

ENGINEERING ROADMAP



Since 2016, the NFL has allocated over \$60 million to the creation and funding of the Engineering Roadmap. It's a comprehensive effort—funded by the NFL and managed by Football Research, Inc. (FRI)—to improve the understanding of the biomechanics of head injuries in professional football and to create incentives for helmet manufacturers, small businesses, entrepreneurs, universities and others to develop and commercialize new and improved protective equipment, including helmets.

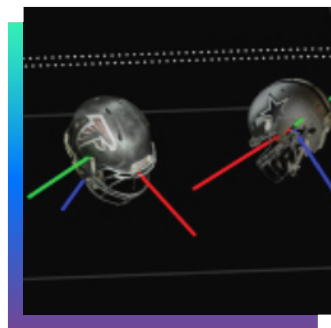
DRIVEN BY EXPERTS : BIOMECHANICAL ENGINEERS

FRI, a nonprofit corporation formed and financially supported by the NFL, manages the Engineering Roadmap. The Board of Directors includes leading engineers and experts who advise FRI on how best to advance the understanding of biomechanics in football and create an environment where new and improved protective equipment will be developed. Jeff Crandall, Ph.D., chairman of the NFL Engineering Committee, serves a leading role in managing the Engineering Roadmap. Dr. Crandall is CEO of Bicare. The Board also works closely with Dr. Kristy Arbogast and Dr. Barry Myers, consultants to the NFL Players Association, who each serve as co-leads on essential elements of the Engineering Roadmap.



RESEARCH : MEASURING THE ON-FIELD ENVIRONMENT AND SHARING TOOLS

The NFL is advised by many of the world's preeminent experts in medicine and football. As part of the Engineering Roadmap, biomechanical engineers completed a comprehensive video review of all reported concussions sustained in NFL games since the 2015 season to better understand concussion-causing impacts. The data is shared widely with helmet manufacturers, designers, innovators, entrepreneurs, universities and others to stimulate new ideas and designs for protective equipment. FRI has also collaborated with university partners to develop new tools to encourage innovation and advance equipment design, including finite element models of modern football helmets, impact test dummy components and test conditions simulating on-field impacts.





EDUCATION : EXPERTS AND INNOVATORS LEARNING FROM EACH OTHER

Experts share the latest knowledge regarding the causes of concussion in professional football, including the best tools available for assessing and optimizing the design and manufacturing of protective equipment. These discussions are an important step in educating and creating incentives for those in the marketplace to design and manufacture protective equipment that performs better than current models. Periodic symposia, webinars and other educational efforts allow experts to share the most up-to-date biomechanical and biomedical information.



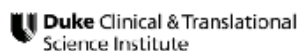
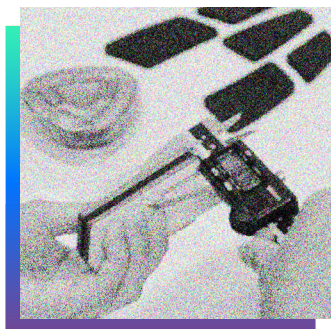
CROWD SOURCED CHALLENGES OFFER INCENTIVES FOR ENTREPRENEURS AND SMALL BUSINESSES TO ACCELERATE INNOVATION

The NFL engages experts to stimulate new developments in engineering, biomechanics and materials science designed to better protect against injuries.



» The NFL Helmet Challenge

In 2019, the league launched the two-year NFL Helmet Challenge, an innovation challenge that aims to stimulate the development by experts, innovators and helmet manufacturers of a new helmet that outperforms all helmet models currently worn by NFL players. The challenge culminated in 2021 with the award of \$1.55 million in grant funding to three teams - Impressio, Kollide, and Xenith - to advance their innovative designs and technologies and to help get their projects on the field as soon as possible. Today, the awardees are working to further develop their prototypes, all of which drew recognition from the NFL HeadHealth TECH Helmet Challenge Committee, which includes experts in biomechanics and sports equipment safety, including engineers, scientists, and researchers.



» HeadHealthTECH Challenges

For five years, HeadHealthTECH Challenges have attracted innovative grant proposals from institutions, individuals and corporations interested in designing the next generation of protective equipment. The Challenges are operated and managed by Duke University's Clinical and Translational Science Institute, which provides constructive feedback for all applicants. Thus far, the NFL and FRI have awarded grants totaling nearly \$3 million to help advance the development of 17 new technologies.

