Research: Test Driven Development
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- Overall question: Should we do test-driven development, or not?
- What are the costs, benefits?
- Does it result in better quality?
- When is this practice optimal?
- What tool support exists/is needed?

- Variables:
  - Calendar time, effort and other costs (development, maintenance)
  - Quality (defects, maintainability: coupling, cohesion)
  - Effectiveness (test coverage)
  - Context: Domain, Application, Size etc.
**TDD (1)**

- What is the state of the practice in… (HI/LD-MD)
  - Test-driven development
  - Test-First, Automated unit/acceptance testing

Examples of questions:
- Where are the costs/benefits?
- How do you manage your test cases when systems scale up?
- How do you test you test-cases?
- How do you maintain your test-cases?
- How do you determine which test-cases to throw away/save?
- Etc.

- Case-studies/workshop/Surveys (web?)
**TDD (2)**

- Family of Experiments: TDD vs. Test-Last (unit) (MI/MD)
  - Controlled studies – Bowling game
    » Washington College - students
    » NCSU (done) – professionals
    » Italy/Canada
    » Germany
    » USC – students ?

- Do you do design before testing or go right to TDD?
  - Case studies and controlled experiments

- More realistic Experiments: (HI/HD)
  - Industry Volunteers
  - Make change to larger system
  - Other suggestions?
TDD (3)

- Adequacy of customer-supplied acceptance test cases? (MI/MD?)
  - Case studies in industry, Experiments?
- TDD for web applications – technology development (HI/LD-HD)
  - Apply technology/tools to Pilot project, evaluate, improve
- Unit testing vs. integration testing (in general) (MI/LD-HD)
  - Examine COCOMO/SEL database for data
  - % of effort on unit test vs. % of effort on integration testing (look for correlation)
- Create TDD interest group (HI/LD)
  - (Italy, Germany, Fraunhofer, NCSU, USC, others?)