



# ***A Matrix Approach to Software Process Definition***

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## Purpose of Project

- **Software Engineering Laboratory (SEL) is part of Information Systems Center (ISC) within GSFC**
- **Support the deployment of sound software processes across the ISC**
- **Develop a way to assist an ISC software team lead in selecting and tailoring a software development or maintenance process for a specific GSFC project**



# Constraints

- **Respond to the requirement for NASA Centers to seek and maintain ISO 9000 registration**
  - Internal audits show issues with metrics & methodology
  - SEL led group of ISC team leads to address these issues
    - Recommendations published November 1999
- **Respond to the forthcoming NASA requirement to adopt the Capability Maturity Model (CMM)**



# Team Lead Methodology Recommendations

- **Define template-based approach to documenting methodology in a Product Plan**
- **Organize information around developer activities, not ISO concepts**



# Summary of our Task

- **Existing Concepts from SEL Recommended Approach to S/W Development**
  - Activities & Methods
  - Products & tools \*
  - Entry/exit criteria; synchronization of activities \*
- **New requirements**
  - Tailoring to diverse projects
  - Multiple life cycles
  - Fit ISO & CMM to projects, not vice versa
  - Value added *perceived* by teams

\* To be addressed next year

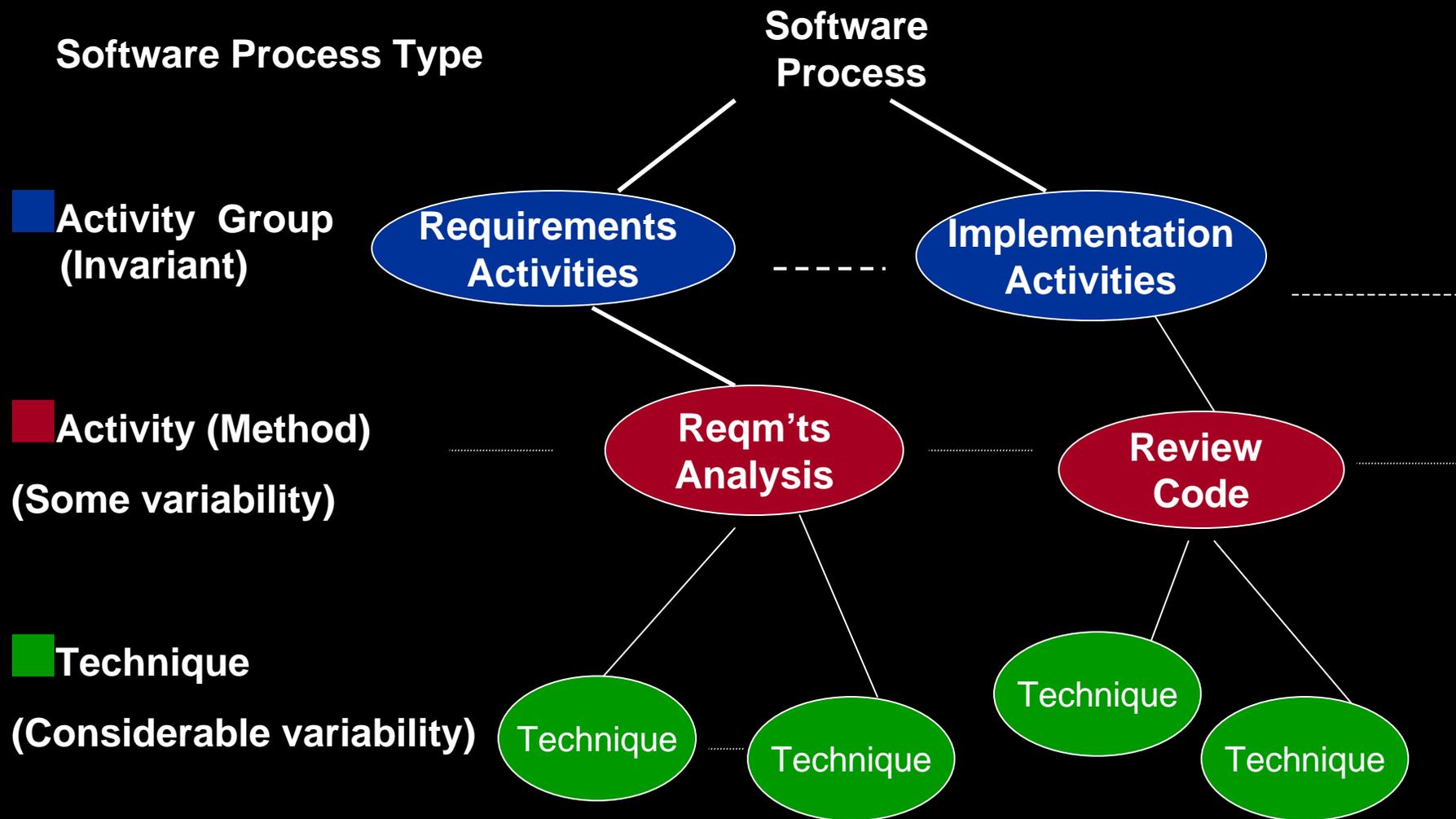


## Our approach

- Focus on activities & products
- Analyze ISC projects to understand variations and driving factors
  - Profile of Software in the Information Systems Center
  - 16 product plan documents
- Verify that proposed approach satisfies ISO requirements
- *Matrix approach supports process engineers in this analysis*



# Conceptual Model





# Process Type Level

- **Process Factors identified to select appropriate Process model**
  - **New Software Development**
  - **High Reuse**
  - **Maintenance**
  - **Prototyping**



# Activity Group Level

- Requirements
- Design
- Implementation
- Test
- Delivery and Support
- Cross-Cutting



# Activity and Technique Levels

- ***Tailoring Factors*** were identified to help select appropriate activities for a project
  - **Criticality:** How critical is the software product to a successful mission?
  - **Schedule:** Is the schedule overly aggressive or not?
  - **Team Size:** Small (1-3), Medium(4-8), Large (9 or more)
- ***Other Characteristics***
  - Are COTS being used?
  - Have high level requirements been written?



# Matrix: Process for New Software Development

Tailoring Drivers Activities	Critical Software				Non-Critical Software				I
	Normal Schedule		Aggressive Schedule		Normal Schedule		Aggressive Schedule		
	S	L	S	L	S	L	S	L	
FOR each ...									
Design	Always perform this activity								
Walkthrough	X	X	X	X	O	X	O	O	
END FOR									
Design Rev	I	F	I	I	O	O	O	O	*



# Matrix Benefits to Process Engineers

- **Using the matrix made our job easier**
  - Facilitated both development and review of the process descriptions
  - Concise matrix representation helped us avoid getting bogged down in details
  - Matrix facilitates early comparisons against industry standards (e.g., ISO, CMM)
- **Matrix doesn't show**
  - Variations in time sequencing activities
  - Tailoring of products (e.g., documents)



# Verification and Validation of Work Products

- **We used several levels of verification and validation of our work products:**
  - Review within the Methodology working group
  - Review by the group of ISC Team Leads
  - Open forums--sucRp p p c 0c 0c



## Where Are We Now?

- **Current work: activity groups and methods**
  - Matrices for new development, high reuse & maintenance projects
  - Overview text describing process model
- **Upcoming work**
  - Address the Prototyping Process
  - Modify our model to address the CMM
  - Begin addressing support tools



# Software Process Tailoring Vision

