



Integration Lab Final Report

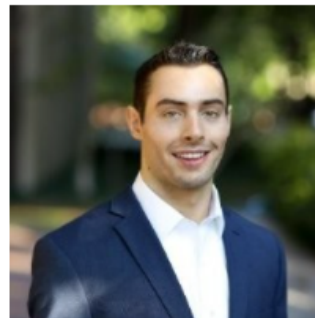
Team Members:



Isaac Schrof

Engineering

M.S.E: Data Science +
B.A.S: Computer Science from the
University of Pennsylvania
B.S : Business Analytics from the
Wharton School



David Heffernan

Engineering

B.A.S: Computer Science from the
University of Pennsylvania
B.S : Statistics from the Wharton
School

Academic Advisor: Professor Eric Eaton

Industry Advisors: Aquilo Capital Management

Introduction and Background:

Biodiligence is an intelligent clinical trials search engine for biotechnology investment firms. The project was inspired by a friend who worked as an analyst at a biotech investment firm conducting scientific diligence on companies who got frustrated by existing tools used for the job.

Biotechnology investment firms primarily conduct diligence on prospective companies based on scientific efficacies as opposed to financial information as the clinical trial status and progress of a company's drug development portfolio are generally better indicators of revenue potential and a company's value than present financials. The existing diligence process involves getting clinical trials information from a government site called clinicaltrials.gov which is a website that contains the most up to date clinical trial information. It is hosted by the national library of medicine (NLM) in conjunction with the FDA. However clinicaltrials.gov has limitations in terms of aggregating and faceting clinical trial data, lacks intuitive data visualizations, and thus causes analysts to spend more time and money sifting through information to find what they need. Given these limitations, there is an opportunity to develop a superior enterprise tool for searching and analyzing publicly available clinical trials data.

In short, Biodiligence is a more niche and simplified version of Crunchbase but for biotechnology companies.

Related Academic Work:

With the limitations of clinicaltrials.gov relatively well known, a group of Duke Professors and several other research groups developed the Database for Aggregate Analysis of ClinicalTrials.gov (AACT) which is an effort to convert clinicaltrials.gov into a normalized relational database in PostgreSQL. It represented a significant enhancement from the clinicaltrials.gov database as the first attempt to create and maintain a version of clinicaltrials.gov data for aggregate analysis and public use of data¹.

Our goal was to leverage this PostgreSQL database with MeSH terms in addition to Elasticsearch cluster with a copy of the data as the back end for the web application search engine and make it possible for non technical users such as biotechnology analysts to be able to effectively query and visualize clinical trials for more effective use.

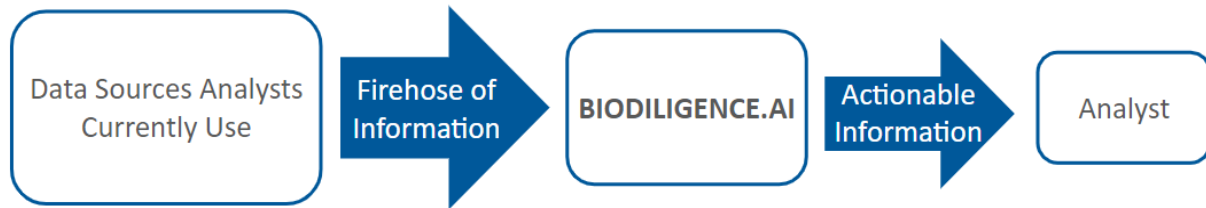
Value Proposition:

Financial backing for medical innovation in the small cap biotech sector is rooted in scientific diligence.

Scientific resources are buried in clinical trial registries, literature, SEC filings and more.

Time is wasted digging for data necessary to justify financing innovation that advances the therapeutic standard.

The following flowchart illustrates where Biodiligence sits in creating value for analysts and firms.

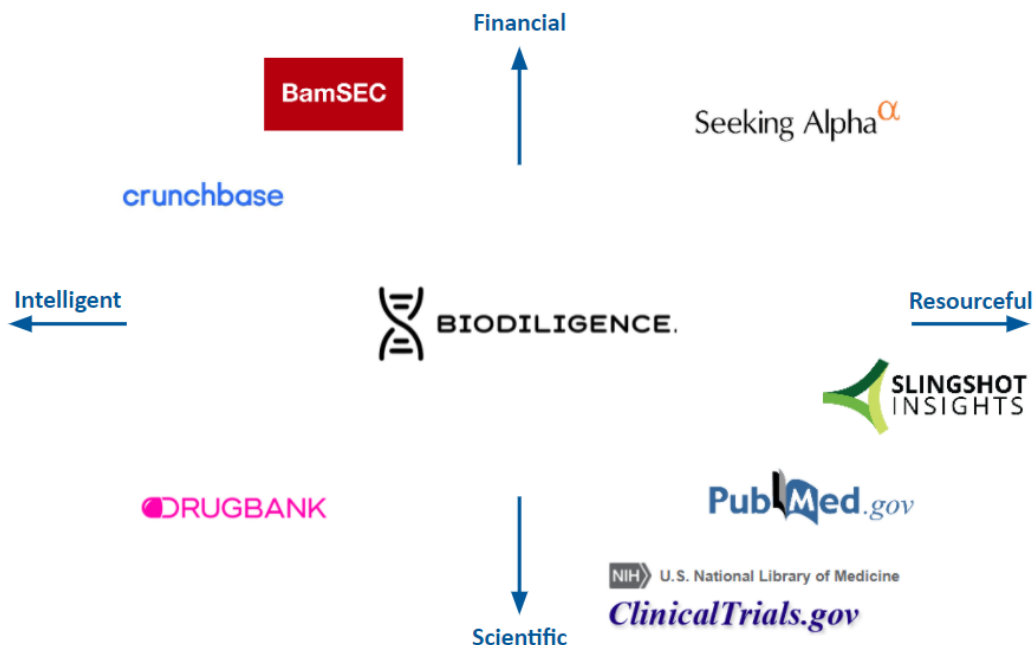


Biodiligence allows investment firms to save valuable time, follow the science, and more importantly transform medicine. By streamlining the scientific diligence process, firms can spend more time evaluating the potential of emerging therapies and less time wandering the web.

Competition

The primary competition for Biodiligence is the aforementioned existing resource that is used which is clinicaltrials.gov in the sense that this is the current tool used by those in industry.

While there are no other direct industry competitors in developing a database search engine for clinical trials for scientific diligence, there are several other ancillary competitors in the space that we have mapped out below.



The graphic above illustrates key axes representing intelligent, financial, scientific, and sentiment based resourcefulness services and current companies that offer these in the scheme of life science/medical diligence. The positioning of Biodiligence at the intersection of all axes is indicative of its own situation within the competitive landscape. There are several scientific resources we can see at the bottom, however they are primarily geared to provide drug information for drug development companies as opposed to investment firms. Biodiligence differentiates itself by focusing on scientific insights but presenting them in a way that is most insightful to the lens of an investment analyst. Meanwhile competitors at the top of the matrix are focused on providing a tool for investment firms, however they are not focused on the scientific diligence component of companies rather the financial metrics that are more generalizable across different industries. Thus there presents a unique opportunity for Biodiligence to fill this void in the competitive landscape.

Market Research:

In 2020 alone there was \$26B in venture funding for US Biotech firms. Additionally there was 2.5X much biotech IPO Activity as compared to 2019.

We tried to find how many small to mid cap focused biotech investment firms were in the market however this was difficult to find as they are obviously not public companies executives are often leaving or creating new firms. But given the amount of transaction activity in the space, we can confidently say that the number of firms are growing very fast as well as the number of analysts and assets they are managing.

One of the reasons many expect VC spending in biopharma to expand is that during 2020, particularly from March through about July, many pharma companies, if able, paused their clinical trials. Now that the vaccines are rolling out and expectations are that the pandemic will be brought under control by mid-2021 or earlier, more normal drug development activity will continue.

According to a Pitchbook report, "The resumption of clinical trials and elective procedures within hospital systems around the world has resuscitated drug development pipelines for several VC-backed biotechs, many of which will return to their private backers for additional capital to fund trials and build out R&D programs."

With the increase in biotechnology innovation as well as investment activity there will be a greater demand for diligence tools to be able to cover analysis on more drugs with less/same headcount. This presents a strong demand tailwind for Biodiligence as we seek to gain footing in this growing market.

Cost and Revenue Model:

Our revenue model looks like other enterprise SaaS companies in that our product will be sold as a monthly subscription. After talking with a couple angel investors and others in the biotechnology industry, we believe that we can charge more than more general diligence tools

such as crunchbase or pitchbook given the more niche and targeted need within the biotechnology space.

Individual licenses for crunchbase cost around \$50 / month. For an individual license of Biodiligence we would be seeking to charge \$75 - \$100 / month. Individual licenses however are not our primary revenue driver as we anticipate enterprise customers to be much more significant buyers of our product as it is for other SaaS companies such as crunchbase.

While enterprise prices for some of these comparable companies are often customized depending on the enterprise client we could try to think about pricing Biodiligence from the bottom up.

Average analysts and senior analysts at biotech funds can make on average \$200K / year. We can estimate that analysts work approximately 3000 hrs/year (50 weeks * 60 hrs / week) and thus average out to getting paid roughly 70\$ / hour. If we can save analysts just 30 mins per day that amounts to savings of roughly \$10,000 / year / analyst for large firms. This provides a promising upper bound on pricing as we are still talking with those in industry to figure out the best pricing plan for enterprise clients.

The great thing about enterprise SaaS companies is that they are extremely lightweight in terms of their cost structure. Our biggest costs will be maintaining a strong and talented group of developers to ensure that our product remains updated and performs at a high level.

Thus as we seek to raise angel investment our first spend will be to bring more talented developers to help continue to improve our product. While our existing product is a value working product, there are still numerous features planned to improve our product in the near future.

In addition to our development (R&D) costs, we imagine facing significant sales costs. Benchmarking against other B2B SaaS companies we expected our sales margins to be in the range of 10-40% and even more in the first few years as we work to grow our customer base.

Other relevant costs include hosting fees, customer support, and potentially premium data needs. While the cost to host our service is currently only \$7 a month on Heroku, we expect this cost to increase significantly as we will need to ensure reliability, security, latency, and scalability.

As we seek to grow there will be costs to our growth namely in the form of customer acquisition costs. We hope to start with our current beta customers and develop organic growth through word of mouth in the industry.