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## Q&A with James Vowles

James Vowles is the Chief Strategist at Mercedes-AMG Petronas Motorsport. He has been part of the team responsible for all racing decisions throughout the Team's four FIA Formula One™ Drivers' and Constructors' Championships. Having worked at Brackley since 2001, Vowles was also responsible for Brawn GP's race strategy, which was critical to the Team's championship-winning 2009 campaign.

### **TIBCO: What are the responsibilities of a strategist for a Formula One™ Team?**

**James Vowles:** Race strategy is not a task for one person anymore, as it was a long time ago. It's now a team of people with a mathematics or an engineering background that are able to look at a race, not just as a series of laps, but in a probabilistic manner. In other words, every decision that you make, every lap you complete, every bit of data that comes in has a probability attached to it, so you can understand whether or not you should be stopping this lap, who you're fighting, and what you should be telling the driver to do.

### **TIBCO: What does it mean to make a decision on this team?**

**JV:** We have a team of people on the pit wall and back at the factory, all providing and analyzing information during the race. As chief strategist, the final decision then generally rests with myself, and the decision can sometimes be made in a matter of milliseconds. I have a team of fantastic engineers working with me the whole way through in order to support me and provide the information we need. Now, we have a number of complex simulations and models that help us make the decision possible, but ultimately it's a human that makes the final call.

### **TIBCO: What outcomes do you look for?**

**JV:** In the world of strategy, you're looking for several different outcomes, depending on the situation. You have a scale of risk versus reward. We try and use all the data that's available to us to understand what is realistic, what we are fighting for, and what's the stretch goal, and make sure that we work within those confines. What goes wrong is when you push yourself just a bit too far; you stretch for something that's not realistic, and you fall as a result.

### **TIBCO: What challenges were you facing regarding the strategy team, your data environment, or data culture?**

**JV:** One big challenge that we face in the world of race strategy is that we have so much data coming in. We go to 21 tracks around the world and just because the data we've gathered at one track is useful doesn't mean we can even apply one-tenth of it to the following track. Every single track is different. But how do you take all of that data and understand what's really important, digest it, and carry it over to the following track? And that's the difficulty we face in the world of Formula One™.

**TIBCO: What kind of data are you looking at and how regular is it?**

**JV:** We record multiple channels of car data, sometimes logged such that we record the data at 10,000 times a second. So, it depends on what data we're looking at, both with our cars and those of our competitors, you'll gather everything you can — engine audio, video, GPS. There are probably close to 15 sources of information for your competitors, and you try and use all of that to build a picture of how you're doing and how they're doing.

**TIBCO: Is there a specific metric that you analyze for in the data?**

**JV:** There's no one single magic metric; it just doesn't exist, unfortunately. Our goal is to create systems that allow us to work towards that, to remove the human and get more from the processes. We are working towards that with the way that we break down data and construct data systems. But for now, we have something close to 50 or 60 key metrics that we're looking at continuously to understand how we're performing, what we need to change, what we need to adapt. What I love about our business is that failure is what actually drives you to improve. It's the failures that push you on, and using the data gives you the opportunity to understand where you went wrong and what you need to do better.

**TIBCO: What kinds of metrics does the strategy team really care about before and after a race?**

**JV:** The type of metrics used in race strategy are all of the inputs to the models. As an example, a driver. A driver is a human, and ultimately, they're very unpredictable as an entity, but you need to understand how good they are at overtaking, how good they are at defending, what happens in a pit stop, etc. You need models to consume all of this information to try and produce the most accurate simulations and understand what could happen in the race and how we should react at each point.

**TIBCO: It's important to generate an insight, but how important is the actual speed of generating the insight?**

**JV:** The speed of response as to how we get insight into the data is absolutely the first priority. Our races take place in a very short time scale relative to perhaps other companies. We have just a few hours to really consume gigabytes of data and understand and dissect it into minute details. Formula One™ is about what we call marginal gains, the small half-of-a-percent improvements that you need across the board. To get down to that level of detail, you need the right tools and systems that allow you insight into the real core of what you're looking for.

**TIBCO: Walk us through the process of how you turn a specific data analysis into an insight and then put that insight into action.**

**JV:** During the course of the weekend, we have a number of steps that allow us to do robust tests to understand where we are, where we're going, and what we need to do. The way a Formula One™ weekend is constructed is we have two one-and-a-half-hour sessions on Friday, and in those sessions we have a number of tests to complete. We have two cars but everything is changing around you; the wind's changing, the track's changing, the temperature's changing, the car's changing, and the driver is changing. He's human and just trying to adapt himself to the track. At the same time, we construct tests that allow us to just try and minimize the variability and understand the core parameters that we're looking for. We construct tests on a Friday to try and maximize the insight that we can get out of the data and then across the remainder of the weekend.

**TIBCO: How do you use predictive analytics to support your racing strategy?**

**JV:** Ultimately race strategy is just predictive analytics if you take a step back and think about it. What we're trying to do is predict an outcome from raw data going into it. And what we're looking for is, the better you tune that, the more you tune that, the better results we're going to get at the back end. Ultimately, we're here to win and to win you need to understand all of your data and understand what's important and what's not.

**TIBCO: How do you disseminate the insights that you get?**

**JV:** When we have data and we produce insights from it, small areas of interesting pockets of information, the consumers for that are both at a track, and at the factories. So, we have over 26 engineers looking at the data at the track and a further 20 back at the factory. And the consumers of that are specialists in a number of areas. We have experts in tires, experts in strategy, experts in optimization of the car, and ultimately the driver. And the driver is one of the largest consumers of this because they understand completely how that data relates to a feeling that they have in a car. And that, when you combine it, allows us to move forward.

**TIBCO: What's next for the strategy team?**

**JV:** We see areas that we can't quite effectively model what's about to happen in the race. And one of those key areas is what is going to happen if we change tires. Are we going to get past that car in front or are we going to be able to overtake him? If we are, how many laps will it take? Where will it be on track? And it's probability models that come out of that. Overtaking is a fantastic area. But those very small amounts of data, and it is a very unpredictable entity. The next steps for us are building systems and models around that in order to improve our understanding of it.



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