

# **Great Lakes Analytics In Sports Conference**

**June 21, 2018**

presented by  
**The College of Letters and Science**



**University of Wisconsin  
Stevens Point**

# **Great Lakes Analytics in Sports Conference at a glance**

**7:30 a.m. Registration**

**8:15 a.m. Welcome and Overview**

**8:20 a.m. Keynote Speaker: John Drazan**

**9:05 a.m. Break**

**9:10 a.m. Breakout Sessions 1**

**9:40 a.m. Breakout Sessions 2**

**10:10 a.m. Breakout Sessions 3**

**10:40 a.m. Break**

**10:45 a.m. Breakout Sessions 4**

**11:15 a.m. Breakout Sessions 5**

**11:45 a.m. Introduce Poster Presentations, Books**

**Noon Lunch, Research Posters**

**1 p.m. Breakout Sessions 6**

**1:30 p.m. Breakout Sessions 7**

**2 p.m. Breakout Sessions 8**

**2:30 p.m. Break**

**2:35 p.m. Breakout Sessions 9**

**3:05 p.m. Breakout Sessions 10**

**3:35 p.m. Breakout Sessions 11**

**4:10 p.m. Keynote Speaker: Laura Albert**

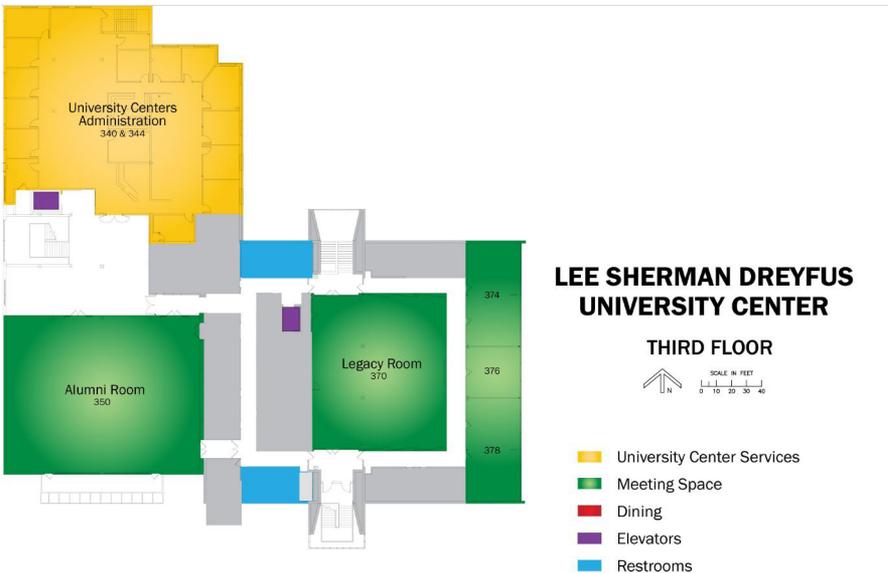
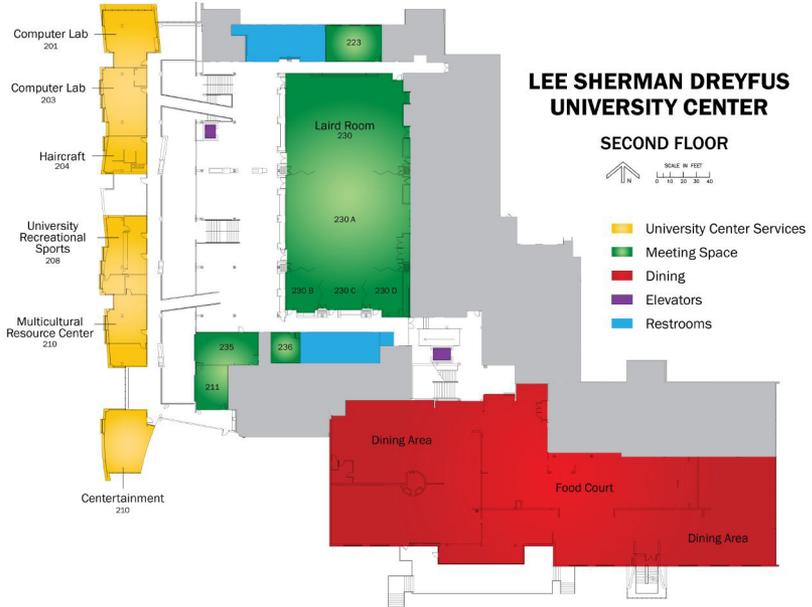
**4:55 Closing Remarks**

## **Wireless Access**

To access the guest wireless network, connect your device to the wireless network connection identified as "UWSP\_Unsecure\_Guest." Next, open your web browser and register by entering a valid email address.

The eduroam wireless network is a secure network that allows visitors from other colleges and universities to connect to it with the credentials of their home institution, provided that their institution also participates in eduroam. This wireless network is labeled "eduroam."

# Dreyfus University Center Maps



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Use hashtag #GLASC when posting about today's event!

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**University of Wisconsin**  
**Stevens Point**

# Welcome to the Great Lakes Analytics in Sports Conference!

About four years ago, I arrived at the University of Wisconsin-Stevens Point without much knowledge of what went on here during the day. My experiences with the university to that point had largely been limited to attending basketball games on nights and weekends, with the understanding that they were part of a more broadly successful athletic program.

Upon starting, I was tasked with writing feature stories for various College of Letters and Science publications. One of the fantastic benefits of working in the College at the Core is the diverse subject areas our faculty and students tackle, including:

- Genetic traits of sprinters and distance runners
- Advanced math used to create schedules for collegiate athletic conferences
- The fast-growing field of data analytics

Being something of a sports nerd who was captivated reading *Moneyball* and watched videos of Sloan Conference panels online, eventually I connected the dots and proposed we convene a sports analytics conference here in Stevens Point. With encouragement from former College of Letters and Science Dean Christopher Cirimo and Outreach Program Manager Julie Hellweg, we forged ahead with the idea. The big question remained: Would people come to the middle of Wisconsin in the middle of summer?

Your presence here today offers a resounding “Yes!” We could not be more grateful that you attended, and hope you will find the second Great Lakes Analytics in Sports Conference fun and educational. We have about 30 presenters lined up to share with you their research and experience with sports analytics. “There’s something for everyone” may be something of a cliché but it is 100 percent applicable to this event.

From beginning to end, we have packed the conference with educational and networking opportunities. Ask questions. Introduce yourself to someone you don’t know. Share what you learn. Don’t be shy!

And let’s light up the Twitterverse – use hashtag #GLASC and @AnalyticsConf! Once again, thank you for helping us make the Great Lakes Analytics in Sports Conference a success, we hope you enjoy your visit to Stevens Point.

Sincerely,  
Scott Tappa @scotttappa  
Conference Director

## **Presentations**

**8:20-9:05 a.m.**

**John Drazan**

Lecturer, Biomedical Engineering | Rensselaer Polytechnic Institute

### ***Using Analytics to Broaden the Appeal of Math and Science Among Youth***

Although I didn't enjoy math or science in high school, exposure to sport science and analytics transformed my perception of STEM. This motivated me to study physics and play basketball in college and pursue a doctorate in Biomedical Engineering where I studied biomechanics. Sports science and analytics is uniquely positioned to engage youth in STEM without a preexisting interest due to its direct application to youth sports. In this talk I will discuss the potential of sports analytics to be bigger than wins and losses by transforming the way we recruit the next generation of scientists and engineers. Attendees will learn how analytics can be deployed in youth sports, how to use sports analytics to broaden access to STEM careers, and issues in the STEM pipeline that lead to a lack of diversity in STEM and analytics.

**John Drazan** is a lecturer in biomedical engineering at the Rensselaer Polytechnic Institute. In addition to his biomedical research, John is the STEM director for 4th Family Inc., where he engages urban students in STEM outreach using sports science and analytics. As STEM director, John has assembled a diverse team of academics, teachers, basketball coaches, and players united by a common goal of broadening educational opportunity for our youth through a shared love of sports. His work in STEM outreach has won several major awards including the "Best Research Paper" at the MIT Sloan Sports Analytics Conference, the NSF GK12 Fellowship, and the NIH-IRACDA Postdoctoral Fellowship at the University of Pennsylvania.

**9:10-9:40 a.m.**

**Andres Alvarez**

CEO | Nerd Numbers

### ***Why Does the NBA Still Undervalue Free Throws?***

The NBA has ramped up its use of analytics considerably. Yet, a fundamental part of the game paramount for winning is still ignored. In this talk, we review the importance of free throws and a case study on the impact of improving a player's performance. Attendees will gain a basic understanding of the math behind the box score for evaluating wins in the NBA, learn the importance of free throws in the NBA game (similar to walks in Moneyball), and gain context, both on a macro and player level, for how free throws can impact team performance.

For several years, **Andres Alvarez** has made his living as a freelance software developer working on data analytics and sports (including daily fantasy sports). Previously he worked as a software engineer for Google. In his spare time he researches and blogs about sports, particularly the NBA, at [wagesofwins.com](http://wagesofwins.com) and [boxscoregeeks.com](http://boxscoregeeks.com). He has a master's degree in computer science from Colorado State University, with a focus on machine learning for computer vision.

**9:10-9:40 a.m.**

**Kratik Malhotra**

Director of Sports Science and Analytics | Texas A&M University

***From Engineering to American Football:***

***How Data Can Help Maximize Team Performance***

Many teams around the world are utilizing data obtained from their athletes to some degree in order to help maximize their on-field performance. This information comes from both qualitative and quantitative sources. However, in spite of plentiful data available from numerous avenues, one of the biggest puzzles, especially in a sport like American football, is how to have the head coach buy into the science, trust it and utilize the data to his advantage. In my presentation, I will talk about learning a football coach's language of communication. Furthermore, I will focus on using regressions and classifications to translate the information in a form that is best understandable to a coach. Moreover, I will highlight the various types of technologies used by us at Texas A&M football not only to test and analyze the data but also, to collect it. I will round off my presentation by explaining how important design and implementation of a successful periodization scheme is in order to prevent injuries and drive future individual and team performance.

**Kratik Malhotra** is the director of sports science and analytics for the Texas A&M football team. He graduated from the University of Pune, India as an electronics engineer with a specialization in Artificial Intelligence. Continuing his work in sports as an analyst, which he started in the final year of his engineering degree, he helped Salgaocar SC and Dempo SC win I-League titles in consecutive years. In 2012, he moved to the United States and graduated with a master's in science degree in sport management from the Florida State University with a focus on analytics. Since graduating from FSU, he has worked with the NFL and NBA combine programs at the IMG Academy, consulted for a number of NFL, NBA and MLS teams during his stint with STATSports Technologies and has been an integral part of Jimbo Fisher's staff first at Florida State and now at Texas A&M. leading their sports science testing, research and implementation.

**9:40-10:10 a.m.**

**Nick Elam**

Assistant Professor of Educational Leadership | Ball State University

***A Closer Examination of Two Specific Sudden-Death***

***Scenarios Under Basketball's Elam Ending***

The hybrid duration format for basketball (which The Basketball Tournament renamed the Elam Ending and implemented during preliminary-round play in 2017), where the final portion of each game is played without a game clock, met each of its primary aims during its initial implementation: eliminating/alleviating deliberate fouling by the trailing defense, eliminating/alleviating stalling by the leading offense, eliminating/alleviating rushed/sloppy possessions by the trailing offense, providing greater hope for late comebacks, and providing more memorable game-ending moments. This presentation focuses on two specific sudden-death (where both teams are within three points of the target score) scenarios that could arise during Elam Ending games, discusses strategies that teams might use in these scenarios, and explores measures that leagues/events could take to further promote fairness and excitement when Elam Ending games encounter these scenarios. Attendees will learn to understand NBA/NCAA/Olympic data that

illuminate the game clock's warping effect on late-game style and quality of play and participate in brainstorming modifications to further fine-tune the Elam Ending concept.

**Nick Elam** has a varied background in education, mathematics, and sports. Dr. Elam currently serves as assistant professor of educational leadership at Ball State University. He previously served as a school principal in Ohio while earning his Ph.D. in educational leadership, culture, and curriculum at Miami University. Before entering administration, Elam taught calculus at the high school and community college level after graduating from the University of Dayton. Nick is founder/coordinator of M-SportsFans (an official special interest group within Mensa) and grounds crew member for the Cincinnati Reds. He is the originator of the hybrid duration format for basketball, and his research and writing have been shared at various outlets, including the MIT Sloan Sports Analytics Conference.

**9:40-10:10 a.m.**

**Michael Machiorlatti**

PhD Candidate | University of Oklahoma Health Sciences Center

### ***Longitudinal Changes in Male***

#### ***Distance Running Performance – 2001 to 2017***

This study explores performance trends (2001-2017) in distance running for men using IAAF data for the distance events at the individual and country level, and examines how performance was associated with age, order of finish, time of year of the event, and location of the event. Attendees will learn to compare running performance across distance events, identify trends in performance by individuals and nations over time, and explain how longitudinal analysis can be used to examine how covariates are associated with performance.

**Michael Machiorlatti** is a PhD candidate planning at the University of Oklahoma Health Sciences Center with a degree in biostatistics. He has a background in applied math and statistics. His areas of interest in statistics are sampling theory, missing data analysis, applied modeling, and computational statistics. Michael is a big sports fan and has been exploring sports analytics as it combines his love for sports and statistics.

**10:10-10:40 a.m.**

**Scott Nestler**

Associate Teaching Professor | Mendoza College of Business,  
University of Notre Dame

### ***Analysis of Potential NCAA Basketball Rule Changes***

The NCAA uses the National Invitation Tournament as a testbed for possible rule changes. In 2018 these modifications included: 3-point line extended by 1 foot, 8 inches; free throw lane expanded from 12 to 16 feet (NBA width); each 20-minute half split into two 10-minute segments (quarters); resetting the shot clock to 20 (rather than 30) seconds after an offensive rebound. In anticipation of the next possible rule change in 2019, this analysis quantifies the effect of these modifications on the college basketball game through comparison with regular season and NCAA Tournament games. Attendees will learn how to combine data from publicly available websites with proprietary databases using R and the “tidyverse” package, explain the fundamental rules of men's college basketball games, and understand how the proposed rule changes may affect scoring and other characteristics of men's college basketball games.

**Scott Nestler** joined the Mendoza College of Business as an associate teaching professor subsequent to his retirement from the U.S. Army after more than 25 years of service. Previously he taught at the Naval Postgraduate School and U.S. Military Academy at West Point. He has served as an analyst and leader of analytic teams in a variety of locations, including the Pentagon and the U.S. Embassy in Baghdad, Iraq. He also serves as the faculty advisor of the Notre Dame Sports Analytics Club.

**10:10-10:40 a.m.**

**Zach Binkley**

Assistant Professor/Program Director,  
Exercise and Movement Science | Lewis University

***Monitoring Jump Performance and Volume Using VERT Technology***

This presentation demonstrates the use of the VERT wearable technology system to track and analyze jump performance. Current research on the topic and a breakdown of the VERT system will be included. The technology will be demonstrated through a small plyometric workout. Attendees will understand the technology powering the VERT system, review, analyze and synthesize the data collected through the VERT system, and discuss research and application use of the system within sports performance.

**Zach Binkley** is an assistant professor and program director for exercise and movement science at Lewis University. He received his bachelor's degree from Millikin University and master's degree from California University of Pennsylvania and his PhD in Education Technology at Northcentral University. Zach specializes in student learning assessment data, education technology and eLearning, wearable technology, data and analytics, and innovation in sports.

**10:45-11:15 a.m.**

**Stephen Devlin**

Associate Professor | University of San Francisco

***Spectral Analysis of NBA Data***

This presentation addresses the question of how to analyze group effects in NBA lineups. We show that noncommutative harmonic analysis is well suited to uncovering and quantifying group effects of all orders, from individuals, to pairs, triples, and groups of four and five players. We illustrate these ideas using NBA play-by-play data. Attendees will be able to explain the group-effects problem in analyzing NBA team performance, identify noncommutative harmonic analysis as a potential solution to the group effects problem, and explain how noncommutative harmonic analysis quantifies group effects and brings insight to NBA team evaluation.

**Stephen Devlin** has a PhD in mathematics from the University of Maryland and is an associate professor at the University of San Francisco. He is a faculty affiliate of the masters in data science program at USF, and has served as the director of the undergraduate data science program.

**10:45-11:15 a.m.**

**Eric Eager**

Associate Professor, Mathematical Biology | University of Wisconsin-La Crosse  
Data Scientist | Pro Football Focus

***Using Machine Learning to Classify Quality and Style of Play at the Quarterback Position***

When it comes to winning football games, success at the quarterback position is the most highly correlated and predictive variable. As such, finding, evaluating, and sustaining a high-level passing attack is one of the most important tasks in all of pro sports. Using Pro Football Focus data, we determine aspects of a quarterback's throw profile that are the most stable season to season, as well as those that are most predictive of future performance. With a variety of machine learning techniques at our disposal, we use these insights to classify quarterback play, and these groups provide substantial information for both explanatory and predictive purposes for teams moving forward.

**Eric Eager** received his PhD in mathematical biology in 2012, and has been a professor at the University of Wisconsin-La Crosse since. He is the author of over 20 papers in applied mathematics and the scholarship of teaching and learning. He joined Pro Football Focus in 2015, and has been one of their analytics leads since January 2017.

**11:15-11:45 a.m.**

**Erik Haslam**

Haslametrics.com

***Haslametrics: A Unique Approach to College Basketball Analysis***

The goal of Haslametrics.com is to provide unique statistical insight and to offer predictive analysis based on teams' prior performances in a given season. The methodology focuses on the bare necessities, specifically how often teams shoot, how close to the basket each shot is, how well teams shoot from different locations on the floor, and how often steals and offensive rebounds affect shot selection and success. Attendees will understand the reasoning and value behind using play-by-play data rather than box score data, and using only meaningful game minutes in calculations (i.e. disregarding game data when a contest is deemed mathematically "over").

**Erik Haslam** is a full-time electrical engineer and a self-taught, part-time disciple of college basketball analytics. He is the proprietor of Haslametrics.com, an analytics website designed to offer team evaluation and predictive analysis for Division I college basketball. He also serves as an analytics consultant by contract for Division I coaching staffs.

**11:15-11:45 a.m.**

**Roland Minton**

Professor of Mathematics | Roanoke College

***The PGA Tour: Playing to Your Strengths***

Data for all shots from the PGA Tour is analyzed to evaluate golfers' strengths and weaknesses. These are compared to performance in individual tournaments to explore whether success and failure are affected more by strengths being improved or weaknesses being minimized. Participants in this session will be able to describe the data available to golfers through ShotLink, define Strokes Gained and explain how it quantifies specific

golf skills, and list the most important skill sin golf and explain how week-to-week performance in these skills relates to year-long performance.

**Roland Minton** is the author of *Golf By the Numbers* on the science and statistics of golf, *Sports Math* on sports science and analytics, and is co-author of the Smith/Minton Calculus series. He has taught at Roanoke College for 32 years.

**1-1:30 p.m.**

**Phillip Leibham**

Founder | Analytics4Athletes

### ***Breaking Down the Film: College Basketball Analytics***

Use of analytics is growing among college basketball programs, but because of coaches' understanding and limited budgets, college coaches can be reluctant to use analytics to help their program win games. This presentation explains how analytics practitioners can apply advanced statistics to improve coaches' game strategy and decision making skills. Attendees will learn how to communicate analytics findings to their intended audience, demonstrate how film can be an effective tool to use with analytics, and discuss ways analytics can be used with player development.

**Phillip Leibham** is a 2018 graduate of Lewis University, working three years in college basketball analytics. Leibham served as an analytics intern for the Loyola University Chicago men's basketball team for the 2017-2018 season, and was previously an analytics consultant for the Northern Illinois University women's basketball team.

**1-1:30 p.m.**

**Uwe Neuhaus, Michael Schulz**

Nordakademie Hochschule der Wirtschaft

### ***Live Measurement of Player Performance During Soccer Matches – A Text Mining Approach***

During a professional soccer match, a large number of key figures (e.g., shots on goals, fouls) is collected to assess the performance of individual players. However, depending on the player's position, these figures are not always informative. Expert evaluations are better suited for individual assessment, but are often merely rough summaries and only available after the end of the match. For this reason, we introduce a method to analyze professional live soccer commentary using text mining techniques. The analysis result is a key figure that can be computed in near real time during the match to provide information about the performance of players and, in aggregated form, the team. We evaluate the suitability of our indicator with data from the 2017 Confederations Cup.

**Michael Schulz** is Professor of Information Systems at the university of applied sciences Nordakademie, Hochschule der Wirtschaft, in Elmshorn, Germany. He earned his doctoral degree in business administration from Philipps University of Marburg. His area of expertise is databases and analytical information systems. His research interests include data mining, data modeling and self-service business intelligence. He has extensive experience in consulting large organizations in data warehousing and business intelligence.

**Uwe Neuhaus** is lecturer of computer science and research associate at the university of applied sciences Nordakademie, Hochschule der Wirtschaft, in Elmshorn, Germany. He

studied computer science at the Technical University of Braunschweig. His area of work comprises the design and analysis of algorithms, data science, and software development. His research interests include the application of machine learning algorithms and text analytics.

**1:30-2 p.m.**

**Kyle Allen**

Boys Basketball Coach | Pine City (Minn.) High School

***Program Purposefulness: Using Analytics in High School Basketball***

**Kyle Allen** has been head boys basketball coach at Pine City (Minn.) for seven years, during which time the Dragons have received statewide and national attention from the likes of the *Wall Street Journal*, Basketball Pro Talk, KFAN Radio and Fox 9, among others. The reason: the program's philosophy and use of data disaggregation.

According to an article in MSHSL's John's Journal, "Mathematics is a big part of (Allen's) job as head coach of the Dragons boys basketball team. That's because everything is measured and charted: not only the typical things like shooting percentages and rebounds, but also talking. Yes, the Dragons keep track of talking. And that's just the start of what makes this basketball team unlike any other. The most visible example: They rarely shoot two-point shots other than layups, and focus on firing from outside the three-point line. It's all based on math."

After posting a 24-56 record in Allen's first three seasons, Pine City has earned an 81-32 record over the last four, capturing its first conference title in a decade. This presentation will explore how one program became more purposeful by using statistics and making everything they did transparent.

**1:30-2 p.m.**

**Chase Tripi**

Sports Analytics Assistant | Samford Center for Sports Analytics

***Centrality and Distinctiveness Mapping of International Soccer Entities***

This presentation will show how Tripi used survey data to create a centrality and distinctiveness map for fan perception of international soccer teams and leagues. The CD map will show fan perception of a team's placement in their minds as a typical or unique team. Attendees will learn to define what centrality and distinctiveness mean in a sports context and to describe the strategic implications of CD maps in a sports marketing/business context.

**Chase Tripi** is a senior at Samford University majoring in marketing with a concentration in sports marketing. As a Brock School of Business student, he has taken numerous data analytics and marketing research-oriented classes prior to his internship in the Center for Sports Analytics. His primary job for the center is running the analytics for the NFL and College Football Relevance Rankings. Chase and his classmates in the sports marketing program recently presented a data-driven, consumer insights project on Generation Z to senior level executives at Nike world headquarters in Oregon.

2-2:30 p.m.

**Jennifer Hobbs**

Senior Data Scientist | STATS

### ***Understanding Sport Through Player Tracking Data***

By leveraging STATS' wealth of player tracking data and machine learning techniques, we are able to generate new analyses and insights into the game. By learning the appropriate representation of multi-agent tracking data, we are able to predict how teams and players move and behave in various situations. Finally, we look ahead to how tracking a player's pose provides an even more detailed and complete description of the game.

**Jennifer Hobbs** is a senior data scientist at STATS working on fine-grained prediction using basketball and soccer player-tracking data. She completed her undergraduate degree at Northwestern University majoring in integrated science, math, and physics, and earned her master's and PhD in physics and astronomy from Northwestern. Over the past two years at STATS, Jennifer has done work on all phases of the data science life cycle, transforming raw data into compelling technology products through data modeling and architecture, data pipeline design and management, machine learning and AI, and interactive visualization and prediction. In particular she has done work on personalized expected points models and team style analysis in basketball, and transition and formation analysis in soccer.

2-2:30 p.m.

**Adam Grossman**

Founder/CEO | Block Six Analytics

### ***The Impact of Star Power in Determining Player Value for Sports Teams***

Determining an athlete's value to a team is one of the most critical challenges facing any organization. One of the problems with traditional analysis used to answer this question is it only looks at a player's on-field performance. This represents only a portion of his or her total value. Fans, media, and sponsors want to see and engage with star athletes more than other team members. Star power plays a critical role in driving ticket sales, television ratings, social media engagement, partnership agreements, and merchandise purchases. Block Six Analytics' Revenue Above Replacement (RAR) Model evaluates the impact of an individual player on these revenue streams. By examining on-court metrics with off-court impact on social media, merchandise sales, endorsement deals, and earned media, we are able to determine the holistic value a player creates for his or her team.

**Adam Grossman** is the CEO and founder of the sports sponsorship technology and analytics firm Block Six Analytics, whose clients include the Dallas Cowboys, Cleveland Browns, Philadelphia 76ers, Pepsi, Gatorade, and Comcast SportsNet. In addition, he is a lecturer for Northwestern University's Masters of Sports Administration where he has developed two classes and teaches classes focused on developing and communicating strategic insights through data. Adam is also the co-author of *The Sports Strategist: Developing Leaders For A High-Performance Industry*, the featured book at the 2015 Sloan Sports Analytics Conference. He has written for *Forbes*, *The Washington Post*, *The Chicago Tribune*, and Comcast SportsNet Chicago and has been featured as an industry expert on CNN, Marketplace, SB Nation Radio, and ThePostGame.

2:35-3:05 p.m.

**Ben Hansen**

Chief Technology Officer | Motus Global Inc.

### ***Optimizing Pitcher Readiness with Machine Learning and Wearable Technology***

As wearable technologies continue to mature, their adoption has reached significant integration within elite sports performance programs. Since its MLB in-game approval in 2015, Motus has captured millions of throws from MLB and MiLB pitchers with the motusTHROW smart compression sleeve. This presentation will explore emerging techniques used to prescribe daily training volumes to help pitchers avoid injury pre-season, optimize arm health in-season, and safely return-to-play during rehabilitation.

**Ben Hansen** is a biomechanics and wearable technology executive specializing in movement analysis using emerging hardware technologies. He has previous experience as a biomechanics engineer for the Milwaukee Brewers, and was a collegiate baseball pitcher at the Milwaukee School of Engineering. During his PhD in biomedical engineering at Marquette University, he worked on a dissertation to model in-vivo forces of the UCL in pitchers, before departing to join Motus Global. At Motus, he leads the technology development, product innovation, and R&D of machine learning workload algorithms to optimize human performance.

2:35-3:05 p.m.

**Ray Stefani**

Professor Emeritus | California State University, Long Beach

### ***Rating the Official International Sports Rating Systems as Predictors of Match Winners at World Team Championships***

A comprehensive analysis is presented as applied to all 13 international team sports that are organized by recognized federations which publish official ratings and conduct world championships. Based on 3,000 world championship matches, rating systems adjusted by the difference between an opponent-dependent prediction and actual match results were 82% accurate at selecting the match winners, while those accumulating result points, not opponent-dependent, were only 74% accurate. An important result for tournament organizers is that having knockout classification matches, beyond those needed to produce a champion, creates additional highly competitive knockout-phase matchups.

**Dr. Ray Stefani** is an emeritus professor of engineering at California State University, Long Beach. His sports publications are divided between individual sports (75) and team sports (75). He seeks a fundamental understanding of the physics, physiology, causes of gender differential performance, rates of improvement, effect of historical events and effects of performance enhancing drugs related to Olympic gold medal performances in athletics (track and field), swimming, rowing and speed skating. He has analyzed Olympic home nation medal advantage. He developed a least squared team rating system applied to predicting the outcome of more than 20,000 games of American football, basketball, European soccer, Australian Rules football, and Super Rugby. Home advantage has been studied in those contexts. He has contributed to the understanding of the types and application of 100 international sport rating systems (both for individuals and teams) and their ability to predict the outcome of world and Olympic championship

events. He has discussed his sports work on a number of radio and television programs, advised the international soccer organization as to changing its world rating system and contributed to the millennium edition of the *New York Times*. He has presented his work at 30 conferences in 12 countries on three continents. He is on the executive committee of two international sports conferences and is an associate editor for an international journal devoted to coaching and sports science.

**3:05-3:35 p.m.**

**Daniel Cunningham**

University of Chicago

### ***Predicting Future Hitting Performance from Statcast Batted Ball Data***

Using statistical models and machine learning algorithms, Daniel predicts the value of each batted ball from MLB Statcast data. These predictions can be used to find under- or overachieving players (measured by wOBA) relative to their batted ball profiles and to create player projections.

**Daniel Cunningham** is a graduate student at the University of Chicago pursuing an MS in statistics. He is interested in statistical modeling and machine learning, especially for applications in the analysis of baseball and other sports. He completed his undergraduate education at the University of Connecticut, where he studied materials science and engineering. Daniel grew up in Massachusetts and is a big Boston sports fan.

**3:05-3:35 p.m.**

**Holly Roof**

PhD | University of Denver

### ***Implicit Bias in Dressage Judging? The Male Advantage***

The equestrian sport of dressage is the only judged Olympic sport in which male and female athletes compete head to head. Multiple regression analysis shows that the mean score for males is predicted to be between 1.52 and 1.25 percentage points higher than for females even though female participation far outpaces male participation. Implicit bias -- societally inculcated gender bias and expectation bias -- frames these results. Attendees will be introduced to the equestrian sport of dressage, learn to use multiple regression to predict competition scores, and learn about implicit bias as a possible explanation for score differentials.

**Holly Roof** is an award-winning researcher, inspiring lecturer, and data visualization expert. An analytics consultant and adjunct in the Department of Business Information and Analytics at the University of Denver, she wields a PhD in research methods and statistics combined with master's degrees in business and education to slice through a wide range of research topics and variety of data. Using empirically supported data visualization she crafts memorable presentations and crystal-clear visualizations that are accessible to all audiences. And she rides horses!

**3:35-4:05 p.m.**

**Jon Nachtigal**

Doctoral Candidate | University of New Mexico

***Handedness in Women's College Softball***

Pitchers' and hitters' handedness has long been accounted for as a strategic consideration in baseball. What about softball? Jon will examine the impact of handedness for women's college fastpitch softball, including whether left-handed throwers are overrepresented and statistical identification of slap hitters. Attendees will learn more about handedness (laterality) as a field of study and its role in sport, ways of measuring handedness in women's college softball, and the potential impact of this study on the sport.

**Jon Nachtigal** is a doctoral candidate studying sport administration at the University of New Mexico. He was an assistant softball coach at Claremont-Mudd-Scripps Colleges, helping CMS to its best record in school history in 2016. He publishes softball research at [FastpitchAnalytics.com](http://FastpitchAnalytics.com).

**3:35-4:05 p.m.**

**Corley Bagley**

Data Scientist | Hudl

***Bump, Set, Spike: Using Analytics to Rate Volleyball Teams and Players***

This talk will outline and quantify methods to objectively rate six fundamental skills in volleyball: serve, reception, set, attack, block, and dig. While these skills are currently rated in competitive volleyball, there is no method in place that will consistently and objectively rate players and teams. With the ability to consistently grade these fundamentals across a large amount of data, it becomes possible to accurately predict matchups and determine player and team success. Attendees will learn to identify critical fundamental skills in competitive volleyball, develop methodologies to rate fundamentals, and identify areas of application.

**Corley Bagley** graduated from Brigham Young University with a degree in statistical science. After school, he began working for VolleyMetrics as the director of analytics. After a couple years of immersive startup experience, VolleyMetrics was acquired by Hudl. Corley now works as a data scientist for Hudl on the Advanced Analytics team in the research and development department. Corley has a wife and two young sons.

**4:10-4:55 p.m.**

**Laura Albert**

Associate Professor of Industrial and Systems Engineering |  
University of Wisconsin-Madison

### ***Forecasting the College Football Playoff Using Markov Chains***

Selecting the teams for the College Football Playoff is a controversial process performed by a selection committee. We present a method for forecasting the four-team playoff weeks before the selection committee makes this decision. Our method uses methodology based on Markov chains, logistic regression, and simulation to forecast the teams that will be selected for the four-team playoff. I will also discuss how this method can be applied to ranking NCAA Division I men's college basketball teams. Attendees will learn how Markov chains can be used to rank sports teams, how to make informed decisions with limited data points, and how simulation can be used for forecasting.

**Laura Albert, PhD**, is the Assistant Dean for Graduate Affairs in the College of Engineering and an Associate Professor of Industrial & Systems Engineering at the University of Wisconsin-Madison. Her research interests are in the field of operations research, with a particular focus on discrete optimization with application to homeland security and emergency response problems. Dr. Albert's research has been supported by NSF, DHS, and the Department of the Army, Sandia National Laboratory, and she has been awarded an NSF CAREER award. She has authored or co-authored more than 50 publications in archival journals and refereed proceedings. Her research has been awarded several honors, including four best paper awards, a National Science Foundation CAREER award, and a Department of the Army Young Investigator Award. Dr. Albert is the INFORMS Vice President for Marketing, Communication, and Outreach. She is the author of the blogs "Punk Rock Operations Research" and "Badger Bracketology."

## **Poster Presentations**

**Bruce Liska**

Park View (Va.) High School

### ***Is 2 Better Than 1? An Analysis of the Relative Success of Running Back By Committee Versus a Feature Back***

This research poster will examine the football strategy known as "running back by committee" (using two or more running backs), comparing it to the traditional practice using one "feature" back.

**Bruce Liska** is a high school sophomore with a passion for sports and statistics. He started watching sports when his stepmother bought his father tickets to a Steelers game, and hasn't stopped watching. He has been studying ways to apply statistics to sports, and has presented at Carnegie Mellon University's Sports Analytics Conference.

**Cole Schuessler**

Concordia University, St. Paul

### ***Correlations Between Major League Baseball Spring Training and Regular Season Team Performance***

Minimal research regarding Major League Baseball spring training statistics has made it difficult to determine their relevance for predicting team performance during the regular season. This study examined the association between MLB spring training and regular season performance measures to determine if spring training statistics could be used to predict regular season winning percentage using offensive, defensive, and pitching statistics from the 2013-2017 seasons. A multiple linear regression model was statistically significant and explained 11% of the variance in regular season winning percentage, and a small number of statistics tested also showed moderate or large Pearson r correlations between spring training and regular season measures.

**Cole Schuessler** is a graduate student in Concordia University, St. Paul's sport management master's program. He currently works as a graduate assistant in the university's sports information department and as a baseball operations intern for Inside Edge, a data and analytics company best known for providing reports to MLB teams. He is pursuing a career in sports analytics, with baseball, basketball, and football being his sports of preference.

**Alex Nack**

University of Wisconsin-Stevens Point

### ***Sprinters vs. Endurance Athletes, A Genetic Advantage***

The performance of skeletal muscle is due, in part, to a fast twitch skeletal muscle protein called alpha-actinin-3 (ACTN3). A single nucleotide polymorphism (SNP) of the actn3 gene was found to be linked to a lower level of expression, due to an early stop codon. The loss of the protein causes impaired skeletal muscle performance in sprinters, but seems to correlate with endurance in female athletes. The purpose of this study was to develop a DNA technique for students, enrolled in Human Genetics, to identify their actn3 genotypes. Primers were designed to amplify both allele types using a multiplex PCR assay. The DNA of 20 students were then genotyped. All possible genotypes were represented in this population. This assay can now be used by future students to identify their own genotypes, to gain insight into their potential to become a sprinter or an endurance athlete.

## Data Analytics at UW-Stevens Point

Central Wisconsin employers in retail, manufacturing, health care, agriculture, insurance and software development industries identified a growing data analytics talent gap in the region. McKinsey Global Institute predicts by 2018, the United States could face a shortage of up to 190,000 people with deep analytical skills. The firm projects a shortfall of 1.5 million managers and analysts with capabilities to use and analyze big data to make effective decisions. To address these workplace needs, the University of Wisconsin-Stevens Point launched a new undergraduate degree program in data analytics, beginning fall 2016. The curriculum integrates fields of business, computer science, economics, geographic information systems, mathematics and statistics. It will be led by Sentry Insurance Endowed Chairs in Computational Analytics (Department of Computing and New Media Technologies) and Business Analytics (School of Business and Economics).

### Career opportunities in data analytics

Graduates with a Bachelor of Science in Data Analytics will be prepared for such jobs as business analyst, business insights analyst, data analyst, data architect, data modeler, junior data scientist and research analyst, among others. Virtually every sector of the economy projects a need for data analysts: insurance, health care, finance, sales, government, information technology, construction, law enforcement, manufacturing, and marketing, among others. We also offer opportunities for students wishing to pursue a master's degree.

### Building your résumé

Students completing the Bachelor of Science in Data Analytics degree program will demonstrate the following skills:

- Data Literacy. Demonstrate knowledge of various data types, attributes, sources and organization value.
- Data Preparation. Create, collect, automate, extract and harmonize data.
- Data Analysis. Use statistics, modeling, visualization and programming and data mining tools to analyze data.
- Data Communication. Translate analytic outputs for non-technical audiences. Interpret and communicate findings to build market intelligence and drive strategic decision-making.
- Data Governance. Understand data security, ethics and privacy issues and relevant regulatory and legal issues.
- Influence. Develop strategic thinking skills to make or support complex decisions, and deal with ambiguity.
- Team Participation. Function effectively on multidisciplinary and diverse teams.
- Curiosity. Cultivate curiosity and pursue continuous learning.
- Problem Solving. Translate analysis into timely, action-oriented systems thinking, problem-solving and recommendations.

In addition to the undergraduate data analytics program, UW-Stevens Point also offers an online master of science in data science degree program in collaboration with University of Wisconsin system partners. For more information visit [www.uwsp.edu/dataanalytics](http://www.uwsp.edu/dataanalytics).

## **UW-Stevens Point Athletics**

University of Wisconsin-Stevens Point athletic teams compete in NCAA Division III, and are part of the Wisconsin Intercollegiate Athletic Conference and Northern Collegiate Hockey Association. Its 20 varsity programs include men's and women's teams in basketball, cross country, ice hockey, swimming and diving, and indoor and outdoor track and field, as well as baseball, football, wrestling, women's golf, soccer, tennis, softball and volleyball.

Pointer teams have won national titles in men's and women's basketball, men's hockey and softball. Notable alumni include former NBA player Terry Porter, former NFL player Clint Kriewaldt, and current MLB pitcher Jordan Zimmermann.

For more information visit [athletics.uwsp.edu](http://athletics.uwsp.edu).