What’s all this ‘churn’ in Systems Engineering Standards and Models?

[where did they come from? and where are they going?]

CMMI Technology Conference

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Objectives

- To provide an overview summary of key Systems Engineering [SE] process standards and models
- To illustrate a top level comparison of them
- To correlate with the Software Engineering Standard
- To indicate trends and usage
- To relate to ODUSD(A&T) System & Software Engineering Directorate acquisition Initiatives
- To briefly address one key process activity – Technical Planning - as an example

Disclaimer: The views and opinions presented here are the author's and do not necessarily represent SAIC or DoD views.
Agenda

- Introduction
- Systems Engineering Standards and Models
  - Evolution of Standards & Models
  - Summary of Standards & Models
    - ISO/IEC 15288: System life Cycle Processes
    - ANSI/EIA 632: Processes for Engineering a System
    - IEEE 1220: Standard for Application and Management of the System Engineering Process
    - CMMI® - DEV: Capability Maturity Model Integrated for Development
    - DAG/SE: Defense Acquisition Guide/Systems Engineering
    - INCOSE Systems Engineering Handbook
  - A Mapping across standards and models
- ODUSD(A&T) Systems and Software Engineering issues in Acquisitions
- Summary
- Some Key References and Links
- Appendix: Example - Summary for Technical Planning activities

Note: Every effort is made to credit sources of material presented here
Remember this? ~10 years ago! – now ood!

Source: Systems and Software Consortium [SSCI]
SE standards & models
# Overview of SE related Standards

<table>
<thead>
<tr>
<th>Standards</th>
<th>ISO/IEC 15288</th>
<th>EIA - 632</th>
<th>IEEE 1220</th>
<th>CMMI®-DEV</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>items</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Purpose</td>
<td>Establish a common framework for describing the life cycle of systems</td>
<td>Provide an integrated set of fundamental processes to aid a developer in the engineering or re-engineering of a system</td>
<td>Defines the requirements for an enterprise's total technical effort related to the development of products and processes that will provide life cycle support for the products</td>
<td>CMMI®) is a process improvement maturity model for the development of products and services. It consists of best practices that address development and maintenance activities.</td>
</tr>
<tr>
<td>Other</td>
<td>~60 pgs [plus separate guide for application] - a hi-level framework [descriptive].</td>
<td>~120 pgs - in between 1220 and 15288 in scope and details.</td>
<td>~85 pgs - less scope but more detailed [prescriptive].</td>
<td>~575 pgs - focus mainly on development; much supplemental info.</td>
</tr>
</tbody>
</table>

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SE standards & models
## SE Standards & Models Life Cycle Phases

<table>
<thead>
<tr>
<th>ISO/IEC 15288</th>
<th>EIA - 632</th>
<th>IEEE 1220</th>
<th>CMMI®-DEV*</th>
<th>DoD/DAG [&amp; DoDI 5000.2]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concept</td>
<td>Pre-system Definition</td>
<td>Concept</td>
<td>concept, exploration, vision</td>
<td>Concept Development</td>
</tr>
<tr>
<td>Development</td>
<td>System Definition, Subsystem Design, Detailed Design</td>
<td>System Def., Subsystem design, Detailed design; FAIT</td>
<td>feasibility, design, development</td>
<td>Technology Development; System Development; Demonstration</td>
</tr>
<tr>
<td>Production</td>
<td>End Product, Physical Integration, Test &amp; Evaluation</td>
<td>Production</td>
<td>production, manufacturing, delivery</td>
<td>Production &amp; Deployment: LRIP</td>
</tr>
<tr>
<td>Utilization</td>
<td>Utilization</td>
<td>operations</td>
<td>Operations &amp; Support [O&amp;S]: FRIP</td>
<td></td>
</tr>
<tr>
<td>Support</td>
<td>Support</td>
<td>support, maintenance, sustainment</td>
<td>O&amp;S: Sustainment</td>
<td></td>
</tr>
<tr>
<td>Retirement</td>
<td>Retirement</td>
<td>disposal, phase out</td>
<td>O&amp;S: Disposal</td>
<td></td>
</tr>
</tbody>
</table>

*inferred
Scope of SE Standards

- IEEE 1220
- EIA 632
- MIL-STD-499B
- ISO/IEC 15288

Level of Detail

Breadth of Scope

Source: S. Sheard, SPC and J. Lake, SMi; 2004
Simple Generic SE Process

Note: Applied to Air Force IT/CSE SE Case Studies; http://www.afit.edu/cse/

Inputs:
- Requirements Analysis
- System Analysis & Control
- Functional Analysis/allocation
- Synthesis

Outputs:

Sources: Mil Std 499A/B and early DAU/DAG guidance
### Clause 4 - General Requirements

1. SE process
2. Policies & procedures for SE
3. Planning the technical effort: Prepare/update engineering plan; schedule; tech plans.
4. Development strategies
5. Modeling & prototyping
6. Integrated repository: data, tools.
8. Specification tree
9. Drawing tree
10. System breakdown structure
11. Integration of the SE effort: concurrent engr., Int. teams.
12. Technical reviews
13. Quality management
14. Product and process improvement: re-engineering, self-assessment, LL.

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### Clause 6 – The SE Process

1. Requirements Analysis
2. Requirements Validation
3. Functional Analysis
4. Functional Verification
5. Synthesis
6. Design Verification
7. Systems Analysis*
8. Control

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* Require-ments/Functional/Design trade studies & assessments

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**Note:** Standard includes detailed flows for each activity; and an example SEMP table of contents

**Sources:** SSCI + mods from IEEE 1220 - 1998

SE standards & models
Processes for Engineering a System
(1999; reaffirmed 2003)

(Source: INCOSE SE Handbook v2)

**ENTERPRISE & AGREEMENT PROCESSES**
- Enterprise Environment Management
- Investment Management
- System Life Cycle Processes Management
- Resource Management
- Quality Management
- Acquisition
- Supply

**SYSTEM LIFE CYCLE PROCESSES**
- Planning
- Assessment
- Control
- Decision-making
- Risk Management
- Configuration Management
- Information Management

**TECHNICAL PROCESSES**
- Stakeholder Requirements Definition
- Requirements Analysis
- Architectural Design
- Implementation
- Integration
- Verification
- Transition
- Validation
- Operation
- Maintenance
- Disposal

**PROJECT PROCESSES**
- Source: INCOSE SE Handbook, v3.0

*Note: Each process has purpose, outcomes, and activities*

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<table>
<thead>
<tr>
<th>Category</th>
<th>Process Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project Management</td>
<td>Project Planning&lt;br&gt;Project Monitoring and Control&lt;br&gt;Supplier Agreement Management&lt;br&gt;Integrated Project Management&lt;br&gt;Risk Management</td>
</tr>
<tr>
<td>Support</td>
<td>Configuration Management&lt;br&gt;Process and Product Quality Assurance&lt;br&gt;Measurement and Analysis&lt;br&gt;Decision Analysis and Resolution</td>
</tr>
<tr>
<td>Engineering</td>
<td>Requirements Management</td>
</tr>
<tr>
<td></td>
<td>Requirements Development&lt;br&gt;Technical Solution&lt;br&gt;Product Integration&lt;br&gt;Verification&lt;br&gt;Validation</td>
</tr>
<tr>
<td>Process Management</td>
<td>Organizational Process Definition&lt;br&gt;Organizational Process Focus&lt;br&gt;Organizational Training</td>
</tr>
</tbody>
</table>

Source: SEI/CMU
Defense Acquisition Guide (DAG)
[Source: Chapter 4 on SE; 11/04]

<table>
<thead>
<tr>
<th>15288</th>
<th><strong>SE Standards/Models Example Mapping - Management</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Project Planning</strong></td>
<td>Planning</td>
</tr>
<tr>
<td><strong>Project Assessment</strong></td>
<td>Assessment</td>
</tr>
<tr>
<td><strong>Project Control</strong></td>
<td>Control</td>
</tr>
<tr>
<td><strong>Decision Making</strong></td>
<td>Systems Analysis (SA)</td>
</tr>
<tr>
<td><strong>Configuration Management (CM)</strong></td>
<td>CM</td>
</tr>
<tr>
<td><strong>Information Management</strong></td>
<td>info dissemination</td>
</tr>
<tr>
<td><strong>Agreement: Acquisition &amp; Supply</strong></td>
<td>Acquisition &amp; Supply</td>
</tr>
<tr>
<td><strong>Enterprise: Environment, Life Cycle, Resource; Quality Mngt.</strong></td>
<td>Environment &amp; Enterprise Support [e.g., resource, process mngt.]</td>
</tr>
<tr>
<td>Stakeholder Requirements Definition</td>
<td>Requirements Analysis</td>
</tr>
<tr>
<td>-----------------------------------</td>
<td>-----------------------</td>
</tr>
<tr>
<td>Systems Analysis (SA)</td>
<td>Requirements and Functional Analysis; SA; Modeling</td>
</tr>
<tr>
<td>Solution Definition</td>
<td>Functional Analysis; Synthesis; SA; Modeling, Specs/drawings</td>
</tr>
<tr>
<td>Implementation; production</td>
<td>prototyping; fabrication, assembly, production</td>
</tr>
<tr>
<td>Integration</td>
<td>Product Integration</td>
</tr>
<tr>
<td>System Verification</td>
<td>Functional &amp; Design Verification; Tech reviews</td>
</tr>
<tr>
<td>Requirements &amp; End Products Validation</td>
<td>Requirements Validation; Tech reviews</td>
</tr>
<tr>
<td>Transition</td>
<td>Transition to Use</td>
</tr>
<tr>
<td>Operation; Maintenance; &amp; Disposal</td>
<td>field support</td>
</tr>
</tbody>
</table>
Imminent Changes

Following is a quick overview of anticipated changes in the SE standards:

- ISO/IEC 15288
- ISO/IEC 12207
- EIA-632
Harmonization of Key Standards Underway

Why?

- Differing concepts, structure, and audience

- First align using a common nomenclature structure for ISO/IEC 15288 & 12207

- Later a general life cycle process to provide a baseline; focus on interoperability and integration

- Goal is a single vocabulary, process set, uniform architecture, shared level of prescription, and suitable across audiences

Sources: Garry Roedler, Lockheed Martin, notes from SC7 subcommittee of ISO/IEC Joint Technical Committee; James W. Moore, Mitre; Harmonization of Systems & Software Engineering Processes; 6/07; brief to ASQ-DC [IEEE and INCOSE supporting]
ISO/IEC 12207:1995 List of Processes

Processes, Activities, and Tasks

Primary Life Cycle Processes
Acquisition Process*
Supply Process*
Development Process [to be addressed]
Operation Process*
Maintenance Process*

Organizational Life Cycle Processes
Management Process**
Infrastructure Process*
Improvement Process**
Training Process**

Supporting Life Cycle Processes
Documentation Process
Configuration Management Process*
Quality Assurance Process**
Verification Process*
Validation Process*
Review process
Audit Process
Problem Resolution Process

*Maps directly to 15288:2007
** maps indirectly to 15288:2007

Sources: Anatol Kark, Canadian National Research Center via Karen Richter, IDA, in support of DUSD(A&T) SSE/SSA; 10/07

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System Life Cycle Processes

**Agreement Processes**
- Acquisition Process (Clause 6.1.1)
- Supply Process (Clause 6.1.2)

**Project-Enabling Processes**
- Life Cycle Model Management Process (Clause 6.2.1)
- Infrastructure Management Process (Clause 6.2.2)
- Project Portfolio Management Process (Clause 6.2.3)
- Human Resource Management Process (Clause 6.2.4)
- Quality Management Process (Clause 6.2.5)

**Project Processes**
- Project Planning Process (Clause 6.3.1)
- Project Assessment and Control Process (Clause 6.3.2)
- Decision Management Process (Clause 6.3.3)
- Risk Management Process (Clause 6.3.4)
- Configuration Management Process (Clause 6.3.5)
- Information Management Process (Clause 6.3.6)
- Measurement Process (Clause 6.3.7)

**Technical Processes**
- Stakeholder Requirements Definition Process (Clause 6.4.1)
- Requirements Analysis Process (Clause 6.4.2)
- Architectural Design Process (Clause 6.4.3)
- Implementation Process (Clause 6.4.4)
- Integration Process (Clause 6.4.5)
- Verification Process (Clause 6.4.6)
- Transition Process (Clause 6.4.7)
- Validation Process (Clause 6.4.8)
- Operation Process (Clause 6.4.9)
- Maintenance Process (Clause 6.4.10)
- Disposal Process (Clause 6.4.11)

*Changes are highlighted*

Source: Anatol Kark, Canadian National Research Center via Karen Richter, IDA, in support of DUSD(A&T) SSE/SSA; 10/07
ISO/IEC 12207: Development Process
[Similar to 12207:1995]

System Context Activities:
- System Requirements Analysis*
- System Architectural Design*
- System Integration*
- System Qualification Testing
- Software Installation
- Software Acceptance Support

Software [SW] Activities:
- SW Implementation
- SW Requirements Analysis
- SW Architecture Analysis
- SW Detailed Design
- SW Coding & Testing
- SW Integration
- SW Qualification Testing

* Maps to ISO/IEC 15288:2007
Technical processes

Note: SW Reuse processes added:
- Domain Engineering
- Reuse Asset Management
- Reuse Program Management

Sources: Anatol Kark, Canadian National Research Center via Karen Richter, IDA, in support of DUSD(A&T) SSE/SSA;10/07; James W. Moore, Mitre; Harmonization of Systems & Software Engineering Processes; 6/07; brief to ASQ –DC.

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## Draft proposal for EIA-632A

(Source: GEIA report; R. Harwell, 11/05 – ood?)

<table>
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<tbody>
<tr>
<td>Planning</td>
<td>Planning</td>
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<tr>
<td>Assessment</td>
<td>Progress Assessment</td>
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<tr>
<td>Control</td>
<td>Control</td>
</tr>
<tr>
<td>Requirements Definition</td>
<td>Concept Definition</td>
</tr>
<tr>
<td>Solution Definition</td>
<td>System Definition</td>
</tr>
<tr>
<td>Product Realization</td>
<td>System Realization</td>
</tr>
<tr>
<td>[Implementation/Transition]</td>
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<tr>
<td>Systems Analysis</td>
<td>Mission &amp; Systems Analysis</td>
</tr>
<tr>
<td>Requirements &amp; End products Validation; System Verification</td>
<td>System V&amp;V</td>
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<tr>
<td>Supply &amp; Acquisition</td>
<td>Customer &amp; Supplier Relationship Management</td>
</tr>
<tr>
<td>Enterprise Support</td>
<td>Resources &amp; Infrastructure</td>
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<tr>
<td>Enterprise Support</td>
<td>Governance</td>
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<tr>
<td>Enterprise support</td>
<td>Life Cycle Portfolio Management</td>
</tr>
</tbody>
</table>
Recent Issues identified as they relate to SE activities:

- NDIA-SE Workshop on SE issues
- DoD SW Engineering Workshop [via NDIA-SE]
- ODUSD(A&T) / SSE Assessment & Support - Program Support Reviews observations
### 2003
- Lack of awareness of SE importance
- Lack of adequate qualified resources
- Insufficient SE tools and environments
- Inconsistent requirements definition
- Poor initial program formulation

### 2006
- Inconsistent SE practices across all life cycle phases
- Insufficient quantity and quality of SE expertise
- Inadequate tools and collaborative environments
- Requirements not well managed or translated
- Insufficient SE early in the life cycle

Source: NDIA SE Conference 10/06; M. Schaffer DUSD(A&T) SSE
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 **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.

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Source: NDIA Top Software Issues Workshop
August 2006; K Baldwin, DUSD(A&T) SSE/SSA
10 Emerging Systemic Issues
[from ODUSD(A&T) SSE/AS Program Support Reviews]

1. Management
   - IPT roles, responsibilities, authority, poor communication
   - Inexperienced staff, lack of technical expertise

2. Requirements
   - Creep/stability
   - Tangible, measurable, testable

3. Systems Engineering
   - Lack of a rigorous approach, technical expertise
   - Process compliance

4. Staffing
   - Inadequate Government program office staff

5. Reliability
   - Ambitious growth curves, unrealistic requirements
   - Inadequate test time for statistical calculations

6. Acquisition Strategy
   - Competing budget priorities, schedule-driven
   - Contracting issues, poor technical assumptions

7. Schedule
   - Realism, compression

8. Test Planning
   - Breadth, depth, resources

9. Software
   - Architecture, design/development discipline
   - Staffing/skill levels, organizational competency (process)

10. Maintainability/Logistics
    - Sustainment costs not fully considered (short-sighted)
    - Supportability considerations traded

*Source: DUSD(A&T) SSE; M Schaeffer, 8/07*
2007 – What a Year!

- INCOSE SE Handbook v 3.1
- Understanding & Leveraging a Supplier’s CMMI Efforts; A Guidebook for Acquirers
- CMMI for Acquisition [CMMI-ACQ]

...and yet to come...

- EIA-632?
- IEEE-1220? [and adoption of latest ISO/IEC 15288, 12207]
- Further Harmonization of ISO/IEC 15288 and 12207
- CMMI®-DEV v2?
ISO/IEC 15288 is becoming a SE process ‘reference’ model

- IEEE – 1220; 2005 updated per ISO/IEC 15288; IEEE adopted the 15288 elaboration; further updates anticipated
- CMMI-DEV v1.2 uses SE standards and models as sources
- ISO/IEC 12207 (SW Engineering processes) is being harmonized with 15288; additionally a ISO/IEC 24748 Guide for LC Mngt. in draft
- INCOSE SE Handbook v3.1, 2007 [applies ISO/IEC 15288; SE Certification will be based on it.
- Coordination also underway with the ISO 9001

DoD supported SE & SWE in Acquisition revitalization activities

- DAG/ SE & T&E are under revision; one area of expansion is Software Engineering
- DAU has implemented a series of SE courses
- DoD Guides:
  - ‘Integrating SE into DoD Acquisition Contracts’
  - ‘System of Systems (SoS) Engineering ‘Guide being piloted
  - ‘SE Plan Preparation Guide’ revised
- NDIA-SE draft Systems Assurance Guide
Acronyms/Definitions

- A&T ‒ Acquisition and Technology [@ODUSD]
- ANSI ‒ American National Standards Institute
- DAU ‒ Defense Acquisition University
- DoD ‒ U.S. Department of Defense
- DoDI ‒ DoD Instruction
- EIA ‒ Electronic Industries Alliance
- GEIA ‒ Government Electronics and Information Technology Association
- IEC ‒ International Electrotechnical Commission
- IEEE ‒ Institute for Electrical and Electronics Engineers
- INCOSE ‒ International Council on Systems Engineering
- ISO ‒ International Standards Organization
- IT ‒ Information Technology
- NDIA ‒ National Defense Industries Association [SE division]
- PMI ‒ Project Management Institute
- SE ‒ Systems Engineering
- SEI ‒ Software Engineering Institute [@Carnegie Mellon U.]
- SEMP ‒ SE Management Plan
- SEP ‒ Systems Engineering Plan
- SSCI ‒ Systems and Software Consortium
- SSA ‒ Software Engineering and Systems Assurance
- SSE ‒ Systems & Software Engineering Directorate [ODUSD (A&T]
- SWE ‒ Software [SW] Engineering
Related Process References

- EIA/IS - 632: 1998 - Processes for Engineering a System
- IEEE 1220: 2005 Application and Management of the Systems Engineering Process
- CMMI®-DEV - Capability Maturity Model Integration® for Development v1.2 (2006) [updating underway]
- Defense Acquisition Guide, Chapter 4 - Systems Engineering; Defense Acquisition University, 2004 [being updated]
- Understanding and Leveraging a Supplier’s CMMI Efforts; DUSD(A&T) SSE; 2007
- PMBOK® PMI’s Project Management Book of Knowledge
References and Links

References:
- “SE Standards & Models Compared” J. Lake (SMi) and S. Sheard (SPC), INCOSE 2004
- “Evolution of a Standard EIA-632” R. Harwell, INCOSE 2006
- “Special Feature: Standards in Systems Engineering” INCOSE Insight; April 2007 (see particularly K. Crowder, D. Kitterman, T. Doran, R. Harwell, and S. Arnold articles)
- CMMI – Next Steps; Kristen Baldwin, ODUSD(A&T) SSE/SSA; CMMI technology Conference; November, 2007
- “Harmonization of Systems and Software Engineering Processes” James W. Moore; Mitre; June, 2007, brief for ASQ-DC meeting
- Issue on Systems Engineering; CROSSTALK, STSC; October 2007

Links:
- CMMI: http://www.sei.cmu.edu/cmmi/
- DAU-DAG: http://akss.dau.mil/dag/
- INCOSE i Standards site: http://www.incose.org/practice/techactivities/standards.aspx
- INCOSE Guide to SE BoK: http://g2sebok.incose.org/
- ISO: http://www.iso.org/iso/home.htm
- NDIA-SE: http://www.ndia.org/Template.cfm?Section=Divisions [then select SE]
- ODUSD (A&T) SSE: http://www.acq.osd.mil/sse/
- Systems & Software Consortium: http://www.systemsandsoftware.org/

Note: If you have problems locating references, contact me at gantzerd@saic.com

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It was found very difficult to ‘map’ planning activities from the various standards & models at this level of detail – so decision was made to just summarize each for your own consideration.

However, it is concluded that some very basic activities that need to be accomplished for planning are…

– the what, why, who, when and how!

ISO/IEC 15288
EIA - 632
IEEE 1220
CMMI®-DEV
PM BoK
INCOSE SE Handbook
ODUSD(A&T)  SSE Technical Planning considerations
5288 - Project Planning Activities

Purpose: to produce and communicate effective and workable project plans

- Identify the project objectives and constraints
- Define the project scope as established in the agreement
- Establish a WBS based on evolving system architecture
- Define and maintain a project schedule based on project objectives and work estimates
- Project achievement criteria for the life cycle stage decision gates, delivery dates and major dependencies on external inputs or outputs
- Define the project costs and plan a budget
- Establish the structure of authorities and responsibilities for project work
- Define the infrastructure and services required by the project
- Plan the acquisition of materials, goods and enabling system services supplied from outside the project
- Generate and communicate a plan for technical mgmt. of the project, including the reviews
- Define the project measures to be generated and the associated data to be collected, validated and analyzed
- Generate a project quality plan

Source: ISO /IEC 15288
Process Implementation Strategy
- stakeholders, applicable docs, process approaches, LC phases, integration, reporting requirements, implementation

Technical Effort Definition
- Requirement types, db, risk mngt. process metrics, metrics/quality, cost objectives, TPMs, tasks, methods & tools, technology

Schedule & Organization
- Event& calendar based schedules, resources, staffing/disciplines, team/ org structure

Technical Plans
- Engineering, Risk mngt., Tech Review, V &V, other

Work Directives
- Work packages, work authorizations

Source: EIA-632
SE standards & models
“Prepare and Implement the technical plans and schedules to guide the project toward accomplishment of its objectives and proper conclusion.”

- Engineering Plan [example SEMP content]
- Master and Detail Schedules
- Technical Plans
- Developmental Strategies
- Modeling & Prototyping
- Integrated Repository, Data, Tools, and Integrated Data Package
- Hw, SW, Humans
- Life Cycle Processes
- Specifications and Drawing Trees; SBS
- Integration the SE Effort
- Tech Reviews
- Quality Management
- Product & Process Improvement

Source: IEEE - 1220
Purpose: to supply and maintain plans that define project activities.

- Establish Estimates
  - Estimate scope
  - Establish Estimates of work products/attributes
  - Define life cycle
  - Determine effort & cost estimates

- Develop Project Plan
  - Establish budget & schedule
  - Identify risks
  - Plan for data management,
  - Plan for resources; Needed knowledge & skills
  - Plan stakeholder involvement
  - Establish the Plan

- Obtain commitment to the Plan
  - Review plans that affect project
  - Reconcile work & resource levels
  - Obtain commitment

Other key process area relationships: – Requirements Development, Project Monitoring & Control, Supplier Agreement Mngt. , Integrated PM, Risk Mngt., Measurement & Analysis, …
VI: Generic Practices for all process areas

- Perform the planning process
- Establish & maintain an Org policy for planning process
- **Plan the planning process**
- Provide resources
- Assign responsibility
- Train people
- Manage configurations
- Identify and involve relevant stakeholders
- Monitor and control the planning process
- Objectively evaluate adherence to the planning process
- Review status with higher level management

*Source: CMMI®-DEV*
Figure 5-2 Context Diagram for the Project Planning Process

Source: INCOSE SE Handbook v3.1
Project Management – Book of Knowledge (PMBOK) – Project Management area

- Scope*
- Integration
  (charter, scope statement, PMP)
- Communication*
- Risk*
- Quality*
- Human Resources*
- Time (definition, sequencing, estimation)
- Cost (estimation, budgeting)
- Procurement (purchase, acquisition, contracting)

* Apply Planning, Execution & Control to each area

* Note: DoD PMBoK Extension (2003 also covers SE, SW Acquisition, Logistics, T&E, Manufacturing

Source: www.PMI.org; 3rd Edition, 2004
Manage a Comprehensive Set of Requirements
- Define project scope with key stakeholders [FoS, SoS]
- Formulate, assess, select the preferred system concept
- Develop explicit and testable system/project requirements
- Develop a WBS [products & process]

Resource & Staffing to the Technical Plan
- Organize and staff the project team [PM, Lead SE, IPTs]
- Estimate the time and resource requirements [IMS, EVMS]
- Develop a project critical path
- Develop a project budget

Develop and Managing Technical Baselines
- Identify, manage, and mitigate project risks [technical]
- Manage project changes and customer expectations

Managing Event-based Technical Reviews

Integrating Tech Planning into overall Program Planning & Management Context [IMP/IMS, EVMS, program Risks]

Note: DoD is updating DAG/SE, DoDI 5000.2, and SEP Prep Guide just updated
JUSD (AT&L) Organization

USD, Acquisition Technology & Logistics

DUSD, Acquisition & Technology

- Dir, Joint Advanced Concepts
- Dir, Systems and Software Engineering
- Dir, Portfolio Systems Acquisition
- Defense Acquisition University
- Defense Procurement and Acquisition Policy
- Industrial Programs
- Small Business Programs
- Defense Contract Management Agency

Flatter, Leaner, Empowered!
An Organizational Construct

Director, Systems & Software Engineering

- Deputy Director
  Enterprise Development
- Deputy Director
  Developmental Test & Evaluation
- Deputy Director
  Software Engineering & System Assurance
- Deputy Director
  Assessments & Support

NEW

Management Visibility – Best Practices – Acquisition Excellence
Systems and Software Engineering Mission Statement

- Shape acquisition solutions and promote early technical planning
- Promote the application of sound systems and software engineering, developmental test and evaluation, and related technical disciplines across the Department's acquisition community and programs
- Raise awareness of the importance of effective systems engineering and drive the state-of-the-practice into program planning and execution
- Establish policy, guidance, best practices, education, and training in collaboration with academia, industry, and government communities
- Provide technical insight to program managers and leadership to support decision making

Source: DOD(A&T) SSE; M Schaeffer, 8/07

We continue to evolve as the challenges change