

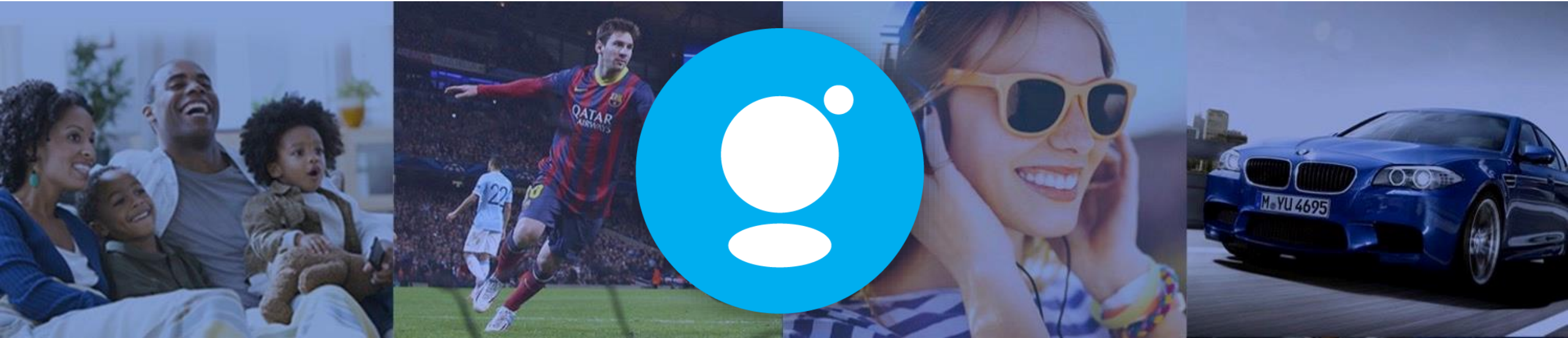


gracenote®
A NIELSEN COMPANY

Predicting the Olympic Games

16 January, 2018

COMPANY OVERVIEW



World's **leading entertainment data and technology** company

We power the world's top music services, consumer electronics, automakers, cable and satellite providers

Gracenote - leveraging the power of metadata



Music



Auto



Video



Sports



Personalization



Gracenote Sports - History

1995

infostradasports

2015

Infostrada sports
a gracenote company

1998

Awarded 1st Olympic Games contract Sydney 2000

2004

Contract with Reuters

2012

Contract with IOC for Olympics up until 2020

2017



gracenote.
A NIELSEN COMPANY

2002

Official Service Provider to FIFA

2009

Contract with Eurosport



Sports Services - Analytics



Benchmarking



Predictive Analysis



Talent Identification



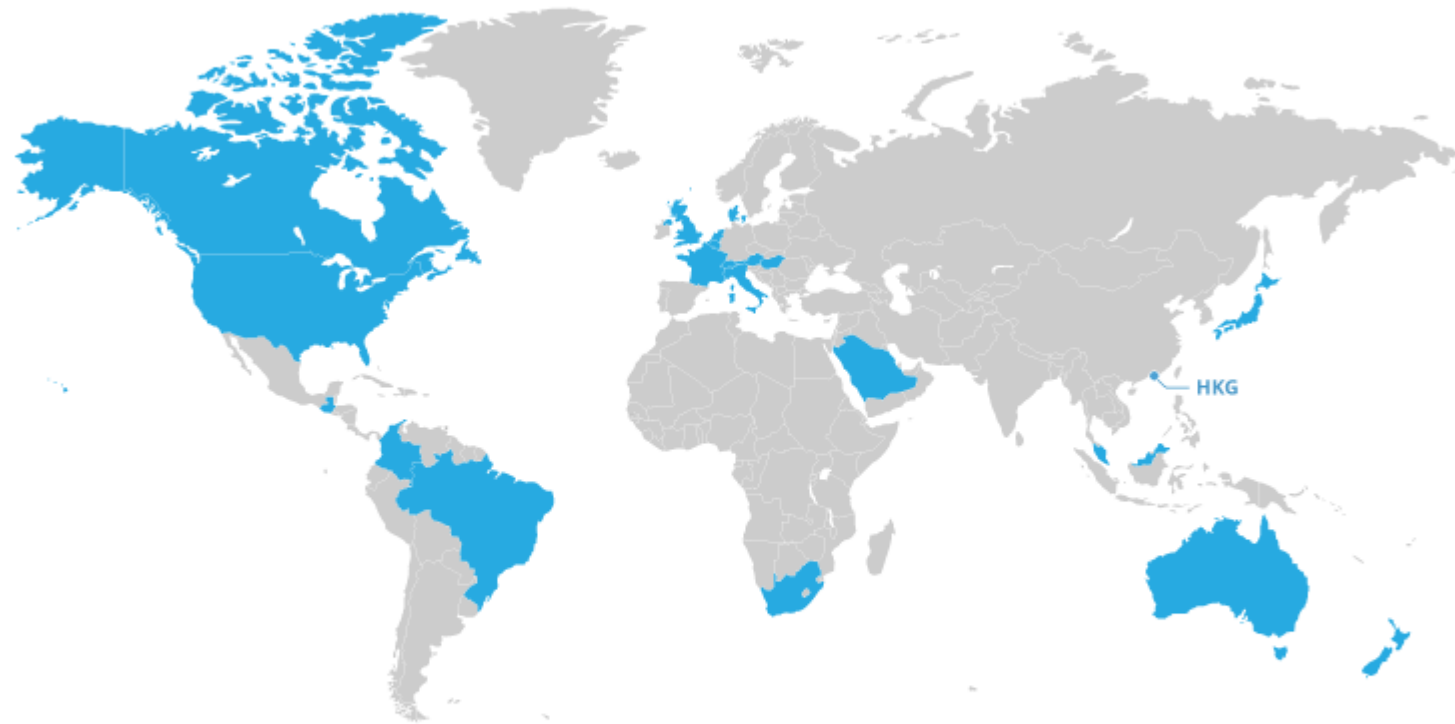
Results Monitoring

Gracernote can dive deep into the numbers to provide business intelligence for decision making.



Gracenote Sports High Performance Customers

High Performance clients - Gracenote Sports Analytics



Storytelling

- “..There are 8 million stories...” in our sports database
- Analytical tools and statistical models help tell them

Virtual Medal Table (Olympic Sports)



Euro Club Index (Football)



Prediction



Prediction is very difficult, especially if it's about
the future.

(Niels Bohr)



Projecting Olympic Medals

- Economic factors
- Expertise
- Results or other performance data



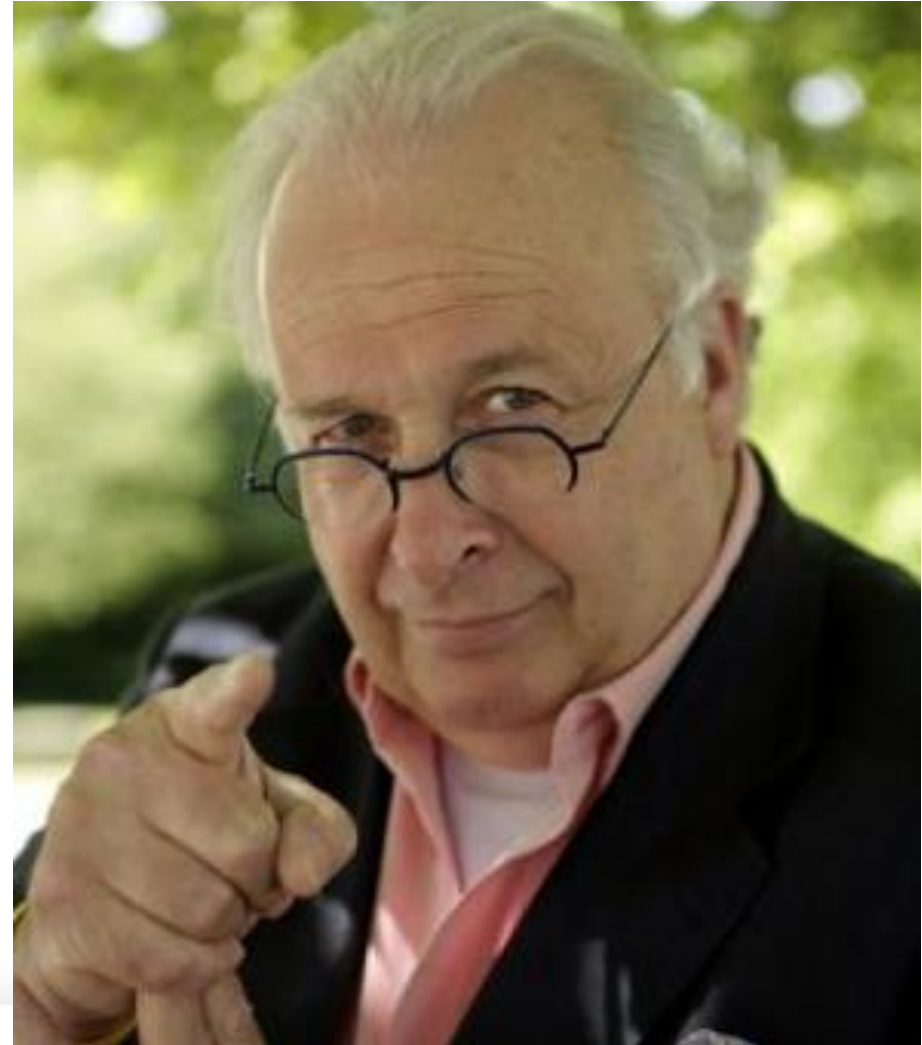
Economic factors

- Needs to include previous Olympic performance
- Static
- Provides no information on who might win medals
- Works poorly for Winter Olympics



Expertise

- Available only just before the Olympics
- Static
- Potential for recency bias



Results

- More information

Date	PhaseName	Rank	Person/Team	Country	Age (days)	Result
14-Jan-2018	Alpine Skiing Downhill Women - Bad Kleinkirchheim 2017/2018	1	Sofia Goggia (ITA, 15 Nov 1992)	Italy	25-060	1:04.00
14-Jan-2018	Alpine Skiing Slalom Men - Wengen 2017/2018	1	Marcel Hirscher (AUT, 02 Mar 1989)	Austria	28-318	1:45.45
14-Jan-2018	Biathlon 12.5km Mass Start Women - Ruhpolding 2017/2018	1	Kaisa Mäkäräinen (FIN, 11 Jan 1983)	Finland	35-003	34:05.6
14-Jan-2018	Biathlon 15km Mass Start Men - Ruhpolding 2017/2018	1	Johannes Bø (NOR, 16 May 1993)	Norway	24-243	37:11.2
14-Jan-2018	Bobsleigh 4-Man Competition Open - St. Moritz 2017/2018	1	Germany (Johannes Lochner)	Germany	26-053	2:08.42
14-Jan-2018	Cross Country Skiing Team Sprint Freestyle Men - Dresden 2017/2018	1	Nöckler / Pellegrino	Italy	28-121	12:18.31
14-Jan-2018	Cross Country Skiing Team Sprint Freestyle Women - Dresden 2017/2018	1	Ingemarsdotter / Dahlqvist	Sweden	28-086	13:33.40
14-Jan-2018	Equestrian - Dressage Individual Open - Wellington 2017/2018	1	Vilhelmson Silfvén (Paridon Magi)	Sweden	50-186	
14-Jan-2018	Freestyle Skiing Ski Cross Men - Idre 2017/2018	1	Jean Frédéric Chapuis (FRA, 02 Mar 1989)	France	28-318	
14-Jan-2018	Freestyle Skiing Ski Cross Women - Idre 2017/2018	1	Sandra Näslund (SWE, 06 Jul 1996)	Sweden	21-192	
14-Jan-2018	Golf Individual Men - BMW SA Open 2018	1	Chris Paisley (ENG, 24 Mar 1986)	Great Britain	31-296	-21
14-Jan-2018	Luge Single Men - Oberhof 2017/2018	1	Felix Loch (GER, 24 Jul 1989)	Germany	28-174	1:25.591
14-Jan-2018	Luge Team - Relay Mixed - Oberhof 2017/2018	1	Germany	Germany	28-100	2:20.952
14-Jan-2018	Nordic Combined Gundersen Large Hill / 10km Men - Val di Fiemme 2017/2018	1	Jan Schmid (NOR, 24 Nov 1983)	Norway	34-051	26:19.9
14-Jan-2018	Short Track 1000m Men - European Championships 2017/2018	1	Sjinkie Knegt (NED, 05 Jul 1989)	Netherlands	28-193	1:24.632
14-Jan-2018	Short Track 1000m Women - European Championships 2017/2018	1	Arianna Fontana (ITA, 14 Apr 1990)	Italy	27-275	1:30.353
14-Jan-2018	Short Track 3000m Relay Women - European Championships 2017/2018	1	Russia	Russia	23-212	4:10.257
14-Jan-2018	Short Track 5000m Relay Men - European Championships 2017/2018	1	Netherlands	Netherlands	25-175	6:36.198
14-Jan-2018	Short Track Overall Men - European Championships 2017/2018	1	Sjinkie Knegt (NED, 05 Jul 1989)	Netherlands	28-193	107
14-Jan-2018	Short Track Overall Women - European Championships 2017/2018	1	Arianna Fontana (ITA, 14 Apr 1990)	Italy	27-275	84
14-Jan-2018	Ski Jumping Individual - Normal Hill Women - Sapporo 2017/2018	1	Maren Lundby (NOR, 07 Sep 1994)	Norway	23-129	251.6

- Dynamic

- Allocates medals



Predicting Olympic medals using results data

- Relative Medal Table
- Virtual Medal Table
- Ranking methodology

↑ Country	1 ▾	2	3	T	4	5
	103	101	102	306	104	103
Germany	17	11	7	35	15	1
United States	12	7	8	27	11	12
Norway	11	7	9	27	8	7
Netherlands	10	3	5	18	5	5
Austria	8	5	6	19	2	9
Canada	5	14	8	27	7	11
France	5	9	9	23	1	5
Japan	5	7	4	16	2	4
Sweden	5	5	6	16	4	1
Switzerland	4	6	5	15	7	2
China	4	3	4	11	3	4
Russia	3	6	8	17	10	9
Czech Republic	3	4	1	8	4	4
Korea	3	1	4	8	0	7
Australia	2	1	2	5	0	0



Relative Medal Table

- Result at last World Championships

- Adjusted for entries at the Olympic Games











- Popularised by Luciano Barra

Date	Rank	Person/Team	Country	Sport	Discipline
12-Mar-2017	3	Suzanne Schulting (...)	Netherlands	Short Track	1000m
12-Mar-2017	1	Netherlands	Netherlands	Short Track	5000m Relay
11-Mar-2017	1	Sjinkie Knegt (NED, ...)	Netherlands	Short Track	500m
12-Feb-2017	1	Kjeld Nuis (NED, 10 ...)	Netherlands	Speed Skating	1500m
12-Feb-2017	3	Sven Kramer (NED, ...)	Netherlands	Speed Skating	1500m
12-Feb-2017	2	Ireen Wüst (NED, 01...)	Netherlands	Speed Skating	1500m
11-Feb-2017	1	Kjeld Nuis (NED, 10 ...)	Netherlands	Speed Skating	1000m
11-Feb-2017	3	Kai Verbij (NED, 25 ...)	Netherlands	Speed Skating	1000m
11-Feb-2017	3	Jorien ter Mors (NED...)	Netherlands	Speed Skating	1000m
11-Feb-2017	1	Sven Kramer (NED, ...)	Netherlands	Speed Skating	10000m
11-Feb-2017	2	Jorrit Bergsma (NED...)	Netherlands	Speed Skating	10000m
10-Feb-2017	1	Jan Smeekens (NED...)	Netherlands	Speed Skating	500m
10-Feb-2017	1	Netherlands	Netherlands	Speed Skating	Team Purs...
10-Feb-2017	1	Netherlands	Netherlands	Speed Skating	Team Purs...
09-Feb-2017	1	Ireen Wüst (NED, 01...)	Netherlands	Speed Skating	3000m
09-Feb-2017	3	Antoinette de Jong (...)	Netherlands	Speed Skating	3000m
09-Feb-2017	1	Sven Kramer (NED, ...)	Netherlands	Speed Skating	5000m
09-Feb-2017	2	Jorrit Bergsma (NED...)	Netherlands	Speed Skating	5000m



Virtual Medal Table

- Developed in 2010
- Results from events with world class fields
- Weighted by recency & event importance

gracenote. A NIELSEN COMPANY		Virtual Medal Table 1-10			
#	NOC	G	S	B	T
1	 Germany	14	12	14	40
2	 Norway	14	11	12	37
3	 Canada	7	12	14	33
4	 United States	10	10	9	29
5	 France	9	9	6	24
6	 Netherlands	6	7	5	18
7	 Austria	6	2	7	15
7	 Japan	4	7	4	15
9	 Sweden	3	10	1	14
10	 Switzerland	3	6	3	12

Last update: 10 January 2018



Virtual Medal Table application

- Media
- Professional sports organisations
- Anti-doping organisations



The screenshot shows a news article on the TSN website. The page header includes the TSN logo and navigation links for SPORTS, VIDEO, LIVE, RADIO, FANTASY, and BARDOWN. The article is categorized under OLYMPICS and includes sub-links for NEWS, VIDEO, and MEDAL STANDINGS. The main headline is 'Gracenote predicts 33 medals for Canada', dated Jan 10, 2018, and attributed to The Canadian Press. Below the headline is a photograph of four sports analysts sitting at a desk in a studio. The desk has a large screen displaying 'INSIDER TRADING' and the TSN logo. The analysts are identified by nameplates: JAMES DUTHIE, DARREN DREGER, PIERRE LeBRUN, and BOB MCKENZIE. The background of the studio features a large screen with 'TSN HOCKEY' and a hockey rink.

TSN SPORTS VIDEO LIVE RADIO FANTASY BARDOWN SI

OLYMPICS NEWS VIDEO MEDAL STANDINGS

OLYMPICS Jan 10, 2018

Gracenote predicts 33 medals for Canada

The Canadian Press



CALGARY — An international data analytics company predicts Canada will win a whopping 33 medals, including men's hockey gold, at the Winter Olympics in Pyeongchang, South Korea.

In a virtual medal table released Wednesday, Gracenote projects the Canadian team will rank third in total medals behind Germany (40) and Norway (37) and ahead of the United States (29).



Virtual Medal Table improvements over time

- Home advantage (2014)
- Winning margins (2016)
- Best 10 results (2016)
- Personal bests (2016)



Virtual Medal Table issues

- Generic model
- Weighting is subjective
- Probabilities not easy to compute









































Ranking methodologies

- Elo method as starting point
- Adjustment for multi-competitor
- Skill sharing across events



Ranking methodologies

- Strength of field is calculated from participants
- Every result can therefore be included
- Updated every day

Short Track	500m	Men	1	Wu Dajing (CHN, 24 Jul 1994)	23-174	China	
Short Track	500m	Women	1	Choi Minjeong (KOR, 09 Sep 1998)	19-127	Korea	
Short Track	1000m	Men	1	Hwang Dae Heon (KOR, 05 Jul 19...	18-193	Korea	
Short Track	1000m	Women	1	Choi Minjeong (KOR, 09 Sep 1998)	19-127	Korea	
Short Track	1500m	Men	1	Hwang Dae Heon (KOR, 05 Jul 19...	18-193	Korea	
Short Track	1500m	Women	1	Choi Minjeong (KOR, 09 Sep 1998)	19-127	Korea	
Short Track	3000m Relay	Women	1	Korea	-	Korea	
Short Track	5000m Relay	Men	1	Korea	-	Korea	
Skeleton	Individual	Men	1	Yun Sungbin (KOR, 23 May 1994)	23-236	Korea	
Skeleton	Individual	Women	1	Jacqueline Lölling (GER, 06 Feb 1...	22-342	Germany	
Ski Jumping	Individual - Large Hill	Men	1	Kamil Stoch (POL, 25 May 1987)	30-234	Poland	
Ski Jumping	Individual - Normal Hill	Men	1	Kamil Stoch (POL, 25 May 1987)	30-234	Poland	
Ski Jumping	Individual - Normal Hill	Women	1	Maren Lundby (NOR, 07 Sep 1994)	23-129	Norway	
Ski Jumping	Team - Large Hill	Men	1	Norway	-	Norway	
Snowboard	Big Air	Men	1	Maxence Parrot (CAN, 06 Jun 1994)	23-222	Canada	
Snowboard	Big Air	Women	1	Anna Gasser (AUT, 16 Aug 1991)	26-151	Austria	
Snowboard	Halfpipe	Men	1	Scott James (AUS, 06 Jul 1994)	23-192	Australia	
Snowboard	Halfpipe	Women	1	Chloe Kim (USA, 23 Apr 2000)	17-266	United States	
Snowboard	Parallel Giant Slalom	Men	1	Nevin Galmarini (SUI, 04 Dec 1986)	31-041	Switzerland	
Snowboard	Parallel Giant Slalom	Women	1	Ester Ledecká (CZE, 23 Mar 1995)	22-297	Czech Republic	
Snowboard	Slopestyle	Men	1	Chris Corning (USA, 07 Sep 1999)	18-129	United States	
Snowboard	Slopestyle	Women	1	Jamie Anderson (USA, 13 Sep 1990)	27-123	United States	
Snowboard	Snowboard Cross	Men	1	Pierre Vaultier (FRA, 24 Jun 1987)	30-204	France	
Snowboard	Snowboard Cross	Women	1	Chloé Trespeuch (FRA, 13 Apr 1994)	23-276	France	
Speed Skating	500m	Men	1	Alex Boisvert-Lacroix (CAN, 08 Apr...	30-281	Canada	
Speed Skating	500m	Women	1	Nao Kodaira (JPN, 26 May 1986)	31-233	Japan	
Speed Skating	1000m	Men	1	Kai Verbij (NED, 25 Sep 1994)	23-111	Netherlands	
Speed Skating	1000m	Women	1	Miho Takagi (JPN, 22 May 1994)	23-237	Japan	
Speed Skating	1500m	Men	1	Denis Yuskov (RUS, 11 Oct 1989)	28-095	Russia	
Speed Skating	1500m	Women	1	Miho Takagi (JPN, 22 May 1994)	23-237	Japan	
Speed Skating	3000m	Women	1	Miho Takagi (JPN, 22 May 1994)	23-237	Japan	
Speed Skating	5000m	Men	1	Sven Kramer (NED, 23 Apr 1986)	31-266	Netherlands	
Speed Skating	5000m	Women	1	Martina Sáblíková (CZE, 27 May 1...	30-232	Czech Republic	
Speed Skating	10000m	Men	1	Sven Kramer (NED, 23 Apr 1986)	31-266	Netherlands	
Speed Skating	Mass Start 16 Laps	Men	1	Lee Seung-Hoon (KOR, 06 Mar 19...	29-314	Korea	
Speed Skating	Mass Start 16 Laps	Women	1	Francesca Lollobrigida (ITA, 07 Fe...	26-341	Italy	
Speed Skating	Team Pursuit 6 Laps	Women	1	Japan	-	Japan	
Speed Skating	Team Pursuit 8 Laps	Men	1	Netherlands	-	Netherlands	



Virtual Medal Table PyeongChang 2018

gracenote A NIELSEN COMPANY		Virtual Medal Table 1-14			
#	NOC	G	S	B	T
1	Germany	14	12	14	40
2	Norway	14	11	12	37
3	United States	10	10	9	29
4	France	9	9	6	24
5	Canada	7	12	14	33
6	Korea	7	3	0	10
7	Netherlands	6	7	5	18
8	Austria	6	2	7	15
9	China	6	1	2	9
10	Japan	4	7	4	15
11	Czech Republic	4	2	2	8
12	Sweden	3	10	1	14
13	Switzerland	3	6	3	12
14	Australia	2	2	0	4

Last update: 10 January 2018

- Germany number 1
- Followed by Norway and Canada
- Netherlands in top-10
- More medals for Japan than hosts
- 28 countries to win medals

gracenote A NIELSEN COMPANY		Virtual Medal Table 15-27			
#	NOC	G	S	B	T
15	Poland	2	0	1	3
16	Italy	1	2	3	6
17	Belgium	1	0	1	2
17	Slovenia	1	0	1	2
19	Latvia	1	0	0	1
19	Liechtenstein	1	0	0	1
21	Great Britain	0	2	3	5
22	Slovakia	0	1	2	3
23	Belarus	0	1	1	2
23	Hungary	0	1	1	2
23	Spain	0	1	1	2
26	Finland	0	0	7	7
27	New Zealand	0	0	1	1
27	Ukraine	0	0	1	1

Last update: 10 January 2018



Netherlands at PyeongChang 2018



Netherlands at PyeongChang 2018



The Esmee Visser problem



Competition Mutations

Date	Sport	Discipline	Gender	Competition	Rank	Person/Team	Age	Country	Forecast
06-Jan-2018	Speed Skating	3000m	Women	European Single Dist...	1	Esmee Visser (NED, 27 Jan 19...	21-344	Netherlands	13
19-Nov-2017	Speed Skating	5000m	Women	Stavanger B Group	1	Esmee Visser (NED, 27 Jan 19...	21-296	Netherlands	19
21-Feb-2015	Speed Skating	3000m	Women	World Junior Champi...	7	Esmee Visser (NED, 27 Jan 19...	19-025	Netherlands	16
20-Feb-2015	Speed Skating	1500m	Women	World Junior Champi...	22	Esmee Visser (NED, 27 Jan 19...	19-024	Netherlands	13



Podium Rankings PyeongChang 2018

- Norway now top ahead of Germany
- Korea look more realistic
- U.S.A. perhaps a bit low

NOC	Gold	Silver	Bronze
Norway	15	8	16
Germany	14	16	8
France	11	6	8
Korea	9	4	4
United States	8	6	9
Japan	7	3	2
Canada	5	13	9
Netherlands	4	6	6
Sweden	4	5	2
Austria	4	2	7
Olympic Athletes from Russia	3	6	8
Switzerland	3	4	3
China	3	4	1
Italy	2	5	5



PyeongChang 2018 insights

- Top of the medal table looks like a fight between Norway & Germany
- Canada, France and U.S.A will round off the top-5 medal winners
- Host nation Korea will gain medals from being at home
- Laura Dahlmeier (Germany, Biathlon) to win most medals
- Record number of countries to win medals at a Winter Games



So how good are these methods?

Rio 2016	Virtual Medal Table			Podium Rankings	
Prediction	Result	Total	Percentage		
Gold	Gold	133	43.46%	114	37.13%
Medal	Gold	211	68.95%	206	67.75%
Top-8	Gold	269	87.91%		
Medal	Medal	517	53.24%	520	53.44%
Top-8	Medal	769	79.20%	811	83.35%
Top-8	Top-8	1601	65.56%	1651	67.44%

Sochi 2014	Virtual Medal Table			Podium Rankings	
Prediction	Result	Total	Percentage		
Gold	Gold	30	30.61%	33	33.33%
Medal	Gold	67	68.37%	70	70.71%
Top-8	Gold	88	89.80%		
Medal	Medal	141	47.96%	146	49.49%
Top-8	Medal	243	82.65%	236	80.00%
Top-8	Top-8	494	63.01%	494	63.01%



So how good are these methods?

- More accurate than the economic models
- Top of ranking more or less same as reality
- At least as good as expert forecasts



Most predictable winter sports events

- Figure Skating – Team (89% of medallists correct)
- Ice Hockey – Women's Team (85%)
- Snowboard - Women's Big Air (83%)
- Cross Country Skiing – Men's Team Sprint (78%)
- Speed Skating – Women's 3000m (78%)
- Ice Hockey, Figure Skating, Speed Skating, Skeleton all predictable



Least predictable winter sports events

- Nordic Combined – Men's Normal Hill/10km (19% of medallists correct)
- Cross Country Skiing – Men's 50km Classic Style (22%)
- Cross Country Skiing – Men's Sprint (22%)
- Speed Skating – Men's Mass Start (22%)
- Alpine Skiing – Men's Super G (23%)
- Nordic Combined, Alpine Skiing, Snowboard, Biathlon all unpredictable



The men's ice hockey problem

NHL will not participate in 2018 Olympics

League announces no break in 2017-18 schedule for PyeongChang Games, says 'matter officially closed'

by Dan Rosen @drosennhl / NHL.com Senior Writer

April 4th, 2017

Share



To summarise

- Results data provides a very good forecast of Olympic medal table
- At individual event level, accuracy still above 50% for medals
- Sport will always have surprises,
- Some sports are more unpredictable than others
- Allows post-hoc analysis of under- or over-performance
- Forecasts an important part of the debate



Thanks for listening

QUESTIONS?

Twitter: @simongleave (@GracernoteGold)

