Possible Dimensions to Appraise in an Organization

- Process
- Financial
- People
- Projects
- Tools/automation

"What are the brutal facts? We've got to get a grip on the facts, what are the trends, what are the trendlines, how bad is it? Get a grip on the facts." – Jim Collins, Author of Good to Great
Inherent Limitations of CMMI Appraisals

• Focused on process
  – Could be a strength!

• Some high maturity organizations fall short on project performance

• Does not review/analyze organizational or project performance against previously established objectives/baselines

• Non-attribution leads to broader organizational findings

• Difficult to identify “What is going wrong in my organization, and how do I fix it?” without performance data
Project Retrospective Opportunity

• In the course of performing a SCAMPI, leverage the resources in place and the intelligence already gained to explore one or more projects and their performance in-depth

• Dimensions reviewed will be actual project performance compared to expectations/promises set at the onset – if available!

• Identify actual performance, whether it fell short, met, or exceeded expectations

• Then, map process gaps (identified through the SCAMPI) to performance gaps to quantitatively determine which processes/practices to improve first!
  – These help solve business goals based on performance data
Project Retrospective Approach

• Identify objectives set at the start of a project:
  – Scope – number of requirements to be delivered
  – Schedule – when the requirements were to be delivered
  – Cost – The expected cost of delivering the requirement
  – Quality – The expected quality of the delivered requirements

• Review actual project results at completion and identify whether they fell short, were met, or were exceeded
  – Requires significant data archeology in some cases!
  – A large amount of analysis occurs as well
Example Project Retrospective
Findings

“What you can measure you can target. And what you can target you can accomplish.” – Jim Collins
Retrospective Summary

ABC 1.0 experienced significant churn early on. After the development phase-gate, some schedule problems remained, although a quality software product with a majority of the planned features was delivered to the market on time and within budget.

- **Scope**: As defined by the requirements at the Development phase-gate w/changes versus actual delivered
- **Schedule**: As determined by Qualify, Launch, and GA actuals versus targets at the Development phase-gate
- **Cost**: As determined by planned cost targets at the Development phase-gate versus actuals
- **Quality**: As determined by quality targets for GA at the Development phase-gate versus actuals
ABC 1.0 Scope Performance Findings

• Not all planned scope defined at the Development phase-gate delivered
  – Major scope changes were not visible in CMB change requests or in the product contract change history – these involved deferment of several features to a future release
  – No schedule/effort impacts due to changes were identified even though it was clear scope changed
  – A significant number of User Interface changes occurred during Beta testing – these were each small in impact, but together “they added up to real work”

• Detailed Requirements were not approved until July 2005, almost 3 months after the Development phase-gate approval

• Many changes occurred to requirements at the all levels
  – Customer requirements changed from 13 to 35 requirements - there is no clear CMB entry criteria or traceability why and how this occurred other than 2 CMB CRs that don’t effectively provide explanations
  – Top 5 SW-related requirements docs changed from 390 to 415 requirements via 194 CRs – these changes generally well managed
  – 47 total ClearQuest software enhancement CRs – no clear traceability to Customer CMB CRs or Detailed Requirements CRs
Requirements Changes Per Month

Numerous requirements changes are occurring late in the project

Requirements baselined after Development Phase-Gate

Development Phase-Gate 04/19/05

Code complete 1/13/06

Qualify Phase-Gate 04/04/06

Launch Phase-Gate 06/20/06

Requirements Changes Per Month

Total # of Requirements

11/24/2008

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ABC 1.0 Schedule Performance Findings

• **Significant churn occurred in the ABC 1.0 planning phase**, resulting in
  – Numerous Planning reviews
  – A delay in Development Phase-Gate of 4 months from 12/21/04 to 4/19/05
  – A delay in Launch Phase-Gate of 7 months from 11/05 to 6/20/06

• **After Development Phase-Gate, interim schedule performance still suffered**
  – Code complete delay of 3 months from 10/27/05 to 1/13/06
  – System Test 2nd pass start delay of 2 months from 1/24/2006 to 3/27/2006
  – Qualify Phase-Gate delay of 4 months from 12/05 to 4/4/2006

• **Launch Phase-Gate and GA slipped by 5 weeks**, due to hardware manufacturing, not software
  – Schedule was crashed by conducting System Test 1st pass and Alpha simultaneously
    (baseline Development schedule planned for conducting System Test 2nd pass and Alpha simultaneously)

| The 7-month Launch difference from the planned estimate resulted in the ABC 1.0 2006 business case revenue projections being reduced from $255M to $40M – a reduction of (up to) $215M |
| (Based on business case expected gross revenue, which considered ABC 1.0 in isolation. Actual, incremental product portfolio net revenue impact to the company is significantly less.) |
Numerous high-profile re-plans and plan reviews

Code Complete slipped by 2 ½ months
Qualify Phase-Gate slipped by 4 months

ABC software ready, but Launch slipped by 5 weeks due to hardware delays

Original Launch Phase-Gate date difference of 7 months, business case revenue reduced from $225M to $40M for 2006

Plan 1
- Plan (1) 9/14
- Dev Phase-Gate 12/21
- Qualify Phase-Gate 06/05
- Launch Phase-Gate 11/05
- Launch 12/05

Plan 2
- Plan (2) 11/14
- Dev Phase-Gate 01/25
- Qualify Phase-Gate 06/05
- Launch Phase-Gate 11/05
- Launch 06/05

Dev Phase-Gate (plan of record)
- Interim Plan Review 10/05
- Interim Plan Review 02/01
- Interim Phase review 08/16
- 2nd Pass Beta Start System 04/04 Test 03/27

Actual
- Plan (1) 9/14
- Plan (2) 11/14
- Interim Plan Review 10/05
- Dev Phase-Gate 04/19
- Interim Phase review 08/16
- Alpha complete Start 1/13 1/23
- Code Complete Start 10/27
- Quality Phase-Gate 12/05
- Qualify Phase-Gate 06/05
- System Test 2nd Pass 1/24
- Launch Phase-Gate 05/23
- Launch Phase-Gate 06/20/
- Launch 07/10

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ABC 1.0 Cost Performance Findings

• **Unable to account for resources/costs specific to ABC 1.0**
  – Work on multiple Phase 1 Releases are not differentiated (i.e., 1.0 vs. 1.1).
  – Unable to account for actual resources during Plan Phase – No actual data prior to February 2005

• 2006 costs are on target; project costs prior to v58 plan are difficult to determine actuals versus estimates

• Effort actuals overran plan during the Plan and Qualify Phases
ABC Phase 1 Cost Performance

FY06

- Plan (v58)
- Actual

Month

Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep

$1,153,997 $1,948,047 $2,926,405 $3,979,404 $4,769,003 $5,749,742 $6,385,870 $7,098,036 $7,647,961

Plan (v58)
Actual
ABC Phase 1 Headcount Performance

Note: Plan v58 = FY06
ABC 1.0 Quality Performance Findings

- Most quality targets established at the Development phase-gate were met at Launch
  - 0 open Sev 1 & Sev 2 CRs
  - 73 open Sev 3/4 CRs versus <100 target
  - 99.15% system tests executed at Launch phase-gate versus 100% target
  - 95.6% system tests ran and passed at Launch phase-gate versus 100% target

- Critical/high severity defect detection occurring late in the product development lifecycle
  - System test & Alpha performed concurrently
  - Approximately 2/3rds of all critical/high severity defects detected in system test or later
  - Almost as many critical/high severity defects reported in (Alpha) phase as were in system test

- 73 open CRs were deferred to later releases (1.1, 1.2) as they were not thought to be critical to the 1.0 release

- SQM recently implemented to track overall project quality progress weekly toward Launch. Overall SQM target met at Launch.

- No critical/high severity customer-found defects reported to-date
# Quality Targets & Measures

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Qualify Phase-Gate Goal</th>
<th>Launch Phase-Gate Goal</th>
<th>Current</th>
<th>Steady State Goal</th>
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<tbody>
<tr>
<td>Open critical Severity 1 CRs</td>
<td>0 or downward trend</td>
<td>zero</td>
<td>Zero</td>
<td>zero</td>
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<tr>
<td>Open critical Severity 2 CRs</td>
<td>0 or downward trend</td>
<td>zero</td>
<td>Zero</td>
<td>zero</td>
</tr>
<tr>
<td>Total open CR’s</td>
<td>&lt;200 severity 3-4 and downward trend</td>
<td>&lt;100 severity 3-4 and downward trend</td>
<td>73 as of 19 June. Defer into 1.1/1.2</td>
<td>&lt;50 severity 3-4</td>
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<tr>
<td>% System tests executed</td>
<td>100% 1&lt;sup&gt;st&lt;/sup&gt; pass</td>
<td>100% 2&lt;sup&gt;nd&lt;/sup&gt; Pass</td>
<td>99.15% Soak up/downgrade and non-critical audio remain</td>
<td>100%</td>
</tr>
<tr>
<td>% System tests passed of executed</td>
<td>80% in 1&lt;sup&gt;st&lt;/sup&gt; pass</td>
<td>100% 2&lt;sup&gt;nd&lt;/sup&gt; Pass</td>
<td>95.6% Issues sev 3, 4 and deferred into 1.1/1.2</td>
<td>100%</td>
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<tr>
<td>In-circuit and functional test in use at contract manufacturer</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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<td>HW Group Test in use at contract manufacturer</td>
<td>Yes</td>
<td>Yes</td>
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<td>Yes</td>
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<tr>
<td>DOA claims</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>&lt; 0.5%</td>
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<tr>
<td>Product return rate</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>&lt; 0.5%</td>
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<tr>
<td>Trouble call rate</td>
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<td>n/a</td>
<td>n/a</td>
<td>&lt; 0.1%</td>
</tr>
</tbody>
</table>
Defects Found Per Month

A good number of defects were found pre-SV

Numerous defects found late in the development cycle

Ok2 Dev 04/19/05
Code complete 1/13/06
Ok2 Qual 04/04/06
Ok2 Launch 06/20/06

Total # of Defects per Month
Almost as many critical/high severity defects were found in in-house trials as in system test.

Only 1/3 of critical/high severity defects found before SV.

Critical & High Severity Defects Detected by Phase

- Development: 25.3%
- System Test: 33.3%
- In-house Trials: 29.9%
- Unit Test: 3.4%
- Integration Test: 4.0%
- Design: 1.7%
- Controlled Introduction: 1.1%
- General Availability: 1.1%

Critical & High Severity Defects Detected by Phase

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- Improving Software Economics
Key CMMI Concepts That Can Help

Scope
- Develop better customer-oriented requirements
- Better manage customer requirements changes via CMB and CRs
- Establish bi-directional traceability from all requirements to project work products and plan to better assess and document impact of changes to the project

Schedule
- Improve planning and tracking for Concept and Planning phases of projects
- Improve tracking (WBS, risks, resources, etc.) of actuals on projects
- Conduct Process and Product Quality Assurance (PPQA) reviews of project plans prior to phase-gate reviews

Cost
- Track and report actual effort and cost throughout the project, not just at phase gates

Quality
- Perform more rigorous design & interface reviews
- Perform more rigorous code inspections and analyze/report code review data
- Implement a Process and Product Quality Assurance (PPQA) capability
- Develop automated unit, integration, and system test harnesses (non-CMMI)
Key Findings Mapped to Product Dev Lifecycle

**Program/Project Management**
- PM tracking & visibility through PM System
- Common product dev life cycle for managing programs
- Phase Gate Reviews at key points through the product development life
- No standardized WBSs
- Not all project activities are accounted for in project plans and schedules
- Lack of clearly defined roles, responsibilities and program infrastructure at all levels

**Develop & Qualify Phases**
- System Test Organization
- Alpha/Beta Test
- High Quality Product Delivery to Launch
- Focus on System test to catch defects, versus earlier prevention
- Lack of development connectedness to “success” of ABC
- Changes to customer-level requirements unclear

**Concept & Plan Phases**
- Product Management infrastructure in place
- UI Prototyping, Focus Groups
- Dedicated Systems Engineering Group
- Churn in early phases leading to early schedule slippage
- Reqs doc too technical, doesn’t convey user requirements
- Reqs not complete at Dev Phase-Gate

**Process Management & Support**
- Software Configuration Management Environment (ClearCase, ClearQuest)
- Organizational processes are referenced, but not followed as documented
- Project information stored in numerous repositories
- No consistent organization/program/project measurement capability
Thank You!

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