# An evolving standard: IEEE 1012 Standard for Verification and Validation

## The IEEE Standard for Verification and Validation is one of the most popular of the IEEE Computer Society Standards

Used throughout numerous industries for the development of mission and safety critical software

- . Depart of Energy (nuclear power plants)
- . Food and Drug Administration (industrial as well as personal medical devices)
- . Department of Defense
- . Department of Homeland Security
- . And many more

## Overview of IEEE1012-2004

- Structured around IEEE12207-1997 Standard for Information Technology—Software Life Cycle Processes
- . Tied to the 12207-1997 life cycle model
- ware development tool . Supports early and full project life cycle involvement . Provides the requirements for V&V, not how to do V&V . Non-deterministic systems . Concurrent engineering Supply Development Acquisition Operation Maintenance Unique Systems V&V Updated Activities/Tasks Concept Requirements Design Installation/ Ops Test Maintenance Acq Support Planning Implementation Systems V&V Support Checkout Integrate SW/HW/User Part I **IEEE1012** V&V Activities/Tasks · Scoping Structure Planning · Document Evaluation (Sys, Regmts, · Acceptance Design, Code) Test New Constraint **Criticality Analysis** Sys Regmts Evaluation Traceability Analysis Review Operating **Interface Analysis** Procedures Planning Hazard Analysis Hazard Analysis Contract Software V&V Hardware V&V User V&V · Security Analysis Security Verification . Risk Analysis Analysis Part II Part III Part IV Risk Analysis Test Planning (component, integration, · SVVP system, acceptance) Anomaly Eval Test Execution • Criticality Migration Follows 12207 Life Follows 12207 Life Remains · Retirement Cycle Outline Cycle outline • Hazard/ unchanged New User V&V tasks Security/ New HW V&V tasks **Risk Analysis** Kenneth Costello, Kenneth.A.Costello@nasa.gov, NASA NASA Independent Verification and Vali-NASA dation Facility Fairmont, West Vir-NASA POC: Kenneth Costello, Kenneth.A.Costello@nasa.gov ginia

#### **Standards Evolution**

- . Guiding desire to move to a process centric approach
- On-going harmonization efforts between IEEE and ISO—resulted in updated ISO15288 Systems Engineering Life Cycle Processes and the new IEEE12207Standard for Systems and Software— Software Life Cycle Processes

## Need to update 1012

Harmonization with the new standards
Realization of need to expand into systems
V&V—synchronize with ISO15288

#### Challenges to the update

- . Enhanced criteria for COTS and reusable software
- . Process identification for hardware V&V
- . Development of complex electronics with software development tool