

In the past 15 years, the pattern of getting funded in pharma companies, from research to marketing, has dramatically changed. To stay competitive in the open market, big pharmaceutical companies started to purchase fancy commercial lab and plant instruments believing those gadgets would give them the competitive edge over others. This led to the era of “lab automation”. Initially, these new shiny gadgets were sitting on the lab bench silently, as most experienced scientists rejected the notion of using the tools for generating thousands of samples at a time. However, shortly after the new instruments’ dynamic nature were proven, and the instruments became scientists’ indispensable tool, more scientists submitted proposals to collect their “own” tools.

As the instruments took over the majority of scientist’s routine lab work, the scientist’s role has shifted from traditional discovery and development to more of documenting how the expensive tools were used to produce potential new leads. And the pressure from the upper management to justify their big ticket items by producing more than expected hits through the new instruments became evident.

Automation of the lab has its own advantages and disadvantages. It creates a safer lab environment dealing with toxic chemicals as the chemicals will be delivered by liquid handling robots under the hood. Often times, scientists only design the experiments and all the chemicals and solvents, which are then delivered to each reaction well by robotic arms. The problem with this practice is we end up with too many samples to analyze where only a few are real candidates. Like humans, each chemical has its own chemical and physical properties. Therefore, the massive screening is only suitable for discovery phase with predefined chemical library sets.

In late stages, scientists need to use their scientific experience and knowledge to select the potential candidates based on careful analysis. Again, over screening will produce a lot of hits and it is hard to distinguish which ones are the true hits.

Usually automated commercial analytic instruments and usage licenses are very expensive. As a result, pharma companies often get a contract for licenses to use the instruments. And more often than not, upper management determines on how many licenses to purchase based on the current usage of the instruments.

The following case study involving an expensive instrumental license demonstrate how funding is being distributed internally:

1. The usage log of the instrument was pulled out by the given period (there are three modules in this instrument)
2. Using GGPlot2, the corresponding usage data by each module overlaying total usage (black line represents total usage)

3. Repeat the plot using two other modules in different colors (blue for Assay Analyzer, red for Condoseo data)
4. Estimate the area under the curve (AUC) to determine the average usage in a given period to determine the number of licenses.

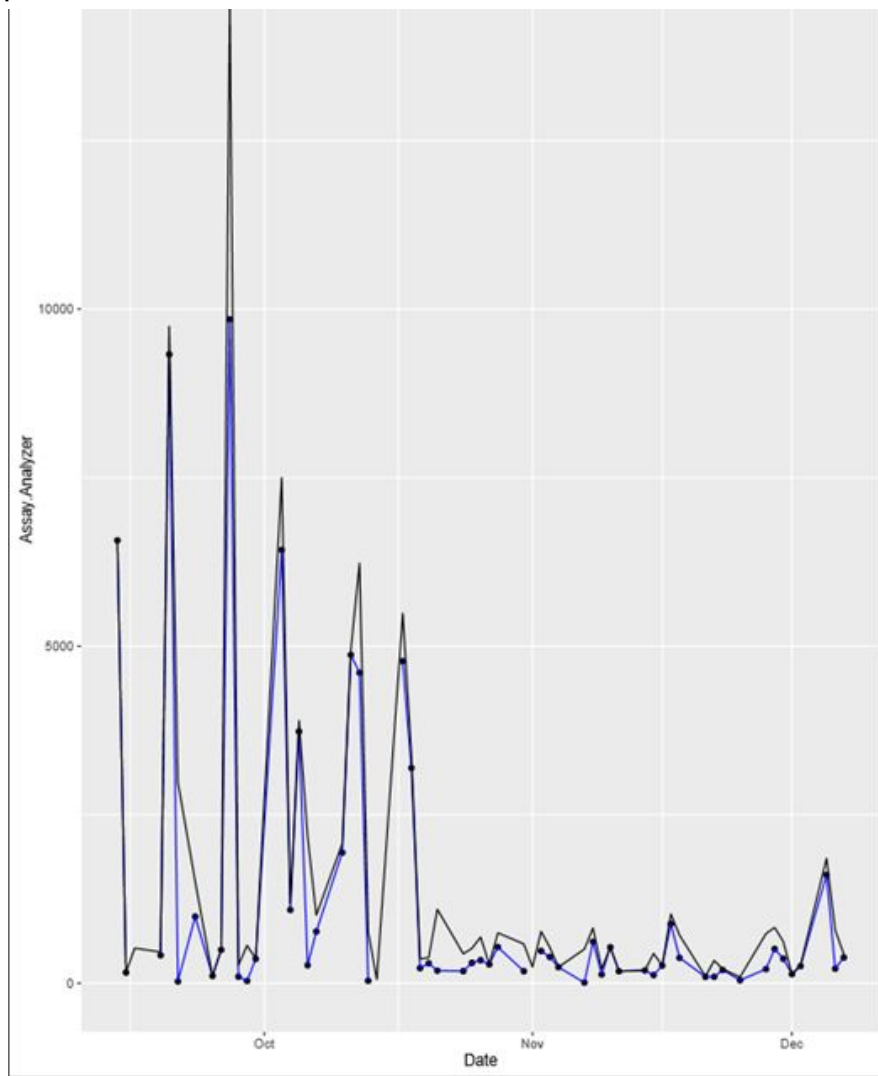
The following three graphs per each site were generated to estimate the usage minutes per day and the types of analysis the instrument was used for in the identification of new drugs. The three different analyses are:

- Assay Analyzer, which enables primary screening of a chemical library;
- Condoseo, equipped with in-depth time-series data analysis;
- Database Explorer, which aggregates Assay Analyzer and Condoseo.

1. Assay Analyzer Usage by *Basel Site* (Sept through December)

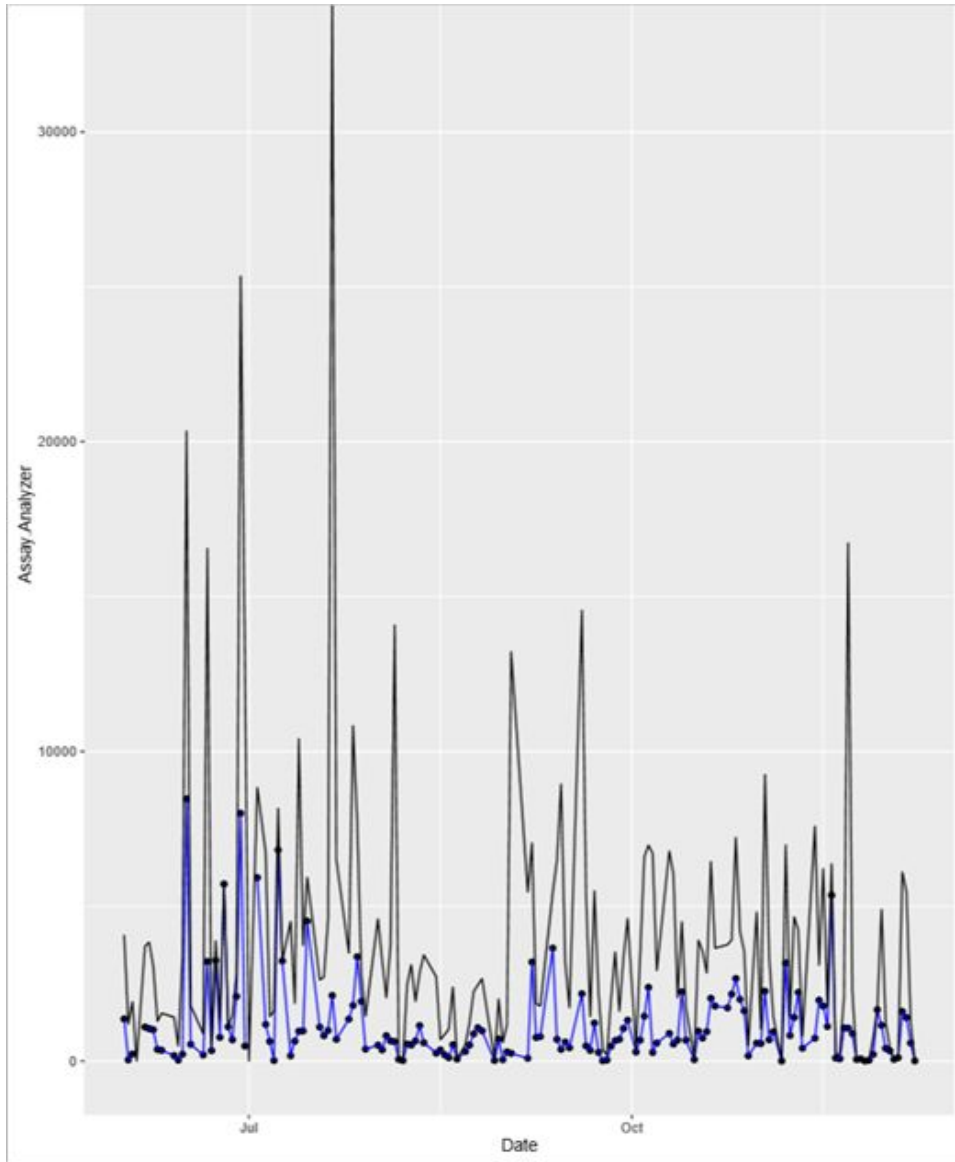
*Black line-plot represents the total usage sum for the given period and blue line-plot for Assay Analyzer usage

** Note that the instrument is not necessarily used continually. Therefore, the usage gap is natural consequence of the process.



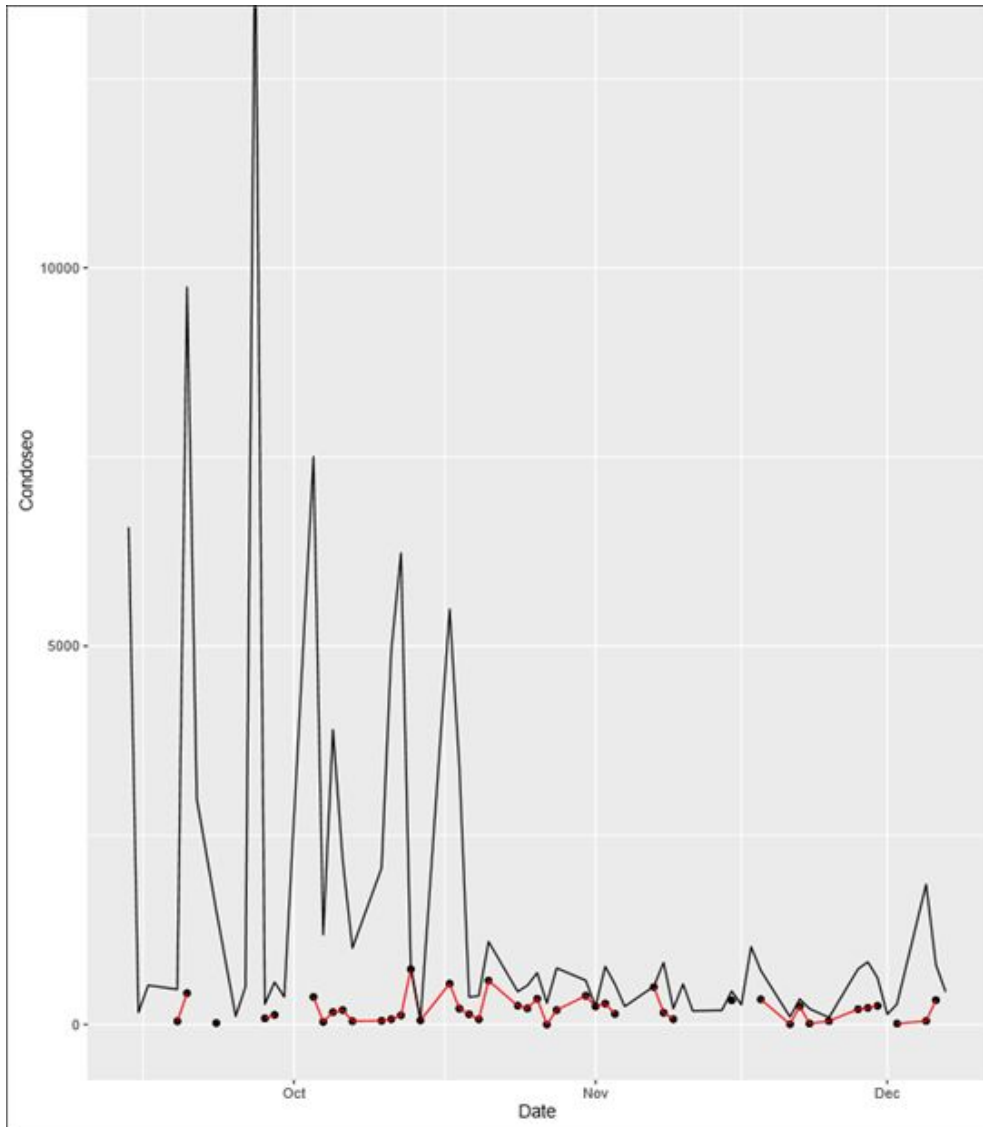
This plot of Assay Analyzer usage indicates Basel is mostly using Assay Analyzer (single point experiment such as library screening), among three modules available in this instrument.

Assay Analyzer usage by Nutley Site (July - Dec)



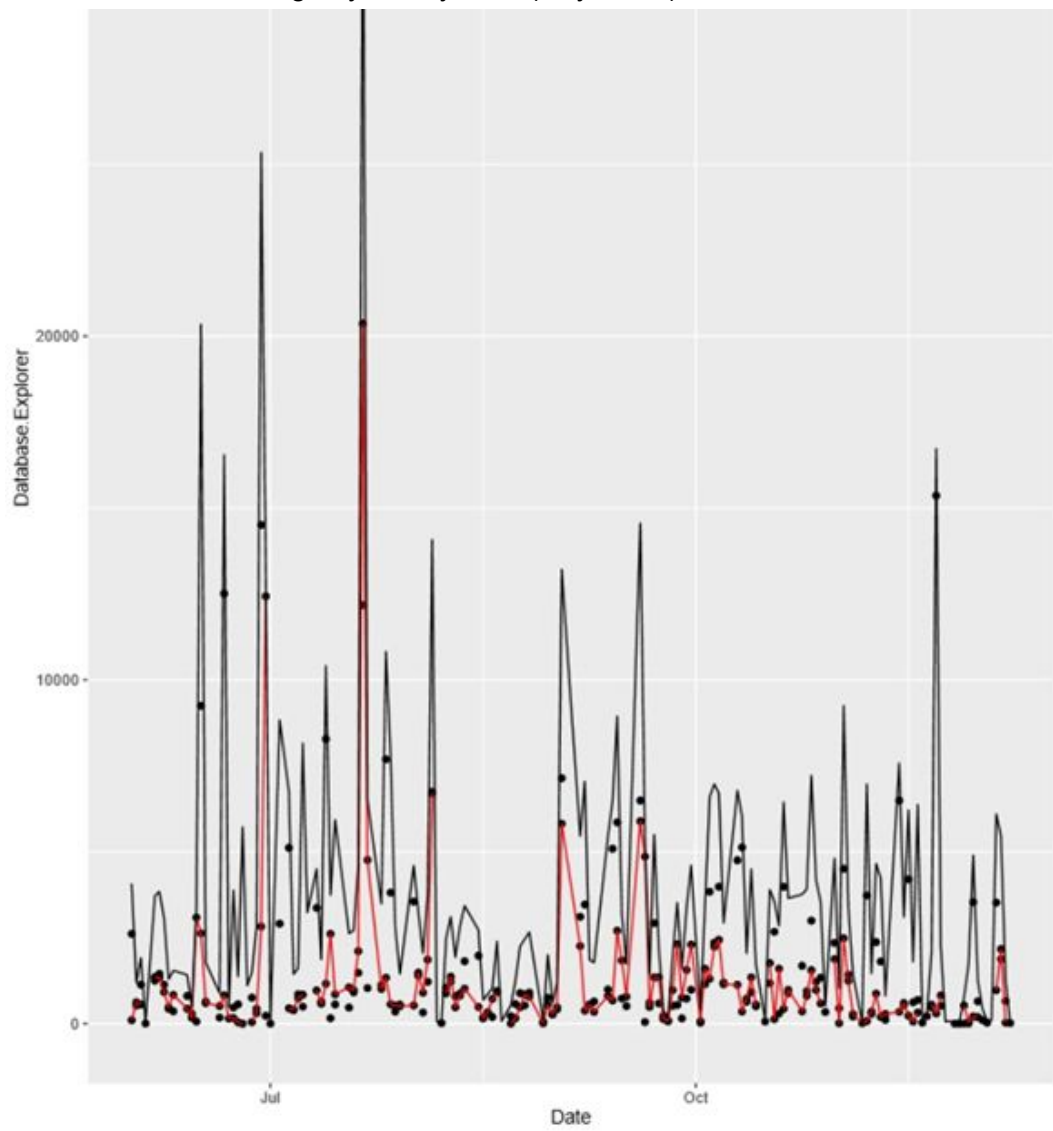
The amount of time Nutley scientists used this instrument was comparable to Basel scientists' overall.

2. Condoseo Usage by Basel Site (Sept - Dec)



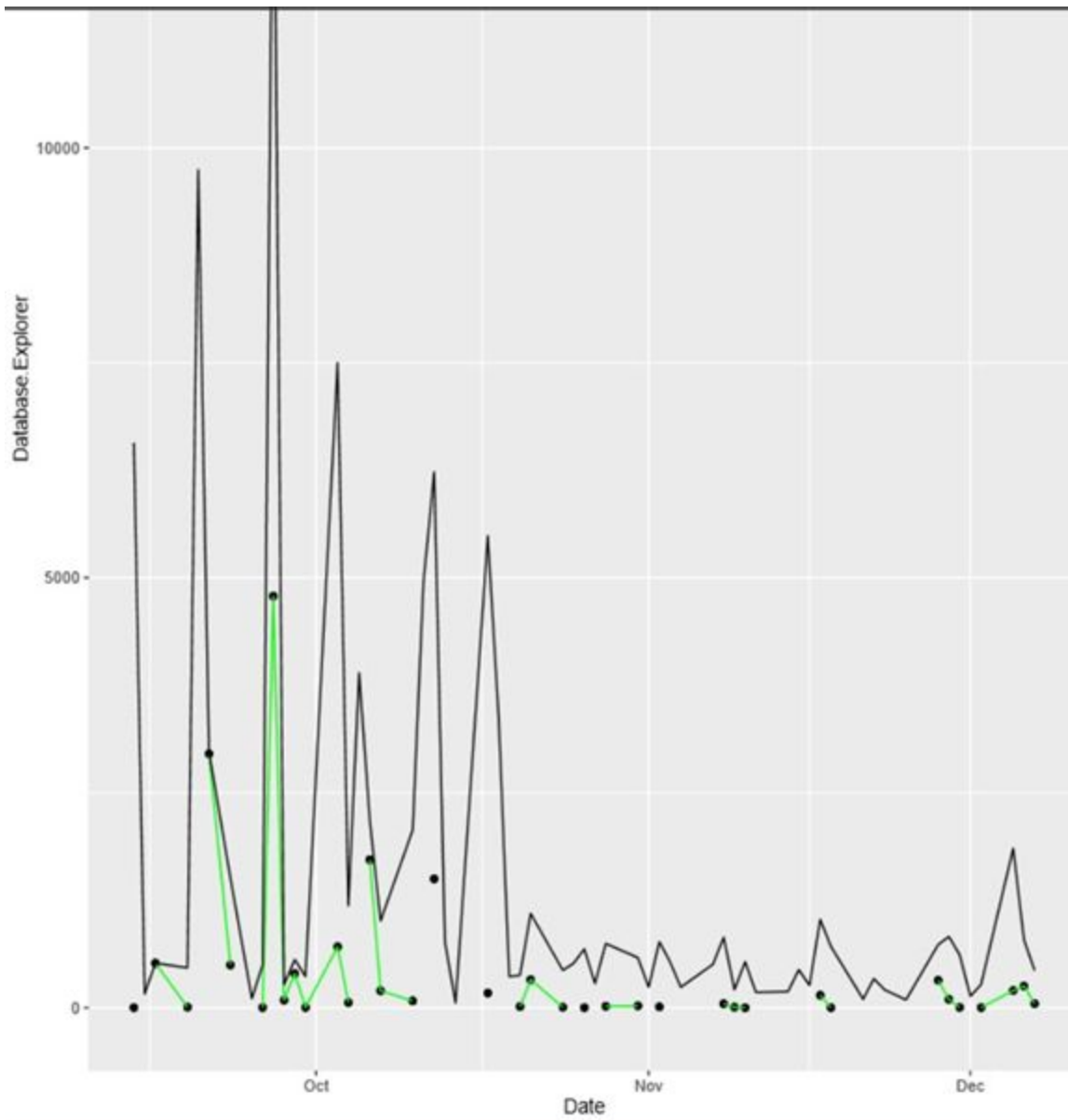
Basel site usage of Condoseo is very limited based on this plot.

Condoseo Usage by Nutley Site (July - Dec)



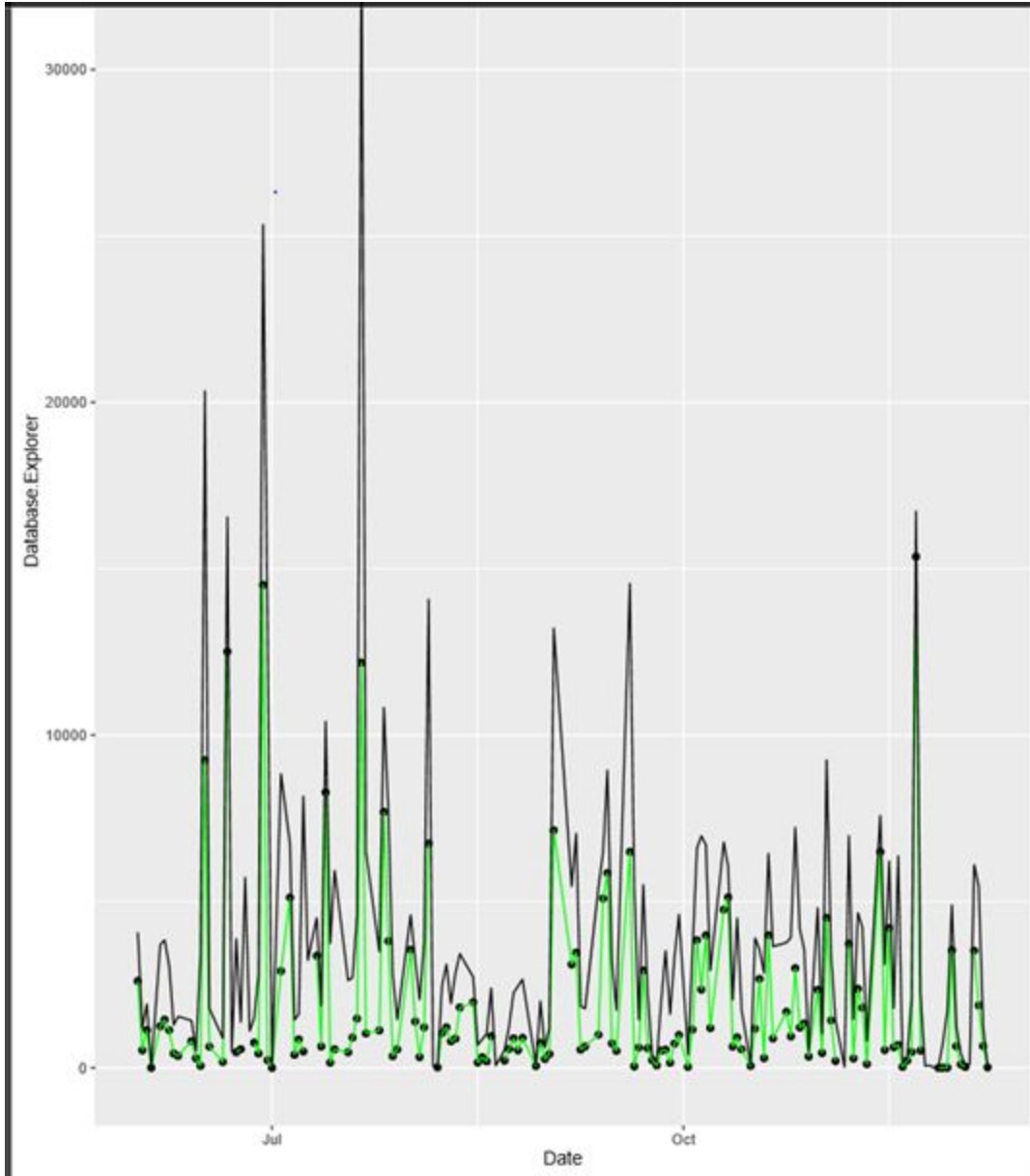
Nutley site is actively using Condoseo module to further analyze their potential hits.

Database Explorer Usage by Basel Site (Sep - Dec)



Basel site's Database Explorer usage is not consistent and very little activities are shown from mid October to December.

Database Explorer usage by Nutley Site (July- Dec)



As the Database Explorer is actively used in Nutley throughout the months shown here.

Following the presentation of the usage stats and graphs, Nutley site was granted more licenses than Basel site as the comparison of usage of the instrument was clearly higher in Nutley site for the given timeframe.