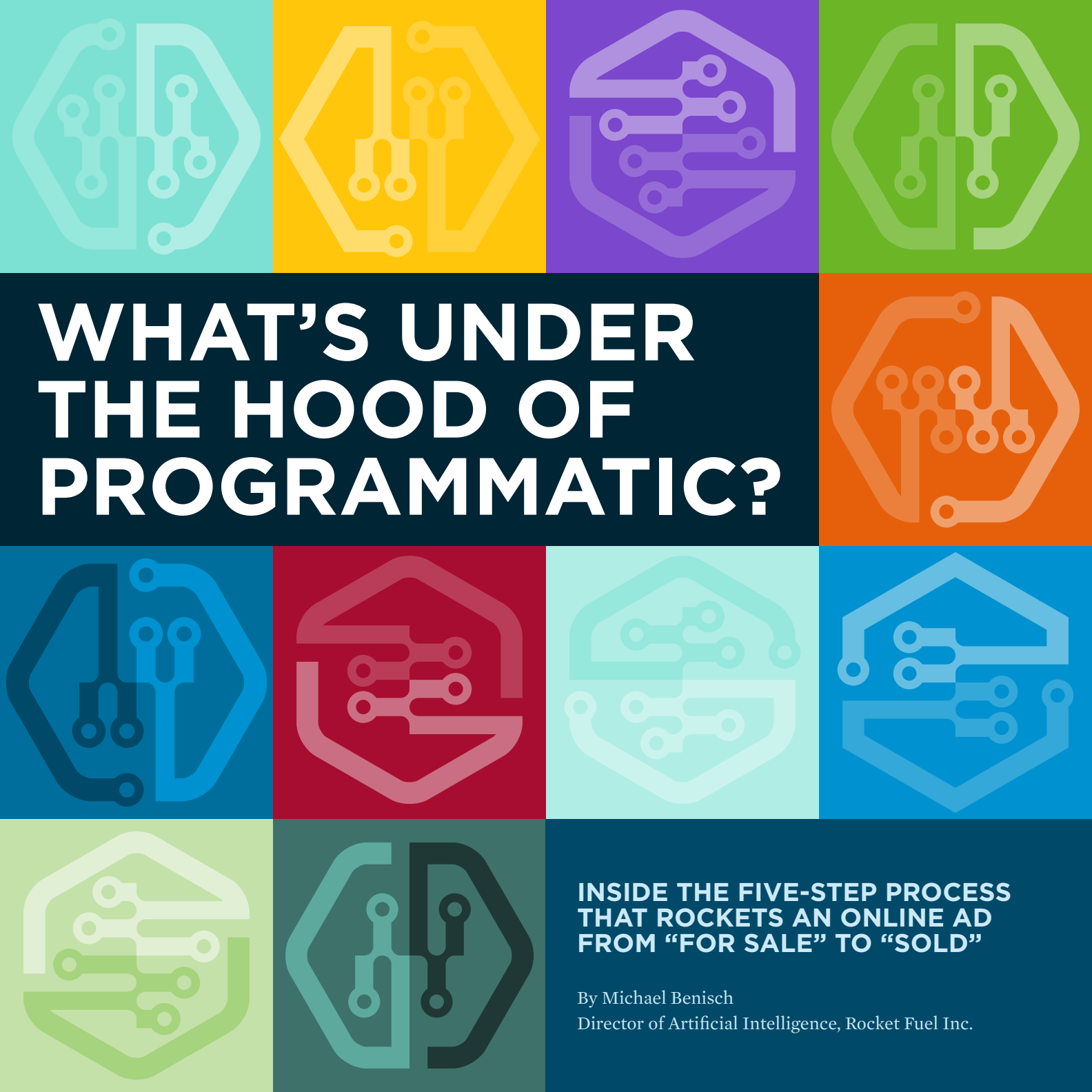


WHAT'S UNDER THE HOOD OF PROGRAMMATIC?

INSIDE THE FIVE-STEP PROCESS THAT ROCKETS AN ONLINE AD FROM "FOR SALE" TO "SOLD"

By Michael Benisch
Director of Artificial Intelligence, Rocket Fuel Inc.

WAY BACK IN THE 1990s,

understanding how digital advertising worked was as easy as popping open the hood of a 1972 Ford. All the parts were visible, and it was simple to see where they connected.

In fact, advertising deals were handmade to an almost shocking degree. The processes of ad buying and placement were handled by humans, and often conducted over the phone. Records of manual insertion orders, on paper, were stored in endless filing cabinets. The mechanics of it weren't pretty or impressive. And they definitely weren't streamlined. But it was relatively easy to see what was what.

Fast forward to today. Technology has taken the steering wheel. If you peer under the hood of programmatic advertising, it's like looking at the engine of a rocket ship. There's nothing but shiny blinking silicon and metal objects, all of which are executing an astonishing range of complex calculations in less than the blink of an eye.

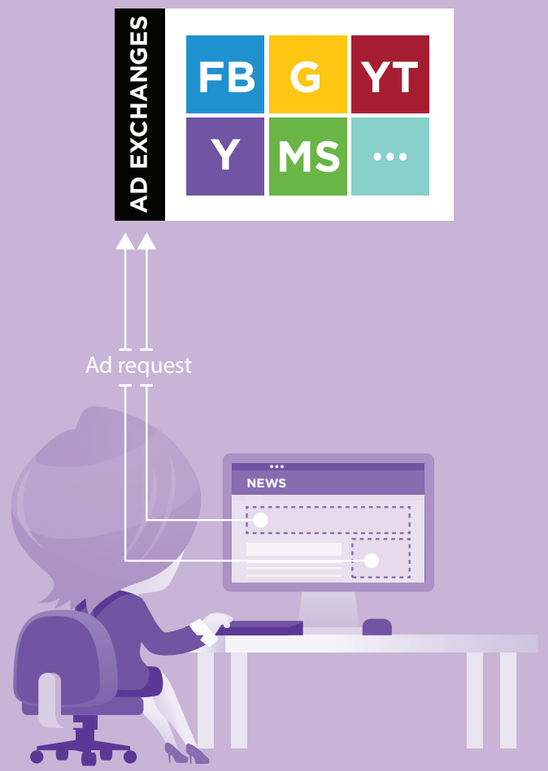
It's tempting to just slam the hood down and stop trying to understand it. But understanding the new world of digital advertising isn't nearly as intimidating as it looks. Let's break down what happens when a consumer sees an interesting link.

STEP 1:

ANONYMOUS CONSUMER CLICKS A LINK

Our average Anonymous Consumer, AC for short, comes across an interesting link to an article on a news site and decides to click it to check it out. This kicks off a flurry of activity that happens in milliseconds.

To understand what happens next, it helps if you imagine you're watching a video of the events, all happening in slow motion.



STEP 2:

HERE COMES THE CONTENT. BUT WHICH ADS SHOULD AC SEE?

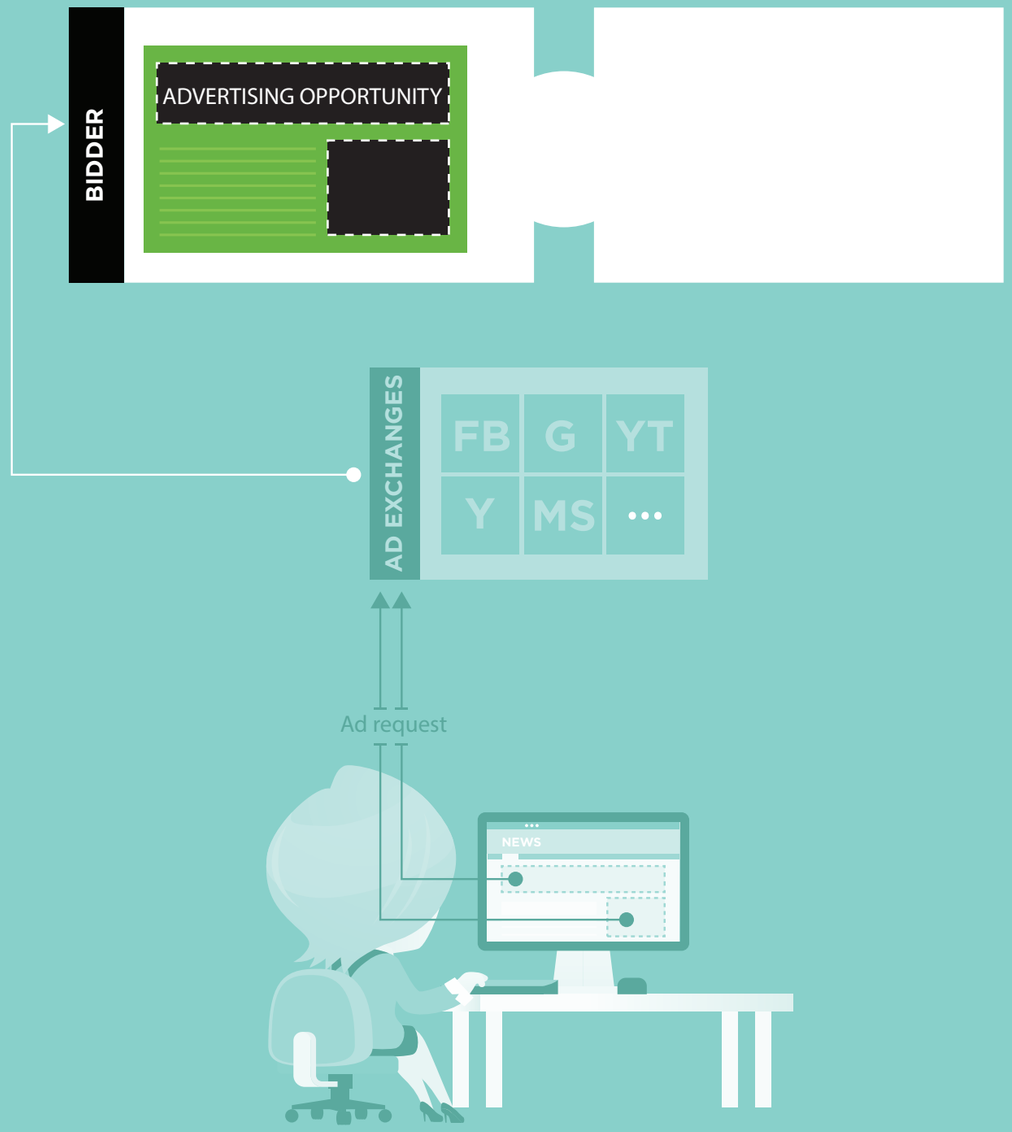
The publisher's content begins to load in AC's web browser. But at this point, there are still blank spaces where the ads will go. Which is the best ad for AC to see? What is she most interested in right now? Which ad will be of enough interest to her that it creates a chance for a successful conversion for the advertiser?

AC's a pretty great consumer, so lots of people will want to advertise to her. But the system decides if it's the right opportunity to show her an ad.

From the publisher's point of view, they want to make the most money they can from attracting a great customer like AC. But what's the ideal price?

An ad exchange can do a great job of matching the needs of buyers to ad sellers to determine the optimal price. After a few quick calculations, the news site offers this impression out to an ad exchange. Remember, this all happens faster than you can blink.

How many different exchanges are there? A lot more than most people realize. At Rocket Fuel, we work with between 15 and 20 meta-exchanges, each of which comprise many smaller exchanges and individual web publishers.

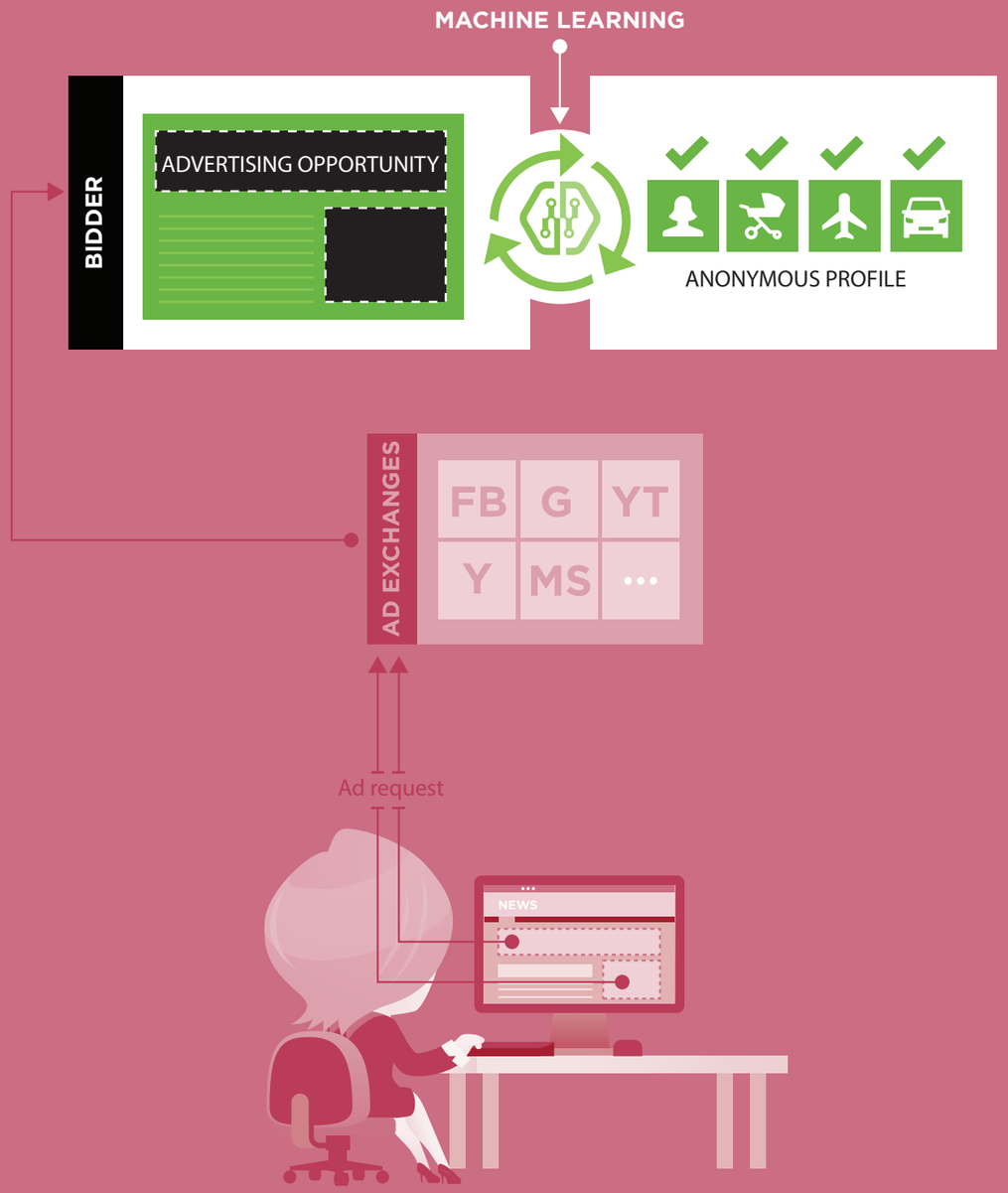


STEP 3:

HEY MARKETERS, WANT TO SHOW AC A GREAT AD?

The ad exchanges send out a bid request that provides potential bidders with a set of information about exactly how attractive a consumer might be to them.

"Dear bidders: Here's what we know about this anonymous consumer from the cookies and other data we have available. You won't get access to personally identifiable information of course, but we can tell you a lot nonetheless. She's using the latest version of Firefox for Mac, she's not on a mobile device, this is the URL of the page she's loading, and you can serve up an irresistible 300 x 250 banner to her if your bid is high enough."



STEP 4: MILLISECONDS TO THINK IT OVER

On the bidder's side – the side deciding which advertisers most want to serve an ad to AC – they have to figure out how much to bid for her attention.

Every bidder has to make a decision about how much to bid in about 100 milliseconds. That's not much time, and there is a range of technology deployed to address this decision in the programmatic ecosystem. The most primitive – or simple algorithms – typically use one or more factors to decide how much to bid. For example, "we will bid exactly $15 for every auto intender." It's simple, but not very smart.

The more complex decision science systems that incorporate machine learning into bidding take into consideration features like:

- Have we seen this consumer before?
- What have we learned about how this consumer has behaved in the past?
- What types of ads do they respond to best?
- What types of ads do they ignore?
- How much data do we have about this consumer?
- Does it sufficiently inform the bid model, or should we buy some supplemental data before we decide?

As it turns out, we've seen AC before and know a few things based on her anonymized browsing. She's in her 20s. She's been shopping for an entry-level import car lately. She's planning a trip to Portugal in December.

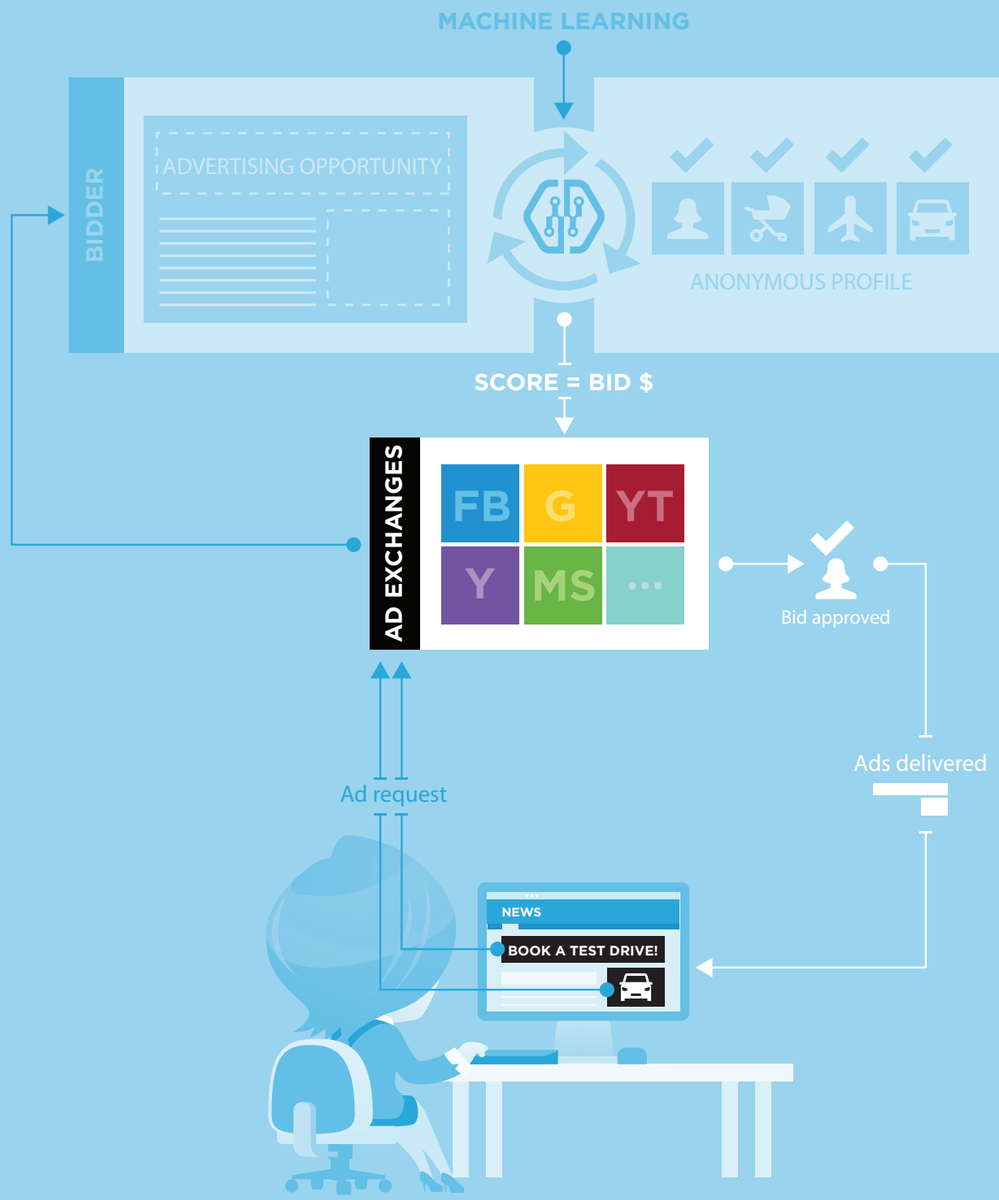
Knowing what we know, learning algorithms consider these factors and others to determine the probability of success if we advertise to AC at a specific moment. Then we price that bid accordingly. There are no pre-determined bid prices. Every bid is evaluated, priced, and analyzed individually. This happens billions of times a day, and no two bids are entirely alike.

So the obvious question is, what makes a good bid? The answer is that it depends on what your system thinks will happen when AC sees the ad.

If your system believes the ad has a really low probability of success, it should bid as little as possible. The advertisers probably won't win the bid, but if they do they will have paid only a little for the ad. It won't cost much, and it still might work.

If your system believes the ad has a high probability of success, it should bid as much as it can justify in order to reach that consumer.

Machine learning algorithms can decide exactly how much they want to bid for AC's attention – and in some cases they can even create the right ad for AC and serve it on the fly. And, since this is all happening in real time, it can be based on a range of factors including location, current prices (think airline tickets or hotel rooms), and almost anything else where data is available to inform the decision.



STEP 5: THE WINNING BID IS IN!

THE WINNING AD, CUSTOM-PICKED FOR AC, APPEARS ON THE WEB PAGE, AND AC CLICKS THE AD.

In our slow-motion version of events, we saw that hundreds of decisions, made by hundreds of potential advertisers, were all made in a fraction of a second to decide exactly which ad to show AC.

In this case, the good news for the advertiser is that they found AC in a good mood. A buying mood. After seeing the carefully chosen auto ad, she went to the dealership and sealed the deal, going from auto intender to happy new-car owner.

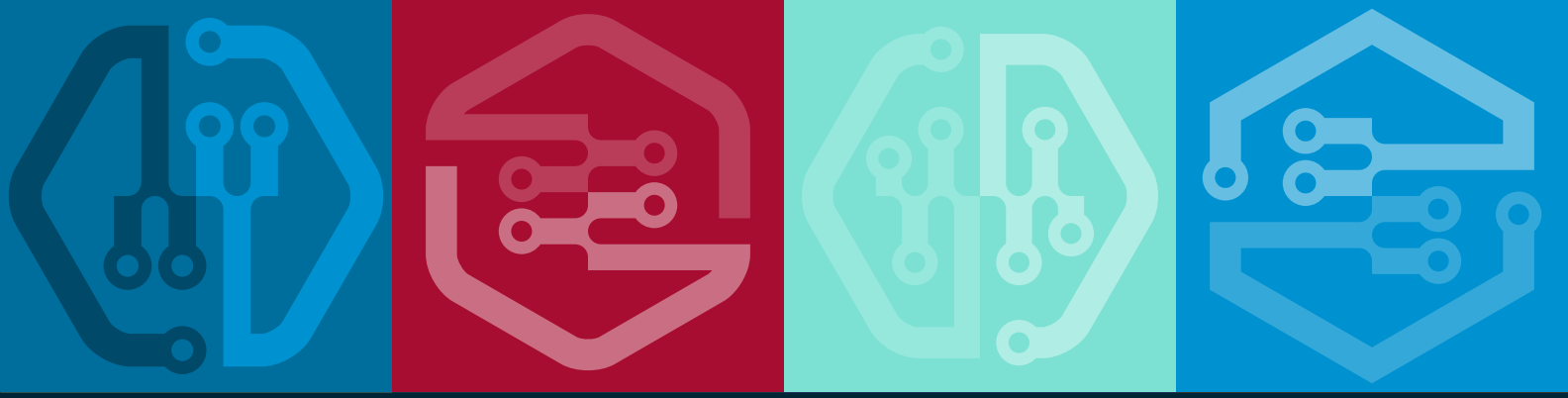
But it's important to remember that most ads – no matter how brilliant – are not likely to persuade a consumer with just a single exposure. As far back as the 1800s, Herman Ebbinghaus demonstrated that there's a learning curve for consumers. Advertising research demonstrates that a consumer usually needs to see an ad multiple times before the message "sinks in" to generate a response. And, for big-ticket, long purchase-cycle items like cars, it takes even more exposures over a longer time period.

This is part of the reason why getting greater targeting capability through programmatic is important. It's important to reach AC just often enough to make the sale, but not so often that the automaker starts annoying her (and wasting money).

FIVE SIMPLE STEPS IN A FEW THOUSANDTHS OF A SECOND

Back in the Mad Men days (and up until rather recently), the decisions about which ads a marketer would send to consumers might be made over the course of months, or even years.

Today, with intelligent programmatic advertising, those same decisions can be made in milliseconds, billions of times a day, across the world. It's a strategy that would be literally impossible for a human to execute without computers—by the time you understood the bid request, it would be far too late to bid for it.



WHY IS IT IMPORTANT TO LOOK UNDER THE HOOD?

Hopefully, now that you've had a chance to peek under the hood of programmatic advertising, it's easier for you to understand how it drives sales.

And really, that's why looking under the hood is so important. In the end, the best algorithm wins. How well a programmatically bought ad performs depends almost entirely on the decision-making capabilities of the algorithm. At Rocket Fuel, we've learned that the more data points an algorithm can evaluate, and the more capable it is of learning from each bidding opportunity it participates in, the smarter the system can be. And a system that makes smarter decisions drives better results.

Now that you know more, you can ask tougher questions: How well does your programmatic partner really know consumers like AC? Are they using fixed-price bid models to reach her? How many factors does your bidder incorporate into its model when determining a bid price? Is your programmatic partner's bid distribution curve smooth, or do you see "bid bunching" around round numbers?

Look under the hood before you choose a partner. It could make the difference between getting where you want to go, or being taken for a ride.