

***So You Expect **Me**
to use a
CMMI Level 3 Process
to achieve
CMMI Level 3?***



**Raytheon Missile Systems
Steve Ross and Kurt McMillen**

November 2005

Organization and Accomplishments

Raytheon Missile Systems, Tucson, AZ

- ★ **Employees: 11,000**
- ★ **'04 Sales: \$3.8 B**
- ★ **Worlds Largest Appraised SEI
CMMI Level 3 Organization
December 2004**
- ★ **SW-CMM Level 5 in
November 2001**



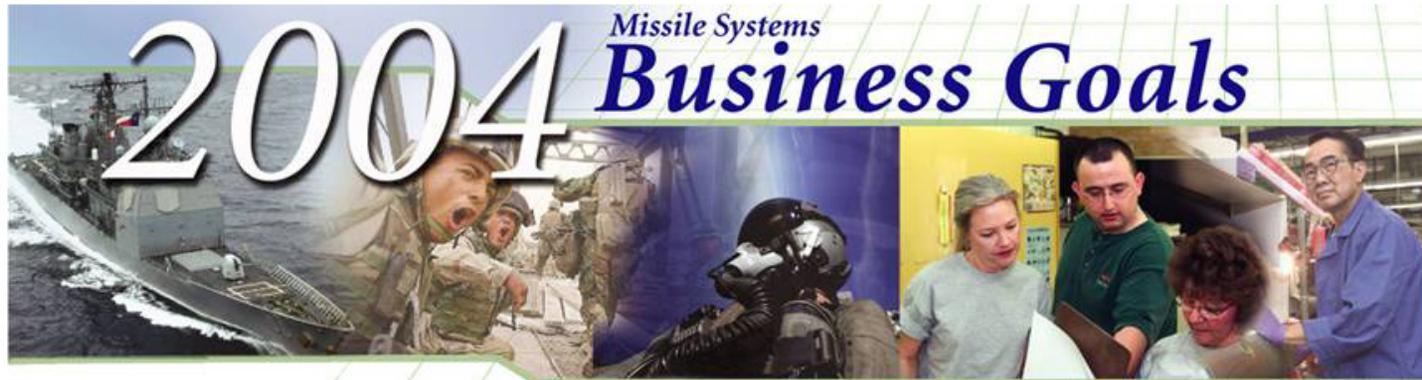
The Case for Change: Our “Burning Platform” Was Ablaze . . .

December 2003 Class 2 Appraisal – A long way to go!

Goals	Maturity Level																	
	Level 2							Level 3										
	REQM	PP	PMC	SAM	MA	PPQA	CM	RD	TS	PI	VER	VAL	OPF	OPD	OT	IMP	RSKM	DAR
GG3	F	F	F	F	F	E	E	D	F	D	D	D	F	F	D	F	E	F
GG2	F	E	E	E	F	E	D											
SG4																		
SG3		C					E	C	F	D	B						D	
SG2		E	D	D	E	E	B	D	F	F	C	C	F		C	F	E	
SG1	F	F	C	C	E	E	E	D	F	E	C	D	F	F	D	F	D	C

And we were the remaining RMS business unit not appraised to CMMI Level 3 . . .

And The Pressure Was On . . .



Customer Satisfaction	Growth	People	Productivity
<ul style="list-style-type: none">• Know our customers and understand their needs• Always perform to our commitments• Grow strong trusting relationships at all customer levels• Be accountable for the entire product life cycle	<ul style="list-style-type: none">• Engage our customers and suppliers in partnerships for success• Fulfill evolving Warfighter requirements with innovative technology, products and solutions• Leverage company-wide capabilities• Grow programs and presence worldwide• Create new business opportunities from innovative ideas	<ul style="list-style-type: none">• Ensure a respectful, productive and safe environment• Improve our culture by valuing diversity• Develop and recognize people• Take personal responsibility for open and honest communication	<ul style="list-style-type: none">• Maintain an unrelenting focus on affordability and cycle time in everything we design and produce• Drive speed and agility through R6σ, IPDS, Commonality and Process Improvement• Meet financial goals• Drive Supply Chain excellence• Achieve CMMI Level 3
<i>Be a Customer-Focused Business</i>	<i>Provide Superior Solutions for the Warfighter</i>	<i>Help Each Other Succeed</i>	<i>Drive Performance Excellence</i>

Customer Success Is Our Mission

The Epiphany

Q: If IPDS @ RMS is our set of best practices for planning and executing complex missile programs, why aren't we using it to plan and execute our CMMI Level 3 Project?

We had the guidance in place (a subset):

- **Creation of IPDS @ RMS Tailoring**
- **Program Leadership, Planning and Support**
- **Program Resourcing, Financial Planning and Management**
- **Program Monitoring and Control**
- **Gate Independent and Start-Up Reviews**
- **Supporting Processes**
 - **Configuration and Data Management, Measurement and Analysis, Objective Evaluation, Peer Review, Risk Management**
- **The “Organizational Level Stuff”**
 - **Organizational Process Focus, Organizational Training . . .**

It is NOT “rocket science”; every type of project should be able to leverage the defined enterprise process

A Short Course on IPDS @ RMS: The Top-Level View

Raytheon
Customer Success Is Our Mission

IPDS @ RMS

Raytheon Home | Directory | Search | Newsroom | Collaboration | Help

IPDS @ RMS | Storyboard | Index | Process Asset Library | Tailoring Tool | RMS CMMI

CMMI @ RMS
Corporate IPDS
IPDS @ RMS Feedback/CR Tool
IPDS @ RMS Contacts
Missile Systems Home

IPDS @ RMS Version 1.5

IPDS @ RMS Quick Links *IPDS @ RMS Previous Versions* *Submit an IPDS @ RMS Change Request*

IPDS @ RMS Components

- Storyboard
- Storyboard Index
- IPDS @ RMS PAL
- Program Tailoring
- IPDS @ RMS Gating
- PLDL Home
- Previous and Developing Versions

Welcome to IPDS @ RMS, your home base for Missile Systems' implementation of the Raytheon Integrated Product Development System. Inside you will find the core process tasks, methods and enablers you need to achieve your results in business development, program management and product development. Process simplification, integration and ease-of-use are the IPDS @ RMS priorities.

IPDS @ RMS News
09/05 [What's New In IPDS @ RMS Version 1.5](#)
[Archives](#)

A Short Course on IPDS @ RMS: Our Process Architecture

Raytheon

Customer Success Is Our Mission

Raytheon IPDS @ RMS Storyboard Home | IPDS @ RMS | Glossary | Tailoring | Policies | TD Index | Methods / Enablers | Help |

Raytheon Home | Directory | Search | Newsroom | Collaboration | Help

Missile Systems Home | MS Leadership | MS Organizations | Communities | Employee Services | Resources

1 2 3 4 Business Strategy Planning/Execution | 5 Project Planning, Mgt. & Control | 6 Requirements & Architecture Dev. | 7 8 Product Design and Development | 9 10 System Integration Verification & Validation | 11 Production and Deployment | Operations & Support

Returning Users
Select your Stage from the Navigation Bar Above
[New Users](#)

What's New at IPDS @ RMS | **IPDS @ RMS Previous Versions** | **Submit an IPDS @ RMS Change Request**

Welcome to the IPDS @ RMS Storyboard, your home base for Missile Systems' implementation of the Raytheon Integrated Product Development System. Inside you will find the core process tasks, methods and enablers you need to achieve your results in business development, program management and product development. Process simplification, integration and ease-of-use are the IPDS @ RMS priorities.

IPDS @ RMS News

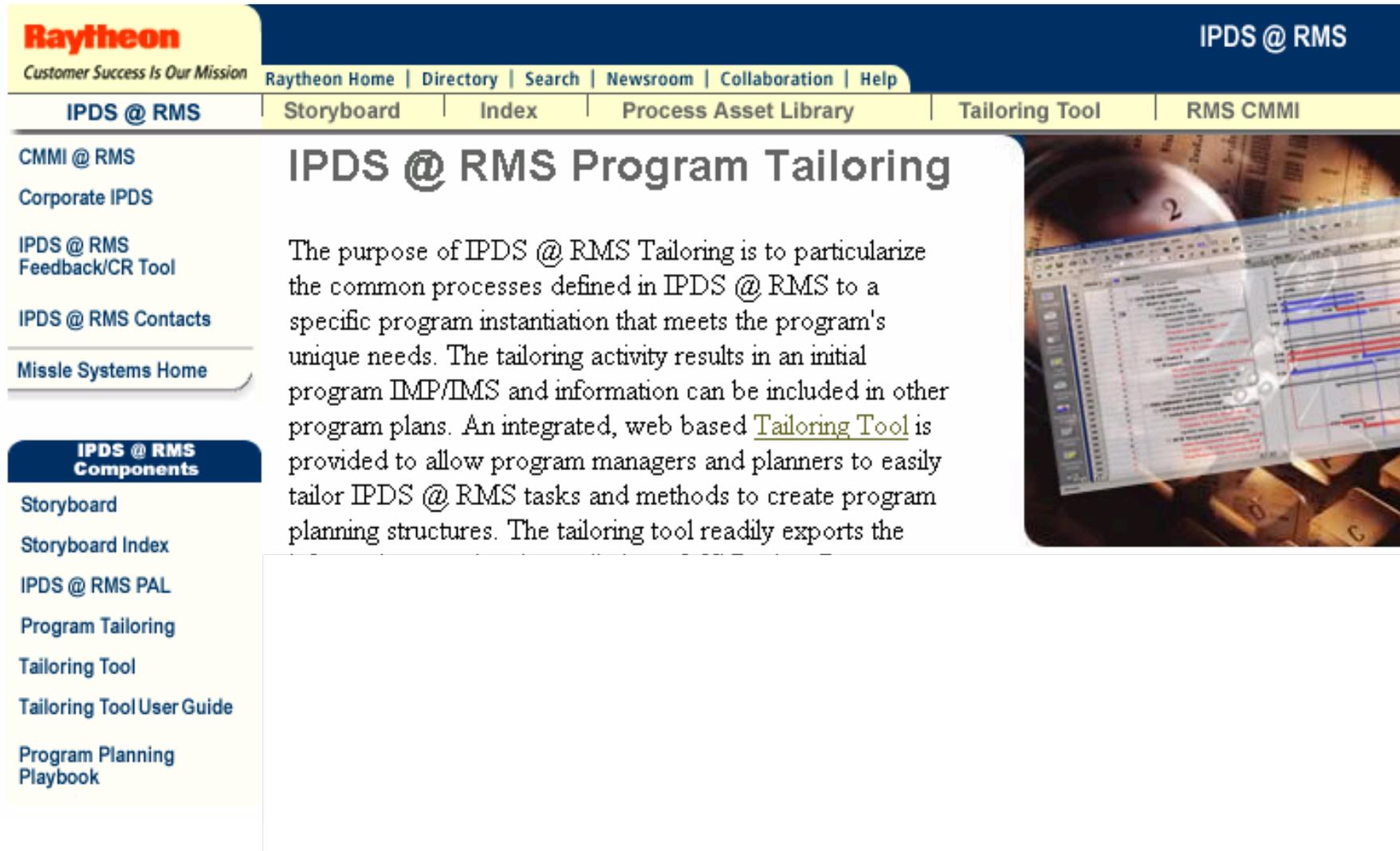
09/05 *What's New In IPDS @ RMS Version 1.5*

[Archives](#)

A Short Course on IPDS @ RMS: Our Tailoring Guidance

Raytheon

Customer Success Is Our Mission



The screenshot displays the IPDS @ RMS website interface. At the top left is the Raytheon logo with the tagline "Customer Success Is Our Mission". A navigation bar contains links for "Raytheon Home", "Directory", "Search", "Newsroom", "Collaboration", and "Help". Below this is a secondary navigation bar with "IPDS @ RMS", "Storyboard", "Index", "Process Asset Library", "Tailoring Tool", and "RMS CMMI". The main content area features the heading "IPDS @ RMS Program Tailoring" and a paragraph explaining the tool's purpose: "The purpose of IPDS @ RMS Tailoring is to particularize the common processes defined in IPDS @ RMS to a specific program instantiation that meets the program's unique needs. The tailoring activity results in an initial program IMP/IMS and information can be included in other program plans. An integrated, web based Tailoring Tool is provided to allow program managers and planners to easily tailor IPDS @ RMS tasks and methods to create program planning structures. The tailoring tool readily exports the". To the right of the text is an image of a computer monitor displaying a complex software interface with various data fields and charts, overlaid on a keyboard. A sidebar on the left lists "CMMI @ RMS", "Corporate IPDS", "IPDS @ RMS Feedback/CR Tool", "IPDS @ RMS Contacts", and "Missile Systems Home". A dark blue box labeled "IPDS @ RMS Components" lists "Storyboard", "Storyboard Index", "IPDS @ RMS PAL", "Program Tailoring", "Tailoring Tool", "Tailoring Tool User Guide", and "Program Planning Playbook".

Our CMMI L3 Project Architecture: The Appraisal Objectives and Scope

- ◆ Objectives
 - Review IPDS @ RMS process content and its implementation against the CMMI-SE/SW model V1.1 (Staged Representation)
 - Identify process and deployment weaknesses
 - Measure performance against CMMI Level 3
- ◆ Organization Being Appraised
 - Raytheon Missile Systems
- ◆ CMMI Scope
 - All CMMI Level 2 and Level 3 Process Areas

A daunting task based upon the complexity of the RMS organization

So How Do We Get There From Here? Our Roadmap

- ◆ Tailor IPDS @ RMS
- ◆ Plan the project
 - Establish / prioritize tasks and their relationships
 - Identify and assign resources, roles, responsibilities and authority
 - Train the team and clearly communicate required work products and criteria for success
- ◆ Project start-up review (Gate 5 IR and Review)
- ◆ Manage execution of plans and track progress against plan
- ◆ Manage risks and take action as appropriate
- ◆ Objectively evaluate adherence to product & process requirements
- ◆ Review status with upper management
- ◆ Identify improvement opportunities

A very typical project plan

CMMI Level 3 Project Tailoring: Our Concept of Operations

Raytheon IPDS @ RMS Tailoring Tool

Raytheon Home | Directory | Search | Newsroom | Collaboration | Help

RMS CMMI | IPDS @ RMS | Storyboard

IPDS @ RMS Tailoring Tool Tailoring Report

TAILORING TOOL HOME | PROGRAM LIST | ADD PROGRAM | ADMINISTRATION | LOGOUT

REPORT FILTERS

Process Area: Select a Process Area (or ALL) to view tasks within the Tailoring Report.

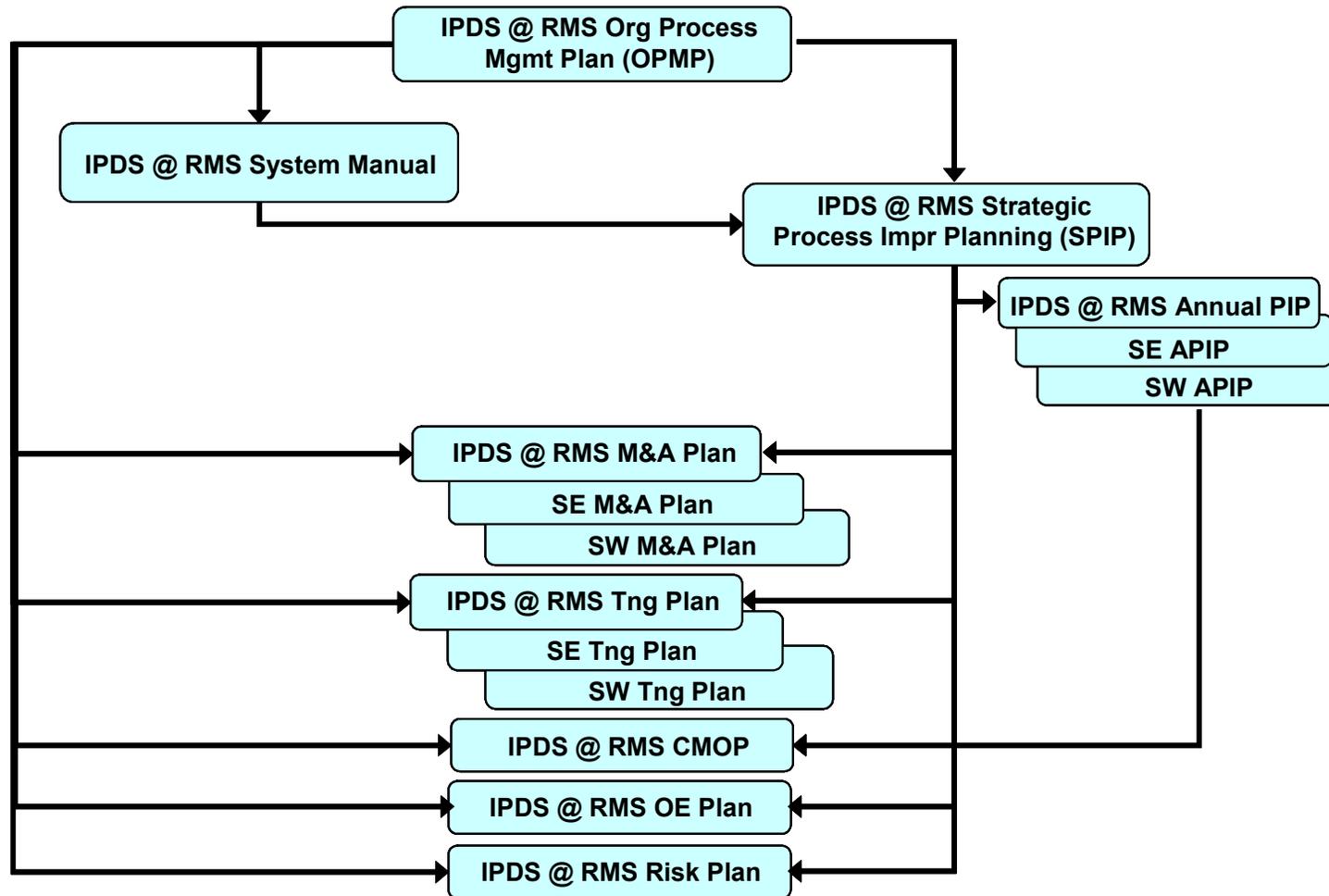
Method Owner Group: Select a Method Owner Group (or ALL) to view methods within the Tailoring Report.

PROGRAM DETAILS

Program name: RMS Organizational Tailoring (EPG and Functional)
IPDS @ RMS Version Nbr: 1.2
Product Line: Productivity
Start: 04/29/04
Finish: 04/28/06
Release to Public: Y
Status: Approved
Program Description: This document contains the organizational-level tailoring of IPDS @ RMS for the Enterprise, Systems Engineering (SE) and Software Engineering (SW). The accepted and modified activities will be reflected in the organizational-level plans: 1. IPDS @ RMS System Manual 2. IPDS @ RMS Strategic Process Improvement Planning document 3. IPDS @ RMS Annual Process Improvement Plan 4. IPDS @ RMS Measurement & Analysis Plan 5. IPDS @ RMS Configuration Management Operating Plan 6. All other plans as required at the Enterprise or SE/SW functional levels.
Program Assumptions: Pre-Processing (Stage / Gate / PO/ MO) Conditions: 1. At the Process Owner level, Stage 2 and Gate 5 apply for this activity. Pre-Gates 6 through 10 activities, though, will be accomplished that are applicable to the organizational-level process definition and improvement management. Gate 11 is not included due to the constrained two-year timeframe applicable to this tailoring. 2. At the Supporting Process Owner level, the following apply: OPD, OPF, OEI, OT, CMDM, DAR, MA, Peer, Quality / OE and SCM. 3. At the Method Owner level, the following apply: PM, Quality, CMDM, OPD, OPF, OEI, SCM and Training.

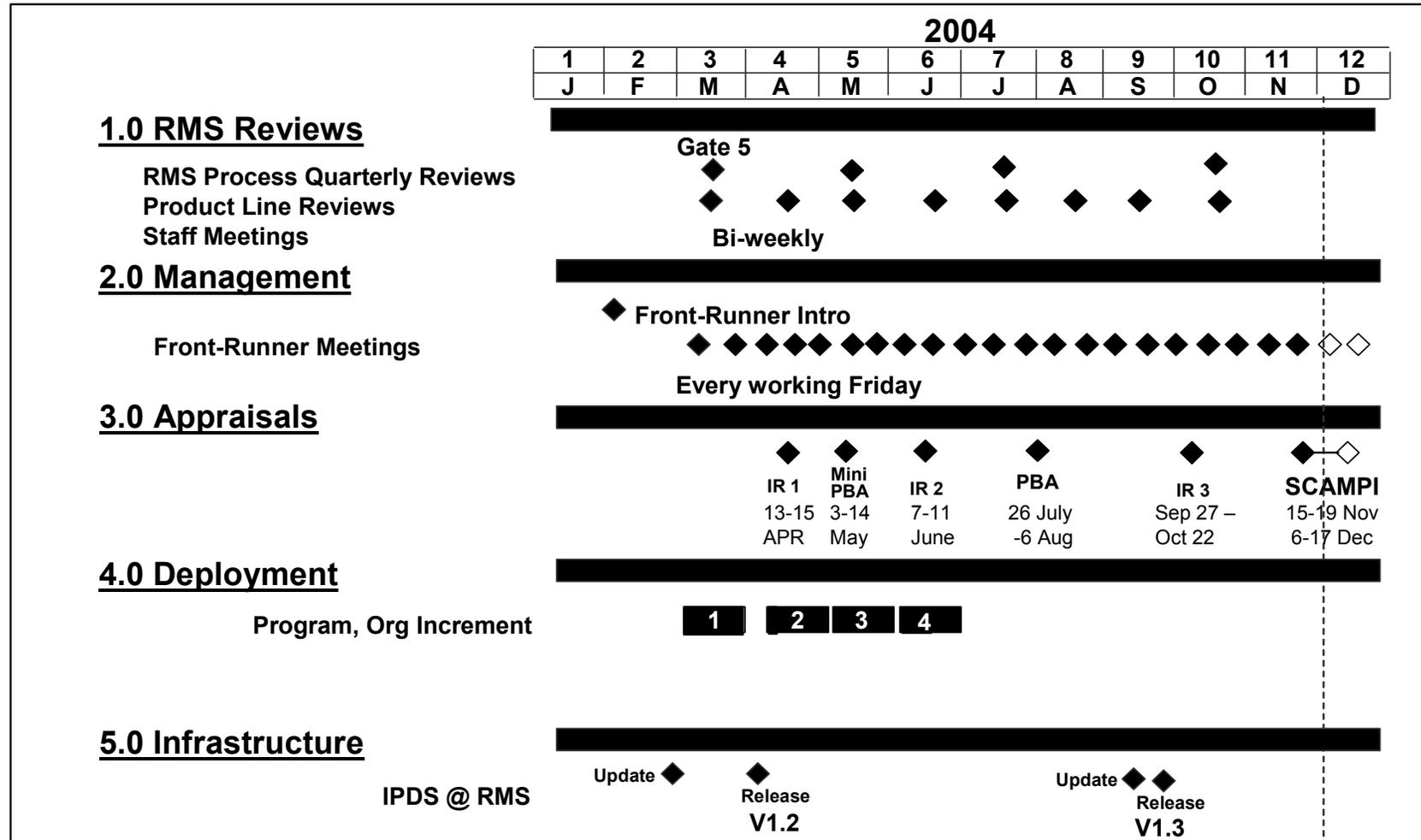
We were able to perform significant “pre-processing”

The Tailoring and Planning Result: Our Organizational “Plan Tree”



And we executed to our plans

The Tailoring and Planning Result: Our Project Master Schedule



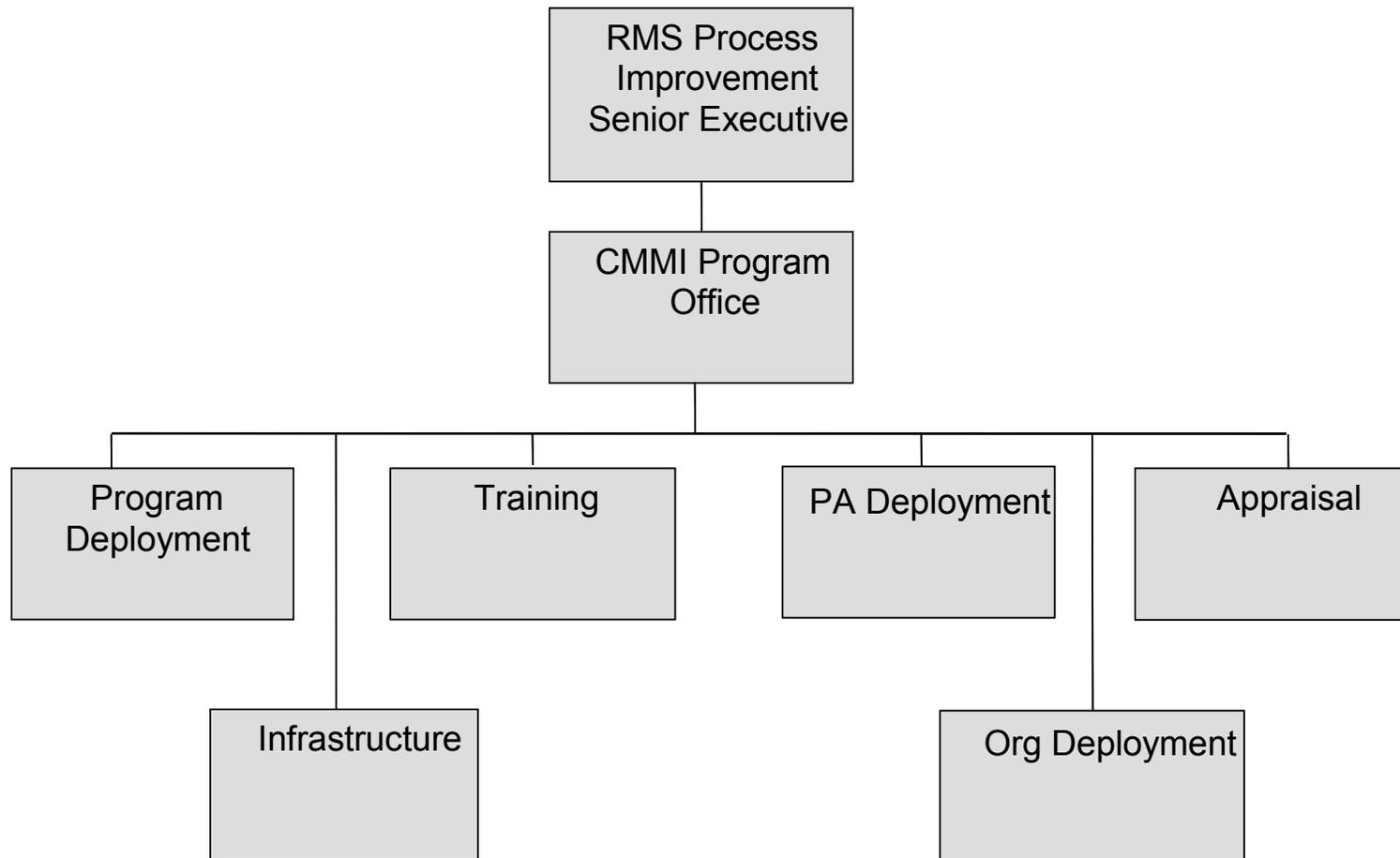
A very typical project master schedule

Just Doing An Activity Is Not Enough: Our Supporting Deployment Infrastructure

To Deploy a Process Instance		
Tasks	Reference	
	Process	GP
Input Process	Process X	3.1
Tailor	Process	3.1
Plan	Process	2.2 +
Resource	Process	2.3, 4
Train	Process	2.5
Execute	Process	3.1
QA/Peer Review	Process	2.9
CM	Process	2.6
Mon/Control	Process	2.8, 2.7
Review w/ Mgt	Process	2.10
Collect Artifacts	Process	3.2

Proper deployment is key to successfully changing the culture

The RMS CMMI Level 3 Project Team



And the CMMI Level 3 Project was one of the Process Action Teams (PATs) under the EPG

Training Strategy (An Extract)

IPDS @ RMS Training Matrix	
Training Module	Content
Process Owner and Method Owner Reps	How Core Process, Core Support Process, Methods and Enablers Owners input new and updated content into IPDS @ RMS.
System Admin Training	Access control and application administration
Program Planning Team	IPDS @ RMS program startup (from initial WBS development through tailoring to IMP/IMS generation) based upon program attributes and business needs.
Senior Management	Business applicability of IPDS @ RMS; Senior management roles and responsibilities with respect to IPDS @ RMS.
IPDS @ RMS Overview	IPDS @ RMS development history and architecture; includes information about how the individual contributor navigates through and uses IPDS @ RMS.
IPDS @ RMS Tailoring Training	Tailoring goals, objectives, and methodology
EPG Roles & Responsibilities	How the organization defines, manages, deploys and improves IPDS @ RMS
Appraisal Training	Preparing for our CMMI assessment
Change Control Management	IPDS @ RMS CM responsibilities
IPDS @ RMS OE PPQA Training	Objective Evaluation for Process and Product Quality Practitioners
IPDS @ RMS CMMI Overview	Provides the background familiarization of CMMI, the language used, and how it affects IPDS @ RMS

Training modules were identified based upon IPDS @ RMS use cases across the RMS business

EPG Training Matrix (An Extract)

Course Number ^[1]	Course Title	Course Hours	Enterprise Process Group (EPG) Roles									
			EPG Lead	EPG Chief Engineer	EPG IPT Leads	EPG Team Members	IPDS @ RMS CCB Members	Process Owner Reps	Method Owner Reps	Deployment Team Members	Process Area Experts (PAEs)	
RMS-CMMI01	RMS CMMI Overview	2	R	R	R	R	R	R	R	R	R	R
KCSW0017	IPDS @ RMS Overview	2	R	R	R	R	R	R	R	R	R	R
KCSW0018	IPDS @ RMS Senior Management Training	2	R	S								
KCSW0042	IPDS @ RMS Program Planning Team Training	2	S	S	S			A	A	R	A	
CMMICC02	IPDS @ RMS Change Control Training	1	R	R	R	R	R	R	R	R	R	R
KCSW0041	IPDS @ RMS EPG Roles & Responsibilities Training	2	R	R	R	R	S	R	R	S	S	
QUAL2004	IPDS @ RMS OE PPQA Training (can be taken ILO QUAL2004)	4	S	S	S	S		S	S	S	S	
QUAL2005	IPDS @ RMS OE PPQA Overview Training	2	R	R	R	R	S	R	R	R	R	
CMMI201	Introduction to CMMI	24	R	R	R	S	S	S	S	S	S	R
SYS0017	Risk Management Overview for Chief Engineers and IPT/Section Leads	2	R	R	R							
JCMMI01	M&A and PMC Overview	2	R	R	R	R				A	R	
KCSW0053	IPDS @ RMS Tailoring Overview	2	S	S	S	S		S	S	S		
KCSW0043	SAM Appraisal Training for Interviewees	1						S ^[4]	S ^[4]	S ^[4]	S ^[4]	
KCSW0046	Organization Representative Appraisal Training for Interviewees	1	S ^[4]	S ^[4]	S ^[4]	S ^[4]	S ^[4]	S ^[4]	S ^[4]	S ^[4]	S ^[4]	S ^[4]
KCSW0050	Senior Management Appraisal Training for Interviewees	1	S ^[4]					S ^[4]	S ^[4]	S ^[4]	S ^[4]	
JAC1123	Project Metrics	8	R	R	R	R				A	R	

LEGEND
R = Required Course
S = Suggested Course
A = As Appropriate (determined by individual and/or manager)

And, like programs, we identified specific project training by role

What We Learned: Key “Knowledge Gained”

- ◆ **Plan for success (GP 2.2)**
 - Leverage off of your already-defined best practices
 - Appraisal internal reviews
 - CMMI project reviews
- ◆ **Keep the end in mind (GP 2.2)**
 - Reverse planning
- ◆ **Make the plan visible to the team (GP 2.2, GP 2.7)**
 - CMMI project plan on the war room wall
 - Stakeholder meetings held where plan was visible

“Critical Chain” methods, tools and techniques were extremely valuable enablers to our success

What We Learned: Key “Knowledge Gained”

- ◆ **Manage to the plan (GP 2.8)**
 - Daily stand up meetings focused on the critical chain
- ◆ **Engage all levels of management (GP 2.4)**
 - The role of our Program Director and Program Manager was primarily to remove barriers
 - Do not take the responsibility and accountability from those who are responsible and accountable
- ◆ **Get the right team (GP 2.3, GP 2.4)**
 - Identify key skills
 - Establish roles and responsibilities
 - Adequately resource a deployment support team

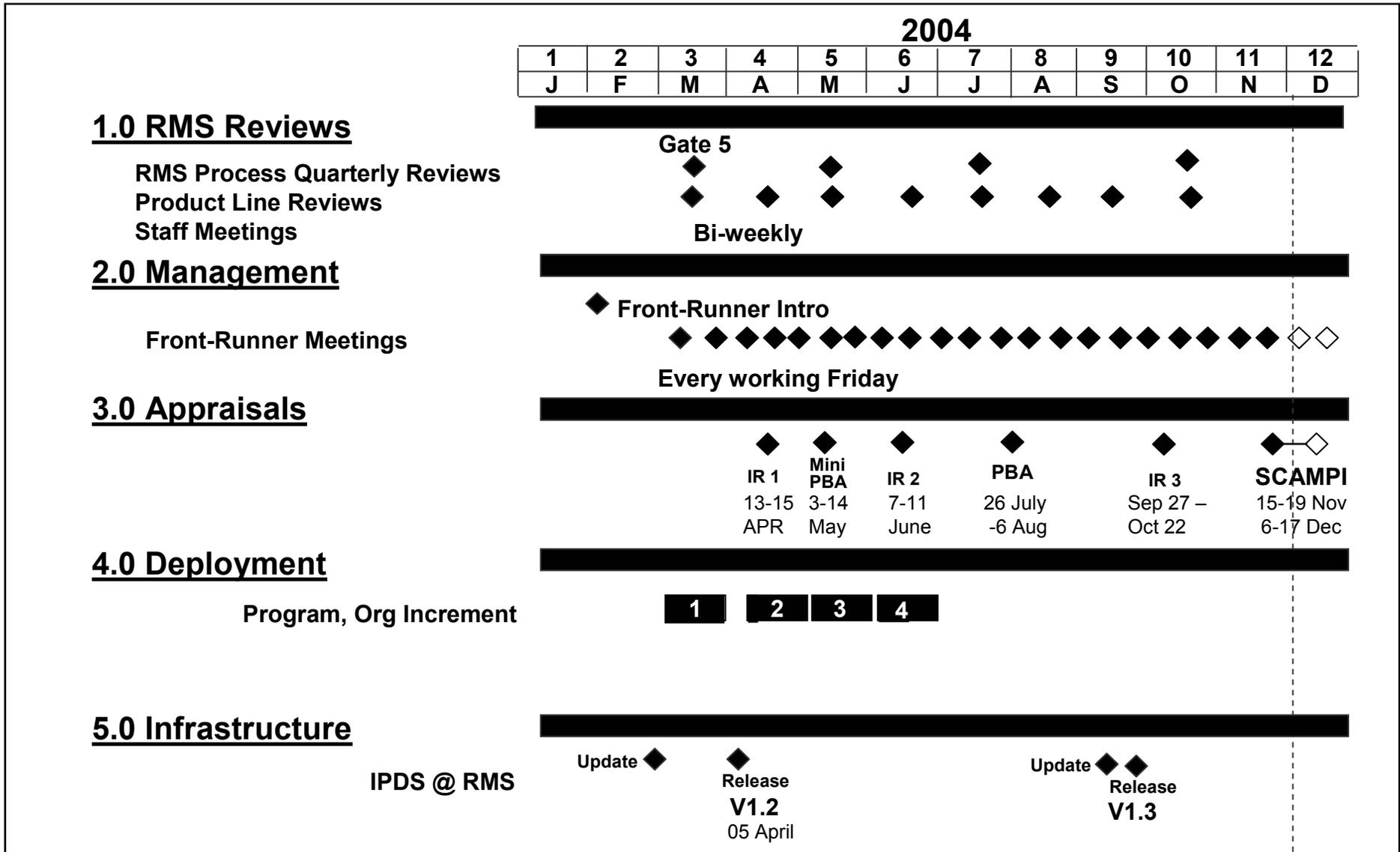
What We Learned: Key “Knowledge Gained”

- ◆ **Ensure team members understand their roles, the program objectives, and commit to the plan (GP 2.7)**
- ◆ **Train the team (GP 2.5)**
 - **Model training**
 - **Appraisal training**
 - **IPDS @ RMS training**
 - **Roles and responsibilities training**
- ◆ **Review progress with senior management (GP 2.10)**
 - **Sponsor reviews**
 - **Center manager breakfasts**
 - **Program management lunches**

What We Learned: Key “Knowledge Gained”

- ◆ **Identify and manage the work products (GP 2.6)**
 - Appraisal evidence
 - Plans
 - Presentation material
 - Intermediate work products
- ◆ **Make sure the process is effective (GP 2.9)**
 - Objectively evaluate the program plans and processes
 - Develop meaningful and effective management indicators and tracking tools
- ◆ **Identify / implement improvements (GP 3.2)**
 - Center manager breakfasts
 - Program manager lunches
 - Appraisal internal reviews
 - CRs to IPDS @ RMS, . . .

The Proof Of Our Planning: Completion on Schedule & Within Budget



The Proof Of Our Planning: PBA Result (August 2004)

Goals	Maturity Level																	
	Level 2							Level 3										
	REQM	PP	PMC	SAM	MA	PPQA	CM	RD	TS	PI	VER	VAL	OPF	OPD	OT	IMP	RSKM	DAR
GG3	B	B	B	D	B	D	D	C	C	C	C	C	B	B	C	C	C	E
GG2	C	C	C	C	B	B	C											
SG4																		
SG3		B					A	B	B	B	B						A	
SG2		B	B	C	D	B	A	B	C	D	D	B	C		B	A	A	
SG1	B	C	C	B	B	A	A	B	B	B	B	B	B	C	B	C	A	B

*August 2004 Class B Appraisal – Progress on all fronts on par
with our plan*

The Proof Of Our Planning: Level 3 Success Chart (December 2004)

Goals	Maturity Level																	
	Level 2							Level 3										
	REQM	PP	PMC	SAM	MA	PPQA	CM	RD	TS	PI	VER	VAL	OPF	OPD	OT	IMP	RSKM	DAR
GG3	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
GG2	S	S	S	S	S	S	S											
SG4																		
SG3		S					S	S	S	S	S	S					S	
SG2		S	S	S	S	S	S	S	S	S	S	S	S		S	S	S	
SG1	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S

December 2004 SCAMPI – Success!

The Proof Of Our Planning: Other CMMI Level 3 Project Success Indicators

- ◆ **Raytheon Missile Systems is the single largest organization to achieve CMMI Level 3**
- ◆ **Schedule Performance Index – 1.0**
- ◆ **Cost Performance Index – 1.02**
- ◆ **Appraisal success indicators**
 - **Appraisal was not a discovery process**
 - **No late nights on the appraisal team**
 - **No weekend work**
- ◆ **Significant Findings: 0**
- ◆ **Weaknesses: 4**
- ◆ **Opportunities for Improvement: 3**
- ◆ **Strengths: 8**

Questions?

Thank you for your participation!

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