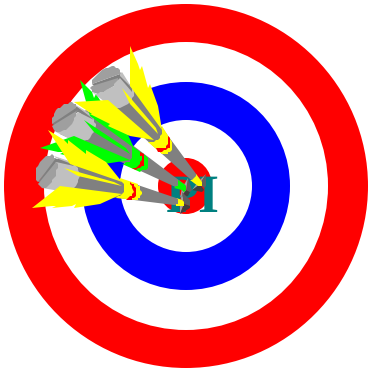
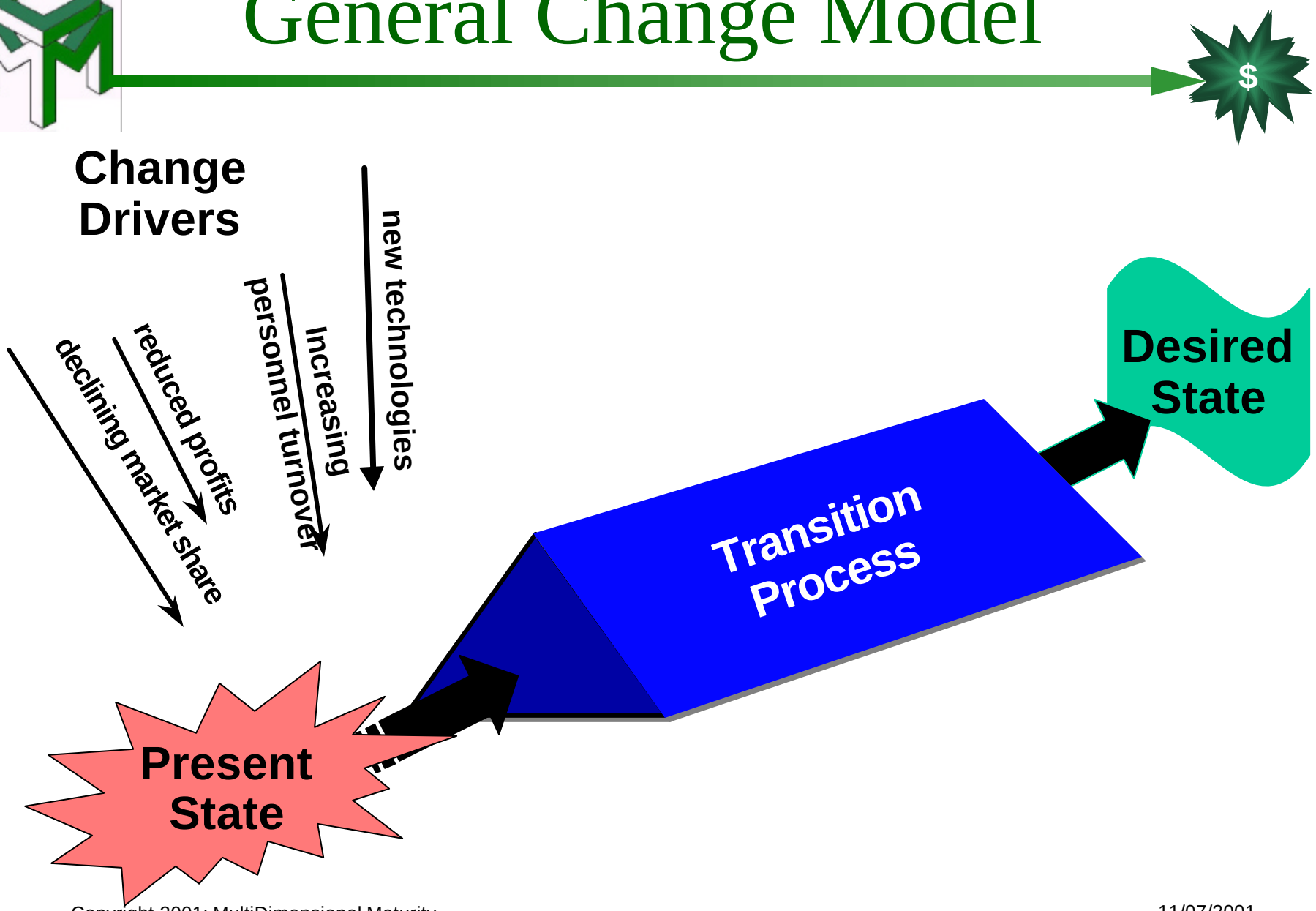
Five Critical Issues in CMMI^{SM} Application



Dick Waina, Principal,
Multi-Dimensional Maturity

General Change Model



Five Critical Issues

- **<u>MOTIVE</u>** - What are the critical business issues driving process improvement?
  - Strategic objectives
  - Current "pains"
- **MODEL** – Which model representation and components best map to the organization practices?
- **METHOD** – How can you quickly and effectively identify improvement opportunities?
- **MANAGING CHANGE** – What factors impact the effectiveness of introduced changes?
- **MEASURES** – What are critical factors in setting up a measurement program?

For more details see the paper, "Five Critical Questions in Process Improvement"

Top Down:
Strategic Objectives

Strategic Objectives

Business leaders determine critical business drivers and associated strategic objectives

Business Purposes

Department leaders identify business purposes and goals that support the strategic objectives

Process Goals

Technical and process leaders document process goals that support the business purposes (approved by business and department leaders)

Key Indicators

Technical and process leaders determine key indicators that measure progress against goals (approved by other leaders)

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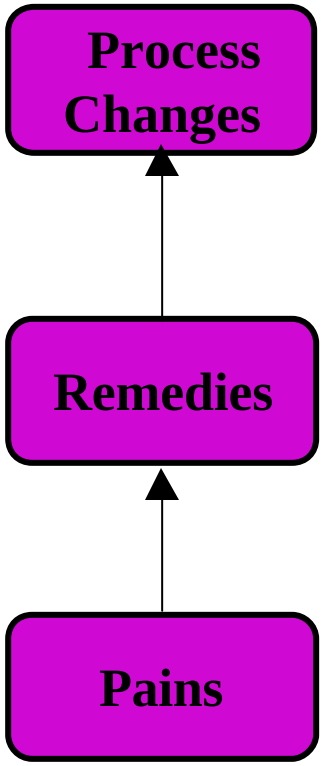
Bottom Up:
"Pains"



Process owners identify related process changes

Leaders and users brainstorm possible remedies to address the "pains"

Technical and process leaders meet with process users to identify significant problems

Case Study - Strategic Objectives

- Small industry-leading company doing subsystem development
- Rapid growth
- Organization initiatives to improve ability to deliver:
  - Improve/expand on product/delivery standards
  - Improve “Time-to-Market”
  - Improve communications
  - Improve internal training
  - Improve resource utilization

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Case Study - Pains

- ☹ Schedules and budgets are routinely exceeded because they are not based on realistic estimates
- ☹ Inability to predict schedule, cost, design/production readiness
- ☹ Poor resource utilization
- ☹ Inadequate testing
- ☹ High incidence of software defects
- ☹ When hard deadlines are imposed, product functionality and quality may be compromised to meet schedule
- ☹ No objective basis for judging product quality

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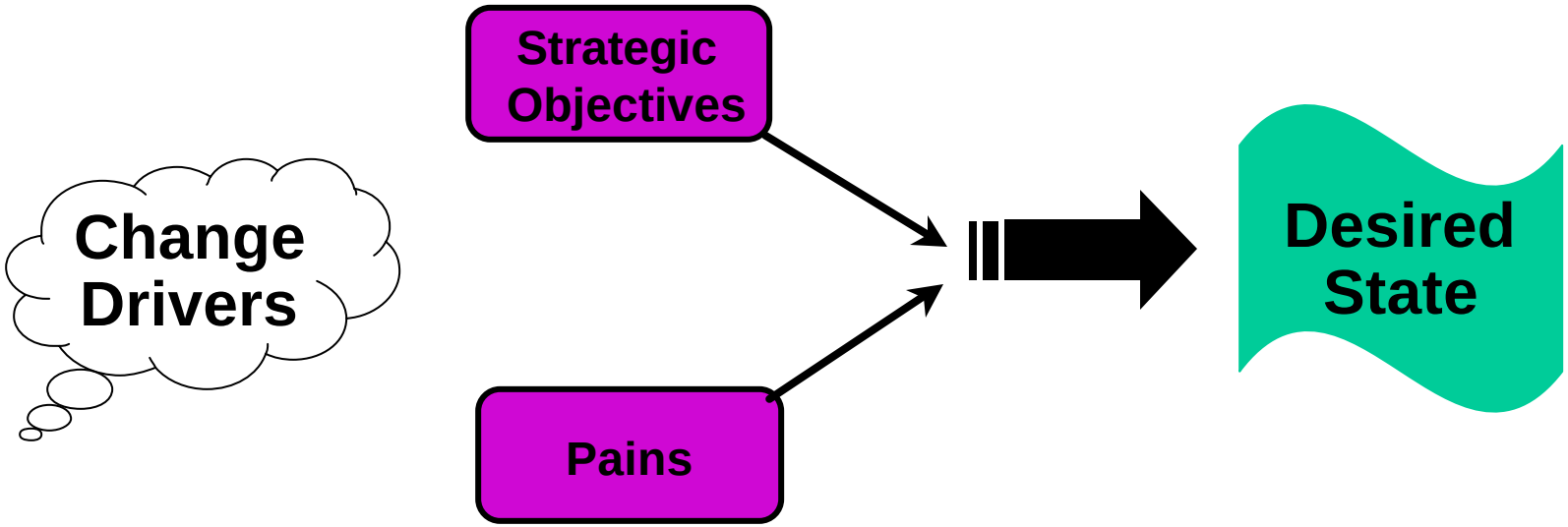
Case Study

- Combining a detailed list of “pains” with organization strategic initiatives enabled the organization to envision a desired state.



Case Study - Setting Direction

- Improve/expand on product/delivery standards
- Schedules and budgets are routinely exceeded because they are not based on realistic estimates
- High incidence of defects

Process Goals:
Increase predictability
Reduce defects

Key Indicators:
Cost/schedule variance
Failures in the field

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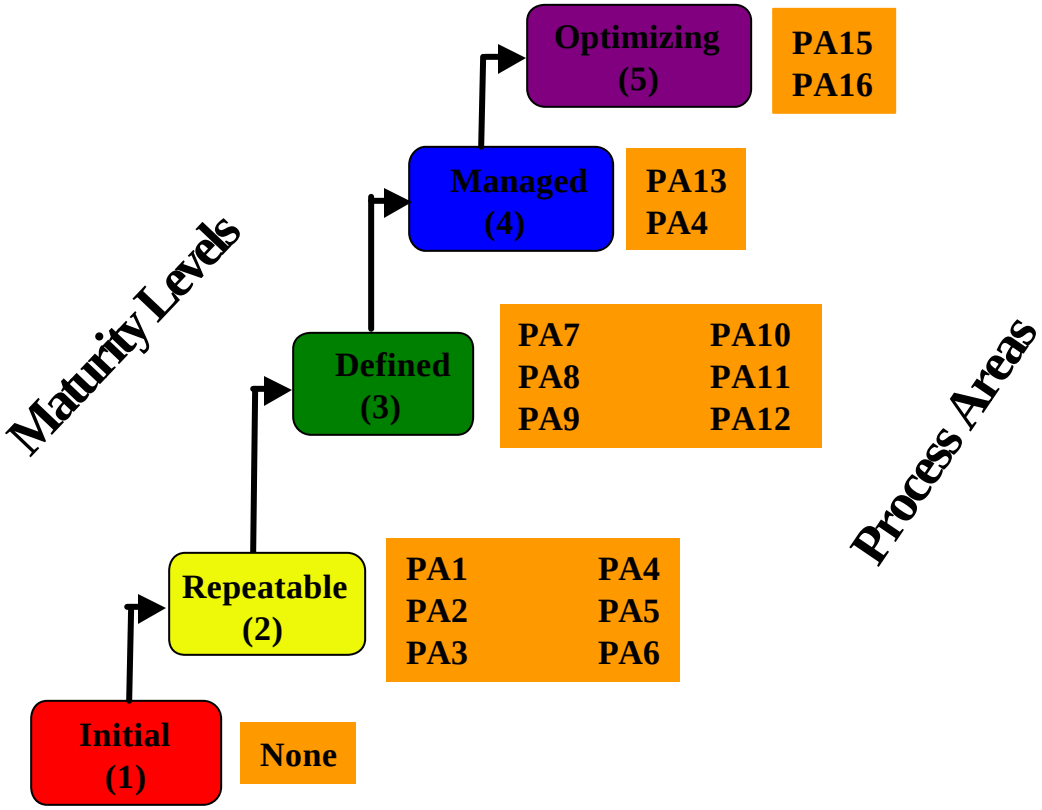
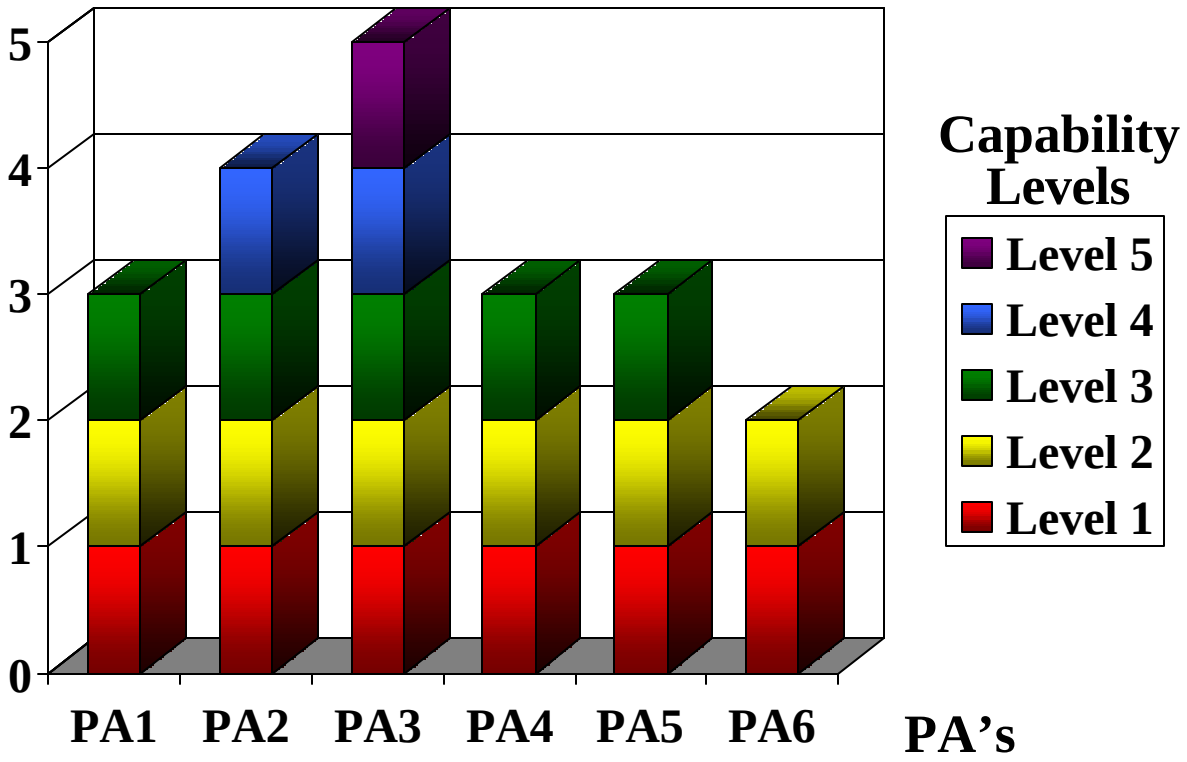
Staged Representation

- Maturity Levels have Process Areas
- Provides clear road map for improvement



Continuous Representation

- Process Areas have Capability Levels
- Provides broad picture of processes



Case Study - Model

Business Goals:

- Increase predictability:
  - Reduce requirements creep
  - Develop estimating database
  - Use planning templates
- Reduce defects
  - Peer reviews
  - Testing

PA's:

RM

PP/PMC

VER

- reviews

- testing

Note that the focus is not on a Level, but on technical aspects of certain PA's.

Select the components which best map to your critical issues

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Assess Organization

Mentored Self Assessment

SCAMPI

Interim Profile SM

SCE SM

Mini-assessments

Assessment Objectives

- Gather accurate data in an efficient, minimally disruptive way
- Help to identify and prioritize improvement opportunities
- Signal to the organization that a new way of life is beginning - in this case disruption is good

Assessment Outputs

- ***FINDINGS***
  - Provide an accurate picture of processes, using the CMMI^{SM} as a framework
- ***RECOMMENDATIONS***
  - Provide a framework and catalyst for action
  - Build ownership of results
  - Develop organizational commitment and energy
  - Sustain sponsorship and establish commitment
  - Facilitate continued process improvement

Assessment Considerations

- Accuracy
- Cost
  - Assessment preparation
    - Organization preparation
    - Team training and preparation
  - Assessment conduct
- Organization Disruption
  - (any measurement impacts object being measured - this is a basic law of physics)

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Assessment Types

- Self Assessment
- Mentored Self Assessment
- Interim Profile℠
- Mini-Assessment
- CBA-IPI℠ (CMM-Based Appraisal for Internal Process Improvement)
- SCE℠ (Software Capability Evaluation)
- SCAMPI℠ (Standard CMMI Assessment Method for Process Improvement)

Comparison

Type	Accuracy	Cost	Disruption
Self	Low	Low	Low
MSA	Fair	Low	Low
IntProf℠	Fair	Low	Low
Mini	Moderate	Moderate	Moderate
CBA-IPI℠	High	High	High
SCAMPI℠	High	High	High
SCE℠	High	High	High

**** Values are the authors' estimates of accuracy, cost and disruption.***

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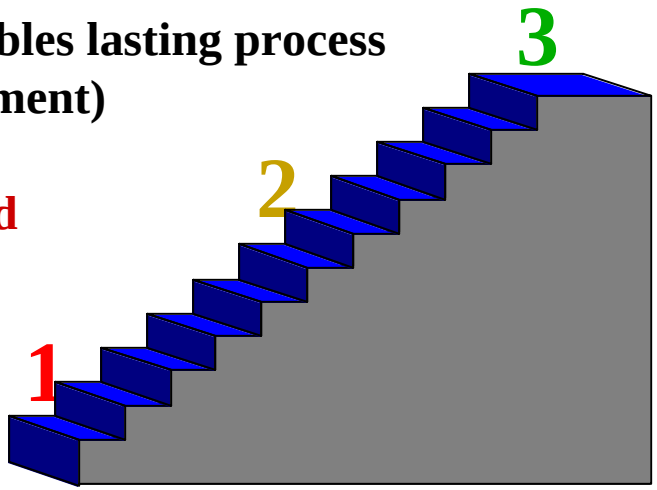
A Maturity Subtlety

There are two different issues to be concerned with in process improvement:

Process Maturity
(focus - improve effectiveness/ reduce variability of process performance)

Organization Maturity
(focus - establish environment that enables lasting process improvement)



Process maturity can't be significantly improved beyond the capability of the organization to incorporate and sustain improvement.

Lasting Change

- Process improvement requires people in the organization to change their behaviors, and that requires attention to a whole range of organizational and cultural issues if process improvement is to be effective for the long term.

What Is Culture?

Culture has a pattern of shared basic assumptions:

- that a group learned as it solved problems,
- that has worked well enough to be considered valid, and
- that is reinforced as the correct way to perceive, think, and feel in relation to resolving problems.

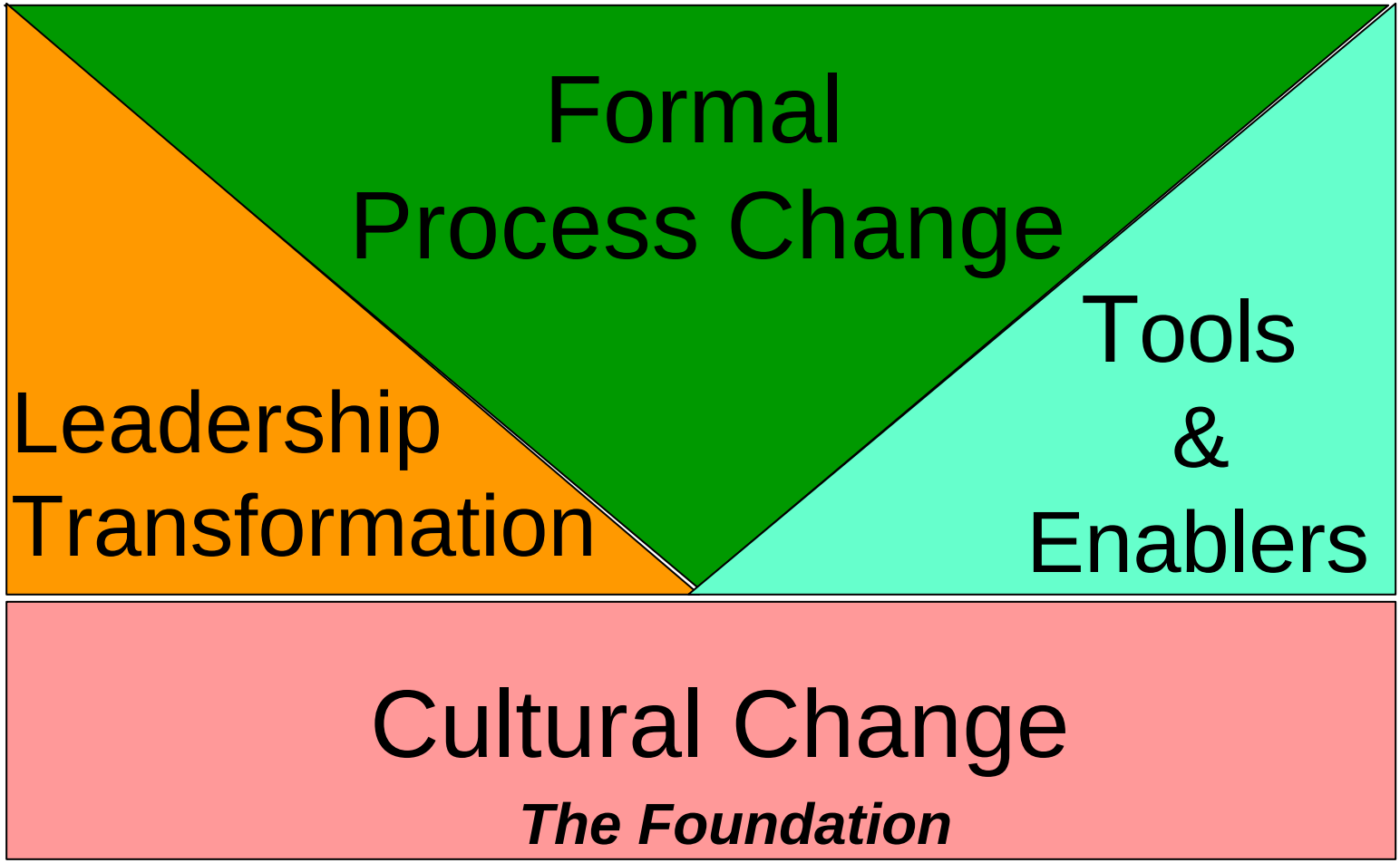
Kim Caputo: "Facilitating CMM Culture Change"

Cultural Change

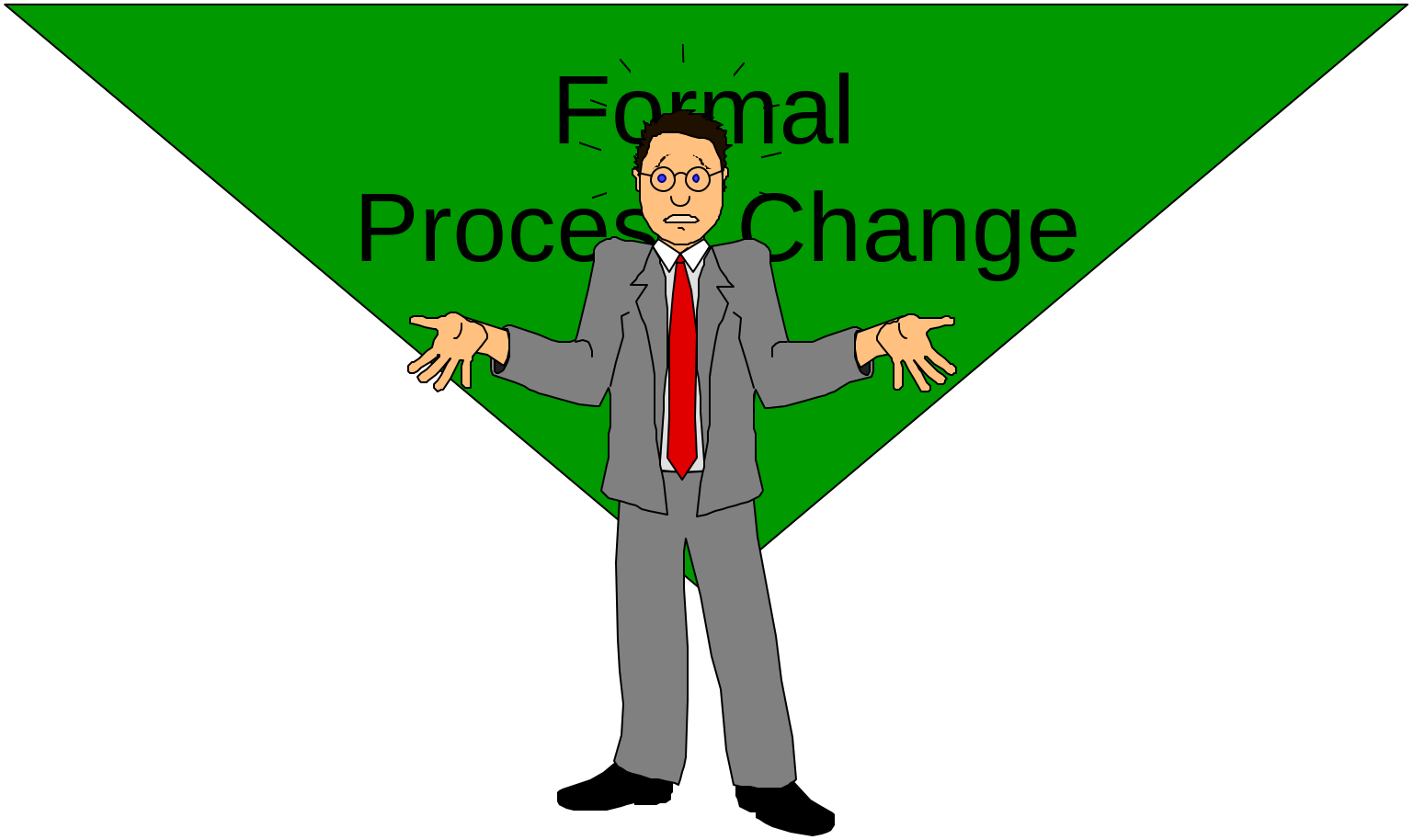
- involves rethinking those basic assumptions,
- deciding some assumptions are no longer valid, and
- learning a new pattern of shared basic assumptions.

Kim Caputo: "Facilitating CMM Culture Change"

Process Supported by Culture



Process Without Culture



Reasons for Failure

- Failures in strategy:
  - Failing to define reasonable goals and plans.
  - Failing to tie the improvement goals to business objectives.
  - Having inadequate resources and unrealistic expectations.
- Failures in planning:
  - Starting improvement efforts without an assessment (and/or without CMMI knowledge).
  - Running improvement efforts like another Level 1 project, with no requirements, no plan, no tracking against plan, no configuration management, no quality assurance, etc.
  - Over-focussing on a common solution - "Let's write a new standard development process."

Rick Hefner:"Top Ten Reasons Improvement Efforts Fail"

Reasons for Failure, cont.

- Failures in execution:
  - Ignoring middle management - Middle managers stand the most to lose, and are the most effective in resisting change.
  - Confusing institutionalization with standardization - a strong culture does not imply everybody does it the same way.
  - Defining the process too early - Improvement is not simply about doing things differently; it requires a change in the culture to sustain the improvements.
  - Trying a do-it-yourself approach - SEPG skills are different than software development and management skills.

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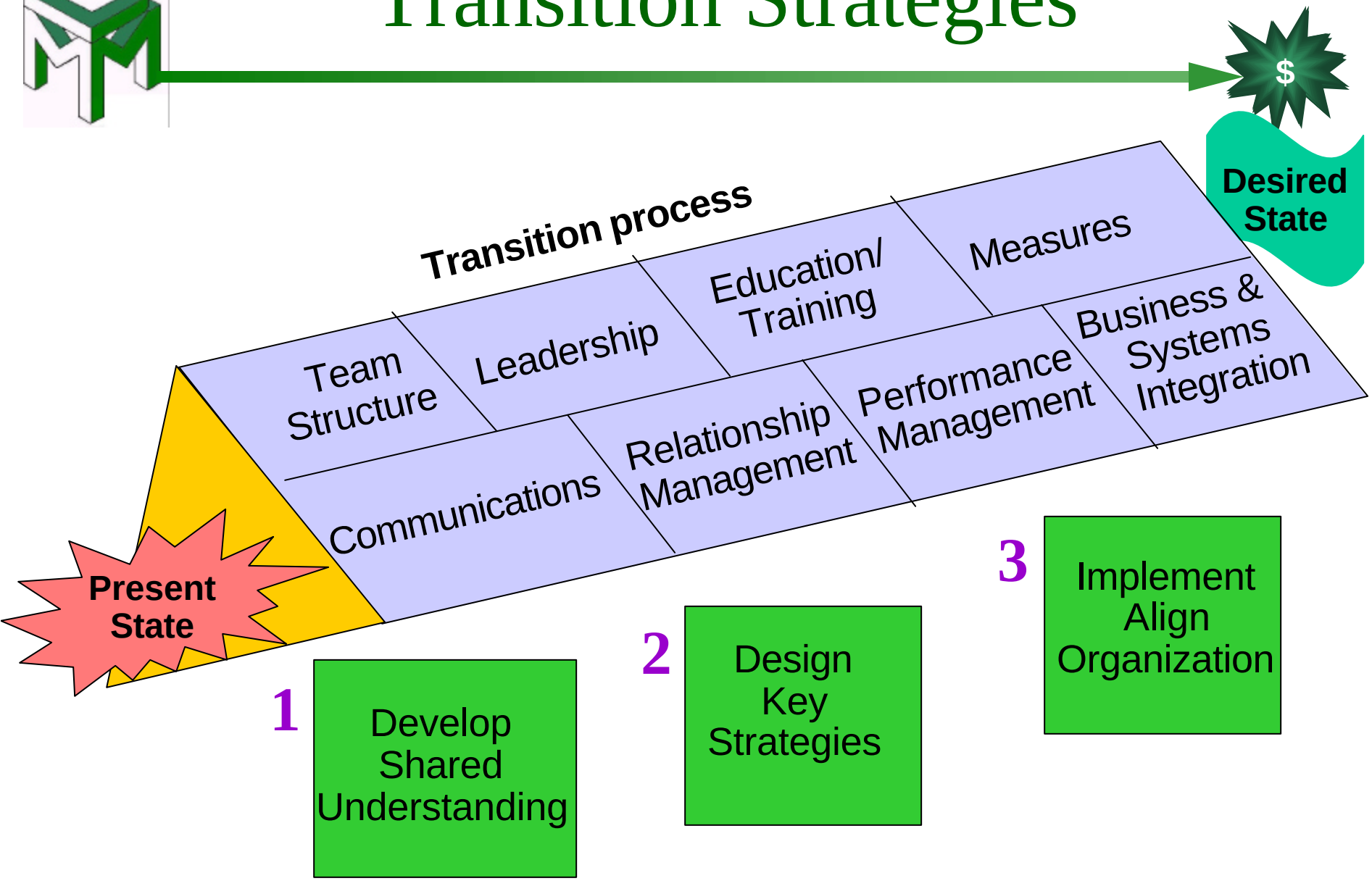
Transition Strategies



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Case Study - Changes

Example transition strategies:

- Organizational Structure:
  - Establish a process improvement focal point
- Sponsorship:
  - Establish senior management reviews of project status
- Education/Training:
  - Have QA mentor project managers on process
- Communications:
  - Develop Communication Plan

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Case Study - Changes

- Business/Technology Process Integration
  - Develop standard project startup process
- Performance Management:
  - Include audits in project schedules
- Relationship Management:
  - Manage customer expectations re project performance
- Measures:
  - Establish and collect measures for size, effort, duration, defects, project success

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Evaluate Impact

The final step* in process improvement is to determine the impact on the organization of the changes which have been implemented. This implies some set of measures which can be compared against a baseline in order to determine quantitatively how successful the process improvement program has been.

*(and the first step in the next cycle)

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Measurement Principles

- Use issues and objectives to drive the measurement requirements
- Define and collect measures based on the technical and management processes
- Collect and analyze data at a level of detail sufficient to identify and isolate problems
- Implement an independent analysis capability

"Practical Software and Systems Measurement," DoD
www.psmsc.com

Measurement Principles, cont.

- Use a systematic analysis process to trace the measures to the decisions
- Interpret the measurement results in the context of other project information
- Integrate measurement into the project management process
- Use the measurement process as a basis for objective communications
- Focus initially on project-level analysis

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Setting Up A Metrics Program

- Planning:
  - Define information needs
  - Define metrics and analysis methods
  - Define selected measures
  - Define the collection process of measurement data:
- Implementation:
  - Collect the measurement data
  - Analyze the measurement data to derive metrics
  - Manage the measurement data and metrics
  - Report the metrics
- Evaluation:
  - Review the usability of the selected metrics

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Case Study - Measures

- Use the two key indicators
  - *Cost/schedule variance*
  - *Software failures in the field*
- Use supplemental metrics
  - *Requirements change rate*
  - *Project plan change rate*
  - *Defects in design, code and test*
  - *Customer satisfaction*

Tying It All Together

- MOTIVE - Why change?
- MODEL – Which model?
- METHOD – How to assess?
- MANAGING CHANGE – How to implement improvements?
- MEASURES – How to measure progress?

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  www.mdmaturity.com

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