# **Decision record template for Alexandrian pattern**

## **Introduction**

* Prologue (Summary)
* Discussion (Context)
* Solution (Decision)
* Consequences (Results)

## **Specifics**

* Prologue (Summary)
  + Statement to summarize:
    - In the context of (use case)  
      facing (concern)  
      we decided for (option)  
      to achieve (quality)  
      accepting (downside).
* Discussion (Context)
  + Explain the forces at play (technical, political, social, project).
  + This is the story explaining the problem we are looking to resolve.
* Solution
  + Explain how the decision will solve the problem.
* Consequences
  + Explain the results of the decision over the long term.
  + Did it work, not work, was changed, upgraded, etc.

**Decision Record 1: Using Anvil as a webhook and Pull Request trigger for merge checks**

**Introduction**

[Anvil](https://anvil.softeng-support.ac.uk/) is a research software testing platform built by STFC (Science and Technology Facilities Council) to run tests on a range of platforms in an automated manner. Anvil is based on Jenkins, a famous DevOps tool, which helps to automate the mundane tasks of running tests, compilation, etc.

RAT Toolbox is a CLI application in MATLAB which needs a test suite in an automated manner and Jenkins proved to be a worthy tool for this job after talks between Lamar, Martyn and Arwel.

With Anvil being run on Jenkins, it is decided that Anvil is an excellent choice to manage the webhooks and merge checks.

**Specifics**

**Discussion**

RAT Toolbox is going to be an open-source data analysis software for Neutron Reflectivity calculations. Once it has become public, it attracts a wide range of contributors, especially on GitHub. It is important that the contributors follow certain instructions to NOT break the code. To ensure that, every time a contributor tries to commit code into the repository through a pull request, it is decided that the repository needs to be put through a series of automated tasks to ensure nothing has been changed in a way that could break the code or result in unexpected outputs.

**Solution**

The whole thing can be automated using a Jenkins pipeline with Anvil as a trigger and manager for the webhooks and pull requests, respectively. Anvil is available to GitHub repositories as a GitHub App that can be ‘downloaded’ into desired repositories from GitHub Marketplace. This allows Anvil to have proper rights and settings to tether the Pull Requests to an instance of Jenkins that builds the job in a freshly created Virtual Machine to make sure everything works in order.

**Consequences**

This idea seems to be working very well for now and foreseeable future as long as Anvil and its dependencies (STFC Cloud) are also functional.

**Decision Record 2: Converting MATLAB code to C++**

**Introduction**

RAT is made of MATLAB and so was RasCal. Arwel decided to introduce some major performance upgrades to RAT by converting MATLAB code base to C++. A MATLAB app called MATLAB Coder can be used to convert the MATLAB code into C++ as opposed to mundane task of hand-scripting MATLAB to C++.

**Specifics**

“C++ averages a processing speed that is over **500 times** faster than Matlab code. Not only does this apply for this code, but this can also be applied for any other code comparison between Matlab and C++ MEX-files “ ([Andrews](https://core.ac.uk/download/pdf/19152615.pdf))

To be able to use C++ MEX files, MATLAB coder can integrate the generated code into the projects as source code, static libraries, or dynamic libraries. The generated code can also be packaged as a MEX-function for use in MATLAB. Moreover, the generated code is readable and portable.

**Consequences**

MATLAB coder is a fantastic way to do this task, especially with great technical support from MathWorks. This could be a stable, long-standing approach to converting MATLAB code to C++, but more efficient converters could be on their way, especially with OpenAI’s [Codex models](https://www.infoq.com/news/2021/08/openai-codex/)

**Decision Record 3:**