

# Pro-Am Allocator Algorithm + Cost Function

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## Objective Function (3v3)

Each speaker is assigned a number in the range  $[1, n]$  where  $n$  is the number of speakers.

**Minimise:**

$$\sum_{i=1}^n \sum_{j=1}^n \sum_{k=1}^n c_{abc} x_{ijk}$$

**Subject to:**

- $x_{ijk} = 1$  if speakers  $i, j$  and  $k$  are matched together, 0 otherwise
- $c_{ijk} = 10^4 v_{ijk} + 10^3 p_{ijk} + 10^2 s_{ijk} + \infty e_{ijk} + \infty w_{ijk}$ 
  - $v_{ijk} = 1$  if the team is all-novice, 0 otherwise
  - $p_{ijk} = z$  where  $z$  is the number of times each speaker has preferences another speaker in the team<sup>1</sup>
  - $s_{ijk} = 2^y$  where  $y$  is the number of novices without a debating background
  - $e_{ijk} = 1$  if the team contains a member which another member conflicted, 0 otherwise
  - $w_{ijk} = 1$  if an all-novice team has a dummy ‘swing speaker’ slot, 0 otherwise
- No team may contain more than 1 pro.

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<sup>1</sup>For example, if one speaker preferences another,  $z = 1$ . However, if those two speakers cross-preference each other,  $z = 2$ .