

# Rapid Adjudication of Static Analysis Meta-Alerts During Continuous Integration (CI)

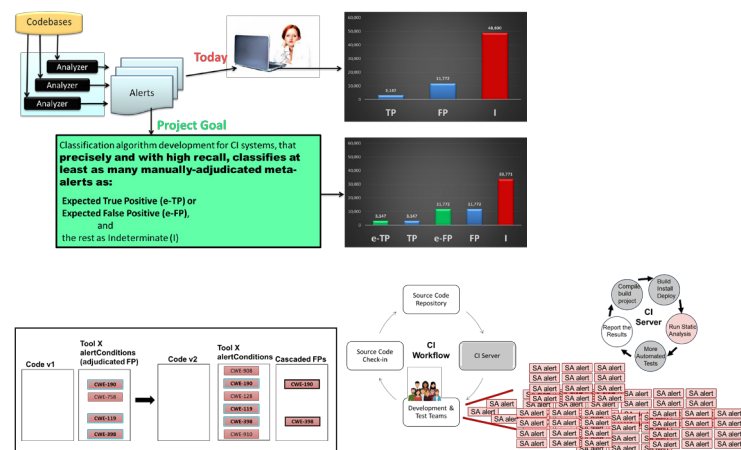
## Problem

**Manual adjudication of static analysis meta-alerts requires too much effort in short CI build and PR-approval time frames** to address many (if any) of them. This problem is technically challenging. Developing a new static analysis to **precisely** match flaws in different version of Java or C++ code requires language-specific algorithms, and the matching must be fast to work in a CI/CD system. Also, when cascading is **imprecise**, mis-labeled data worsens classifier performance, and no effective systems exist that use automated classifiers for multiple static analysis tools in a CI system.

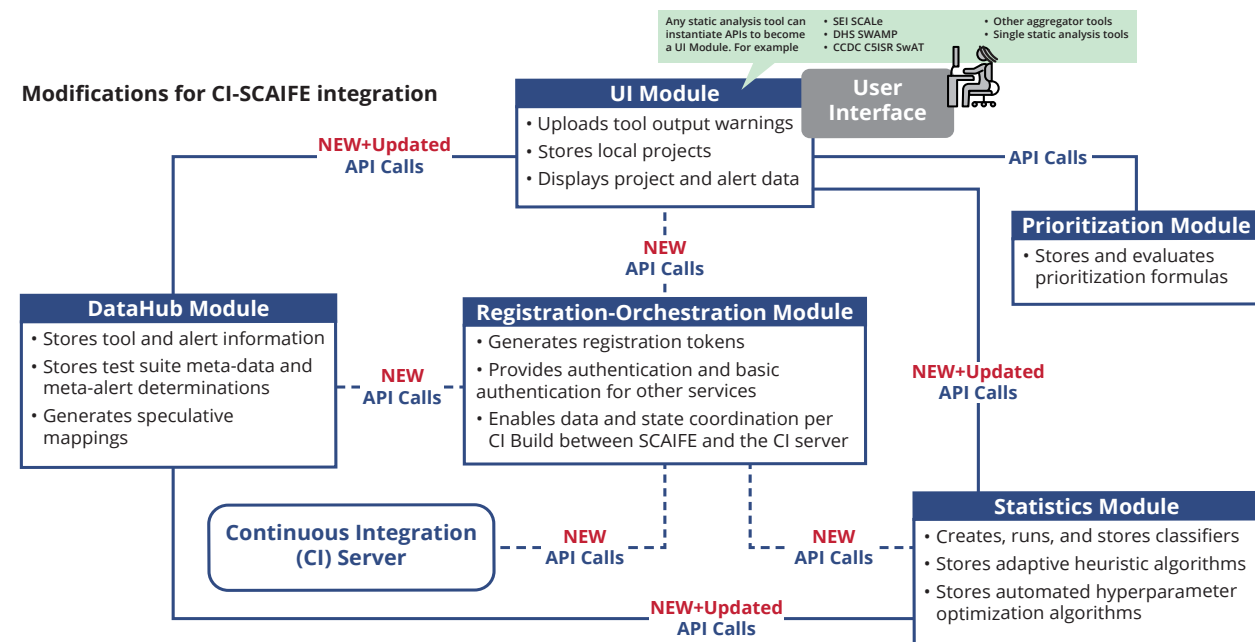
## Solution

The solution involves (1) a system that supports classification integrated with CI, and builds on the SCAIFE API and implementation we developed for an extensible architecture that supports classification, and (2) precise cascading algorithms for C++ code.

We (1) designed a model for integrated SCAIFE-CI systems, including SCAIFE changes, performance measures, and new classifier features; (2) implemented parts of the design (collaborators tested and reviewed subsequent versions); (3) performed an experiment using diff-based (imprecise) cascading and generated data for comparison to precise cascading. Future plans are to develop a precise cascading algorithm, improve classifiers, and fully integrate them.



# To overcome barriers to using automated classifiers during CI, we designed a system that enables classification to be used in CI builds, including cascading adjudications.



## FY20 Code and API Artifacts

- (Sep 2020) SCAIFE System v 1.2.2 is released with significant CI-SCAIFE integration progress; it includes five APIs, an HTML manual, SCALE, and the rest of the software system. (collaborators)
- (Sep 2020) SCAIFE is released for SCAIFE v. r.6.2.2.A. (public)
- (Sep 2020) Five SCAIFE APIs are released. (collaborators, public)
- (Jul 2020) SCAIFE System v 1.1.1 is released with API modules and SCAIFE automation for CI-SCAIFE integration; the system includes separable SCAIFE v. r.6.1.1.1.A, five APIs, and an HTML manual. (collaborators)
- (Mar 2020) SCAIFE System v 1.0.0 is released with containers for CI-SCAIFE integration; the system includes a SCAIFE separable module, new APIs, and an HTML manual. (collaborators)
- (Feb 2020) SCAIFE API v 0.0.9-beta is published. (collaborators, GitHub)
- (Oct 2019) SCAIFE System Beta VM v 2.1 is released with a bill of materials. (collaborators)

## FY20 Additional Artifacts

- (Sep 2020) Diff-based cascading experiment artifacts are produced.
- (Sep 2020) A SCAIFE/SCAIFE HTML manual is released for SCAIFE v r.7.0.0.0.A. (public, collaborators)
- (Jul 2020) "How to Instantiate SCAIFE API Calls" manual is released. (public)
- (Apr 2020) "Open Dataset RC\_Data for Classifier Research" is published. (public)
- (Mar 2020) "How to Test and Review the SCAIFE System v 1.0.0 Release" manual is published. (collaborators)
- (Feb 2020) "SCAIFE API Version 0.0.9-Beta: Reviewer Roadmap" manual is published. (collaborators)

**The team developed progressive versions of (1) a design for CI-classifier (CI-SCAIFE) integration and (2) an API definition. The team also implemented a system for modular classification with features to enable CI-integration and to measure performance.**