



Tackling concussion in Impact Sports with PROTECHT

Sports & Wellbeing Analytics (SWA), supported by Keytree and Swansea University, have designed and built an award-winning head impact management and monitoring system, PROTECHT, to better understand and prevent issues relating to concussion in impact sports.

Currently in use at Ospreys Rugby and Cardiff Blues, the ground-breaking technology utilises sensors in a mouthguard to display data resulting from head impacts.

PROTECHT™

This is presented in real-time, via a web application designed specifically for the project. The app translates and displays the data of each sub-concussive and concussive impact, providing instant visibility to the pitch-side medical team.

PROTECHT is a world-first in professional sport and exemplifies the innovative use of technology in a non-traditional field to create meaningful outcomes. It clearly demonstrates how technology has a unique ability to change not only the shape of an industry for the better but improve people's lives - a key motivation for all involved.

The Rugby Football Union calculated that there are 21.5 concussions per 1,000 player hours in the English Premiership last season - one concussion in every six games. Concussion across all impact sports is increasingly recognised as having serious immediate and long-term medical ramifications for players. PROTECHT is already a market leader in tackling these issues and has the ability to extend the careers of sportsmen and women who play high impact sports and just as importantly protect their quality of life on retirement.

"We are committed to using the very best technology available in building a solution which will undoubtedly help to protect sportsmen and women from serious head health issues in the short, medium and long term. The innovative Keytree team continue to be an integral part of this critical ongoing mission."

- Chris Turner, SWA CEO

Meeting requirements

The primary business requirement was simple - measure all minor and major impacts to athletes in real-time, providing insights and analytics to pitch-side coaches and medical staff. Sitting underneath this central requirement is a set of complex algorithms which provides for the first time, objective data to the pitch-side team to supplement their decisions on a player's ability to continue on the pitch, be that in training or in a match. The requirements were collated in conjunction with the Sport and Exercise Science Department of at Swansea University and with Ospreys Rugby. The overall project and prototype was conceived and developed by SWA using design and development services from Keytree and SAP.

The unique hardware and electronics embedded in the mouthguard were designed and built by SWA in close collaboration with a team of Keytree and Swansea University specialists. The same team also wrote the firmware used to capture and transmit information wirelessly to a receiver which logs and analyses detailed impact data accurately and in real-time. The innovative and industry-changing project harnesses powerful elements of both SAP Leonardo and SAP Cloud Platform to serve the app used by the pitch-side coaching staff. The app has an intuitive UI, making analysing the data quick and easy and displays in-play and post-play analytics in relation to these impacts.

Project delivery

Keytree was selected as the partner of choice by SWA based on SAP's recommendation as the most innovative SAP partner in the UK eco-system, with expertise in agile working. Keytree proposed this methodology for project delivery - using associated toolkits and documentation services such as Jira and Confluence.

To ensure the consistently refined requirements were introduced on an iterative basis, the Project Quality Plan (PQP), created at the outset, included planning for regular cycles of user testing to ensure that the quality of the app, mouthguard and receivers was optimum. Accuracy and quality of data obtained was validated and verified through testing against industry-leading accelerometers/gyroscopes at HORIBA MIRA, a crash testing institute. The results of injury risk algorithms were corroborated by academics at Swansea University. Verifying these values was fundamental to the product validity along with the performance of the product which was assessed through weekly field trials with Ospreys Rugby Club. Further to this, the PQP included a cycle of testing to CE-certification and laboratory stress testing, which has a stringent and rigid set of controls with very high acceptance criteria, validating the quality of the deliverables to the highest standard possible.

PROTECHT, Ospreys Rugby & Cardiff Blues

The system is proving immensely popular with the professional sportsmen from both Ospreys Rugby and Cardiff Blues – as demonstrated recently on BBC's weekly technology show Click. Recording and measuring every in-game player impact, coaches and medical staff are alerted in real-time when multiple impacts aggregate to a dangerous threshold level. The key success criteria for the project, as highlighted in the BBC report, is that the solution accurately records and analyses concussive impacts using data that is trusted.

The project to develop PROTECHT, staffed through a strong partner network, was the genesis of Keytree's Port Talbot office - the embodiment of Keytree's commitment to creating jobs across the UK and investing in the local communities where its offices are located.