An empirical study of system design instability metric and design evolution in an agile software process

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Abstract

Software project tracking and project plan adjustment are two important software engineering activities. The class growth shows the design evolution of the software. The System Design Instability (SDI) metric indicates the progress of an object-oriented (OO) project once the project is set in motion. The SDI metric provides information on project evolution to project managers for possible adjustment to the project plan. The objectives of this paper are to test if the System Design Instability metric can be used to estimate and re-plan software projects in an XP-like agile process and study system design evolution in the Agile software process. We present an empirical study of the class growth and the SDI metric in two OO systems, developed using an agile process similar to Extreme Programming (XP). We analyzed the system evolutionary data collected on a daily basis from the two systems. We concluded that: the systems' class growth follows observable trends, the SDI metric can indicate project progress with certain trends, and the SDI metric is correlated with XP activities. In both of the analyzed systems, we observed two consistent jumps in the SDI metric values in early and late development phases. Part of the results agrees with a previous empirical study in another environment.
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