Interview: Dongliang Guo â?? Founder & CEO, Vishuo Biomedical, Singapore

â??Having a fully integrated data system is key to providing comprehensive medicine in todayâ??s modern age.â?•

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Motivated by the transformative role of big data in healthcare, founder and CEO of Vishuo Biomedical, Dongliang Guo discusses the inspiration behind the company, the successful path to commercialization, as well as leveraging Singaporeâ??s brand in the biomedical landscape.

What was the inspiration for founding Vishuo Biomedical? What was the vision for the company and the motivation behind the technology?

The technology and the mechanism we use today is one that only gained traction in the market in 2004. Previously, when a pharmaceutical company discovered a drug, their target demographic automatically became the entire population. This was not ideal given that they are not catering to the need of the specific cohort for the specific therapy. Around 2002, there was a trend in the industry for looking closely into selected population groups through a genomic-based lens. This was an imperative shift given that only certain genes are mutated. This targeted strategy is necessary in preventing serious side effects or creating a drug that has no effect at all in the first place.

Moreover, another favourable factor for the rise of the need for precision diagnostics is the fact that the cost of genomic sequencing has decreased. Since 2008, the cost has gone below 1000 USD for whole genome sequence and has further significantly decreased to 300 USD for most of the cancer target sequence today. However, targeted drug therapies themselves have remained expensive, costing at least 10,000 USD for treatments that would only last for a few months. Therefore, companion diagnostics, has become significantly more important as a means of overall costs reduction, as well as the reduction of the side effect risks.

Companion diagnostics is a powerful tool to provide comprehensive healthcare. In an information age with a wide plethora of choices, it is difficult for physicians to remember every single drug as well as integrate the latest diagnostic techniques. Having a fully integrated data system is key to providing comprehensive medicine in todayâ??s modern age. This was the main motivation for my partner and I to begin research and development for the product and lay the foundations for the company in 2011.

In essence, there were three parts to building our business. Firstly, the upstream part of the business is foundational, which involve setting up the hardware sequencers. The middle layer involves the operators. Among the well-renowned players in this space are BGI (Beijing Genomics Institute) in China, Macrogen in South Korea, as well as AITbiotech in Singapore, therefore signifying that there is a healthy ecosystem in the region at large. Thirdly, the key element of our business is to provide translational data in order to provide doctors with clinical leverage in their practices. Interpreting genomic data can produce a range of 1 GB to 100 GB worth of information. The overarching goal for us is to look into how we can offer an analytical platform to that is succinct and user-friendly to hospitals and clinics in order to translate genomic data.

What are your methodologies for compiling such a large database? What are the main challenges for this process?

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The challenge does not like in the volume but in the accuracy. There is a plethora of information available today, but the most popular means of extracting data currently is through the text-mining tool gathered from public data records. While this mechanism itself is effective, it cannot be sufficiently trusted for clinical accuracy.

The first step for us also involves utilizing the text-mining tool, but it is later vetted by a group of 20-30 top-notch data scientists curating the data manually to ensure accuracy. On average, 2 million biomedical papers are published each year so the need for an automated text-mining tool as a first step is a crucial prerequisite. After the aggregated data is filtered, our expert scientists curate the data one by one in order to provide the most precise information to our clients. The process is lengthy, typically spanning 5 years as it needs to be reviewed and validate at the utmost standards, especially given the fact that it will be for clinical use.

Your flagship product iCMDB (individual Customized Medicine Database) has been gaining traction in different markets. How did you go about commercializing this product? Is there a big demand in the market for this type of product?

In the last two years, there has been an exponential growth in the bio-medical database market, especially in the precision medicine database niche of this market. The US has been a strong proponent of this technology as President Obama himself endorsed the need for this technology two years ago as a means to save money and resources for both the government and the patients.

Another therapeutic significance to identifying biomarkers is that they are not limited to the proteins, but also to the expression levels themselves. This is an advantageous feature for diagnostics, and therefore both the practitioners and the patients, and even the government to some extent, recognize its value. Although this concept is relatively new when retrospectively perceived from five years ago, it has gained traction in the last two years as it value is becoming more and more evident. The main focus today is to push the concept to the investors and justify its advantages over the risks.

Even though the global market is experiencing a fast growth, it is still a relatively new concept in Singapore itself. We leveraged the decline in the cost for genomic sequencing, as well as strong partnerships with well-reputed healthcare institutions in order to gain presence in the market. For example, we have a strong partnership with the Mount Sinai Hospital in the US, as well as hospitals in Australia, China and Thailand. It was important to build our reputation and solidify our identity in different markets in order to establish ourselves in each one, including Singapore.

As the precision medicine market is experiencing exponential growth, the competitive landscape is sure to grow in line with the market as well. Who do you believe are your main competitors and how does Vishuo leverage itself against the competition?

One of our main competitor is the Foundation Medicine, which is based in Boston and has recently been acquired by Roche. The US is where the saturation of the competition lies with very strong player as there is a very healthy biomedical research ecosystem formed there. Another competitor is Tute Genomics, which has recently been invested by Google. Though the database aspect of the business faces a wealth of competition as it is easily transferrable across the globe, the sequencing aspect offers leveraging factors to compete with the rest of the market as it is a hardware technology. In regards with the database itself, even companies such as Thomas Reuter would be considered as a competitor. Even though they are a financial database company as it stands today, they are venturing into the untapped potential of the healthcare markets as big data becomes more influential in this sector.

As a point of differentiation, one of the main initiatives that we have is to ensure that the language for instruction is catered specifically to the local market, not only in English. This is especially true for markets like Thailand and China. Secondly, our dual approach of a combination of the text-mining tools as well as the manual curation and validation by top-notch PhD data scientists is a strong value proposition to our clients. Although the cost of maintain this team is very high, this provides a sense of security to our customers as it speaks volume about the high-level calibre of our work.

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From the technical standpoint, the barriers to entry in the market is relatively low. Nonetheless, the challenges lie in ensuring appropriate collaboration, as well as the validation process. Typically, it takes 2 years to validate the data for one disease, which implies that the cost for validation itself is also very high, in addition to the time that needs to be allocated. There needs to be a high volume of data at the start in order for them to be available for clinical use. To date, Vishuo boasts a repertoire of 8,000 patient samples for cancer alone and 12,00 biomarkers.

Despite the growth of the market, the reason why there is still a scarcity of companies in this space is the very stringent regulation levels. As the technology is ultimately aimed at two critical healthcare channels â?? clinical and pharmaceutical â?? the evaluation and validation processes are very lengthy. For example, our technology had to be reviewed and validated by Mount Sinai for two years. This is one of the main reason why no precision diagnostic company has ever had an IPO. The ecosystem is fairly new.

Since the companyâ??s inception in 2011, how has it evolved today?

Vishuo began with a team of three to five employees in Singapore. Today, our R&D team in Singapore has over 20 employees. Our Beijing office â?? which also houses its own clinical diagnostics laboratory â?? proudly has over 80 employees. Globally, there is approximately a network of 150 employees, with 10 sitting in Shanghai, three in New Haven (USA) as well having set up a new office in Thailand.

In regards with our geographic focus, there is an emphasis in nurturing our presence in the US as Mount Sinai Hospital already uses our database and platform in their genomic centre and got CAP certificate recently. We also have an entry-level presence in Japan given that the precision database market is not established there yet. Our products are currently undergoing the approval process in that market and are in the pipeline to be implemented in pioneering clinics.

Is the application for this technology only for cancer and diabetes, or could they be extended to other therapy areas?

Oncology, pharmacogenomics, diabetes and cardiovascular are the four main focus of our products. However, it should be noted that the functionalities are diverse. For example, for oncology, the main purpose is to identify the main hereditary indicators for mutation whereas for cardiovascular, the intention is the determine the proper dosage. This is exactly the premise of precision medicine, which is to provide a targeted therapeutic solution.

Prior to precision medicine diagnostics historically largely revolved around experiential medicine wherein there is a trial and error dynamic as to which drug performs well for a patient. Thereafter, evidence-based medicine became the trend, which had then been overtaken with the rise of genetics and its clinical applicability.

From a pharmaceutical point of view, the inclusion of precision diagnostics both has its advantages and disadvantages. For the latter, having more precise diagnostics could have implications on the volume of sales of drug being sold. In being able to have more targeted therapies, population groups taking the drugs could be reduced and therefore lesser revenues. Nonetheless, higher efficacy levels are clearly evident as the main advantage, which improves the overall healthcare for patients.

What is the significance of having a presence in Singapore?

Singapore is the Biomedical center in Asia Pacific. Many Asian companies, especially the ones looking to expand into Europe and the US, look into Singapore first to leverage its competencies. From the language to its talent pool, Singapore itself is a well-reputed brand in the biomedical sector. There is a healthy infrastructure and ecosystem here as nurtured by different agencies. There is a strength of the biomedical cluster in Singapore is unparalleled in the region and therefore facilitates our entry to other markets once we have established a presence here.

As the founder of the company at the forefront of tackling all the challenges in the market, how do you keep yourself motivated?

For me, the motivation comes from the novelty of the technology and discoveries made in this field. The challenges are a source of motivation in and of itself. I believe that biomedical informatics will pave the way for the future of healthcare and it inspires me to be amongst its pioneers. In the next ten years, a new status quo for healthcare will emerge as driven by the value brought by big data.

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