BiOxyDyn

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Prof. Geoff Parker, Scientific and Founding Director BiOxyDyn.

Tessella expertise helps BiOxyDyn meet critical milestone in commercialisation of Oxygen Enhanced MRI technology

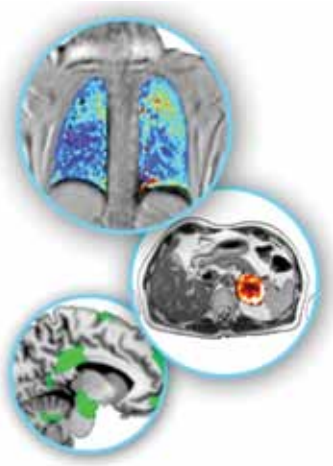
When BiOxyDyn, (*www.bioxydyn.com*), a spin out company from Manchester University, needed to turn their innovative research and Intellectual Property (IP) in non-invasive medical imaging into a commercially robust, well-architected and fully-documented set of software tools, they called on Tessella's unique blend of expertise in image analysis and scientific software engineering. The collaboration has enabled BiOxyDyn to meet the first critical milestone in the commercialisation of their technology – allowing them to more fully engage with potential partners and customers, capitalise on their market lead, attract additional investment and better meet regulatory requirements.

Business Background and Challenge

BiOxyDyn, a spin out from Manchester University, was formed to commercialise innovative research work into non-invasive medical imaging techniques, including a method for imaging lungs called Oxygen Enhanced Magnetic Resonance Imaging (OE-MRI). The company's portfolio of technologies and capabilities includes tools and services to improve the understanding of lung diseases such as chronic obstructive pulmonary disease (COPD) and asthma. BiOxyDyn are also active in the development of new imaging tools for oncology and neuroscience. The technology provides a greater insight into the diagnosis and response to treatment for these diseases, and can be applied to both drug development and clinical use.

BiOxyDyn's imaging technologies, especially OE-MRI, have the potential to change the way in which lung disease is diagnosed and monitored by providing non-invasive regional assessment of lung ventilation/perfusion ratio (V/Q) and measures of changes in pulmonary vascular function. It is also more cost effective, easier to use and safer than traditional methods such as X-ray CT (CAT) scanning.

Prof. Geoff Parker, who heads up a large research group at Manchester University and is Scientific & Founding Director at BiOxDyn, takes up the story "We could see the value and potential of the new techniques we had developed. However, in order for them to make an impact on the health of patients we knew we had to bridge the gap between academic research and commercial delivery. To this end we



founded BiOxyDyn and approached the University's technology office (UMIP) to recommend a software partner to help us turn our Intellectual Property (IP) of image analysis models & algorithms into a robust, well-architected and documented toolset. This critical first step in our product development roadmap would give us the credibility to more fully engage with potential partners, attract additional funding and be ready to meet future regulatory requirements".

Solution and Benefits

The technology office recommended Tessella, and after preliminary discussions they were selected to work on the project. Geoff continues "Because of their background in science, image analysis and complex algorithm development, the Tessella consultants were able to come up to speed quickly. They worked very closely with the research team to document requirements, and iteratively design, build and test a well-architected and auditable solution"

The team identified the need for a number of workflow tools to form a wrapper around the core image analysis algorithms. Geoff adds "The workflow tools Tessella have developed have enabled us to significantly speed up the overall analysis process".

The first three tools in the workflow are used to pre-process the raw image data before analysis. The first of these is a file conversion module that isolates the complexity of the meta-data extraction in the raw MRI image file making it easier to work with and convert into the optimum format for subsequent downstream analysis. The second tool then calculates the difference in the partial pressure of molecular oxygen observed across the lung as oxygen is delivered - as a function of time. The final part of the pre-processing workflow is a region-of-interest and small image tool that allows the computationally intensive modeling to be localised, speeding up downstream analysis.

Finally, in order to speed up the image analysis process itself, Tessella reworked the original mathematical models developed by the research group into C++, including formulating the numerical integrations and parameter fitting. The algorithms were then fully verified by comparing the results against "synthetic" data where the expected values for the fit parameters were known.

Summary and Future

Geoff concludes "Partnering with Tessella has enabled us to take the first vital step in commercialising our research and IP in non-invasive medical imaging technology. We now have a robust, well-documented and very efficient set of verified algorithms and workflow tools that allow us to have meaningful dialogue with potential pharmaceutical and clinical partners and customers. We could not have achieved this so smoothly and quickly without Tessella's background in science and image analysis, and their high quality approach to software engineering.

"From this foundation we can move confidently onto the next steps in our product and commercial development, meeting other critical milestones such as clinical field validation and regulatory approval. Tessella have played a vital role in our success to date, and we are already discussing ways in which they can assist us with this next important phase in our growth."

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