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Hard Problem Area: Policy-Governed Secure Collaboration

Overall Research Goal(s):
What do you ultimately hope to show with your research? This section can involve some jargon, but try to relate these goals to your broad impact section. Start with the larger goal(s) and narrow the scope towards your specific study (and specific goals, below).

Software bugs and defects can increase the cost of software projects significantly, and the use of security analysis tools may find bugs and defects cheaper and faster than manual inspections. Adoption of security analysis tools, however, is not common in software development. The overall goal of the project is to develop a simulation model to improve understanding of the adoption of security analysis tools in software development.

Broad Impact:
Why is your research important? This section should avoid any technical jargon and should be meaningful to the general public. Try to keep this down to five sentences. This should be hierarchical: the broad impact decomposed into more specific impacts that connect your overall research goals to your more specific goals.

We envisage that a framework that incorporates rational decision making of developers and their manager in a project with realistic representation of heterogeneity of tasks and organizational structure. The framework can be applied to improve understanding of the factors influencing the adoption of security tools in software development.

Specific Research Goals:
Lay out the steps you are going to take to achieve your overall research goal. You can get technical here.

- Develop a decision model to capture the dynamic decision making of developers, working on a set of tasks that fulfill the goals of a software project.
- Develop a sanction model for managers to explore the influence of sanctions on adoption of security analysis tools.
- Simulate developers of heterogeneous skills in alternative organizational structures under sanction mechanisms

Proposed Data Collection (if applicable):
What data will you collect to answer your research goals? How will you collect it? Will it be an observational study, randomized comparative experiment, or simulation study? Include potential biases and be prepared to explain how the data will achieve your specific research goals.
**Developers decision model**
- Survey, time sheets that may explain the distribution of project time of a developer in coding, running security tools, learning and other work.
- The change in the skill level of developers for coding and running security tools at the beginning and end of a project.

**Manager’s sanction model**
- Interview managers to understand sanction mechanisms

**Success Criteria:**
*How will you determine whether you satisfied your specific and overall research goals?*

- Developing a simulation framework for the interactions of the developers and the manager
- Capturing realism in the framework
- Applying the framework for different organizational structures and skills of developers

**Anticipated Difficulties, Limitations, and Criticisms:**
*What will make the above specific research goals difficult to achieve? How do you plan on dealing with these difficulties if they arise?*

- The developers and the manager make rational decisions at every time tick.
- The developers’ utility from working on a project is a function of their improvement in skills or completion of the project.
- The manager doesn’t have an explicit objective function. The manager applies sanctions for timeliness of product delivery, functionality and security of the product.