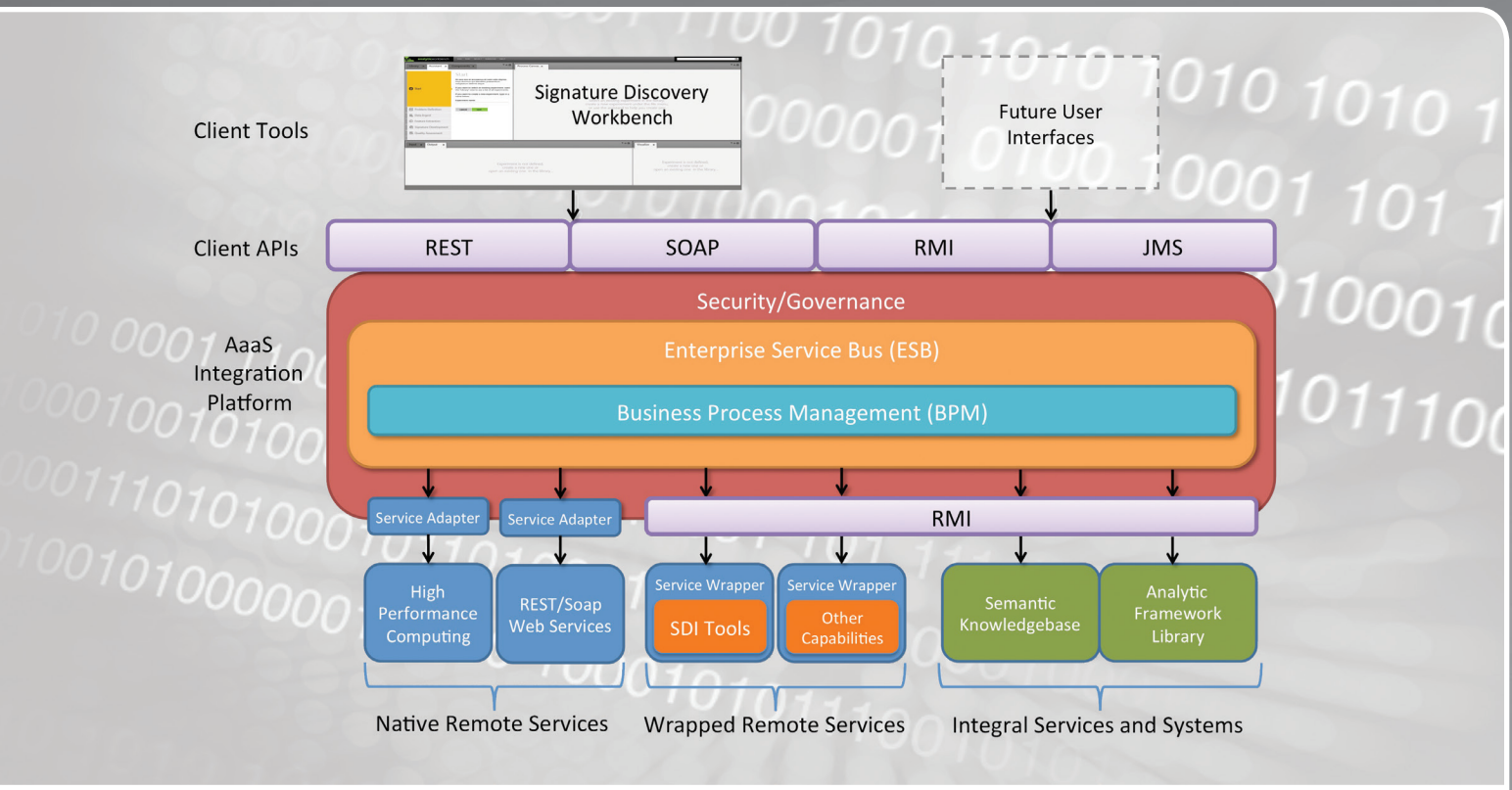


The Analytic Framework

The Analytic Framework is an extensible service-oriented integration platform that enables signature development and discovery over multiple domains.

CHALLENGE

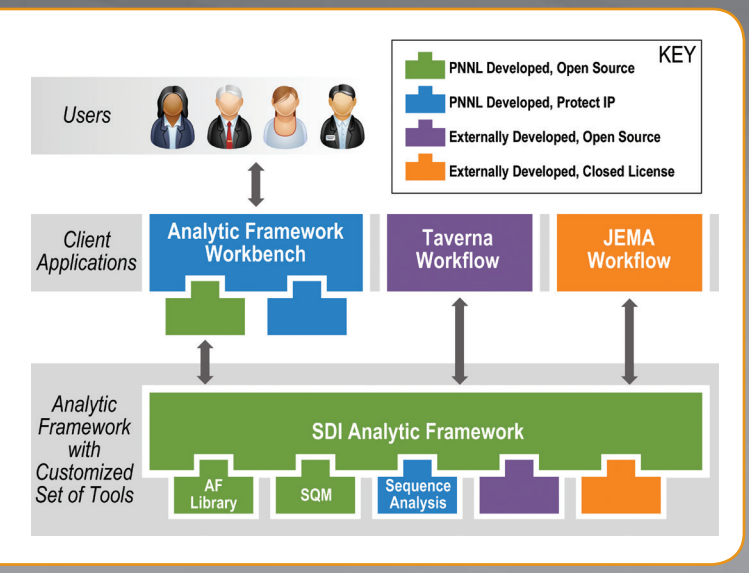
The analytic framework for signature discovery was created for users who need to find signatures in diverse and complex datasets across a number of national security and scientific domains. The challenge associated with this is the integration of numerous analytic tools from initiative projects into a unified and highly re-usable platform that supports PNNL's signature discovery process.

APPROACH/METHODS

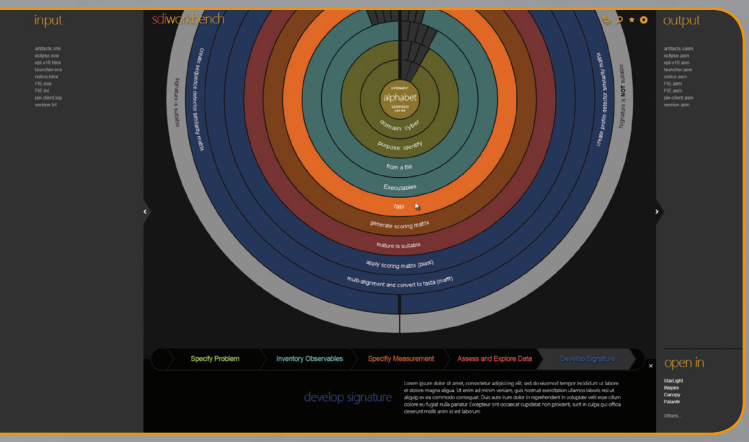
Our approach is to use service-oriented and enterprise integration architecture techniques to offer tools developed under the initiative as web services that can be "plugged together" in different combinations to perform various signature discovery tasks. The Analytic Framework supports integrating tools developed in any programming language or high performance computing platform.

In developing the architecture, special care was taken to create a system that would support PNNL's long term signature discovery mission by making it highly maintainable, modular, extensible, and deployable in various combinations to suit the needs of PNNL customers.

The Analytic Framework is implemented using open source, lightweight, enterprise Java technologies, which makes the platform easy to deploy and accessible to a wide range of Java developers inside and outside of PNNL. Tools (also known as analytic services) developed under the initiative are available to client applications as web services and are hosted in the Tomcat application server. The enterprise service bus is implemented using spring integration and is used to construct services by linking components together into pipelines to form a particular analytic task. For example, a service may include a pipeline of components that aggregates several files into a



Modular Design and Licensing Structure



Sequence Analysis Demo Depicted in Workbench

single data type, transforms that data type to a standard format, and then runs an external R script to perform the analytic step. Tools are integrated into the framework in one of three ways: 1) as native Java components hosted directly in spring, 2) with service adapters, which are used to execute analytics hosted remotely, or 3) with service wrappers in which analytics written in any language are executed by a thin layer of Java code by using the standard legacy wrapper design pattern. Integral services such as the semantic knowledge base and the analytic framework data library are integrated as native Java code. The whole platform is developed in a very modular way and is easy to deploy to new servers and environments.

IMPACT/BENEFIT

The Analytic Framework

- introduces the first platform for analytics as a service that is focused on signature discovery
- increases signature discovery efficiency by combining PNNL's signature discovery process with tools for statistical modeling, classification, fusion, and signature validation
- adapts to client needs by allowing them to pick and choose the tools needed to address their particular signature development needs and deploy it to their environment of choice

Adam Wynne
Pacific Northwest National Laboratory
adam.wynne@pnnl.gov | (206) 528-3227

Pacific Northwest NATIONAL LABORATORY
Proudly Operated by Battelle *Since 1965*
U.S. DEPARTMENT OF ENERGY