ACCELERATING THE PURSUIT OF TRUTH THROUGH T&E

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THE TRUTH IS OUT THERE

Beauty is truth, truth beauty –

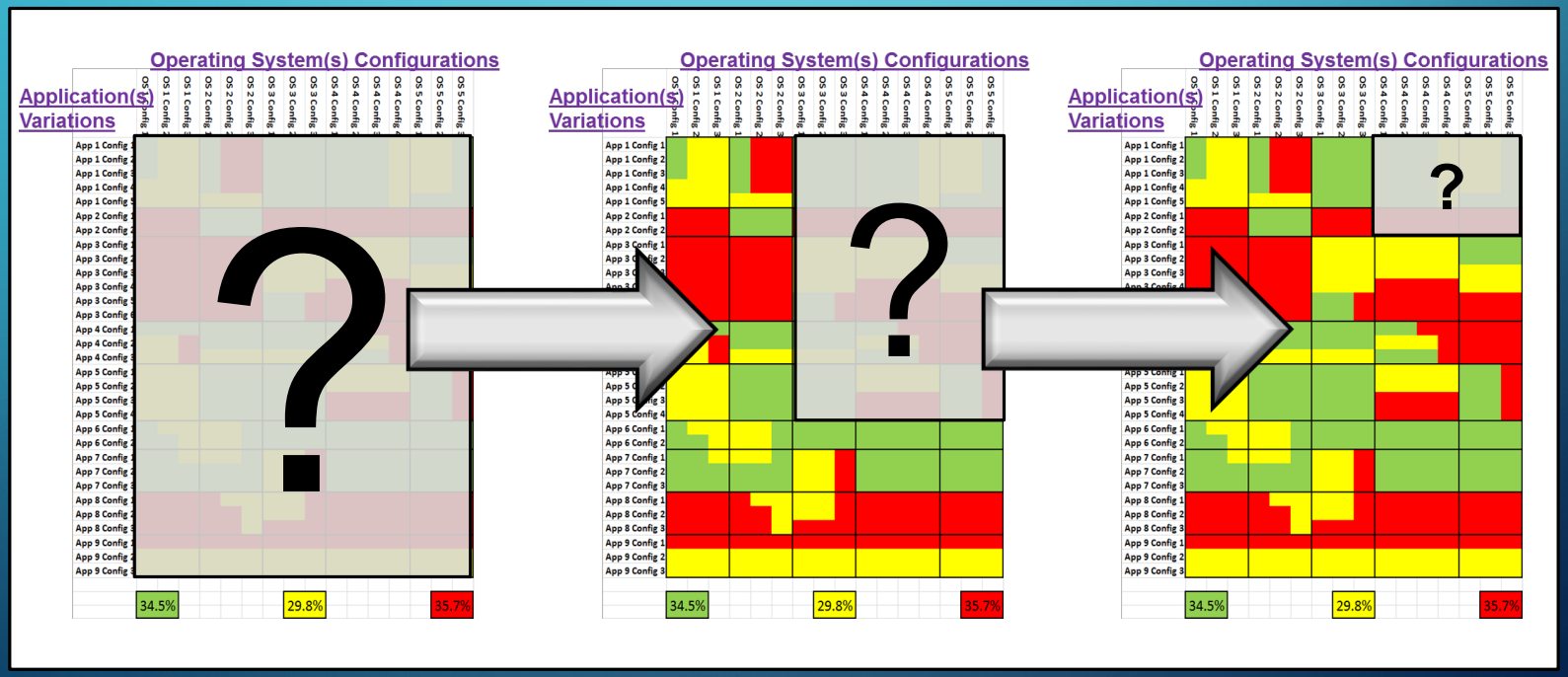
that is all ye know on earth, and all ye need to know.

John Keats

1819

THE TRUTH IS ELUSIVE

- Through T&E, we approach truth asymptotically.
- Given enough testing we can get arbitrarily close to truth.



How much uncertainty are we willing to accept?

CHARACTERIZING THE SYSTEM

- Intent is to characterize capabilities and limitations of weapon systems
- Inform refinement of tactics, techniques, and procedures
- Optimize utilization of system by the warfighter to achieve favorable operational outcomes

System = Hardware + Software + Warfighter

EVENT HORIZON PREDICTED DISTRIBUTED T&E

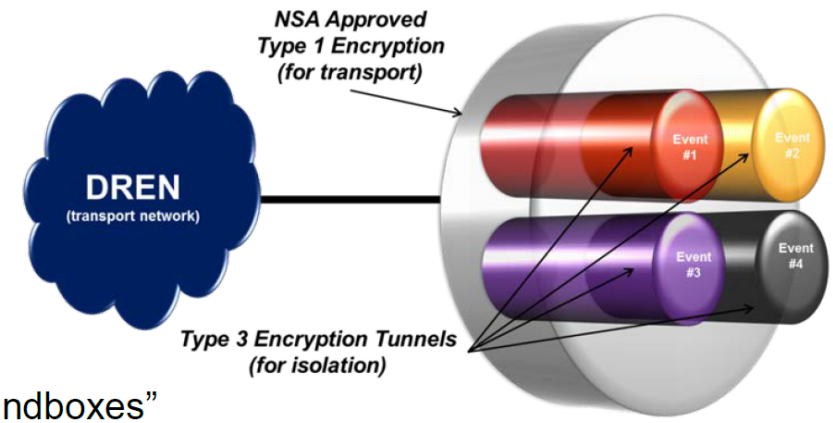
“The shortest distance between two points is zero. And that's what the gateway does—it folds space so that Point A and Point B coexist in the same space and time.”

– Dr. William Weir

RIDE THE LIGHTNING
VIA SECURE CONNECTIVITY

JMETC MILS Network

- Provides **secure distributed testbeds** to support unconstrained cyber activities at **multiple classifications**
  - Users access to NCRC enterprise resources
  - Connect remote facilities and capabilities
- Employs **Multiple Independent Levels of Security** (MILS) architecture
  - Allows for segregation of data streams by protocol, system, event, COI, etc.
    - Capable of supporting multiple simultaneous events at multiple classifications concurrently
    - Ability to create isolated, distributed "sandboxes"



THE DIGITAL TWIN

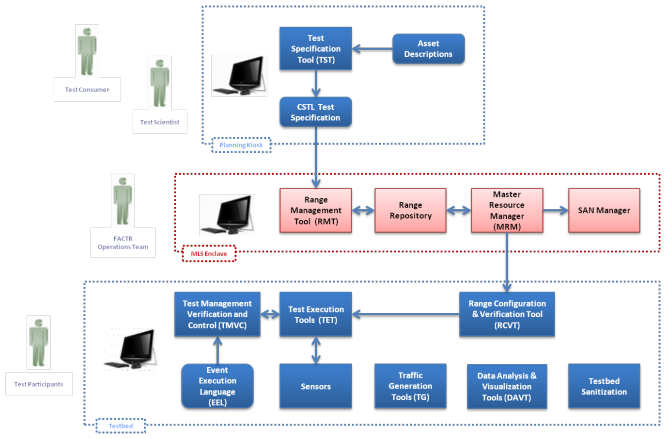
- To enhance realism in T&E, it is desirable to exercise the field configuration of the system
- For various reasons, this may be infeasible
- May be able to leverage *digital twin* to improve robustness of T&E

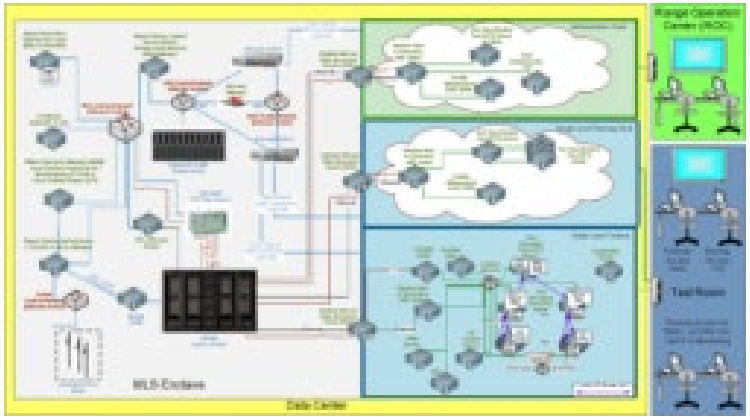
"The Digital Twin is a set of virtual information constructs that fully describes a potential or actual physical manufactured product . . . any information that could be obtained from inspecting a physical manufactured product can be obtained from its Digital Twin."

Grieves, M. and J. Vickers, *Digital Twin: Mitigating Unpredictable, Undesirable Emergent Behavior in Complex Systems*, in *Trans-Disciplinary Perspectives on System Complexity*, F.-J. Kahlen, S. Flumerfelt, and A. Alves, Editors. 2016, Springer: Switzerland. p. 85-114.

AUTOMATION AND SANITIZATION SUPPORT INCREASED T&E OPTEMPO

- Tools to automate the instantiation of T&E cyberspace environments are in use and continue to evolve
- Sanitization capabilities enable reuse of test infrastructure assets and reduce constraints (non-destructive cyber T&E)





CONCLUDING REMARKS

- Intent of T&E is to characterize the capabilities and limitations of systems → the pursuit of Truth
  - Obligation to inform gaining units and commanders
- Level of acceptable residual uncertainty regarding system performance in the field is set by DoD acquisition decision makers
- Can accelerate knowledge acquisition throughout the T&E process by leveraging distributed infrastructure and expertise