World Ranking List

FSG Academy – Main Workshop for FSG 2026
on 25th of October 2025 at ZEISS in Oberkochen

Formula Student Electric - World Ranking List

308 | 2024-12-08 | 0,91 | AU
307 | 2024-10-26 | 0,85 | CN
305 | 2024-09-14 | 0,90 | JP
304 | 2024-09-08 | 0,93 | IT
302 | 2024-08-25 | 0,85 | AA
300 | 2024-08-18 | 0,94 | DE
299 | 2024-08-10 | 0,90 | CZ
297 | 2024-08-07 | 0,85 | ES
295 | 2024-08-03 | 0,94 | EA
293 | 2024-07-25 | 0,93 | AT
291 | 2024-07-21 | 0,85 | UK
290 | 2024-07-18 | 0,93 | NL
289 | 2024-07-17 | 0,85 | CH
288 | 2024-06-15 | 0,95 | MI

Formula SAE® Australasia 2024

(Pure Electric Event)
https://saea.com.au/formula-sae-a

SUM top10 event: 5.242,0405
SUM top10 wrl ID 307: 6.976,0073
=> **competitiveness** of competition:
0,7514 * 0,375 + 0,625 = **0,9068**

22 teams at competition (result > 0): kml for google earth
403 teams in WRL: kml for google earth

2023-12-17 > Season 1 ≥ 2024-12-08
2022-12-11 > Season 2 ≥ 2023-12-17
2019-12-08 > Season 3 ≥ 2022-12-11

WRL ID 308 | 2024-12-08 | c 0,91 | AU

rank	wrp	cn	university name	team	A
1	778,36	EE	Tallinn TU UAS	FSG	A
2	774,17	AT	Fachhochschule Joanneum Graz	FSG	A
3	766,88	CH	ETH Zürich	FSG	A
4	735,74	DE	Westsächsische Hochschule Zwickau	FSG	A
5	704,87	AT	Technische Universität Graz	FSG	A
6	692,72	US	Rochester Institute of Technology	--	A
7	672,00	NZ	University of Auckland	--	A
8	646,21	US	University of Pittsburgh	--	A
9	630,10	NZ	University of Canterbury	FSG	A
10	629,33	US	Georgia Institute of Technology	--	A
11	628,97	AU	University of Queensland	--	A
12	598,33	AU	The University of Newcastle	--	A
13	597,14	DE	Karlsruhe Institute of Technology	FSG	A
14	594,14	US	Carnegie Mellon University	FSG	A
15	590,36	US	University of Washington	FSG	A
16	586,28	AU	Monash University	FSG	A
17	584,50	CZ	Czech Technical University in Prague	FSG	A
18	580,76	AU	Curtin University	--	A
19	571,29	JP	Nagoya University	--	A
20	568,11	US	Virginia Polytechnic Institute and State University	--	A

Overall Results
Formula SAE® Australasia 2024

City/Univ	place	cost	bp	ed	acc	sp	autox	endu	eff	pen	total
Melbourne Monash	1.	10.	1.	1.	2.	1.	1.	3.	9.	0	863
Auckland U	2.	16.	2.	2.	1.	4.	2.	4.	10.	0	795
Bentley U Curtin	3.	3.	3.	10.	9.	6.	3.	6.	7.	0	759
Callaghan NCL	4.	8.	14.	12.	4.	9.	8.	5.	4.	0	734
Brisbane UQ	5.	1.	18.	5.	13.	10.	4.	1.	5.	0	726
Christchurch UC	6.	4.	5.	11.	8.	5.	-	8.	1.	0	685
Wollongong UOW	7.	7.	11.	8.	14.	12.	11.	2.	3.	0	677
Perth UWA	8.	9.	13.	4.	6.	3.	6.	10.	8.	0	625
Adelaide U	9.	12.	17.	9.	11.	11.	5.	7.	11.	0	603
Sandy Bay U Tas	10.	2.	7.	14.	5.	7.	-	9.	2.	0	578
Sydney UNSW	11.	6.	6.	3.	7.	2.	9.	12.	-	0	482
Melbourne RMIT	12.	18.	10.	5.	10.	13.	7.	13.	-	0	362
Taipei TU	13.	-	21.	20.	12.	8.	10.	11.	6.	0	356
Melbourne Swinburne	14.	15.	20.	7.	3.	-	-	-	-	0	294
Brisbane TU	15.	5.	4.	15.	15.	-	-	-	-	0	260
Nathan Griffith	16.	11.	12.	15.	-	-	12.	-	-	0	233
Melbourne U	17.	13.	16.	13.	-	-	-	14.	-	0	223
Hamilton Waikato	18.	14.	15.	17.	-	-	-	-	-	0	215

Thought Experiment

Thought Experiment

FS Eifel

Thought Experiment

Teams

Thought Experiment

No Exchange with other Competitions

Thought Experiment

Overall Results

FS Eifel Competitiveness: 0.85

rank	pts	university name
1	950	Uni of Deutz
2	900	Uni of John Deere
3	890	Uni of Massey Ferguson
4	880	Uni of New Holland
5	870	Uni of JCB
6	860	Uni of Fendt
7	850	Uni of Same
8	840	Uni of Eicher
9	830	Uni of Hanomag
10	820	Uni of Valtra

Thought Experiment

Thought Experiment

World Ranking List

rank	wrp	cn	university name
1	**807,5**		**Uni of Deutz**
2	778,36	EE	Tallinn TU UAS
3	774,17	AT	Fachhochschule Joanneum Graz
4	766,88	CH	ETH Zürich
5	**765**		**Uni of John Deere**
6	**756,5**		**Uni of Massey Ferguson**
7	**748**		**Uni of New Holland**
8	**739**		**Uni of JCB**
9	735,74	DE	Westsächsische Hochschule Zwickau
10	**731**		**Uni of Fendt**
11	**722,5**		**Uni of Same**
12	**714**		**Uni of Eicher**
13	**705,5**		**Uni of Hanomag**
14	704,87	AT	Technische Universität Graz
15	**697**		**Uni of Valtra**
16	692,72	US	Rochester Institute of Technology

Competitiveness of next FS Eifel ➔ **0.99**

Thought Experiment

Thought Experiment

World Ranking List

rank	wrp	cn	university name
1	**950**		**Uni of Deutz**
2	**900**		**Uni of John Deere**
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16	692,72	US	Rochester Institute of Technology

Competitiveness of FS Eifel ➔ **1**

Thought Experiment

Teams

Thought Experiment

Point Distribution of FS Eifel

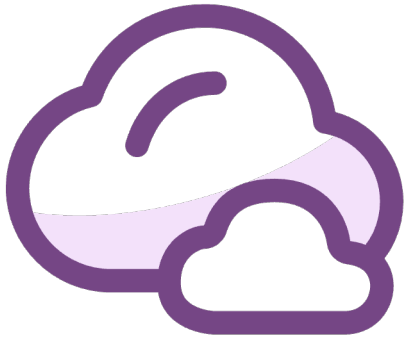
Cost	BP	ED	SP	DV SP	Acc	DV Acc	AutoX	Endu	Eff
700	0	0	100	0	100	0	0	100	0

Thought Experiment

Goal

Goal

Give the best possible estimation of the performane of each team compared to all other teams in the world



What are the main Goals for a FS World Ranking List?

Goal

- Fair comparison between the team performances
  - Asses according to common performance standard
- Meaningfull Score
  - Score can be interpreted by the community
- Asses team performance
  - Asses performance over one season
- Find the balance between beeing too volatile and too constant

Formula

Existing Solutions

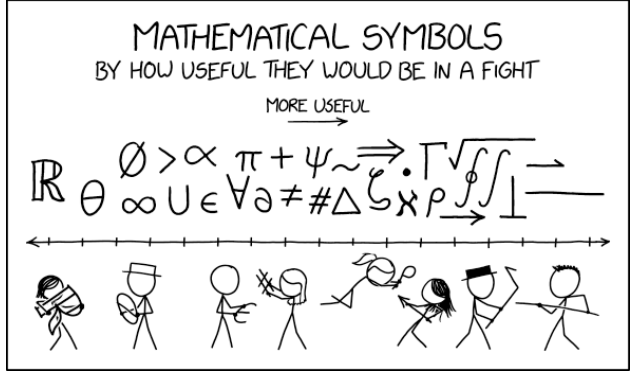
Current Rankings

	TEAM	hide legacy teams	ELO RATING	COMPETITIONS
1	CH ETH Zürich		2254	54
2	AT Fachhochschule Joanneum Graz		2207	13
3	IT Politecnico di Milano		2176	18
4	DE Universität Stuttgart		2158	51
5	DE Technical University of Munich		2147	45
6	DE Duale Hochschule Baden-Württemberg Stuttgart		2133	34
7	NL TU Delft		2130	39
8	CZ Czech Technical University in Prague		2122	33
9	NO Norwegian University of Science and Technology		2118	28
10	EE Tallinn TU UAS		2117	39
11	DE Rheinisch-Westfälische Technische Hochschule Aachen		2113	31
12	DE Hochschule Esslingen		2097	32
13	SE Chalmers University of Technology		2087	16
14	DE Ostbayerische Technische Hochschule Amberg-Weiden (OTH)		2074	31
15	AT Leopold-Franzens-Universität Innsbruck		2054	13
16	CA École Polytechnique de Montréal		2006	10
17	US Georgia Institute of Technology		1999	5
18	DE Technische Universität Berlin		1996	23
19	AT Technische Universität Wien		1987	33
20	DE Karlsruhe Institute of Technology		1982	45
21	US San José State University		1981	7
22	AT Technische Universität Graz		1971	24
23	AU Monash University		1969	12
24	US Rochester Institute of Technology		1965	3

Existing Solutions

Explanation Speed

Proposal for WRL Formula



xkcd.com

$$p_{WRL} = \sum_{d \in D} \sum_{s=1}^{3} \omega_s \frac{1}{|K_d|} \sum_{k \in K_d} c_k \, \mathrm{norm}(p_{k,d})$$

with

p_{WRL} - Points of team in World Ranking List

$p_{k,d}$ - Points in discipline d at competition k

D - Set of all disciplines in Formula Student

s - season

ω_s - normalized season weight

K_d - (Sub)set of competitions which are taken into account for discipline d

c_k - competitiveness of competition k

$\mathrm{norm}(x)$ - function to normalize raw discipline score

Proposal for WRL Formula

Sum over all Disciplines

$$p_{WRL} = \sum_{d \in D} \sum_{s=1}^{3} \omega_s \frac{1}{|K_d|} \sum_{k \in K_d} c_k \, \mathrm{norm}(p_{k,d})$$

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Proposal for WRL Formula

$$p_{WRL} = \underbrace{\sum_{d \in D} \sum_{s=1}^{3} \omega_s \frac{1}{|K_d|} \sum_{k \in K_d} c_k \, \mathrm{norm}(p_{k,d})}_{\text{One Discipline}}$$

Sum over all Disciplines

with

p_{WRL} - Points of team in World Ranking List
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Proposal for WRL Formula

Sum over 3 seasons

Sum over all Disciplines

$$p_{WRL} = \sum_{d \in D} \sum_{s=1}^{3} \omega_s \frac{1}{|K_d|} \sum_{k \in K_d} c_k \, \mathrm{norm}(p_{k,d})$$

with

p_{WRL} - Points of team in World Ranking List

$p_{k,d}$ - Points in discipline d at competition k

D - Set of all disciplines in Formula Student

s - season

ω_s - normalized season weight → $\omega_s = \frac{4}{7}\left[1 \quad \frac{1}{2} \quad \frac{1}{4}\right]$

K_d - (Sub)set of competitions which are taken into account for discipline d

c_k - competitiveness of competition k

$\mathrm{norm}(x)$ - function to normalize raw discipline score

Proposal for WRL Formula

Sum over 3 seasons

Mean over event results

Sum over all Disciplines

$$p_{WRL} = \sum_{d \in D} \sum_{s=1}^{3} \omega_s \frac{1}{|K_d|} \sum_{k \in K_d} c_k \, \mathrm{norm}(p_{k,d})$$

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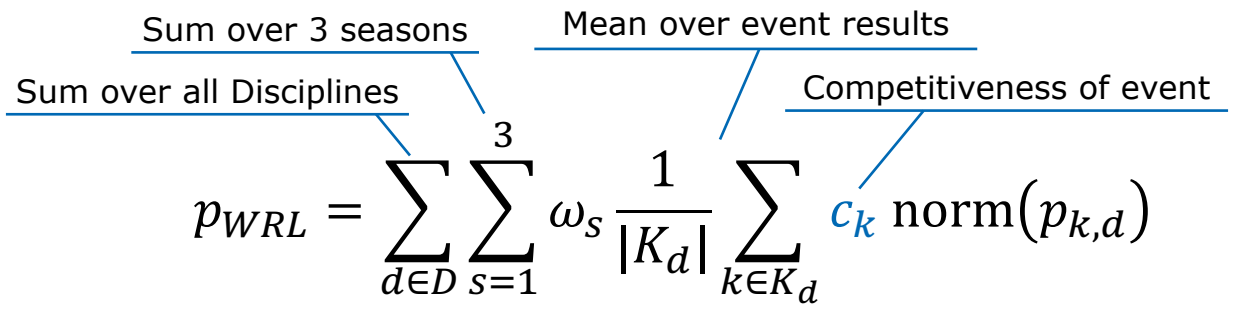
Proposal for WRL Formula



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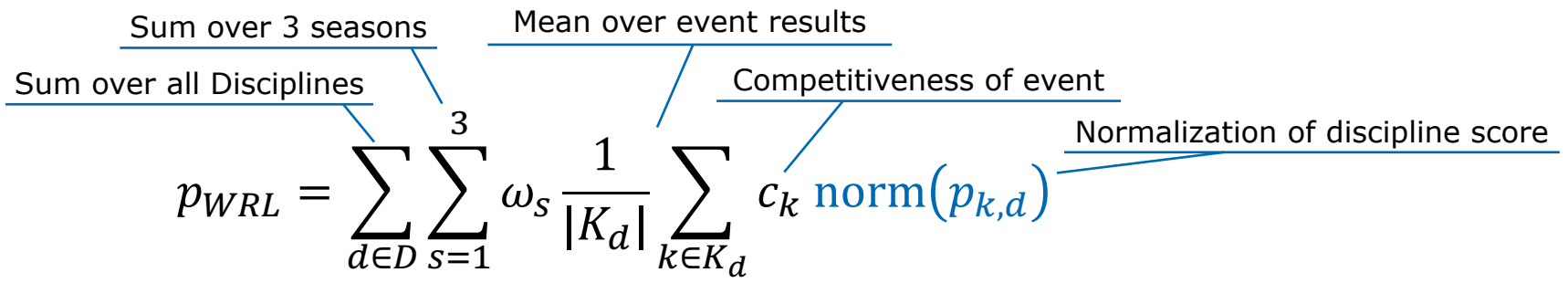

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Proposal for WRL Formula

Sum over 3 seasons

Mean over event results

Sum over all Disciplines

Competitiveness of event

Normalization of discipline score

$$p_{WRL} = \sum_{d \in D} \sum_{s=1}^{3} \omega_s \frac{1}{|K_d|} \sum_{k \in K_d} c_k \, \mathrm{norm}(p_{k,d})$$

with

$$\mathrm{norm}(p_{k,d}) = \max(p_{k,d}, 0) \frac{\bar{p}_{r,d}}{\bar{p}_{k,d}}$$

$p_{k,d}$ - Points in discipline d at competition k

$\bar{p}_{k,d}$ - Max possible points in discipline d at competition k

$\bar{p}_{r,d}$ - Max possible points in discipline d according to FS Rules

Competitiveness

$$c_k = \frac{\sum_{T_k} con_{T_k} \cdot p_{WRL}(T_k)}{\sum_{T_w} con_{T_w} \cdot p_{WRL}(T_w)}$$

with

con - Connectivity of team

p_{WRL} - points in World Ranking List

T_k - Set of top teams in competition k such that $\sum_{T_k} con_{T_k} = 3$

T_w - Set of top teams in World Ranking list such that $\sum_{T_w} con_{T_w} = 3$

➔ Competitiveness is similar to old competitiveness, but teams are scaled according to their connectivity

➔ No limiting of the competitiveness like in old formula

Competitiveness

$$c_k = \frac{\sum_{T_k} con_{T_k} \cdot p_{WRL}(T_k)}{\sum_{T_w} con_{T_w} \cdot p_{WRL}(T_w)}$$

with

con - Connectivity of team

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T_k - Set of top teams in competition k such that $\sum_{T_k} con_{T_k} = 3$

T_w - Set of top teams in World Ranking list such that $\sum_{T_w} con_{T_w} = 3$

If sum of connectivity of all teams in an event is $\sum con < 3$, the competitiveness will be computed over the available sum of connectivity, but at least over $\sum con = 1$

➔ Competitiveness is similar to old competitiveness, but teams are scaled according to their connectivity

➔ No limiting of the competitiveness like in old formula

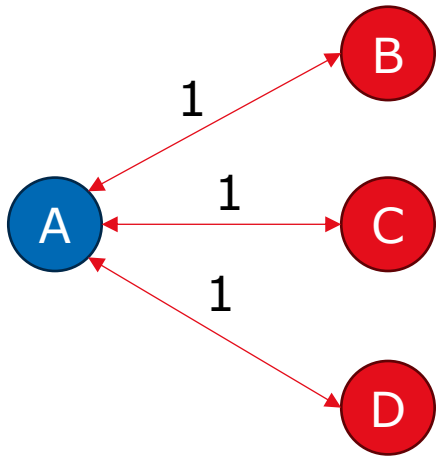
Connectivity

- A team which directly competed with all other teams in the WRL* ➔ Connectivity: $con = 1$
- A team which indirectly competed with all other teams in the WRL* ➔ Connectivity: $con = 0.1$
- A team which double indirectly competed with all other teams in the WRL* ➔ Connectivity: $con = 0.01$

- At maximum three hops (double indirect) are considered

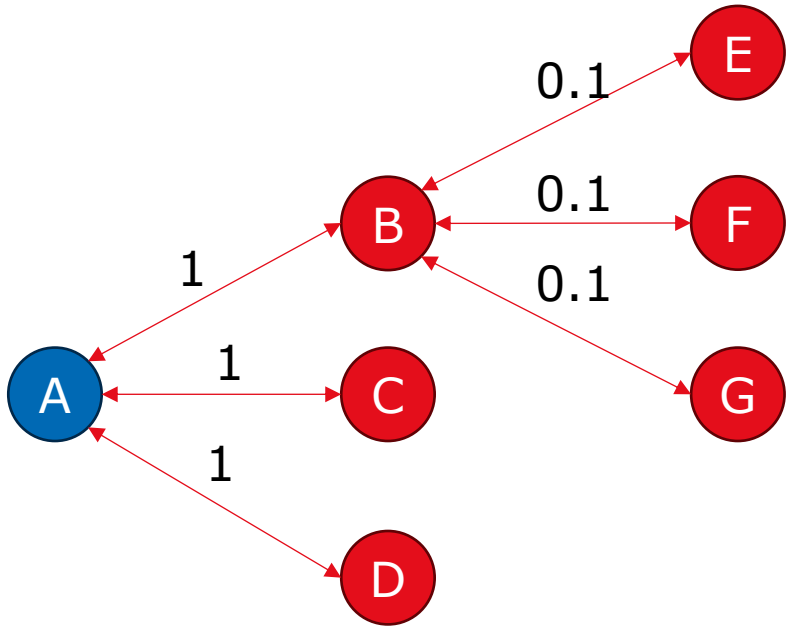
* Teams which have >0pts in all static disciplines and >0pts in the endurance in WRL

Connectivity



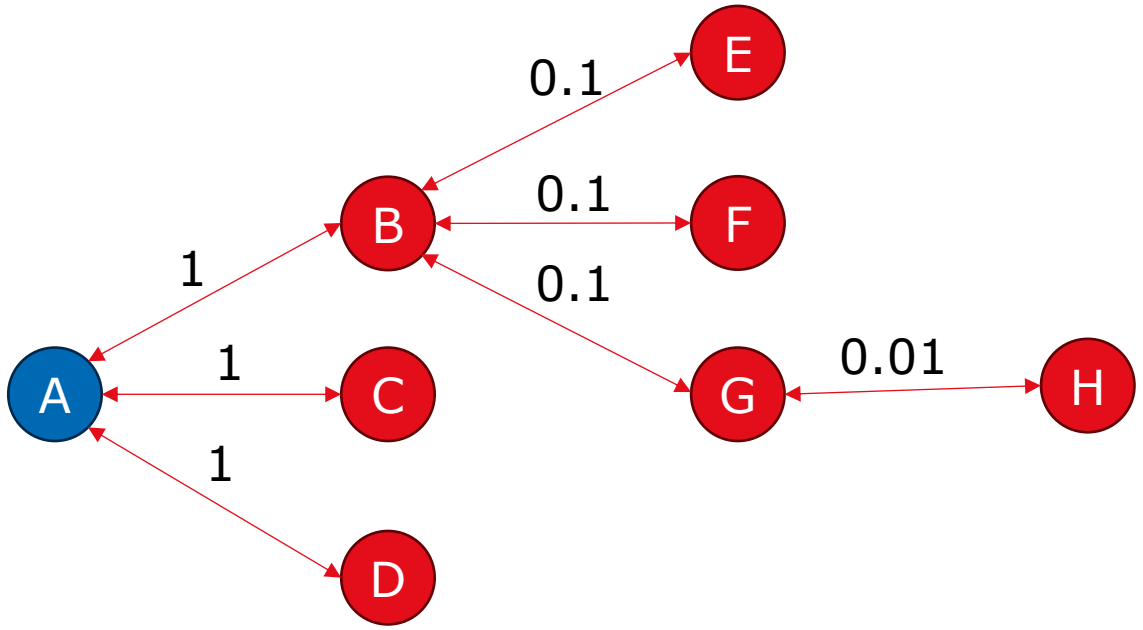
Connectivity: $con_A = \frac{1}{3}(1 + 1 + 1) = 1$

Connectivity



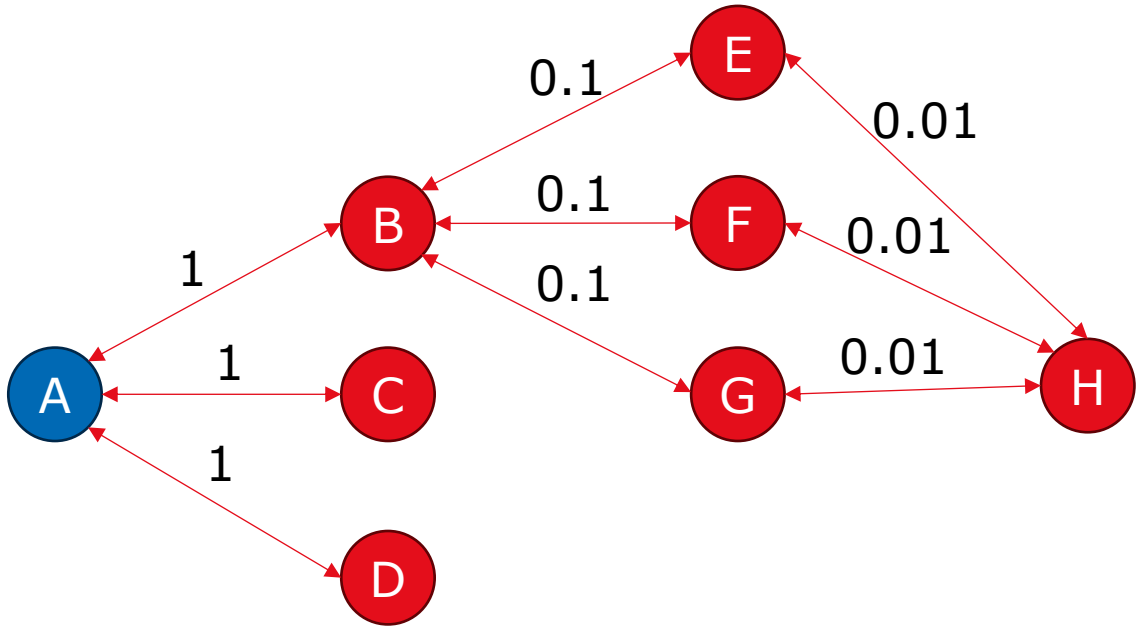
Connectivity: $con_A = \frac{1}{6}(3 \cdot 1 + 3 \cdot 0.1) = \frac{3.3}{6} = 0.55$

Connectivity



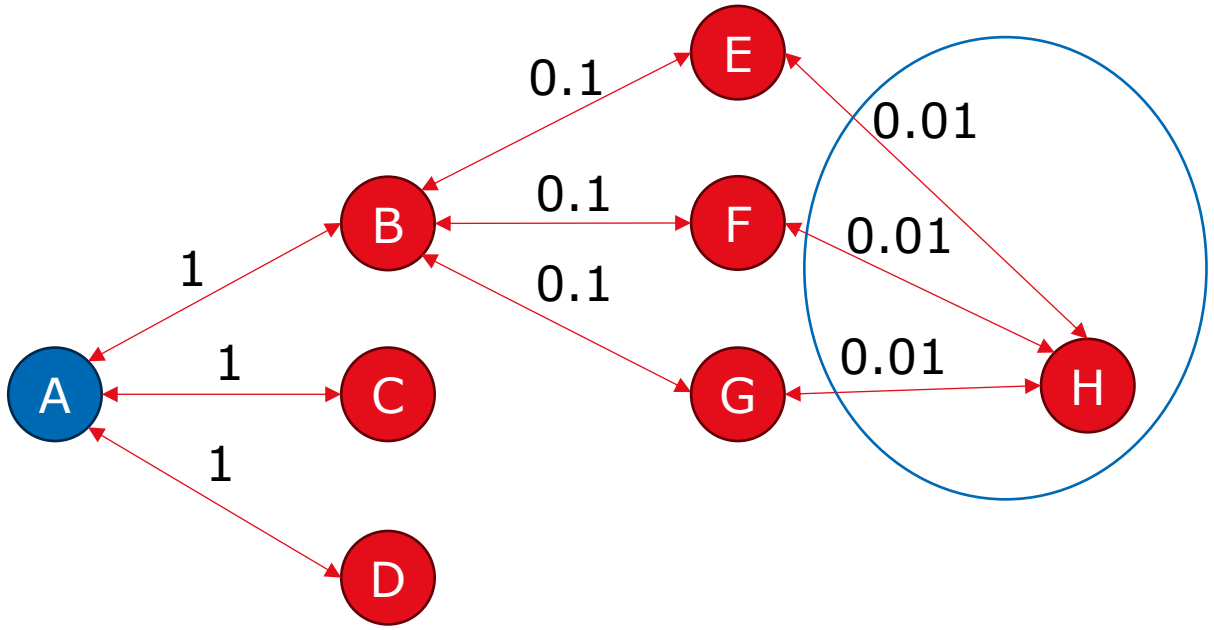
Connectivity: $con_A = \frac{1}{6}(3 \cdot 1 + 3 \cdot 0.1 + 1 \cdot 0.01) = \frac{3.31}{7} \approx 0{,}473$

Connectivity



Connectivity: $con_A = \frac{1}{6}(3 \cdot 1 + 3 \cdot 0.1 + 3 \cdot 0.01) = \frac{3.33}{7} \approx 0{,}476$

Connectivity

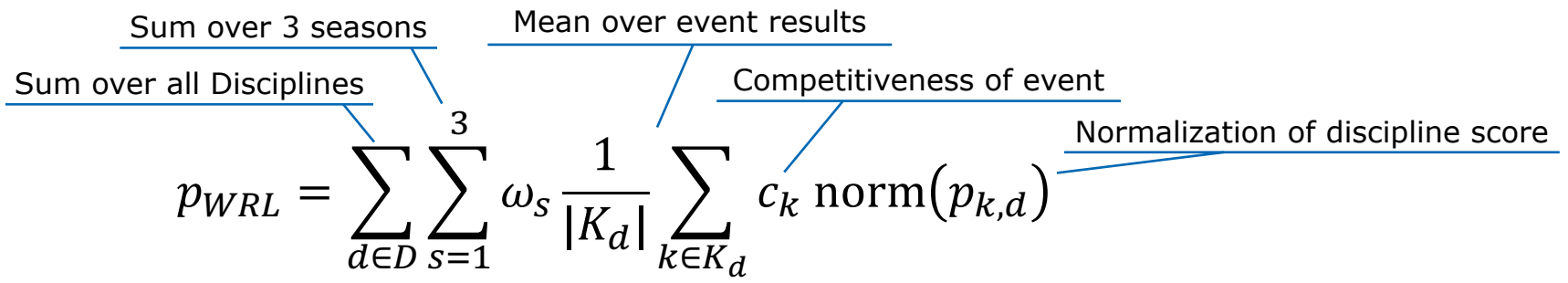


Connectivity Weight A⇔H = 0.03

The connectivity weight cannot be higher than the weight of the next lower level.
Here A⇔H = $0.03 \leq^{!} 0.1$

Connectivity: $con_A = \frac{1}{6}(3 \cdot 1 + 3 \cdot 0.1 + 3 \cdot 0.01) = \frac{3.33}{7} \approx 0{,}476$

Proposal for WRL Formula



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Proposal for WRL Formula

Sum over 3 seasons
Mean over event results
Sum over all Disciplines
Competitiveness of event
Normalization of discipline score

$$p_{WRL} = \sum_{d \in D} \sum_{s=1}^{3} \omega_s \frac{1}{|K_d|} \sum_{k \in K_d} c_k \, \mathrm{norm}(p_{k,d})$$

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Subset K_d

- Use events that scored the discipline
- If there are more than two discipline scores:
  - Uset the two discipline scores of the competition with the highest competitiveness
  - Only use those remaining competitions, where the team could have improved the WRL event score. I.e. $c_k \cdot \bar{p}_{r,d} > p_{WRL,d}$ without the competition k

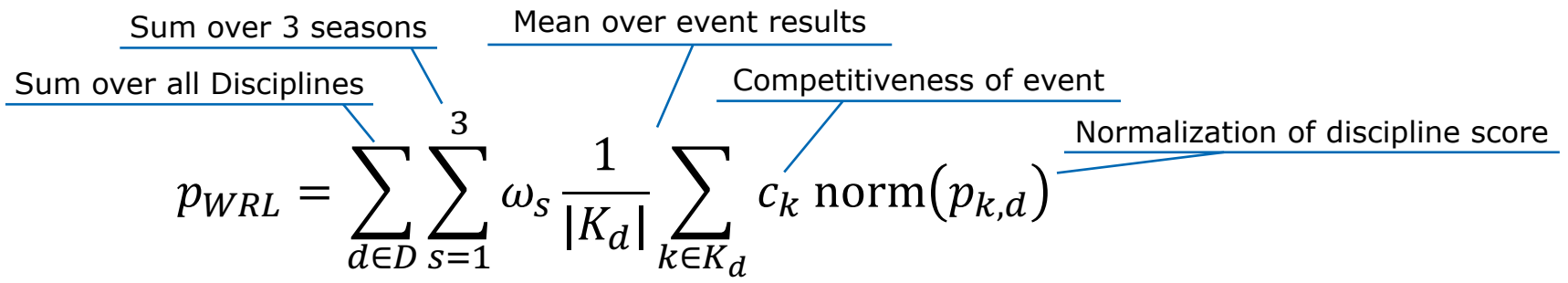
with

c_k - competitiveness of competition k

$\bar{p}_{r,d}$ - Max possible points in discipline d

$p_{WRL,d}$ - WRL points in discipline d

Proposal for WRL Formula



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Goal

Sum over 3 seasons

Mean over event results of Season

Sum over all Disciplines

Competitiveness of event

Normalization of discipline score

$$p_{WRL} = \sum_{d \in D} \sum_{s=1}^{3} \omega_s \frac{1}{|K_d|} \sum_{k \in K_d} c_k \, \mathrm{norm}(p_{k,d})$$

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Contact

Feedback, questions, help:

wrl@fs-world.org

$$p_{WRL} = \sum_{d \in D} \sum_{s=1}^{3} \omega_s \frac{1}{|K_d|} \sum_{k \in K_d} c_k \, \mathrm{norm}\left(p_{k,d}\right)$$