

ARCHITECTURE EVALUATION
POLICY/MEASUREMENT APPROACHES

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ARCHITECTURE EVALUATION APPROACH

**ARCHITECTURE POLICY FRAMEWORK DEVELOPED / BASELINED
DURING REQUIREMENTS SPECIFICATION STAGES (INCLUDED IN
TECHNICAL FRAMEWORK COMPONENT OF TAFIM)**

**COMPLIANCE TO EVOLVING ARCHITECTURE FRAMEWORK
POLICIES EVALUATED DURING ANALYSIS, DESIGN,
DEVELOPMENT REVIEW STAGES (DYNAMIC BASELINE)**

**EFFECTIVENESS OF ARCHITECTURE FRAMEWORK DETERMINED
THROUGH MEASUREMENT PROGRAM**

APPLICATION DESCRIPTION

COMMAND AND CONTROL

1M+ LOC

REALTIME / NEAR-REALTIME

OBJECT-ORIENTED / C++

INCREMENTAL/ITERATIVE LIFECYCLE

NEW + LEGACY + RECAPITALIZED ASSETS

ARCHITECTURE POLICY SPECIFICATION

PRESENTS A DESCRIPTION OF THE GENERAL SOFTWARE ARCHITECTURE POLICIES, THEIR PRINCIPAL BENEFITS, AND ASSOCIATED MEASURES OF QUALITY

SUPPORTS STRATEGIC AND TACTICAL DECISION MAKING WITH EMPHASIS HIGH-LEVEL DESIGN POLICIES

DYNAMIC - EVOLVING POSITION BASED ON PROGRAMMATICS, RESULTS OF PROTOTYPING/TRADEFOS, ETC.

ARCHITECTURE POLICIES PACKAGING

POLICY DESCRIPTION

BENEFITS

QUALITY ACHIEVEMENT

SPECIFIC MEASUREMENT

GRAPHICAL MODEL

ARCHITECTURE POLICIES USAGE

FOCUS ON DESCRIBING WHY THE SYSTEM LOOKS THE WAY IT DOES

POLICIES ARE APPLICABLE ACROSS MULTIPLE LIFE-CYCLE STAGES (WHAT, HOW ISSUES)

POLICY OVERLAP / NO ATTEMPT TO GENERATE MINIMUM SPANNING SET

ADOPTION / TAILORING OF ANY PARTICULAR POLICY OFTEN THE RESULT OF A SERIES OF DESIGN TRADEOFFS

ARCHITECTURE POLICIES EXAMPLE CATEGORIES

EXTERNAL INTERFACES

LEGACIES

ABSTRACTION

LAYERING

PARTITIONING

ENCAPSULATION

INFORMATION HIDING

PATTERNS

FRAMEWORKS

COMMERCIAL SOFTWARE

STANDARDS

PERSISTENCE

REUSE

ARCHITECTURE EVALUATION POLICY EXAMPLE

EXTERNAL INTERFACES

EXT-1: PARTITION THE SYSTEM TO ISOLATE PHYSICAL EXTERNAL INTERFACES

BENEFITS: EXTENSIBILITY GAINS DERIVED BY LIMITING THE SCOPE OF CHANGE TO MODULES INTERFACING WITH EXTERNAL ENTITIES, REDUCED DEPENDENCY ON IMPLEMENTATION DECISIONS OF EXTERNAL SYSTEMS, REDUCED COMPLEXITY OF INTERFACING MISSION-SPECIFIC APPLICATIONS WITH EXTERNAL SYSTEMS

QUALITY: ACHIEVED BY WEAKLY COUPLING MISSION-SPECIFIC APPLICATION SOFTWARE WITH EXTERNAL PHYSICAL INTERFACES THROUGH ABSTRACT, INFORMATION-HIDING INTERFACES (REF: ABSTRACTION/ENCAPSULATION POLICIES).

ARCHITECTURE EVALUATION POLICY EXAMPLES

EXTERNAL INTERFACES (CONT)

DESIGN DECISIONS LEAST LIKELY TO CHANGE ARE INCLUDED IN ABSTRACT EXTERNAL INTERFACE SPECIFICATIONS WHILE HIGHLY CHANGEABLE ASPECTS OF EXTERNAL SPECIFICATIONS ARE PACKAGED IN IMPLEMENTATION SPECIFICATIONS

QUALITY MEASURES INCLUDE CROSS COMPONENT COUPLING (ASSOCIATIONS, INHERITANCES, AGGREGATIONS), AND CHANGEDATA PROBLEM REPORT ANALYSIS (NUMBER OF MODULE IMPACTS)

ARCHITECTURE POLICIES

POLICY EXAMPLES

LEG-1 PARTITION THE SYSTEM TO ISOLATE LEGACIES

ABS-1 UTILIZE ABSTRACTIONS WHICH PROVIDE BOUNDARIES WHICH MINIMIZE THE NUMBER OF INTERFACES

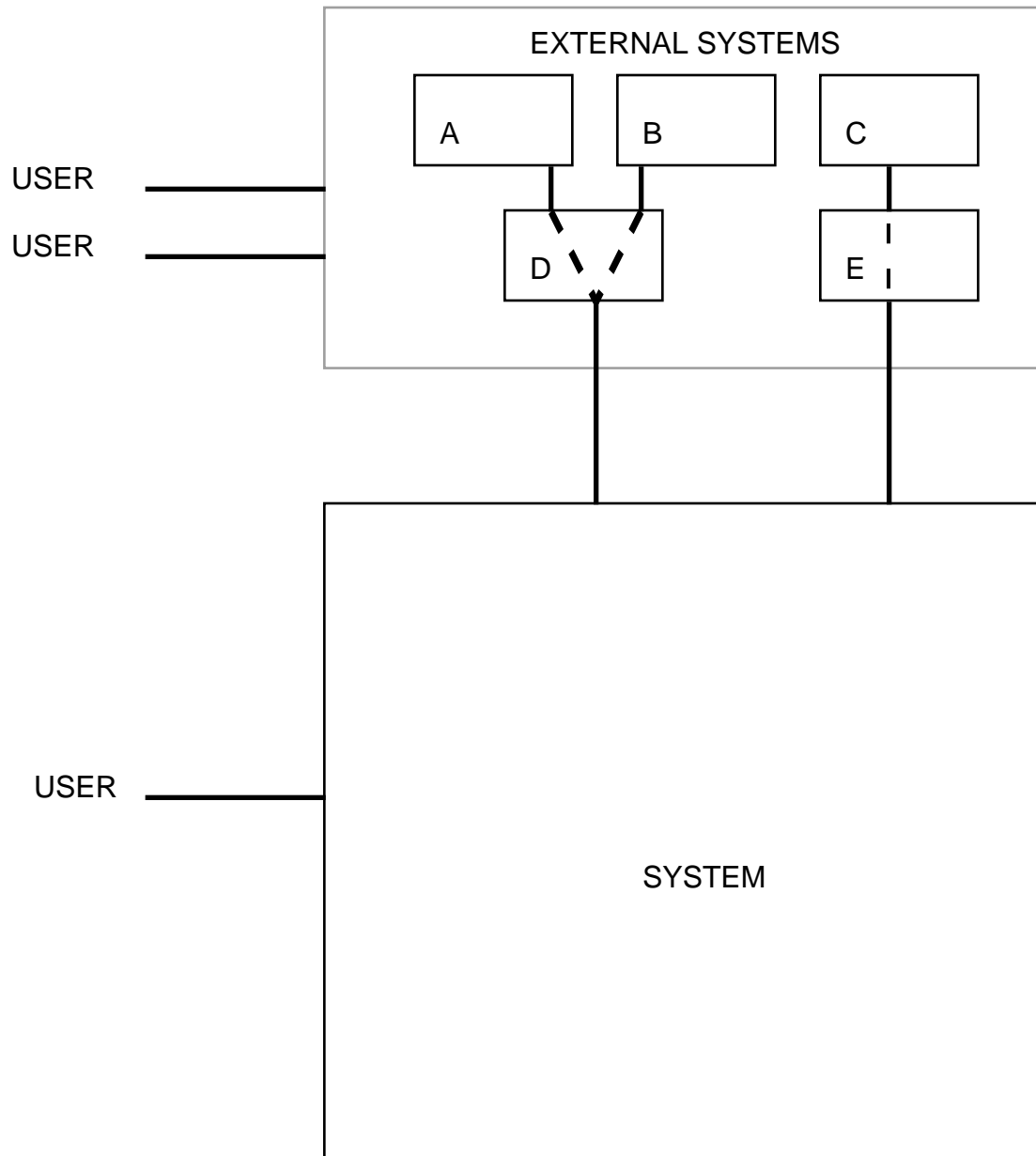
LAY-1 IMPLEMENT LAYERING COMMUNICATION PROTOCOLS WITH CLOSED ARCHITECTURE MODELS

PART-1 SEPARATE CONTROL OBJECTS FROM ENTITY OBJECTS

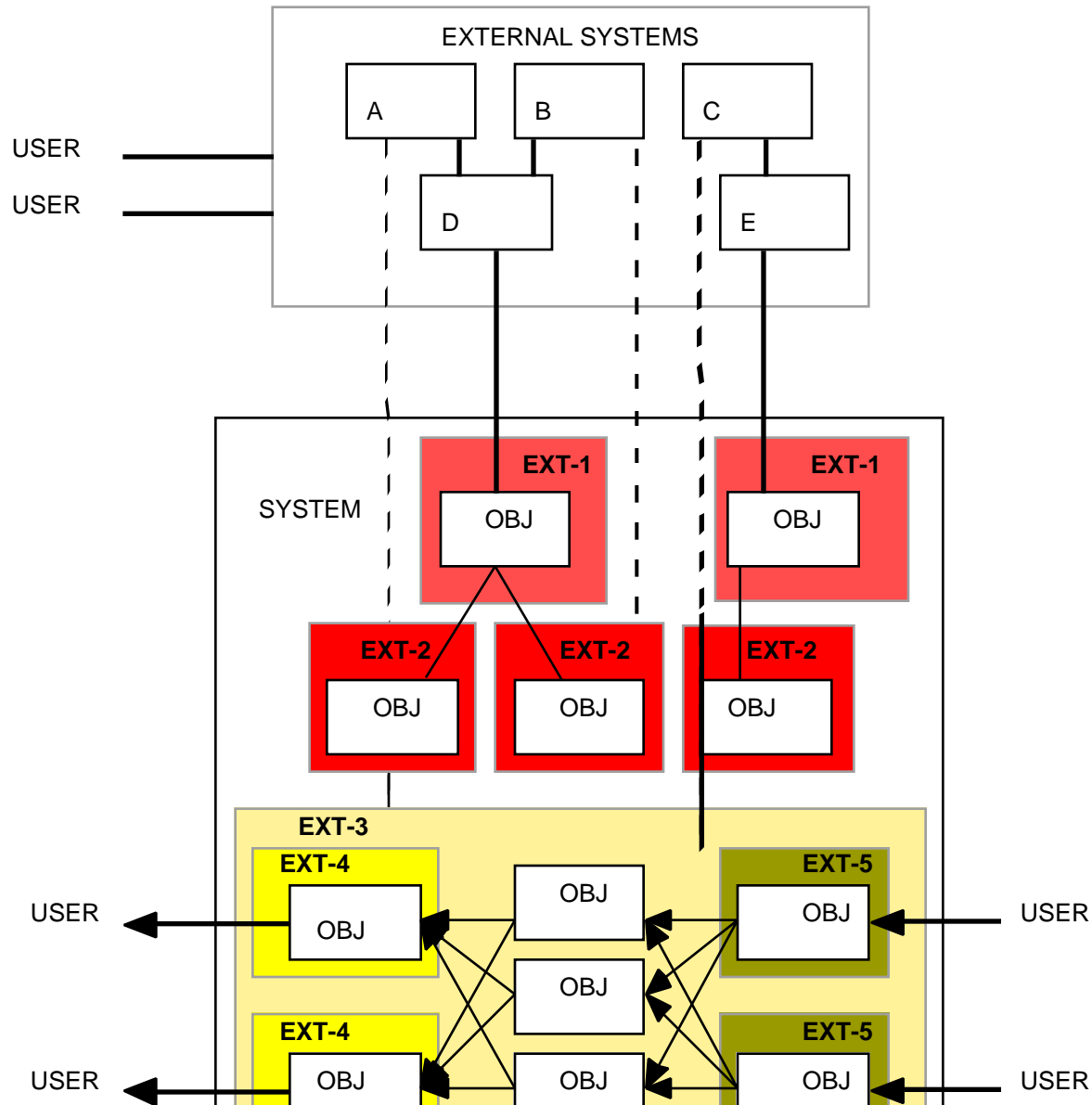
INF-1 MAKE DETAILS WHICH MAY CHANGE INDEPENDENTLY THE SECTES (PRIVATE PARTS) OF A CLASS

PAT-1 UTILIZE COMMON CREATIONAL CLASS PATTERNS TO DEFER APPROPRIATE PARTS OF OBJECT CREATION TO SUBCLASSES (FACTORY METHOD0

NOTIONAL CONTEXT OF A SYSTEM



EXTERNAL I/F ARCHITECTURE MODELS



Principal Benefits	Architecture Policy												
	External Interface	Legacy	Abstraction	Layering	Partitioning	Encapsulation	Information Hiding	Patterns	Frameworks	Standards	COTS	Persistence	Reuse
Confinement of Change	X	X	X	X	X	X	X	X	X				
Reduced Implementation Dependencies			X	X	X	X	X	X	X				
Reduced Interface Complexity	X	X	X										
Extended Operational Complexity	X		X	X	X	X	X	X	X	X	X		
Reduced Effort to Maintain	X		X	X	X	X	X	X	X	X	X		
Improved User Productivity	X												
Efficient Usage of Training Resources		X						X	X	X			
Improved Quality of Training Materials	X	X	X	X	X	X	X	X	X				
Deferred Obsolescence			X	X	X	X	X	X	X	X	X		X
Separation of Concerns			X	X	X	X	X	X	X				
Reliability		X	X	X	X	X	X	X	X	X	X		X
Resilience/High Availability/Weak Coupling			X	X	X	X		X	X				
Conceptual Simplification	X	X	X	X	X	X	X	X	X	X	X	X	X
Design/Development/Testing Efficiency			X	X	X	X	X	X	X		X	X	X
Incremental Build Support			X	X	X	X	X	X	X	X	X		
Hardware Support			X	X	X					X	X		X
Hardware Support				X	X				X				
Concurrent Development Support			X	X	X	X	X	X	X	X	X	X	
Interoperability			X	X	X	X	X	X	X	X	X	X	
Risk Reduction	X	X	X	X	X	X	X	X	X	X	X	X	X
Interchangeability	X		X	X	X	X	X	X	X	X	X		
Design/Operational Flexibility													
Enhanced Performance		X						X	X	X	X	X	X
Uniformity/Consistency				X		X	X	X	X	X	X	X	X
Robustness													

OBJECT-ORIENTED METRICS SHOPPING LIST PARTIAL

APPLICATION SIZE

- NUMBER OF SCENARIOS
- NUMBER OF CLASSES
- NUMBER OF SLOC

CLASS SIZE

- NUMBER OF PUBLIC INSTANCE VARIABLES
- NUMBER OF INSTANCE VARIABLES
- AVERAGE NUMBER OF INSTANCE METHODS PER

CLASS

- NUMBER OF CLASS METHODS (PUB/PRI/PRO)
- NUMBER OF CLASS VARIABLES

METHOD SIZE

- NUMBER OF MESSAGE SENDS

- SLOC
- AVERAGE METHOD SIZE

METHOD INTERNALS

- METHOD COMPLEXITY
- NUMBER OF PARAMETERS

CLASS INHERITANCE

- CLASS HIERARCHY NESTING LEVEL
- MULTIPLE INHERITANCE

OBJECT-ORIENTED SHOPPING LIST PARTIAL (CONT)

METHOD INHERITANCE

- NUMBER OF METHODS OVERRIDDEN BY A S/C
- NUMBER OF METHODS INHERITED BY A S/C
- NUMBER OF METHODS ADDED BY A S/C
- NUMBER OF CHILDREN
- NUMBER OF CLASS EXTENSIONS THROUGH SPECIALIZATION

CLASS EXTERNALS

- CLASS COUPLING
- NUMBER OF TIMES A CLASS IS USED
- NUMBER OF CLASS-TO-CLASS RELATIONSHIPS

CLASS INTERNALS

- CLASS COHESION
- GLOBAL USAGE
- INSTANCE VARIABLE USAGE
- AVERAGE NUMBER PARAMETERS PER METHOD
- AVERAGE NUMBER OF COMMENT LINES PER C/M
- NUMBER OF PROBLEM REPORTS PER CLASS

