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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. Security analysis tools may find bugs and defects in a cheaper and faster way 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 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. This framework can be applied to improve understanding of the factors influencing the adoption of security analysis 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 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 with heterogeneous skills in alternative organizational structures under different 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.
Currently we focus on the theoretical aspects and evaluate our framework through simulations. In our future work, we plan to apply real-life data to examine the performance of our approach. Data may include survey and time sheets that explain distribution of time spent by a developer in coding, running security tools, learning and other work, and interviews with managers to understand sanction mechanisms.

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

The success of the framework depends on capturing realism in the framework while 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 major difficulties may arise from the following:
- The assumption that developers and the manager make rational decisions at every time tick.
- Capturing preferences of developers in different projects.
- Differentiating between positive and negative sanctions in simulations.