DETECTION AND AVOIDANCE OF ERRORS IN COMPUTER SOFTWARE

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The research examined the acceptance test errors of a computer software project to determine if the errors could have been detected or avoided in earlier phases of development. GROAGSS (Gamma Ray Observatory Attitude Ground Support System) was selected as the software project to be examined. The development of the software followed the standard Flight Dynamics Software Development methods. GROAGSS was developed between August 1985 and April 1989. The project is approximately 250,000 lines of code of which approximately 43,000 lines are reused from previous projects.

GROAGSS had a total of 1715 Change Report Forms (CRFs) submitted during the entire development and testing. These changes contained 936 errors. Of these 936 errors, 374 were found during the acceptance testing. These acceptance test errors were first categorized into methods of avoidance including: 1)more clearly written requirements; 2)detail design review; 3)code reading; 4)structural unit testing; and 5)functional system integration testing. The errors were later broken down in terms of effort to detect and correct, class of error, and probability that the prescribed detection method would be successful. These determinations were based on Software Engineering Laboratory (SEL) documents and interviews with the project programmers. A summary of the results of the categorizations:

PROBABILITY OF SUCCESS IN ERROR AVOIDANCE AND DETECTION.

METHOD	TOTAL	%	YES	NO	MAYBE
BETTER SPECIFICATIONS	9	2.4	5	1	3
DESIGN READING	16	4.5	5	5	6
CODE READING	157	41.7	87	23	47
STRUCTURAL TESTING	58	15.5	23	14	21
FUNCTIONAL TESTING	134	35.8	64	33	37
TOTAL	374		184	76	114
			(49.2%)	(20.3%)	(30.5%)

Based on the results of this study, the number of programming errors at the beginning of acceptance testing can be significantly reduced. This study subjectively examined the results of the existing development methodology for ways of improvements. This study provides a basis for the definition of a new development/testing paradigm. Monitoring of the new scheme will objectively determine its effectiveness in avoiding and detecting errors.