A Myth: The Problems Are Technical

- Projects generally fail for management reasons
  - "Bugs in the Program" report, 1989
- The major problems in software development are managerial - not technical.
Defining Process

- Process - a sequence of steps performed for a given purpose (IEEE)

An Immature Process

- Ad hoc; process improvised by practitioners and their management
- Not rigorously followed or enforced
- Highly dependent on current practitioners
- Low visibility
Mature Processes

- Process maturity – the extent to which a specific process is explicitly defined, managed, measured, controlled, and effective
- Mature processes share a number of attributes

Institutionalized Processes

- “That’s the way we do things around here.”
- The organization builds an infrastructure that contains effective, usable, and consistently applied processes.
- Institutionalized processes endure after the people who originally defined them have gone.
Process Is Not the Only Value!

- Operational excellence is one possible value system to drive business success.
- There are other values than reliability and meeting commitments, though all are important.
  - product leadership: features, innovation
  - customer intimacy: customization, service

What Is a "Best Practice?"

- Can be a management or technical practice
- Consistently demonstrated to significantly improve the bottom line
  - one or more of productivity, costs, schedule, quality, user satisfaction, predictability
- Demonstrated high return-on-investment
“M” is for (Capability Maturity) Model

THE REAL WORLD
Integrated product teams
System engineering
Organization culture
Technology
Marketing

Models are simplified views of the real world.

Process descriptions, models, and instantiations are below the level of detail of the CMM.

Maturity Levels
Key Process Areas
Key Practices

“All models are wrong; some models are useful.” George Box

What Was the Software CMM?

• Common-sense application of Total Quality Management
• A model for transforming organizations
• Community-developed guide
• Prescription for changing organizational behavior
• Basis for reliable and consistent appraisals
Evolution of Process Capability

<table>
<thead>
<tr>
<th>Level</th>
<th>Process Characteristics</th>
<th>Predicted Performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>Optimizing Process improvement is institutionalized</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Managed Product and process are quantitatively controlled</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Defined Software engineering and management processes defined and integrated</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Repeatable Project management system in place; performance is repeatable</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Initial Process is informal and unpredictable</td>
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</tbody>
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Software CMM v1.1

<table>
<thead>
<tr>
<th>Level</th>
<th>Focus</th>
<th>Key Process Areas</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>Optimizing Continual process improvement</td>
<td>Defect Prevention Technology Change Management Process Change Management</td>
</tr>
<tr>
<td>4</td>
<td>Quantitatively Managed Product and process quality</td>
<td>Quantitative Process Management Software Quality Management</td>
</tr>
<tr>
<td>3</td>
<td>Defined Engineering processes and organizational support</td>
<td>Organization Process Focus Organization Process Definition Training Program Integrated Software Management Software Product Engineering Intergroup Coordination Peer Reviews</td>
</tr>
<tr>
<td>2</td>
<td>Repeatable Project management processes</td>
<td>Requirements Management Software Project Planning Software Project Tracking &amp; Oversight Software Subcontract Management Software Quality Assurance Software Configuration Management</td>
</tr>
<tr>
<td>1</td>
<td>Initial Competent people and heroics</td>
<td></td>
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</tbody>
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Two Architectural Perspectives

- A “staged” architecture, e.g., the Software CMM
  - focuses on building organizational capability
  - identifies the vital few issues to focus on
  - describes a roadmap for process improvement

- A “continuous” architecture, e.g., ISO/IEC 15504
  - focuses on building process capability
  - provides a reference model for rating processes
  - describes the terrain of process management

Continuous Architecture
Evolving Frameworks

- Software CMM has been replaced by CMMI for Development
  - CMMI-DEV combines the continuous and staged representations
- ISO/IEC 15504 is being replaced by ISO/IEC 330xx
  - Generic practices in the original continuous representation have been replaced by process attributes

Questions?

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