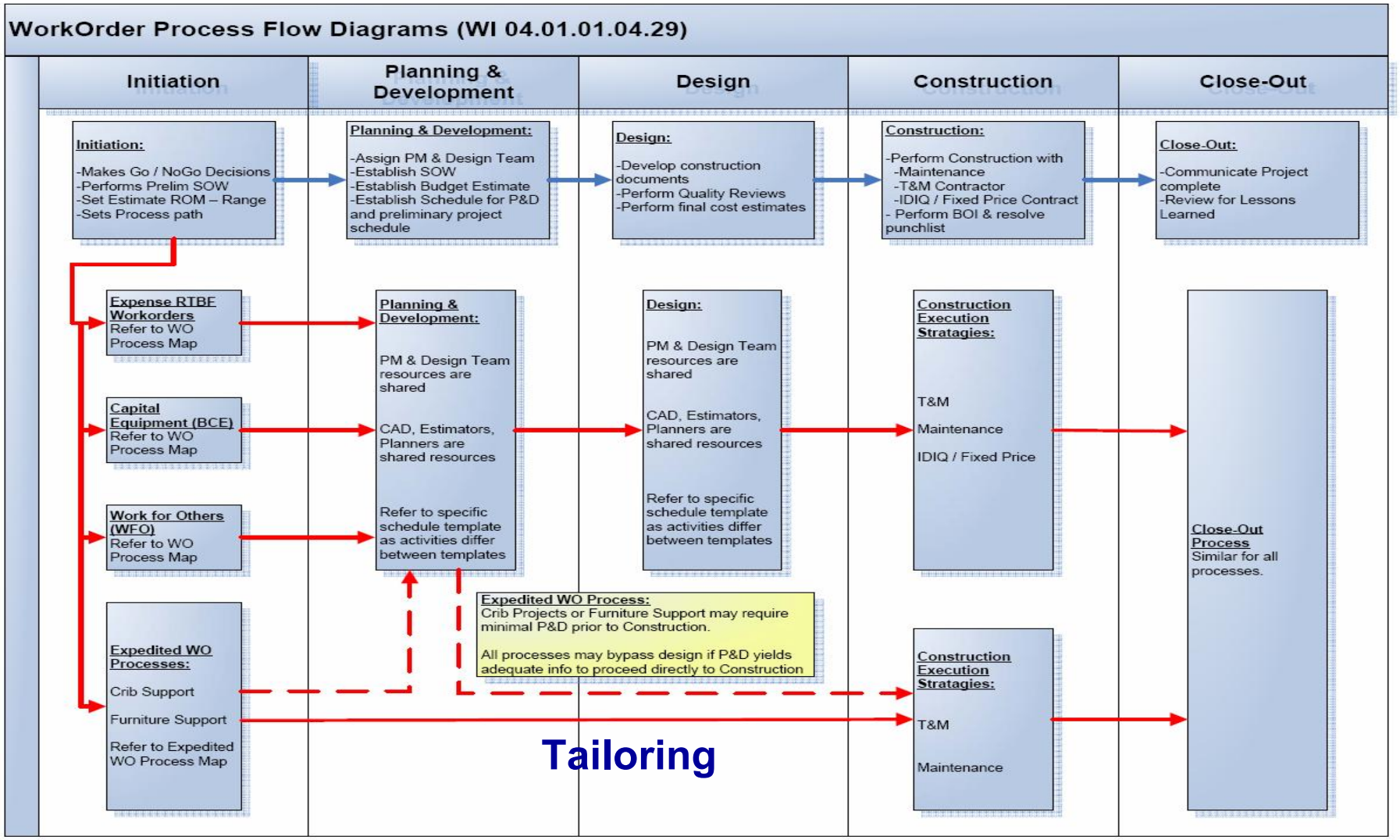

Phase Gates

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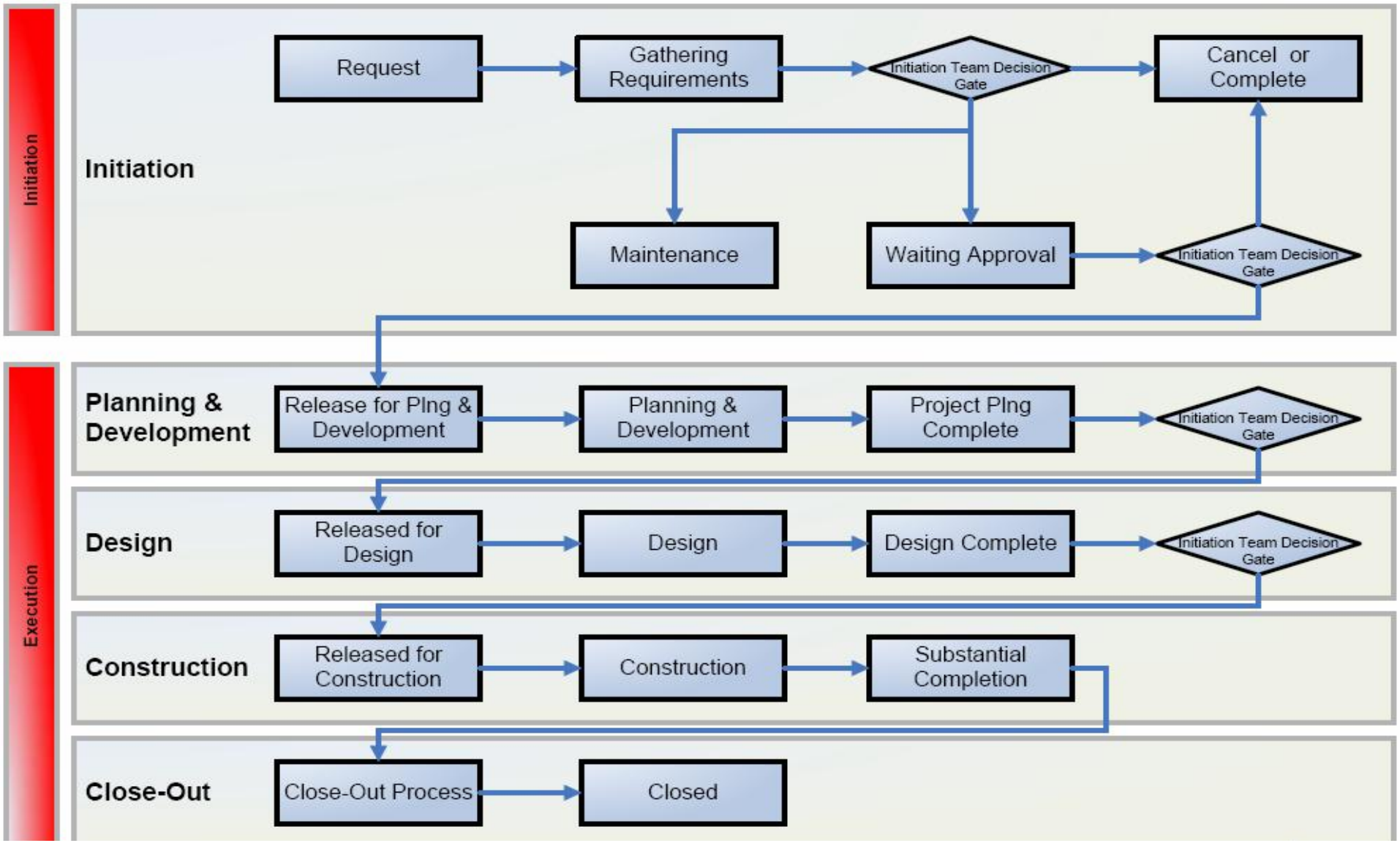

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Challenge

Mapping Construction Language to CMMI

Configuration Management

Specific Goal and Practices		Typical Work Product	Process/Tool that satisfies SP	Link to Process/Tool
SG 1	Establish Baselines			
SP 1.1	Identify Configuration Items			
		Scope	How to Control Authorized Projects	04.01.01.04.37
		Schedule		
		Budget		
SP 1.2	Establish a Configuration Management System		Need system Description	
		File System	Project Records	04.01.01.04.35
		Command Media	Facilities Reference Manuals	04.01.01.04.21
		Project Database		
		Process Maps		
		QA Manual		
SP 1.3	Create or Release Baselines			
		Project Charter	Database	
		SOW	EVMS Work/Budget Authorization	04.01.01.04.37
		Design Criteria	How to Request Project Authorizations	04.01.01.04.08
		Drawings & Specs	Project Layouts	04.01.01.04.22
		PEP	How to Prepare Line Item Documents	04.01.01.04.04
		Authorization Documents	How to Prepare GPP Documents	04.01.01.04.45
SG 2	Track and Control Changes			
SP 2.1	Track Change Requests			
		emails	How to Perform Project Change Control	01.04.04.00.18
		Q-Reviews	EVMS Change Incorporation	04.01.01.04.37
		Authorization Mods & BCP	How to Control Authorized Projects	04.01.01.04.37
		Project Database		
SP 2.2	Control Configuration Items			
		Project Files	How to Close-out Facilities Projects	04.01.01.04.39
			How to Disposition records	01.06.05.00.04
SG 3	Establish Integrity			
SP 3.1	Establish Configuration Management Records			
		Project Database		
		Change Orders	EVMS Subcontract Management	04.01.01.04.37
		Submittals	Construction Management Manual	
SP 3.2	Perform Configuration Audits			
		Audits	Project Records	04.01.01.04.35
		Q-Reviews		
		BOI	How to Disposition records	01.06.05.00.04
		Project Closing Review	How to Close-out Facilities Projects	04.01.01.04.39

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Appraisal Team Members

Internal
External

Jeanie Kitson, President, KAMO Consultancy, LLC (Appraisal Team Lead)

Dave Kitson, Vice President, KAMO Consultancy, LLC

Paul Kimmerly, SEPG Lead, US Marine Corps Technology Services Organization, Kansas City

Valerie Tourangeau, Director of Corp IT Global Quality Programs, Honeywell

Steve Stafford, Construction Oversight Manager, FES, Honeywell Kansas City Plant

Craig Nordeen, Cost Engineer, FES, Honeywell Kansas City Plant

Randy Hamilton, Project Director, FM&T, Honeywell Kansas City Plant

Larry Stotts, Project Engineer, FES, Honeywell Kansas City Plant

Level 2 PA's and RSKM (Continuous)

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Appraisal Interviewees and Document References

- 1 Sponsor
- 5 Project Managers
- 1 Project Director
- 1 Team Manager
- 1 Title III Engineer
- 1 Construction Manager
- 2 Planners
- 2 Cost Engineers
- 1 Architect
- 1 Project Engineer
- 1 Utility Engineer
- 1 Safety Engineer
- 2 Project Control Engineers
- 2 Buyers
- 1 Quality Auditor
- 1 Project Lead

1,985 Document References

- ÅWork and Change Orders
- ÅElectronic Corrective Action Tracking System (eCATS)
- ÅMeeting Minutes
- ÅRisk Analysis Spreadsheets
- ÅRisk Mitigation Plans

{ **Contingency & Management Reserve**

- ÅMaturity Path to Premier Construction Supplier Process
- ÅBeneficial Occupancy Inspectin and Close-Out Processes
- ÅEVMS Data and Quad Reports
- ÅAs-built Drawings and Plant Model
- ÅBuilding Codes, Industry Standards, and Regulations
- ÅQuality Audit Results and Corrective Action Reports

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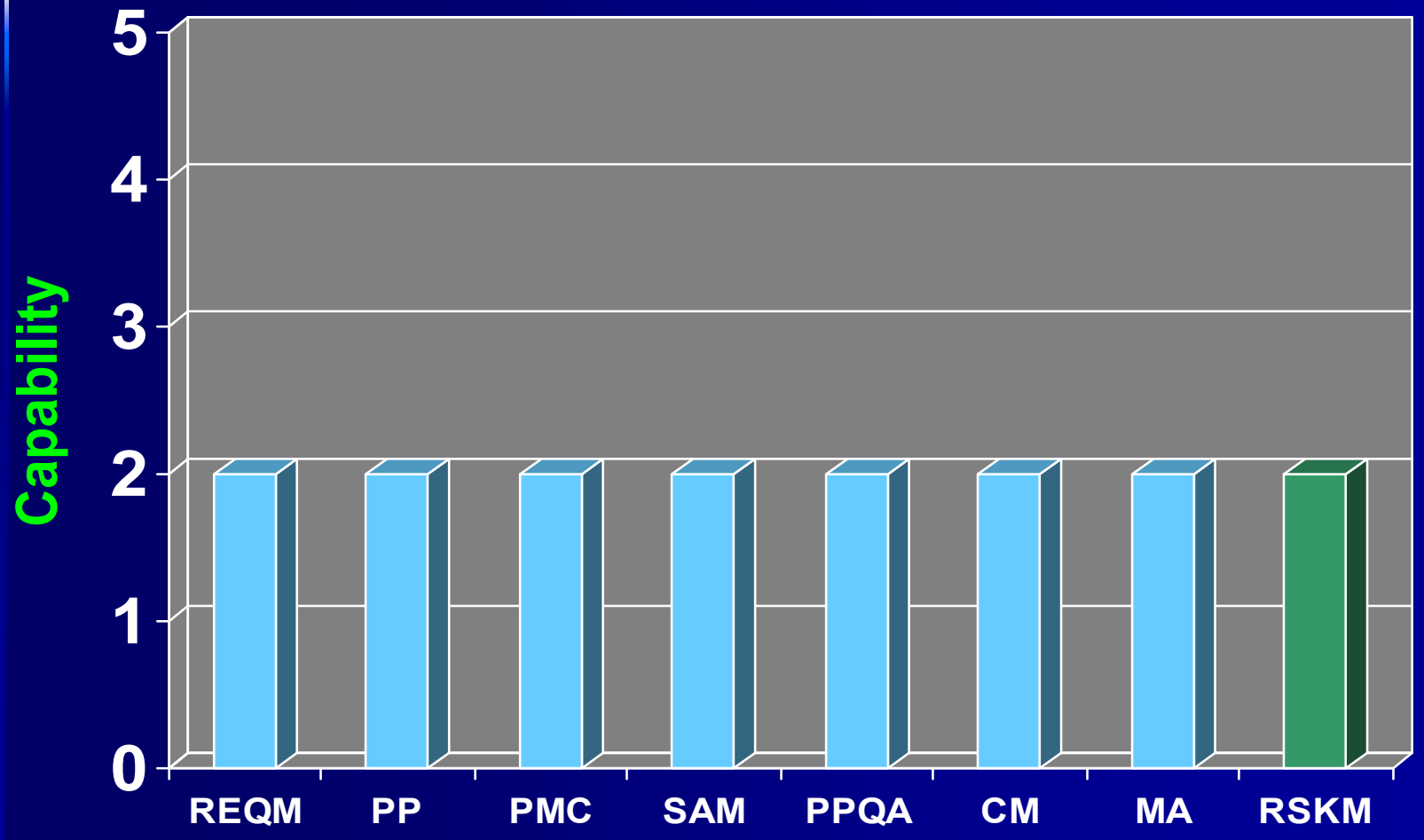
Process Area Profile



Conclusions

- Understanding the context of Configuration Management and Process and Product Quality Assurance for construction projects required the most appraisal team deliberation.
- The organization is driven to maintain a secure and safe work place for all site personnel. This has created a culture of continually improving work processes.
- CMMI is applicable to facilities maintenance as a service and also to the oldest form of engineering, construction. Many Maturity Level 3 practices were clearly evident in the organization.

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Questions?