Synergies of DoD Systems Engineering and International Standards

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Outline

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- Background of DoD and IDA Involvement
- Standards for Life Cycle Processes
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Relevant Standards Organizations

Relevant International Standards Organizations

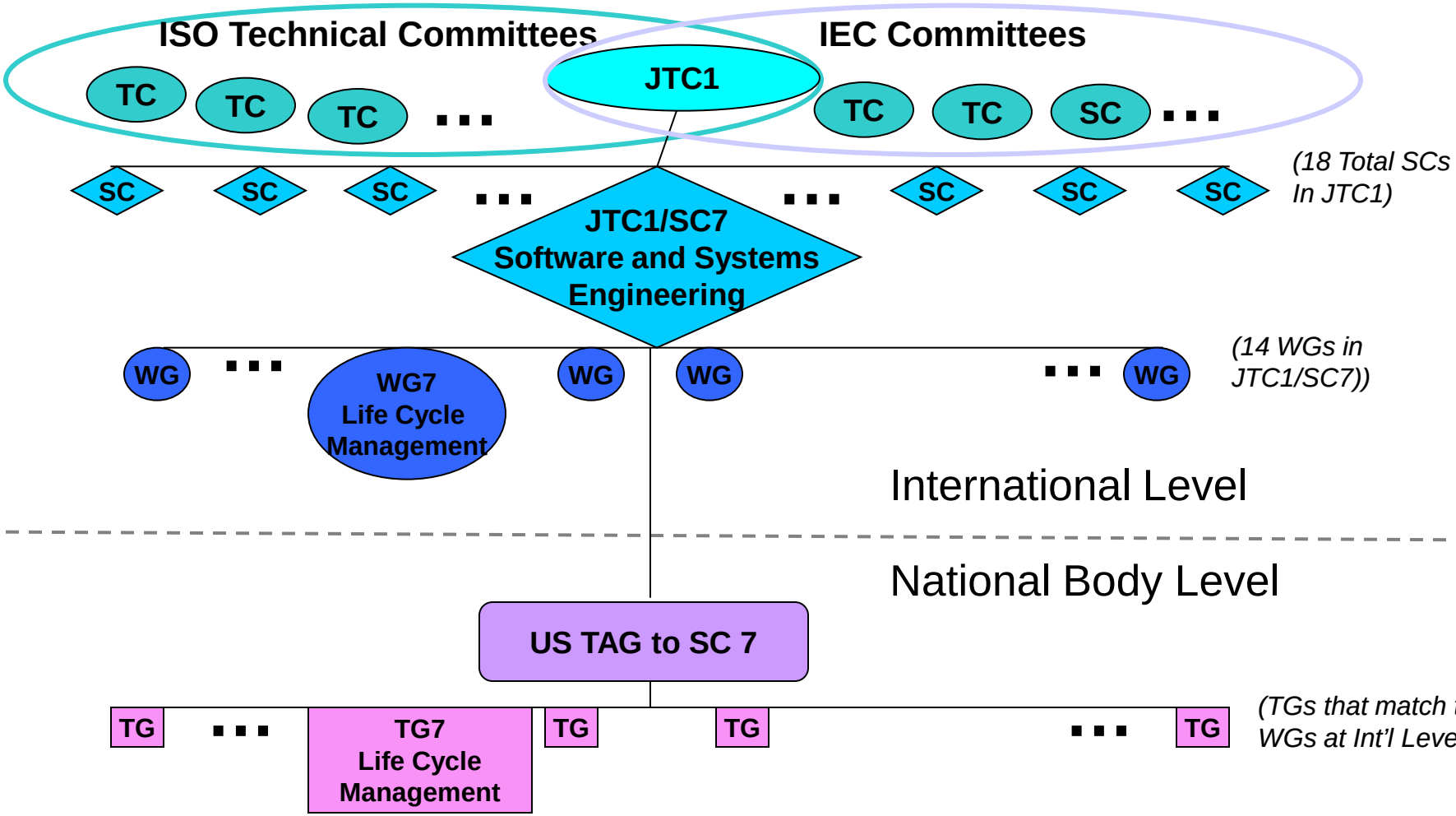
- International Organization for Standardization (ISO)
- International Electrotechnical Commission (IEC)
- ISO/IEC Joint Technical Committee 1 (JTC1), Information Technology
- ISO/IEC JTC1 Subcommittee 7 (SC7), Systems and Software Engineering
- Working Group 7 (WG7), Life Cycle Management

Relevant National Standards Organizations

- **U.S. National Body Technical Advisory Group (TAG)**
  - Administered by the Institute of Electrical and Electronics Engineers (IEEE)
- **Task Group 7 (TG7), Life Cycle Management**

Next slide shows the hierarchical relationship between these international and national organizations

ISO/IEC/TAG Hierarchy for JTC1



Background of DoD and IDA Involvement

DoD and IDA Involvement

- **In 1994, SecDef Dr. William Perry issued a memorandum directing the use of performance and commercial specifications and standards in lieu of military specifications and standards, unless no practical alternative existed to meet the user's needs**
- **Shortly after the Perry memo was issued the Systems Engineering office, under the direction of Mr. Mark Schaeffer, became a member of the U.S. TAG**
  - U.S. Army ARDEC provides the alternate member who attends the meetings and does the work of the TAG

DoD and IDA Involvement, continued

- DoD's purpose in joining the TAG was to help ensure international commercial standards would meet the needs of DoD in the areas of systems and software engineering
- DoD also tasked the Institute for Defense Analyses (IDA) with participating in international standards organizations to help achieve DoD's goals for the use of commercial standards

Standards for Life Cycle Processes

Process Framework Standards

- **ISO/IEC 15288:2008 “Systems and Software Engineering – System Life Cycle Processes”**
- **ISO/IEC 12207:2008 “Systems and Software Engineering – Software Life Cycle Processes”**

ISO/IEC 15288

- **Product of ISO/IEC JTC1, SC7, WG7**
- **Purpose**
  - A need existed for this standard
    - Increased system complexity due to hardware, software, human interaction
    - Absence of harmonization between relevant disciplines
  - Establish a common process framework for describing the life cycle of systems
- **Background/Status**
  - First published as an International Standard in 2002
  - 2008 version aligned with 12207
  - JTC1/SC7 has initiated efforts to harmonize and integrate all of the standards under its purview, consistent with 15288 as the framework standard
    - Resolution 629 at the Nagoya SC7 Plenary meeting in 2001

ISO/IEC 15288:2008 List of Processes

Process Purpose, Outcomes, Activities, and Tasks

Organization Project-Enabling Processes
Life Cycle Model Management
Infrastructure Management
Project Portfolio Management
Human Resource Management
Quality Management

Project Processes
Project Planning
Project Assessment and Control
Decision Making
Risk Management
Configuration Management
Information Management
Measurement

Agreement Processes
Acquisition
Supply

Technical Processes
Stakeholder Requirements Definition
Requirements Analysis
Architectural Design
Implementation
Integration
Verification
Transition
Validation
Operation
Maintenance
Disposal

ISO/IEC 12207

- **Product of ISO/IEC JTC1, SC7, WG7**
- **Purpose/Scope**
  - Establish a common framework for software life cycle processes
- **Background/Status**
  - Initial release, August 1995
  - 15288-aligned version published in 2008

ISO/IEC 12207:2008 List of Processes

Process Purpose, Outcomes, Activities, and Tasks

Organization Project-Enabling Processes
Consistent with 15288

Agreement Processes
Consistent with 15288

Project Processes
Consistent with 15288

Technical Processes
Qualification Testing
Installation
Acceptance Support
*In addition to 15288 Technical Processes

Software Reuse Processes
Domain Engineering
Reuse Asset Management
Reuse Program Management

Software Implementation Processes
Implementation
Requirements Analysis
Architectural Design
Detailed Design
Construction
Integration
Qualification Testing

Software Support Processes
Documentation Management
Configuration Management
Quality Assurance
Verification
Validation
Review
Audit
Problem Resolution

Example Implementation Standards

- **ISO/IEC 24748:2010, Technical Report "Systems and Software Engineering – Life Cycle Management" in four parts**
- **ISO/IEC 15939:2007 "Systems and Software Engineering – Measurement Process"**
- **ISO/IEC 16085:2006 "Systems and Software Engineering – Life Cycle Processes – Risk Management"**
- **ISO/IEC 16326:2009 "Systems and software engineering – Life Cycle processes – Project management"**
- **ISO/IEC 15289:2006 "Systems and Software Engineering – Content of Systems and Software Life Cycle Process Information Products (Documentation)"**

Four Parts of ISO/IEC 24748

- **Part 1, Systems and software engineering – Guide for life cycle management**
- **Part 2, Systems and software engineering – Life Cycle Management – Guide for the application of ISO/IEC 15288**
- **Part 3, Systems and software engineering – Life cycle management – Guide to the application of ISO/IEC 12207 (Software life cycle processes)**
- **Part 4, Systems and software engineering – Life cycle management – Systems engineering management plan**

Synergy with DoD Activities

15288 Processes in the DAG and DAU Courses

- **Alignment of processes in Defense Acquisition Guidebook (DAG) and Defense Acquisition University (DAU) SE courses with ISO/IEC 15288:2008**

Technical Management

- Decision Analysis
- Technical Planning
- Technical Assessment
- Requirements Management
- Risk Management
- Configuration Management
- Technical Data Management
- Interface Management
- Measurement

Technical

- Stakeholder Requirements Definition
- Requirements Analysis
- Architectural Design
- Implementation
- Integration
- Verification
- Validation
- Transition

NATO Use of 15288

- **Adoption of ISO/IEC 15288**
  - NATO Life Cycle Management Group adopted ISO/IEC 15288:2002 as the standard for life cycle management
- **Alignment of NATO's processes with ISO/IEC 15288:2008**
  - Currently adopting ISO/IEC 15288:2008 processes
  - Plan to develop a NATO Standardization Agreement (STANAG) based on ISO/IEC 15288:2008 for ratification by NATO nations
  - Developing implementation guide for ISO/IEC 15288:2008 to add NATO-specific requirements

SEBoK Project

- **Coordination of Body of Knowledge and Curriculum to Advance Systems Engineering (BKCASE) project with ISO/IEC TR 19759:2005, Software Engineering -- Guide to the Software Engineering Body of Knowledge (SWEBOK)**
- **WG7 members will serve as reviewers**

Verification and Validation Study Group (WG7)

- **Problem Statement**
  - Within SC7 product portfolio, a clear understanding of the relationships between the multitude of processes, activities, and tasks in the areas of V&V is missing
- **Issues to be Addressed**
  - Establishment of a high-level V&V environment consistent with life cycle process model
  - Understanding of the difference between the objective of evaluation and the evaluation techniques used to meet the objective
  - Consistent and economical terminology related to V&V
  - Relationships between various methods and techniques for V&V of products
- **Desired Outcomes**
  - Recommendations of ISO/IEC SC7 V&V environment
  - Recommendations on how existing and emerging standards (12207, 29119, etc.) can support the environment/process model and harmonization

Summary

- **Participate in ISO/IEC Standards development as a member of the U.S. National Body Technical Advisory Group (TAG)**
- **Participate in Study Groups (SGs) focused specifically on *harmonization* across life-cycle processes and relevant standards**
- **Alignment of Defense Acquisition Guidebook (DAG) with ISO/IEC 15288**
- **Alignment of NATO's quality management process with ISO/IEC 15288**
- **Coordination of Body of Knowledge and Curriculum to Advance Systems Engineering (BKCASE) with ISO/IEC TR 19759:2005**

What We Need from DoD Participants in Audience

- **Need participants from other parts of DoD**
- **Need subject matter experts from the Services to review draft standards and technical reports**

Thank you!

Questions?

For Additional Information

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