The Principle of Organizational Maturity and E-Type Dynamics

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The process maturity of the client organization provides a critical parameter modulating the evolutionary effects described in the Laws of Software Evolution.

The fundamental characteristic of an E-type system is its need to evolve to satisfy the needs of its users. Most approaches to system enhancements assume that a set of evolving requirements can be elicited from system clients that indicate their common needs at the time the requirements are elicited. However, decades of experience in requirements analysis and business process engineering indicates that client organizations frequently lack common processes for common business functions performed across the organization. Thus, the elicited requirements contain a cacophony of approaches used by different organizational units for performing the same business process. Therefore the requirements reflect the unnecessary complexity induced by a lack of process maturity. This complexity exacerbates the phenomena described by in the Laws of Software Evolution.

The concepts underlying Watts Humphrey’s Process Maturity Framework -best understood in its instantiation in the Capability Maturity Model (CMM)- provide a way of predicting how organizational conditions will modulate the system’s evolutionary trends as stated in Lehman's Laws of Software Evolution. Stated simply, the less mature the business processes automated in an E-type system, the greater the evolutionary effects described in the Laws of Software Evolution. Organizations with few or no stated processes will experience the greatest evolutionary impact in the system, since the specification of its enhancements will be little more precise than the ad hoc processes it is automating. Organizations that have local processes and procedures will have good local specifications, but their amalgamation into a system enhancement specification will be complex, since this amalgamation has not been previously worked out in the business processes being automated.

An organization that has common business processes that can be tailored for local use has already performed much of the confusing, complex, and error prone work that would otherwise have to be worked out by the software requirements team. The more an organization has disciplined methods for improving its business processes and deploying the improvements across the organization in an orderly way, the more the organization will have control over the evolutionary effects described in the Laws of Software Evolution. In the most mature organizations, the control of system evolution and complexity is performed initially at the level of the business process, allowing the system to evolve as part of a planned improvement with built-in controls on complexity. Thus the level of evolutionary impact experienced in a system is modulated by the maturity of the business processes being automated.