NARRATOR: Welcome to Intersections: The RIT Podcast. Sports analytics, highlighted in the real-life story told in the popular book and movie *Moneyball*, is transforming the landscape of college sports as well. In today’s episode, Matthew Hoffman, associate professor in RIT’s School of Mathematical Sciences, and Ryan Stimson, author of the book *Tape to Space: Redefining Modern Hockey Tactics*, talk about the RIT Sports Analytics Conference that they founded and how analytics is shaping the larger sports world and making data cool.

MATTHEW: When did you get interested in hockey analytics?

RYAN: I guess I had been casually reading about it since about 2012 or 2013. I'm a Devils fans, and they lost to the Kings in the Cup Finals in 2012. So I was trying to figure out, why did that happen? I remember Eric Tulsky, who is now some VP of the Carolina Hurricanes, he had written an article on how well the Kings had exited their zone or denied zone entries or exits or something like that. It kind of led to this idea of creating extra possessions within the game. I was like, oh, that's really interesting. Why doesn’t anybody else write about this or read about this? Then I just kept reading for a while. And then I read the book *Soccernomics*. They talked a lot about decision making and a lot of different things: randomness in sports; decision making; using data-driven analysis. And they talked a lot about passing in soccer. I was like, we don’t have anything like that in hockey. That gave me the idea. I’m just going to start this little project and collect some passes while watching Devils games. And I just started publishing it online. And lots of people – it blew up on Twitter and everything – and lots of people wanted to help out with it. That’s led to everything and why I’m sitting here today.

MATTHEW: Yeah. Pretty soon you had a whole bunch of different people tracking different teams.

RYAN: Yeah. That’s kind of how it started. And then it gradually grew from who passes the puck well to these interesting topics on how teams move the puck and how they defend it. What does that mean? And then along the way we met, and I started learning proper ways to do adult analysis. That’s kind of how it started. So, I guess that’s how I got into it. I presented on it at the D.C. conference in April of 2015. Videos were uploaded. I sent them to (RIT Men’s hockey coach) Wayne (Wilson). This is now the point in the movie where we flash back to your origin story, and then we meet again.

MATTHEW: And then we meet in the middle. Yeah. My research has always been data-oriented, so I’m used to dealing with a lot of data and large-scale models and prediction. My background is in numerical weather prediction. So, in 2014 in the fall, I read a bunch of sports sites and there was a lot of articles about the hiring spree that happened in ice hockey. This was “the summer of analytics.” There was a whole bunch of articles and think pieces written about “the summer of analytics.” All of a sudden, a bunch of people who had been writing about hockey on the internet suddenly had professional jobs. That community sort of took off but also hit the mainstream of, there’s this community talking about hockey analytics. I had been at RIT for a couple of years. Then in March of 2015,
Davidson made the NCAA basketball tournament, and *The New York Times* ran a big piece about one of the math professors for Davidson who did analytics for the basketball team. Davidson is this small school. And, sure, they've had Steph Curry, but they're good at basketball even beyond Steph Curry being there. So, there was this story about how they had a math professor and some students working with the basketball team. And this was a frontpage *The New York Times* story. I thought, that’s really cool. That would be a neat thing, I bet students would like it. I’m a new professor here at RIT, that would be fun. But, of course we don’t have a Division I basketball team.

RYAN: Right.

MATTHEW: But we did have a Division I hockey team. And about two weeks after that *The New York Times* story ran, RIT was the 16 seed in the Frozen Four and upset Minnesota-Mankato in the first round. I think it was the first 16-1 upset at that time in NCAA hockey. So, it was a big deal. And it was like, oh hey, this could work with RIT here. This might be a good opportunity and a good opportunity to get students involved in research and get people interested in mathematics and statistics. That was what prompted me to contact Wayne and say, “Hey!” RIT seemed like a neat place to do this because 1) We have a Division I hockey team. 2) Just the type of school, right? The mixture of tech and hockey is sort of a nice blend that I thought was interesting. And also, it seemed like there was potential opportunity for RIT because we don’t do (athletic) scholarships.

RYAN: Right.

MATTHEW: It's like, hey, if there's any edge that you can get, take advantage of what's around. So, I emailed Wayne. And again, now we meet up where we were put in contact with each other and just said, “Oh, okay cool. Let’s do a conference.”

RYAN: Yeah. So, that first meeting with Wayne, was there a point – did you think when you went in to talk to him, “Oh yeah, this is going to work out?”

MATTHEW: I wasn't really sure. But I figured it was sort of a, “What did they have to lose?” type of sales thing. Hey, we’re not asking you to pay us right now.

RYAN: Right. We’re not trying to sell you anything.

MATTHEW: We’re not trying to sell you anything. How about us and some RIT students maybe help out and see what's useful to you? Wasn't really a downside. So I didn't really think there was a reason for him to say no. But I sort of didn't know what it was going to turn into by any means. But that year we did some tracking for the team and had meetings, and I think that worked out well.

RYAN: Yeah it did. They were pretty successful that year.
MATTHEW: Yeah. I had a student at the time who built an app to do some tracking to watch the games and then be able to click the locations of the shots. Having you there, interested in passing, so we included the pass that led to the shots. At least we could try to look at the passing there as well. That was data that wasn't there with the team at the start. They had some shot locations that are sort of recorded at the time in real time just by hand on a piece of paper. But...

RYAN: Yeah. Just on paper, and you couldn't do anything with it after.

MATTHEW: Yeah. So, it was neat that first year just being able to get coordinates into the computer and plot a lot of different things by the player and then do filtering. And just having data, I mean, I think that's one of the interesting things about, one of the neat things about hockey. I tend to like a lot of my research topics that are relatively new because there's a lot of things you can do. Just having data lets you do simple things that aren't really looked at before.

RYAN: Right. And it just gives you that foundation, too, falling back on, we think this player's doing this well or not well. It's like, oh well, this is exactly how they're doing. It's like, oh okay, so let me maybe recalibrate how I'm viewing this player and the reasons why.

MATTHEW: And I'll say, one of the fun things for me that first year or two was just being able to go and look at data, going in and saying, “Hey, I noticed this pattern in the data,” and having Wayne say, “Oh yeah. Well, you know, we've been telling our team to do this so that's probably why you're seeing that.” It's like, oh okay. It's neat to see a pattern and then...

RYAN: Right. You get the story behind the shot plot chart.

MATTHEW: I mean, that was, for me, sort of enjoyable as I was getting into it and understanding more of the strategy of hockey that I had not grown up with.

RYAN: So Matt, you had mentioned one of the things you like about using data and new fields of research and new techniques. Because we haven't really talked a lot about what you do professionally. I mean, I know you study weather, but that's a lot of things. Right? So, what are some of the things that you do when we're not talking to Wayne?

MATTHEW: As you said, my background is the weather prediction community. And a lot of my training is in this question of: you have a system that's hard to predict, the weather is a chaotic dynamical system notoriously difficult to predict, and how are you able to improve the predictability by combining a lot of data, and often, a lot of data that's not well distributed in space and time with, in the case of the weather, this computation model of what you're seeing? So, analytics and sports analytics is different than that because it's primarily data driven. You don't have a computational model of how people are moving around. That doesn't exist. But one of the things that I sort of learned a lot about in doing some of that work on weather and ocean estuary and lake
systems is just working with this data and working with large amounts of data and getting more interested in what you can do just from the data side. And that was one of the similarities between the other things that I do and this. This led me to do some tennis work as well. So I had a student who did some tennis analytics, and a paper is on second revisions now. Hopefully we'll be accepted pretty soon.

RYAN: Is that related to what you presented on a couple years ago?

MATTHEW: So, I gave a talk at our conference maybe two years ago on tennis analytics. We had tracking data from the U.S. Open, and I had a master's student who did a project trying to create a stock ticker. It’s sort of like they have in basketball, with the expected value of a possession with trying to define the expected value of a point based on where the players are located on the court. So he did that model and he graduated a couple years ago. He actually is now working for the Sacramento Kings. That's a sports project that I’ve actually done and hopefully will be published soon. Moving forward, as more and more data comes about, I think one of the interesting things following sports analytics, at least at some level, is the movement from extreme data scarcity to pretty soon it'll be into overload. And I think we’re probably pretty close to the transition.

RYAN: You mean hockey or just sports in general?

MATTHEW: Hockey. We’re pretty close to the transition. I think a lot of sports have gotten there and have been there for a bit.

RYAN: As far as data, they’re definitely ahead of hockey.

MATTHEW: Pretty soon, you’re going to have a ton of data, and early on it was just, hey, what do we have? We’ve got shots.

RYAN: Right.

MATTHEW: What else?

RYAN: Not much.

MATTHEW: Basically shots and goals.

RYAN: And it became people filling in entries and exits and passes. It’s like, okay, now we’re filling in more of the event-level data. But we still don’t know where anybody else is on the ice. So, you can’t get into decision making, you can’t do any of that, you can’t get into any sort of defensive evaluation. I think those are the biggest things as far as players making ideal decisions – who to pass to or where to shoot from at a moment in time. And also how good or bad players are defensively. I think there’s going to be a whole world of evaluation for that because those are probably the two biggest market inefficiencies as far as player evaluation right now.
MATTHEW: Were you doing analytics stuff as part of your job when you started doing this? Or was this sort of totally different?

RYAN: No. Totally different. I had done a little bit of data, a little bit of reporting in my career. But no, I'm not modeling and assessing complex weather systems like other folks. But it's funny when you mention modeling chaotic systems because it's like, oh, that's hockey.

MATTHEW: Right. Exactly. Yes. [laughter] You said you didn't start in an analytics field. Did you find that it increased your appreciation of statistics and math doing it? Did you enjoy it more than you did before?

RYAN: Oh yeah. I wished I had taken more math classes in college. But I think making data cool or making stats cool is – people argue about sports all the time. Not to get all metaphysical, but humans naturally want to figure things out. This is something I can learn about and I can study, and, to your point earlier, a lot of it was new. It's explorative. So you're kind of creating the research. The articles I had written years ago or the papers get cited in other things now because it was part of the first thing to do it. You're kind of etching your place in a small piece of trivial history. But that's cool because it's an opportunity that people want to take. You can reach out and you can learn. I didn't really have a statistics background, I still really don't. But I've learned and self-taught and asked enough questions where I can ad hoc my way and brute force my way through regression techniques and answer some questions that people have.

MATTHEW: I don't have a statistics background either.

RYAN: Compared to me you do.

MATTHEW: I wish I could go back to grad school. I've never taken a formal statistics class. But there's lots of places that data and the use of data has really made math and stats more interesting and exciting for people. So, I do think that sports, in general, is a nice entryway for a lot of people. You can at least address them and start looking at things with relatively simple and understandable methods. You can start with a simple regression method and you can understand that in high school and you can actually start looking at some of this. We had a data contest as part of this year's conference. We got some tracking data and we had a competition where people submitted their own analysis based on this. And one of the winners was a high school student.

RYAN: Yep.

MATTHEW: There's an entryway for people. And I think that's great. It's a great way for people to get more involved in mathematics, get more involved in statistics. And see them not just as this thing that you're supposed to learn, but actually a thing that has use.