Module 11 - Measurement: Application

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Technical Performance Measurement

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"When you can measure what you are speaking about, and express it in numbers, you know something about it; but when you cannot...your knowledge is of a meager and unsatisfactory kind..."

--William Thompson Kelvin
19th Century English Scientist

Lord Kelvin's quote indicates that measurements provide essential insight into a project, from the systems level to the enterprise level. Managers rely on such insights to understand what is going on.

As part of Systems Engineering, system-level measurement is done to gain insight into critical systems-level issues. Systems Engineers use a variety of tools, such as Configuration Management, Life-Cycle Reviews, Risk Management, etc. to control the overall systems engineering processes and gain insight into progress and risks. One key tool is a measurement technique called "Technical Performance Measurement (TPM)."

Learning Objective

This lesson explains how Technical Performance Measures (TPMs) are used at the systems level and contrasts TPMs with software measures.

After completing this lesson, you will be able to:

- Describe the role of Technical Performance Measurement.
- Differentiate between Technical Performance Measurement and software measurement.

System Engineering and Measurement

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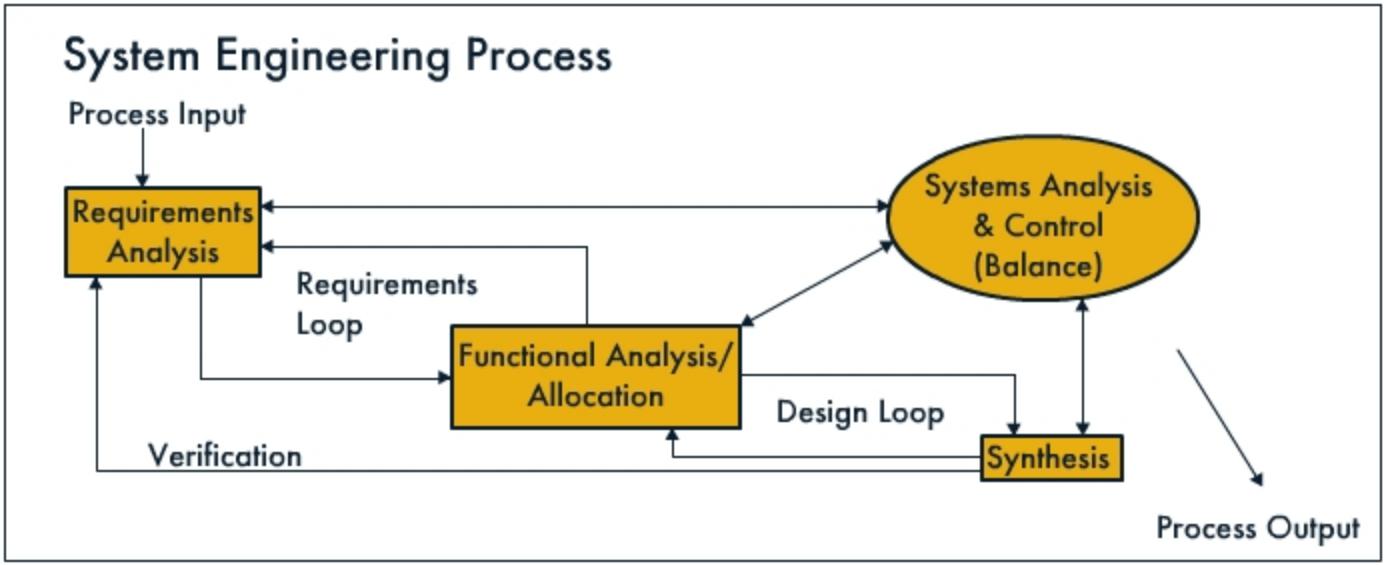
Systems engineering uses Technical Performance Measurement (TPM) as a control tool to balance cost, schedule, and performance throughout the life cycle.



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Technical Performance Measurement (TPM)

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Technical performance measurements compare actual versus planned technical development and design. They also report the degree to which system requirements are met in terms of performance, cost, schedule, and progress in implementing risk handling. Performance measures are traceable to user-defined capabilities. Systems Engineers use Technical Performance Measurement (TPM) to:

- Provide early visibility of actual versus planned systems-level performance
- Provide early detection of systems-level performance problems
- Help support assessment of proposed changes to the system's technical baseline

Common TPM Parameters

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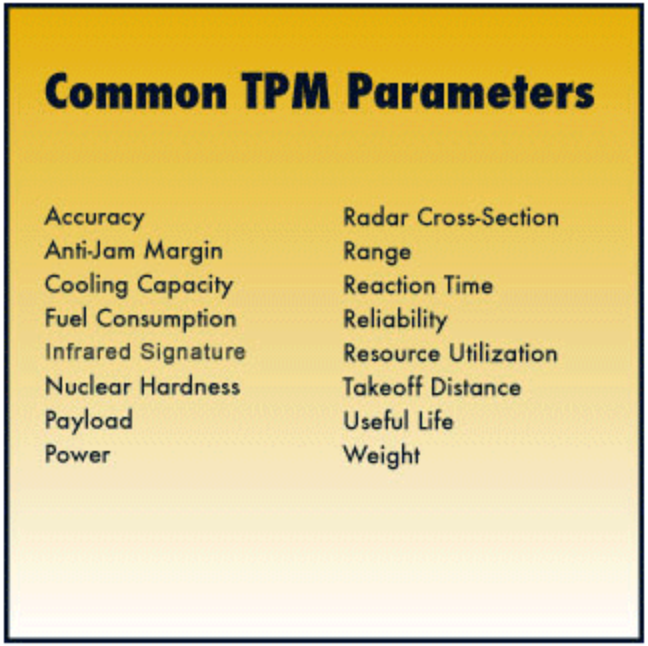
TPM is a disciplined approach to monitoring the status of critical technical elements throughout the program.

The process begins by selecting key measurable and quantifiable parameters such as the examples listed here. These parameters reflect product-level characteristics that directly impact critical performance requirements at the system-level.

If these critical systems-level parameters are not met, the overall capability provided by the system to the warfighter is in jeopardy. Therefore TPMs are measured and formally evaluated at key points across the system development lifecycle. If projections indicate a potential performance problem, early corrective action is taken.



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TPM Usage

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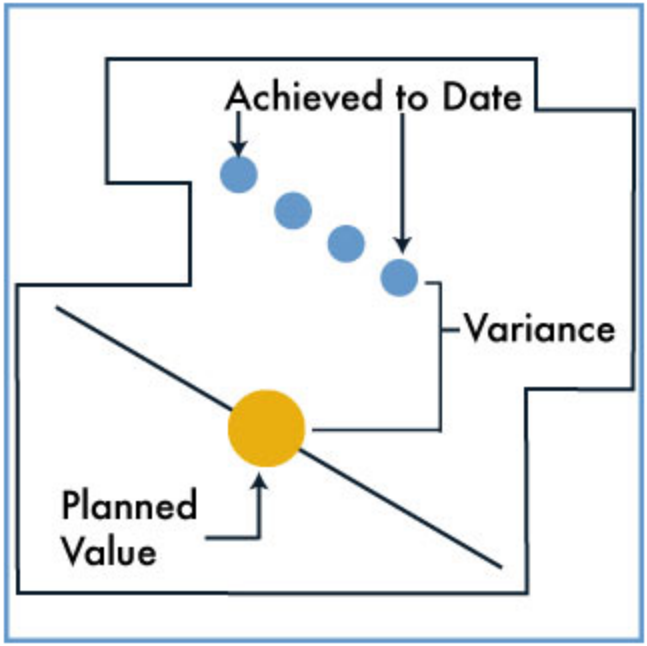
Critical system parameters are selected. These parameters are based on user capability requirements and so-called Key Performance Parameters (KPPs). Most KPPs are system-specific, but some, like net-centricity, are mandated for all programs.

Based on selection of TPMs:

- Parameters are tracked over time.
- Actual values are measured and compared to planned values to determine variances.
- Extrapolations are performed to predict future technical variance.
- Analyses are conducted to determine the impact of current and future variances on program risk, schedule, and cost.
- Recommendations for resolving variance are provided to the Program Manager.



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Knowledge Review

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Technical performance measurements compare actual versus planned technical development and design. Analysis of these measurements helps identify system requirements issues which may impact performance, cost, schedule, and progress in implementing risk handling.

- [ ] True
- [ ] False

Check Answer

TPM in LRATS

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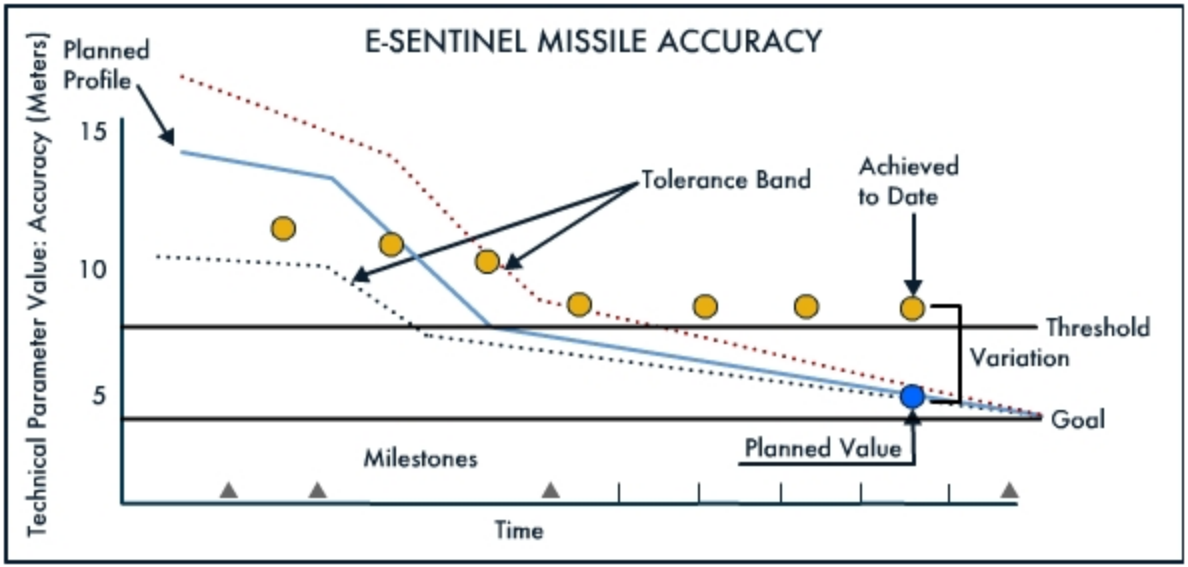
Overall mission effectiveness of the LRATS is directly related to the accuracy of the E-SENTINEL missile. Therefore, Missile Accuracy was chosen by the LRATS System Engineering IPT as one of the TPMs that needed to be closely monitored during development of the E-SENTINEL.



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TPM Interpretation

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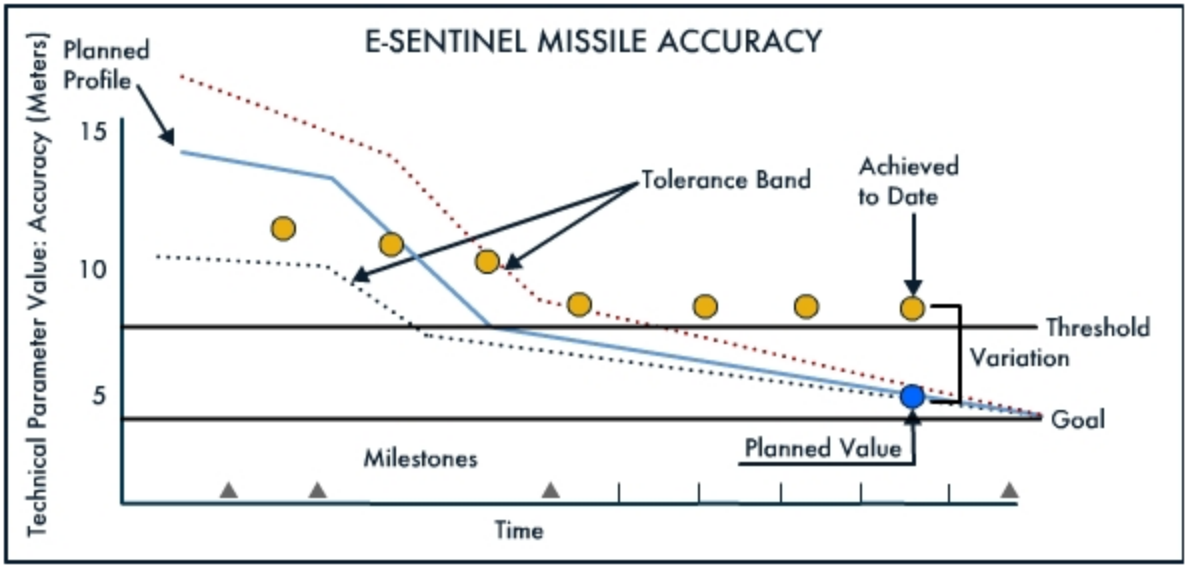
"Achieved to Date" indicates missile accuracy is worse than the planned value and above the expected threshold for this point in its development. Because accuracy is a KPP for the LRATS, this is a significant problem that needs to be addressed immediately!



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TPM Key Distinctions

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Some key distinctions between TPMs and software measures are:

- The process used for TPM evaluation is not much different than the process for interpreting software measurements. Good measurement practices are universal!
- TPM parameters are grounded in physically measurable and quantifiable attributes. Therefore, TPM thresholds and interpretation of variances are generally more accurate and precise than those for software-specific indicators.
- TPMs are broad in scope. These measures focus on system-level products that typically include software and hardware as key components.
- TPM and software measures are essential parts of system development activities.
- TPMs typically are not referred to as such on Defense Business Systems (DBS) programs. In a DBS, the software is the "system", so technical software measures perform the function of TPMs in DBS development. Also, most of the software with DBS is COTS and the vendor is responsible for measuring performance on their product.

Knowledge Review

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Software measures provide only general information, Technical Performance Measures provide data that is which of the following. (Select all that apply)

- [ ] typically more precise than software measurement data
- [ ] system critical
- [ ] easily interchangeable with software measures
- [ ] focused at system levels

Check Answer

Knowledge Review

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Read the statements and decide if they describe Software Measure (SWM). (Select all that apply)

- [ ] The parameters include take off distance, fuel consumption or range.
- [ ] The parameters are more narrowly focused.
- [ ] The measurements include requirement volatility, schedule progress.
- [ ] Measures are focused on system level products.
- [ ] The parameters are grounded in physical measurements and attributes can be quantified.
- [ ] Selection of specific measures are issue driven to ensure the indicators are relevant.

Check Answer

TPM Summary

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This lesson looked at the role of Technical Performance Measurement and contrasted it with IT and software measures. The major points of TPM are:

- TPM is a Systems Engineering control tool.
- TPMs are traceable to key system-level performance requirements.
- Because they are usually grounded in physical attributes of a system, TPMs are more accurate than software measures.
- TPM parameters are physically measurable and quantifiable.

Lesson Completion

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