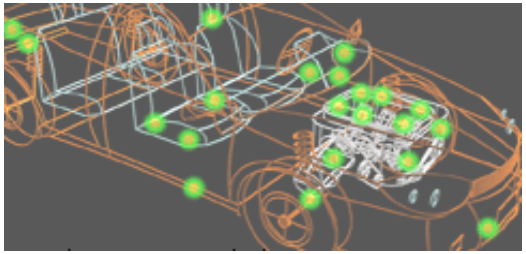
CMMI[SM] Transition at Motorola GSG



Daniel Henry, GSG-Canada

Larry McCarthy, GSG-PQE

Sanjay Chitnis, GSG-India

CMMI Technology Conference
Hyatt Regency Tech Center
Denver, Colorado
November 17-20, 2003

[SM] - CMMI is a service mark of Carnegie Mellon University

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Motorola's Strategic Focus

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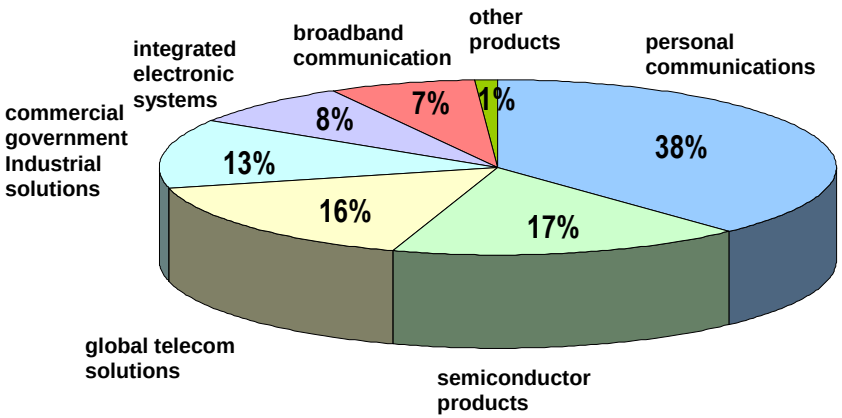
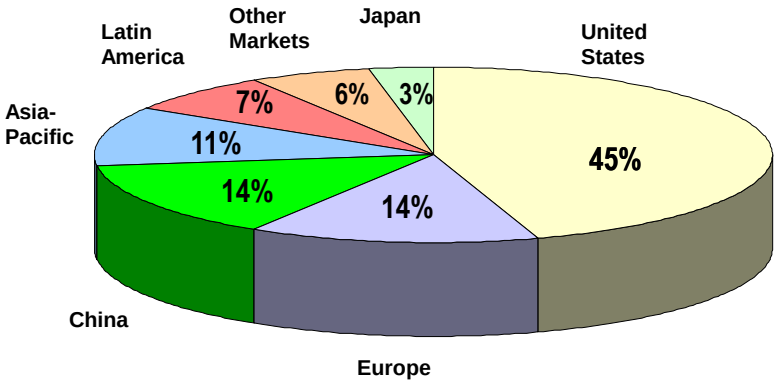
Motorola's Business

Motorola is a global leader in providing integrated communications and embedded electronic solutions.

- $26.679 billion in revenue*
- $3.754 billion in r&d expenditures*
- 97,000 employees*
- 808 patents issued





Source: Motorola 2002 Annual Report

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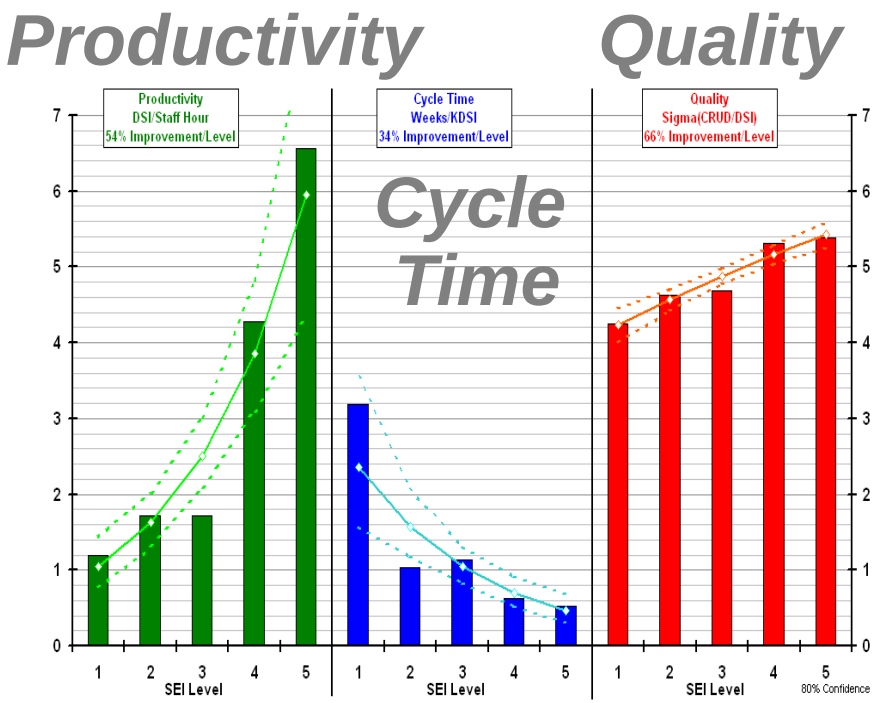
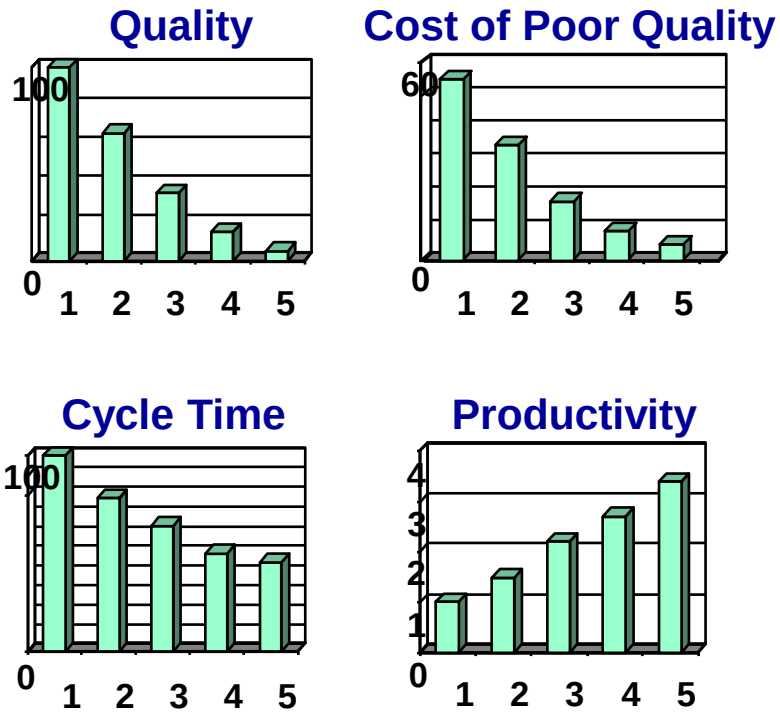
Benefits of Achieving Higher Maturity





Source: Presidential Task Force – 2002 Data

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Motorola's Process Strategy

- **Use process framework(s) based on models of maturity and capability**
  - Motorola Quality System Review (QSR) 1985-2002
  - SEI Maturity Models (SW-CMM, SE-CMM, CMMI) 1988-present
- **Leverage high maturity in software**
  - QSR Subsystem 10 and Motorola Software Assessments
  - "SEI" Assessments (SPA, CBA IPI, SCAMPI)
- **Improve with Six Sigma methods and tools**
  - Six Sigma (first wave)
  - Digital Six Sigma (2003)
- **Extend engineering-related success**
  - Malcolm Baldrige Performance Excellence Awards

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Global Software Group (GSG)

VISION:

Be the premier provider of innovative software products and services to Motorola's businesses and customers worldwide.

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GSG Locations

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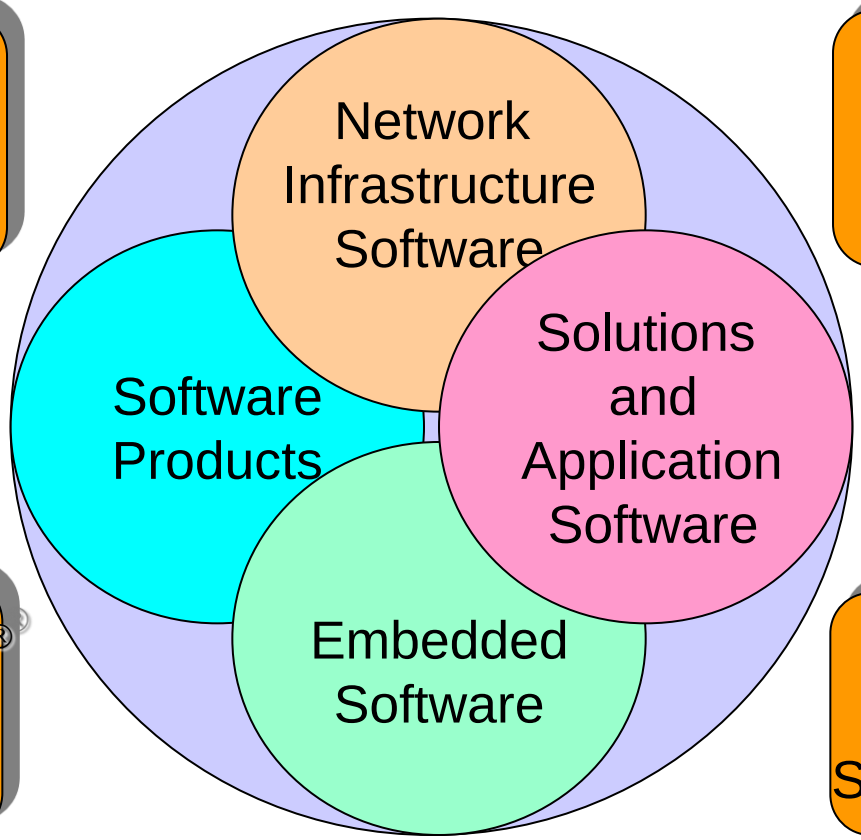
GSG Competencies

Proven Expertise In Software Development

Software Talent World-wide Locations



SEI CMM®/CMMI® Software Quality Focus

Motorola Products and Systems Expertise

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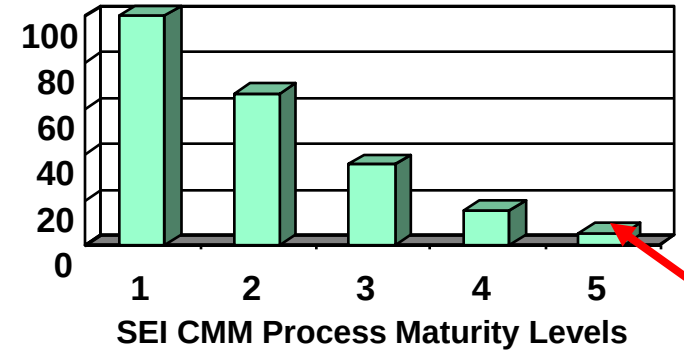
GSG's Proven Performance

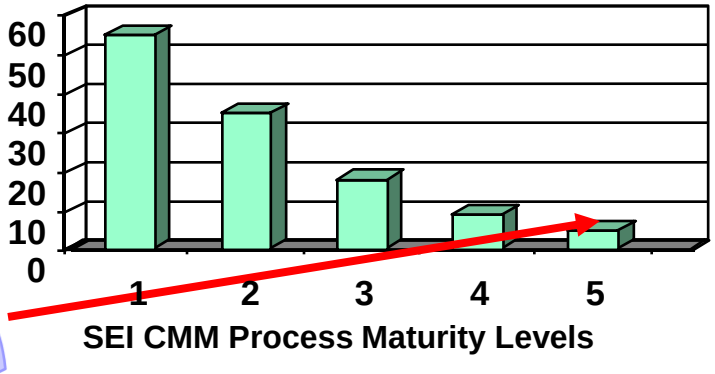
Quality:

Relative Defects After Release



Decreased Cost of Poor Quality:

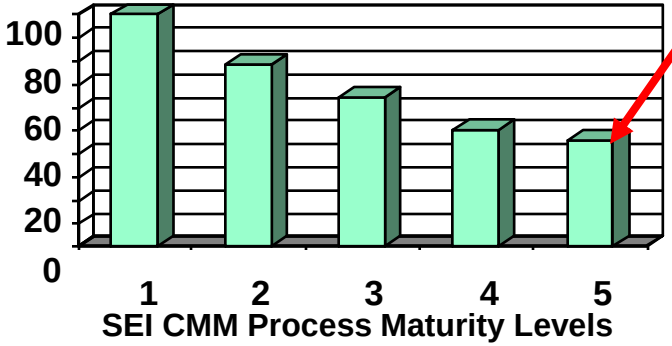
Relative % of Development Effort



GSG

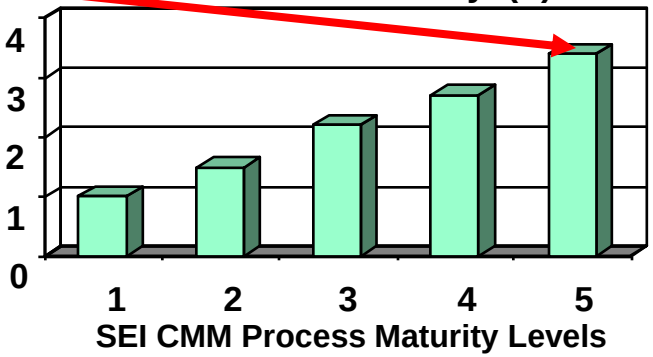
Reduced Cycle Time:

Relative Cycle Time



Increased Productivity:

Relative Productivity (X)



Source: Presidential Task Force – 2002 Data

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GSG India Overview

- Opened in 1991
- 1000 engineers
- Provides custom software, software products and system solutions for Motorola Businesses and their customers worldwide
- Assessment history:
  - SW-CMM Level 5 in 1993
  - CMMI Level 5 in May 2003 using CMMI SE/SW/IPPD/SS

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Project Domains (Businesses)

INFRASTRUCTURE BUSINESS

- CDMA1X, UMTS, GSM, Cable Infrastructure system software
- Network Management.
- Infrastructure Tools
- System Integration
- Verification & Validation

MULTIMEDIA & EMBEDDED BUSINESS

- Multimedia solutions
- DSP libraries & applications
- DSP Audio solutions
- Network processor applications
- EDA Tools
- Broadband protocols

BUSINESSES

SUBSCRIBER BUSINESS

- Wireless Applications
- Wireless Protocols: GSM, GPRS, CDMA, UMTS
- User Interface
- Internet Access
- Test suites & tools

SYSTEM ENGINEERING

- System Integration
- Performance modeling
- Consultancy

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Transition Strategy

- **Business Goals on Scorecard drives improvement**
  - CMMI-SE/SW/IPPD/SS continuous representation selected
  - Target Profile and Metrics program to suit business needs
- **Direct involvement of ~50% of the organization**
  - Extensive Training for the whole organization
- **Reuse from outside sources wherever possible**
- **Automation to support deployment**
- **Use of an SEI transition partner**
  - Training
  - Clarifications on interpretation of the model
- **Incremental transition using sequenced appraisals**
  - Class C -> Class B -> Class B -> Class A

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Appraisal Sequence

Appraisal Type	Class C	Class B	Class B	Class A SCAMPI
Duration	Nov 01~Feb 02	June 12-21, 2002	March 17-21, 2003	May 6~15, 2003
Objective	Gap Analysis for process assets	Identify Practice Level Gaps	Readiness Check	Benchmark; To establish a baseline
Relative: Cost/Duration Confidence Accuracy	Low	Medium	Medium	High
Rating?	No	No	No	Yes

Reference: Appraisal Requirements for CMMI (ARC)

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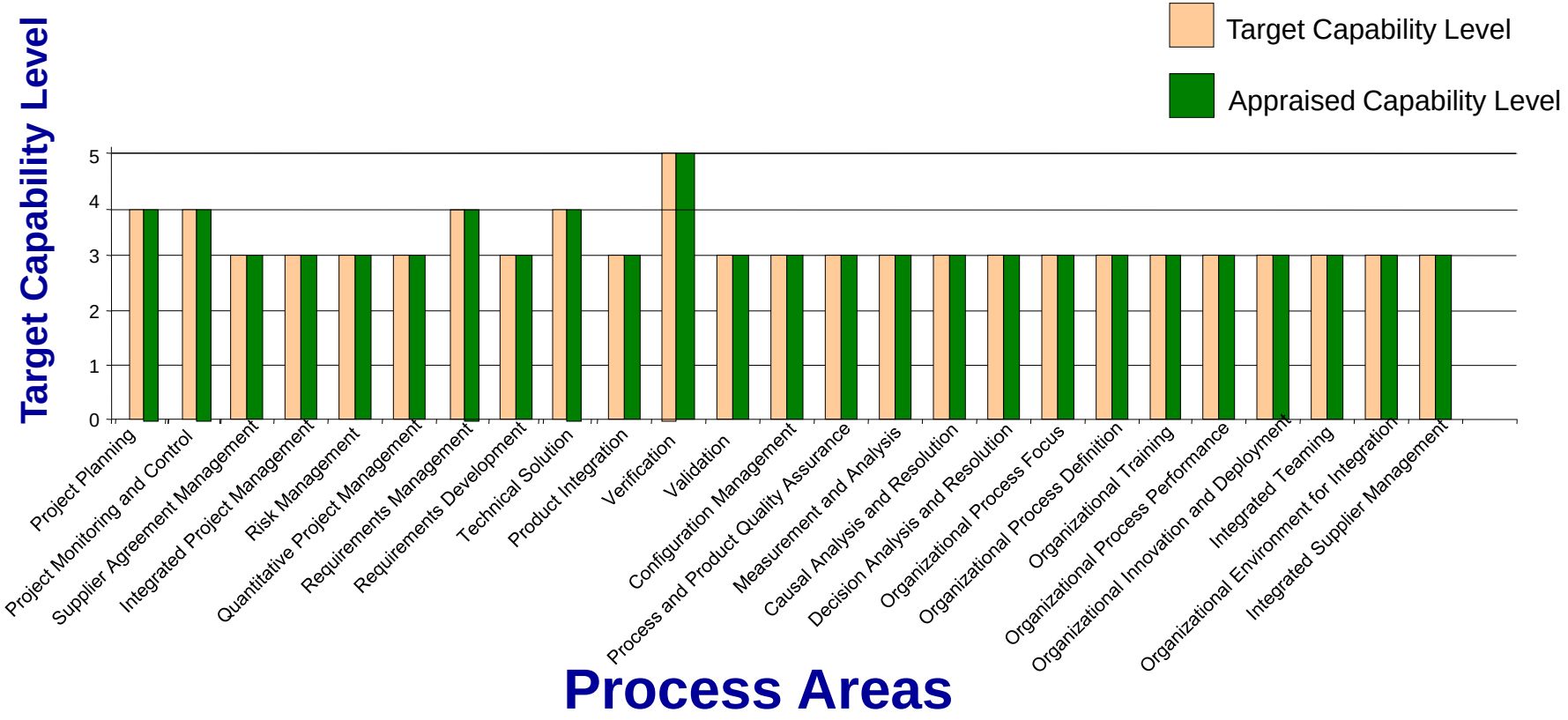
Target Profile

Profile validated by SCAMPI A



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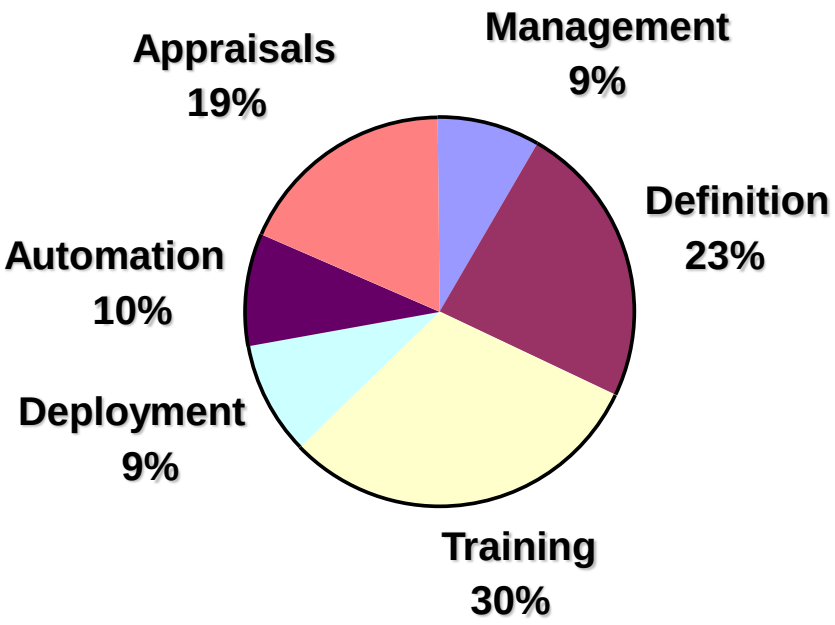
CMMI Transition Effort

Effort Distribution of 2578 Staff days (~85 man months)



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Performance Results*

	GOAL	ACTUAL
Customer Satisfaction *(scale of 10)*	8.5	8.8
Post release Defect *(sigma level)*	6	5.8
In-process Fault *(Faults/KAELOC)*	0.6	0.72
Cost of Poor Quality *(% of Effort)*	8%	6.4%
Cycle Time Reduction *(X Factor)*	1.6X	1.62X
Productivity *(X Factor)*	1.5X	1.17X
On Time Delivery *(% of Projects)*	95%	95%
Process Maturity *(% of Projects at L5)*	90%	92%
Cost of Quality *(goal set in Q4)*	35%	42%

*** Results include use of practices from CMM/CMMI**

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GSG Canada Overview

- **Opened in 1999**
- **~ 176 engineers**
- **Provides customer software and services for Motorola businesses and their customers worldwide**
- **Assessment history:**
  - **SW-CMM Level 3 in October 2000 (Motorola Software Assessment)**
  - **SW-CMM Level 5 in December 2001(CBA-IPI)**
  - **SCAMPI C (SEI SCAMPI method pilot) in July 2003**

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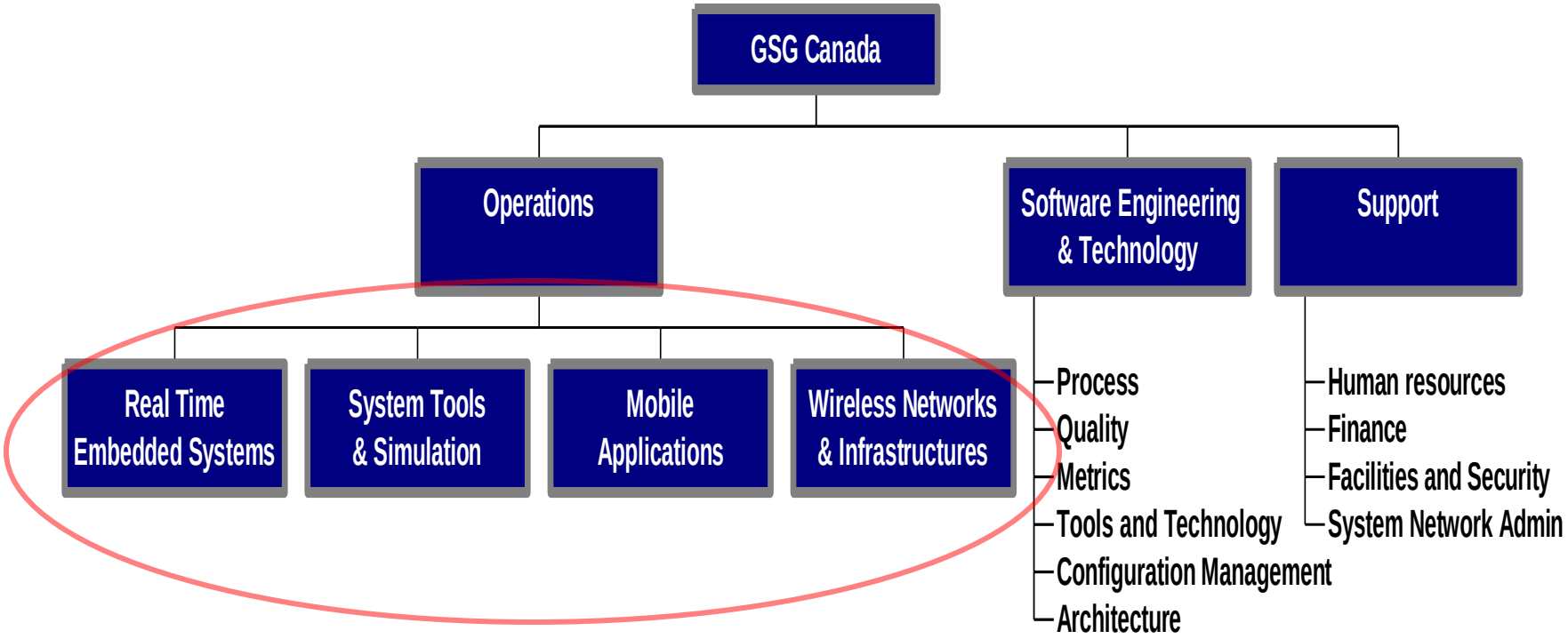
Project Domains and Organization



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Transition Strategy

- **Identified GAPS in current process (Q2, 2003)**
- **Performed pilot SEI SCAMPI C (Q3, 2003)**
  - **Focus on Engineering Process Areas**
  - **Identify target capability level goals**
- **Identify assets to re-use (potential of 23+ % effort savings on total transition effort through re-use)**
  - **Assets from GSG Centers such as GSG-India**
  - **Results from Digital Six Sigma Projects**
- **Improve process capability levels for RM, RD, TS, VER, PI, DAR, RSKM**
- **Plan/perform additional SCAMPIs**
  - **SCAMPI B to complete capability baseline (Q4, 2003)**
  - **Follow-on SCAMPI B in Q2-Q3, 2004**

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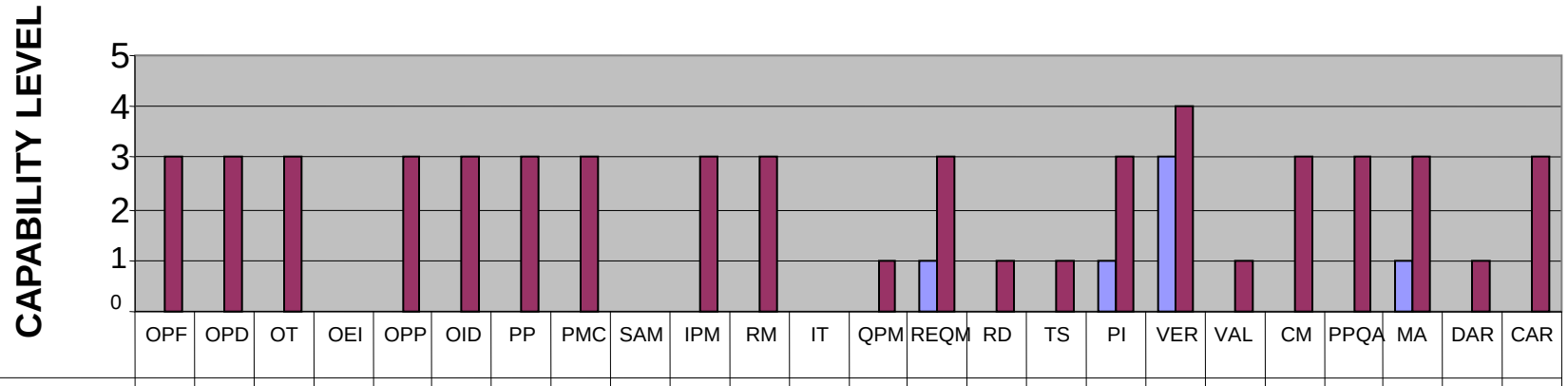
Target Profile



	OPF	OPD	OT	OEI	OPP	OID	PP	PMC	SAM	IPM	RM	IT	QPM	REQM	RD	TS	PI	VER	VAL	CM	PPQA	MA	DAR	CAR
CURRENT					0						0		0	1	0	0	1	3	0			1	0	
TARGET	3	3	3		3	3	3	3		3	3		1	3	1	1	3	4	1	3	3	3	1	3

PROCESS AREA

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Transition Effort - Estimated

Estimated Effort to Reach Target Capability Levels (TCL)

	Hours	TCL
REQM	48	3
Requirements Development	250	1
Technical Solution	350	1
PI	164	3
Verification	40	4
DAR	175	1
RSKM	53	3
Total staff hours	1080	

…..excluding training

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Other GSG CMMI Activities

- **GSG Malaysia**
  - **Organization**
    - **Opened in 1999**
    - **~ 150 engineers**
    - **SW-CMM L5 in October 2001**
  - **Strategy used for transition**
    - **Gap analysis (Nov 2002)**
    - **Reuse process assets from GSG-India**
    - **Use SEI Transition Partner for appraisals**
  - **Status / Results**
    - **20-70% reuse from Motorola India assets**
    - **~20 staff months of transition effort over 15 months**
    - **CMMI L5 (SW) in October 2003**

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Overall Lessons Learned (strengths)

- ✓ **Finding less CMMI gaps than expected within a practicing high maturity (SW-CMM) operation**
- ✓ **Reuse of validated assets and learning can significantly reduce time and effort to transition (at high level of maturity)**
- ✓ **Use of graduated and integrated appraisals accelerates smooth transition & deployment**
- ✓ **Motorola GSG is capturing the cost of transition better than prior costs to implement SW-CMM**

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Lessons learned (opportunities)

- ✓ Plan more time/effort to educate organizations on CMMI to reduce “competition” with current models
- ✓ Plan time/effort to “unwind” quantitative benefits of high maturity CMMI vs. SW-CMM for ROI
- ✓ High maturity organizations will (should) transition to new process technology (like CMMI) when ready
- ✓ Core or common process requires enterprise and organization-level investment

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What's next?

- Continue to use experience and assets from early adoptors to reduce the time/effort to transition remaining organizations
- Extend pilots in non-software engineering disciplines and organizations (Motorola objective)
- Continue to document and measure transition costs and returns
- Define and use tighter links between CMMI and Digital Six Sigma

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Questions & Contact Information

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