QinetiQ

North America

Systems Engineering Standards & Process Architectures

NDIA Systems Engineering Conference
SE Standards Panel

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The Role of Systems Engineering Standards In Process Definition

- Recognized Systems Engineering Standards contain standard processes and activities for engineering systems:
  - ✓ ANSI/EIA-632, Processes for Engineering A System
  - ✓ ISO/IEC-15288, Systems &Software Engineering –System Life Cycle Processes
  - ✓ ISO/IEC-12207, Systems &Software Engineering –Software Life Cycle Processes
  - ✓ ISO/IEC-26207 (1220), Application and Management of the Systems Engineering Processes
  - ✓ CMMI-DEV, Capability Maturity Model Integration – For Development
  - ✓ INCOSE SE Handbook, A Guide for Life Cycle Processes and Activities
- To actually accomplish systems engineering, an organization may use any or all standards to define how they will apply systems engineering to programs
- A standard establishes technical requirements for processes --

Source: Defense Acquisition Guidebook, Chapter 4. Systems Engineering, Sections 4.2.1 & 4.4.18

To define a set of organizational processes that are robust, descriptive and suitable, -- The organization should consult multiple sources, including (SE) standards, select suitable ones, and use them as a baseline--

Source: CMMI-DEV, Second Edition, Page 97

Applying Process Standards In Process Definition

For well over ten years we have leveraged this guidance in the DAG and CMMI to develop integrated sets of technical processes for used by Navy organizations

Five examples are shown on the slides that follow:

1. **Process Architecture (System View)**
2. **Process Architecture (Technical View)**
3. **Process Framework for a SE Guide (Technical View)**
4. **An individual Process-to-source worksheet (simple process example)**
5. **An individual Process-to-source worksheet (more complex example)**

Example #1

Process Architecture – System View

(Process *Asset* Relationships)

Standard Process Assets Architecture (SPAA)

Project-Focused; Life Cycle-Oriented; CMMI & Related Standard-Based

Category 100 Processes — Organizational Level Processes

1.1.0 Strategic Focus	1.2.0 Process Innovation	1.3.0 Process Definition	1.4.0 Process Improvement	1.5.0 Quality Assurance	1.6.0 Integrated teams	1.7.0 Performance Measurement & Analysis	1.8.0 Project Oversight & Control

Life Cycle (LC) Model

Pre-Development			Development			Post-Development		
LC 1 2.1.0 Requirements Analysis & Proposal	LC 2 2.2.0 Analysis	LC 3 2.3.0 Project Planning	LC 4 2.4.0 Design	LC 5 2.5.0 Production	LC 6 2.6.0 Testing	LC 7 2.7.0 Operation / LC 8 2.8.0 Support		LC 9 2.9.0 Retire

Category 200 Processes — Engineering Processes: 50 to 70+ processes in "expert mode" format

• Eval cust reqs • Translate cust reqs • Develop tech solution • Identify WBS • Estimate size • Est effort/cost • Create proposal	• Id and analyze system reqs • Develop prelim logical design	• Prepare, update & approve the project plans	• Design synthesized physical design • Design applications • Design database	• Code SW • Assemble HW • Unit integration tests • Create user docs	• Function & system tests • OT&E I/II • QT&E I/II	• Site survey • Site prep • Install product • Conduct training • Transition to customer	• Provide user support • Provide feedback to program office	• Collect lessons learned • Remove systems • Conduct final customer follow-up

Category 300 Processes — Organizational Engineering/Support Processes

3.1.0 Configuration Management	3.2.0 Risk Management	3.3.0 Decision Support	3.4.0 Management Other	3.5.0 Contract Management	3.6.0 Material Procurement	3.7.0 Information Management	3.8.0 Training Processes	3.9.0 General Support

Process Related Assets

Reference Assets:
- Policy Docs
- Guidance
- Handbooks
- Standards

Implementing Assets:
- Templates
- Forms
- Checklists
- Tools

Life Cycle Model Descriptions

Lexicons

Example #2

Process Architecture – Technical View
(OSSP* Processes – Relationships to Standards)

ID #	Process Name	CMMI	NSEG	EIA 632	IEEE 1220	ISO 15288 (2008)	ISO 12207 (2008)
1	Organizational Innovation and Deployment (OID)	5					
2	Causal Analysis and Resolution (CAR)	5					
3	Organizational Process Performance (OPP)	4					
4	Quantitative Project Management (QPM)	4					
5	Organizational Process Focus (Improvement) (OPF)	3			4.14		
6	Organizational Process Definition (OPD)	3			5.6	5.2.3	
7	Organizational Training – Plan Development (OT)	3					
8	Project Investment Management (new projects)					6.2.3	
9	Project Initiation and Proposal (PMBOK)						
10	Work Breakdown Structure-Create (WBS) (PMBOK)						
11	Project Cost Estimation (PMBOK)						
12	Project Planning/Documentation	2				6.3.1	6.3.1
13	Project Management					6.3	
14	Project Management Reviews						
15	Integrated Project Management/teaming (IPM)	3			4.11	5.2.1	
16	Supply Products and Services Process		SP 1	1			
17	Acquisition Products and Services Process		SP 2	2		6.1.1	6.1.1
18	Supplier Agreement/Performance Management (SAM)	2	SP 3	3		6.1.2	6.1.2
19	Process Implementation Strategy Planning		SP 4	4			
20	Process Tailoring Process (INCOSE)					5.3.4	
21	Technical Effort Definition		SP 5	5			
22	Activity Organization and Scheduling		SP 6	6			
23	Technical Plan Documentation		SP 7	7	4.3		
24	Work Directives/Instructions/Tasks Definition		SP 8	8			
25	Progress Assessment – of Plan s and Schedules		SP 9	9		5.3.2	
26	Progress Assessment – of Requirements Achieved		SP 10	10			

Notes-Other References:
ID# 9 Reference PMBOK Section 3.2.1, ANSI/PMI-STD-99-001-2004
ID# 10 Reference MIL-HDBK-881, PMBOK Section 5.3, ANSI/PMI-STD-99-001-2004
ID# 11 Reference PMBOK Section 7.1, ANSI/PMI-STD-99-001-2004
ID# 20 Reference INCOSE, Systems Engineering Handbook v2.0, July 2000, Section 5
ID# 52 Reference IEEE-STD 1012-2004, IEEE Computer Society
ID# 53 Reference PMBOK Section 4.7, ANSI/PMI-STD-99-001-2004
Note: Additional software specific processes in ISO-12207 of 2008

*** OSSP = Organizational Set of Standard Processes**

Example #2 (continued)

Process Architecture – Technical View (2)

(OSSP Processes – Relationships to standards)

ID #	Process Catalog #	Process Name	CMMI	NSEG	EIA 632	IEEE 1220	ISO 15288 (2008)	ISO 12207 (2008)
27	PR 2.6.3	Systems Engineering Technical Reviews (SETR)		SP 11	11	4.12		
28	PR 1.8.4	Project Monitoring and Control (PMC)	2	SP-12	12	6.8	6.3.2	6.3.2
29	PR 1.7.1	Measurement and Analysis (M&A)	2				6.3.2	
30	PR 3.2.1	Risk Management (RSKM)	3	SP 24	24		6.3.4	6.3.4
31	PR 3.1.1	Configuration Management (CM)	2				6.3.9	6.3.9
32	PR 1.5.2	Quality Assurance (product and process) (PPQA)	2			4.13	6.2.5	6.3.5
33	PR 3.3.1	Decision Analysis and Resolution (DAR)	3				6.3.3	6.3.3
34	PR 3.7.1	Project Information Management		SP 13	13		5.3.6	6.3.6
35	PR 2.1.1	Requirements Development (project) (RD)	3	SP 14	14			
36	PR 2.1.2	Requirements Identification (stakeholder)		SP 15	15		6.4.1	6.4.1
37	PR 2.1.3	Requirements Identification (technical)		SP 16	16			
38	PR 2.1.4	Requirements Analysis / Management (REQM)	2			6.1-16	6.4.2	6.4.2
39	PR 2.4.1	Technical Solution (design/implement) (TS)	3		5			
40	PR 2.4.6	Architectural Design Definition					6.4.3	6.4.3
41	PR 2.4.8	Logical Solution Definition		SP 17	17	6.3		
42	PR 2.4.9	Physical Solution/Synthesis Definition		SP 18	18	6.5		
43	PR 2.4.12	Design Solution (specifications) Documentation		SP 19	19	4.8		
44	PR 2.4.14	Product Integration (and testing) (PI)	3			5.4	6.4.5	6.4.5
45	PR 2.4.7	Technical Data Package Development				4.6/4.7		
46	PR 2.5.1	Implement the Product Design		SP 20	20	5.5	6.4.4	6.4.4
47	PR 2.7.1	Transition (to use)		SP 21	21		6.4.7	6.4.7
48	PR 2.2.2	Effectiveness Analysis		SP 22	22			
49	PR 2.2.1	Tradeoff Study		SP 23	23			
50	PR 2.6.1	Validation	3	SP 25 to 29	25 to 33	6.2	6.4.8	7.2.5
51	PR 2.6.2	Verification	3	SP 30 to 33	30, to 32	6.6	5.4.6	7.2.4
52	PR 2.6.4	Independent Verification and Validation (IEEE-1012)						
53	PR 2.7.2	Operation (Monitor System Operations)					6.4.9	6.4.9
54	PR 2.8.1	Maintenance (Monitor System Performance)					6.4.10	6.4.10
55	PR 2.9.1	Project Closeout (PMBOK)						
56	PR 2.9.2	Disposal					6.4.11	6.4.11

Notes-Other References:

ID# 9 Reference PMBOK Section 3.2.1, ANSI/PMI-STD-99-001-2004

ID# 10 Reference MIL-HDBK-881, PMBOK Section 5.3, ANSI/PMI-STD-99-001-2004

ID# 11 Reference PMBOK Section 7.1, ANSI/PMI-STD-99-001-2004

ID# 20 Reference INCOSE, Systems Engineering Handbook v2.0, July 2000, Section 5

ID# 52 Reference IEEE-STD 1012-2004, IEEE Computer Society

ID# 53 Reference PMBOK Section 4.7, ANSI/PMI-STD-99-001-2004

Note: Additional software specific processes in ISO-12207 of 2008

Example #3

Systems Engineering Guide Content–to-Sources (Technical View)

(DAG) means "recognized systems engineering process standards and capability models" in paragraph 4.2.1 of the DAG.

SE Guide Content (WBS Level – 2/3) (WBS Level 4/5 in work)	Org process Inventory	Org OSSP	I Org SE Manual	EIA 632 (DAG)	NSEG (DAG 4.6.2)	ISO/IEC 15288 (DAG)	ISO/IEC 12207 (DAG)	DAG (Content)	IEEE 1220 (26702) (DAG)	INCOSE SE HB (DAG)	CMMI DEV (DAG)
Project Evaluation		X									
Project Definition		X									
Project Enabling Processes						X	X				
Supply		X		X	X	X	X			X	
Acquisition		X		X	X	X	X			X	
Work Directives		X			X						
Life Cycle Model Management						X	X			X	
Measurement		X				X	X			X	M&A
Phase or project closure		X									
Technical planning	X	X		X	X	X	X	X	X	X	PP
Process Implementation Strategy		X			X						
Technical Assessment / Control	X	X		X	X	X	X	X	X	X	PMC
Technical Reviews		X		X	X				X		
Interface Management	X							X			
Technical Measurement		X				X	X				
Data/Information Management	X	X		X	X	X	X	X	X	X	TS
Configuration Management	X	X				X	X	X		X	CM
Risk and Opportunity Management	X	X				X	X	X		X	RSKM
Quality Assurance Management		X				X	X		X		PPQA
Contract / Performance Management					X			X			SAM
Stakeholder Requirements Definition	X	X	X	X	X	X	X	X		X	RD
Requirements Analysis / Management	X	X	X		X	X	X	X	X	X	RM
Architectural Design	X	X	X			X	X	X		X	TS
Functional Analysis and Allocation									X		
Logical Solution Definition		X		X	X						TS
Physical Solution Definition		X		X	X						TS
Document Design in Specifications				X	X				X		TS
Implementation/production	X	X	X	X	X	X	X	X		X	TS
Integration	X	X	X			X	X	X		X	PI
Decision Analysis / Trade Offs	X	X		X	X	X	X	X	X	X	DAR
Effectiveness Analysis		X		X	X						
Verification	X	X	X	X	X	X	X	X	X	X	VER
Product Readiness Determination				X	X						
Transition / Installation	X	X	X	X	X	X	X	X		X	TS
Validation	X	X	X	X	X	X	X	X	X	X	VAL
Operations		X	X			X	X			X	
Maintenance		X	X			X	X			X	
Disposal		X	X			X	X			X	

Example #4

Process Activity to Source Worksheet

(There is a worksheet for each of 36 Processes)

(1 of 1 – least complex example)

SE guide-Project or Phase Closure Process-to-Source Worksheet

Process Name: Project or Phase Closure									
ID#	**Process Tasks**	**CMMI**	**DAG4**	**NSEG & 632**	**1220**	**15288**	**12207**	**INCOSE SEG**	**Other (PMBOK)**
1	Plan for project or phase closure a de-staffing								4.7.1
2	Determine if project is complete based on criteria in the agreement, tasking, or the organization's procedure					6.3.2.3 c) 1)			
3	Develop an event-based schedule based on key events, related tasks, and relevant completion criteria for the applicable enterprise-based life cycle phase			4.2.1-6 (a)`					
4	Prepare and utilize Administrative Closure procedure								4.7.3.1
5	Prepare a Contract Closure procedure								4.7.3.2
6	Deliver final product, service or result and arrange for product support								4.7.3.3
7	Perform workplace resources turn-in and closure								4.7
8	Perform workforce reorganization or reassignment.								4.7
9	Collect and submit lessons learned								4.7
10	Collect and archive project records as required by the agreement and/or organizational policy					6.3.2.3 c) 1)			4.7

Example #5

Process Activity-to-Source Worksheet

(1 of 3 Most complex example)

SE guide-RD Process- Process-to-Source Worksheet

Process Name: Stakeholder Requirements Definition									
ID#	**Process Tasks**	**CMMI**	**DAG4**	**NSEG & 632**	**1220**	**15288**	**12207**	**INCOSE SEG**	**Other**
1	**Define Acquirer Requirements**			14					
2	Determine operational concepts and scenarios (CONOPS)	RD SP.1							
3	Determine a definition of required functionality (capability) That corresponds to operational scenarios.	RD SP3.2				6.4.1.3	6.4.1.3. 2.3		
4	Elicit, identify, collect, and prioritize assigned, customer, user, or operator requirements for the system or portion thereof, including and requirements for development, production, test, deployment/installation, training, operations, support/maintenance, and disposal of the systems products.	RD SP 1.2 RD SP 2.1		14 (a)		6.4.1.3 (a)2	6.4.1.3. 2.1	4.2.5 (2)	
5	Allocate requirements down the WBS to system elements and enabling product components	RD SP2.2							
6	Identify Interface Requirements	RD SP2.3							
7	Identify the individual stakeholders or classes of stakeholders who have a legitimate interest in the system or product throughout its life cycle					6.4.1.3 (a)1	6.2.1.3. 1.1	4.2.5 (1)	
8	Define the constraints on a system or product solution that are unavoidable consequences of existing agreements, management decisions, and technical decisions					6.4.1.3 (b)1	6.4.1.3. 2.2	4.2.5 (3)	
9	Define a representative set of activity sequences to identify all required services that correspond to anticipated operational and support scenarios and environments					6.4.1.3 (b)2	6.4.1.3 2.3		
10	Define interactions between users and the system					6.4.1.3	6.4.1.3.		

Note: need definitions of both system elements and enabling elements

Example #5
(continued)

Process Activity-to-Source Worksheet

Stakeholder Requirements Definition Process –to-Source Worksheet (2 of 3)

Process Name: Stakeholder Requirements Definition									
ID#	**Process Tasks**	**CMMI**	**DAG4**	**NSEG & 632**	**1220**	**15288**	**12207**	**INCOSE SEG**	**Other**
	to account for needed skills, knowledge and any limitations (HSI)					(B)5	2.4		
11	Ensure that the resulting set of requirements agrees with the acquirer needs expectations (see Ver. process)			14 (b)					
12	Recorded the resulting set of acquirer requirements in the established database.			14 (c)					
13	**Define Other Stakeholder Requirements**			15					
14	Elicit, identify and collect other stakeholder requirements that can constrain the system's end products			15(a)		6.4.1.3 (b)1			
15	Elicit, identify and collect other stakeholder requirements that can constrain development, production, test, deployment/installation, training, Health, safety, security, environmental, support/maintenance, and disposal of system end products.			15 (b)		6.4.1.3 ((b)4	6.4.1.3. 2.5		
16	Identify and collect other stakeholder constraints such as applicable laws, regulations, policies, technology base, standards and specifications, competitors product capabilities and trends, and interfaces with other evolving systems or platforms.			15 (c)					
16	Ensure that the resulting set of requirements agrees with other stakeholder needs and expectations (see ver process)			15 (d)					
17	Record the resulting set of requirements in the established database (to facilitate RM)			15 (e)					
18	**Define System Technical Requirements**			16					
19	Establish required transformation rules, priorities,			16 (a)					

Example #5 (continued)

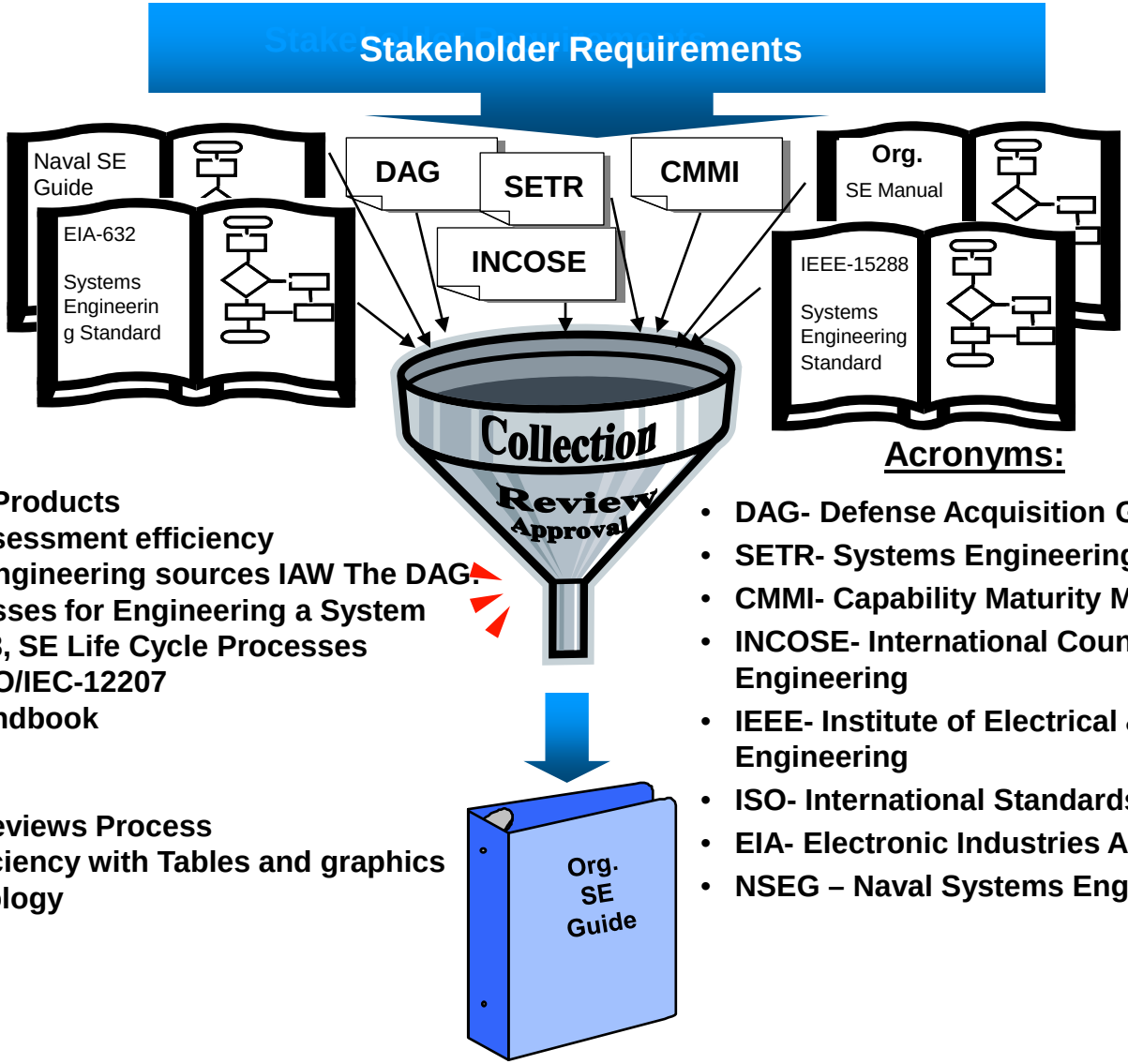
Process Activity-to-Source Worksheet

Stakeholder Requirements Definition Process-to-Source Worksheet (3 of 3)

Process Name: Stakeholder Requirements Definition									
ID#	**Process Tasks**	**CMMI**	**DAG4**	**NSEG & 632**	**1220**	**15288**	**12207**	**INCOSE SEG**	**Other**
	inputs, states, modes, and configurations, as appropriate to each system product.								
20	Define operational requirements to include operational profiles, and for each operational	RD SP 3.1 SP 3.2		16 (b)					
21	Define the performance requirements (how well each functional requirement must be accomplished), including identification of critical performance parameters. ° Define performance objectives ° Define Affordability objectives /Constraints ° Define schedule constrains ° Define technical constraints			16 (c)				4,2,5 (4) & (5)	
22	Analyze acquirer and other stakeholder requirements to define human factor effects and concerns, establish capacities and timing, define technology and product design constraints, define enabling product requirements, identify conflicts, and determine criteria for tradeoff analysis to resolve conflicts.	RD SP3.3 SP 3.4		16 (d)		6.4.1.3 (C) 1	6.4.1.3. 3.1		
23	Analyze Requirements to achieve Balance	RD SP3.4							
24	Identify and resolve requirements that have questionable utility or have unacceptable risk of not being satisfied.			16 (e)		6.4.1.3 (C)2		4.2.5 (6)	
25	Resolve identified conflicts between sets of acquirer requirements and other stakeholder requirements, and among these sets (tradeoff process)			16 (f)					
26	Select/prepare a set of technical requirement	RD		16 (g)					

Back-up Materials

Systems Engineering Guidebook



Requirements

1. **Engineer Excellent Products**
2. **Map to CMMI for assessment efficiency**
3. **Integrate systems engineering sources IAW The DAG:**
   a. **EIA-632, Processes for Engineering a System**
   b. **ISO/IEEE-15288, SE Life Cycle Processes**
   c. **IEEE-1220 & ISO/IEC-12207**
   d. **INCOSE SE Handbook**
   e. **CMMI-DEV**
4. **Incorporate SETRs**
5. **Incorporate Joint Reviews Process**
5. **Design for user efficiency with Tables and graphics**
6. **Standardize terminology**

Acronyms:

- **DAG- Defense Acquisition Guide**
- **SETR- Systems Engineering Technical Review**
- **CMMI- Capability Maturity Model Integration**
- **INCOSE- International Council on Systems Engineering**
- **IEEE- Institute of Electrical & Electronic Engineering**
- **ISO- International Standards Organization**
- **EIA- Electronic Industries Association**
- **NSEG – Naval Systems Engineering Guide**

Systems Engineering (SE) Manual Content Outline – With Source References (1 of 2)

(DAG) means "recognized systems engineering process standards and capability models" in paragraph 4.2.1 of the DAG.

SE Guide Content (WBS Level – 2/3) (WBS Level 4/5 in work)	Org process Inventory	Org OSSP	Org SE Manual	EIA 632 (DAG)	NSEG (DAG 4.6.2)	ISO/IEC 15288 (DAG)	ISO/IEC 12207 (DAG)	DAG (Content)	IEEE 1220 (26702) (DAG)	INCOSE SE HB (DAG)	CMMI DEV (DAG)
Project Evaluation		X									
Project Definition		X									
Project Enabling Processes						X	X				
Supply		X		X	X	X	X			X	
Acquisition		X		X	X	X	X			X	
Work Directives		X			X						
Life Cycle Model Management						X	X			X	
Measurement		X				X	X			X	M&A
Phase or project closure		X									
Technical planning	X	X		X	X	X	X	X	X	X	PP
Process Implementation Strategy		X			X						
Technical Assessment / Control	X	X		X	X	X	X	X	X	X	PMC
Technical Reviews		X		X	X				X		
Interface Management	X							X			
Technical Measurement		X				X	X				
Data/Information Management	X	X		X	X	X	X	X	X	X	TS
Configuration Management	X	X				X	X	X		X	CM
Risk and Opportunity Management	X	X				X	X	X		X	RSKM
Quality Assurance Management		X				X	X		X		PPQA

Systems Engineering (SE) Manual Content Outline – With Source References (2 of 2)

(DAG) means "recognized systems engineering process standards and capability models" in paragraph 4.2.1 of the DAG.

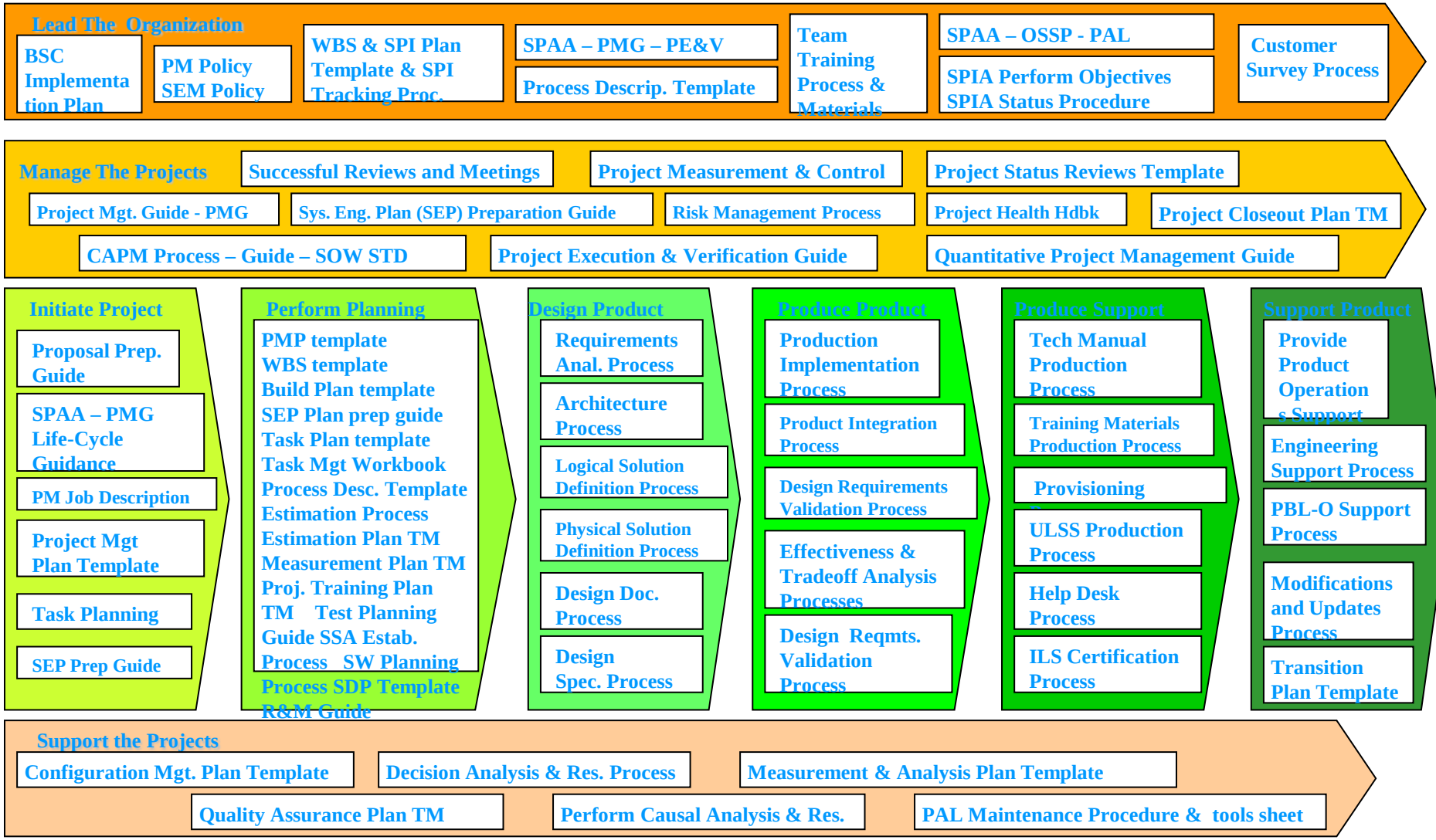
SE Guide Content (WBS Level – 2/3) (WBS Level 4/5 in work)	Org process Inventory	Org OSSP	Org SE Manual	EIA 632 (DAG)	NSEG (DAG 4.6.2)	ISO/IEC 15288 (DAG)	ISO/IEC 12207 (DAG)	DAG (Content)	IEEE 1220 (26702) (DAG)	INCOSE SE HB (DAG)	CMMI DEV (DAG)
Contract / Performance Management					X			X			SAM
Stakeholder Requirements Definition	X	X	X	X	X	X	X	X		X	RD
Requirements Analysis / Management	X	X	X		X	X	X	X	X	X	RM
Architectural Design	X	X	X			X	X	X		X	TS
Functional Analysis and Allocation									X		
Logical Solution Definition		X		X	X						TS
Physical Solution Definition		X		X	X						TS
Document Design in Specifications				X	X				X		TS
Implementation/production	X	X	X	X	X	X	X	X		X	TS
Integration	X	X	X			X	X	X		X	PI
Decision Analysis / Trade Offs	X	X		X	X	X	X	X	X	X	DAR
Effectiveness Analysis		X		X	X						
Verification	X	X	X	X	X	X	X	X	X	X	VER
Product Readiness Determination				X	X						
Transition / Installation	X	X	X	X	X	X	X	X		X	TS
Validation	X	X	X	X	X	X	X	X	X	X	VAL
Operations		X	X			X	X			X	
Maintenance		X	X			X	X			X	
Disposal		X	X			X	X			X	

Systems Engineering (SE) Guide Framework (Applied over the Development Life Cycle)

Life cycles Framework adapted from INCOSE SE Handbook, Figure 3-3.

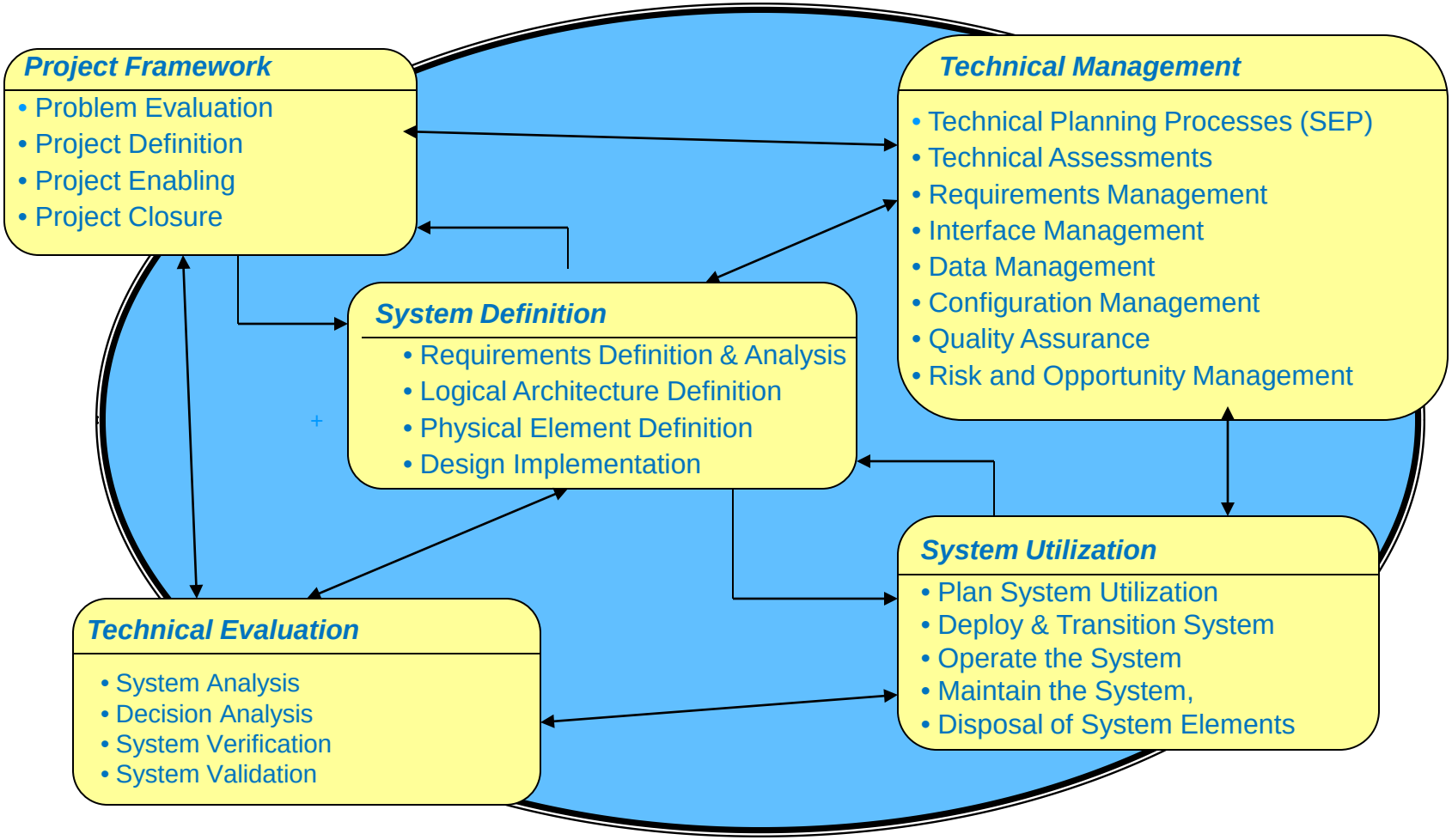
SE Guide Content to Life Cycle Framework	Pre-project Activities	Analysis & Reqmts	Project Initiation	Planning	Preliminary Design	Final Design	Production & Acceptance Testing	Deployment ,Operations & Maintenance	Project Closeout & Product Disposal
SE Guide Content to Tech Reviews Framework	**ITR ASR**	**SFR IBR SRR**	**PDR 1**	**PDR 2**	**CDR SRR**	**PRR SVR**	**TRR OTRR IRR**	**PCA**	**ISR**
Project Evaluation	X								
Project Definition	X								
Project Enabling Processes	X								
Supply	X								
Acquisition	X								
Work Directives	X		X						
Life Cycle Model Management				X					
Measurement				X					
Phase or project closure				X	X	X	X	X	X
Technical planning				X					
Process Implementation Strategy				X					
Technical Assessment / Control				X					
Technical Reviews				X	X	X	X	X	
Interface Management				X					
Technical Measurement				X					
Data/Information Management				X					
Configuration Management				X					
Risk and Opportunity Management				X					
Quality Assurance Management				X					
Contract / Performance Management			X	X					
Stakeholder Requirements Definition		X							
Requirements Analysis / Management		X							
Architectural Design					X				
Functional Analysis and Allocation		X			X				
Logical Solution Definition					X				
Physical Solution Definition					X	X			
Document Design in Specifications					X	X	X		
Implementation/production							X		
Integration						X	X		
Decision Analysis / Trade Offs		X			X			X	
Effectiveness Analysis		X			X	X	X		
Verification					X			X	
Product Readiness Determination			X					X	
Transition / Installation								X	
Validation								X	
Operations								X	
Maintenance								X	
Disposal									X

Process Related Assets Framework (Operational View)



Systems Engineering Technical Framework

The systems engineering technical framework provides an overall structure that shows the life cycle relationships of technical processes. This Framework Becomes the Overall Systems Engineering Process (SEP)



EIA 632 Processes for Engineering A System

Supply Process
- 1- Product Supply

Acquisition Process
- 2- Product Acquisition
- 3- Supplier Performance

Planning Process
- 4- Process implementation Strategy
- 5- Technical Effort Definition
- 6- Schedule & Organization
- 7- Technical Planning
- 8- Work Directives

Assessment Process
- 9- Progress on Plans & Sch.
- 10- Progress on Reqts.
- 11- Technical Reviews

Control Process
- 12- Outcomes Management
- 13- Info Dissemination

Requirements Definition Process
- 14- Acquirer Requirements
- 15- Other Stakeholder Reqts.
- 16- System technical Reqts.

Solution Definition Process
- 17- Logical Solution Def.
- 18- Physical Solution Def.
- 19- Specification

Implementation Process
- 20- Implementation

Transition to Use Process
- 21- Transition To Use

Systems Analysis Process
- 22- Effectiveness Analysis
- 23- Tradeoff Analysis.
- 24- Risk Analysis

Requirements Validation Process
- 25- Reqts. Statements Val.
- 26- Acquirer Requirements Val.
- 27- Other Stakeholder Req. Val.
- 28- System Tech Reqts. Val.
- 29- Logical Solution Reqts. Val.

System Verification Process
- 30- Design Solution Verification
- 31- End Product Verification
- 32- Enabling Product Readiness

End Products validation Process
- 33- End Products Validation

13 Process areas, 33 Technical Processes
208 Technical Activities, 229 outputs by activity

ISO/IEC 15288 Life Cycle Processes

Process Grouping Arrangement -2008 Version- Example B

Organizational Process-Enabling Processes

- Life Cycle Model Management Process
- Infrastructure Management Process
- Project Portfolio Management Process
- Human Resource Management Process
- Quality Management Process

Agreement Processes

- Acquisition Process
- Supply Process

Project Processes

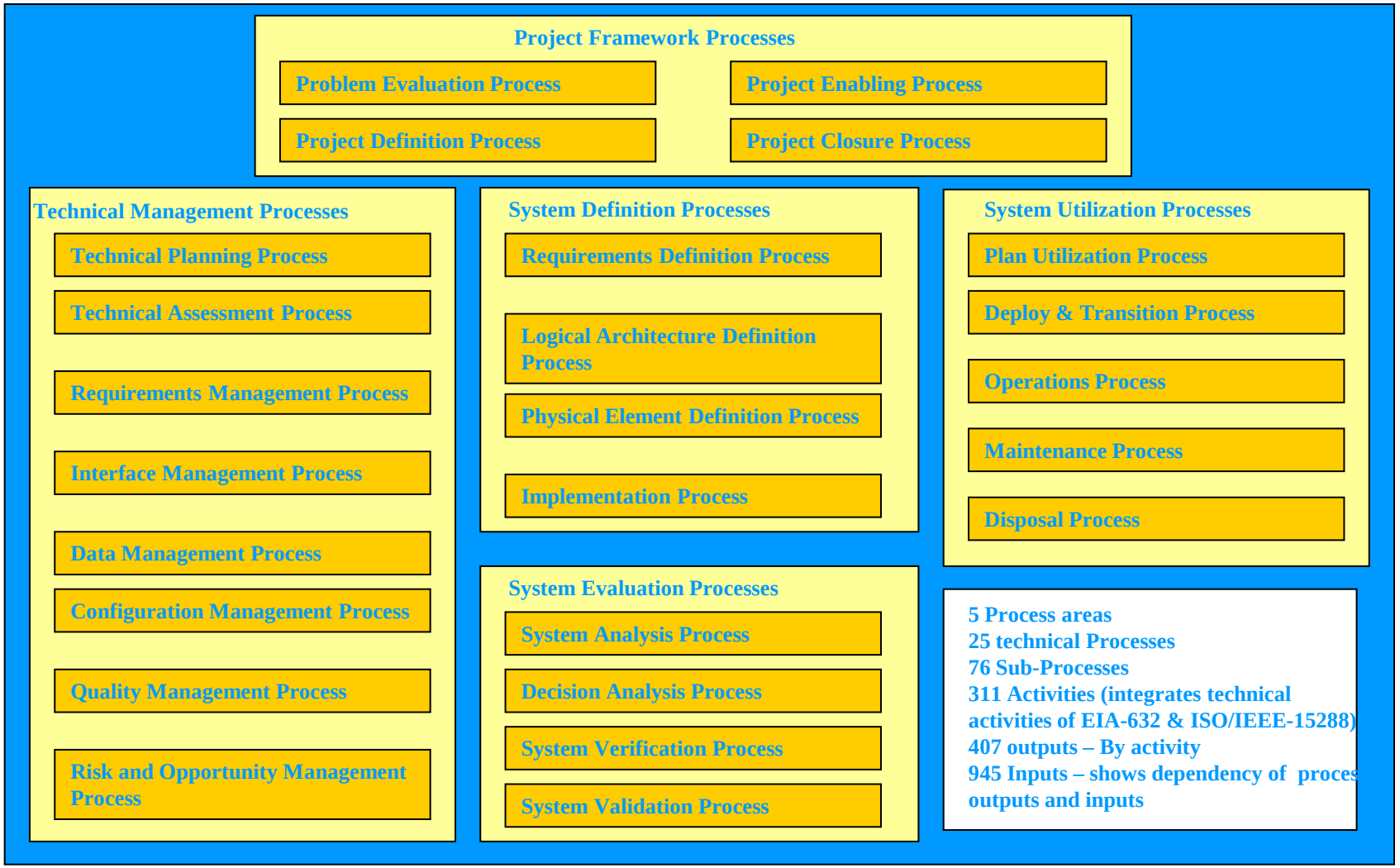
- Project Planning Process
- Project Assessment & Control Process
- Decision Management Process
- Risk Management Process
- Configuration Management Process
- Information Management Process
- Measurement Process

Technical Processes

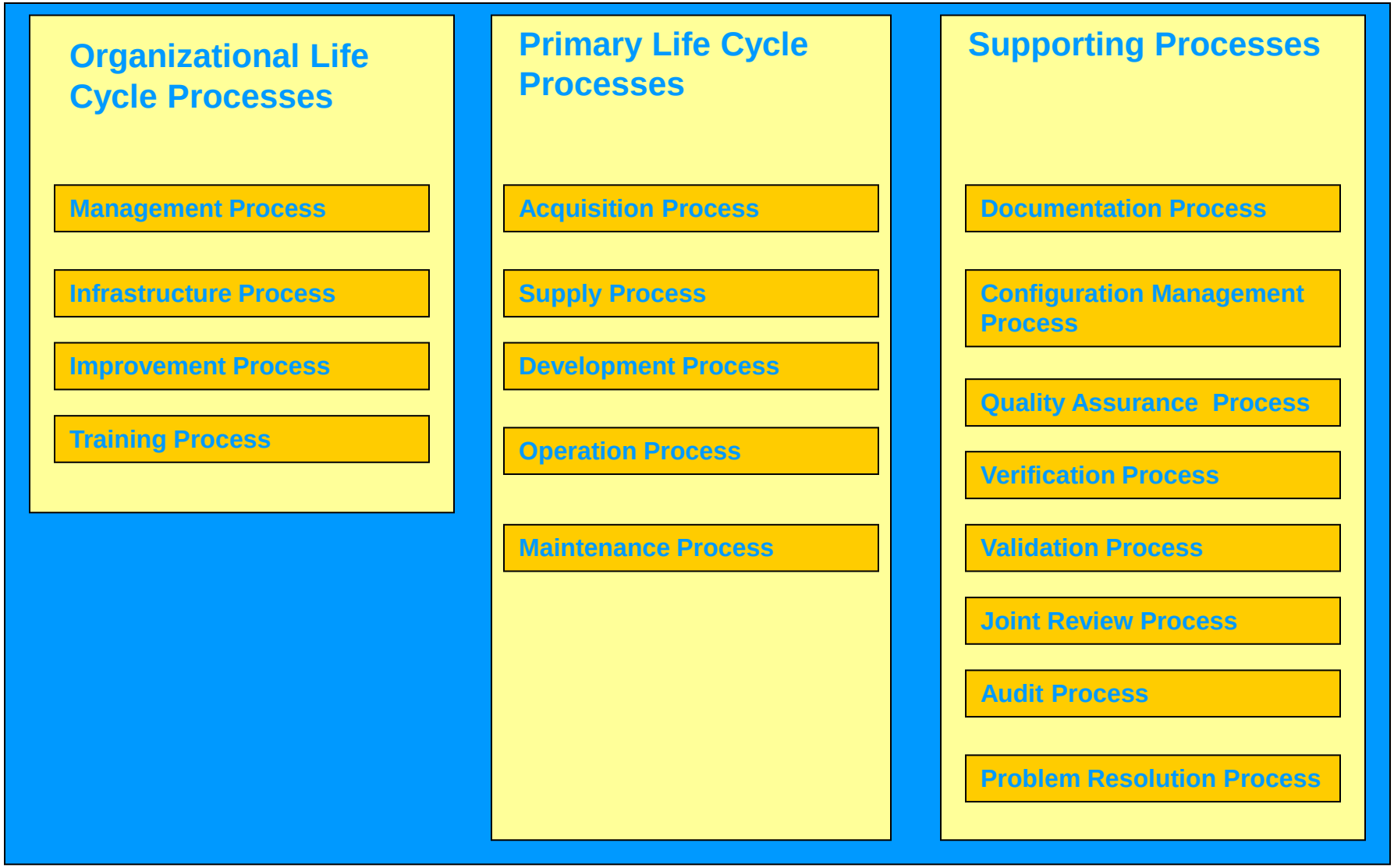
- Stakeholder Requirements Definition Process
- Requirements Analysis Process
- Architectural design Process
- Implementation Process
- Integration Process
- Verification Process
- Transition Process
- Validation Process
- Operation Process
- Maintenance Process
- Disposal Process

4 Process areas, 18 Project &Technical Processes
210 Technical Activities, 112 outputs NOT by activity

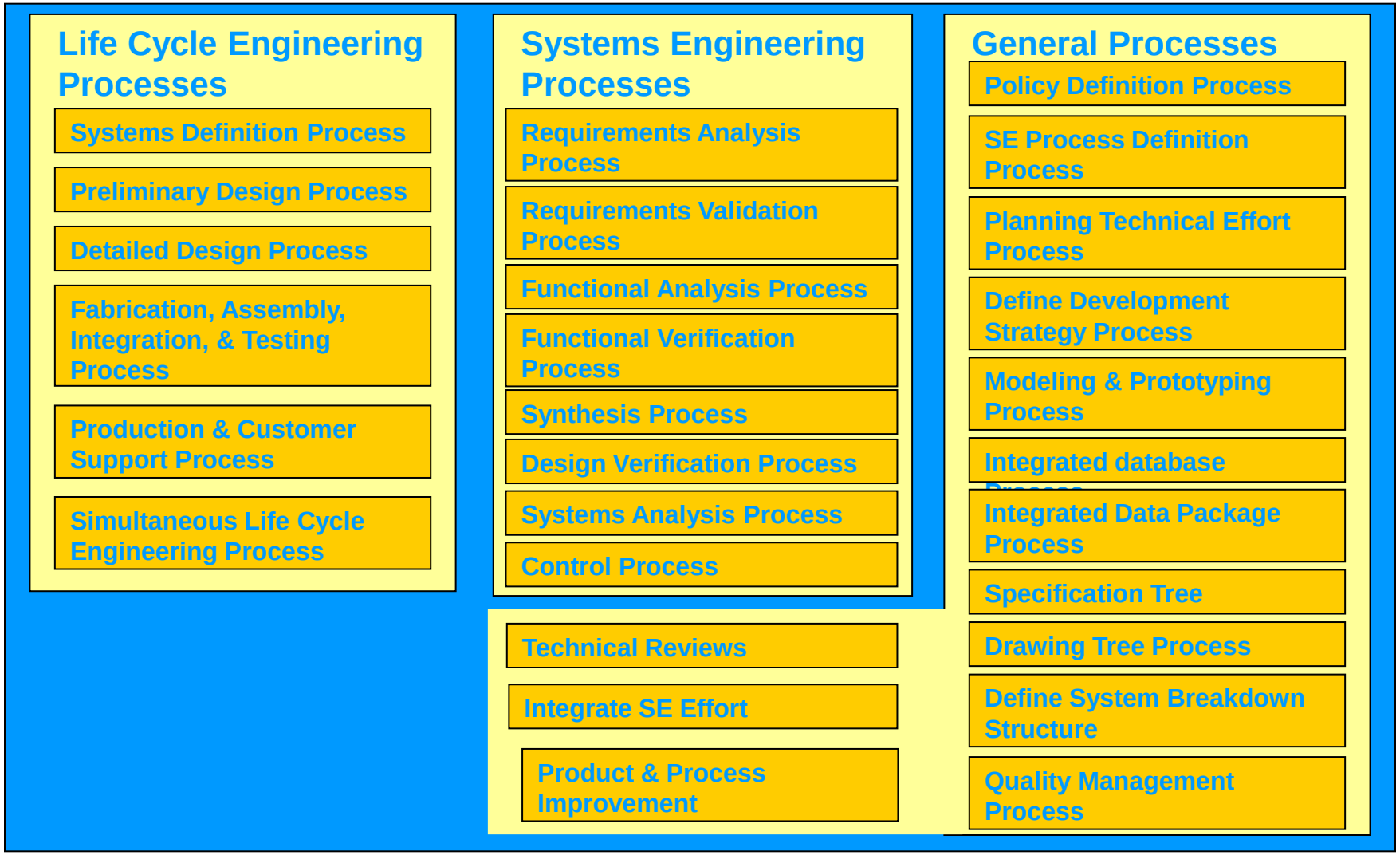
EIA-632A Technical Life Cycle Processes



IEEE/EIA 12207 Software Life Cycle Processes

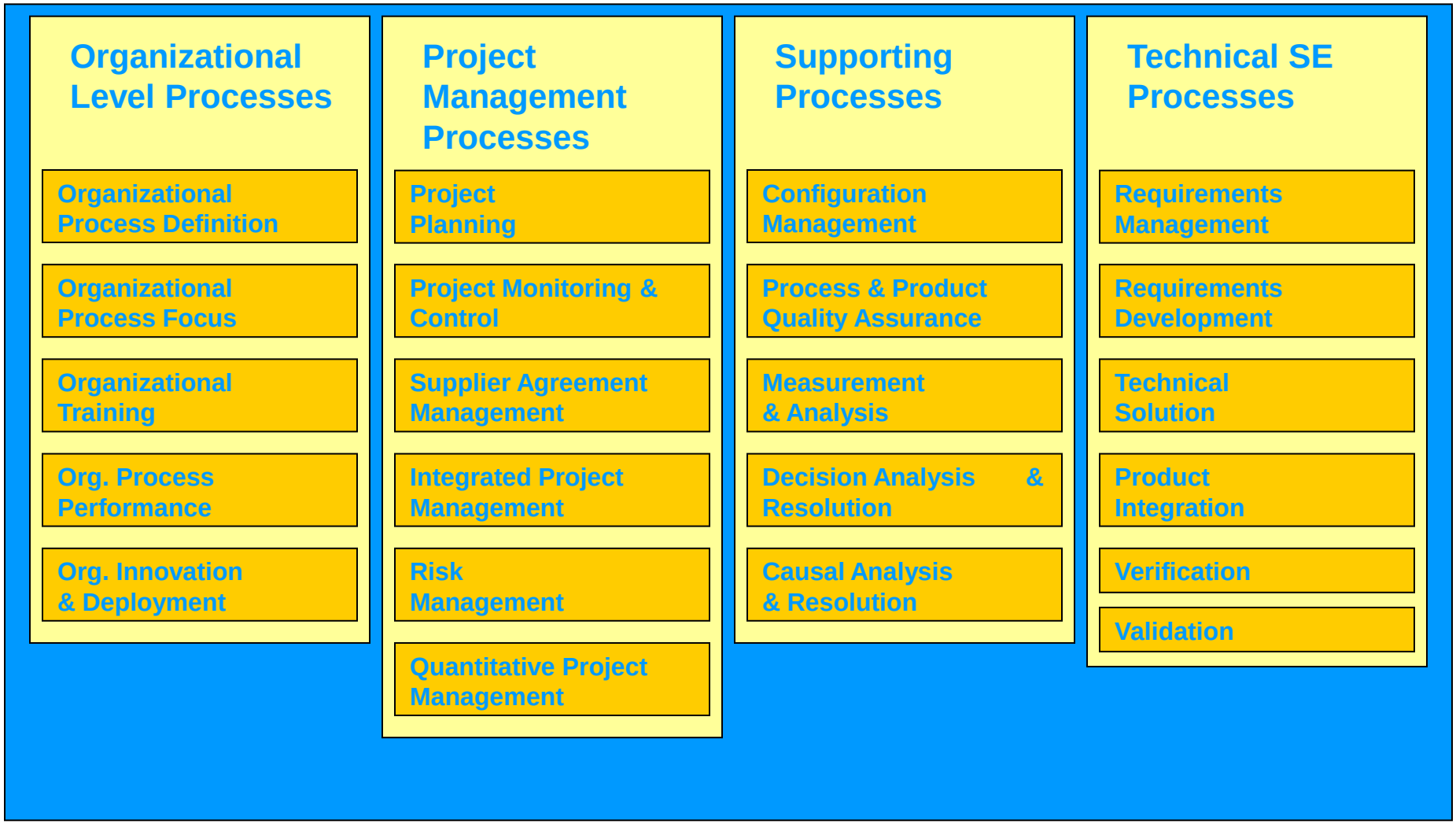


IEEE 1220 - Management of Systems Engineering Processes



CMMI - DEV

Process Grouping Arrangement - Example F



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