G A P 2000

User guide to the International Scoring System

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GAP scoring was developed for CIVL by

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The idea was to get a fair scoring easily adaptable to any competition everywhere in the world, both for hang gliding and paragliding, with a philosophy that is easy for the pilot to understand, regardless of the mathematical complexity.

You can download the RACE2000 scoring program from: www.fai.org/hang_gliding/race

To compare different tasks within the competition and to adapt the scoring to hang gliders or paragliders, different flying sites, pilot's level and task philosophy, before the competition the meet director sets some parameters.

NOMINATION BY ORGANISER

Nominal Distance**: the minimum task distance that should be worth 1000 points. (In the Alps, for hang gliding competition is suggested 50-70 km, for paragliding 30-50 km). If a task distance is less than the Nominal Distance, the day will be probably de-valued. There is no penalty for a task that is longer than the Nominal Distance as long as the task results in an even distribution of the pilots along the course. There would also be no penalty if the Nominal Distance parameter was set shorter, as long as it would take a reasonable length of time for the pilots to fly this distance. What constitutes a "reasonable length of time" is explained further down the page.**

Minimum Distance**: the distance awarded to every pilot who takes off. It is the distance below which it is useless to measure pilot's performance. This distance should be at least one tenth of the Nominal Distance. (In the Alps for hang gliding or paragliding competitions 8-10km is suggested). The minimum distance is there so that pilots who are about to "bomb out" will not be tempted to fly into the next paddock to get past a group of pilots. It is not in the interests of safety, retrieval or landowners to encourage pilots to try to stretch their flight when they clearly have been beaten on the day by either poor weather or a poor flight.**

Nominal Goal **%: the percentage of pilots in goal the meet director would wish to have in a well-chosen task. (For National competitions it is suggested to use 20-30%)**

Nominal Time: equivalent in time to Nominal Distance. It is the fastest elapsed time, below which the task should be devalued. It can be considered as the time necessary for the fastest pilot to fly the Nominal Distance. (In the Alps for national competitions, it is generally suggested 2 hours). There is no penalty for having the fastest pilot take longer to complete the task. Nominal time is also a consideration in the departure bonus (see the departure bonus section)

Nominal Distribution is a direct consequence of the first three parameters and the maximum distance flown on the task. This is represented on the distance validity graph.

Keep in mind: that to get a fair competition task, you should normally have pilots in goal and pilots need to be in the air for a period of time so that the competitors make a series of different decisions, thereby sorting out the best pilots from the good ones.
If a pilot reaches goal with two thermals, then this is not necessarily a good test of skill. This task may have a tailwind and a high cloud base and therefore could be maybe, 100 km long (or it could just be a short task). In this case the fastest time can still be short and the day will be de-valued because of the **Nominal Time** factor. In this case there was not much scope for the pilots to make decisions and the day was not such a fair test of skill.
It is important to remember that it is mainly time in the air (to make decisions about the flight) that separates different levels of pilot skill. Set tasks that will take a reasonable amount of time to complete and have no difficult part at the beginning. A good task will have pilots making many decisions in the air, and the pilots who do not reach the goal would be landing evenly along the course.

How to chose the parameters:

The Nominal Distance is the minimum distance that would still result in a good task worth 1000 points. The Nominal Distance ties in with Nominal Time, and these two parameters need to be considered together.

If a task distance is less than the Nominal Distance, the day will probably be de-valued. There is no penalty for a task to be set that is longer than the Nominal Distance as long as the task results in an even distribution of the pilots along the course.

The suggested distances are not mandatory, as what makes a good minimum task length depends on the terrain, the weather that would normally be expected for the duration of the competition, and the level of skill that you would expect from the pilots in the competition.

Minimum Distance is the distance that, generally, a normal pilot will easily achieve, for example climbing over takeoff and gliding down. It shall not be less than 1/10 of Nominal Distance.

Nominal Goal % depends on the philosophy of the competition: for example, if it's a pure free distance competition where there are no goals, it should be set to 0%. While if it's a pure race competition where it's expected to have everybody in goal everyday, it could be set to 100%.

Of course these parameters could not be changed during the competition and are extremely important to get correct results. BE CAREFUL !

Day Quality

Day Quality varies between 0 and 1 and measures how suitable a competition day is to evaluate pilot's skill. It is obtained by multiplying the three validity coefficients. Launch Validity, Distance Validity and Time Validity

Launch Validity
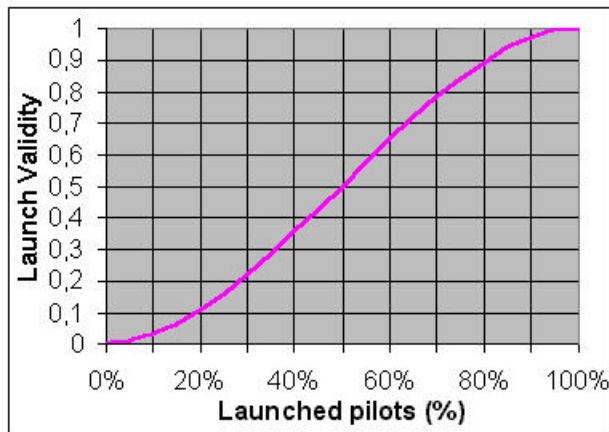
Coefficient depending from the percentage of pilots actually present in takeoff who launched.

If everybody launches Launch Validity is 1 while if only 20% of the pilots present in takeoff launches it's about 0.1

Launch conditions may be dangerous, or otherwise unfavourable. If a significant number of pilots at launch think that the day is not worth the risk of launching, then the gung-ho pilots who did go will not get so many points. This is there as a safety mechanism.

Distance Validity
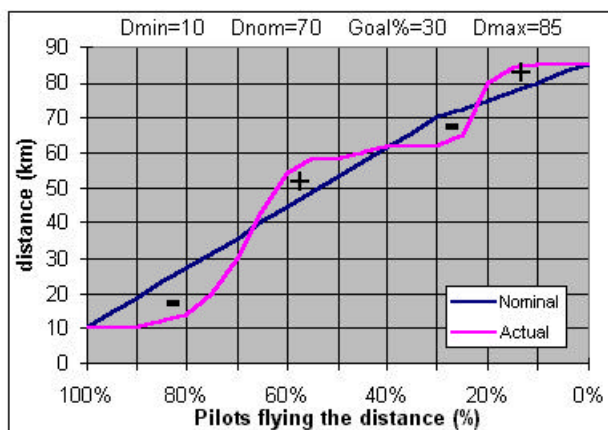
Coefficient depending from the ratio between Actual Distribution of pilots along the course and the Nominal Distribution.

The plus areas increase Distance Validity (max =1) while the minus areas decrease the value.

If there is an inconsistent distribution of the pilots along the course (for example many pilots bombed out, or there was an area of poor lift somewhere on the task) it means the day was inconsistent and luck could have played a major factor in the results. In this case the day will be devalued to give good pilots the possibility to catch up.

Keep in mind: If you set tasks that are longer than the nominal distance, the day will not be de-valued because of **Distance Validity** if less than the nominated % reach the goal, as long as a fair percentage of pilots fly a good distance. This sounds like a vague statement, but the task setter should be trying to set tasks that are reasonable for the day and for the pilots to do. If everyone lands in goal you must ask if this was a valid test of skill (it probably was if the fastest time and the distance flown were reasonably long). If everyone lands short of goal, was it an unsuitable task but still a good test of pilot skill? You also can have the case where a task that is shorter than the **Nominal Distance,** has a **Distance Validity** of 1. This will happen when a large percentage of the pilots fly a large percentage of the course but in this case you still have a practical devaluation because there is little spreading between the scores.

Time Validity
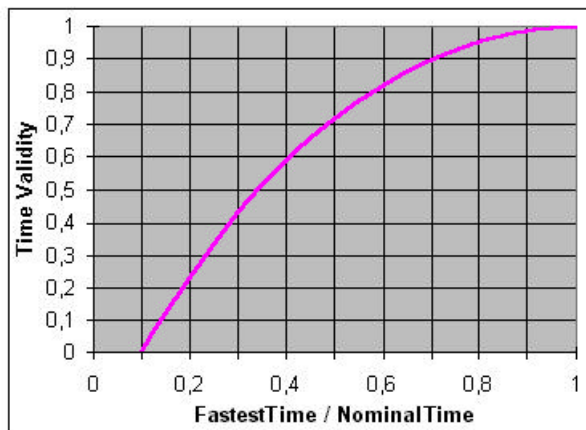
Coefficient depending from the Nominal Time and the fastest elapsed time.

If the Fastest Time is longer than Nominal Time, then Time Validity is always equal to 1.

If the fastest time is short the day is not a good measure of pilot skill because there would not be many decisions to make and, because of this, luck can distort scores as there will be little possibility to recover any loss of time.

Keep in mind:

There needs to be reasonable parameters set and the task setter needs to set reasonable tasks to get a good and fair competition!

Points Allocation

The available points for each task (1000*DayQuality) are allocated to Distance Points, Speed Points, Departure Points, Arrival Points, using a function of the percentage of pilots in goal (within the Zero Score Time Limit) compared to launched pilots.

GAP2000 Points Allocation
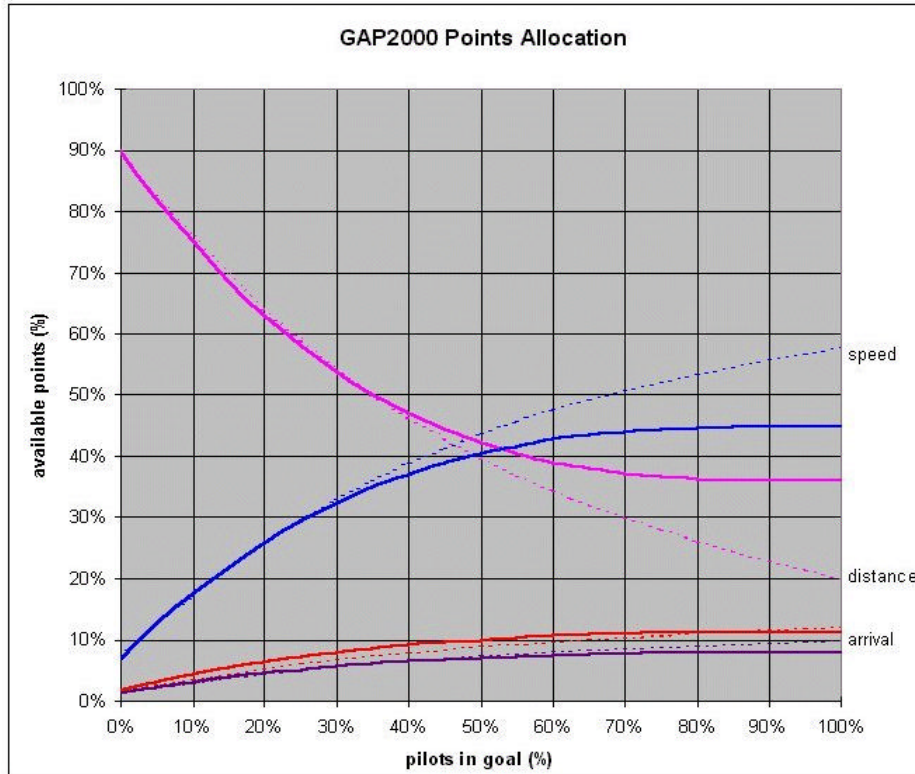
Out of the total of 1000 points that are available for a full value task, if 25% of launched pilots made goal, there are available approximately:

582	Distance points
93	Speed points
73	Departure points
52	Arrival points

If nobody gets goal there are a maximum of 900 points available for distance.

Compared to GAP98 (dotted lines) there is practically no difference up to 40% of pilots in goal except more points for Departure and only the pilots with speed points are considered to calculate the percentage of pilots in goal. This modification was made because a fast pilot who lands just before the goal line was penalised extremely heavily on days where most of the competition field made the goal. Fast pilots are at risk in this situation because they must calculate their final glide to goal in such a fashion that they need may to risk landing short in order to be fast.

For the same reason the organisers now have the possibility to put the "Finish line" and the "Goal Line" in two different places (reasonably a couple km apart): who crosses the Finish Line gets the "Time" points (speed + departure + arrival) he deserves but if he does not cross the Goal Line he will be penalised by 20% of his own Time points.

This way a fast pilot will always try to get the Goal Line because he doesn't want to lose 20% of his Time points but, if he misses it, he will only lose 20% of his Time points instead of all Time points like it is right now.

This new option will increase both safety (especially with Paragliders) and fairness.

Keep in mind: That if a good task does not produce 1000 points, that does not matter as long as there is a reasonable spread of points in between pilots. On a good day there might be say 500 points separating a good pilot and an average one. A day that has a small spread of points between pilots will have less weight towards the final scores. To find out the importance of a task do not look at the winner score or the Day Quality coefficient: what really counts is the spreading between pilots scores i.e. the Task Weight Coefficient.

Pilot Distance Score

One half of the available distance points are assigned to the pilots linearly with the distance flown while the other half is assigned taking into consideration the difficulty of the kilometres flown.

To measure the relative difficulty of each kilometre we consider the number of pilots landed in the successive few kilometres.

With this system each km has a different value depending on the relative difficulty (for example upwind and downwind) but, nevertheless, it's easy for the pilot to judge this value because it depends from the number of pilots that will land in that area.

Graphical example:
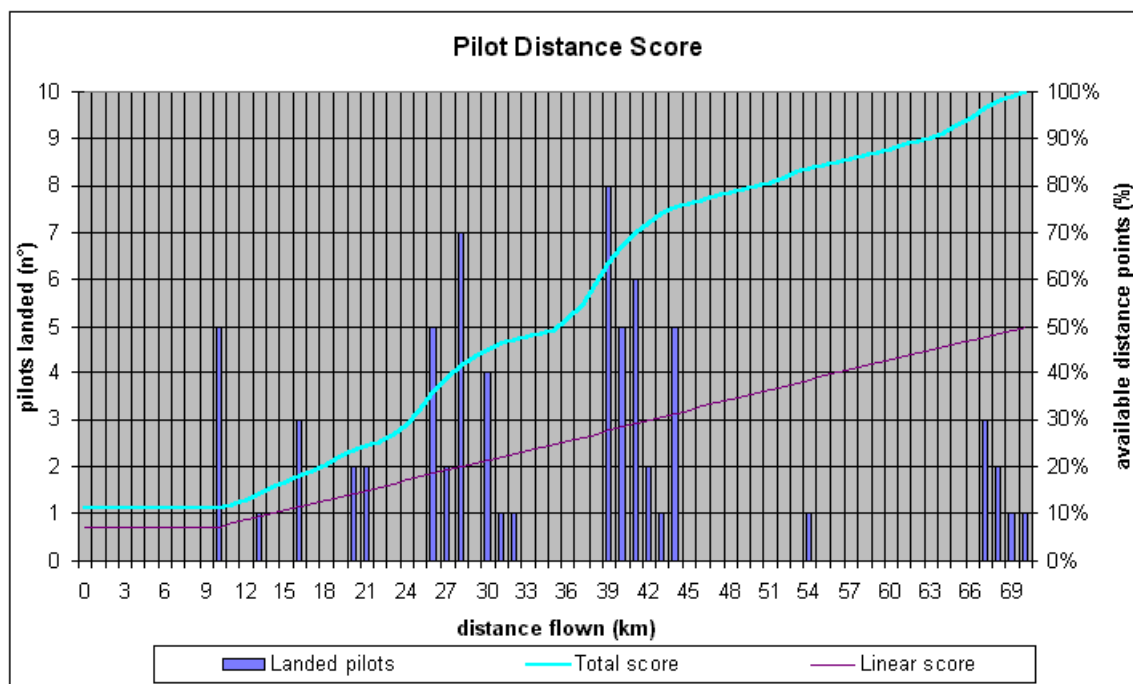
Note that the slope becomes steeper __before__ the area where more pilots landed and less steep just after.

There are two reasons for this: first, for safety (and retrieval) reasons, we do not want to encourage pilots to fly just after a group; second if you land somewhere probably it was difficult just before, then you glided a while before landing.

Keep in mind: If you are flying an easy part of the task, for example tailwind along a ridge, where nobody will land, you will get only half the points per kilometre compared to old linear scoring systems.

Pilot Speed Score

Speed points are assigned to the pilot with a function of Fastest Time and Pilot Time. Slow pilots will get zero points for speed if their elapsed time is longer than the Fastest Time plus the square root of the Fastest Time. (Times measured in hours)
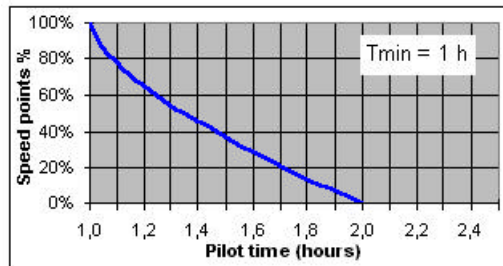
Examples:

Fastest Time = 1 hour

80%ScoreTime = 1:05

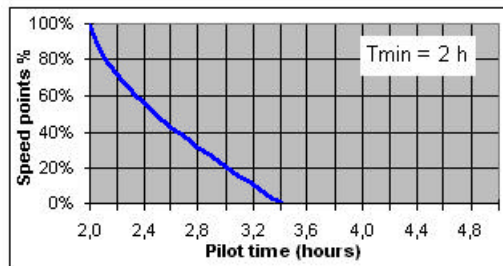**50%ScoreTime = 1:21**

Zero Score Time = 2 hours

Fastest Time = 2 hours

80%ScoreTime = 2:08

50%ScoreTime = 2:30
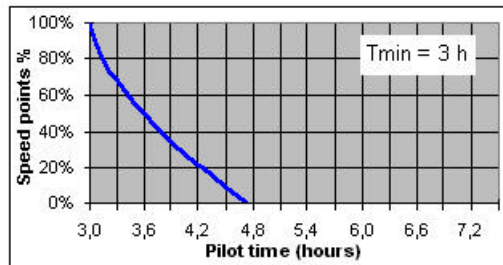
Zero Score Time = 3:24 (3.4 hours)

Fastest Time = 3 hours

80%ScoreTime = 3:09

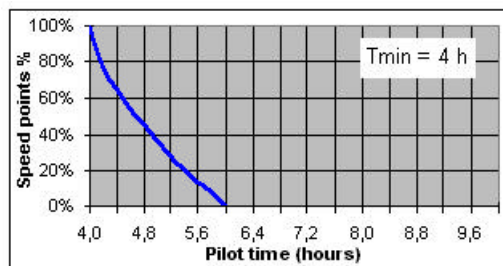**50%ScoreTime = 3:37**

Zero Score Time =4.42 (4.7 hours)

Fastest Time = 4hours

80%ScoreTime = 4:11

50%ScoreTime = 4:43

Zero Score Time = 6 hours

Keep in mind: that if the zero speed score ratio is fixed, in a short task, slow pilots will be more likely to get zero speed points and therefore there will be a group of pilots with the same (or very similar) points for the day. On a long task, those same pilots will run out of day and land before goal, hence getting rid of this evident anomaly.
The scoring system tries to overcome this problem but it is important to set tasks that require the pilots to be in the air for a reasonable amount of time.
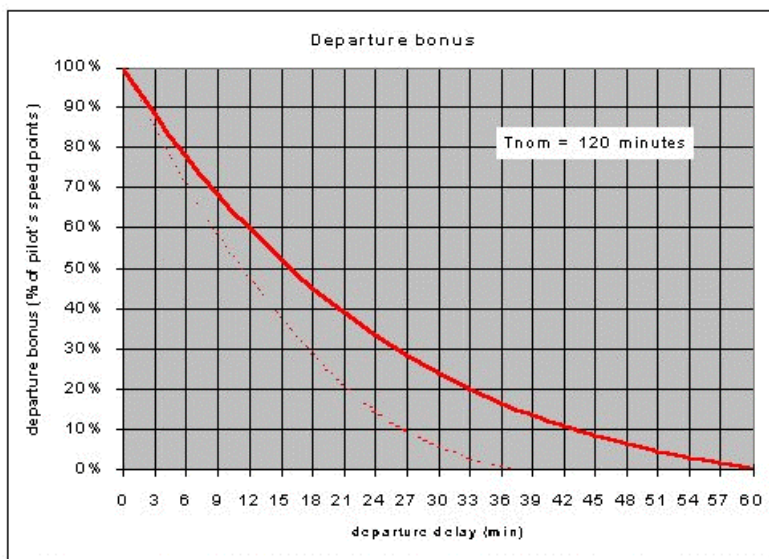
Pilot Departure Bonus

Known as the "early bird bonus" but better defined as the "leading bonus" is provided to encourage fast pilots to take off early and rewards the risk involved in being in the leading group.

The maximum available points for each pilot are 1/4th of his <u>own speed points</u> (it was about 1/5th with GAP98) and are fully awarded to the first pilot who launches and also makes goal. Pilots not making goal are not considered for the departure bonus. If the departure delay (the time difference in between the start time of a pilot and the earlier start time between pilots in goal) is bigger than 1/2 Nominal Time, the departure bonus is zero (with GAP98 it was 1/3 as is shown by the dotted line).

The other pilots will score accordingly to their speed points and their departure delay after the first pilot launched that made goal.

A fast pilot will get more departure points than a slow pilot taking off at the same time because he was probably leading for a longer time.

Example with **Nominal Time** = 120 minutes (2 hours)

A pilot that launches with a departure delay of 1/10 of the **Nominal Time** will get a departure bonus of 0,60/4 of his own speed points (with GAP98 was about 0,47/5).

What is being achieved is that fast pilots will get more points if they take off early, because they will stay in front for more time, and then collect an arrival bonus as well.

Keep in mind: <u>Departure points are a percentage of your own speed points</u>.
If all the pilots start at the same time like in a pure race, departure points will still be different, because the fast pilots (who will get more arrival points as well in this case) will have <u>the same percentage of a higher number of points</u>.
You could say that in tasks with a single start time for all pilots, speed points are effectively increased.
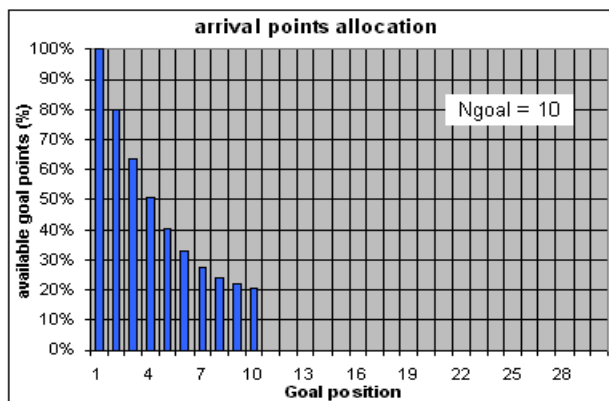
Pilot Arrival Bonus

The Arrival Bonus is provided to reward pilots for racing to goal and is a pure position score, which considers the arrival position in goal.

The first pilot in goal gets the maximum available Arrival Points, the others get points accordingly to their arrival position regardless of time delay. The last pilot in goal will get a minimum of 20% of the available arrival points.
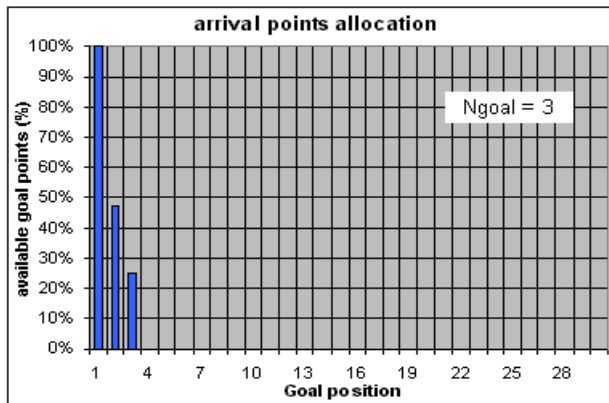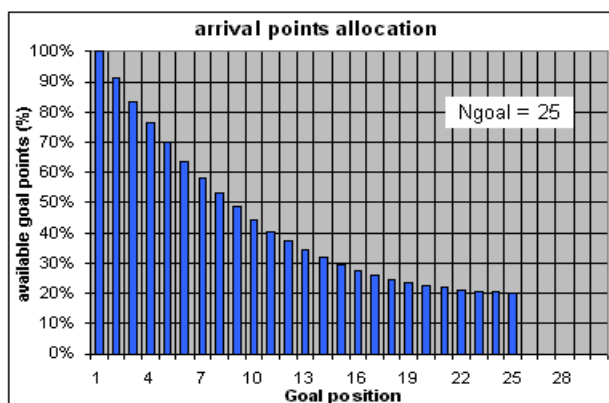

example:

3 pilots in goal

example:

10 pilots in goal

example:

25 pilots in goal

Keep in mind: The departure and arrival bonus system is there to reward the pilot who leads out. If you lead out, you make decisions yourself, and you take more risks of bombing out or being slower. If you follow other pilots, you might get to goal with a fast time, but your points will be less than the pilot who flew with the same time (or maybe a slightly slower time) but who flew in front of you.

The GAP formulas are designed to reward the pilot who makes the decisions.

Summary

Pilot Score is, of course, the sum of Distance Points plus Speed Points plus Departure Bonus and Arrival Bonus ... and the best pilot wins!

The GAP scoring system rewards the pilot which takes his own decision and stays in front of the others. Waiting on takeoff for the others pilots to fly, then follow to go safer and faster, is a less valuable tactic with this scoring.
With previous scoring systems the best tactic to recover on your opponent was to start a few minutes after him, then catch him. His best tactic was to wait for you and fly with you. Everybody was always waiting on takeoff because both had to follow the same tactic!
With this scoring system a good tactic to recover points to your opponents is to start early and fly fast. This way you force your opponents to take the risk of being an early bird with you, or wait for more pilots to be in the air for safer (scoringwise) flying.

With GAP scoring, even if the day quality is 1, the winner will automatically get 1000 points only if the task is a "race to goal". In an elapsed time task, the winner gets 1000 points only if he is the fastest one and the first one to launch between the pilots that make goal. If nobody reaches goal the maximum available points are 900.

Note that, if DayQuality=1, even if the winner does not take 1000 points, it's still a full value day because, although the winner has not gained as many points as he could have, it does not influence other pilot's score.
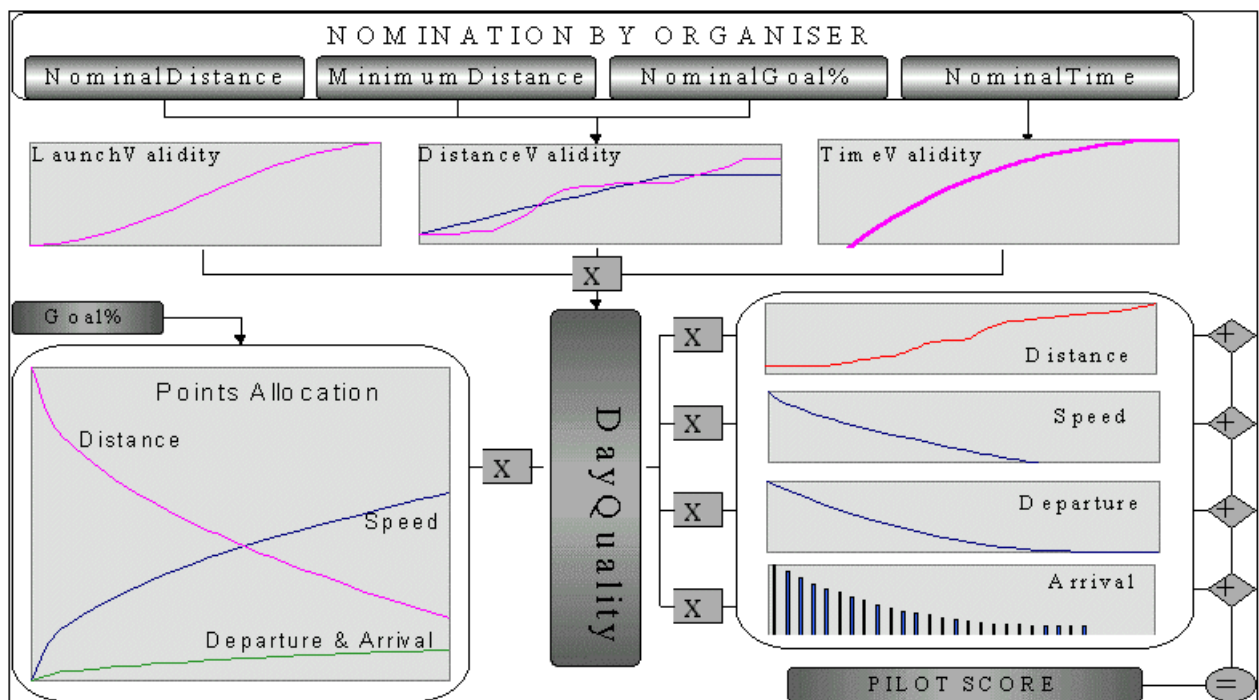
Nice flying,

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