2009 NDIA Software Test & Evaluation Summit/Workshop Review

The Summit/Workshop was facilitated by the NDIA Systems Engineering Division's Software Industry Experts Panel and the Developmental Test and Evaluation Committee

Basis for SW T&E Summit/Workshop

- NDIA SE Division's SW Committee report completed in September 2006
  - Top Software Engineering Issues in the Defense Industry
- Key Theme of the Report

  Current approaches for acquiring, developing, verifying and sustaining software enabled systems are inadequate to deal with the complexities of a dynamic and changing acquisition environment.
- Requested to identify top five issues
  - Actually came up with seven

Top Seven SW Engineering Issues

1. The impact of requirements upon software is not consistently quantified and managed in development or sustainment.
2. Fundamental system engineering decisions are made without full participation of software engineering.
3. Software life-cycle planning and management by acquirers and suppliers is ineffective.
4. The quantity and quality of domain-knowledgeable software engineering expertise is insufficient to meet the demands of government and the defense industry.
5. Traditional software verification techniques are costly and ineffective for dealing with the scale and complexity of modern systems.
6. There is a failure to assure correct, predictable, safe, secure execution of complex software in distributed environments.
7. Inadequate attention is given to total lifecycle issues for COTS/NDI impacts on lifecycle cost and risk.

Issue 5 – Description

Traditional software verification techniques are costly and ineffective for dealing with the scale and complexity of modern systems discussion points:

- Over-reliance on testing alone rather than robust SW verification techniques.
- Manual testing techniques are labor-intensive, scale poorly, and are unproductive relative to the large investment of resources.
- Compliance-based tests do not adequately cover risks or failure conditions.
- Tests are over-documented with disproportionate effort on detailed procedures.
- Education, training, certifications are inadequate to develop effective test skills.

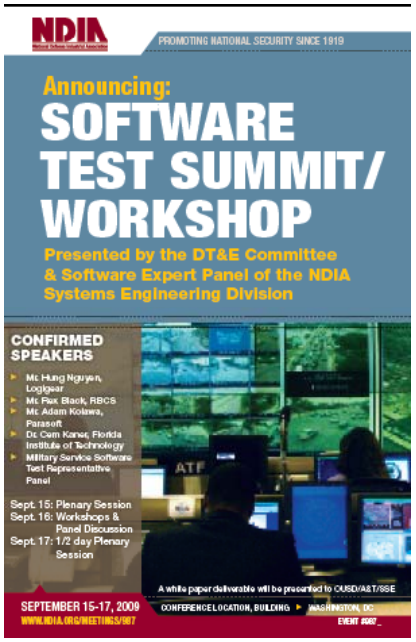
Issue 5 – Recommendation

Study current software verification practices in industry, and develop guidance and training to improve effectiveness in assuring product quality across the life cycle.

- Sponsor a study of state-of-the-practice verification and testing approaches.
- Review/update testing policies and guidance to emphasize robust, productive approaches that maximize ROI.
- Review adequacy of verification plans/approaches early in the acq. life cycle.
- Emphasize skilled investigation throughout the life cycle, based on coverage, risk mitigation, high volume automation.
- Strengthen curricula, training, certifications, career incentives for testing roles.

Summit/Workshop Objective

To recommend policy and guidance changes to the Defense enterprise to emphasize robust and productive software Testing and Evaluation (T&E) approaches in Defense acquisition.



Location & Attendance

- Hotel: Hyatt in Reston Town Center, VA
- Dates: September 15 -17, 2009
- 110 Registered Attendee
  - 9 no-shows
  - Approx. 80 stayed to the end of last day!
- Better than expected participation!

Day 1 Agenda

8:00 Introduction – Why this Summit/Workshop

8:10 Government Presentations

9:50 Break

10:15 DoD Industry Panel

11:45 Lunch & Speaker

12:45 SW Test Industry Experts

2:25 Break

2:50 SW Test Industry Experts

4:30 Adjourn

Day 2 Agenda

8:00 Re-Cap Day 1

8:10 DoD Services Panel

9:45 Introduction of Workshops

10:00 Break

10:30 Workshops

12:00 Lunch & Speaker

1:00 Workshops

2:30 Break

3:00 Workshops

4:30 Adjourn

Day 3 Agenda

8:00Re-Cap Day 2

8:10 Introduction of Workshop Leaders

8:15 Presentation of Issues and Recommendation by Workshop Leaders

9:45 Break

10:00 Way Forward Discussion & Final Q&A's

– Final Summit/Workshop Product defined

11:00 Adjourn

Speakers Morning Day 1

Framing the DoD Software T&E Issues

- Dr. Ernest A. Seglie, Chief Science Advisor, DOT&E
- Mr. Chris DiPetto, Acting Director, DT&E
- Ms. Kristen Baldwin, Director for System Analysis, OD, DR&E

Speakers Morning Day 1

Panel: Framing the Industry Software T&E Issues

- Mr. Edgar Doleman, CSC
- Mr. Bruce Casias, Raytheon
- Mr. Tom Wissink, Lockheed Martin

Speakers Afternoon Day 1

- Lunch: Mr. Paco Hope, Cigital
  - Software Security in Defense T&E
- Dr. Cem Kaner, Florida Institute of Technology
  - Challenges in the Evolution of Software Testing Practices in Mission-Critical Environments
- Dr. Adam Kolawa, Parasoft
  - Software Development Management
- Mr. Rex Black, RBCS
  - Risk-Based Testing
- Mr. Hung Nguyen, Logigear
  - Software Testing & Test Automation

Speakers Morning Day 2

Panel: Framing the Services Software T&E Issues

- Dr. James Streilein, US Army Test and Evaluation Command
- Dr. Steve Hutchison, Defense Information Systems Agency (DISA)
- Mr. Mike Nicol, Aeronautical Systems Center, Wright-Patterson AFB

Lunch: Mr. Richard Kuhn, NIST

- Combinatorial Testing

Remainder of Day 2

Workshops – Three Key Challenge Areas (KCA):

1. How Much T&E is Enough
   - Risk considerations, Installed System T&E, Instrumentation, Reliability, Completion Criteria, Coverage and C&A
2. Lifecycle and End-to-End Software Testing
   - How does SW T&E get involved in early development (i.e. left-hand side of the V-model and I&T deliverables
3. Changing Paradigms
   - Open Architecture, COTS, SOA, SoS, SaaS, Legacy plus New, Security

Remainder of Day 2

Workshops – Four Focus Areas for each KCA:

1. Review, revise, improve RFP Language (Including T&E activities/deliverables in Competitive Prototyping)
2. Training, Competency Model, Human Capital
3. Policy, Guidance & Standards
4. Tools/Automation, Methodologies & Processes

Results of Workshop – Raw Data

Issues

1. Workshop #1 – 108
2. Workshop #2 – 51
3. Workshop #3 – 20

Total – 179

Recommendations

1. Workshop #1 – 43
2. Workshop #2 – 26
3. Workshop #3 – 13

Total – 82

Participants

1. Workshop #1 – 30
2. Workshop #2 – 31
3. Workshop #3 – 25

Total – 86

Results of Workshop – Raw Data

Recommendations by Focus Area

- 16 for FA #1 Revise/Improve RFPs & T&E Deliverables
- 22 for FA #2 Training, Human Capital, Competency Models
- 22 for FA #3 Policies, Guidance & Standards
- 18 for FA #4 Tools/Automation, Methodologies & Processes
- 4 for FA #5 Costs, Software, Studies, Organization

Key Recommendations

Need Common Terms, Processes, Training, Career Path, etc

1 Develop and provide standard language (template, checklist, lexicon) for all areas of Software test & evaluation

2 Define a set of competency models / skills for SW testing & SW-intensive system testing. Include all levels of test (unit, function, integration, system, SoS). Include cross-training in SW & SE

3 Develop 'Wikipedia-like' software T&E knowledge repository like DoD techipedia or e-learning on domain (by OSD/ATL DDR&E, NDIA)

4 Establish career path incentives for test engineers

Key Recommendations (cont'd)

Need Common RFP Language, approaches and guidance

1. Policy/Guidance development to require critical SW deliverable documentation to support SW test & evaluation and list in RFP to include:
   a. SW lifecycle test strategy within the context of the Program Integrated Test Strategy (i.e. coverage, types of testing (unit, functional, integration, system, SoS), and SW test automation and tools);
   b. SW T&E supporting SW Engineering in SE PROCESSES (requirements development / management, design and development, system reliability growth, risk identification, analysis and management).
2. RFP development plan needs to demonstrate early involvement of T&E engineering
3. In RFPs: identify the information required for making decisions that can be satisfied by test & evaluation (e.g., CDRLs) - also, what format (e.g,. Templates)
4. Develop model RFP language for SOA acquisitions

Create & fund research activity in the area of software testing and test automation

Way Forward

The White Papers Recommended Way Forward:

"It is the recommendation of the NDIA SE Division's DT&E Committee and Software Industry Experts Panel that the workshop lists of issues and recommendations be consolidated, prioritized and turned into a specific set of actionable recommendations for the Government to consider. This activity can be started in 2010 and worked on an on-going basis based on agreed to priorities."

Q & A

SW T&E Summit/Workshop Presentations:

www.ndia.org/Divisions/Divisions/SystemsEngineering/Pages/Test_and_Evaluation_Committee.aspx

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