Compliance Frameworks
Systems Engineering Standards

Terry Doran
NDIA Systems Engineering & Supportability Conference
October 25, 2000
Questions You Might Have

How many SE standards and models are there?

Why are there so many?

What’s the difference between a standard and a model?

What good are standards and models?

How are SE standards and models changing?

Which ones do I have to comply with?

How hard is it to comply with all of them?
The Frameworks Quagmire

- PSP
- People CMM
- SA-CMM
- FAA-iCMM
- SW-CMM
- SDCCR
- SDCE
- IBM
- IEEE Stds. 730, 828, 829, 830, 1012, 1016, 1028, 1058, 1063
- ISO 15504
- MIL-Q-9858
- NATO AQAP1, 4, 9
- BS 5750
- EQA
- MIL-STD-498
- DOD-STD-2168
- ISO/IEC 12207
- MIL-STD-1679
- DOD-STD-2167A
- DOD-STD-7935A
- FAA-iCMM
- SE-CMM
- SECAM
- EIA 632
- EIA 1220
- EIA/IS 731
- ISO 15000
- ISO 15288*
- ISO 9000 Series
- IEEE 1074
- FAA-iCMM
- SE-CMM
- MIL-STD-499B*
- EIA/IS 632
- EIA/IS 731
- ISO 12207
- ERIA/IS 632
- IEEE 1220
- IEEE 12207
- TickIT
- Q9000
- ISO 10011
- EIA 632
- You are here

* Not released
** CMMI-SE/SW released
IPPD not yet released
Systems Engineering Standards

- MIL-STD-499B. Systems Engineering, 5/6/92
- EIA 632. Processes for Engineering a System, 1/99
- ISO 15288. Life Cycle Management—System Life Cycle Processes, 9/00 draft for CD #3 or FCD
MIL-STD-499A
May 1974
“Engineering
Management”

MIL-STD-499B June 1992
“Coordination Copy”

Began
IEEE P1220 to
develop commercial
SE standard approx. 1992

February 1995
IEEE 1220 ‘Trial-Use’
released

IEEE 1220 ‘Full Use’
January 1999

EIA/IS 632 begun after Perry memo

ISO 15288 initiated by ISO 1996

ISO/IEC 15288 release expected
February 2002

EIA/IS 632 released
December 1994

Perry Memo abolishes new military standards June 1994

EIA/EIA 632-1998
January 1999 release

coordination
Standards Commonality

• History (evolution from one to the next)
  — Owners (affiliation) and applicability
  — Authors
  — Reviewers

• Scope
  — Total system approach
  — Transformation of needs into solutions
Standards Differences

- History details
  - US vs. international
  - Military vs. commercial
- SE process elements and life cycle
- Definitions of system and systems engineering
- Level of detail, and text vs. graphical descriptions
- Focus
  - Contract vs. system vs. enterprise vs. product
Scope of SE Standards

- IEEE 1220
- MIL-STD-499B
- EIA/IS 632
- EIA 632
- ISO 15288
“Systems Engineering”

• Never released; 6 May 92 version intended to replace 1 May 74 MIL-STD-499A, “Engineering Management”

• Shortly thereafter, Air Force approval of May 92 version for application to contracts that are still in force

• Military contract language (“shall”) and implied military contract focus

• Detail to activity level of SE process

• Used as basis for other SE standards; set terminology and initially described SE process
“Systems Engineering”

- IS release December 15, 1994
  - Interim Standards: annual review and up to 5 year lifespan

- Commercialized version of MIL-STD-499B
  - Uses less military language and life cycle, but actually geared to same target audience

- Same level of detail as MIL-STD-499B (nearly identical content)
“IEEE Standard for Application and Management of the Systems Engineering Process”

- February 28, 1995 Trial Use release
  - Intended lifetime of 2 years, for projected IEEE 1220 and EIA/IS 632 merge

- Focused more on enterprise and less on any specific system being built

- More detailed than MIL-STD-499B or EIA/IS 632
  - To the detailed task level of the SE process

- January 22, 1999 Full Use release
  - Nominal revisions
“Processes for Engineering a System”

- Joint project of INCOSE and EIA
- Broader scope than previous SE standards and less detailed: 33 requirements set in context of application environment & application key concepts
  - Project { Enterprise { External Environments
  - System consisting of End Products & Enabling Products
  - Building block structure
  - Processes applicable at any point in Product Life Cycle
Members of these committees are national bodies, i.e. countries.

SC7 Working Groups (WGs)

- WG2 – System Software Documentation
- WG4 – Tools and Environments
- WG6 – Evaluation and Metrics
- WG7 – Life Cycle Management
- WG8 – Support of Life Cycle Processes
- WG9 – Software and System Integrity
- WG10 – Software Process Assessment
- WG11 – Software Engineering Data Definition and Representation
- WG12 – Functional Size Measurement
- WG13 – Measurement Process Framework
- WG14 – Enhanced LOTOS
- WG15 – ODP Frameworks and Components
- WG16 – ODP Quality of Service
- WG17 – ODP Enterprise Language

USTAG members are US based companies and organizations.

USTAG Technical Groups (TGs) correspond to SC7 WGs.
ISO 15288

“Systems Engineering — System Life Cycle Processes”
ISO/IEC 15288

• Draft for CD #3 or Final Committee Draft – 1 SEP 00…
  Expected release in FEB 02

• International effort by same subcommittee that authored
  ISO/IEC 12207, augmented with SE expertise

• Intent to be high level, common framework for
  describing LC of systems based on well-defined
  processes and terminology
  — Processes defined i/t/o purpose, outcomes & activities
  — Does not detail methods or procedures

• Guidebook project approved; ISO/IEC TR WD #1 1SEP00
ISO 15288
Draft for CD#3  Contents

Clauses 1-6 + Annex A: Normative
1. Scope
2. Conformance
   • Full
   • Tailored
   • Compliance with an Agreement
3. Normative References
   • ISO 9001:2000
   • ISO 12207:1995
4. Terms & Definitions
5. SLC Processes
6. SLC Stages

Annex A – Tailoring
• Tailoring Process
• Tailoring Process Outcomes
• Tailoring Process Activities

Annexes B – D: Informative
Annex B – SLC Stages
Annex C – Relationship 15288 & 12207
Annex D – Concepts
5. SLC Processes

- Agreement Processes
  - Acquisition
  - Supply
- Enterprise Processes
  - Enterprise Management
  - Investment Management
  - SLC Processes Management
  - Resource Management
- Project Management Processes
  - Planning
  - Assessment
  - Control
  - Decision Making
  - Risk Management
  - Configuration Management

SLC Processes (cont.)

- Technical Processes
  - Stakeholder Requirements Definition
  - Requirements Analysis
  - Architectural Design
  - Implementation
  - Integration
  - Verification
  - Transition
  - Validation
  - Operation
  - Maintenance
  - Disposal
6. SLC Stages

- A SLC model required
- One or more stage models, as needed
- Overlap & iterate as appropriate

A SLC Example

- Concept Stage
- Development Stage
- Production Stage
- Utilization Stage
- Support Stage
- Disposal Stage
Some Issues

WG7 Meeting – 30OCT00 - 3NOV00 – Perth, Australia
ISO/IEC 15288 CD #3 or FCD
- Comments not incorporated
- Traceability
- Principles
- Standard/Guidebook allocation
References

• Software Productivity Consortium & The Quagmire on the web: www.software.org

• ISO On-Line: www.iso.ch

• INCOSE Standards Committee & Links: www.incose.org

• EIA/G47 for EIA 632 & EIA 731: www.geia.org

• IEEE Standards: www.ieee.org
Terry Doran
Software Productivity Consortium
Systems Engineering Group
doran@software.org
Tel: 703-742-7190
Fax: 703-742-7200