

Practical Software and Systems Measurement

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A Foundation for Objective Project Management



***SE Product and
Process Measurement
Workshop***

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***PSM SE Product Measurement Workshop
07/27/00***

In Cooperation With:



Acknowledgement

- ***Primary sources for this information are***
 - 1. Systems Engineering Fundamentals, DSMC***
 - 2. INCOSE Measurement Primer, INCOSE MWG***
 - 3. Practical Software and Systems Measurement (Draft)***

SE Product Measures

- ***Measures that are used to track key attributes of the product design***
 - ***Tracks progress in meeting the requirements and ability to fulfill them across the life cycle***
 - ***Performance***
 - ***Suitability***
 - ***Affordability***

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Insight Provided by Measurement

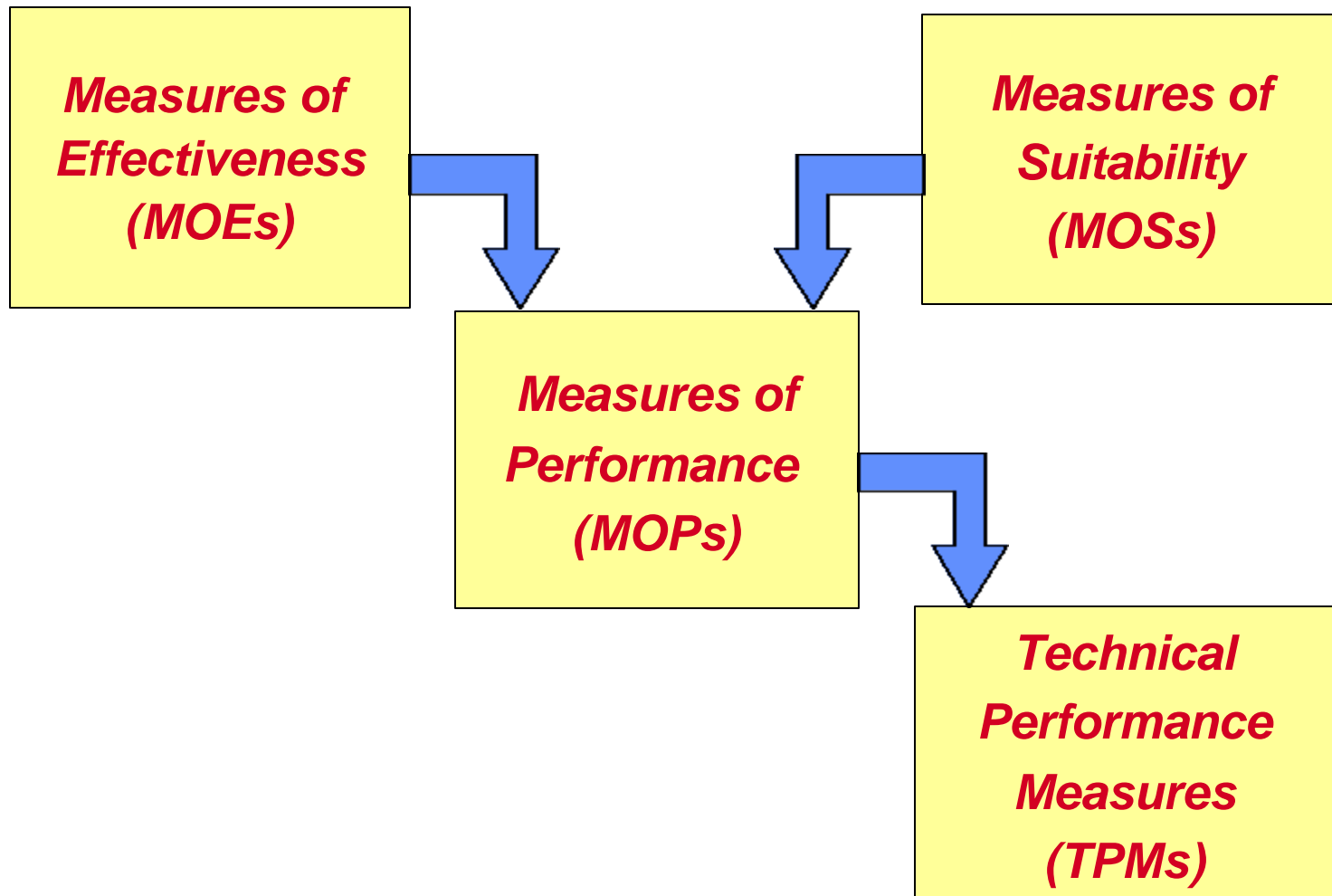
- ***characterize***
 - *to gain understanding of processes, products, resources and environments*
 - *to establish baselines for future assessments*
- ***evaluate***
 - *to determine status with respect to plans*
- ***predict***
 - *to support planning and trades, BOE/proposal preparation*
- ***improve***
 - *to help identify roadblocks, root causes, inefficiencies and other opportunities for product and process improvement*

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Relationship to PSM

<u><i>Common Issue Area</i></u>	<u><i>Measurement Category</i></u>	<u><i>Measures</i></u>
<i>Product Size and Stability</i>	<i>Physical Size and Stability</i>	<i>Database Size Components Interfaces Lines of Code Physical Dimensions</i>
<i>Product Quality</i>	<i>Functional Correctness</i>	<i>Defects Technical Performance</i>
	<i>Supportability</i>	<i>Time to Restore Maintenance Actions</i>
	<i>Efficiency</i>	<i>Utilization Throughput Timing</i>
	<i>Portability</i>	<i>Standards Compliance</i>
	<i>Usability</i>	<i>Operator Errors</i>
	<i>Dependability</i>	<i>Failures Fault Tolerance</i>

Hierarchy of Product Measures



Measures of Suitability (MOSs)

- ***Measures the extent to which the system integrates into the operational environment***
 - ***Looks at most of the 'ilities***
 - ***Supportability (Maintainability, ILS, Testability, Transportability, etc.)***
 - ***Dependability (Reliability, Availability, Life Expectancy, Safety, etc.)***
 - ***Functional Correctness (Defect density, Design simplicity, Design robustness, etc.)***
 - ***Efficiency (Usage Rates, Required performance, etc.)***
 - ***Portability (Portability, Compatibility, Interoperability, etc.)***
 - ***Usability (Human Factors, etc.)***
 - ***Can be used to track necessary improvement in these***

Measures of Effectiveness (MOEs)

- ***Measures of the operational effectiveness***
 - ***Looks at the systems' capability to achieve mission success within the total operational environment***
 - ***Customer/Acquirer view***
 - ***Requires identifying the most critical performance requirements***

Measures of Performance (MOPs)

- ***Measures that characterize physical or functional attributes relating to the system operation***
 - ***Focuses on:***
 - ***Quantify technical or performance requirements as derived from MOEs and MOSs***
 - ***Key performance requirements in the system specification***
 - ***Can help define/refine performance requirements***
 - ***Identification of critical technical parameters for which TPMs should be derived to track***
- ***Derived from MOEs and MOSs***

Technical Performance Measures (TPMs)

- ***Measures to assess design progress, compliance to performance reqts, and technical risk***
- ***Derived from MOPs***
- ***TPMs and MOSs often overlap***
 - ***e.g., Mean Time Between Failure (MTBF) provides insight into both effectiveness and suitability***
- ***Focus on specific performance related reqts as incorporated in the design solution***
 - ***Can include range, accuracy, weight, size, availability, power output, throughput, and other product characteristics related to critical operational reqts.***

Technical Performance Measures (TPMs)

- ***An attribute of a system that can be measured to determine how well a system is satisfying or meeting a technical requirement or goal.***
 - ***Provides an assessment of the product design by estimating the values of essential performance parameters of the design through engineering analyses and tests.***

Technical Performance Measures (TPMs)

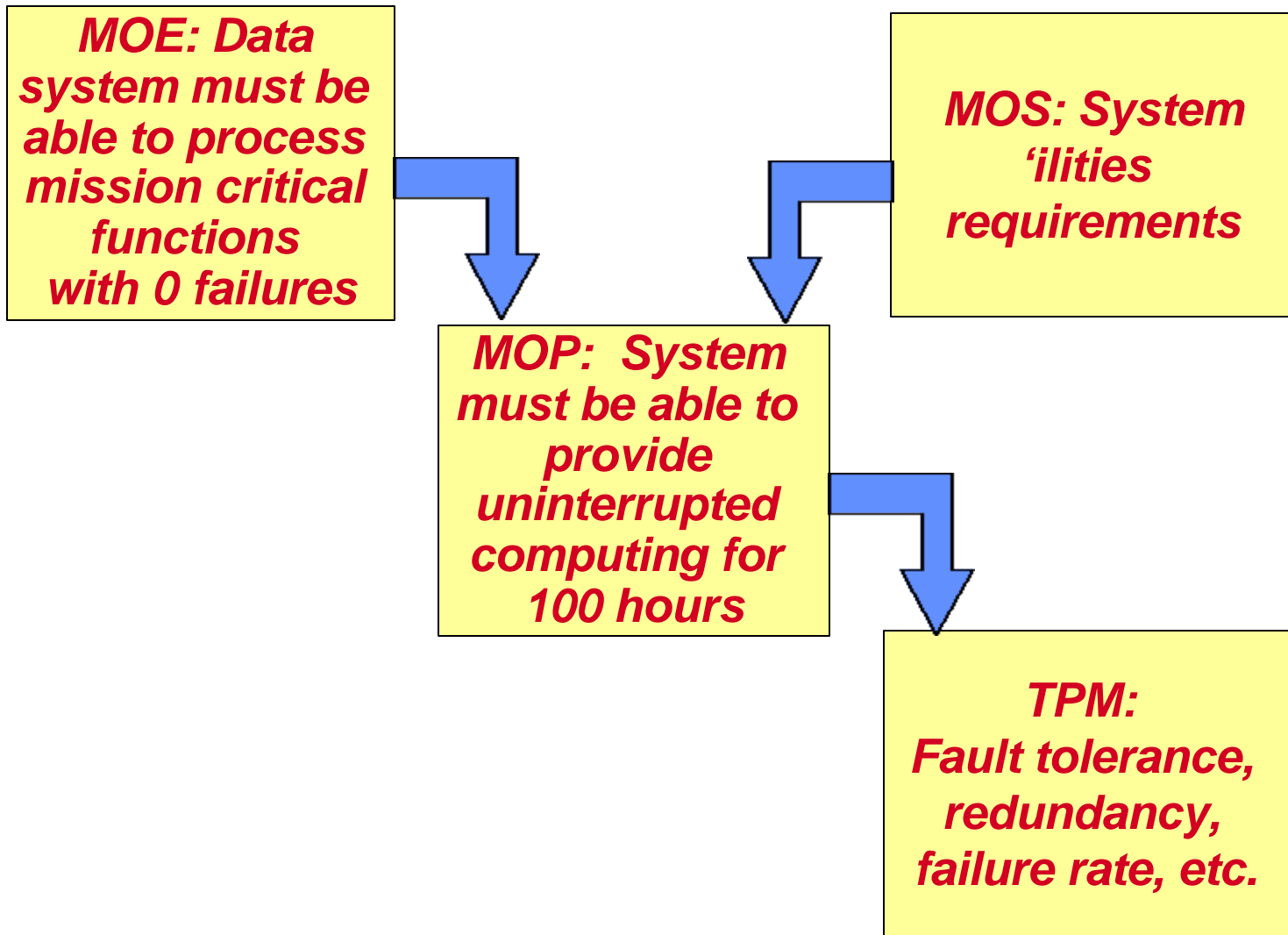
- ***TPMs are used to:***
 - ***Forecast the values to be achieved through the planned technical effort***
 - ***Measure differences between the achieved values and those allocated to the product by the systems engineering process***
 - ***Determine the impact of these differences on system effectiveness.***

Technical Performance Measures (TPMs)

- ***The purpose of a TPM is to:***
 - ***Provide visibility of actual versus planned performance***
 - ***Provide early detection or prediction of problems requiring management attention***
 - ***Support assessment of technical impact of proposed change alternatives.***

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Examples of Product Measures



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Examples of Product Measures

