NHL DATA ANALYTICS & VISUALIZATION

Anthony Battaglia

June 16, 2021

AGENDA

LEAGUE COMPARISONS & HISTORY

BASIC STATISTICS AND VISUALIZATIONS

ADVANCED ANALYTICS

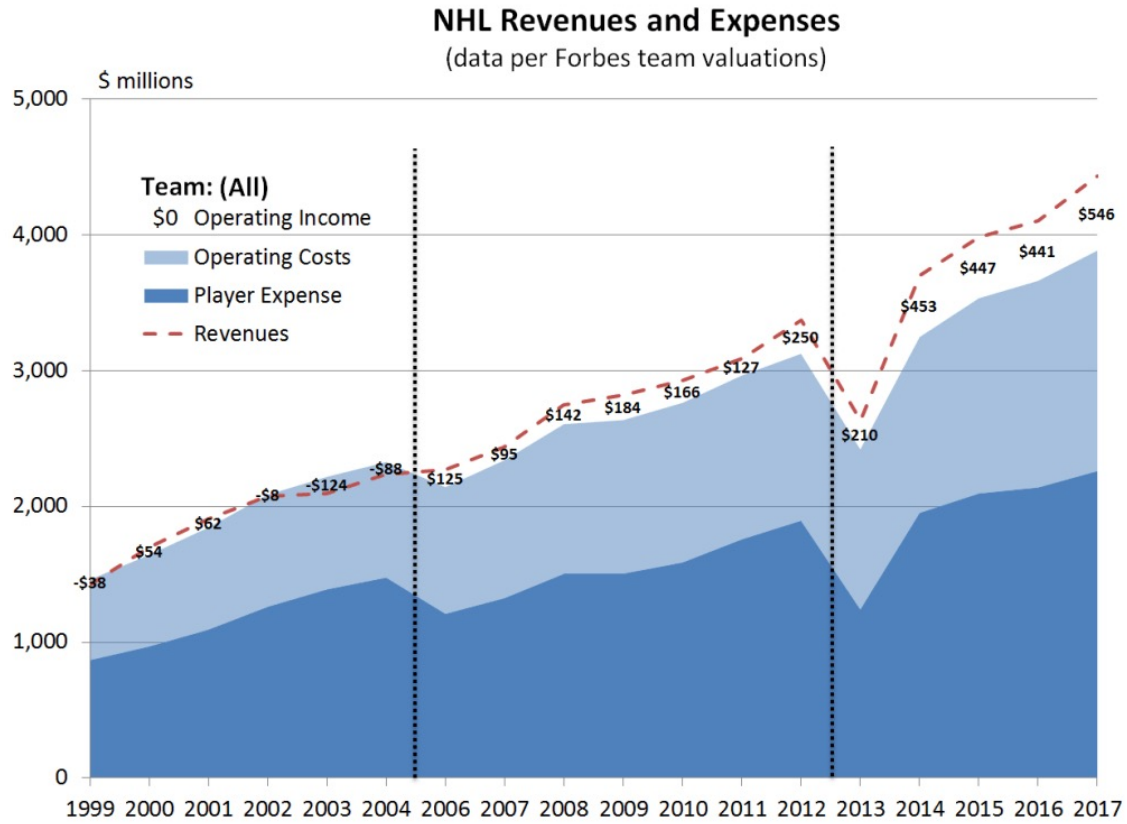
CONTROVERSY & PUSHBACK

COMMUNICATING DATA

PLAYER TRACKING

LEAGUE RANKINGS

- Highest grossing sports leagues (billions):
  1. National Football League (NFL) – 13
  2. Major League Baseball (MLB) – 10
  3. National Basketball Association (NBA) – 7.4
  4. Indian Premier League (Cricket) – 6.3
  5. Premier League (EPL) – 5.3
  6. National Hockey League (NHL) – 4.4

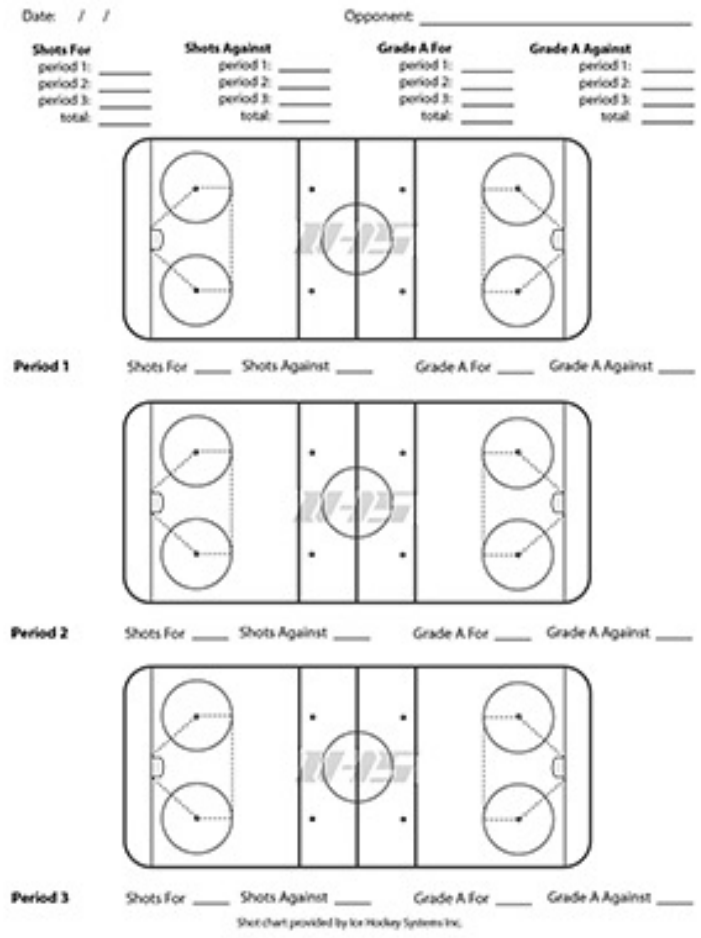


(Graphic Comments, 2017; Randjelovic, 2020)

	Gabriella Switaj	Team Services Analyst & Amateur Scout
	John Chayka	President of Hockey Operations and General Manager
	Brad Rossen	Director of Statistical Analysis
	Jeremy Rogalski	Director of Hockey Operations/Analytics
	Joshua Pohlkamp-Hartt	Analyst, Hockey Operations
	Campbell Weaver	Data Engineer, Hockey Operations
	Jason Nightingale	Director of Analytics
	Chris Snow	Assistant General Manager
	David Johnson	Database Work
	Eric Tulsky	Vice President of Hockey Management and Strategy
	Kevin Kan	Developer, Hockey Operations
	Matt Walter	Data Engineer
	Margaret Cunniff	Data Scientist
	Arik Parnass	Hockey Analyst
	Dawson Sprigings	Hockey Analyst
	Andrew Contis	Hockey Analytics/Video Analyst
	Josh Flynn	Assistant General Manager
	Tom Bark	Scouting Coordinator
	Zac Urback	Hockey Analyst
	Mark Janko	Assistant General Manager
	Alex LePore	Hockey Analytics Coordinator/Professional Scout
	Sam Lites	Hockey Analytics Coordinator/Amateur Scout
	Justin Mahe	Manager of Hockey Analysis
	Rhys Jessop	Amateur Scout, Part-Time
	Josh Weissbock	Amateur Scouting Consultant
	Cam Lawrence	Amateur Scouting Consultant
	Bryan Campbell	Director of Statistical Analysis and Hockey Administration
	Rob Vollman	Senior Analyst
	Hayden Speak	Analyst
	Jason Lewis	Video Technician
	Mat Sells	Manager of Hockey Analytics
	John Sedgwick	Vice President of Hockey Operations and Legal Affairs
	Pierre Allard	Sports Science and Performance Director
	Mario LeBlanc	Video Coach
	Matt Hamann	Hockey Operations Analytics Coordinator
	Dalton Linkus	Research and Data Development Engineer
	Tyler Dellow	Vice President of Hockey Analytics
	Matt Cane	Director of Hockey Analytics
	Frank Gardner	Analytics
	Taran Singleton	Analytics
	Sal Tornambene	Analytics
	Alex Martynov	Analytics
	Jim Sullivan	Director, Player Care & Development/Analytics and Hockey Technology
	Richard Dry	Director of Sports Technology
	Daniel Hovasse	Software Developer/Data Analyst
	Tim Pattyson	Hockey Data Analyst
	Elias Collete	Analytics Consultant
	Ian Anderson	Director of Hockey Analytics
	Jacob Hurlbut	Lead Developer
	Tom Minton	Director of Hockey Information/Video
	Matthew Karliner	Analyst
	Sam Ventura	Director of Hockey Research
	Doug Wilson Jr.	Director of Scouting
	Alexandra Mandrycky	Director of Hockey Strategy & Research
	Dani Chu	Quantitative Analyst
	Mike Perelman	Hockey Data Analyst
	Michael Peterson	Director of Hockey Analytics
	Kyle Dubas	General Manager
	Darryl Metcalf	Special Assistant to the General Manager
	Cam Charron	Analyst, Hockey Research and Development
	Judy Cohen	Analyst, Hockey Research and Development
	Bruce Peter	Analyst, Hockey Research and Development
	Rob Pettapiece	Analyst, Hockey Research and Development
	Wesley Waldner	Developer, Hockey Research and Development
	Dan Hamilton	Developer, Hockey Research and Development
	Andrew Low	Developer, Hockey Research and Development
	Jonathan Wall	Senior Director, Hockey Operations and Analytics
	Aiden Fox	Analyst, Hockey Analytics
	Ryan Biech	Video Analyst, Hockey Analytics
	Tom Poraszka	Hockey Operations Analyst
	Dustin Walsh	Hockey Operations Analyst
	Tim Barnes	Director of Hockey Analytics
	H.T. Lenz	Manager of Hockey Analytics
	Max Erenberg	Coordinator, Research and Data Analysis
	Adam Konefal	Research & Data Coordinator
	Jordy Finnigan	Data & Video Coordinator

@hayyyshayyy

(Condor, 2019)

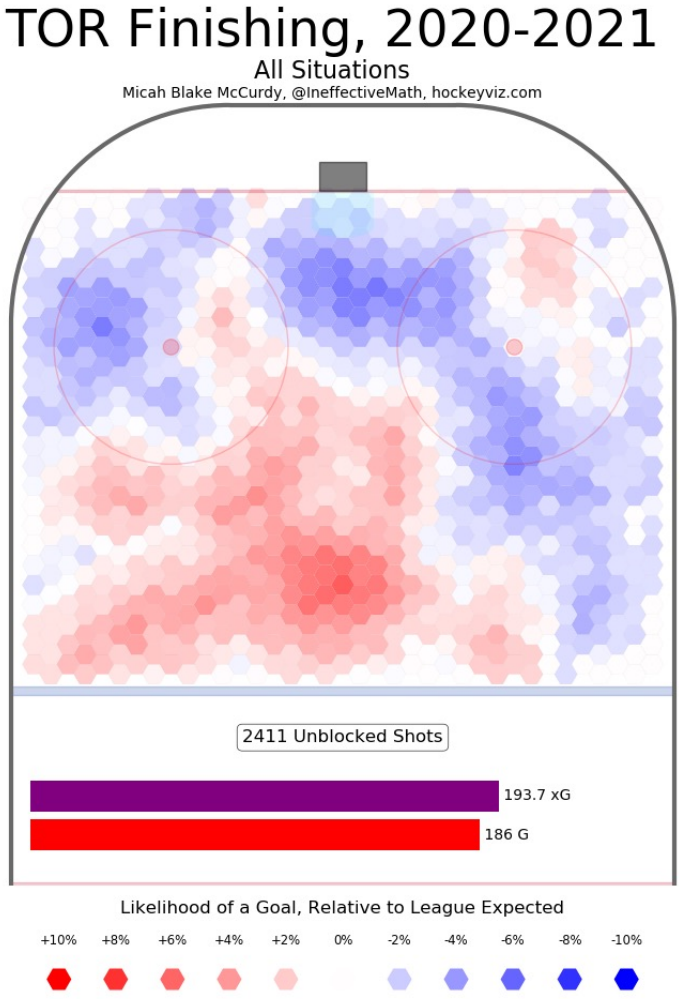


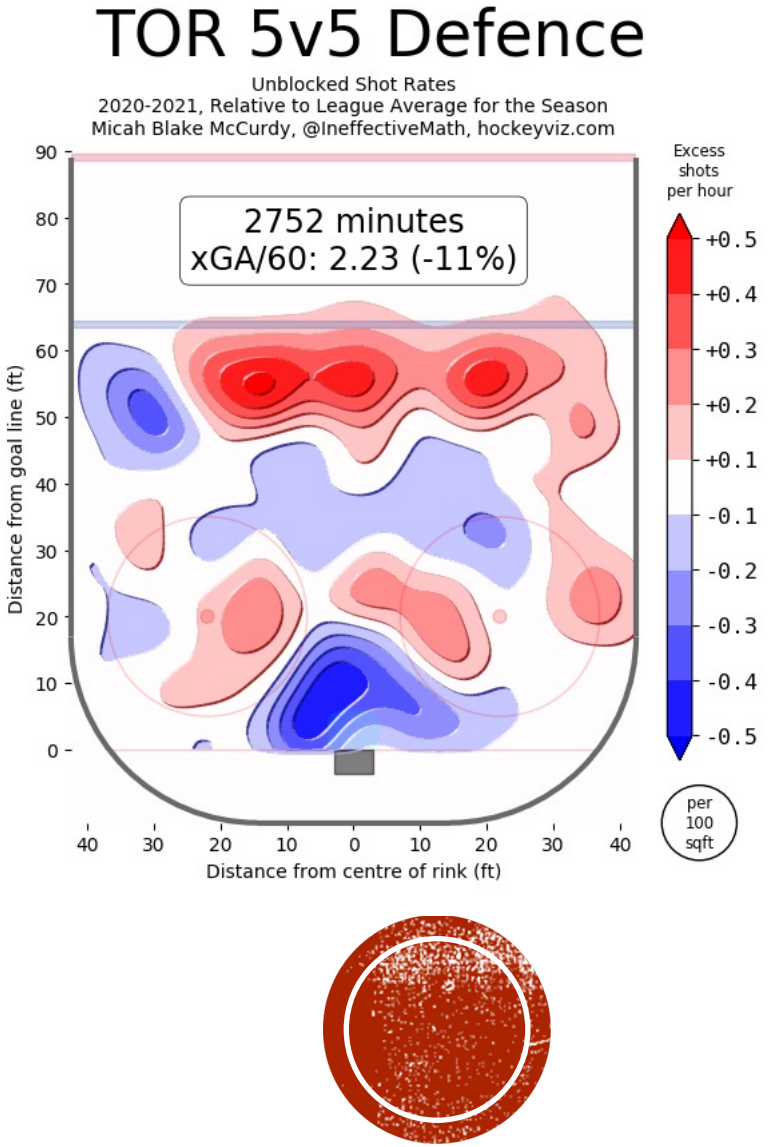
HISTORY

- 1875: organized hockey began
- 1917: NHL founded, tracking goals and assists
- 1967: plus/minus
- 1982: shot totals
- 1997: shot attempts, blocked shots, hits, face off wins
- 2015: NHL.com created statistical section on their site

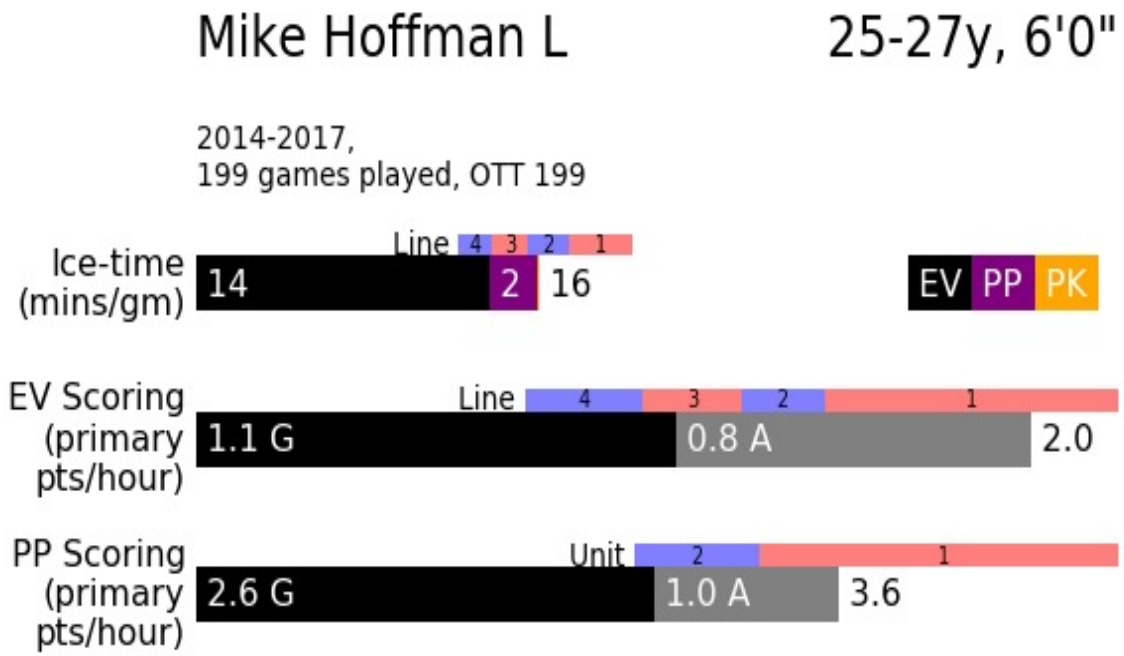
(Klein, 2014)

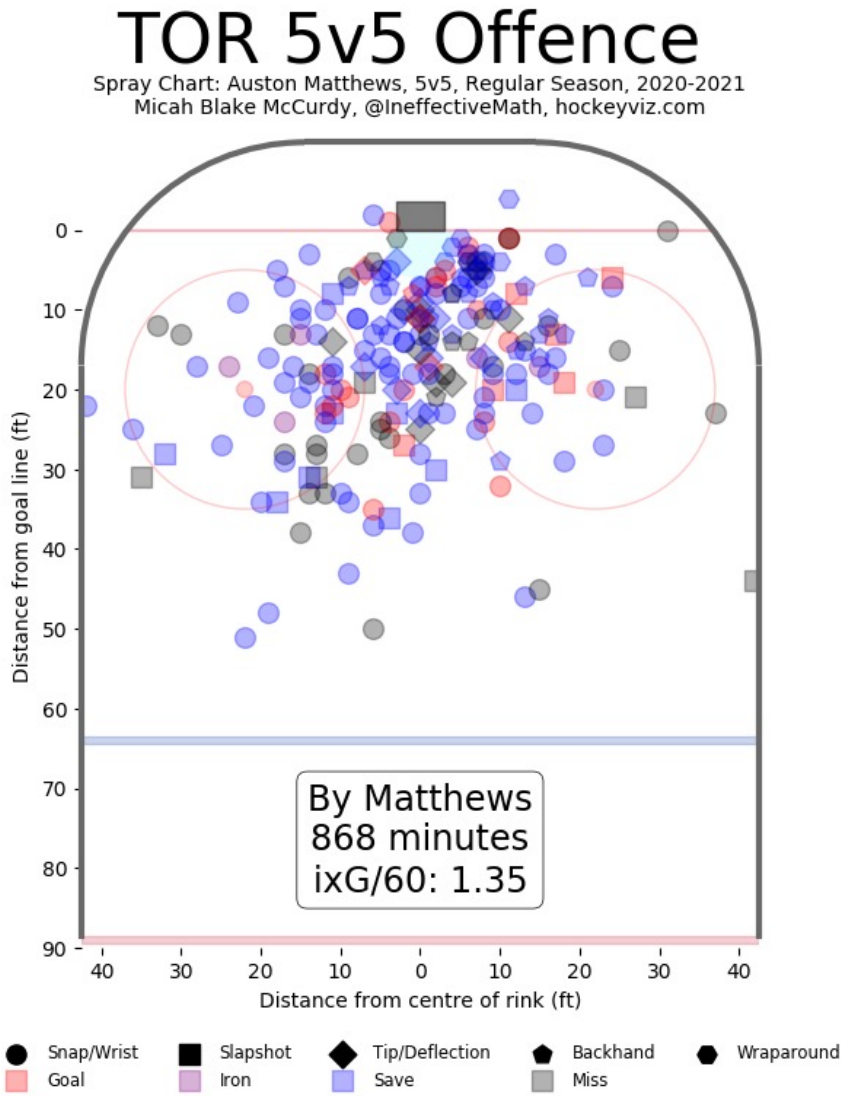
SHOT MAPS


TOR Finishing, 2020-2021
All Situations
Micah Blake McCurdy, @IneffectiveMath, hockeyviz.com
2411 Unblocked Shots
193.7 xG
186 G
Likelihood of a Goal, Relative to League Expected
+10% +8% +6% +4% +2% 0% -2% -4% -6% -8% -10%

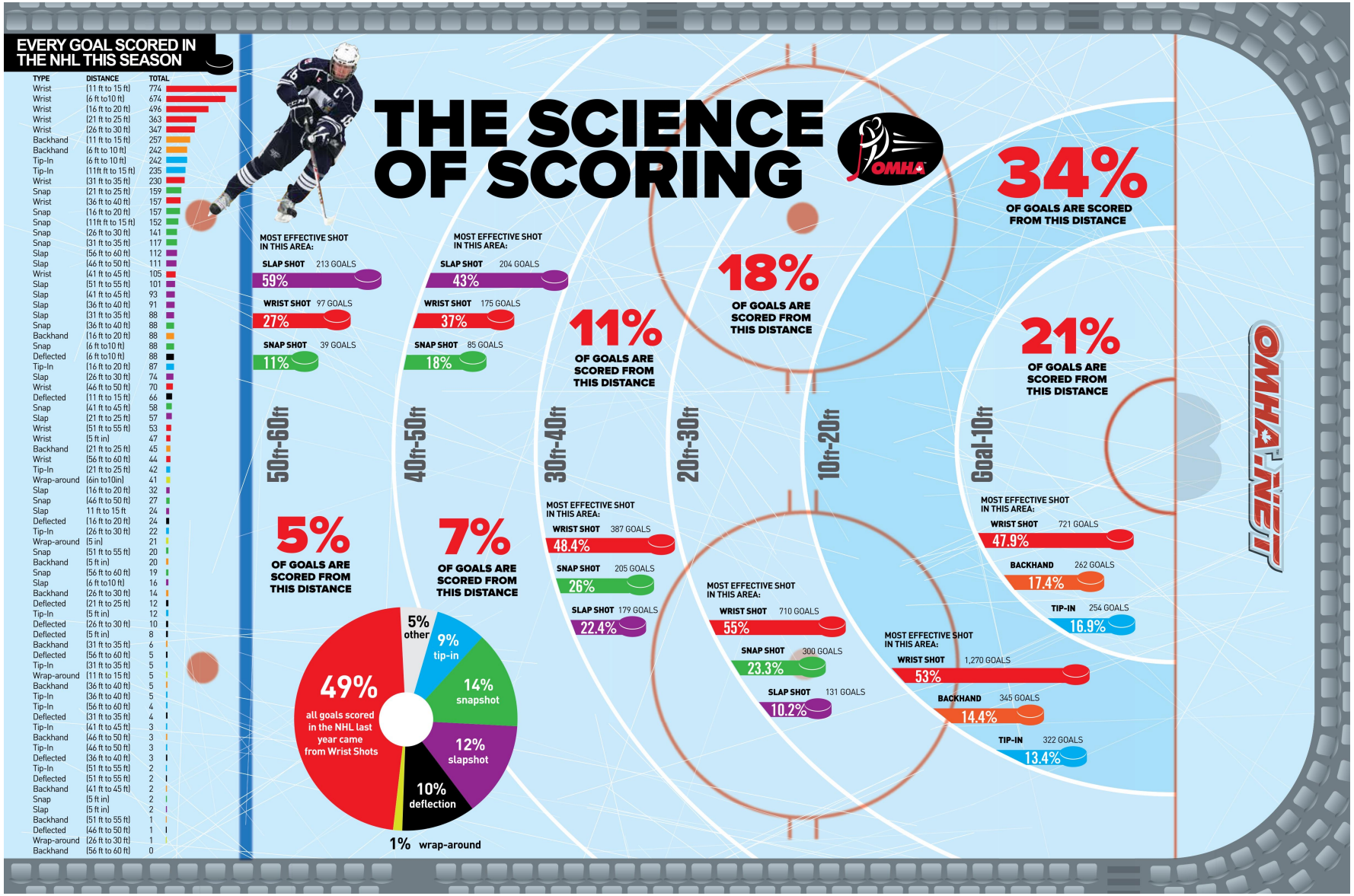

TOR 5v5 Defence
Unblocked Shot Rates
2020-2021, Relative to League Average for the Season
Micah Blake McCurdy, @IneffectiveMath, hockeyviz.com
2752 minutes
xGA/60: 2.23 (-11%)
Excess shots per hour
+0.5 +0.4 +0.3 +0.2 +0.1 -0.1 -0.2 -0.3 -0.4 -0.5
per 100 sqft
Distance from goal line (ft)
Distance from centre of rink (ft)

PLAYER EVALUATION





PLAYER DEVELOPMENT



(OMHA, 2016)

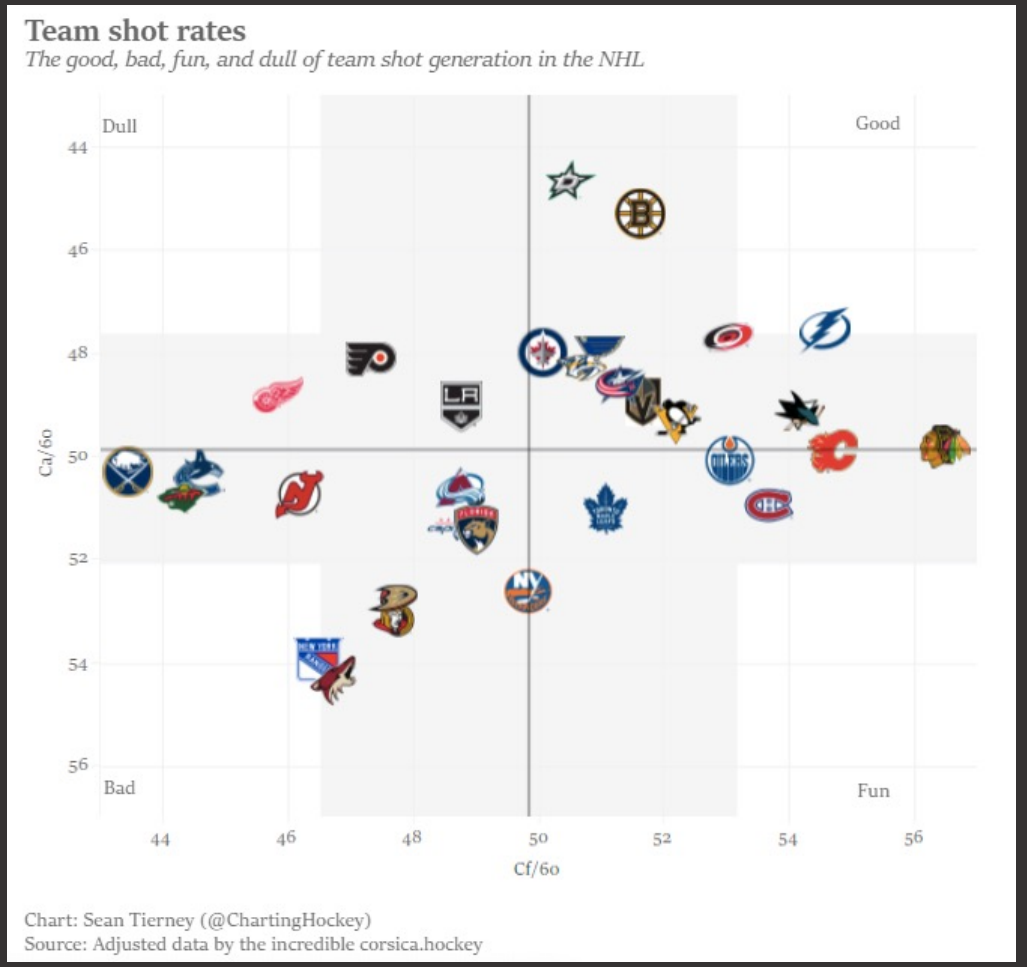
"ADVANCED" ANALYTICS

- Shot-based measures: larger sample size
- Tough to predict hockey: goal differential small, inferior team can easily win
- Complex game with very little independence
- CORSI & PDO

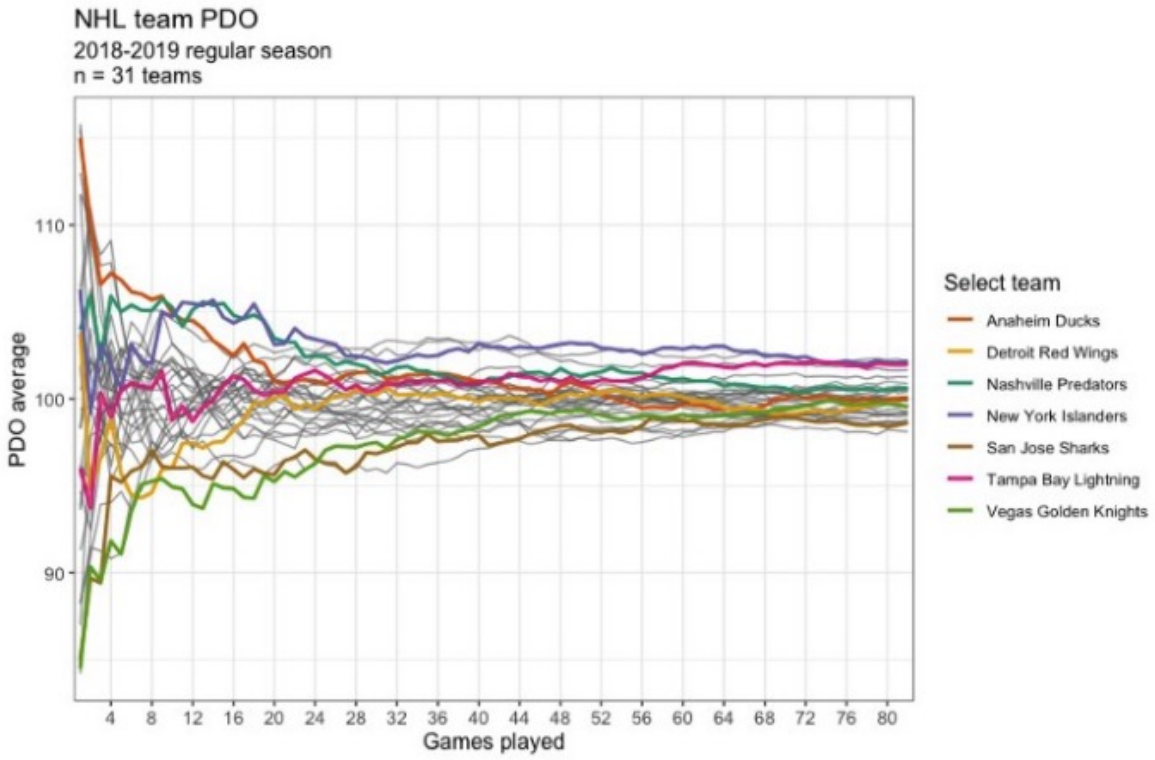
(Burke et al., 2014; Mehta et al., 2019)

CORSI

- Measured 5v5
- Includes all shot attempts: goals, shots on goal, misses, blocked shots
- Proxy for puck possession: when you have the puck, better chance to score
- Corsi% = Corsi For/(Corsi For + Corsi Against) x 100%
- Want at least a 51% CORSI



(Wesley, 2015)



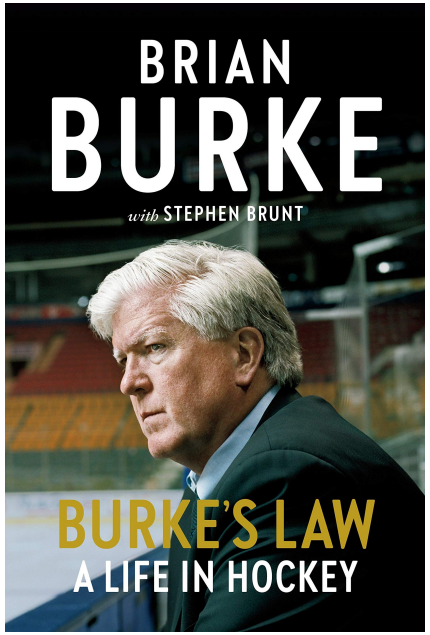
PDO

- Add team shot save % (your goalies) to shooting % (goals as percentage of total shots)
- Long term average = 100
- Measure of luck with regression to mean
- PDO over 100 team has been "lucky", under "unlucky"
- Possibly the goalie saving or team scoring a bit more than expected (or vice versa)

(Lee, 2021; Wesley, 2015)

PUSHBACK

- "Hockey statistics are like a lamppost for the drunk – useful for support but not elimination" - Brian Burke
- "You've never played, so you don't know what you're talking about"
- Intangibles that aren't believed to be captured by statistics:
  - "Grew up on a farm, knows how to work hard"
  - Who wants that puck in certain situations?
  - Grit, fortitude, mental toughness
  - Character
  - High pressure experience



(Burke et al., 2014)

COMMUNICATING DATA

- Integrating people who don't speak same language (stats to hockey background)
- Deliver information in their language: hockey first, stats second
- Most individuals in hockey are visual thinkers: need to pair statistics with video
- Need to have wins with data – will increase buy-in

(Burke et al., 2014; Dellow et al., 2015; Dellow et al., 2017)

PUCK TRACKING: FOXTRAX

Hockey pucks with shock sensors and infrared emitters, which were then read by sensors to generate on-screen graphics

Criticized as a distraction, but was deemed an overall technological success (Cavallaro, 1997)

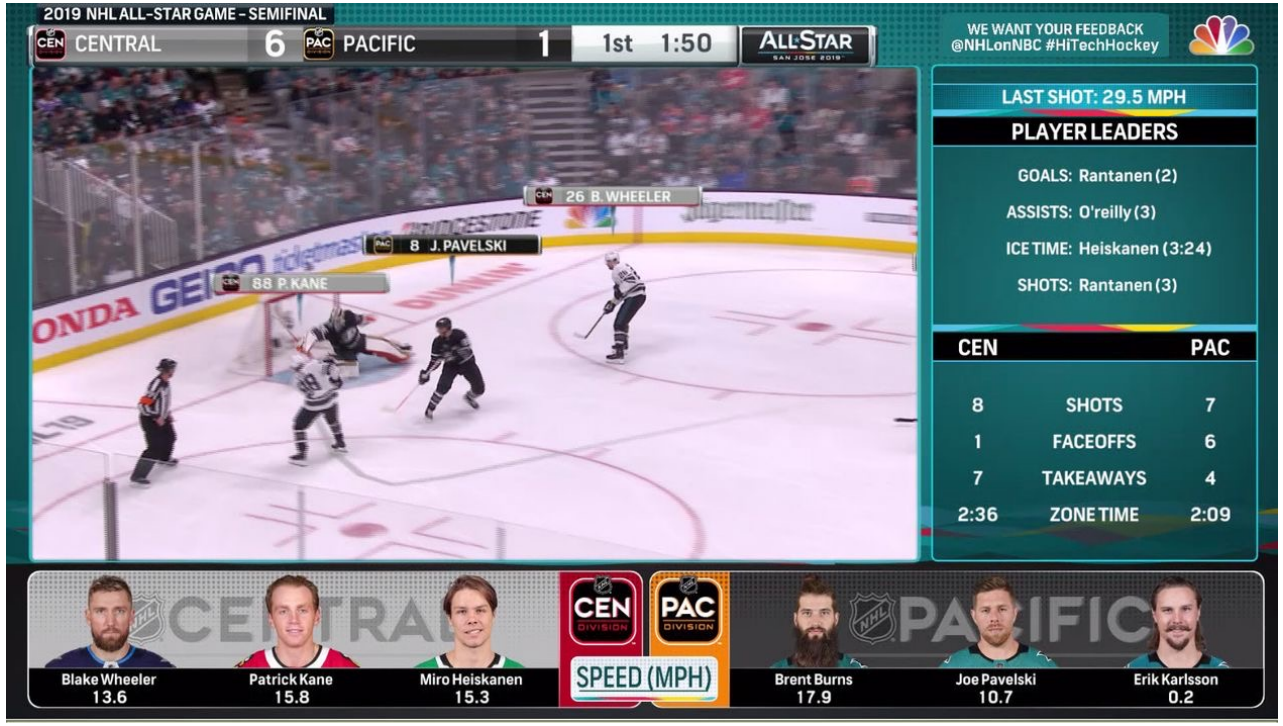
PLAYER TRACKING

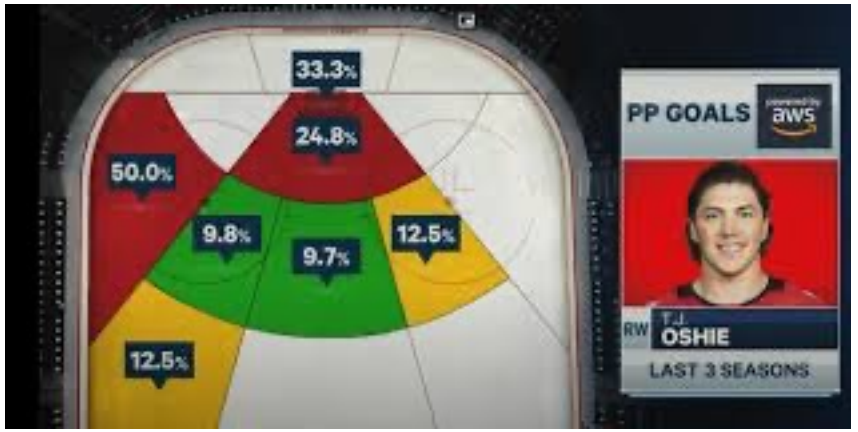
- Will provide context to event data (e.g., providing pre-shot information)
- Identify common plays using computer algorithms
- Maps for powerplay
- Quantify valuable defensive play

(Dellow et al., 2017; Mehta et al., 2019)

BROADCASTING

- Need to tell stories using data in broadcasts
- Hockey broadcasting lacking in detailed focused stories about why teams are winning





(Dellow et al., 2017)

“We can’t capture the whole game with analytics, it’s a beautiful messy art’’(Burke et al., 2014)

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