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Customer Success Is Our Mission

National Defense Industrial Association

3rd Annual

CMMI® Technology Conference

and

User Group

with Technical Co-sponsorship by

Software Engineering Institute,

Carnegie Mellon University

November 17-20, 2003

Using Behavior Surveys for CMMI Process Deployment

Raytheon North Texas Software Engineering

Donna Freed

Overview: Using Behavior Surveys for CMMI Process Deployment

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- PPQA Support of CMMI Level 4 and 5
- N TX Software Engineering Process Journey
- SW Steps to CMMI Level 5
- R6σ Process for Achieving Level 5
- What Is a Behavior Survey?
- Survey Results
- Improvements Made:
  - Levels of Control
  - Incremental Planning
  - Metrics Analysis focused on defect containment, and statistical process control

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PPQA Focuses on Improvement

Improve and Strengthen Process by Closing Gaps

Step 3: Identify and Resolve Gaps

- Work with Process Owners
- R6σ Specialist Projects
- Optimize Execution

Step 2: How Well Process Is Supporting Programs

- Determine Process Gaps
- Identify Process Improvement

Step 1: How Well We Are Executing

- Feedback to Program and Process
- Causal Analysis

N TX Software Engineering Typical Program

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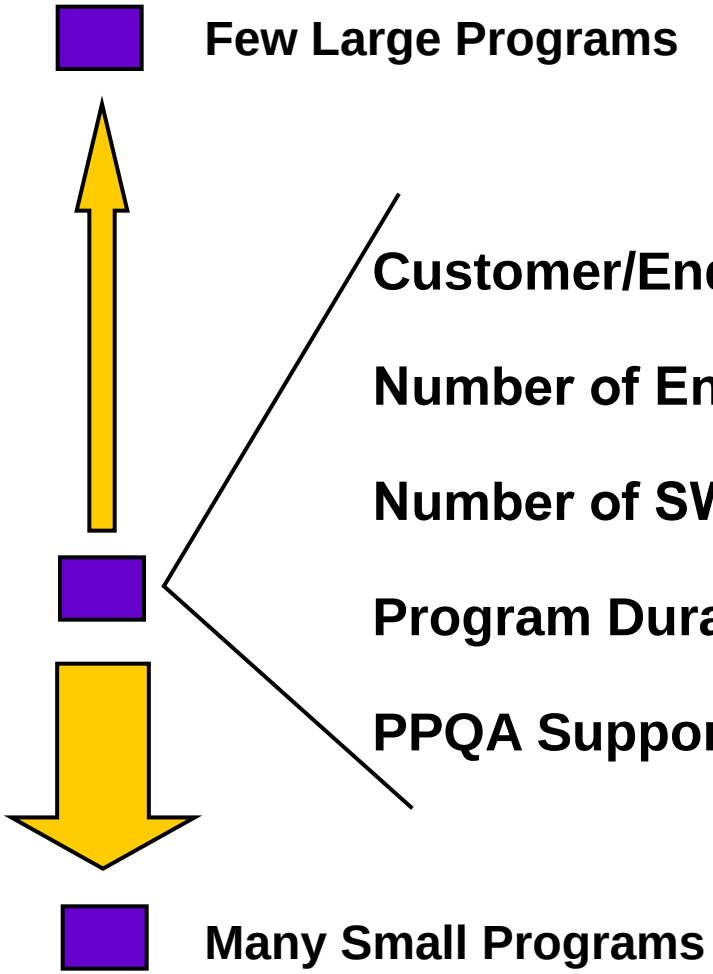

Customer/End User:	**Military**
Number of Eng's:	**10**
Number of SW Engr's:	**5**
Program Duration:	***18 Months***
PPQA Support:	**3 Programs Per SQE**

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N TX Software Engineering Process Improvement Journey

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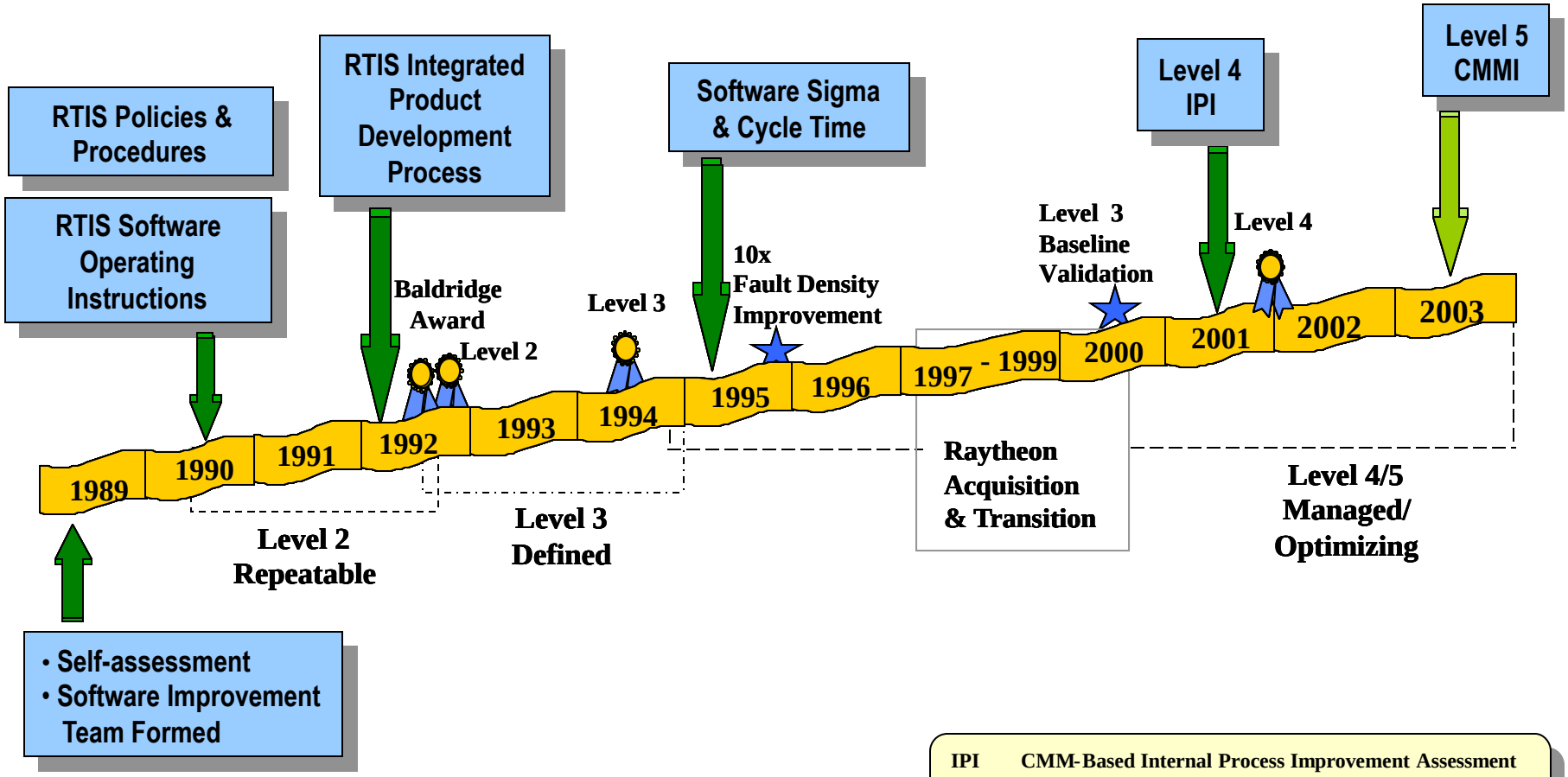

IPI CMM-Based Internal Process Improvement Assessment
RTIS Raytheon/TI Systems
CMMI CMM Integrated

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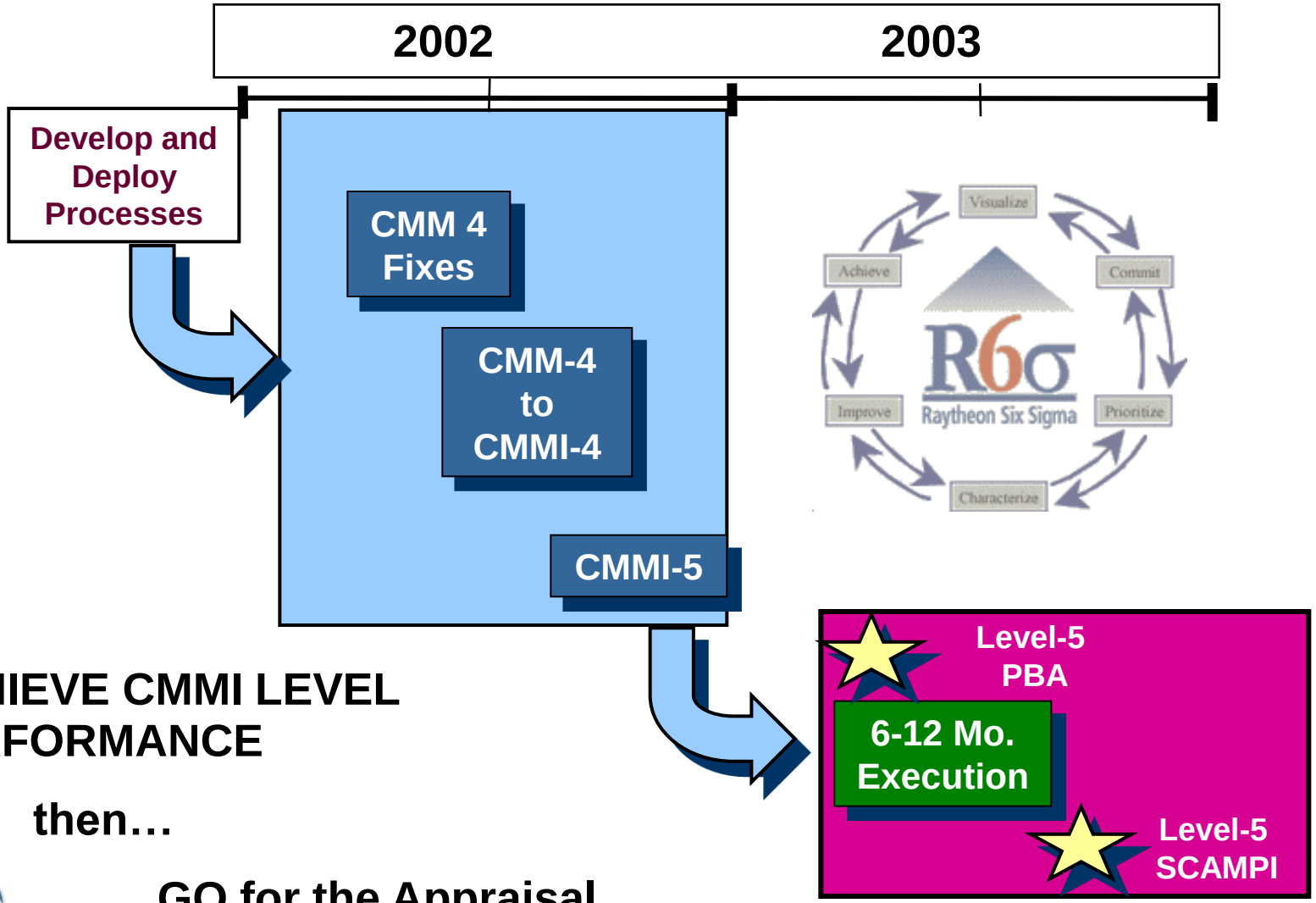
SW Steps to CMMI Level 5

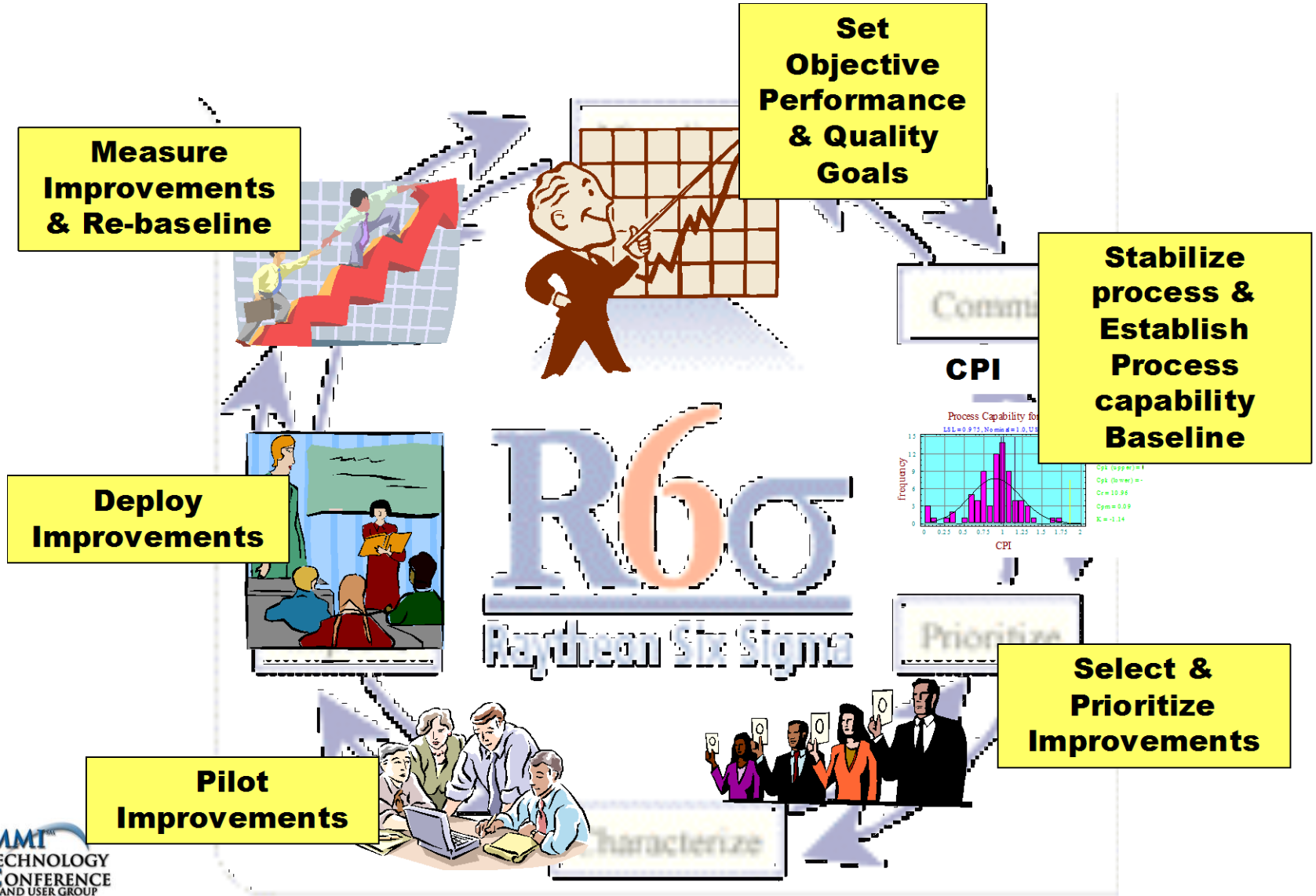


ACHIEVE CMMI LEVEL PERFORMANCE

then…

GO for the Appraisal

R6σ Process – Life at Levels 4 & 5



Identify Improvement Opportunities

- Ideas are the inputs to this process
- Ideas are gathered from many sources:
  - Raytheon Six Sigma visualization and assessments
  - Program level metrics analysis meetings
  - Organization level software improvement metrics root cause analysis
  - Make progress toward software improvement objectives
  - Improvement ideas from individuals and management reviews
  - Process appraisals
  - Behavior surveys

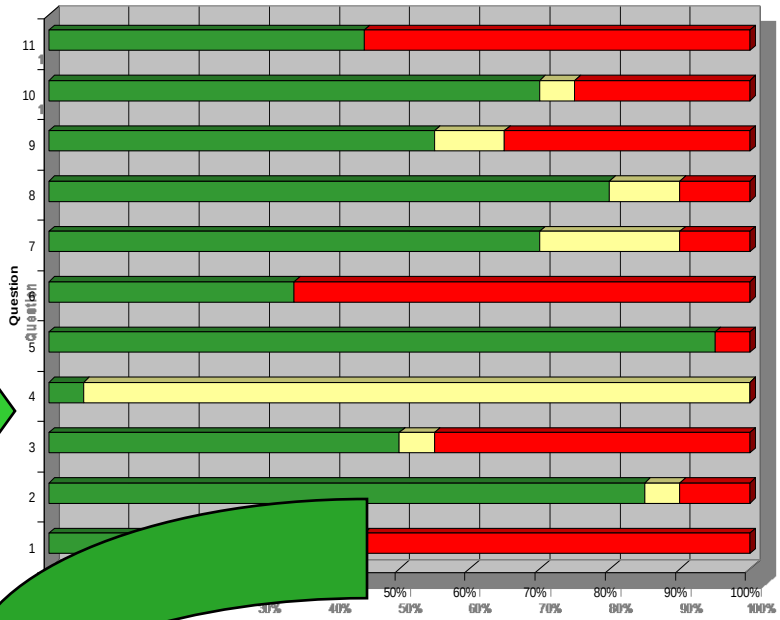
Surveys are a feedback process based on the Behavior Rollouts

What Is a Behavior Survey?

Behavior Verification Questions

				Valid entries in blue cells below are: N, Y, P, T, N/A			
			1	2	3	4	5
Update the total # of programs being verified in the cell below:	Total # of questions	SEI Level	3	3	4	4	4
24	18	PA					
Project	Business Area	SQE/SQE Lead	Questions				
DO NOT EDIT, DELETE, OR MOVE THIS ROW, ADD NEW PROGRAMS IN YELLOW AREA BELOW THIS ROW							
			Y	Y	Y	Y	
			Y	Y	Y	Y	
			N	Y	Y	Y	
			Y	Y	Y	Y	
			Y	Y	Y	Y	
			Y	Y	Y	Y	
DO NOT EDIT, DELETE, OR MOVE THIS ROW, ADD MORE PROGRAMS ABOVE THIS LINE IN YELLOW AREA							
Current Data:		Yes Behavior	19	19	16	18	17
		Partial Behavior	0	0	0	0	0
		Tailored or Variance	1	0	0	0	0
		No Behavior	2	2	6	3	5
		N/A (not time)	1	2	1	2	1
		NR (not required)	0	0	0	0	0
		Not Assessed	0	0	0	0	0
			23	23	23	23	23

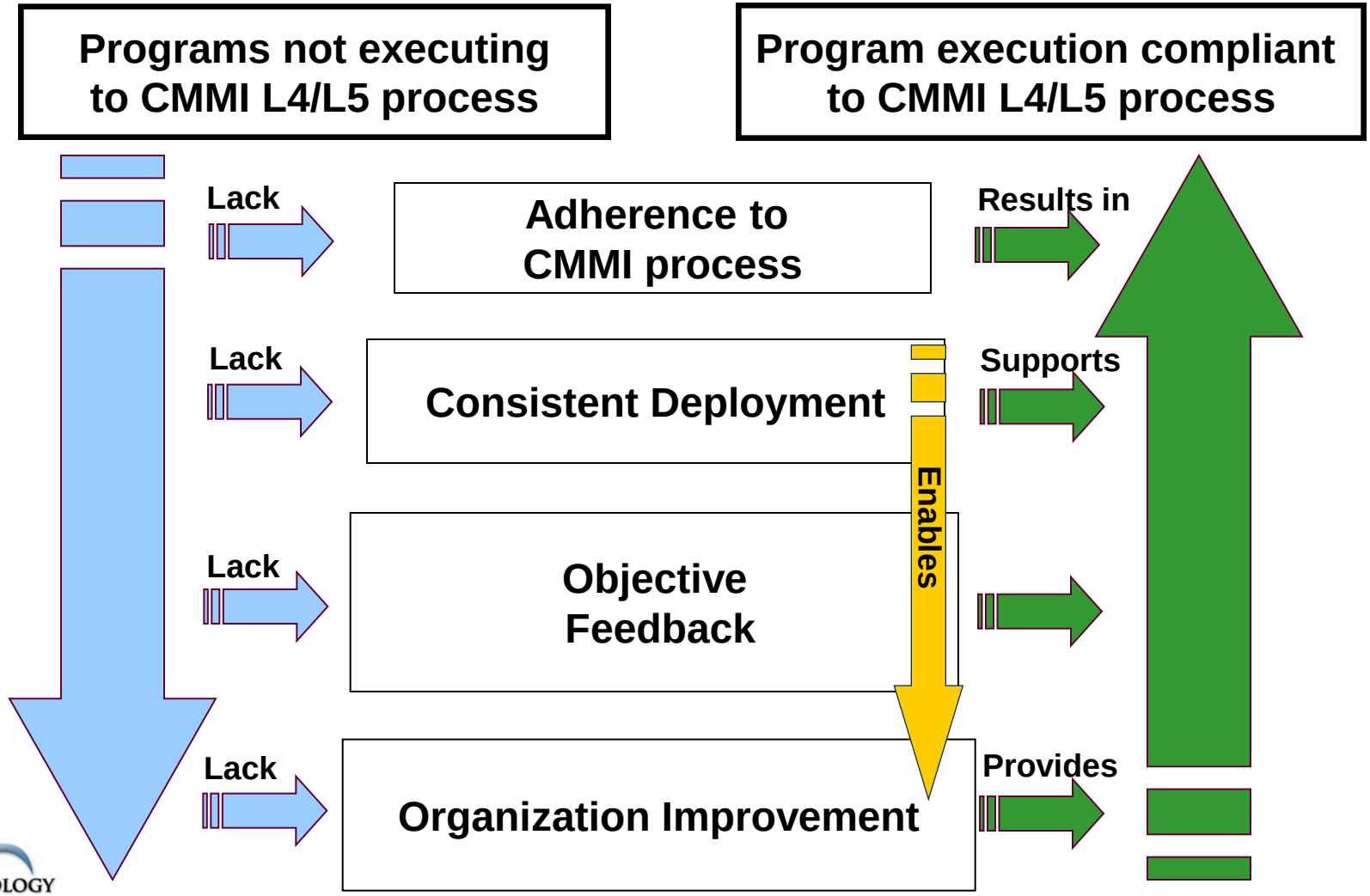
Summary Metrics



Improve

Deploy Consistent Behavior

Why Are Behavior Surveys Needed?



This Is Not an Audit

An Audit is more formal than a Behavior Survey

Audits

- Based on approved plans and tailored requirements
- Identify non-compliances
- Attributable to programs
- Compliance

Behavior Survey

- Based on communication packages
- Identify gaps
- Not attributable to programs
- Process deployment

Surveys take the pulse of process deployment

Developing Checklist Questions

			Valid entries in blue cells below are: N, Y, P, T, N/A				
			1	2	3	4	5
Update the total # of programs being verified in the cell below:	Total # of questions	SEI Level	3	3	4	4	4
24	18	PA					
Project	Business Area	SQE/SQE Lead	**Questions**				
DO NOT EDIT, DELETE, OR MOVE THIS ROW, ADD NEW PROGRAMS IN YELLOW AREA BELOW THIS ROW							
			T	N/A	Y	N/A	N
			Y	Y	N	Y	Y
			Y	Y	N	Y	Y
			Y	Y	Y	Y	Y
			Y	Y	Y	Y	Y
			Y	Y	Y	Y	Y
			Y	Y	Y	Y	Y
			Y	N	N	N	N
			N/A	Y	Y	Y	N
			Y	N/A	N/A	N/A	Y
			Y	Y	N	N	N
			N	Y	Y	Y	Y
			Y	N	N	N	N/A
			Y	Y	Y	Y	N
			Y	Y	N	Y	Y
			Y	Y	Y	Y	Y
			Y	Y	Y	Y	Y
			Y	Y	Y	Y	Y
			Y	Y	Y	Y	Y
			N	Y	Y	Y	Y
			Y	Y	Y	Y	Y
			Y	Y	Y	Y	Y
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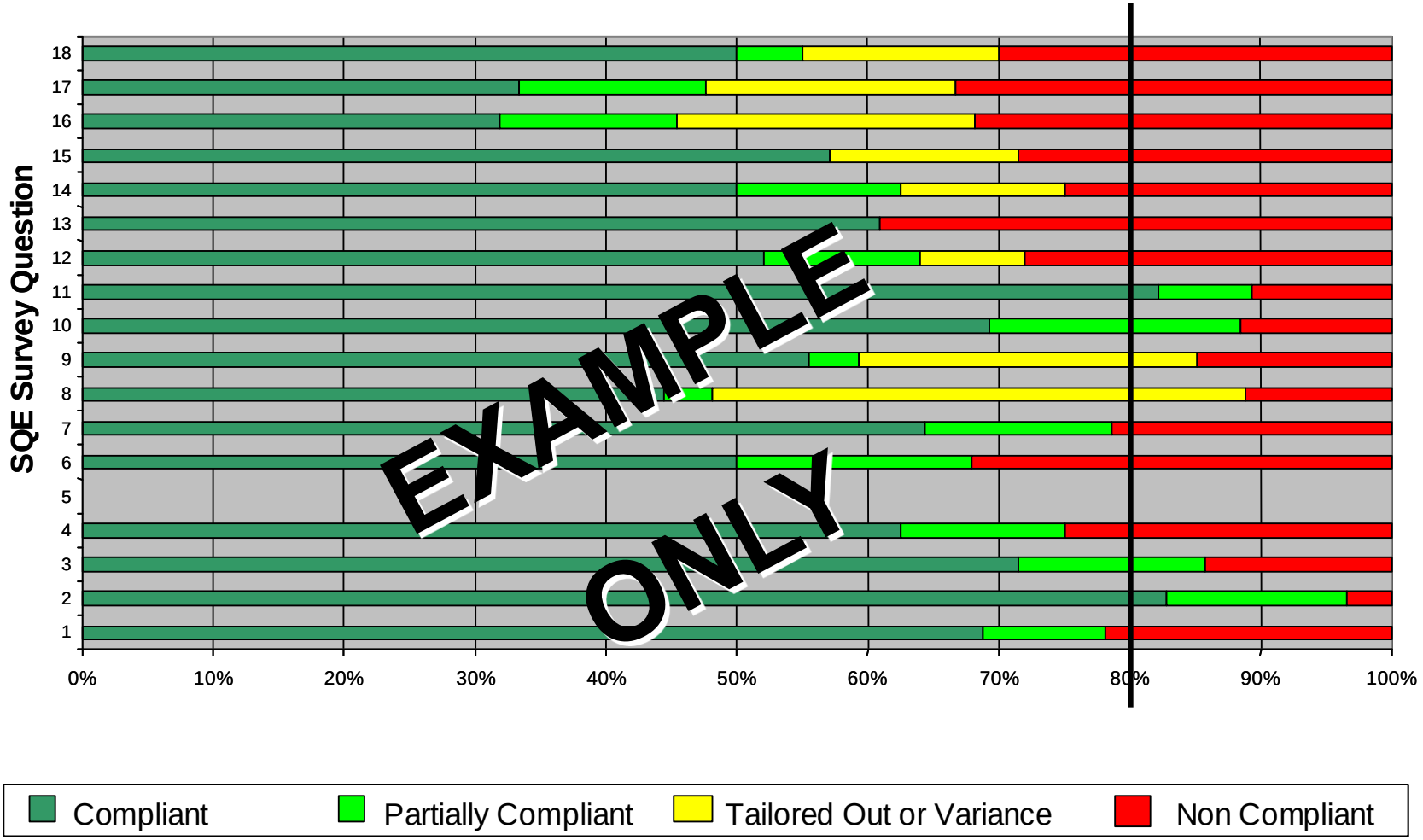
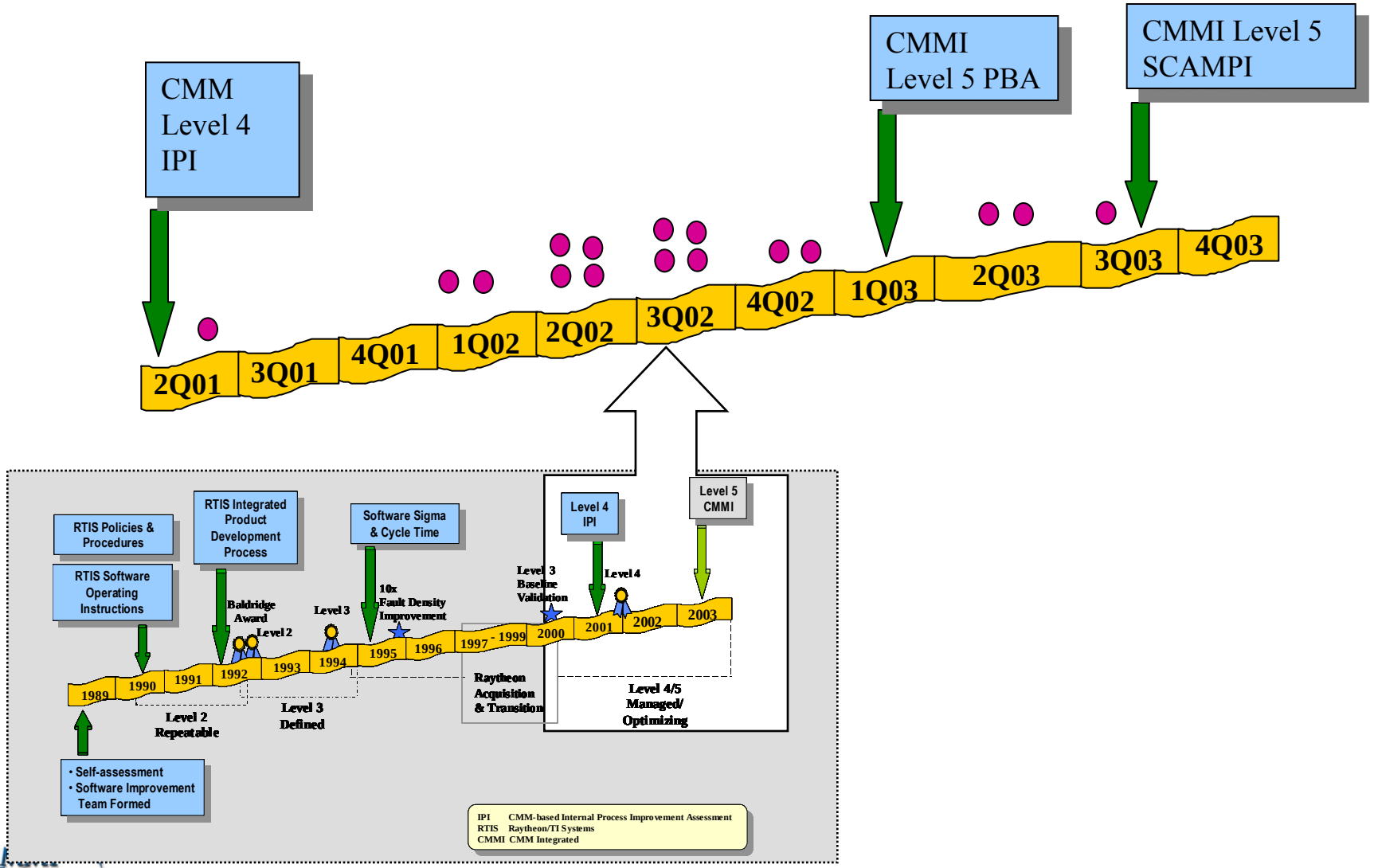
			23	23	23	23	23

- Survey Questions created by Software Quality Engineering (SQE) and stakeholders
- Results to be reported for each question

Survey of CMMI Level Behavior

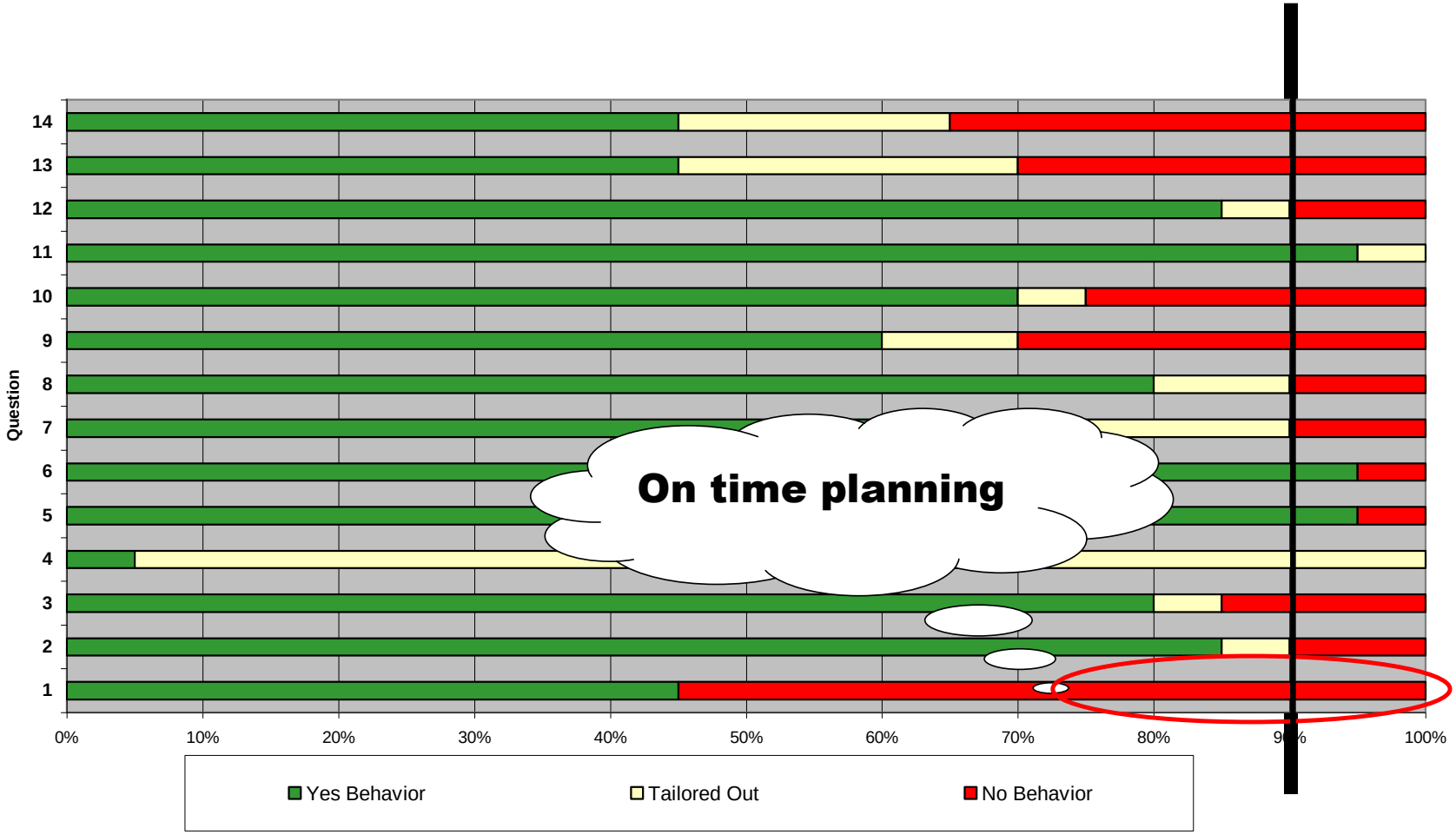


Survey Timeline



17 surveys conducted over a 3 year period

Behavior Survey 2001
CMM Level 4



Behavior Survey April 2002
CMMI Level 4

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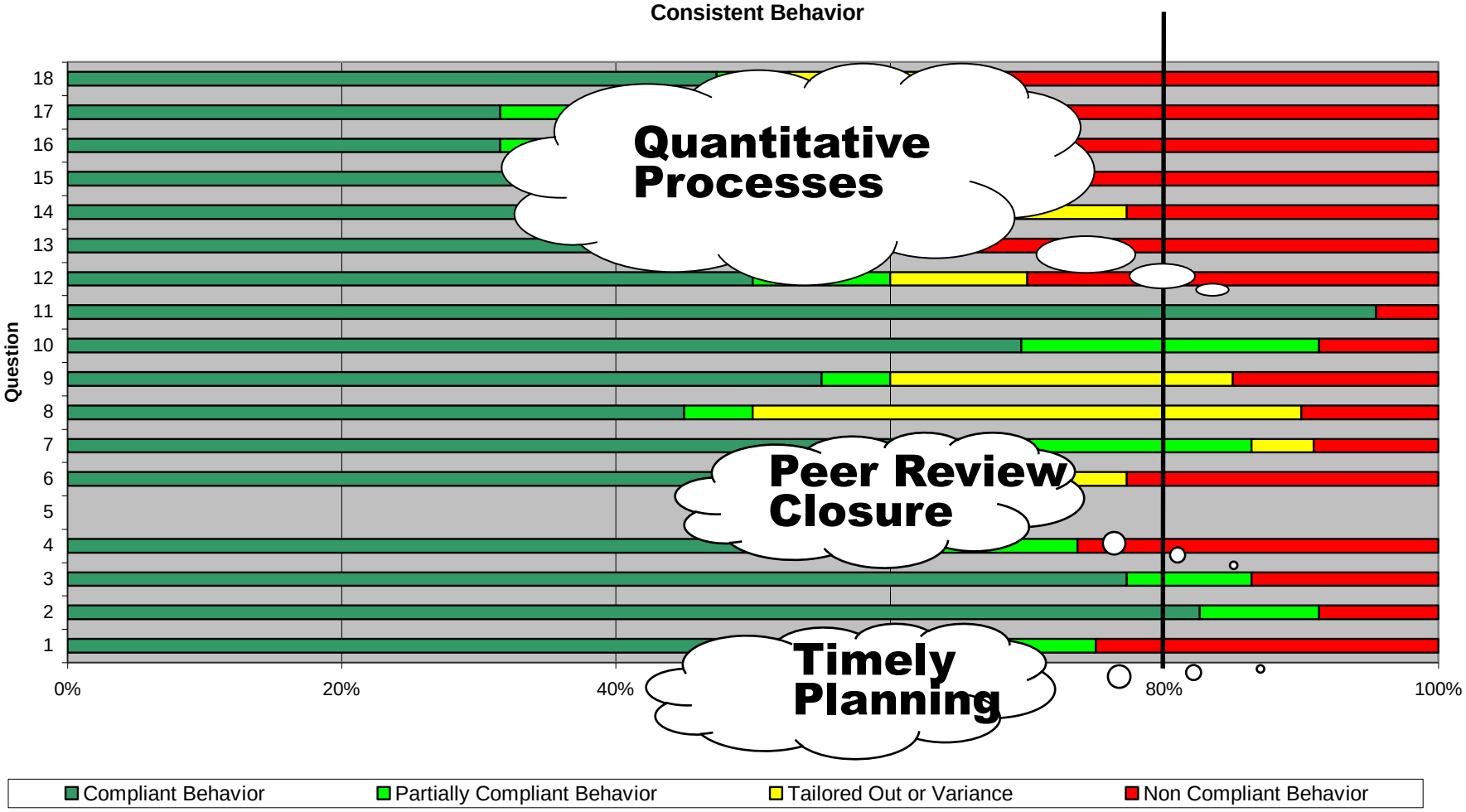

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Behavior Survey May 2003
CMMI Level 5

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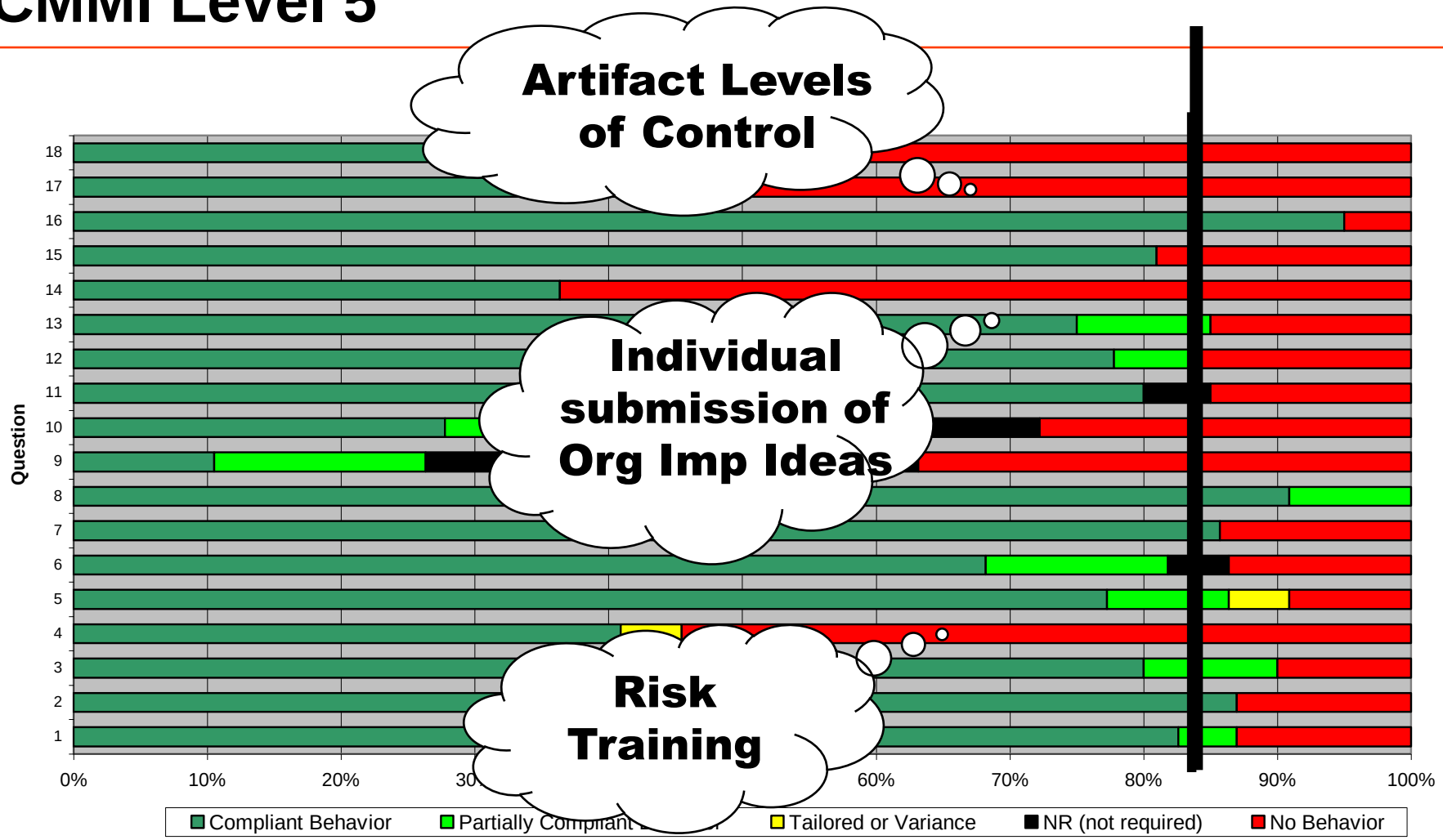

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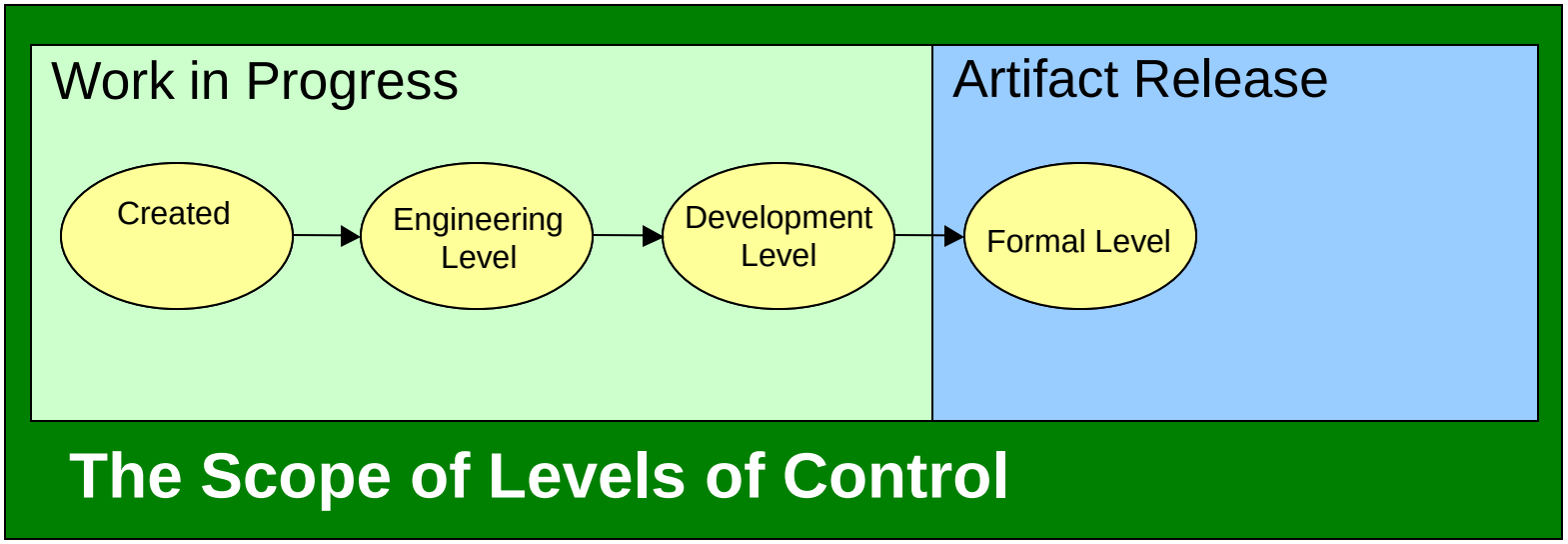
Levels of Control PBA Correction

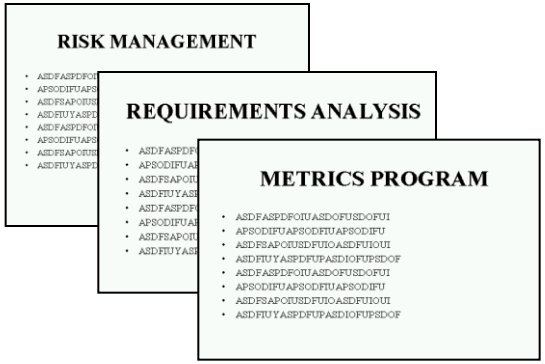


- Levels of control provide change and configuration control for work in progress
  - Emphasis is on earlier control of artifacts and inclusion of more artifacts that are controlled at lower levels.
  - Communicate Levels of Control concept to program team
  - Update SCM plan and procedures to describe levels of control

A small improvement with significant impact

Planning Improvement Proposal

- Triggers
  - Consistent Behavior Survey findings
  - Programs have difficulty meeting the 90-day planning requirement
- Incremental SW Planning
  - Define planning activities for each SW stage
- Review and Approval
  - Stakeholder Involvement, and reduce cycle time
- Lean Planning
  - Power Point slides
- Revised SWP350 Software Project Management training class



A big improvement with significant impact

Defect Containment Improvement Proposal

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- Defect Containment
  - Monitor peer review performance
  - Verify defect classification
  - Consistent use of standard tools:
    Synergy 6.2b and Defect Logger 3.1
  - Survey on organization behavior
  - Implement organizational improvement through
    - ☐ Defect Containment
    - ☐ Statistical Process Control for code reviews
  - Developed and provided training to SWEC

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A big improvement leading to multiple improvement projects.

Expectations from SPC Behavior Rollout

- Peer Reviewers
  - Implement SPC on your design and code peer reviews
- Project Metrics Team
  - Add SPC data to your Metrics Analysis Meetings and record minutes
  - Execute Causal Analysis and Resolution as part of Metrics Analysis Meetings
- Project Lead
  - Use new Senior Management Review template

Behavior Survey September 2003
CMMI Level 5 Behavior Results

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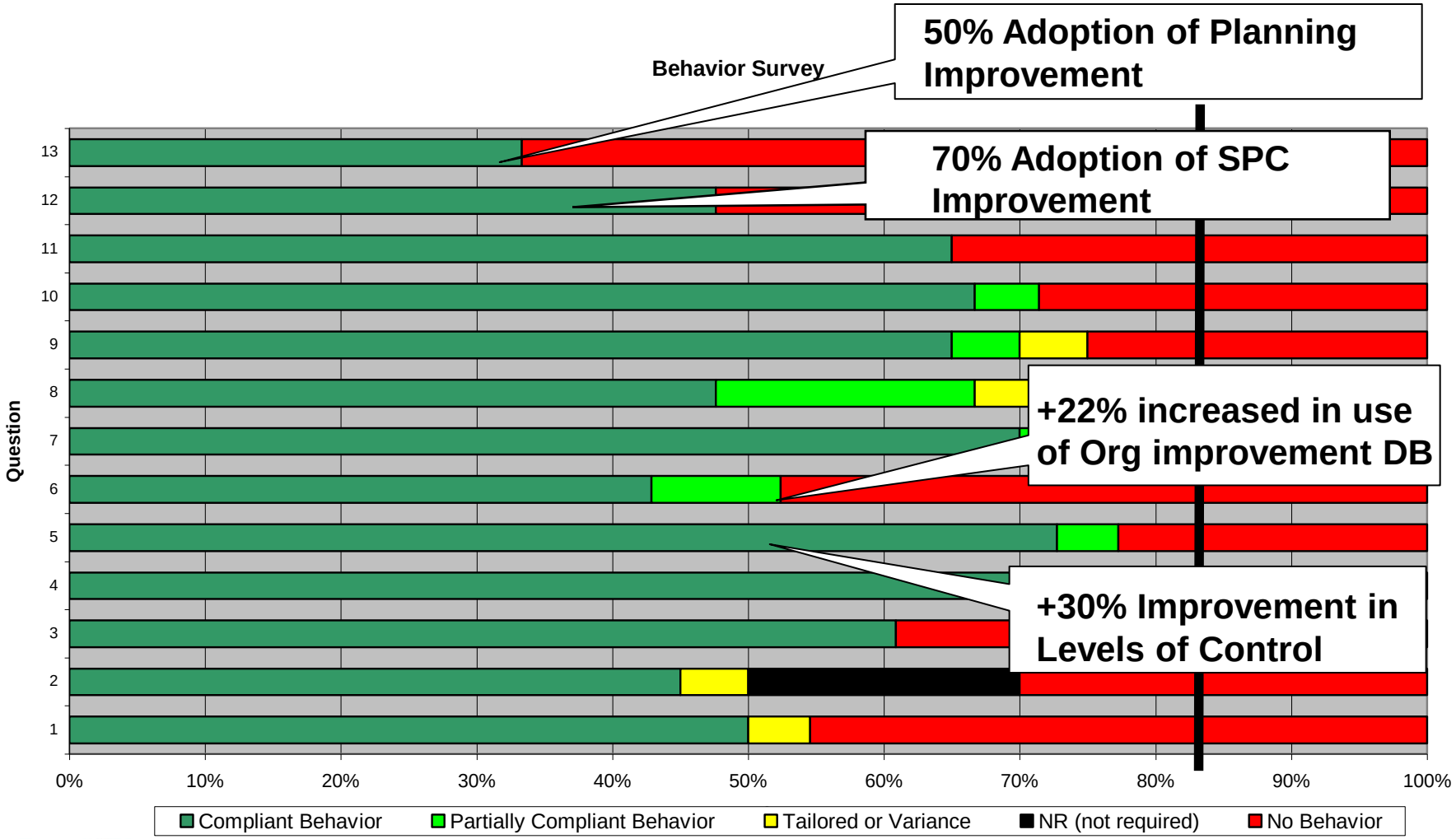

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Summary

- Behavior surveys have been successfully used:
  - as a deployment tool to reinforce expectations, and
  - to identify areas for process deployment
- The most significant improvements triggered by behavior surveys were identified as strengths in our SCAMPI:
  - Levels of Control
  - Incremental Planning
  - Metrics Analysis Meetings as the focal point for quantitative process
- Started with basic behaviors which were refined with process maturity
- Evolved to address more sophisticated activities
- A tool for deployment, but with further analysis can also identify specific improvements
  - Improvement in procedures
  - Improvement in training
  - Improvement in enablers