

## 5.2 Predictive Analytics

Predictive analytics concerns capabilities to address challenges in building software to satisfy/predict expected quality factors. Each quality factor is defined according to how it is measured and the acceptable tolerance/range in which it must fall to be acceptable for a given problem-solution. The degree of importance of a quality factor may be localized (differ in different parts of a solution and accommodate different tradeoffs with other factors). The attainable satisfaction of a factor may be constrained by behavioral limitations of the operational platform on which the product is deployed.

- derive and compare alternative solutions based on product quality criteria choices/tradeoffs to correlate effects on behavior/exhibited quality
- generalize instance-level analytic methods to express variability in quality predictions (e.g., model adaptability based on predicate logic: commonality (universal quantifier/predicate constant), variability (existential quantifiers/predicate variable))
- create tailorable models of behavior/properties of artificial-natural systems and ecosystem, with and without induced effects of injected products
- create ability to simulate natural and artificial systems, including users operating in an enterprise-defined process with means to inject faults and provide observability/traceability of non-observable behavior
- root cause predictive analyses: what could change that would invalidate (or require changes in) inferences based on historic data {relate to diagnostics/prognostics for hardware}
- options for leveraging operational platform constraints, such as analyses of massive data with local processing limitations, responsiveness of remote processing, data storage accessibility/transport, source and result data quality criteria, effective deadlines for results

- processing needs: redundancy, replication for reduced access latency, security, update delays, history retention at needed scale / granularity, time-sensitive data accuracy (is sensing-capture-retention delay acceptable precision)