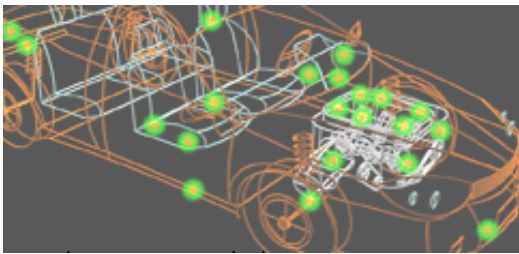


CMMISM Transition at Motorola GSG



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

The Person	The Work Team	The Home	The Auto
Wireless	Broadband	Internet	

intelligence  *everywhere™*



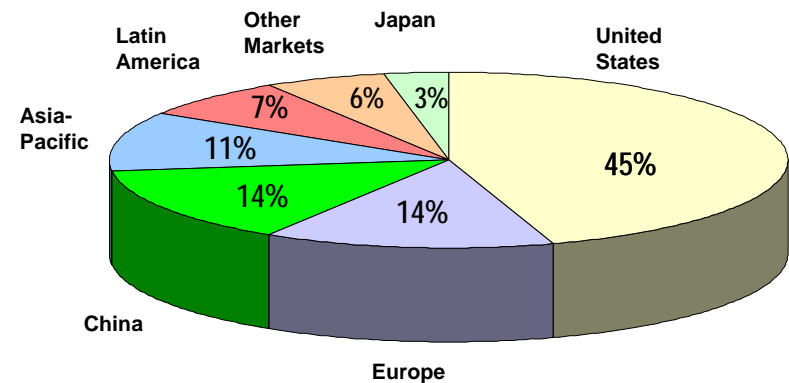
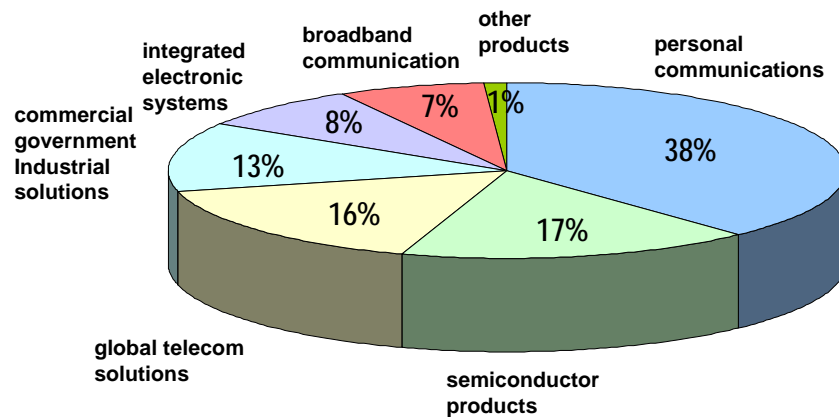
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Motorola's Business

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

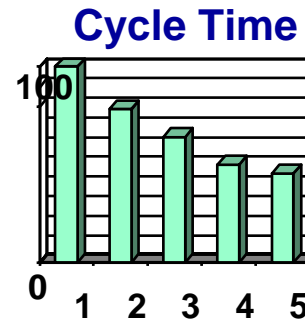
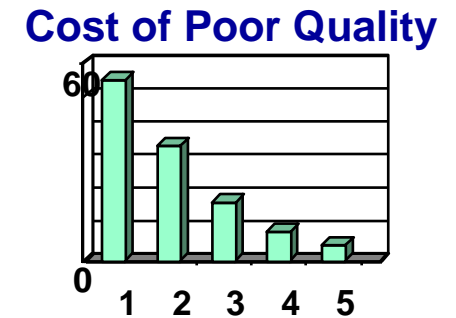
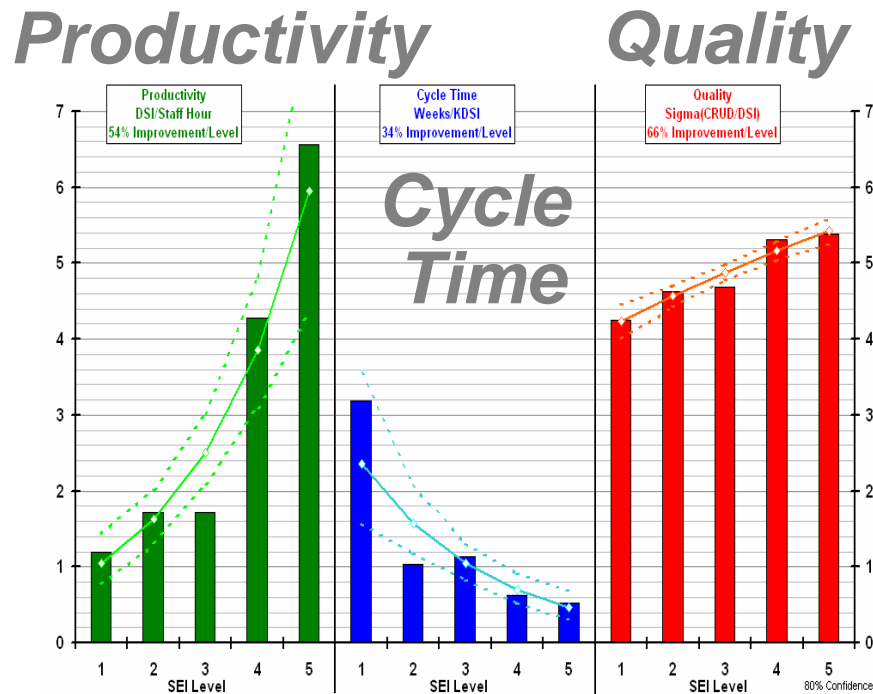


Source: Motorola 2002 Annual Report



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Benefits of Achieving Higher Maturity



Source: Presidential Task Force – 2002 Data



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



Global Software Group (GSG)

VISION:

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



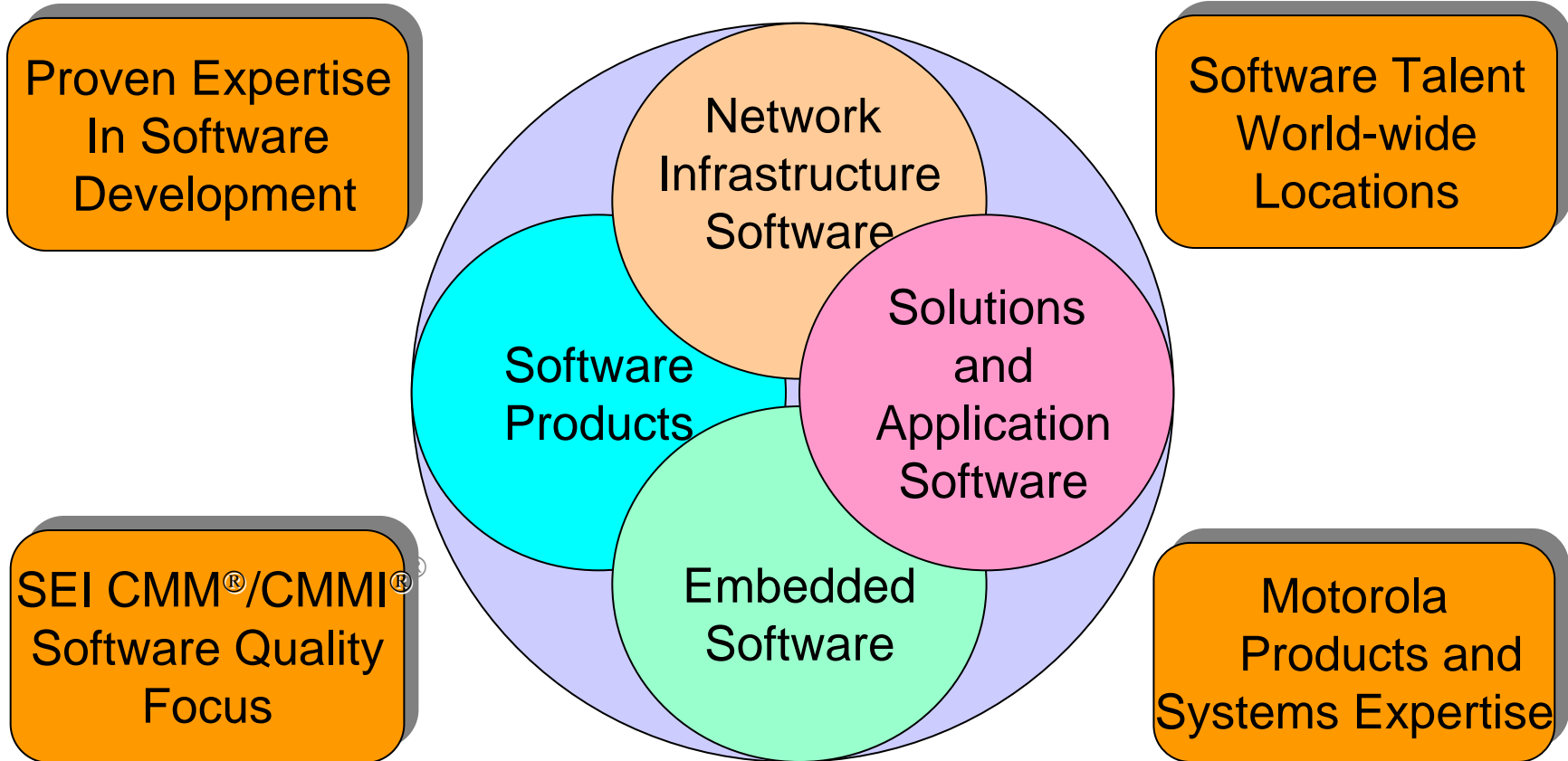
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GSG Locations



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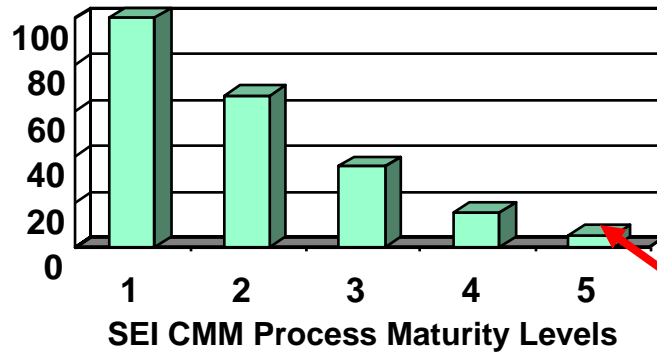
GSG Competencies



GSG's Proven Performance

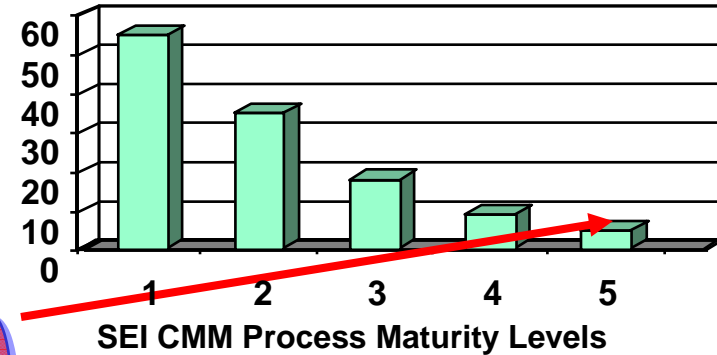
Quality:

Relative Defects After Release



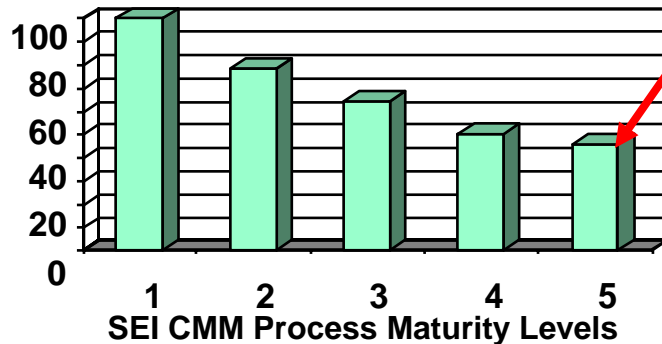
Decreased Cost of Poor Quality:

Relative % of Development Effort



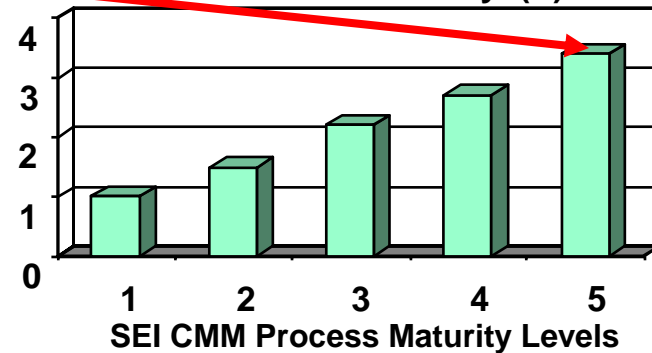
Reduced Cycle Time:

Relative Cycle Time



Increased Productivity:

Relative Productivity (X)



GSG

Source: Presidential Task Force – 2002 Data



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GSG India Overview

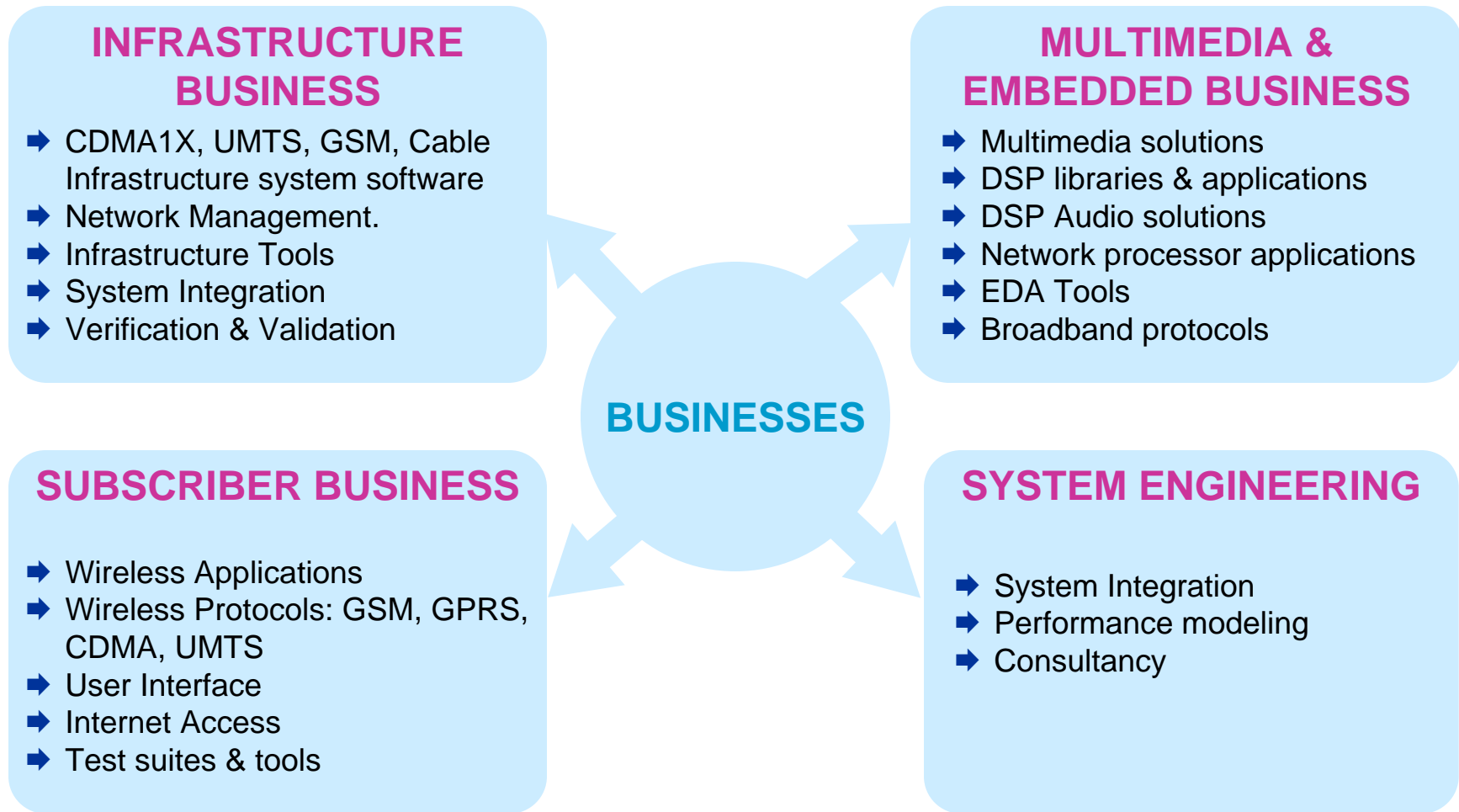


- **Opened in 1991**
- **1000 engineers**
- **Provides custom software, software products and system solutions for Motorola Businesses and their customers worldwide**
- **Assessment history:**
 - **SW-CMM Level 5 in 1993**
 - **CMMI Level 5 in May 2003 using CMMI SE/SW/IPPD/SS**



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Project Domains (Businesses)



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



Appraisal Sequence

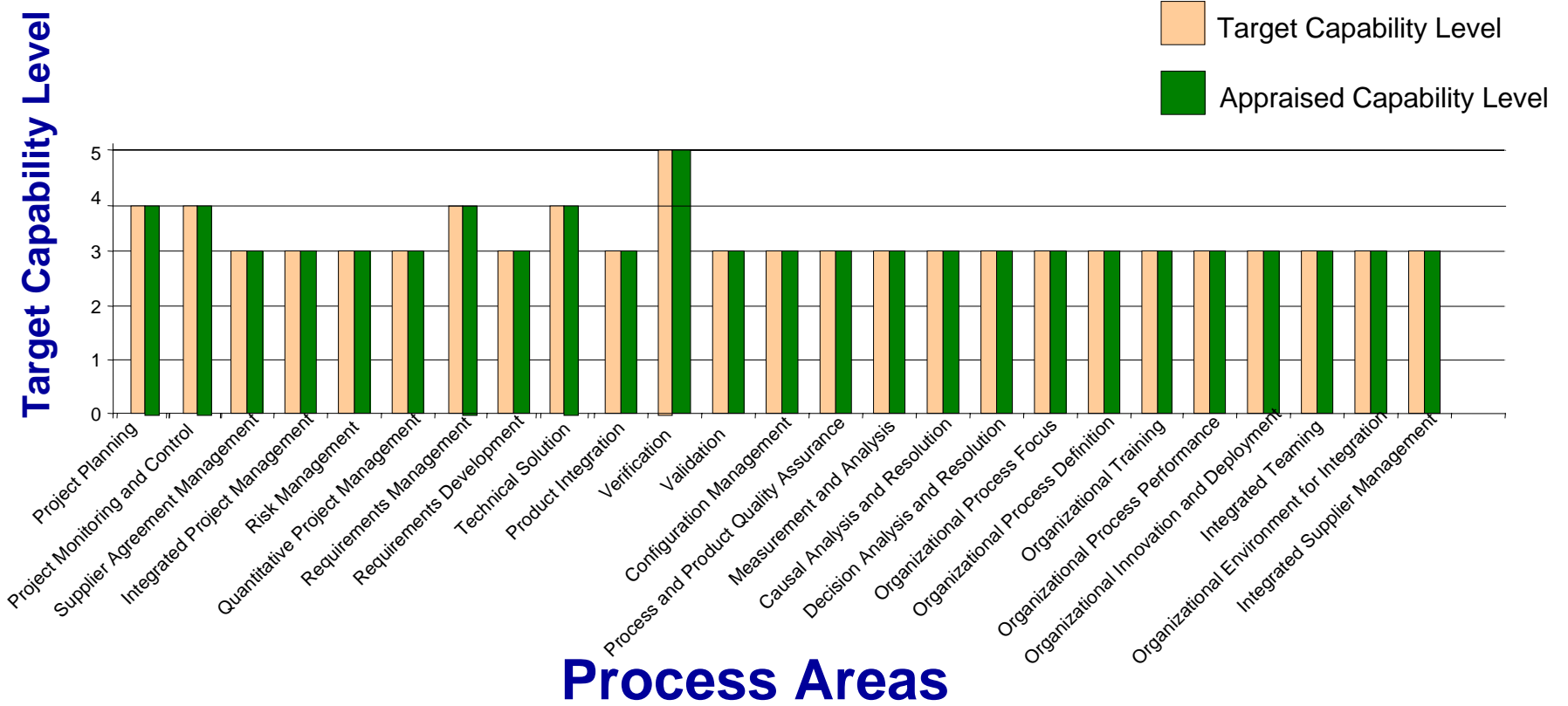
Appraisal Type	Class C	Class B	Class B	Class A SCAMPI
Duration	Nov 01~Feb 02	June 12-21, 2002	March 17-21, 2003	May 6~15, 2003
Objective	Gap Analysis for process assets	Identify Practice Level Gaps	Readiness Check	Benchmark; To establish a baseline
Relative: Cost/Duration Confidence Accuracy	Low	Medium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

Reference: Appraisal Requirements for CMMI (ARC)



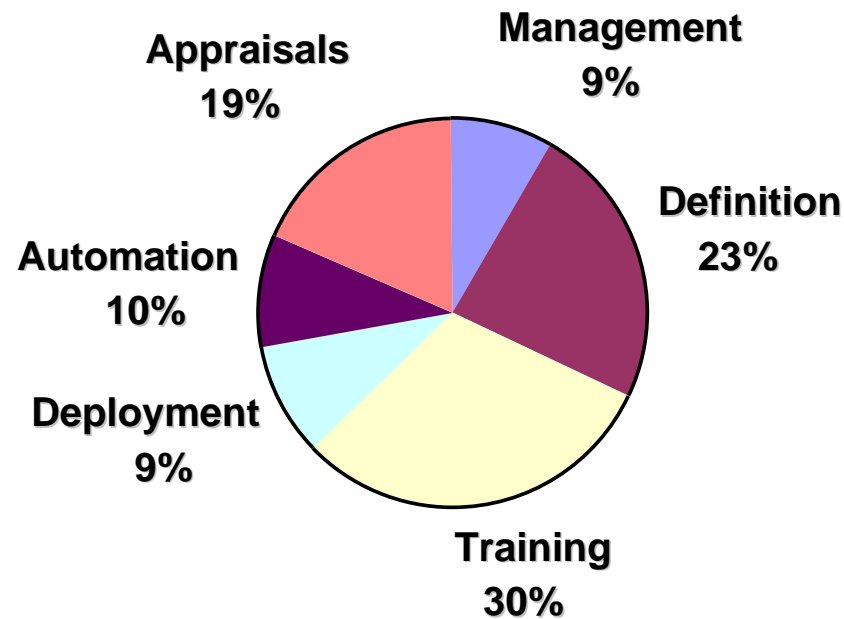
Target Profile

Profile validated by SCAMPI A



CMMI Transition Effort

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



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Performance Results*

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

* Results include use of practices from CMM/CMMI



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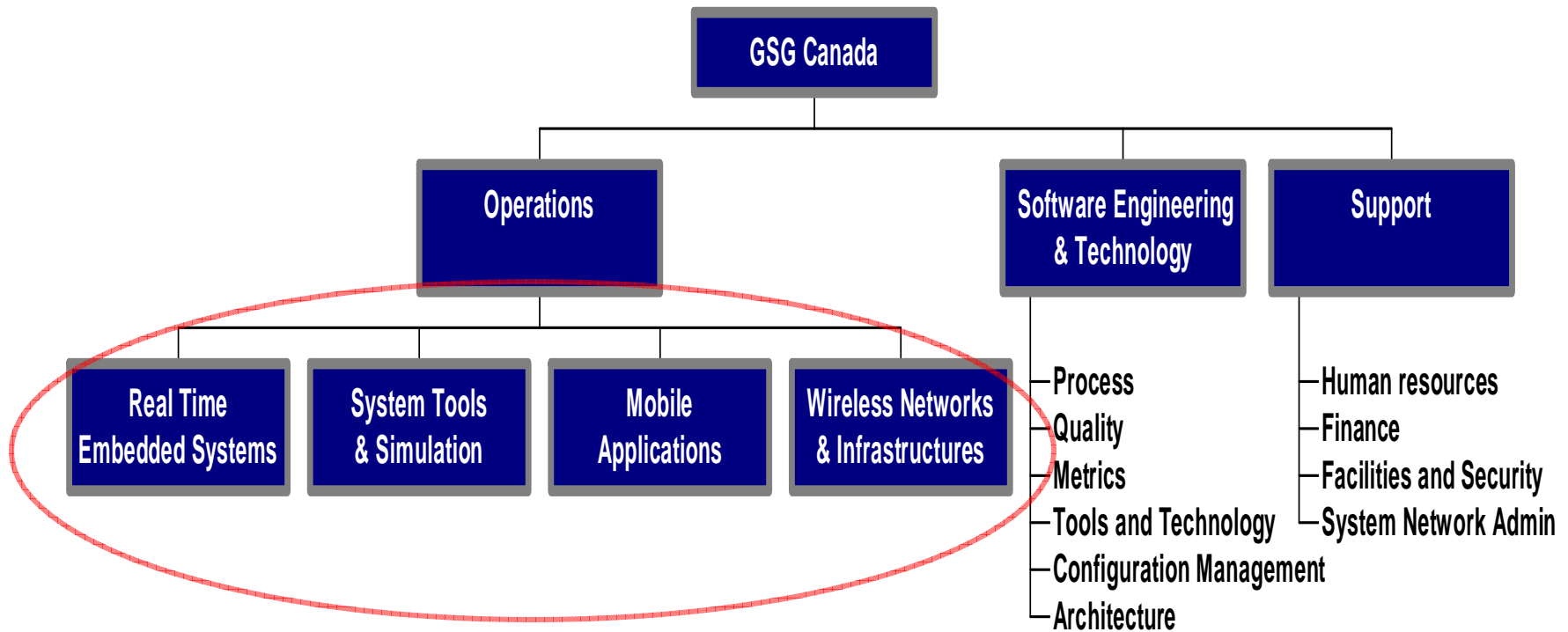
GSG Canada Overview



- **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**



Project Domains and Organization

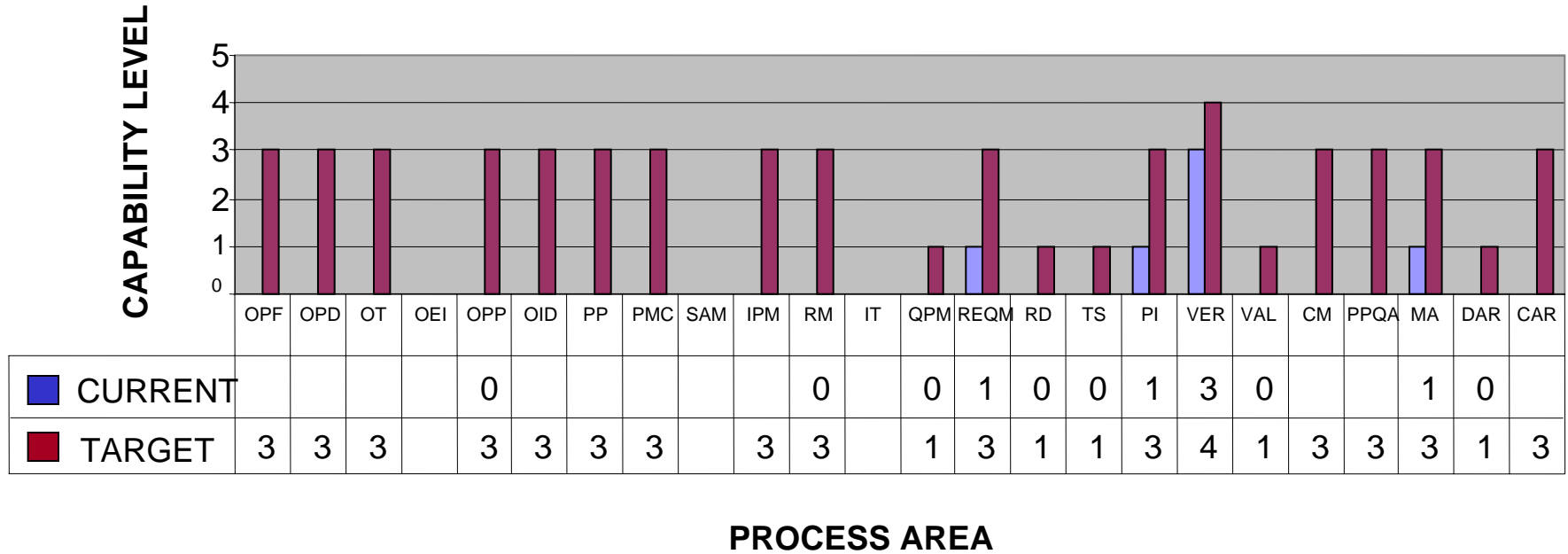


Transition Strategy

- **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



Target Profile



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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	<u>53</u>	3
Total staff hours	1080	

.....excluding training



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



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



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



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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