

Q&A with Dr. Matthew Michelson, CEO of Evid Science using Artificial Intelligence and Machine Learning to build the Largest Database of Therapy Evidence in the World for Pharmaceutical Companies, Life Sciences and Medical Research



Dr. Matthew Michelson
Chief Executive Officer

Evid Science
www.evidscience.com

Contact:
Matthew Michelson
(626) 765-1903
mmichelson@evidscience.com

Interview conducted by:
Lynn Fosse, Senior Editor
CEOCFO Magazine

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- Dr. Matthew Michelson

CEOCFO: Dr. Michelson, what is the concept behind Evid Science?

Dr. Michelson: The driver for our company is the concept of evidence based medicine, where physicians are making decisions based on what research tells them rather than what they have done historically. And yet, there is actually a lack of evidence funneling into this process, evidence in this context being the comparative studies that compare how effective or safe therapies are relative to their peers or placebo. The reason there is a lack of evidence is that it is an extremely manually intensive process to do these comparisons. Humans have to go and read through all of the medical literature, pull out the results they care about, and combine them all together. So the genesis for our company is really about automating that process, and this was driven by research we did for the National Institute of Health initially, with follow on research from DARPA. The research goal is to have the machine read and understand the medical literature so to answer these questions about how effective and safe therapies are in a much broader way than that is done now.

CEOCFO: What is the technology that will allow a computer to access and take all of the information into account?

Dr. Michelson: We use a technology called Artificial Intelligence, which means that we are building a computer system that can mimic a human cognitive task. Just like you and I would sit and read a paper and can understand the facts that are being presented to us, so does the machine. We have created a computer system that can read medical texts like a person does and pull out the main results. We run this on a large set of cloud computers and the system is reading through the literature, pulling out those facts and storing them so then you can ask it what the evidence is behind comparing therapy A to therapy B for some kind of outcome, whether that is efficacy, safety or cost.

CEOCFO: When you are looking at diagnosing something, how do you know when the computer is ready?

Dr. Michelson: Firstly, we do not do anything related to diagnosis; we focus solely on treatment. The physician makes the regular diagnosis and then they would say, “maybe we should prescribe this drug.” The idea is when they are making that choice about what drug to give, they should be doing that based on what data and research says. The data should say this is the best drug, not just because that is way it’s always been done. With that being said, we are actually not selling our product to healthcare providers or physicians yet. That is a long term goal for us. We want the machine to be extra careful and extra vetted for those circumstances, since there could be life-and-death implications. Therefore, right now we are focusing on the pharmaceutical vertical, medical research, etc. where the machine’s decisions don’t imply a life-or-death decision. I should mention, we validate that our system is doing the right thing in two ways. When we did our initial National Institutes of Health project, one of the outcomes was to compare against human generated, systematic reviews.

A systematic review is where physicians go out and compare one therapy to a bunch of others. We compared the results generated by our system to the one that had already been published in the literature, and we generated the same results. Secondly, what we do is periodically check in with our algorithm and validate the evidence it pulls out. We can measure and say whether it is correct or not.

CEOCFO: *How do you pull all of the material together?*

Dr. Michelson: We have a separate computer program called a crawler and its job is to pull in text and data from all over the internet that is either publicly available or for which we have some kind of copyright agreement. There are abstracts that are publicly available after a major medical conference, and sometimes there are papers called open access where we can pull down the entire paper. Often, if they are not open access, we can usually get the abstracts from other sources. The system is constantly crawling and pulling in as much text as it can and funneling that through the system.

CEOCFO: *Can you weigh the quality of the source or the length of the studies?*

Dr. Michelson: We are soon to publish a scientifically peer reviewed paper on just this topic. Essentially we have an algorithm that makes an assessment of the scientific soundness of the paper it is reading. One way to think about our approach is that we have a number of different reading modules. One of the readers is able read a paper and pull out the facts. This one extracts the main results that are being published, the disease, the drugs that were used and things about the people included and excluded from the study. We have a separate reader that makes this quality assessment. Since we haven't published the scientific paper on that yet, I can't talk too much about it right now because it is under review. What that does is look for particular patterns in the language that are highly indicative that a study was scientifically sound, in contrast to papers that are not. It does this by analyzing the title an abstract text.

CEOCFO: *Are similar projects underway now? What is different about your approach or where you are at this point?*

Mr. Michelson: In the marketplace, there are a few companies that provide this level of data. They go through the medical literature, pull out the results and information about who was included and excluded, the main results, etc. but their data is largely curated by hand. Think rows of people reading the papers, pulling the data out and storing it in their database. That is as inherently limited as the first problem that we tried to address with the National Institutes of Health. They can get very precise and deep on the data that they can extract, but they are inherently limited because human beings are doing the reading. In contrast, our system has a machine doing the reading and pulling in data from a huge, broad swath of the medical literature. Not to say that we are Google, because we are a startup company, but we liken it to the original library sciences where people were organizing the data by hand and doing it very precisely, versus the modern age where search engines do not have that level of organization but they let you have access to so much more data that you can find yourself.

CEOCFO: *Are you funded only by government programs? Are you funded privately or are you looking for funding or partnerships?*

Mr. Michelson: We are funded with private investor capital funding.

CEOCFO: *What surprised you through the process so far?*

Mr. Michelson: A few things have really surprised me. One is that the system itself surprises me almost every day. I will look into a result and I cannot believe a computer is doing this. Just the fact that we live in this age where computer systems do some of these tasks, like pull out some of the complicated results and combine them across these papers or make an assessment of quality. It's all just sort of amazing. From an entrepreneurial perspective, one of the things that surprised me was how positive people are on the ability to let the machines make some of these decisions. I have worked in Artificial Intelligence and machine learning for a very long time and this was not always the case. There was a fairly heavy dose of either skepticism or a "What is this?" type of attitude to AI systems. Now people are becoming so comfortable with these technologies whether they are talking to Alexa or contemplating the self driving car, that there is much more up take on these types of technologies and that has been surprising too.

CEOCFO: *Why pay attention to Evid Science right now?*

Mr. Michelson: As I mentioned, we are focused shorter term on pharmaceutical company, life sciences research, medical research and things like that, but in the future, we are going to address bedside patient point of care, clinical decision support systems. What is powering that is the data we have. Evid Science is going to have the largest, most comprehensive, most timely database of therapy effectiveness in the world. And whether it is us or someone else, the world is shifting to this arena where healthcare is going to be driven by data and by evidence. We think we have one of the most important, proprietary datasets in that area. In the next ten years, as this to evidence over eminence happens in healthcare, we are poised to own one of the most important pieces of data in the evidence space.