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The *TechTank* Podcast

"How the NFL is using technology to improve performance"

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Guests:

KELVIN BEACHUM
NFL Player,
Arizona Cardinals

ARTHUR DAEMMRICH
Director,
Arizona State University Consortium for Science, Policy and Outcomes

Host:

DARRELL M. WEST
Senior Fellow, Center for Technology Innovation,
Governance Studies;
Douglas Dillon Chair in Governmental Studies,
The Brookings Institution

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CO-HOST NICOL TURNER LEE [00:00:00] You're listening to TechTank, a bi-weekly podcast from the Brookings Institution, exploring the most consequential technology issues of our time. From racial bias and algorithms to the future of work, TechTank takes big ideas and makes them accessible.

CO-HOST DARRELL WEST [00:00:26] Thanks for joining our Brookings TechTank podcast. I'm Darrell West, Senior Fellow in the Center for Technology Innovation at the Brookings Institution. We're at the start of the new National Football League season and many of us are excited about how the season will go and how our favorite teams will perform. But here at TechTank, we have a special interest in the NFL because we're interested in how teams are using new digital technologies. There's a growing use of data analytics in sports. And the ways that teams can use AI to try and improve player performance, as well as handling various administrative tasks. It raises important questions regarding how technology is transforming sports and helping people do a better job. Joining us today are two distinguished guests. Kelvin Beecham is on the front lines of this topic in a literal sense. He plays tackle for the Arizona Cardinals and has had a long and distinguished career in the NFL. He was drafted in 2012 by the Pittsburgh Steelers and has played for them, as well as the Jacksonville Jaguars and the New York Jets. But he also has an abiding interest in technology and we will get his perspective on what is happening. So also with us is Professor Arthur Daemmrich. He is a professor of practice at Arizona State University and director of the Consortium for Science Policy and Outcomes. He focuses on real time technology assessment and ways we can innovate in a responsible manner. So Arthur, thank you for joining us as well.

GUEST KELVIN BEACHUM [00:02:01] Yeah, glad to be here, thank you.

CO-HOST DARRELL WEST [00:02:03] So I wanna start with Kelvin. I've been a long time fan of your career and I remember we actually met at Brookings several years ago when you were playing with the Jets. And I know there's been a lot of talk about the use of data analytics and AI in the NFL, but was wondering if you can give us an overview of how AI and data analytics are being used in the league.

GUEST KELVIN BEACHUM [00:02:23] For sure. So when you think about the concept of beta analytics and AI, you have to think about it from a three-pronged approach. The ownership level, coaches, scouts, things of that nature, and then the players

themselves. The ownership levels, you've got to think how data is being used and is being used to be able to evaluate talent, evaluate the way in which coaches are making decisions, especially regarding the talent that they're bringing onto their squad, draftees, free agents, priority free agents, et cetera. So that's the first thing you have to think about. Secondly, you have to think about it in relation to the film development and how film is being used in the day-to-day lives of coaches and scouts, where you have platforms that are used for data and film, but how are you analyzing that and what's the speed at which you can be able to see either more films and see more patterns, making adjustments based off of that, or again, in the evaluation of those players. When you get to the player level, That's where, you know, I think it's right at rampant as far as just all the data that's being collected on us. Our cleats, our shoulder pads, our helmets. When we run, when we sleep, when retrain, there's so much that's been collected on us that, you know, the concept around data analytics and AI is being used to take it to a whole other level. And I think at the player level, many guys are starting to take care and many women are starting to take of that conversation of how do I own the data and the AI experience as I'm going about my sport? So that's where wearable technology comes in, Whoop, Aura, Strava, things of that nature. So there's a plethora of ways in which data analytics and AI are being used, it just depends on where in the spectrum one begins to sit.

CO-HOST DARRELL WEST [00:04:04] Now that is very interesting. So I'm just curious with how players feel about these developments. Like do they see technology as a way to improve their performance? Or do they have particular fears about all this data that's being collected on them?

GUEST KELVIN BEACHUM [00:04:18] Well, I think for one, you have to just come to reality. This is the world that we now live in. It's not changing. It's now going backwards. This is a world that were having to be a part of. So the question as a player that you have to wrestle with is how do I want to interact with technology in this new environment with all this data that's been collected on me? How do I wanna leverage it for my good? How do want to leverage it from my career? How do wanna leverage for longevity and performance and optimization around sleep and training and things of that nature. I hope so. I think it really puts the onus on the player of really taking the time to grab what you like and what you don't like and move those things in separate buckets and then be able to operate within that particular framework.

CO-HOST DARRELL WEST [00:05:00] So, Arthur, I know you have been a longtime student of technology assessment. How do you see the NFL using new technologies, and how would you assess NFL usage?

GUEST ARTHUR DAEMMRICH [00:05:09] Great question, yeah. So, I mean, I agree with what Kelvin said, just the incredible amplification and run-up and massive amount of new data coming in and the fact that it's been collected from the players, everything about their physical position on the field, their movement, their acceleration, to overall team data, to league data. I do have a somewhat skeptical view at times about big data when it comes to the NFL. Remember the NFL season is short. It's 17 games. You have 32 teams And there's about 60 offensive plays on average per game, you know per team so that's actually not that much data to crunch and so there's a fair amount of Statements about what big data will do that. I'm not completely certain. I'd be interested in Kelvin's take on some of this. So You know, for example, the NFL is sponsoring the Big Data Bowl now every year at the NFL Combine. It, you know, doesn't get quite the same attention as the players' performance. And it's quite interesting, their efforts to develop predictive models. So you see it affecting coach decisions. So do we go for two points or one point in the, you now, point after? And when in the game is it optimal to go for it? So that's kind of interesting. It gives a team an advantage but for really only a short time because other teams can very quickly adopt this. This kind of technology improvement is not patentable the way a new helmet technology could be, for example. The winner in 2024 at the Big Data Bowl was a team that developed some predictive analytics around missed tackles. And it's based entirely on proximity to the runner. Not the actual observed contact. So I'm not sure how much you really learn from that in terms of getting players to be better at tackling. So yeah, I guess I do have a somewhat skeptical view about some of it, but there's no question it keeps accelerating. And the competitive advantage, I would say, is short-term. And the other kind of question I have for the NFL teams is, How well do they integrate the analytics with their style of play? Different teams and different players do have different approaches. And so is this going to kind of flatten play so every team becomes identical or are the teams being selective in what they bring in?

GUEST KELVIN BEACHUM [00:07:41] To answer that point, I would say most teams have their way of evaluating players and they have a style or a rubric that they go by. So Philadelphia Eagles, if you look at that team, that is a big gigantic team, like top to bottom. Lama in a big defense. Lama the big receivers a big Wildbackers are big. That's just how they think about the game. When you think about The Pittsburgh Steelers, there's a way and an aura that they played the game from a physicality standpoint.

Same for the Baltimore Ravens. So I think there are a number of teams that, yes, they use data, but at the same time, they are true to what they believe is the way in which the game needs to be played.

CO-HOST DARRELL WEST [00:08:25] I think that's a very good point there certainly is a lot of variation across teams and how they are viewing this Kelvin one particular way That I'd like to get your view. Of course. We know injuries are a part of the NFL I'm curious how technology is being used in sports performance and recovery?

GUEST KELVIN BEACHUM [00:08:44] I would say that's probably like the highlight of where it's being used. Again, I mentioned root technology earlier, which I think is beneficial to the player themselves because they get to own the entire process of what they're doing to their body, the strain, the recovery, the sleep consistency, the HRV. So I would that has been integral, I feel, for the betterment of the athlete of understanding those types of metrics to better assess how they can perform better and perform at a much higher level. And over a sustained amount of time.

CO-HOST DARRELL WEST [00:09:16] So Arthur, I know there's some new technologies in regard to first down measurement and officiating. Instead of the chain that measures 10 yards, there's gonna be a new digital measuring device that will determine if there is a first down. How do you feel about that and perhaps other digital tools that could aid in determining whether there is penalty in the game?

GUEST KELVIN BEACHUM [00:09:38] Yeah, no, it's a fascinating moment here where we're bringing Hawkeye into football even more so. So the technology evolved out of Paul Hawkins, who was an aerospace engineer, and he himself was a cricket player, very frustrated when he was called, what he thought was a bad call, what's called a leg before the wicket, so the ball hit his leg, but it was determined had his leg not been there, it would have hit the wicket, So he was called out. He felt that wasn't right. And being an aerospace engineer, he then developed this technology where using cameras and predictive tools, it says where the ball's gonna be. Now that got adopted into tennis and we've seen some controversies, but on general pretty rapid uptake. It's now been used in Major League Baseball in the pre-season to call ball strikes. And so it's very interesting to see it brought into the NFL when it comes to the 10 yards of a first down. What's interesting is, of course, you know, historically you had the umpire place the ball and then these guys would run in from the sideline, plant the chain, and then march off

10 yards. So the chain is totally accurate to 10 yards, but the start point seems a little, you know, flexible, right? So now they're still going to have the umper place the ball, so there'll be some controversy around that, but then the 10 yards will be to a high degree of specificity and without people running out. So there's still kind of some issues to argue about, which maybe makes the game partly entertaining for fans. Could imagine it gets frustrating for players at times.

CO-HOST DARRELL WEST [00:11:17] Yeah, Kelvin, I'm sure there's still possibilities for measurement error in that process, but I'm curious how players feel about the new first down measuring tool and whether there should be better ways than human eyesight to identify penalties in a game because that often is very controversial as well.

GUEST KELVIN BEACHUM [00:11:35] I mean, I think you have humans that are playing the game. So I think we need to be having humans that are evaluating the game, you know. For me, that's where I get, you know, skeptical of having too much technology in the game because I don't think a robot or technology should be able to dictate what's going on within a game. I think it should be a tool that's helpful. But I don't think that that should be the guiding principle that's used to be able to evaluate whether a penalty is taking place or whether first down is a first down. Use the marker if it's over the marker. First down if it's not, I understand, but I think that, you know, having the first down marker helps speed the game up, which is what they're trying to do, and I think that's more of the conversation versus, hey, this is very new technology that should be used for the betterment of the game. It's more, how do we speed the game up by not having to bring the chain game out to make a decision? As it pertains to penalties, a penalty is a penalty. A holding is a holding. It's objective. Some, you know, refereeing fools call it a certain way, others call it a certain away, but i think that's the human element that takes place in the game.

GUEST KELVIN BEACHUM [00:12:35] And I would say that's a kind of important part of the fan experience as well. You know, you cheer for your team and you want to kind of shout at the referee. So, keeping some of that human element in the game is actually going to be kind of important to the future of football as well.

CO-HOST DARRELL WEST [00:12:52] So Arthur, I know there are several new stadiums that are being built. And I was wondering if you could give us a quick review of

changes to a stadiums and what you would like to see in the new stadium's technology-wise.

GUEST KELVIN BEACHUM [00:13:04] Yeah, so I've done a bit of historical work on this, and there's a new book out we call Inventing for Sports that is available free online from Smithsonian Press. And looking at the history of stadiums, there's really five eras, I would say. There's the older Stone stadiums going back to the Coliseum in Rome, and then 19th century American football, sort of the Ivy League experience of Franklin Field in Philadelphia and the Harvard Stadium. Then, in the 1910s onward, started to build... Steel based, steel frame stadiums. Kelvin's too young, but the concrete bowls of the 1960s and 70s, I remember going to Veterans Stadium in Philadelphia, those were very much sort of round bowls. They were meant to be football, baseball, other sports, but really kind of inward looking and surrounded by huge parking lots. Then in the 1980s, you kind of had this wave of the more flexible stadium. Some of them in soccer pitches in Europe and Asia, they could literally move the field in and out so you could keep live grass growing. But also the Baltimore Stadium to connect it back to the city. And I think we're entering a fifth wave. The Washington Nationals are proposing a stadium and a number of other teams. There's at least five or so underway. And it's quite interesting to think how they connect to community better and whether... You know, the time of year when they're not being used for professional football for the NFL, what other purposes can they serve? Can they be innovation centers? Can they some other form of community engagement and activation that a building of that size can offer?

CO-HOST DARRELL WEST [00:14:47] It does seem like there would be great opportunities to use the stadium for broader community building functions. Kelvin, I'm just curious your take on this, on how tech is being built into stadiums and how that will alter or improve the fan experience.

GUEST KELVIN BEACHUM [00:15:03] At the end of the day, we get paid because fans love the game. So anything that makes fans have a better experience at the stadium, we're all for it. So I know stadiums are using touches kiosks to allow people to come into games in a much more efficient and frictionless fashion. I know that a lot of the tickets are digitized, so you don't have fraudsters and scammers that have been able to come into the stadium. So the fan experience is the most important. Whether you're looking at NFL stadiums, basketball stadiums soccer stadiums. All these are playing a role in being able to increase the fandom around our sport.

CO-HOST DARRELL WEST [00:15:38] Yeah, I'm certainly impressed with the new scoreboards that have gone into a lot of these statums. They're very interactive and certainly are enhancing the fan experience. Now, Arthur, I know you study the responsible use of technology. Are there any changes you think the NFL should make in how it deploys technology?

GUEST KELVIN BEACHUM [00:15:57] Yeah, I mean, I think the NFL is really on this. They do a great job of testing out technologies in an iterative way, and understanding the fans' experience with it, which is really crucial. What I have less insight on, because it's less publicly known, is just the degree to which players have a voice in the amount of technology being used, and then the data on them. So fans, of course, are obsessed with the athletes. And in many ways, that's quite healthy, but of course it can also go to extremes. And so I wonder to what extent the athlete who's the source of a lot of the data has control over it longer term and feels like the way it's being used is appropriate.

CO-HOST DARRELL WEST [00:16:39] Well, Kelvin, I know that you have been on the advisory board of the NFL Players Association, which is the union that represents players. So kind of following up on Arthur's point, what stance does the association take on technology? Does it have any guidelines? Are there things it is particularly concerned about?

GUEST KELVIN BEACHUM [00:16:57] I mean, at the end of the day, it was protecting the players holistically and protecting both the players on the field and off the field. And data has been a conversation that has been at the heart of a lot of conversations that either collectively bargained or talked about publicly or privately, online, you know, what have you. It's super important because at the the end today, this is a player's game played by players. And you have to have a healthy game for the game to continue to grow. So when you think about data, AI, analytics, the way in which. We're changing so many different things. We're finding a way to provide a better fan experience. The players are still at the heart of the conversation. And if we're not thinking about that and pushing for us to be able to control the data, having sustained control over that data, being able to monetize the data in the way in which we want to. As players, there will always be some tension and guidance that we're trying to provide our partners as we continue to play this great game.

CO-HOST DARRELL WEST [00:17:55] So I have a closing question for each of you. Arthur, I'll start with you. How do you see sports technology developing in the future? Any projections on how things might unfold?

GUEST ARTHUR DAEMMRICH [00:18:07] I mean, I think it continues largely on the trajectory it's on in terms of data collection observation. I think the next wave will be trying to, in a way, use data about brain wave patterns and even players' eye motion to have some projection of where they're going to move next and then using that in an effective way. Teams will be able to, you know, using the as the game is unfolding, using AI to anticipate what the other coach is gonna call in terms of a play. So based on how the game has gone, what are the probabilities of different calls and reacting to that. These are all technologies that every team will adopt very quickly. So again, you get a competitive edge, if any, only for a very brief time. And the trajectory continues unless or until people draw a limit and the limit can be from fans saying holy cow this has gotten out of control or the league needing to you know intervene and say there need to be some limits here

CO-HOST DARRELL WEST [00:19:16] So Kelvin, the same question for you. How do you see sports technology developing in the future? And do you have any projections on how things might unfold?

GUEST KELVIN BEACHUM [00:19:25] Yeah, I would say that, you know, it's not going anywhere. It's not slowing down the way in which is integrated at every step and every level in the game is going to continue to proliferate across not only our sport, but other sports as well. But I fundamentally believe at the end of the day, you have people that are playing a violent game that people love watching. And I still believe that at the core of NFL football, people want to see humans playing this game. It's a very hard sport. People look forward to it. They enjoy it. They get a lot out of it. There's a lot of fandom and a lot of stories that they get to tie their own personal lives to. And I think people want that. And I, think that there's a level and a balance that has to continue between technology innovation and the development of the game.

GUEST ARTHUR DAEMMRICH [00:20:09] I totally agree and I mean the other thing is I mean after watching Sunday games or Monday night game you know you do talk to colleagues about just these incredible displays of athletic performance and keeping that at the center of the game is going to be crucial even as the data analytics accelerates

and then Kelvin pointed to it is a very physical game and finding ways to reduce the long-term risks the lifelong injuries would really something that would help make NFL. Football frankly more enjoyable because an incredible tackle is an amazing thing to watch but these days you kind of see that and you can't help but think, ooh, what are the long term consequences for that athlete?

CO-HOST DARRELL WEST [00:20:54] I know these tackles by these 350 pound guys certainly is worrisome, but it is an amazing sport and people around the world love it. So I want to thank Kelvin and Arthur for sharing their insights with us and Kelvin, good luck in your upcoming season. We appreciate you taking the time at this very crucial time in the lead up to the NFL season. And we do write regularly about tech topics on our TechTank blog and you'll find that at brookings.edu. So thanks to both of you for joining us in this conversation.

GUEST ARTHUR DAEMMRICH [00:21:28] Yeah, glad to do it.

CO-HOST NICOL TURNER LEE [00:21:34] Thank you for listening to TechTank, a series of roundtable discussions and interviews with technology experts and policymakers. For more conversations like this, subscribe to the podcast and sign up to receive the TechTank newsletter for more research and analysis from the Center for Technology Innovation at Brookings.