

JSM Discussion:
**Eye in the Sky: The Player Tracking
Revolution in Sports Analytics**

Challenges and Opportunities

The Low-Hanging Fruit

- Traditional, hand-tracked statistics
- Modern, computer-enabled statistics
- Functions, manipulations, and tweaks of existing statistics

New Opportunities

- Who is the best decision-maker in the NBA?
- Which team is best at forcing players to take low-probability shots?
- Automatic extraction of complex events from game video
- Understanding plays and formations. When is 4-4-2 the right choice in soccer? When is a give and go effective in hockey?

Challenge 1: Too Much Data

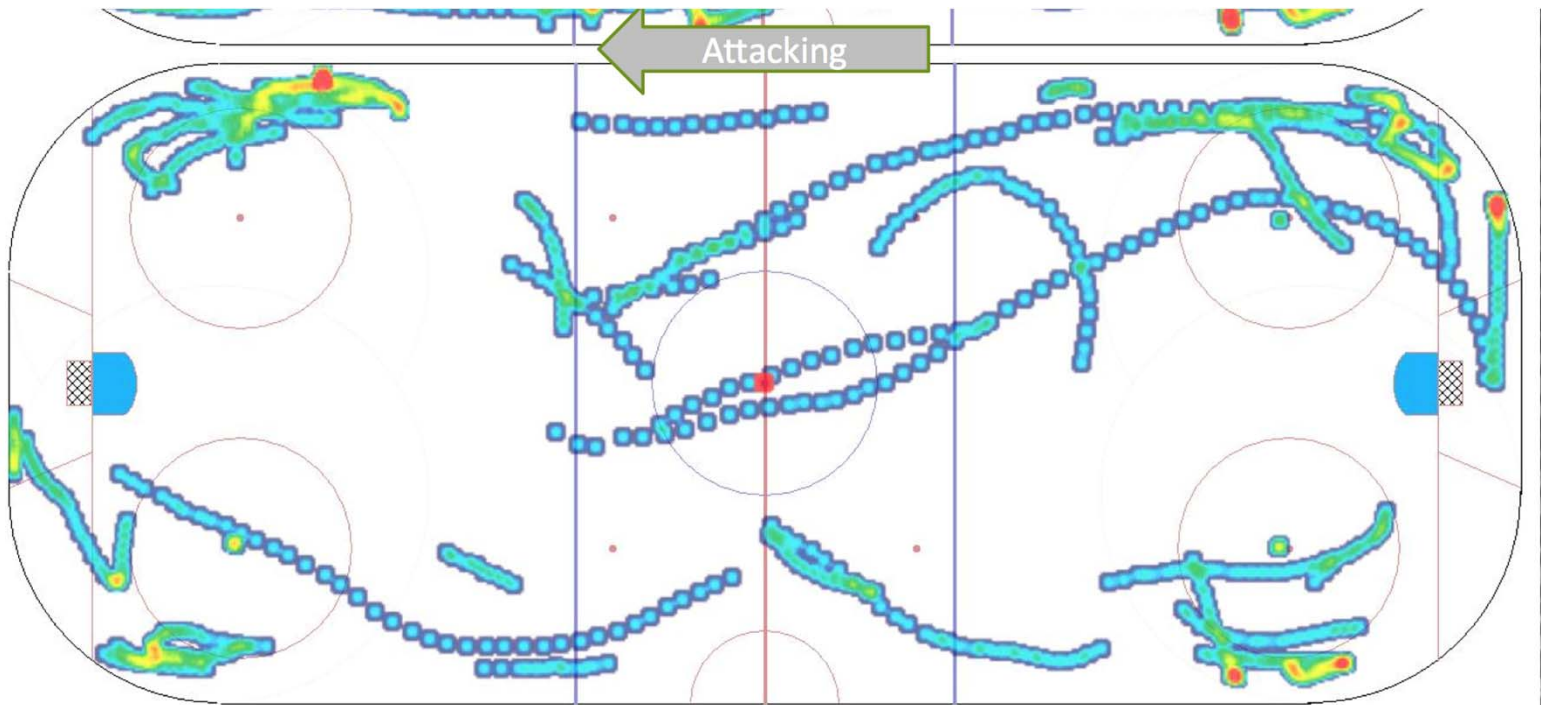
- Multifarious data sources
- Numerous data types
- Data in 100GB+ range -- won't fit into memory
- Most methods scale at $O(N^3)$
- Throwing out data limits potential insights (with caveats)

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Challenge 2: Not Enough Data

- Most events have never been seen before!
- How do we share information across space, time, and players?

S. Crosby
(Even-strength
with puck)



Challenge 3: Silos

- Analytic dominance considered a competitive advantage
- Every data problem, method, and technique is re-discovered 30 times

Lights, Cameras, Revolution

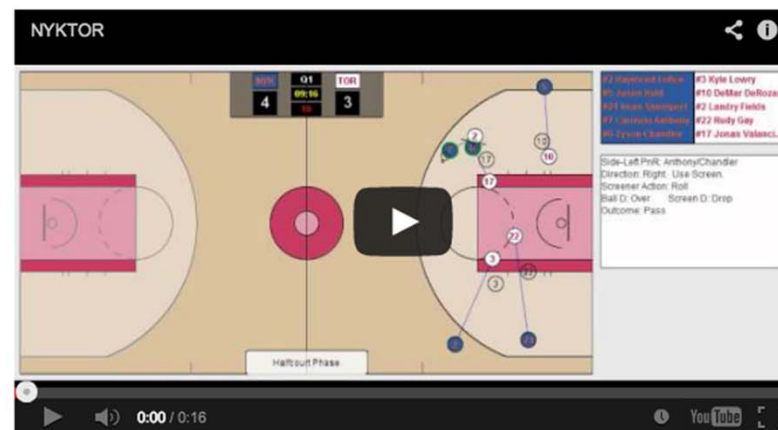
The NBA is undergoing an analytical transformation, and the Raptors are one of the teams at the forefront. For the first time, here is an exclusive, inside look at how SportVU is changing basketball.

By Zach Lowe on March 19, 2013 [PRINT](#)

New technology and statistics will change the way we understand basketball, even if they also create friction between coaches and front-office personnel trying to integrate new concepts into on-court play. The most important innovation in the NBA in recent years is a camera-tracking system, known as SportVU, that records every movement on the floor and spits it back at its front-office keepers as a byzantine series of geometric coordinates. Fifteen NBA teams have purchased the cameras, which cost about \$100,000 per year, from STATS LLC; turning those X-Y coordinates into useful data is the main challenge those teams face.¹

Some teams are just starting with the cameras, while others that bought them right away are far ahead and asking very interesting questions. Those 15 teams have been very secretive in revealing how they've used the data, but one team that has made serious progress — the Toronto Raptors — opened up the black box in a series of meetings this month with Grantland.

The future of the NBA, at least in one place, looks like this:



That's Jason Kidd hitting a 3-pointer off a Carmelo Anthony pick-and-roll in the first

Challenge 4: Talent

- Data not widely accessible for learning and research
- How to compete with tech and finance?
- Is taking a position with a sports team a career killer?
- Who to hire?

