

DOCTOR OF PHILOSOPHY

HOLISTIC FRAMEWORK FOR ESTABLISHING INTEROPERABILITY OF HETEROGENEOUS SOFTWARE DEVELOPMENT TOOLS

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This dissertation presents a Holistic Framework for Software Engineering (HFSE) that establishes collaborative mechanisms by which existing heterogeneous software development tools and models will interoperate. Past research has been conducted with the aim of developing or improving individual aspects of software development: however, this research focuses on establishing a holistic approach over the entire development effort, where unrealized synergies and dependencies between all of the tools' artifacts can be visualized and leveraged to produce improvements in both process and product. The HFSE is both a conceptual framework and a software engineering process model (with tool support) where the dependencies between software development artifacts are identified, quantified, tracked, and deployed throughout all artifacts via middleware. Central to the approach is the integration of Quality Function Deployment (QFD) into the Relational Hypergraph (RH) Model of Software Evolution. This integration allows for the dependencies between artifacts to be automatically tracked throughout the hypergraph representation of the development effort, thus assisting the software engineer in isolating subgraphs as needed.

KEYWORDS: Software Evolution, Interoperability, Integrated Software Development Environments, Heterogeneous Software Systems, Quality Function Deployment