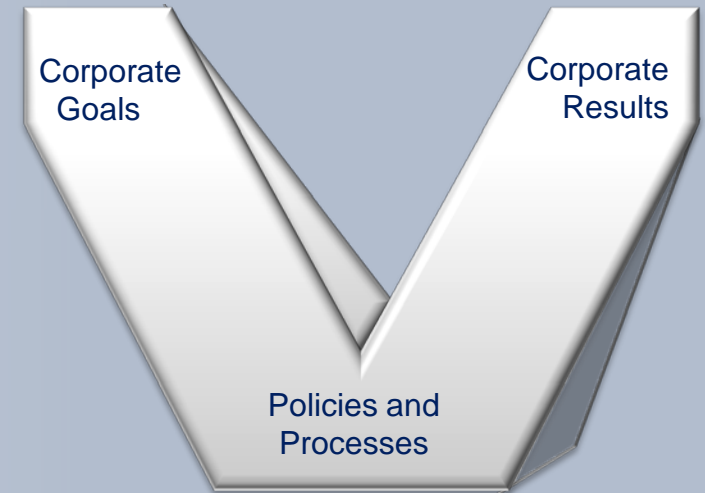


# NDIA Walk the Talk

*Integrating Corporate Goals and Processes  
Using the Engineering Lifecycle Vee Model*



Ken Mosteller  
November 18, 2009  
Denver, Colorado

# Overview

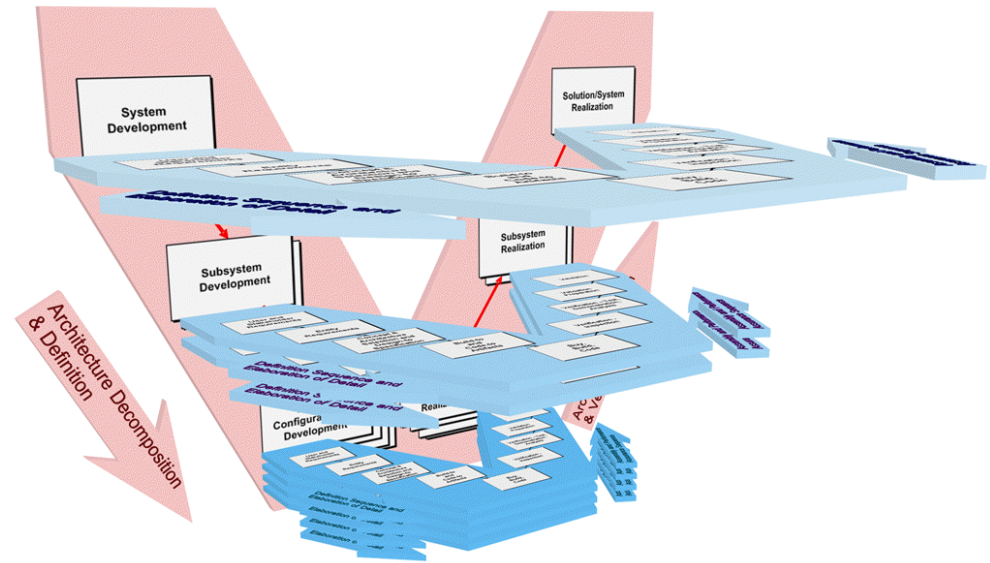
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- The Systems Engineering Dual Vee
- Using the Architecture Vee to Assimilate Business Goals and “Best Practice” Processes
- Using the Entity Vee to Integrate Business Goals into the Project Cycle
- Traceability – an example
- Summary

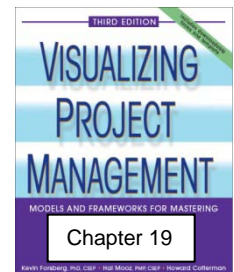
# The Systems Engineering Dual Vee

# Vee Model – Forsberg and Mooz

- Three dimensional system development model
- Integrates architecture and entity development
- Emphasizes:
  - Concurrent opportunity and risk management
  - In-process validation
  - Integration, verification, and validation planning
  - Integration and verification problem resolution



Vee Model promotes opportunity and risk driven architecture and entity development.



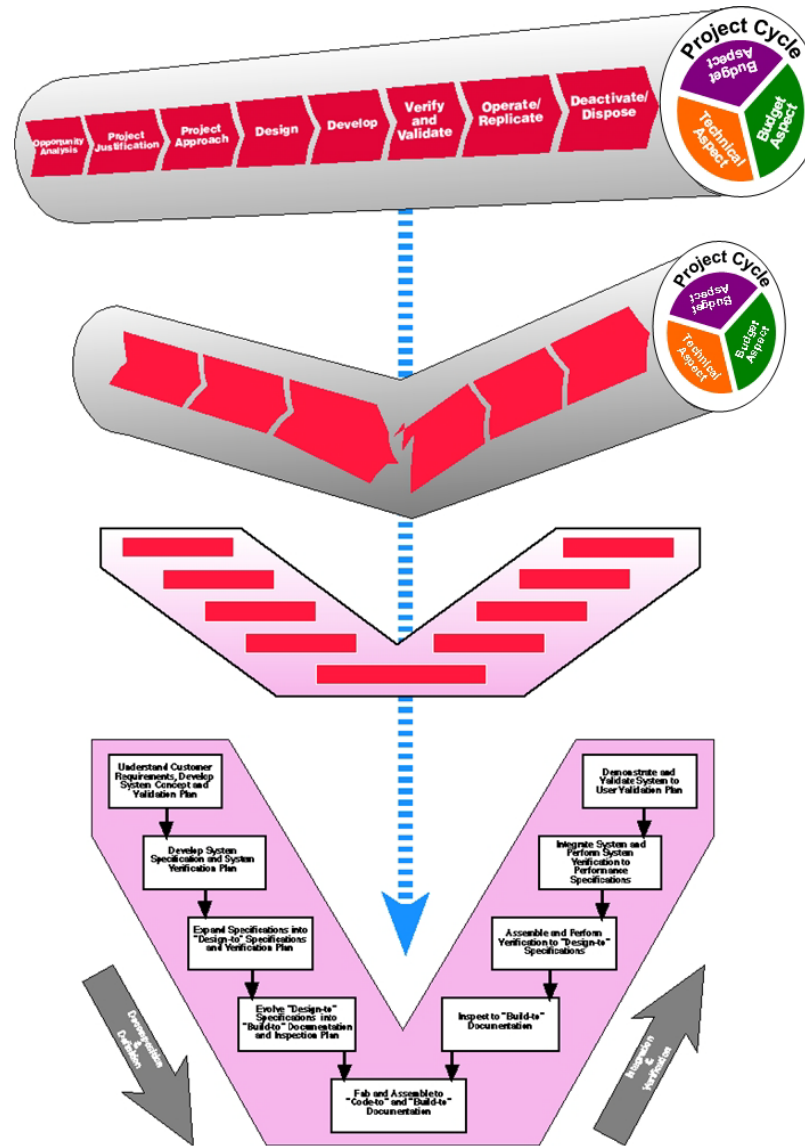
# Technical Aspect of the Project Life Cycle – Vee Model

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Three dimensional system development model that:

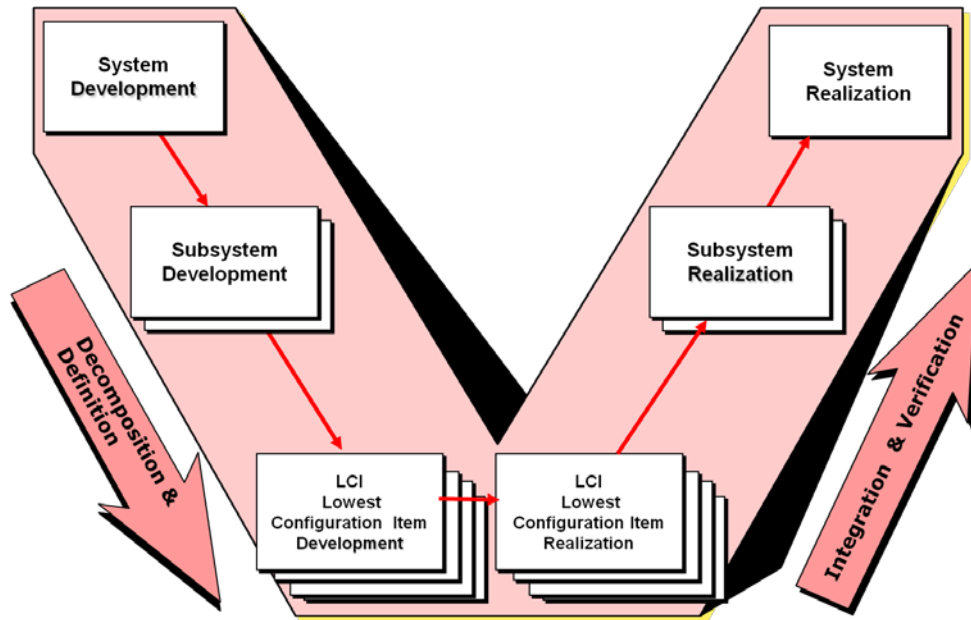
- Reflects concept of decomposition and integration
- Displays relationship of verification planning to requirements development
- Emphasizes in-process validation
- Reflects elaboration of baselines and configuration management
- Emphasizes early and continuing opportunity and risk management and problem identification and resolution
- Illustrates impact of time and maturity

# Evolution of the "Vee"



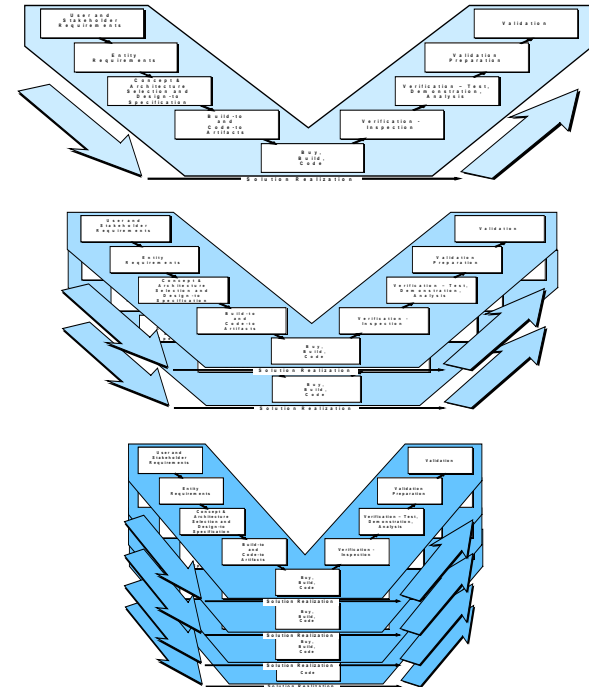
# Typical SE Process Overview – Dual “Vee” (A System Thinker’s View)

## Architecture “Vee” for Architecture Management



- Depicts architecture baseline evolution.
- Vertical dimension is architecture decomposition.
- Horizontal dimension is system realization.
- Third and normal dimension is quantity of entities and their interfaces.

## Entity “Vee” for Entity Management

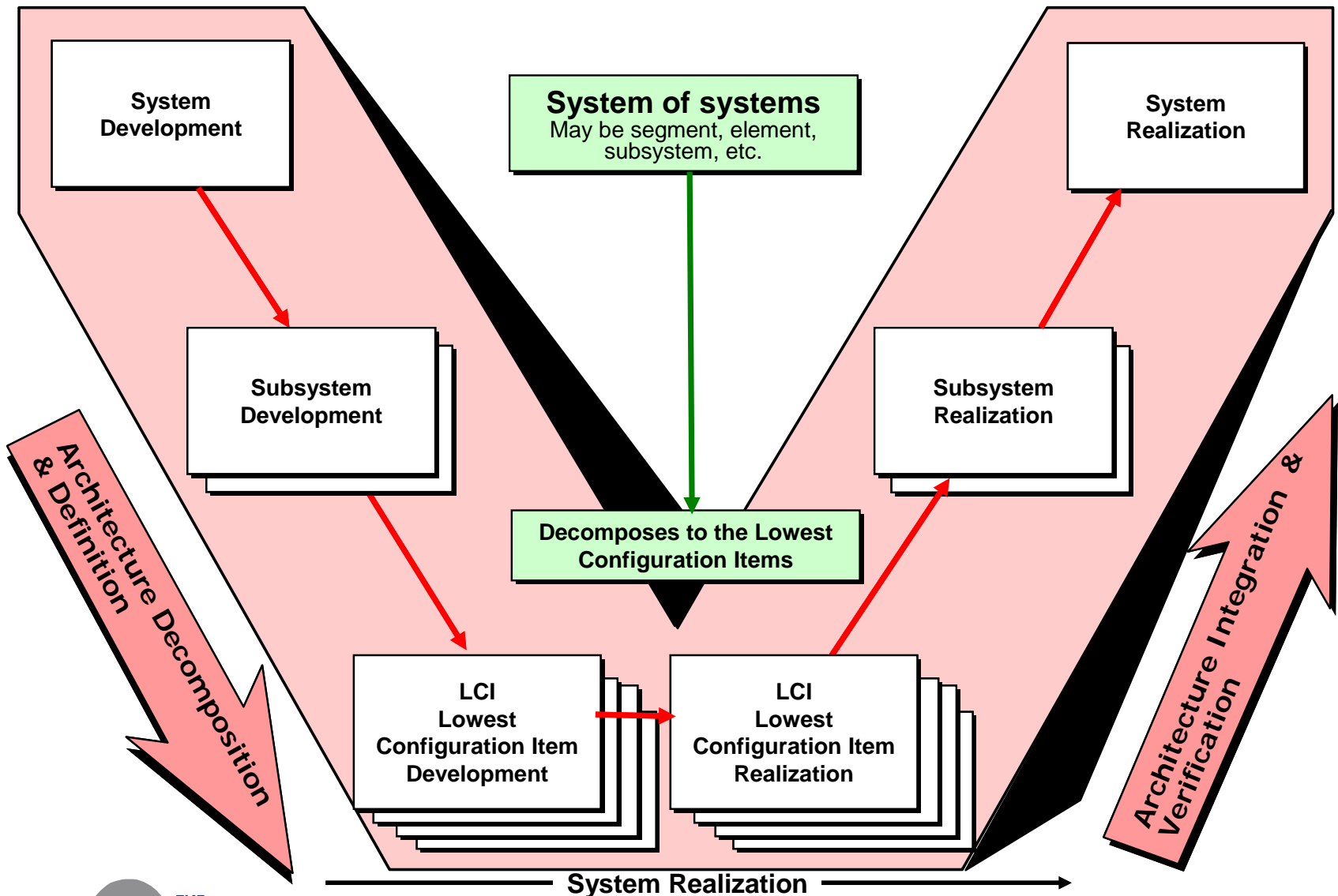


- Depicts entity baseline elaboration.
- Vertical dimension is entity detail.
- Horizontal dimension is entity realization.

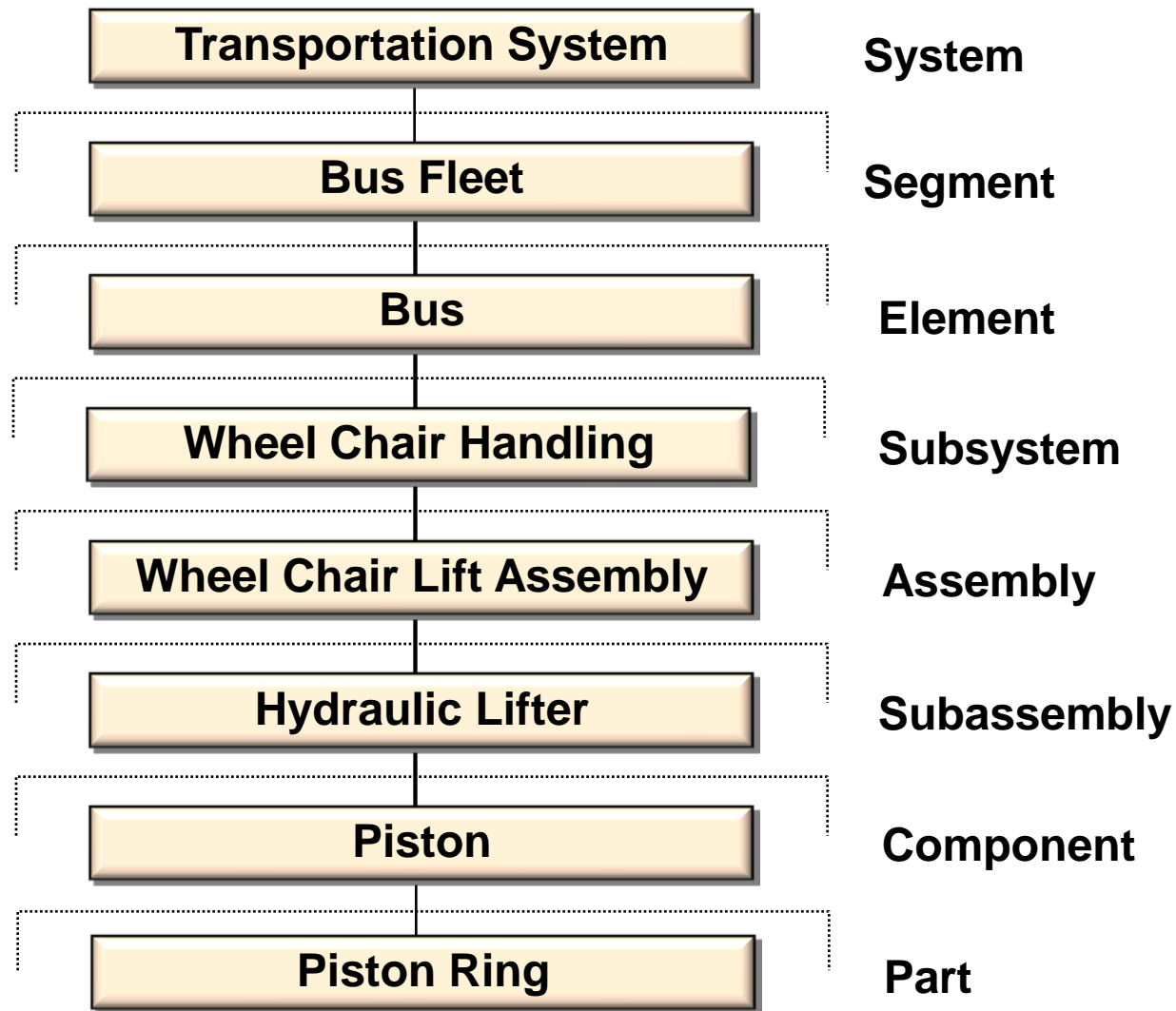
# Assimilating the Business Goals and Best Practices into the Dual Vee Model



# SE Process Overview – Architecture “Vee”



# System Decomposition Nomenclature\*



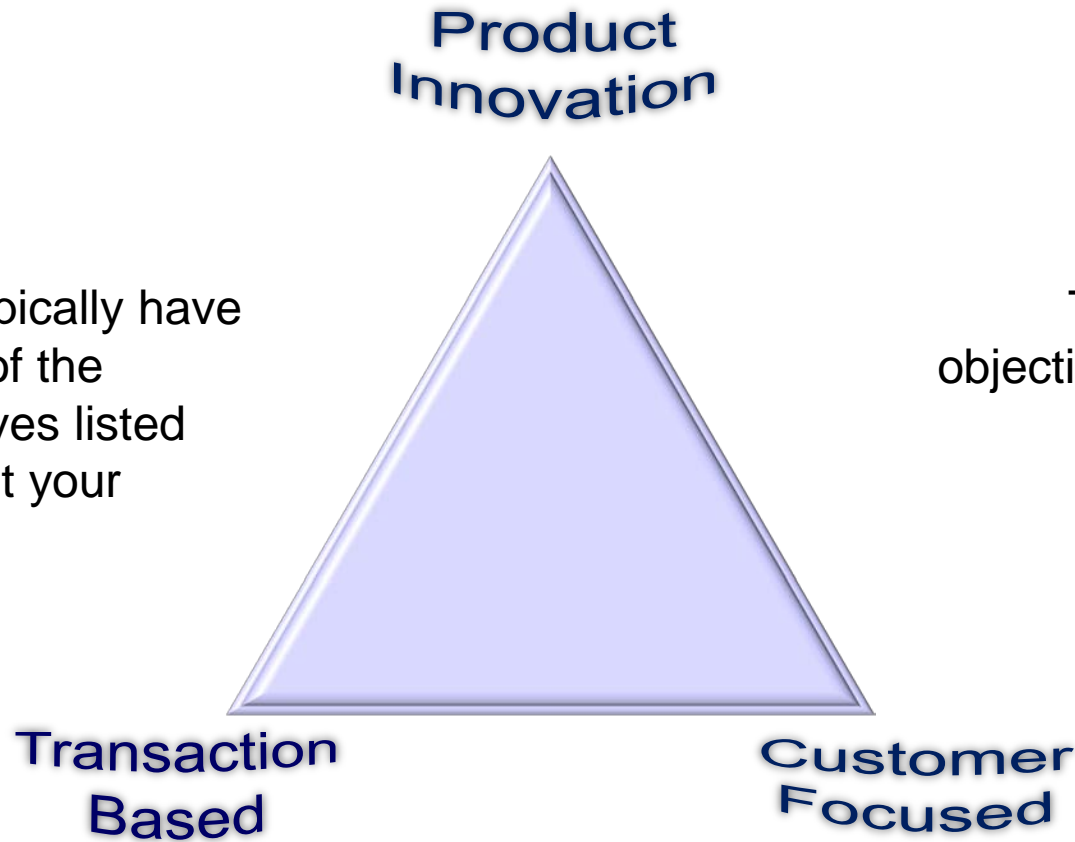
Note: Establish hierarchy levels and names and add them to vocabulary.

\*Ref. INCOSE SE Handbook

# SE Concepts = Business Vision and Objectives

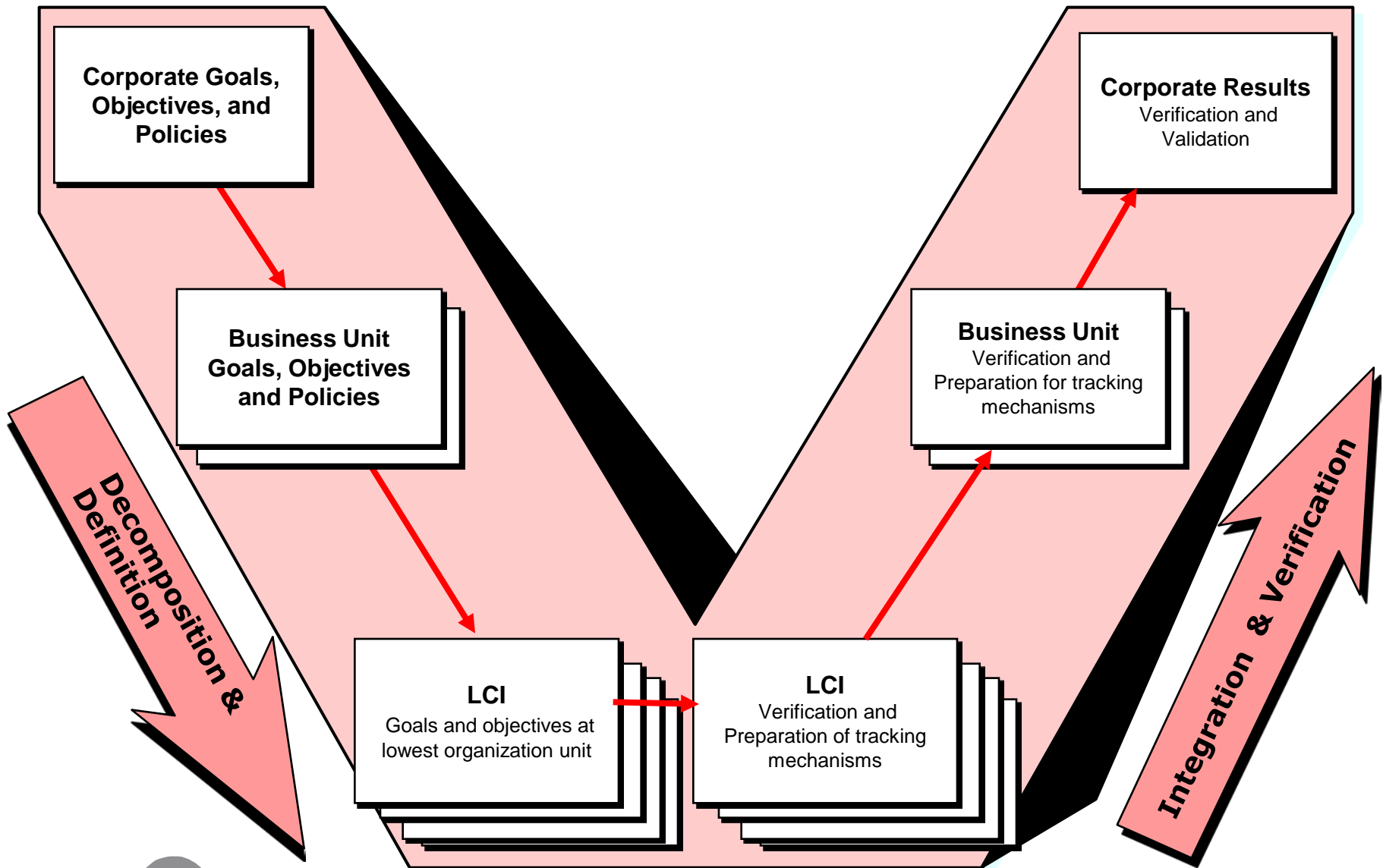
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Organizations typically have one maybe two of the business objectives listed here- What about your organization?



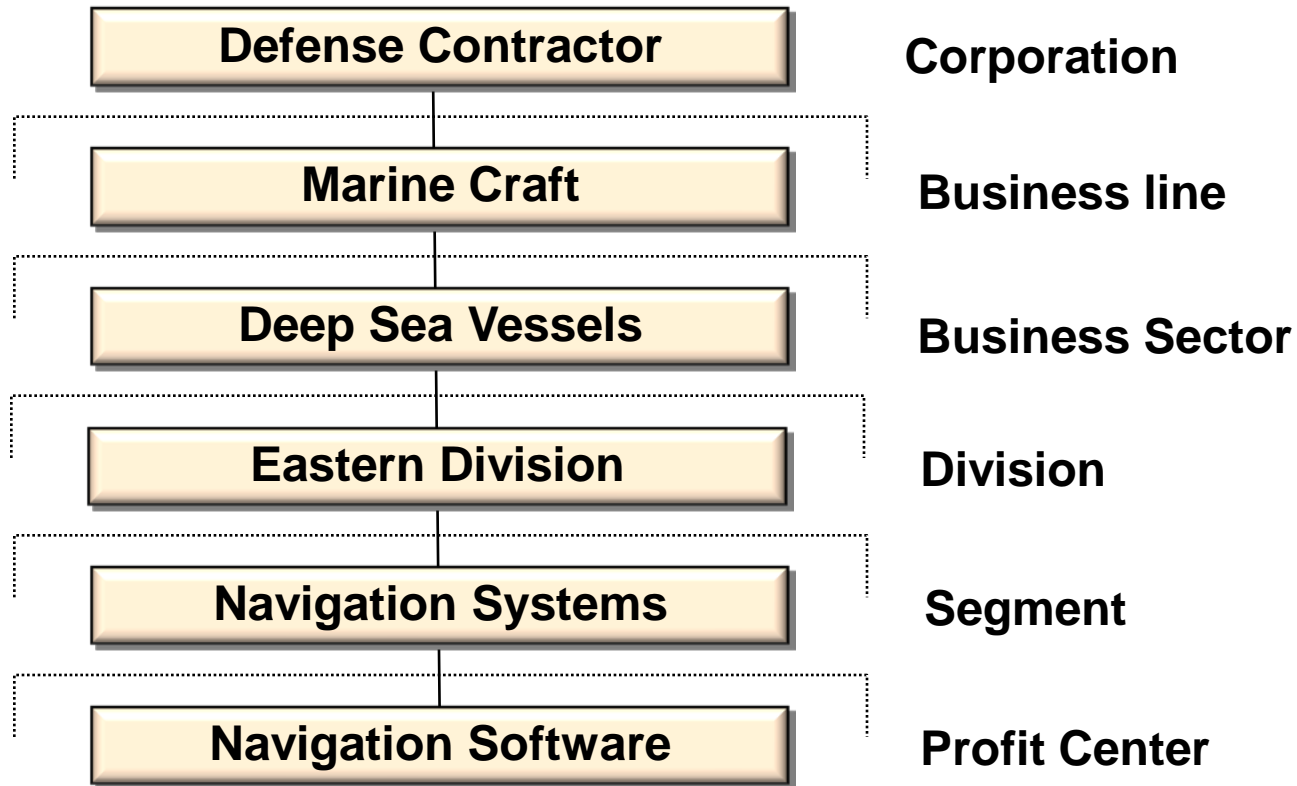
Typically these objectives tie back to project scope, schedule and resources.

# Cascading the Goals and Objectives

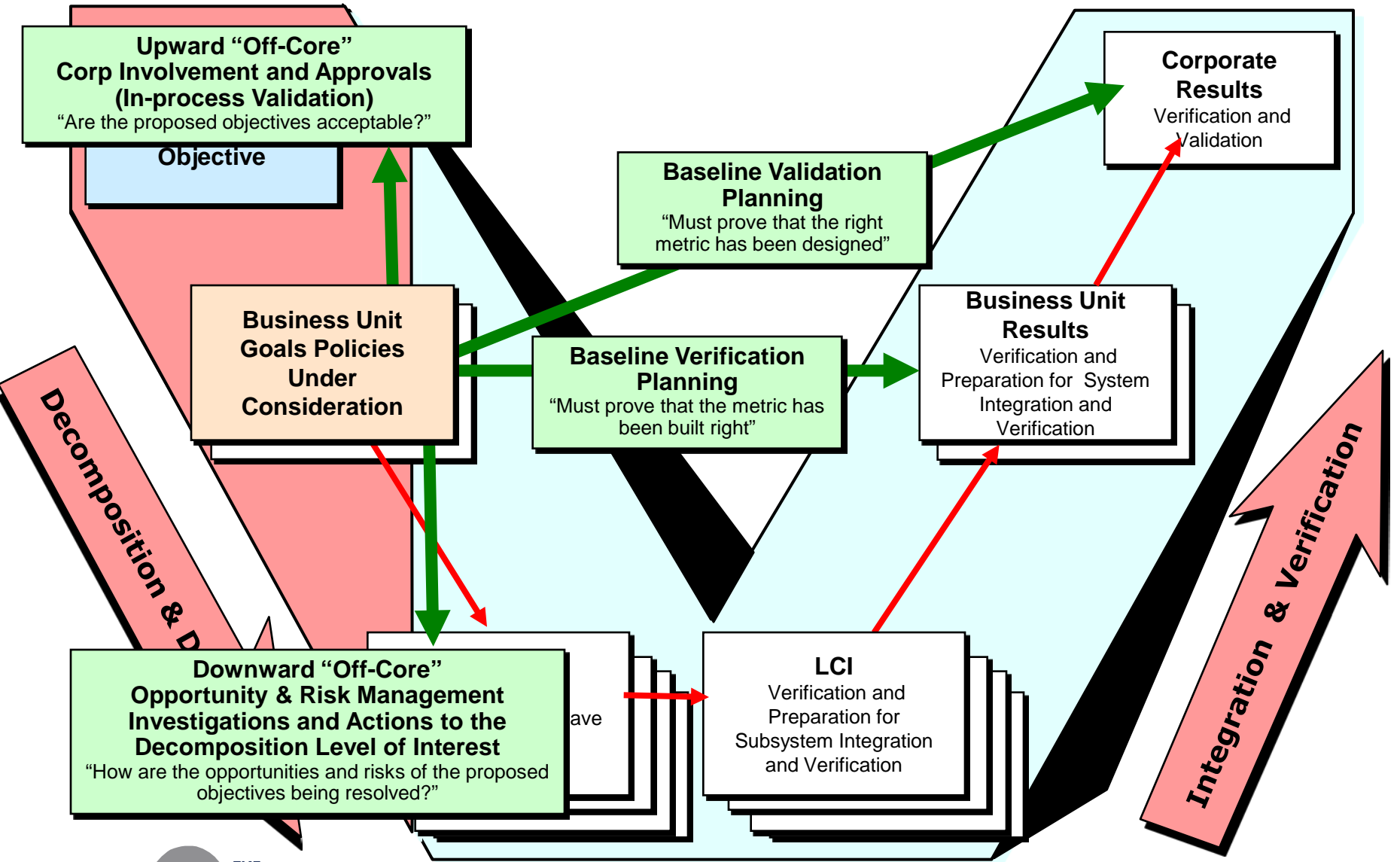


# Business Goals Decomposition Nomenclature

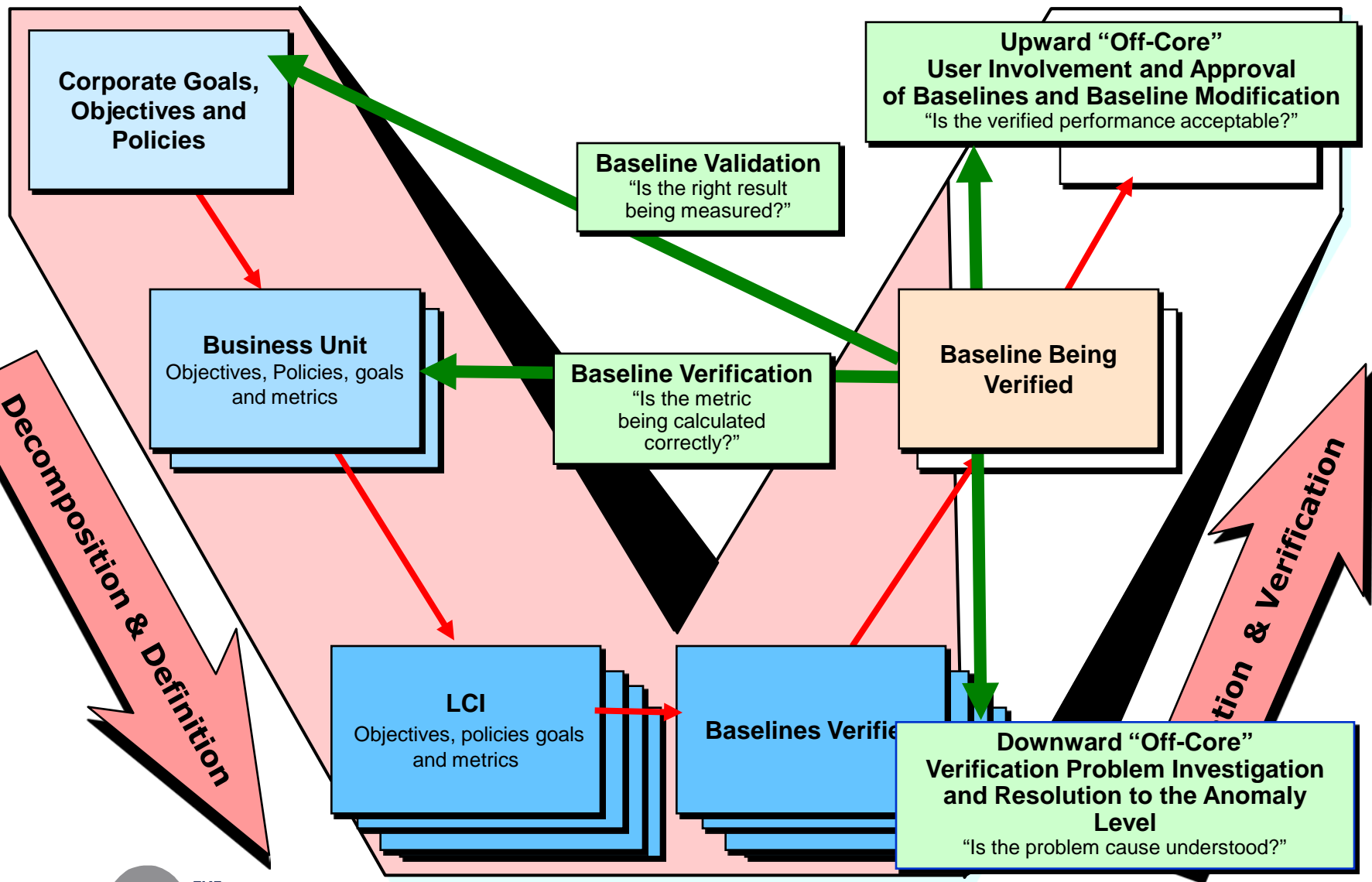
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# Solution Creation Issues (1 of 2)



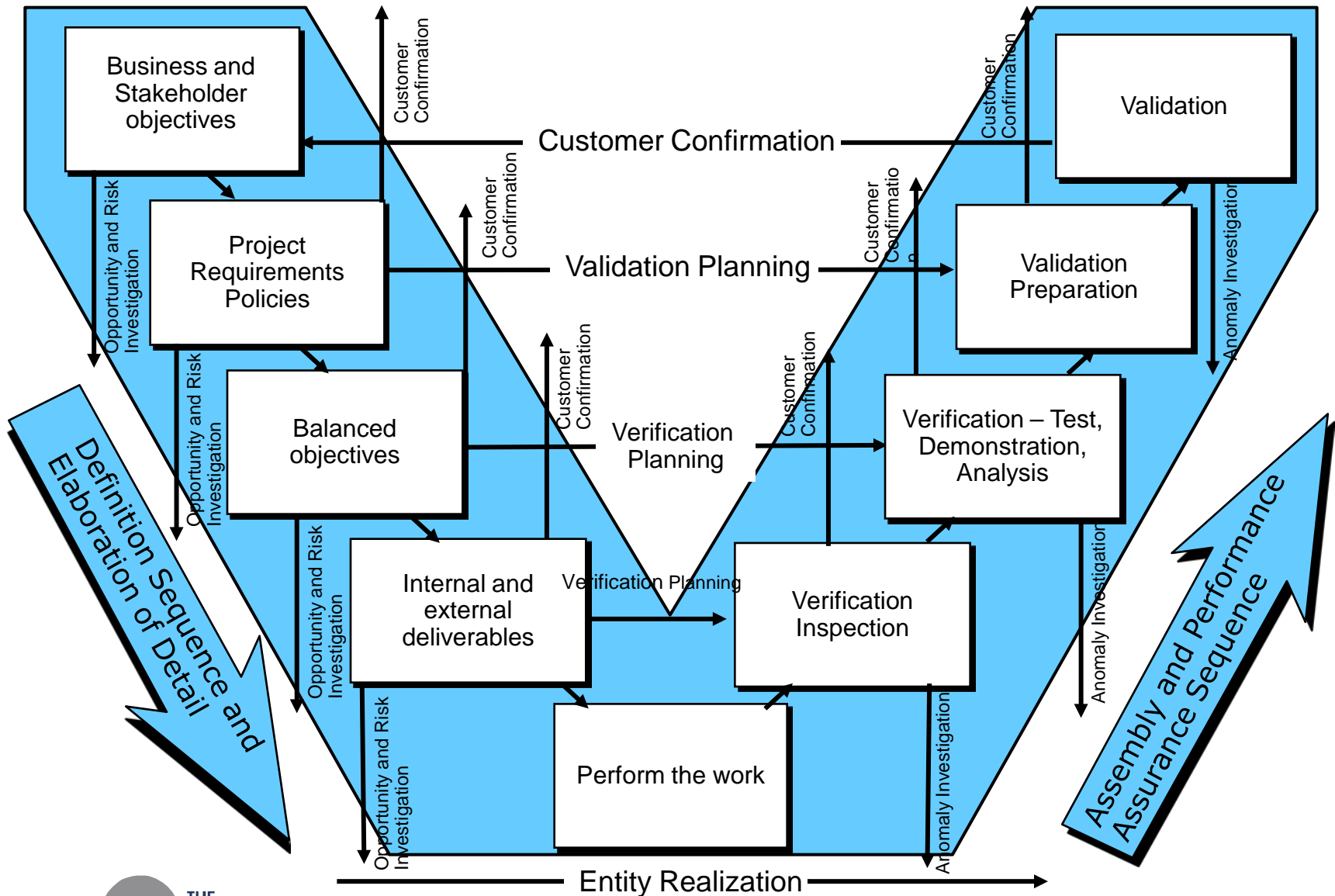
# Solution Creation Issues (2 of 2)



# Integrating Business Goals into the Projects Elaboration



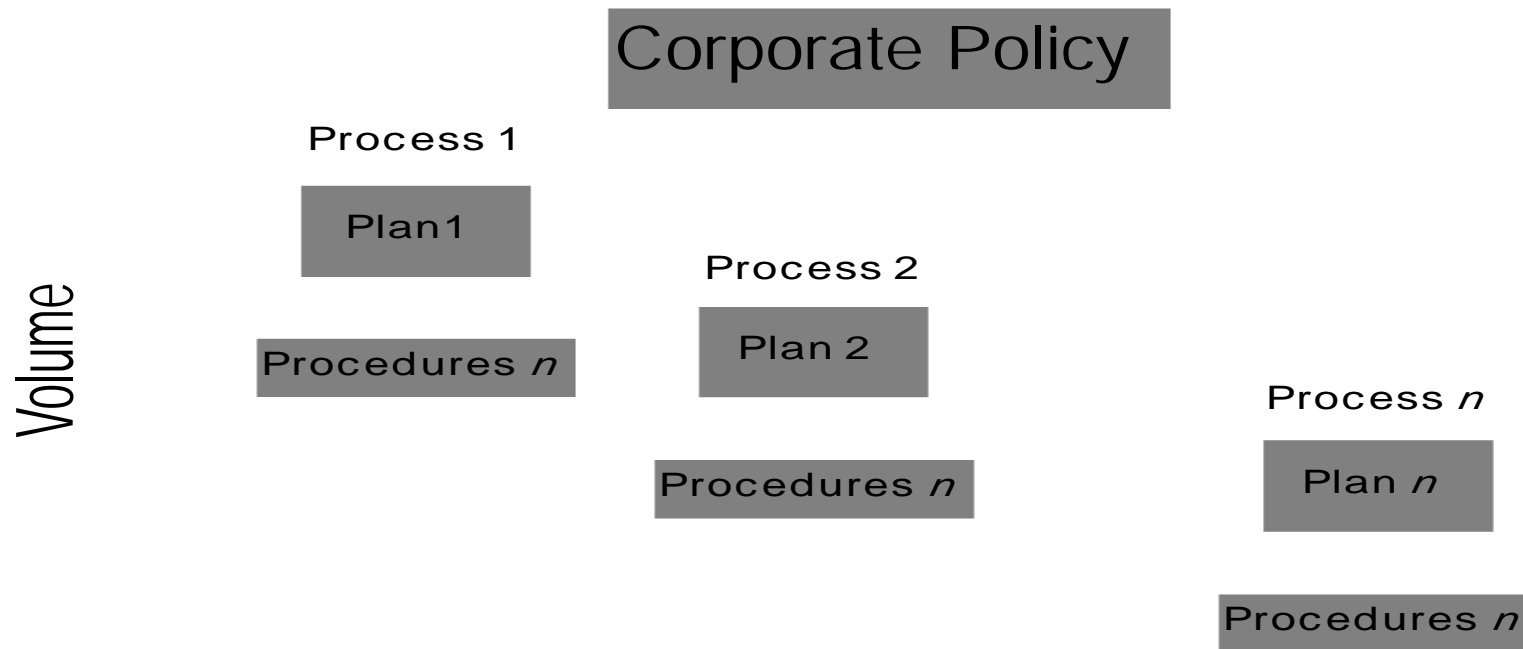
# Project Elaboration – The Entity Vee



# Traceability – An example of Cascading Corporate Policies Through to a Project

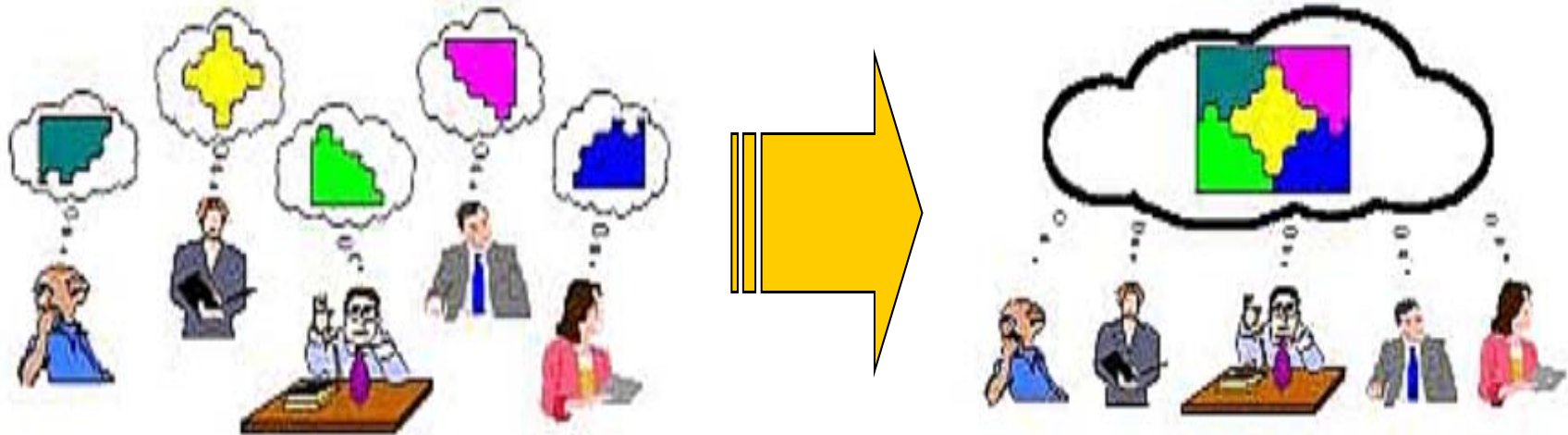
# Why Corporate Policies?

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# SE/PM Overall Process Focus Approach

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**Stovepipe versus SE/PM Process Focus Approach**, demonstrates the concept that the SE process environment concentrates on a product focus (as opposed to the traditional functional stovepipe focus).

# Process Improvement and Benefits Oriented Model

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<b>Activity</b>	<b>Benefit</b>	<b>Potential</b>
<b>Manage</b>	<b>Manage performance and continuous improvement</b>	
<b>Improve</b>	<b>Execute actions to improve lead times, optimize resources etc.</b>	
<b>Measure &amp; Simulate</b>	<b>Identify costs, lead time, quality, cost for non-value added activities, improvement potential, problem areas</b>	
<b>Document</b>	<b>Improved routines, securing quality</b>	
<b>Identify</b>	<b>Increased understanding, involvement, ideas</b>	

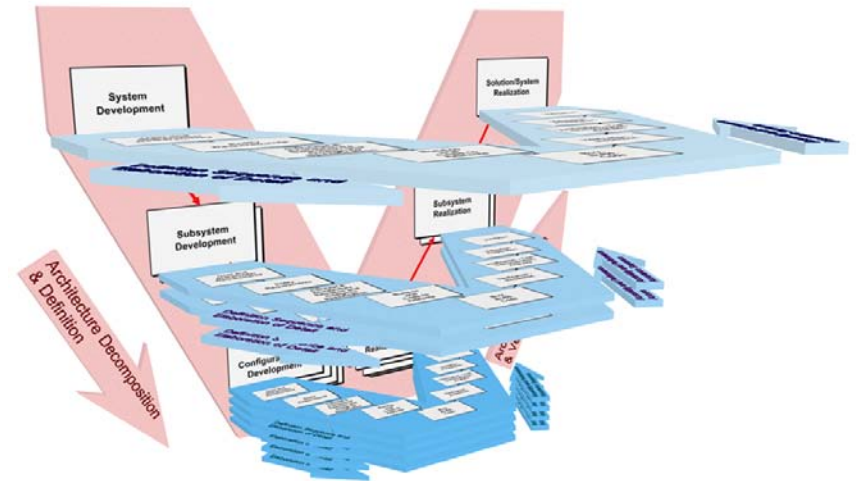
The **Process Oriented Model** is designed to help all people involved in the organization to understand the whole picture and their part in implementing the process and "organizational "best practices"

# Sample Document Tree Hierarchy of Corporate Policies and Procedures

ORG	PM	SW	HDW	Systems	QA	Logistics	CM	DM	IPT
<b>Tier 1 – Policies/Directives</b>									
Mission Statement									
Company Directives									
<b>Tier 2 – Strategic Documents/Manuals/Quality Management Plans (ID-0000)</b>									
QMP	PMP	SDP	HDP	SEP	QA Plan	ILP	CMP	DMP	ISD Plan
QM-0000	PM-0000	SW-0000	HW-0000	SE-0000	QA-0000		CM-0000		
<b>Tier 3 – Procedures/Forms/Forms Instructions (ID-0nnn)</b>									
ORG-0001	PM-0001	SW-0001	HW-0001	SE-0001	QA-0001	LO-0001	CM-0001	DM-0001	IS-0001
ORG-0002	PM-0002	SW-0002	HW-0002	SE-0002	QA-0002	LO-0002	CM-0002	DM-0002	IS-0002
ORG-0003	PM-0003	SW-0003	HW-0003	SE-0003	QA-0003	LO-0003	CM-0003	DM-0003	IS-0003
	PM-0004	SW-0004	HW-0004	SE-0004	QA-0004	LO-0004		DM-0004	
	PM-0005	SW-0005	HW-0005	SE-0005	QA-0005	LO-0005			
	PM-0006	SW-0006	HW-0006	SE-0006	QA-0006	LO-0006			
	PM-0007	SW-0007	HW-0007	SE-0007	QA-0007	LO-0007			
		SW-0008	HW-0008	SE-0008	QA-0008	LO-0008			
			HW-0009	SE-0009	QA-0009	LO-0009			
			HW-0010	SE-0010	QA-0010	LO-0010			
			HW-0011	SE-0011	QA-0011				
			HW-0012		QA-0012				
			HW-0013		QA-0013				
<b>Forms (ID-1nnn)</b>									
ORG-1nnn	PM-1nnn	SW-1nnn	HW-1nnn	SE-1nnn	QA-1nnn	LO-1nnn	CM-1nnn	DM-1nnn	IS-1nnn
<b>Forms Instructions (ID-2nnn)</b>									
AS-2nnn	PM-2nnn	SW-2nnn	HW-2nnn	SE-2nnn	QA-2nnn	LO-2nnn	CM-2nnn	DM-2nnn	IS-2nnn
<b>Tier 4– Work Instructions/Project Specific Documents (PID-ID-5nnn)</b>									
Project Name-	Project Name-	Project Name-	Project Name-	Project Name-	Project Name-	Project Name-	Project Name-	Project Name-	Project Name-
ORG-5nnn	PM-5nnn	SW-5nnn	HW-5nnn	SE-5nnn	QA-5nnn	LO-5nnn	CM-5nnn	DM-5nnn	IS-5nnn
<b>Tier 5– Evidence</b>									

# Vee Model – Forsberg and Mooz

- Three dimensional **business management model**
- Integrates **business unit goals** and project development deliverables
- Emphasizes:
  - Concurrent opportunity and risk management
  - In-process validation
  - Integration, verification, and validation planning
  - Integration and verification problem resolution



Vee Model promotes opportunity and risk driven business development.

# Any Questions or Comments?

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## Appendix 1 – A Process

# Create / Refine the Business Vision

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## Business Vision Analysis (or Refresh Business Vision)

- Summarize (refresh) business vision in terms of mission, **business objectives**, specific strategies, critical success factors, and critical business issues
- Verify business vision via interviews with executives and managers to confirm details regarding business strategy

# Establish Performance Metrics

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- Develop a business process performance measurement system to effectively measure the performance of processes
- Process measures must be tied to and reflect the business vision and objectives
- Use a Balanced Scorecard to guide and evaluate business performance
- Identify and measure specific aspects of performance as they relate to business objectives
- Use activity-based costing to determine process cost
- Establish process performance baselines and models

# Validate Alignment / Effectiveness

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- Continuously evaluate the performance of critical processes that directly support business objectives against established process performance baselines and models, as well as evaluate the results of deploying new process components
- Analyze the time, cost, and quality performance of the process at the elementary business process level
- Recognize process problems, improvement opportunities, and leverage points
- Apply process improvement principles to streamline and improve the process

# Organization Systems Engineering Integrated Approach Using the Dual Vee- Lifecycle

