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“Harmonization Lite” —A Proposal



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Socialization

- **This started as a proposal of the IEEE Computer Society. We began socializing it ...**
- **... with Garry Roedler, and then ...**
- **... with the US TAG to SC7.**
- **We have incorporated many of their good ideas.**

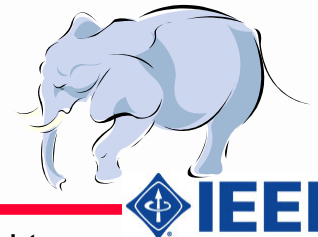
Purpose

- **This presentation offers a plan for doing “just enough” harmonization to ensure compatibility and consistency, yet provide a more acceptable evolution path for users.**
- **It is intended to be executed quickly.**
- **It is intended to meet the following needs:**
 - **Substantially compatible with 12207:1995**
 - **Substantially compatible with 15288:2002**
 - **Support process assessment as well as it is currently supported by 12207 Amd.**
 - **Establish consistent terminology and concepts**

Reduce the Number of Harmonization Issues

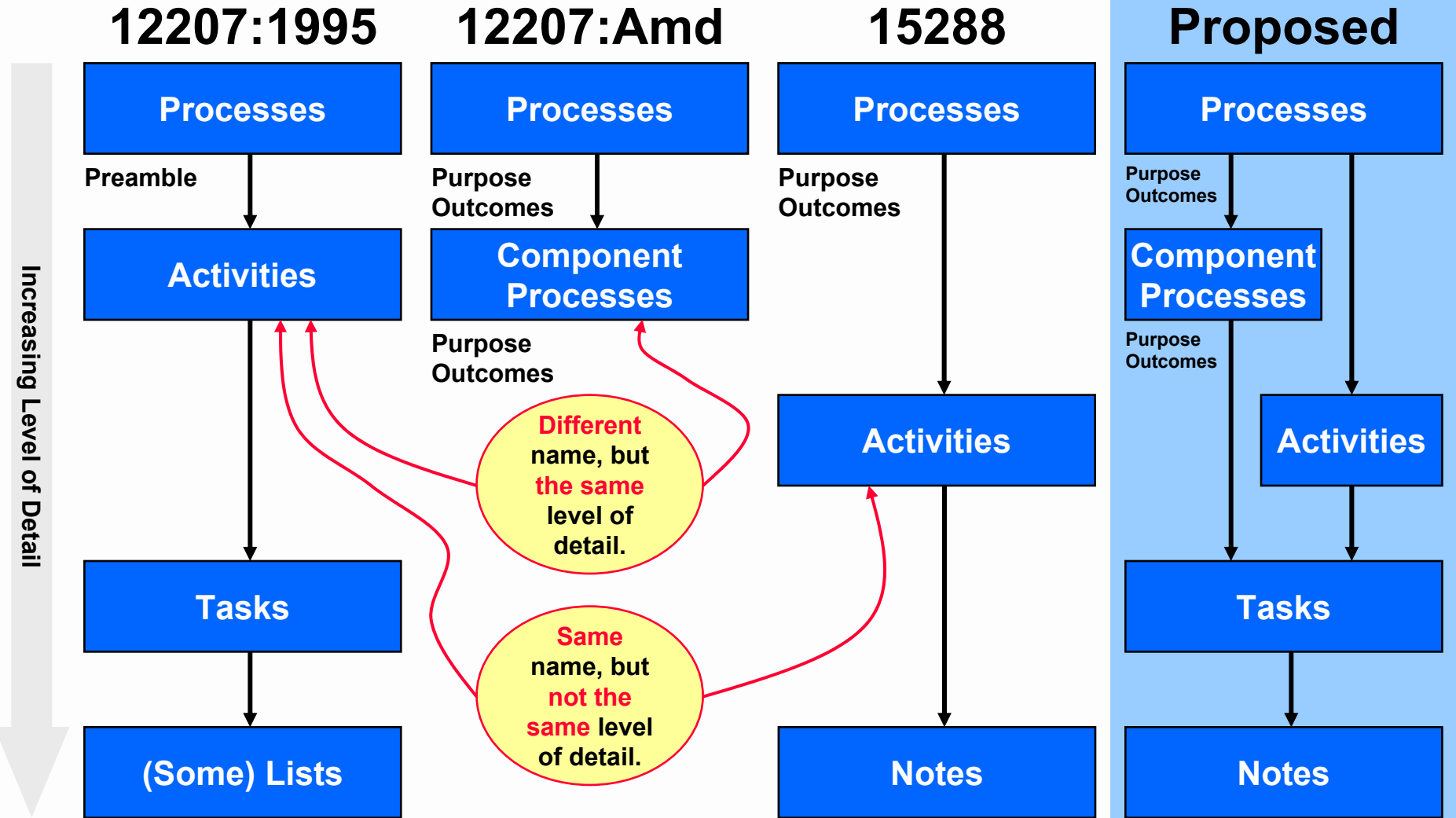
- Simplify as much as possible and perform harmonization in steps.
- First to do the minimum necessary to align the existing documents, including:
 - Common terminology
 - Common process names (where applicable)
 - Adherence to SWG5 guidelines
 - Incorporation of 12207 amendments
 - Annexes in each document for process reference model information (to be used for assessment purposes)
- Advantages to the “Lite” approach
 - Removes difficulties of trying to get to a completely integrated solution in one pass.
 - Defers coming up with a completely integrated set of processes.
 - Defers need to determine integrated document architecture.
 - Allows leveraging current experience with 12207 and 15288.
 - Gives user community a chance to slowly evolve and transition.
- Can focus on full integrated approach with single process architecture and a unified set of documents after the initial alignment.

“Eat the Elephant One Bite At a Time”



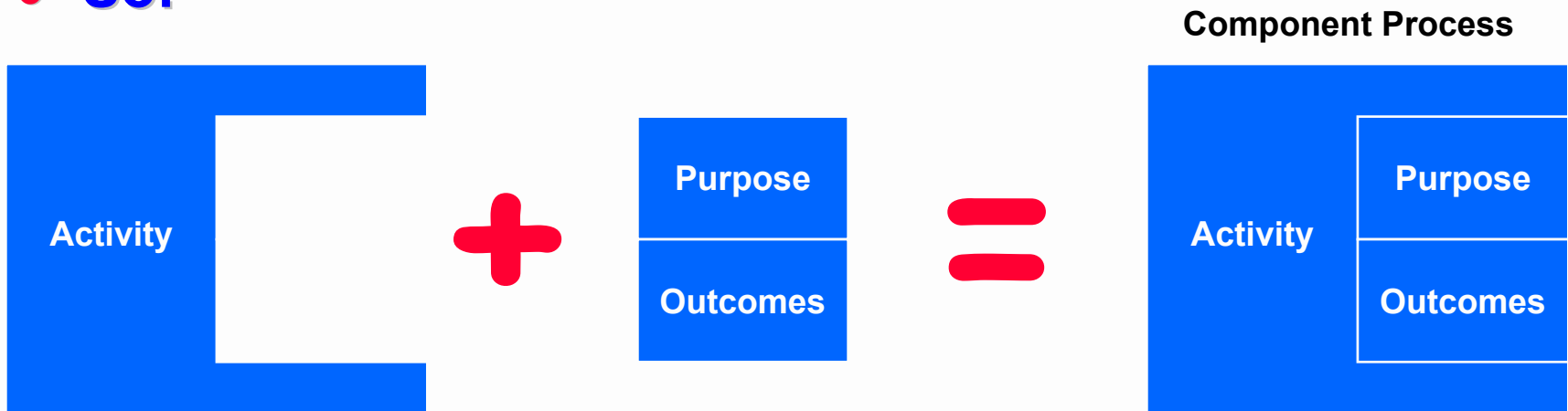
Architectural Constructs

*It is **not** required to use all architecture constructs in any particular document or for any particular process.*



You say “Tomato” ...

- The list of component processes in 12207:Amd is *very similar* to the list of activities in 12207:1995.
- So:



- The name that we choose is *not important*.
- I chose to call it “component process” for this briefing.

Proposed Usage

*It is **not** required to use all architecture constructs in any particular document or for any particular process.*

Other Documents

Other documents copy or reference material from 15288R, 12207R and add activities, tasks and/or guidance within the scope of the processes.

Examples:

- 14764 SW Maintenance
- 15026 (?) Assurance
- 15504 Process Assessment
- 15939 Measurement
- 16085 Risk Management
- 16326 SW Project Management

Increasing Level of Detail

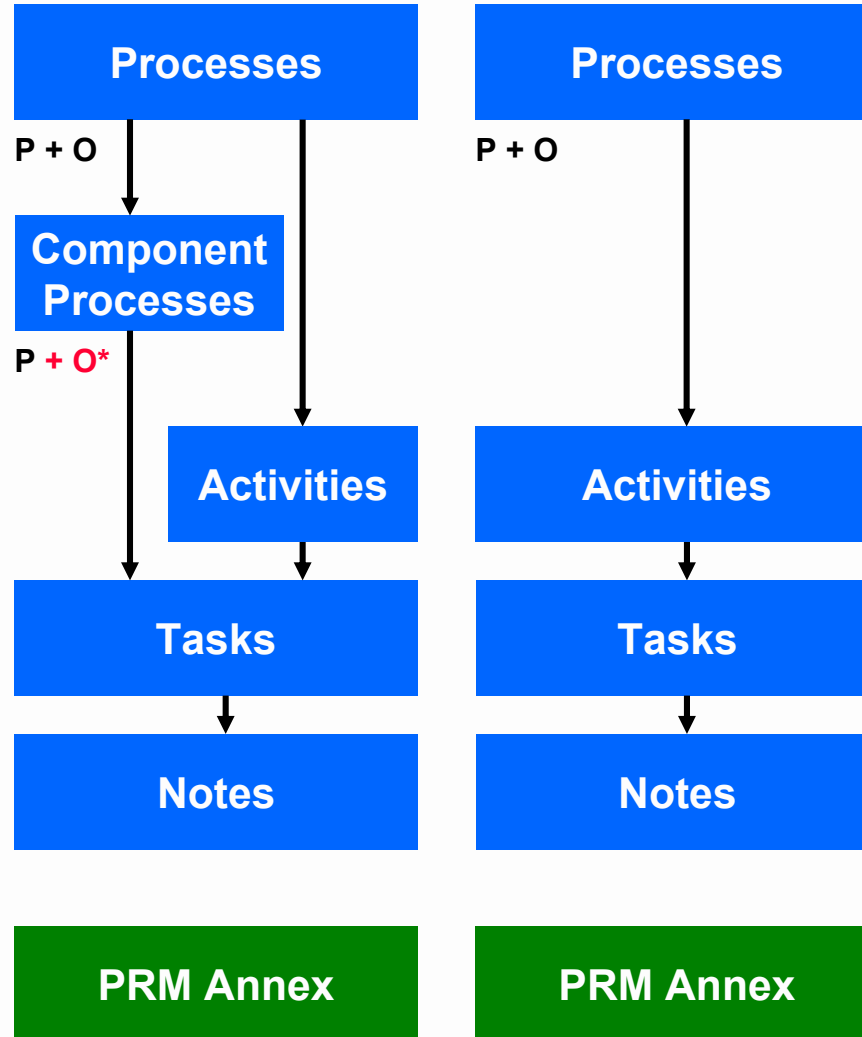
A process is decomposed into component processes when each one has a distinct purpose and outcomes. Otherwise it is decomposed into activities.

**For readability, we might omit the outcomes of the component processes from the body of the standard.*

The PRM annex gathers the purpose and outcome information.

12207R

15288R



Relating Old to New

This chart is an overview.
There will be exceptions to
the general cases.

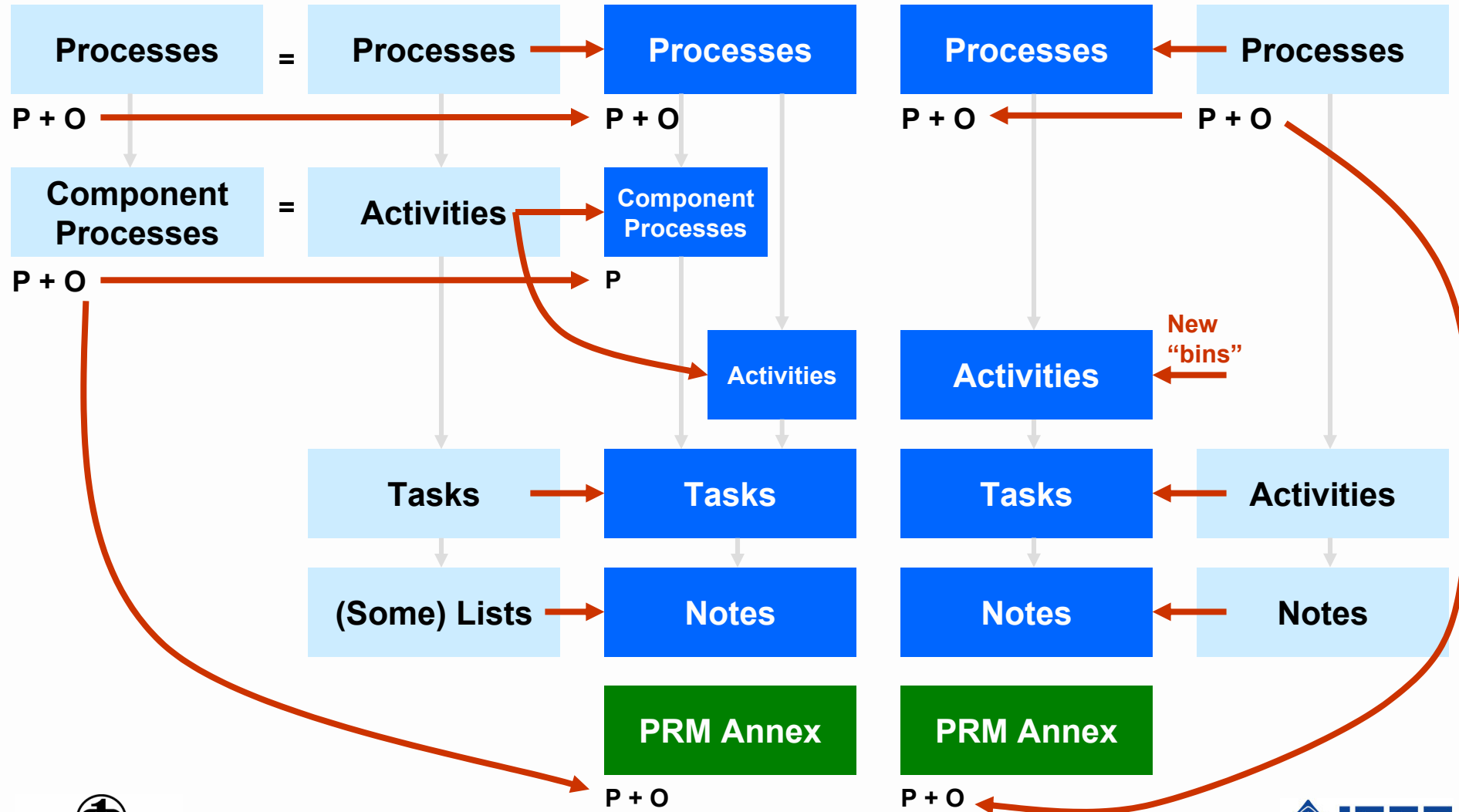
12207:Amd

12207:1995

12207R

15288R

15288:2003



Relationships among Processes

- Process *is-part-of* Process, e.g.
 - SW Detailed Design *is-part-of* SW Implementation
 - (This is the relationship between processes and component processes.)
 - Also, Activity *is-part-of* Process
- Process *is-specialization-of* Process, e.g.
 - SW Implementation *is-specialization-of* Implementation
- Process *contributes-to* Process, e.g.
 - SW Installation *contributes-to* Transition
 - Also, Activity *contributes-to* Process

Considering the Processes

- **We will consider the processes in several groups.**

- **Development group**
- **Downstream group (maintenance, operation, disposal)**
- **Project management and support group**
- **Enterprise group**
- **Agreement group**
- **Left-overs**

The “groups” do not have any architectural significance. They are only labels for the charts in this presentation.

Development Group

The groups are not part of the architecture. They are only here to provide some structure for the discussion.

- **Includes:**
 - **12207 Development Process**
 - **15288 Technical Processes related to development**
- **Key Consideration:**
 - ***Interoperability:* The software and system processes should “talk to each other”.**
- **Approach:**
 - **Capture the **minimal relationships*** necessary to make the software and system processes interoperate.**

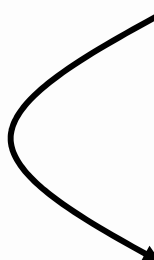
* Key to “Lite” approach

Development Group (Now)

	15288		12207:1995		12207:Amd	Notes
		P	Development	P	Development	
		A	Process implementation			Process implementation is like a "strategy".
P	Stakeholder requirements definition			CP	Requirements elicitation	Amendment added elicitation.
P	Requirements analysis	A	Sys requirements analysis	CP	Sys requirements analysis	
P	Architectural design	A	Sys architectural design	CP	Sys architectural design	
P	Implementation					
		A	SW requirements analysis	CP	SW requirements analysis	
		A	SW architectural design	CP	SW design	The amendment merged these two.
		A	SW detailed design	CP	SW design	
		A	SW coding and testing	CP	SW construction	
		A	SW integration	CP	SW integration	
		A	SW qualification testing	CP	SW testing	The amendment merged two kinds of testing.
P	Integration	A	Sys integration	CP	Sys integration	
P	Verification	A	Sys qualification testing	CP	SW testing	The amendment merged two kinds of testing.
P	Transition	A	SW installation	CP	SW installation	
P	Validation					
		A	SW acceptance support			Amd 1 moved this to supply and Amd 2 generalized it.

Development Group (Proposed)

15288R		12207R	Notes
		(System Context)	User would be allowed to use 15288 instead.
Stakeholder requirements definition	P	[SW] Sys Requirements elicitation	is-specialization-of
Requirements analysis	P	[SW] Sys Requirements analysis	is-specialization-of
Architectural design	P	[SW] Sys Architectural design	is-specialization-of
Implementation (See below)	P	[SW] Implementation (See below)	
Integration	P	[SW] Sys Integration	is-specialization-of
Verification	P	[SW] Sys Qualification Testing	contributes-to
Transition	P	SW Installation	contributes-to
	P	SW acceptance support	contributes-to
Validation			
Implementation	P	SW Implementation	is-specialization-of
	A	SW Impl Strategy (was Process Impl).	For now, these remain specific to software.* Later we can rewrite them to create specialization relationships. Also, we would reverse the Amendments merger of the testing processes and the design processes.
	CP	SW requirements analysis **	
	CP	SW architectural design **	
	CP	SW detailed design	
	CP	SW coding and testing	
	CP	SW integration **	
CP	SW qualification testing **		



** Note: If recursion is applied to a low enough level with 15288, then these are obviated.

* Key to "Lite" approach

- Impact on 15288**
- Possibly some minor modifications to purposes and outcomes.
 - Negligible normative impact.

- Impact on 12207**
- Current development process is broken into two parts.
 - Users are allowed to use 15288 for "System Context" if they prefer.
 - Current activities would become processes with stated purposes and outcomes.
 - Some purposes and outcomes in Amendments might have to be rephrased.
 - Amendment's merger of testing and design processes would be reversed.
 - Negligible normative impact.

Downstream group

The groups are not part of the architecture. They are only here to provide some structure for the discussion.

- **Includes processes related to:**
 - Maintenance
 - Operation
 - Disposal
- **Key Consideration:**
 - *Compatibility: Don't break what exists.*
- **Approach:**
 - Provide economical statements of shared concerns.
 - Provide sub-classes of processes to address unique concerns of systems and software when necessary.

Downstream Group (Now)

	15288 Processes		12207:1995		12207 Amd 1	Notes
P	Operation	P	Operation	P	Operation	
		A	Process implementation			
		A	Operational testing			
		A	System operation	CP	Operational use	Amendment seems broader.
		A	User support	CP	Customer support	Amendment seems broader.
P	Maintenance	P	Maintenance		Maintenance	
P	Disposal					

Downstream Group (Proposed)

15288R		12207R	Notes
Operation	P	[SW] Operation	is-specialization of. User would be allowed to use 15288 instead.
Maintenance	P	[SW] Maintenance	is-specialization-of
Disposal	P	[SW] Disposal	is-specialization-of. User would be allowed to user 15288 instead.

Operation

- The motivation for the additional operations processes in the Amendment is unclear. *Needs additional study.*

Maintenance

- Software maintenance should be a specialization of system maintenance. We need to maintain compatibility with 14764.

Disposal

- 12207 needs a disposal process but the one in 15288 extends well beyond the scope of software. We probably need a simpler disposal process.

Impact on 15288

- Probably little impact.

Impact on 12207

- New Disposal process
- Existing tasks of the maintenance process might be binned into different activities.
- Some tasks of maintenance and operations might be rephrased slightly to clarify that software operation and maintenance are specializations of the system-level processes.

Project Management and Support group

The groups are not part of the architecture. They are only here to provide some structure for the discussion.

- Includes processes related to:
 - 12207 Project Management Processes
 - 12207 Supporting Processes
 - 15288 Project processes
- Key Considerations:
 - *Interoperability*: The software and system processes should “talk to each other”.
 - *Contextual compatibility*: There should be a clear relationship to general project management discipline.
 - *Enterprise relationship*: There should be a clear relationship (but a clear separation of concerns) with enterprise processes.
- Approach:
 - Capture the **minimal relationships*** necessary to make the software and system processes interoperate.
 - Sort out enterprise versus project in 12207 and amendment.
 - Add supporting process concept to 15288.

* Key to “Lite” approach

Project Management and Support Group

15288 Processes		12207:1995		12207 Amd 1	PMBOK	Approach
			P	Management		<i>Treated in Enterprise group</i>
			C	Organizational alignment		
			C	Organizational management		
	P	[Project] Management	C	Project Management		In both 15288 and 12207, five processes (or five activities) similar to PMBOK process groups. This implies some additional processes in 15288 and some rebinning in 12207. Name processes: <i>Project Initiation, Planning, Execution, Assesment & Control, and Project Closure</i> .
	A	Initiation and scope defn			Initiating	
Project planning	A	Planning			Planning	
	A	Execution and ...			Execution	
Project control		... control			Controlling	
Project assessment	A	Review and evaluation				
	A	Closure			Closing	
			C	Quality management		<i>Treated in Enterprise group</i>
Risk management			C	Risk management		Relabel as supporting process and use purpose and outcomes from 16085.
			C	Measurement		Relabel as supporting process and use purpose and outcomes from 15939. Add to both 12207 and 15288. Will require rebinning some activities and tasks.
Decision-making						Recharacterize as "trade-off analysis" or "decision analysis" (distinct from product evaluation), label as a supporting process, and add to 12207.
		(Supporting processes)				
Information management	P	Documentation	P	Documentation		Reconcile into a single supporting process
Configuration management	P	[SW] Configuration management	P	[SW] Configuration Management		(Merge or leave separate?)
	P	[SW] Quality assurance	P	[SW] Quality Assurance		* Key to "Lite" approach
	P	[SW] Verification process	P	[SW] Verification		
	P	[SW] Validation process	P	[SW] Validation		
	P	Joint review process	P	Joint Review		
	P	Audit process	P	Audit		
	P	Problem resolution process	P	Problem Resolution		
			P	Change management		
			P	Usability		
			P	Product evaluation		Relabel as supporting, use purpose and outcome from Amd, add to 12207 and 15288.

Impact on 15288

- A new class of "supporting processes"
- A few new processes
- Some rebinning of existing outcomes and activities.

Impact on 12207:1995

- A few new processes.
- Some rebinning of existing tasks.
- Possibly a few changes to Documentation.

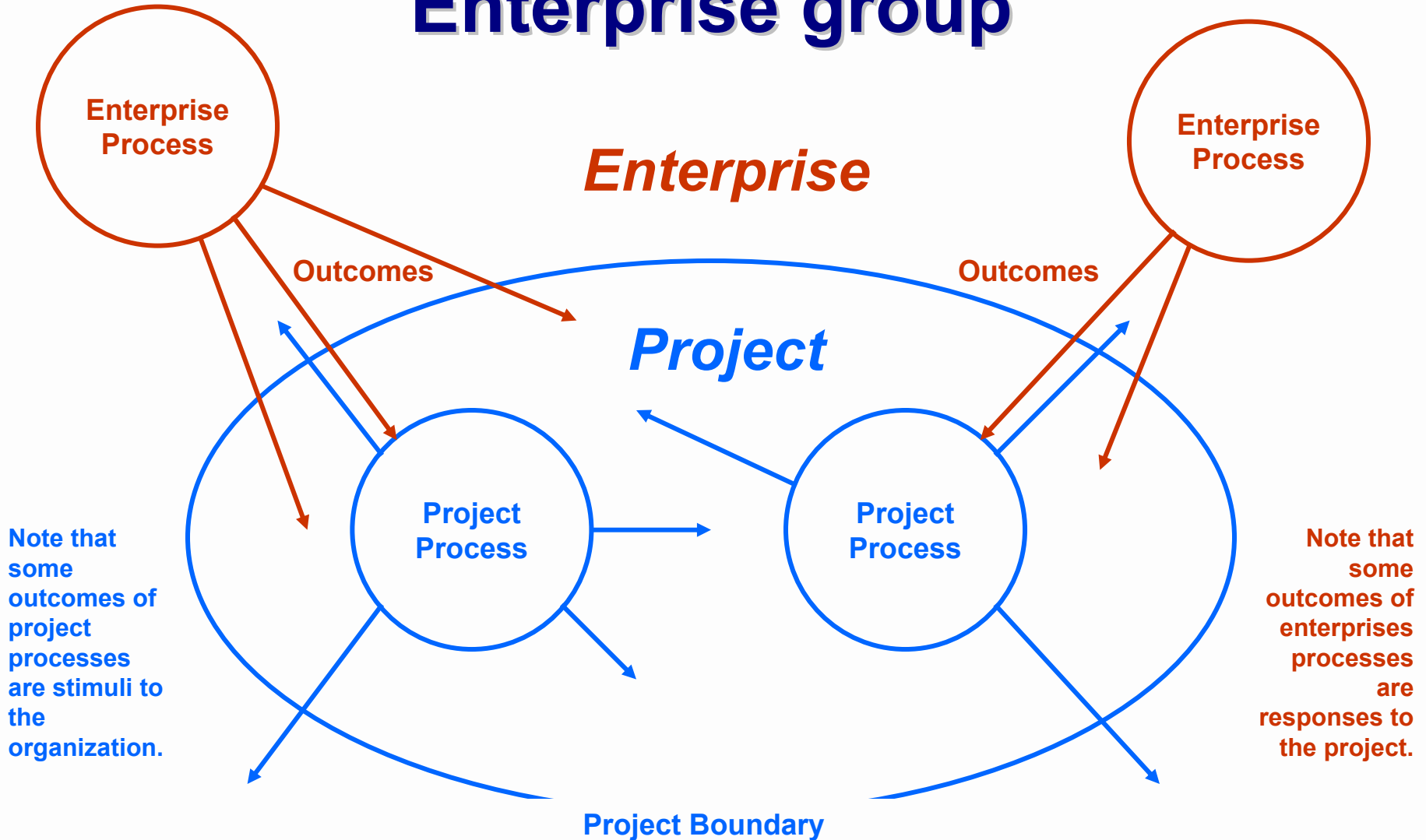
Enterprise group

The groups are not part of the architecture. They are only here to provide some structure for the discussion.

- Includes processes related to:
 - 12207:1995 Infrastructure, Improvement, Training Processes
 - 12207:Amd Infrastructure, Improvement (establishment, assessment, improvement), and Human Resources / Training *plus Organizational Alignment, Organizational Management, Quality Management, Knowledge Management*
 - 15288 Enterprise processes
- Key Consideration:
 - *Economy*: State the minimum assumptions* placed on the enterprise (these might not be complete processes).
- Additional considerations:
 - Create relationship to ISO 9001 via a Quality Management Process (see 12207 Amendment)

* Key to “Lite” approach

Enterprise group



Note that some outcomes of project processes are stimuli to the organization.

Note that some outcomes of enterprises processes are responses to the project.

Approach for Enterprise Group

- Do **not** describe complete processes.
 - This is beyond the scope and competency of SC7.
- Instead, provide the **minimum set of outcomes** that a system or software project requires of the enterprise.
- The outcomes can be binned into subject categories. A possible set of categories is:
 - Infrastructure and Environment
 - Life Cycle Process Definition and Improvement
 - Human Resource Management and Training
 - Financial Resource Management
 - Quality Management (the link to 9001)
 - Organizational Alignment
 - Knowledge Management
- Impact on 15288 and 12207:1995
 - Little: Existing outcomes, activities and tasks would be rebinned.
- Impact on 12207 Amd
 - Outcome bins would not be processes, hence not assessable
 - Annex could provide additional material to enable assessment.

Agreement group

The groups are not part of the architecture. They are only here to provide some structure for the discussion.

- **Includes processes related to:**
 - Acquisition
 - Supply
- **Key Considerations:**
 - *Interoperability*: The acquisition and supply processes should “talk to each other”.
- **Problems:**
 - Activities of 12207:1995 do a pretty good job of talking to each other.
 - Component processes introduced in the Amendment do not.
- **Another Possibility: Harmonization Team proposal.**

Agreement Group

15288		12207:1995		12207 Amd		Harmonization Prop WD1	
Agreement	Supply	Agreement	Supply	Agreement	Supply	Agreement	Supply
Plan		Initiation	Initiation				
Prepare request	Find acquirer	RFP preparation	Prepare response	Prepare acq	Supplier tendering	Prepare acq	Supplier tendering
Communicate request	Evaluate request						
	Prepare response						
Select supplier				Supplier selection		Supplier selection	
Negotiate agreement	Negotiate agreement	Contract prep & update	Contract		Contract agreement	Contract agreement	Contract agreement
			Planning				
Assess execution	Execute	Supplier monitoring	Execute and control	Supplier monitoring		Supplier monitoring	
	Assess						
Confirm acceptance	Deliver	Accept & complete	Deliver and complete	Customer acceptance	Product release	Acquirer acceptance	Product release
	Transfer responsibility						
					Product accept support		Product accept support

Observations:

- There is nothing specific to systems or software in 15288 or 12207 Amd.
- There are software *details* in 12207:1995.
- 12207:1995 has a good acquirer/supplier “conversation”. 15288 is almost as good.
- 12207 Amd is not as good in this regard.

Move to Transition

Strategy for Agreement Processes

- A single pair of processes should work for both systems and software.
- We should try to retain the good “conversations” of 12207:1995 and 15288.
- We should try to retain the component processes of 12207 Amd.
- A possible solution



Harmonization Prop WD1 (with additions)	
<i>Acquisition</i>	<i>Supply</i>
Prepare acq	(None)
Advertise acq	Supplier tendering
Supplier selection	(None)
Contract agreement	Contract agreement
Supplier monitoring	Contract execution
Acquirer acceptance	Product/service delivery
Closure	Closure

Left-overs

The groups are not part of the architecture. They are only here to provide some structure for the discussion.

- **12207 Amd has processes for systematic software reuse**
 - Domain engineering
 - [Reuse] Asset management
 - Reuse program management
- **Product line management can be characterized as a distinct project with some specialized processes.**
- **Approach:**
 - Short-term: Include the processes in the PRM annex.
 - Long-term: Write a distinct “add-on” standard that describes product line management.

Terminology

- **Activity/Process:**
 - Use SWG5 guidelines.
 - Explain that a component process is part of a larger process.
 - Explain that a component process is an activity plus purpose and outcomes.
- **Customer/Acquirer:**
 - 12207 Amd uses the term “customer” (probably to match up with 9001)
 - 12207:1995 and 15288:2003 use the term “acquirer”
 - Alternative 1: Explain that “customer” and “acquirer” are synonymous in these standards.
 - Alternative 2: Change “customer” back to “acquirer” in the purposes and outcomes taken from 12207 Amd.
 - Explain that when we mean the user, we say “user”.
- **Item/Element:**
 - In 12207, replace “item” with “element” or stipulate that 12207-item maps to 15288-element.
- ***We need to look for other terminology mismatches.***

Conformance

- **15288 is probably OK as is.**
- **12207 would have three forms:**
 - **Perform activities and tasks of a stated set of processes.**
 - **Achieve outcomes with activities and tasks providing evidence.**
 - **Tailored usage (with tailoring declared).**

General Impacts on 12207

- **12207:1995**
 - Process preambles would be replaced and/or supplemented by purpose and outcomes.
 - Some existing activities would be relabeled as component processes, and purposes and outcomes would be added to them. (Purposes would be added inline and outcomes would be listed in the PRM annex.)
 - Some existing tasks would be rebinned into different activities.
 - Additional supporting processes would be added, e.g. risk management, measurement.
 - *We need to look for opportunities to turn lists into notes.*
 - *We need to verify that we don't break relationships among activities of 12207.*
- **Amendments**
 - Most of the content would migrate into the PRM annex.
 - Some purposes and outcomes would be modified.
 - Some component processes would be added, subtracted, changed, or devolved.

Near-term Investigations

- **Verification and Validation Issues:**
 - Is 15288 verification continuous or done at end?
 - What is the relationship of 12207 “verification” and “evaluation” to 15288 “verification”?
 - Are SW V&V specializations of Sys V&V?
- **Is SW CM a specialization of System CM?**
- **Additional items re specialization:**
 - Applying the recursion concept of 15288, can we permit use of 15288 processes as alternatives to some of the SW-specific component processes of SW Implementation?
 - Also, some of the SW-specific supporting processes?

We recommend investigating these issues while we draft “Lite” and incorporate solutions that are found.

Additional Tasks for “Lite”

- **If the “Lite” proposal is accepted, then the following are additional tasks needed to complete it:**
 - **Identify and address additional instances where terminology is different between 15288, 12207 and 12207 Amd.**
 - **Determine which 12207 task lists would become notes and which should remain as lists**
 - **Where relationships of “contributes to” and “is a specialization of” exist, ensure there are no conflicts**
 - **Make sure that project process outcomes are suitable to stimulate the enterprise to provide outcomes needed by projects.**

Left for Future Harmonization

- **Stronger integration of system and software engineering disciplines**
- **Resolution of dissimilar level of detail in 12207R and 15288R**
 - **12207 sets a minimum level of responsible practice. 15288 does not.**
- **Completion of enterprise processes beyond being bins of outcomes**
- **Completion of elegant class/sub-class hierarchy of processes**
- **Decision whether to integrate documents**
- ***These omissions are key to the “Lite” approach.***

How “Lite” is It?

- **Discards many constraints**
 - Focuses on interoperability
 - Focuses on backward compatibility
- **Provides “just enough”**
 - Process architecture reconciliation
 - Compatibility and consistency
 - Process assessment support
 - Enterprise context
- **Can be executed quickly**
 - We can make a complete list of tasks to be performed to complete the job.

