Time Space Position Information T&E Instrumentation Technology Investment Plan

"Ensuring T&E Ranges Can Meet the Test Requirements of the Future"

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Background

- The Time Space Position Information (TSPI) T&E Instrumentation Technology Investment Plan.

- A Defense Test Resources Management Center (DTRMC) initiative within the Central Test and Evaluation Investment Program (CTEIP).

  - Started as a GPS TSPI Technology Investment Plan several years back.

- Tri-Service test ranges provided a significant amount of data that has been compiled regarding current TSPI capabilities versus projected requirements.

- Several "Common Test & Training Range Architecture" (CTTRA) Workshops were conducted with government and private industry to collect information as well.

Background

- A draft document titled - "*TSPI Capabilities Survey, Needs Assessment and Preliminary Gap Analysis*" was produced with the data.

  - The objective was to identify current TSPI capabilities at the Major Range Test and Facility Base (MRTFB) facilities versus emerging TSPI needs.

  - Capture the deltas between current capabilities and emerging requirements.

  - Provide some insight into emerging technologies that could potentially bridge the gap.

- In essence, provide a roadmap for future CTEIP investment programs involving (originally) GPS TSPI instrumentation.

Background

- CTEIP determined there were significant gaps and holes in the data collected after reviewing the TSPI Technology Investment Plan (TSPI TIP).

- The Range Commanders Council's (RCC) Electronic Trajectory Measurement Group (ETMG) was approached to review and update the TSPI TIP.

  - Identify the holes in the current TSPI capabilities section and finish filling them in.

  - Scrub the emerging requirements and update them.

  - Update and validate the gap analysis between current TSPI capabilities versus future TSPI requirements.

  - Identify emerging technologies that could potentially be used to bridge the gap.

Initial Evaluation

- An analysis of the TSPI TIP determined:

  - The TIP spent a considerable amount of effort analyzing and documenting all TSPI capabilities (radar, GPS, optics, acoustics, multilateration, etc.), not just GPS TSPI capabilities.

  - The ETMG felt the gap analysis focused on high level requirements that didn't really provide any useful level of detail.

  - It also utilized survey responses from the T&E community which are useful, but not always accurate.

    - Hard to know if the person filling out the survey was the person with the right knowledge base and background.

    - Filling out surveys tends to be low on everyone's priority list.

    - The predominant theme tended to lean toward obsolescence versus inability to meet "current" TSPI requirements.

TSPI TIP Update

- The ETMG asked these questions after reviewing the TSPI TIP:

    – How can we take what has been collected thus far and turn it into a useful tool for CTEIP?

    – With so much effort put into documenting all TSPI instrumentation's current capabilities, should the gap analysis focus on just GPS instrumentation shortfalls or should it focus on TSPI capability shortfalls in general regardless of the type of instrumentation involved?

    – How do we validate the future TSPI requirements in order to conduct a meaningful gap analysis of current capabilities versus future requirements?

    – Who really should be providing these future TSPI requirements – i.e. the MRTFB ranges, their customers, or a combination of both?

    – Should an attempt be made to identify emerging technology that could hold the potential to meeting the identified future requirements?

TSPI TIP Update

- The approach adopted to update the TSPI TIP included the following:

  - Start with filling in the holes in the MRTFB current TSPI capabilities section as well as identify the shortfalls in meeting current TSPI requirements from a "Range" perspective.

  - Don't use surveys but rather contact the ranges either by phone or face to face, and talk to the owners/operators of the TSPI hardware.

  - Obtain a much more accurate inventory of current TSPI capabilities.

  - Talk to the test managers and get their perspective on whether or not they can meet their customers TSPI requirements of today.

  - Identify who their top 5-7 customers are today (more on this later!)

  - Get the range's perspective on where they see TSPI requirements (for all the types of testing they do) headed over the next 5-10 years without tying it to specific instrumentation.

TSPI TIP Update

- Identify and document (to the extent possible) known and projected TSPI requirements 5-10 years from now.

  - Very tough to do!

  - Identify the types of TSPI required including performance expectations, types of data required, level of accuracy/resolution, real-time or post processed, regardless of the type of TSPI instrumentation that would potentially provide this data.

  - More on this later!

- Review current capabilities (all TSPI instrumentation) versus known or projected future TSPI requirements and conduct a gap analysis.

- Document shortfalls where possible (known or projected).

Identifying Emerging TSPI Requirements

- Considered to be the toughest challenge in updating the TSPI TIP.

- Identifying "real" hard requirements versus "I think this will be the requirements" or the notion of "If we build it, they will come" type of requirements is hard to do.

- Obtaining funding for new range instrumentation or upgrades to existing instrumentation is hard to come by.

- Approving a new I&M or CTEIP program based on the two reasons listed above is not going to fly.

- To the extent possible, we need documented requirements from range customers.
    - What systems will be tested at the MRTFB ranges 5-10 years from now?
    - What types of TSPI is going to be need and at what level of accuracy/resolution?

Identifying Emerging TSPI Requirements

- Problems faced in obtaining hard data on emerging TSPI requirements:

  - Obtaining input directly from the range test mangers and equipment operators is a key part of the process but not the only component.

    - Their perspective tends to be limited to what types of TSPI requirements they have today as well as looking at the progression of TSPI requirements over recent years in order to project future requirements.

  - The more important component in identifying future TSPI requirements has to come from the program offices, companies and vendors (i.e. range customers) that use the MRTFB ranges to conduct testing requiring TSPI data.

Identifying Emerging TSPI Requirements

- MRTBF range customers - government program offices, hardware manufactures, etc. hold the key to identifying future TSPI requirements.

  - We must find out from them what hardware, equipment, or systems they plan on bringing to our MRTFB ranges in the next 5-10 years to test.

  - We must identify their TSPI requirements in order to successfully test these systems.

- This can only be accomplished if we know what their test requirements are.

  - What are the performance specifications they have to test and validate?

  - What are the types of test scenarios they will employ?

Identifying Emerging TSPI Requirements

- Problems faced by many programs that use MRTBF ranges for testing:
  - They do not usually consider specific TSPI requirements they have early on in their programs.
  - They focus is on hardware and system development and identifying their own performance specifications.
  - Quite often very little thought is given to what kind of TSPI instrumentation and data they are going to need to validate their system performance until they get close to being ready to utilize a test range.
  - Many times, they do not have a good understanding of the TSPI capabilities available in order to determine if they can adequately test their system in the test scenarios that need to be conducted.

Documenting Emerging TSPI Requirements

- The ETMG will attempt to contact as many of the program offices and companies as possible after identifying the top 5-7 customers for each T&E range.

  - Discuss what they have on the drawing board (new systems, upgrades to existing systems, etc).

  - Determine what types of testing will they expect to conduct at the T&E ranges.

  - Identify the system performance requirements they will have to validate through testing such that we can back our way into what TSPI instrumentation will be required and the level of accuracy/resolution needed.

  - Where possible, have the various customers submit these requirements in writing.

Customer Understanding
Of TSPI Capabilities

- The ETMG will discuss current TSPI capabilities with customers.

    - Try and determine what the customers' level of understanding is about TSPI capabilities at the ranges.

    - Educate them where needed on the current TSPI capabilities available and help them determine if what we have now is going to meet their requirements 5-10 years from now.

- But you may ask, if they are already T&E range customers, they should know what capabilities are there!

- Surprisingly this is not necessarily the case (e.g., Boeing)

Identify Emerging Technology

- The final phase of updating the TSPI TIP will be identifying emerging technology that holds the potential for meeting future TSPI requirements.

- This will be a high level look at emerging technology due to the time constraints for completing this document.

  - The ETMG feels that identifying and documenting future TSPI requirements and conducting a gap analysis is the most important part of this task.

- Current TSPI instrumentation capabilities and associated technology will be compared to emerging technology and recommendations will be provided on potential technology areas to explore in the future.

Summary

- The ETMG will update and validate the existing TSPI Capabilities Survey, Needs Assessment and Preliminary Gap Analysis.

- Update current existing TSPI instrumentation capabilities.

- Focus on identifying emerging TSPI requirements.
  - Obtain formal documentation on these new requirements when possible.

- Perform a gap analysis on existing TSPI capabilities versus future TSPI requirements.

- Update the TSPI Technology Investment Plan based on the gap analysis

- Provide CTEIP with a viable planning tool they can use for years to come.