

High Maturity Practices in Quality Assurance

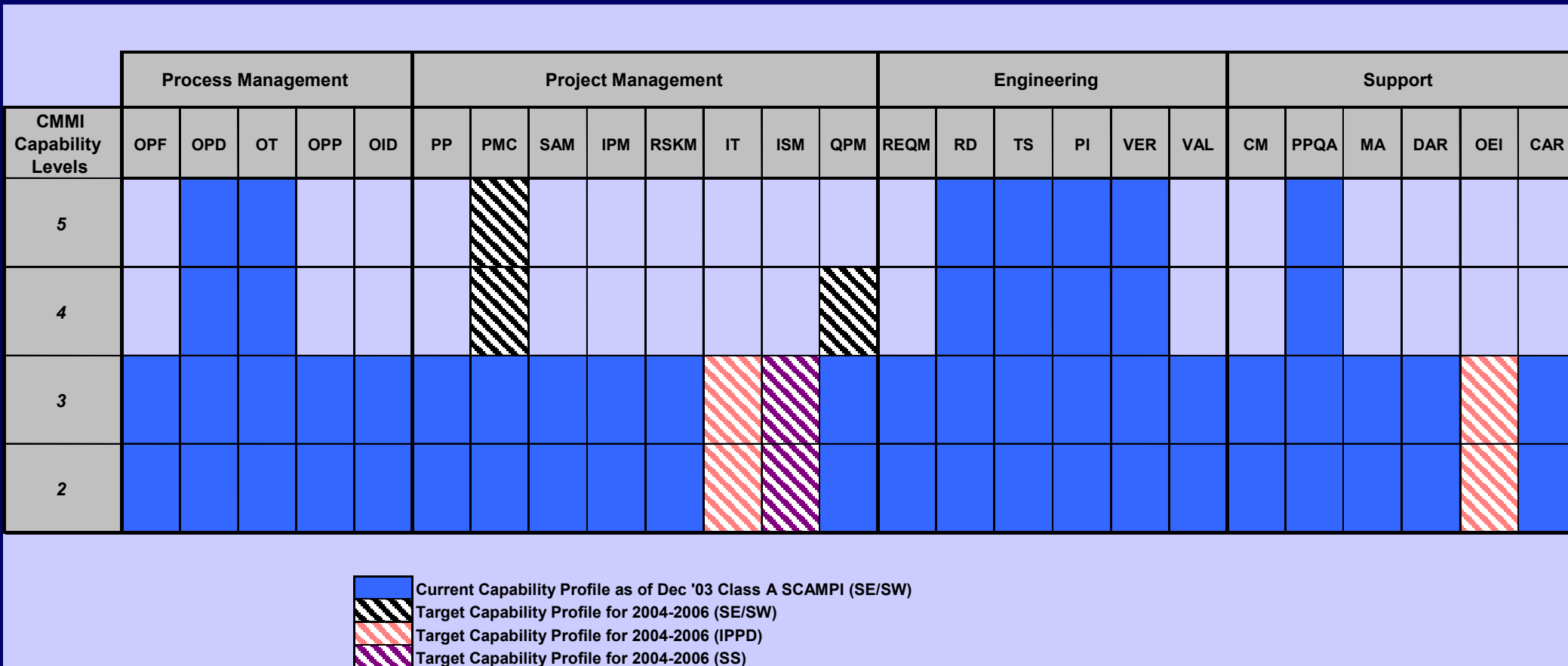
Mechanisms for Quantitative Management (QM)
and Continuous Process Improvement (CPI)

Presentation Outline

- **Mission Solutions' Maturity Profile**
- **Quality Assurance (QA) Influence Model**
- **Quality Assurance Sub-processes**
- **Quantitative Management**
- **Continuous Process Improvement**
- **Results and Lessons**

PROCESS IMPROVEMENT PROGRAM

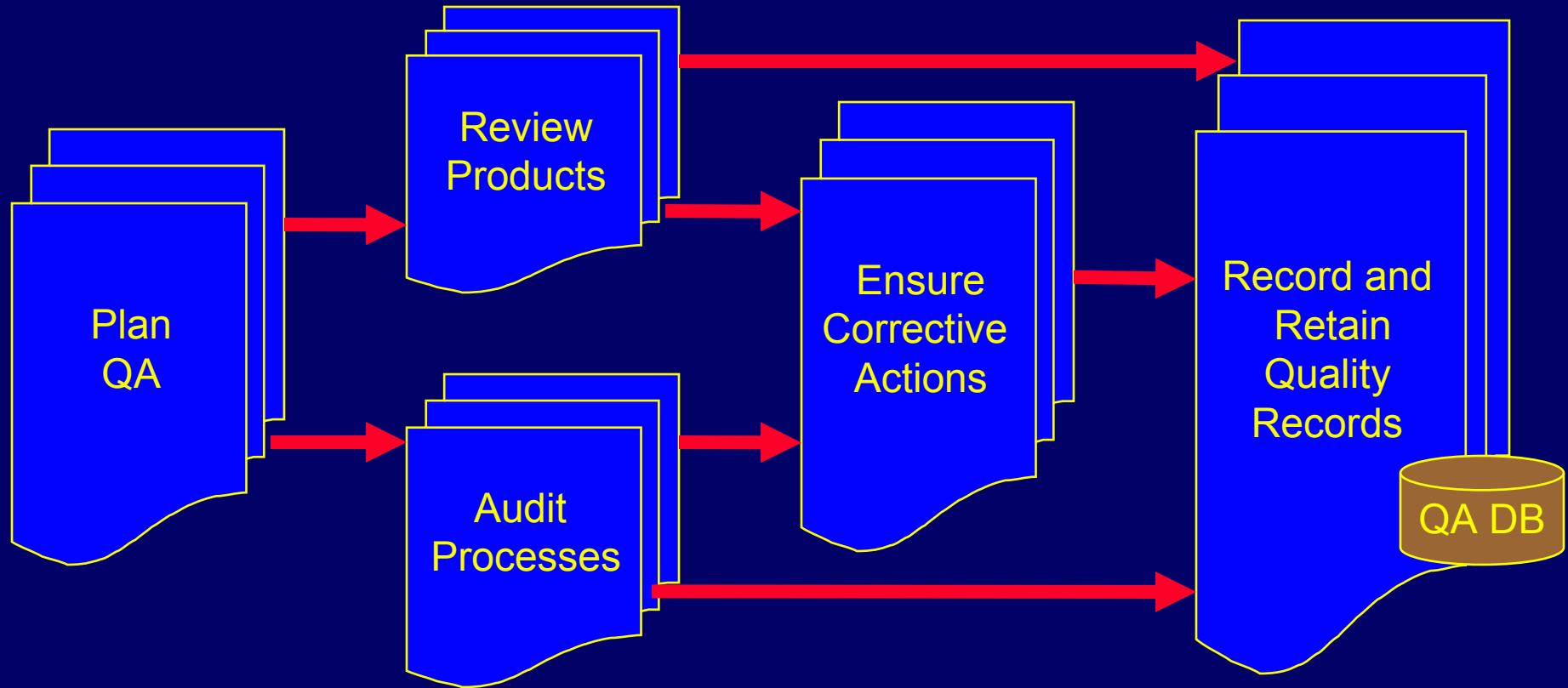
CMMI Capability Profiles for SE/SW/IPPD/SS



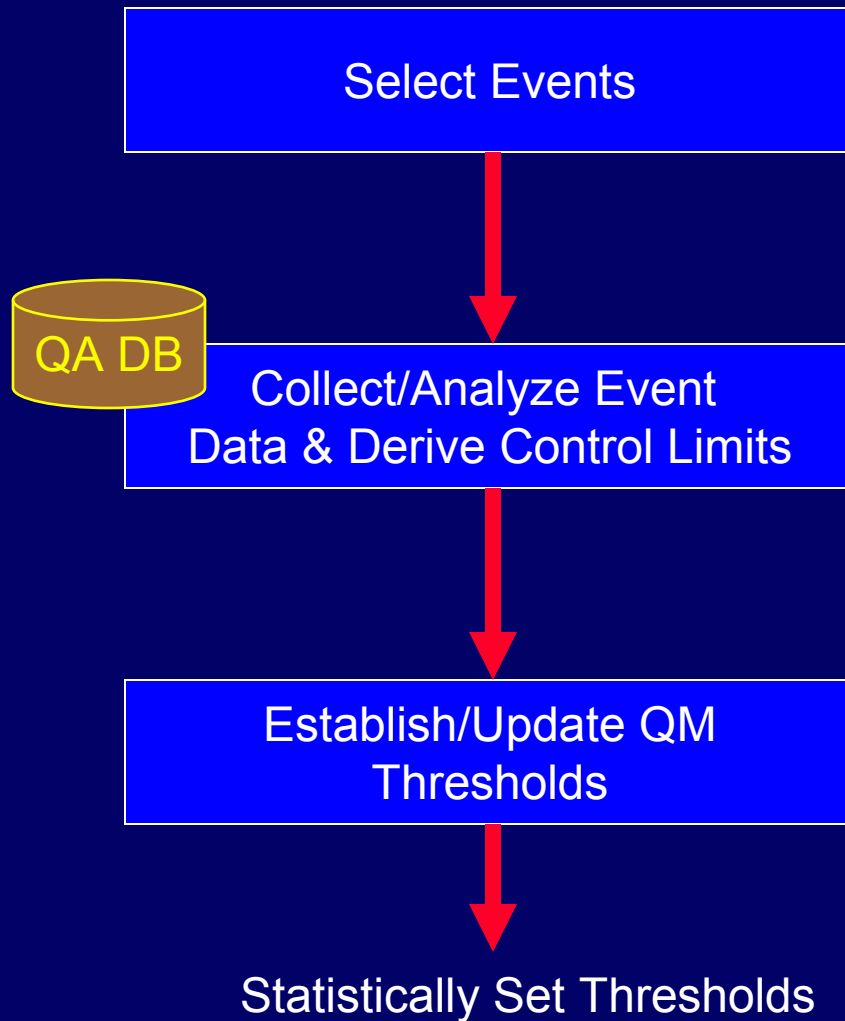
Quality Assurance Influence Model



Primary Quality Assurance Sub-processes



Quantitative Management: Creating the Basis



EVENTS:

- Audits
- Document Reviews
- Change Control Board Support
- Metrics Validations

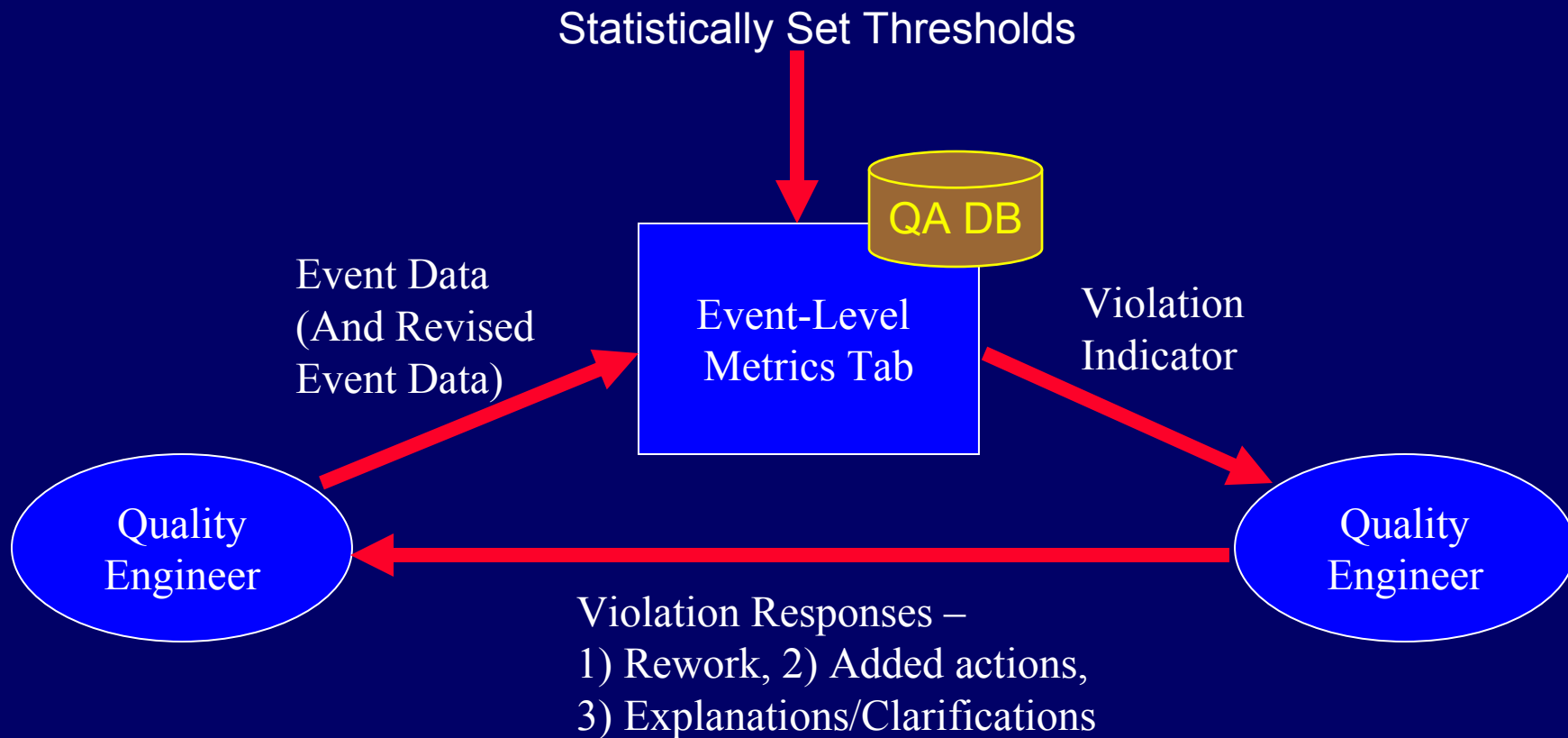
MEASURES:

- Size (#),
- Effort (\$),
- Quality/Yield (Q)

THRESHOLDS:

- Set near Mean +/- '3 Sigma'
 - Productivity (#/\$)
 - Yield Rate (Q/\$)
 - Batch Yield (Q/#)

Quantitative Management: Event Level Checking and Intervention



Metrics Tab

SOFTWARE

Action Edit Mail Administration Reports Help

Document Number: Program: SQER Status:

Plant: DB: Next Step Record: of << < > >>

Query Query Results SQER Discrepancy Item Metrics Mail History

Close SQER

Event Type 1st Reviewed Qty

 Event Subtype Total Qty

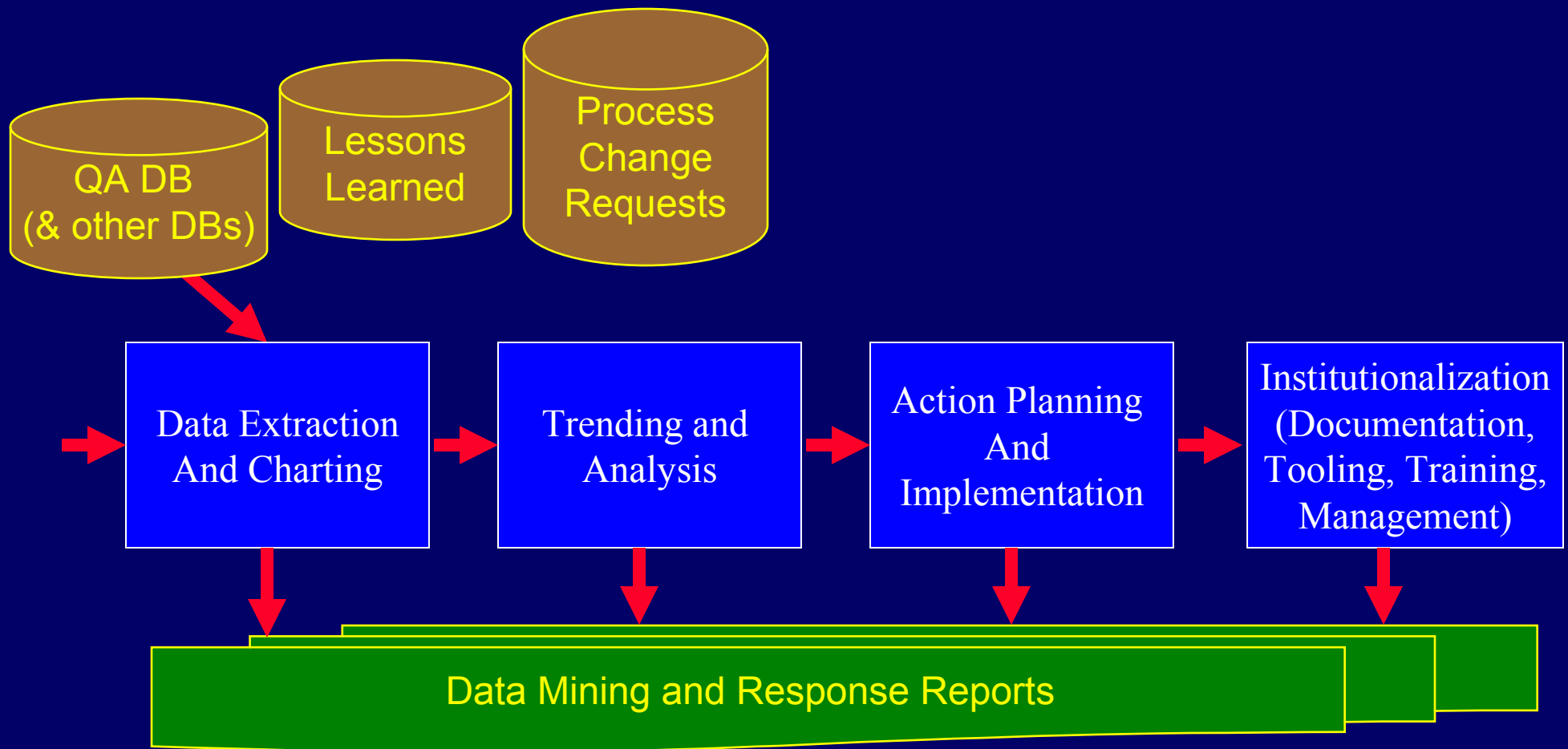
 1st Size Unit Type Hours (Running Total) Number of Defects

	Low	Current	High	Analysis	Commentary & Response
Size/Hour	<input type="text" value="2.1"/>	<input type="text" value="34."/>	<input type="text" value="75."/>	The calculation for Size/Hour falls within the control limits of 2.1 and 75.	
Defects/Hour	<input type="text" value="2."/>	<input type="text" value="22."/>	<input type="text" value="15.9"/>	The calculation for Defects/Hour falls above the upper control limit of 15.9. Please explain.	Spreadsheet document - quick identification of some repeat errors.
Defects/Size	<input type="text" value=".05"/>	<input type="text" value=".65"/>	<input type="text" value="1.6"/>	The calculation for Defects/Size falls within the control limits of .05 and 1.6.	

Enter value for the number of units reviewed based upon the unit type.

Record: 1/1 ... <OSC>

Continuous Process Improvement: Transforming Data into Action



Data Mining for Improvement

■ Metrics Cycle:

- Identify Quantitative Goals and Indicators
- Develop and Implement Plans to Accomplish Goals
- Identify Measures, Charting, and Analysis

- Collect Data
- Create Charts

- Identify Trends/Anomalies
- Perform Causal (“Contributing Factors”) Analysis
- Identify and Trigger Actions
- Track and Report Status

■ Document all together (“Data Mining Report”)

Realized Improvements

- **Quantitative Results:**
 - **Provided event-level data for estimating QA**
 - Project CMMI Audits take 11.74 hours on average, etc.
 - **Improved detection of problems**
 - Discrepancy Report review findings/hour increased 108%
 - **Improved Corrective Actions**
 - Proportion with Preventive actions increased from 15.7% to 26.5%
 - **Reduced audit cycle time**
 - 48.1% reduction in cycle time (days to complete audits)

Realized Improvements (continued)

- **Qualitative Results:**
 - Improved discipline of Quality Engineers (QE)
 - Provided example of QM/CPI for organization
 - Improved QE ability to support project QM/CPI
 - Improved perception of QA organization

Lessons Learned (QM & CPI)

- Improvement of Data Collection dominated early QM/CPI activity
- Link to organization level goals was allegorical rather than provable
- Few (~10%) data mining charts provide insights
 - Combinations of charts provide better picture
- QM/CPI Plans and Reports provide critical artifacts for focusing and proving QM/CPI

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