Why Can’t We Be Friends?  
The Case for Man + Machine
## Why Can’t We Be Friends? The Case for Man + Machine

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Introduction

It’s long past time to stop talking about the rise of the machines.

They have risen. They are here. And they are insinuating themselves into our lives at a rapidly accelerating pace. Barely a day goes by without some new twist on a theme that was once framed as “man vs. machine,” shorthand for the tension between the reliance on intuition and instinct versus a blind acceptance of computer-created decisions.

The time has come for détente; to turn toward human + machine and a world where human abilities are amplified in ways we once only dreamed of.

This eBook will:
• trace the growing importance of machines in solving business problems and the corollary need to resist being blinded by the power of computing.
• provide concrete examples of solutions that combine the best of humans and machines to solve everyday problems.
• suggest guidelines for deciding how to balance human skills and machine capabilities to best tackle the task at hand.
The Machines are Here to Stay

Machines fly the airplanes we travel in and help diagnose the diseases that plague us. They trade our stocks, match us with mates and find us deals on hotel rooms. Machines are picking winners in World Cup soccer and suggesting bets on football. The Associated Press is using machines to write business stories and other outlets are using them for editing. Marketers have turned to machines to help consumers discover products that delight them. Artists have turned to machines to figure out what songs to write and release and what plot lines will make for good TV.

And this is all really in its infancy. Gartner recently predicted that within the next two years, an entirely new digital business, conceived by a computer algorithm, will be launched. Mobile commerce will constitute half of all e-commerce by then, up from about 20 percent today. That evolution will be helped along by more than $2 billion in spending performed entirely by digital assistants, including apps on all sorts of platforms, but primarily mobile-based, Gartner says.

It is both glorious and terrifying. Glorious to imagine what humans have created and what they have the power to create in the future. And terrifying because it raises the question: Are humans working to make themselves obsolete?

“I think we've kind of gone astray in thinking about computers as this kind of force of nature that we adapt to, rather than as a set of software programs, each of which can be designed well or used poorly,” says author Nicholas Carr, whose “The Glass Cage: Automation and Us” examines the role of automation and machines in our lives.

For decades, robots and computers have relied on algorithms and processors to take on tasks once done by humans, says Paul Saffo, a tech forecaster who teaches at Stanford University and chairs the futures studies and forecasting program at Singularity University in Silicon Valley. But in recent years, the amount of data available and the speed with which that data can be processed has raised the machine’s game to a new level.
“It’s an old story,” Saffo says of the tension between wonder and worry at the rise of the machines. “The big shift is that the machines that support knowledge work in the past decade are sneaking up on us. First, we could program machines to solve problems. Now it’s becoming commonplace to program machines to learn.”

As machines become more sophisticated and versatile, it is also becoming increasingly clear that the notion of man vs. machine is outdated, if in fact it was ever the right lens to look through. The most successful companies instead focus on human plus machine, leveraging the best of both to build the optimal solution.

“It’s definitely a partnership,” Saffo says. “And there are plenty of problems that humans find easy and machines find impossible.”

Machines are good at remembering. Humans, not so much. Machines are bad at generalizations. Humans rely on generalizations to move through life. Humans are good at innovation. Machines are not good at innovation, but quite good at improving on innovation. Humans have a difficult time shaking their biases and ignoring their passionate beliefs. Machines crank out answers with cold-hearted precision and -- provided they’re powered by algorithms designed to mitigate bias -- they offer us something close to impartial information.

“Machines can’t replicate common sense, the kind of rich, intuitive knowledge that comes from a human being having experience of the world, having experienced problems in lots of situations, lots of challenges,” Carr says.

The human plus machine partnership is one that can benefit from some skepticism on the humans’ part. After all, machines can reflect the biases of their human creators. Simply accepting the machine’s conclusions without examination might be an all-too human trait.
“We humans are very trusting of computers, because they’re a black box,” Carr says. “We tend to take it for granted that they’re right. Unfortunately, it’s still a matter of what the data sets are that are going in and also the algorithms that human beings are programming.”

But, of course, humans have much to offer. While on the surface we might accept the machine as cold and calculating, deep down we know that machines can hold biases as pronounced as those held by humans. Humans, after all, design the algorithms and models that power the machine’s thinking. A human can spot outliers, anomalies and instances where a desired result influenced the approach that a human asked the machine to take.

No doubt, the rise of the machines means fundamental changes for the humans that designed them. Just as we are transforming machines, machines are transforming us.

“First we invent our machines, then we use our machines to reinvent ourselves,” Saffo says. “The first person to get a callous from using an early shovel discovered that machines change us.”

And to go back to the Gartner predictions, it appears as though it is time again for humans to change in the face of the machines we’ve created. As big data, algorithms and processing capabilities become more powerful, even more jobs that involve relatively routine tasks can be taken over by the machine. At the same time, more workers who can perform the higher-level work will be needed.

In fact, Gartner says that by 2018, digital business will need 50 percent fewer of the employees involved with processes -- taking orders, driving deliveries to homes, etc. -- than they typically need now. And, the consultancy says, they’ll need 500 percent more workers who do key digital business jobs.

Put it to Work: Machines and humans have different strengths. Break a project into the various tasks you’ll need to accomplish to achieve your goal. Which of those jobs play to a machine’s strengths? Which are best handled by a human? Line up your human -- and not -- resources accordingly.
If they wanted to keep it up, no one would have enough money to throw at the manpower that would be needed to do that.

Steve Jurvetson, Cylon Centurian, creative commons
The Case for the Machine

The more we give over to the machine, the more we realize that in many cases we still need a human touch. Google’s self-driving car is proving to be an astonishing success. Seven hundred thousand miles without causing an accident or receiving a ticket. And yet, what is one of the early lessons Google engineers have learned, according to the San Jose Mercury News?

“One of the most surprising lessons: While hoping to make cars that are safer than those driven by people, Google has discovered its smart machines need to act more human, especially when dealing with pushy motorists,” the Mercury reports.

The autonomous cars, it turns out, are not assertive enough. Their programming and machine learning have taught them to be cautious, so cautious that impatient human drivers dart in front of them, accelerate out of turn and create the sort of traffic havoc that the self-driving cars were designed to eliminate.

Like any relationship involving humans, the one between humans and machines is complicated. There is practically a human need to be needed. It’s hard to shake the perception that results curated or offered by a human must be deeper and more genuine than those produced by a machine. We boast “hand-crafted” or “hand-made,” but not “machine-manufactured” or “computer-processed.” “Artisan cheese?” Yum. “Processed cheese?” Yuck.

But sometimes turning to humans, or continuing to rely on them, is irrational, as any machine could tell you. In 1994, Yahoo set out to tease order out of the chaos of the fledgling World Wide Web. The company began manually building a directory of Web pages that users would find relevant and interesting.

Yahoo employed an army of “surfers” who combed through digital piles of URLs, submitted by site owners and the public, and decided which were worthy of inclusion in the directory and under which categories and subcategories they should be listed.

“It was pretty wild,” says Steve Berlin, Yahoo employee No. 14 and the company’s first full-time surfer. “Basically, everyone was given a list of hundreds of sites and every day they were given a new list, or every week they were given a new list. Everyone had their own specialties.”
A music fan might be in charge of vetting and categorizing new music sites that were submitted by their developers. A bookworm would categorize books. A sports nut might sort out sports teams and fan sites.

Organizing the Web through a hand-made directory is hard to imagine today. But keep in mind that the system, conjured up at Stanford University by company founders Jerry Yang and David Filo, was better than what was out there at the time. Today it feels a little like turning to a telephone switchboard to complete a call you could make on your iPhone 6.

And maybe it’s exactly like that. Yahoo recently announced that it would be shutting the directory down.

The truth about the directory is that like those operators working the switchboards of the last century, search technology has by-passed the Yahoo Directory. The Internet is a very different place today than it was in the 1990s. As early Yahoo surfer Berlin said, speaking of the directory:

“If they wanted to keep it up, no one would have enough money to throw at the manpower that would be needed to do that.”

Think about it: While the exact numbers are open to debate, the Internet Live Stats website reports that there were about 258,000 websites in 1996. The number of sites recently passed one billion. So if, as former surfer Jon Brooks reported on KQED radio, Yahoo needed 100 workers at the time to keep track of the World Wide Web, the Sunnyvale company today would need about 388,000 employees to do the work.

And what would it do tomorrow? Hello employee No. 388,001?

Sure, the human in us feels a certain nostalgia, maybe even a sadness at the passing of the directory.
“That’s a shame,” Search Engine Land co-founder Danny Sullivan said in an e-mail response to our questions about the Yahoo directory’s subdued send-off. “Yahoo simply might feel calling attention to the closure is somehow a failure; so it doesn’t want to be seen as celebrating a failure. But the directory was so important, so foundational to Yahoo, that this should have overridden those other concerns.”

“It was the best job I ever had and the best job I ever will have,” says Berlin. “Basically, without Yahoo, the Web itself would not be around the way we know it right now.”

Not only has Yahoo abandoned its hand-crafted directory, but it apparently is working toward becoming a machine-powered search engine, in part to end its reliance on Microsoft’s search technology.

Clearly, in the case of the Yahoo directory, the work balance between humans and machine had become seriously out of whack. It is the natural course as technology evolves. But it in no way diminishes the value of human beings or signals their coming obsolescence.

Instead, it’s a lesson that some things are better left to the machine, while human minds are freed up to work on creative solutions to the next big problem.

Put it to Work: Be honest with yourself and be ready to let go: Does that work that you always thought needed the instinct and intuition of a human, really need the human touch? Times change and technology changes with it.
Quiz: Could a Machine Do My Job?

It is undeniable that since the invention of the first machines, human jobs have been lost to them. With headlines emerging about robot home caregivers and fast food assembly machines it’s understandable to feel that we could all be just a bit scared a machine could do our job. Answer yes/no in the quiz to see if your job is at risk.

1. Can you do your job with your eyes closed? _____
2. Could you do your job if you lost your voice? _____
3. Does your job consist of repetitive tasks? _____
4. Does your job require you to make decisions? _____
5. Can you do your job while multi-tasking (such as holding an unrelated conversation)? _____
6. Does your job require spontaneity or creativity? _____

7. Do you have one sore muscle group when you get home from work? _____
8. Does the majority of your work time involve interacting with humans? _____
9. Does your job require you to innovate? _____
10. Does your job use the influence of your personality? _____

Scoring: Please give yourself one point if your answer matches.
1-Yes 2-Yes 3-Yes 4-No 5-Yes 6-No 7-Yes 8-No 9-No 10-No

0-5 Don’t worry, It’ll be a long time before machines are that good.
6-8 Machines might reduce your work for you to be more creative.
9-10 It might be time to start innovating. Where do you bring value?
Ideally, Machines are Our Helpmates

Humans + machines: It can be an uncomfortable concept. It is not black or white, one or zero. It’s nuanced, subtle. It involves give and take. The true believers talk about “human amplification,” the idea that machines can supercharge our thinking, our innovation, our performance.

MIT’s Cynthia Breazeal is one of the world’s leading robot experts. In talking with the New York Times’ Tom Friedman at one of his global technology forums, Breazeal, who directs the personal robot group at MIT’s Media Lab, described the beneficial partnership that machines make possible.

“The new, new thing is how it really engages with you, not just as a tool, but as a partner,” she said of robots pitching in to manufacture, teach and care for the infirm. “Now, you’re side-by-side, doing something together and I think that’s a profound change. To me, that’s a more enlightened view. It’s not a replacement. It’s extending human capabilities.”

The best baseball pitchers live off of being able to throw a baseball 60-feet-6-inches with pinpoint accuracy. They know exactly where they want the ball to go when they throw it. How helpful would it also be to know exactly where the ball would go if the batter is able to hit it?

That’s approaching reality in major league baseball, where coaches now rely on computer models to position their defensive players in the field. Sure, baseball has always been about the gut. The manager in the dugout knows he has a pitcher in the bullpen who owns the pinch-hitter coming up to bat. He knows the wheel play is on and that swinging away, rather than bunting, might give him the advantage of surprise.

But baseball, like all professional sports, is about something else, too. Winning. So, if a machine churning data can help win, why not turn away from the gut and toward the data?

Oakland Athletics general manager Billy Beane and author Michael Lewis did more to promote that thinking than anyone, as outlined in “Moneyball: The Art of Winning an
Unfair Game.” (The view, of course, applies to other businesses, as well.)

San Francisco baseball guru and KNBR-AM radio host Marty Lurie recently raised the gut vs. data issue during an interview with Arizona Diamondbacks’ coach Mark Weidemaier, who was talking about a baseball hot-button: The practice of employing an infield shift to better defend against left-handed pull hitters. The move, in which three defenders (or four in extreme cases), take positions between first and second base, appears to be working.

And it makes sense: Left-handed hitters naturally hit the ball to the right side of the infield. But Weidemaier said he’s not going with his gut when he sets the Diamondbacks up in a shift.

“I’m in charge of putting together the defensive alignments, our optimal positions, where we’re going to play to start a ballgame against each hitter,” Weidemaier, who’s been in the game for three decades, told Lurie. “We look at all the spray charts. We look at all the data.”

He added that looking at charts that show where on the field hitters hit the ball is nothing new. Coaches and managers have been jotting that down for decades. But something has changed since the days of dugout clipboards.

“Now you have the computer, which gives you these charts at a click of a finger for 4,000 at bats,” he said.

“When you see the shading, when you see the charts, it’s wise to take advantage of the data.”

It is wise, but not necessarily universally accepted by fans and pundits. The idea that stats can outsmart baseball brains is the source of a heated and ongoing debate.
How can a machine outperform years of playing and coaching ball?

Sound familiar? Whether the field is education, climatology, politics, investing, journalism, retail or baseball, there are people involved, people who develop expertise and experience. People, who at times, trust their guts.

Maybe these all-or-nothing debates unintentionally make the most important point: The answer is not to give over all decision-making to the machine. Nor is it to completely disregard the data and go solely with the gut. The secret is to combine the best of both types of intelligence to give an organization the maximum chance to succeed.

Put it to Work: It’s only human to feel threatened by the rise of the machines. You’ve built expertise in your job. You know what you’re doing. Let see a machine do that! But it’s not about a machine doing your job. It’s about a machine helping you do your job better.
Machines Process Big Data; Humans Process Thick Data

Big thinkers have been drilling into the idea that the big deal over big data sometimes obscures an important point: Data on its own is just data. For a time “big data” was running the risk of becoming one of those eye-roll-inducing buzz phrases that instantly cures insomnia.

But authors including Christian Madsbjerg and Mikkel Rasmussen, of ReD Associates, have been adding nuance to what is actually a fascinating conversation. Their message is that numbers, even numbers that are gathered and crunched and re-crunched, tell only part of the story. I think we all know that on some level, but the allure of massive data sets is a powerful thing. They draw us in. They reassure us. They provide cover for our decisions.

“In fact,” Madsbjerg and Rasmussen write, “companies that rely too much on the numbers, graphs and factoids of big data risk insulating themselves from the rich, qualitative reality of their customers’ everyday lives. They can lose the ability to imagine and intuit how the world — and their own businesses — might be evolving.”

Madsbjerg and Rasmussen, authors of “The Moment of Clarity: Using Human Sciences to Solve Your Toughest Business Problems,” are pushing the case for “thick data.” Thick data, the authors say, allows businesses to look beyond the numbers and get a handle on squishy things. Thick data provides emotional context into how people approach their products and services or whatever it is they might be selling. It’s the information about how one individual is different from another.

Thick data – empirical information gathered by humans through observation, interviews and experience – is an idea that is popping up in different places and in
different contexts. Madsbjerg and Rasmussen write about how it was deployed in consumer marketing and health care. West Chester University professor Paul Stoller writes in the Huffington Post about how big data could better inform the Obama administration's national security decisions.

Often these stories, like Joshua Klein's in Fortune, include examples of where big data has steered people and organizations wrong. Yes, big data snafus can lead to $27.7 million books on Amazon and outrageously offensive machine-designed T-shirts being offered online in England.

And as Madsbjerg and Rasmussen point out, big data often needs the leavening of human observation and experience to tell the complete story. Numbers, statistics and financials aren’t generally enough alone to drive key decisions. The authors point to medical technology company Coloplast, for instance, which in 2008 saw a sudden financial downturn that it attributed to cases in which its stoma bags leaked.

Coloplast went with the industry’s conventional wisdom, Madsbjerg and Rasmussen write. The solution for the company’s leaky medical product was better adhesive. Designers worked for years on adhesive and better design, which the authors say provided incremental improvement. Then Coloplast executives decided they needed to better understand their customers. Madsbjerg and Rasmussen were called in to get to know the patients through interviews, photographs and journals kept by patients.

And what executives realized through thick data – data that one executive told the authors he could “pick up” and “feel” – was that they hadn’t adequately considered the differences in different customers’ bodies. It was a general, one-size-fits-all mentality that was the major cause of the leak.

Or consider the story of toy building-brick maker LEGO, as written by Madsbjerg and Rasmussen in The Wall Street Journal. The company took one data point -- declining sales -- and assumed it meant that modern-day kids wanted toys they could pick up and play with immediately, not toys they had to build before enjoying. LEGO started down the path of designing action figures and working on other ideas for toys that were ready to
go out of the box. Then a new chief executive questioned the original assumption.

LEGO hired Madsbjerg and Rasmussen’s firm to travel around the world to play with kids playing with LEGO sets. (Nice gig.) They observed, videotaped sessions, talked to kids and provided mounds of unstructured data to LEGO. LEGO studied the data, looking for patterns. Ultimately, LEGO researchers reached a new conclusion:

“Not every child wants to be a LEGO builder” the authors wrote in the Journal, “but those who do, the company discovered, are passionate about the play experience. They want to achieve mastery, and they want to understand where they fit in the hierarchy of LEGO skills. LEGO’s team arrived at a moment of clarity. They needed to ‘go back to the brick.’”

Where some of those who fret about big data go wrong is in thinking that this reliance on digital information is a binary problem. In fact, it’s not black or white; about either crunching numbers or connecting meaningfully with your customers.

It’s both.

**Put it to Work:** Use the machine to help you identify insights and to process and analyze the results of your taking action on those insights.
“You can’t lose that human element. We’ll let the data tell us, but I wouldn’t have figured that out by just letting the data run. We have to find the nuggets. It’s still kind of letting the humans craft it.”
The Case for Humans

Calculating the cumulative distance of all of Central London’s streets is a job for a machine. Actually navigating those streets is arguably a job for a human.

Every black-cab driver in London has The Knowledge, which is not a figure of speech, but an actual deep understanding of every street and alley, every monument, historic site and landmark — roughly 25,000 streets and 20,000 monuments — within a six-mile radius of Charing Cross.

The drivers have recently made a point of their vast knowledge in the face of a challenge by GPS-aided Uber drivers who have moved onto their turf without putting in the years of work it takes to master The Knowledge.

Getting from Point A to Point B and beyond, the cabbies say, is so much more complicated than following the directions of a machine, which the cabbies refer to as “sat-navs.” The shortest distance between two points is not necessarily a straight line — in fact if you look at a map of London, there are hardly any straight lines.

“Sat-navs are hopeless in London’s complex and ever-changing road network,” David Styles, a black-cab driver who writes the “CabbieBlog,” told BloomReach by email. “Often an alternative route might be longer, but faster. In fact, many of our customers will have a preferred route.”

Styles’ argument is a compelling one or at least one you want to believe. Who wouldn’t want to believe that there is a benefit to being driven by a man who spent more than four years studying the streets of London, rather than a driver who takes machine-issued directions well?

There is something intuitive about the argument that there are subtleties, aberrations, emotional factors, that humans can understand and machines can’t — the idea, for instance, that the longer route is actually the shorter route.
And the cabbies argue that they provide so much more than basic transportation. Black-cab driver Robert Lordan, who blogs at “View from the Mirror: A Cabbie’s London,” says there are times when human intuition is invaluable in his cab. Take Jermyn Street, pronounced “German Street.” How many enter that correctly into a GPS device? He’s been flagged down by people needing to get to the emergency room, who figure a black cab is faster than an ambulance.

“I’ve lost count of the times in which a passenger has mixed up roads and destinations,” Lordan adds by email.

Like the woman who wanted to go to King William Street in Covent Garden. He knew there was a King William Street, but it’s in the financial district. And he knew that there was a William IV Street in the vicinity of Covent Garden, so he asked the woman where in particular she was headed. A restaurant, she said. Terroirs, he asked? Bingo.

“I frequently meet passengers who are unsure of where they’re going, who are only vaguely aware of the address, who get muddled up,” Lordan added. “People who want to go to multiple destinations (and not always by the most direct route); people who change their mind halfway through a journey; people who want hotel, restaurant, pub recommendations; ideas of places where they can take their kids; people who want to know about London and its history; about obscure museums and so on and so on.”

And London cabbies’ brains are packed with that information. In fact, London’s black-cab drivers have actually been studied by neurologists at University College in London who have concluded they have larger hippocampi than the general population -- and better memories, too.

“The city becomes a part of you,” Lordan says, offering a plausible non-scientific explanation for the brain bulge. “You have a handle on it and know how to deal with the many problems and conundrums, which occur every day.”
And then consider the thoughts of Paul Densham of University College London, who is not a neurologist, but a geography instructor whose work has been incorporated into modern surveying and positioning systems. What does an algorithm know, he asks, about timed and untimed traffic signals, or the events that cause pedestrian traffic to surge and repeatedly halt auto traffic as mob after mob avails itself of a crosswalk?

“There have been attempts to bring in real-time traffic feedback,” says Densham, who is a reader at UCL, “but again, if everybody is getting the same feedback, then all our algorithms are going to recommend similar diversions. The irony is that at the moment, the black-cab driver is probably in a better position than the Uber software in terms of working in London.”

Put it to Work: Embrace the machines and their ability to amplify your performance, but don’t become too smitten. Machines have their limits, as we all know. Think about what you bring to the table and where a machine could help.
“Anytime you are trying to do an innovative thing, out of the box, trying to set a trend, you don’t have the data for that. You have your wild intuition.”

Steve Jurvetson, Hamburger Making Robot, creative commons
Humans are Innovators; Machines are Optimizers

In fact, taking the best of both — the best of humans and the best of the machines — can lead to accomplishments that neither could achieve on its own. The truth is that in the end, machines amplify human potential.

“When you are building this whole man and machine model, the machine needs to be a companion,” says Ashutosh Garg, BloomReach’s chief technology officer. “Machines need to be an assistant. You don’t want to be competing with a machine.”

Garg, a former IBM researcher and Google scientist, says that machines and humans are good at different things — meaning the potential for partnership abounds.

A machine, for instance, is good at remembering what you spent, where you spent it and what you spent it on for years on end; you are not. A machine can churn through massive amounts of data and come up with a result. You would be overwhelmed by massive amounts of data. But you are good at generalizing based on past experience. Machines aren’t. You’ve got intuition; machines don’t.

The differences between humans and machines mean that each has a role. For instance, Garg says, think about innovative ideas and the evolution of them.

“As a machine, you can come up with an algorithm that will make your iPhone better,” he explains. “But a machine cannot come up with an iPhone. The machine is going from the iPhone 4 to the iPhone 5.”

In other words, innovation takes a creative spark; a very human creative spark. But a machine is able to amplify that creativity. A machine can in essence survey millions of iPhone users and track the performance of millions of iPhones. It can tell human engineers, designers and marketers what apps iPhone users favor and what apps they are ignoring. It can tell the humans at what times and for what purposes.

Machines are great optimizers and humans are great innovators.
purposes people are using their iPhones.

Are consumers primarily using their phones to listen to music? The humans are going to want to work on improving the next version’s speakers and acoustics. Have iPhones become consumers’ go-to cameras? Maybe it’s time for designers and engineers to improve upon the lens and flash. Is the iPhone battery dying at dinnertime instead of bedtime? Time for a better battery. Are users complaining about the weight of the phone? Machines can process millions of comments and figure that out. Then the humans can figure out how to make the phone lighter.

Or think of the human and machine partnership in launching a marketing campaign, Garg says. An experienced marketer, for example, might rely on intuition and experience to conclude that blue sweaters are going to be a big seller in the coming season.

“Machines cannot come up with that. The amount of data they would require to come up with that is practically non-existent,” he says. “Anytime you are trying to do an innovative thing, out of the box, trying to set a trend, you don’t have the data for that. You have your wild intuition.”

But if you’re building a results-oriented marketing campaign to sell those blue sweaters, turning to a data-infused, intelligent machine makes a lot of sense.

“If you’re doing certain things, machines can help you improve things — a lot,” Garg says. “Machines can tell you the likelihood of this campaign performing, of having conversions, what the cost is.”

A human marketer can figure out what kind of Web page makes sense for the
campaign — a theme page, a splash page, a collection concept page. A machine can quickly process a ton of product data — what are consumers searching for, what do they buy as a result, what other products do they view and purchase as a result of their initial search — and determine exactly which products should go on the page. The machine can not only come up with the answer faster, its answer is more reliable than one arrived at by a human, who has no chance of processing the same amount of data and who is left to rely on partial data and artistic hunches.

“Optimization is a tedious task. Machines are very good at that, churning through a bunch of data,” Garg says. “Machines are great optimizers and humans are great innovators.”

**Put it to Work:** So invent and invent and then invent some more. But don’t dismiss the ability of a machine to take your invention and point the way to the next iteration of it.
Centaur Chess Players Harness Machines to Amplify Intelligence

The story of IBM’s Deep Blue computer defeating world chess champion Garry Kasparov in 1997 has been told so many times that it’s practically shorthand for the philosophical debate over man vs. machine.

But the story lacks subtlety and perhaps the right moral. Deep Blue was only the beginning; and out of Kasparov’s defeat grew a type of chess player that more richly illustrates the interplay between man and machine in 2014: All hail the centaur.

Yes centaur – and Kasparov was apparently the first. Rather than half-horse, half-human, a centaur chess player is one who plays the game by marrying human intuition, creativity and empathy with a computer’s brute-force ability to remember and calculate a staggering number of chess moves, countermoves and outcomes.

The centaur story is an elegant example of the way visionaries see the optimal interplay between humans and machines. Teaming the two in chess, experts say, produces a force that plays better chess than either humans or computers can manage on their own.

Centaur chess is all about amplifying human performance.

The human plus machine style of play is called Freestyle (often played online) and the rules of the game allow chess players to consult outside sources – books, other humans and most importantly computerized chess engines that are stocked with the moves and results of thousands or millions of chess games that have been played through the years. The Freestyle games are timed, forcing players to think on their feet while managing the clock.

“You merge the computer games with the human games and you’ve got something
that is quantitatively and qualitatively out there,” says Nelson Hernandez, a suburban Washington D.C. data analyst who is a member of one of the most successful Freestyle teams in history.

The three-member team is led by Londoner Anson Williams, a reserved engineer and software developer, and is rounded out by Williams’ girlfriend, Yingheng Chen, a math whiz who has become an expert at analyzing Freestyle chess.

None of the three consider themselves accomplished chess players and with the help of the machine they needn’t be. In fact, you could argue that chess experts -- grandmasters -- are at a disadvantage when it comes to Freestyle. It isn’t that the same computer-based fire power isn’t available to grandmasters. It’s that they sometimes fall prey to the very human belief that as experts in their fields, they know better than the machine.

George Mason University professor Tyler Cowen covered the syndrome in his book, “Average is Over.” In it he tells of U.S. grandmaster Hikaru Nakamura, “who was not a huge hit when he tried Freestyle chess... His problem? Not enough trust in the machines. He once boasted,” Cowen continued, “I use my brain, because it’s better than Rybka on six out of seven days of the week.’ He was wrong.”

Rybka is a top chess engine, part of the machine.

The flip-side to Nakamura’s hubris, of course, is placing too much trust in the machine. Carr, the “Glass Cage” author, has said humans risk being seduced by automated programs because they carry out work in a “black box.” Questions in; answers out.
But centaurs understand that the machine has limitations. Chess is too complicated a game, with too many possible moves leading to a slew of other possible moves, for today’s computers to solve. What they can do is push players toward perfection by charting out a series of flawless opening moves and then providing recommendations the rest of the way.

Not all machines are created equal, however. And different machines will provide different answers to the question: What’s my best next move? Then the human – who by the rules of Freestyle must physically make the move – has to decide not just what’s the right move, but what’s the right move against a specific opponent at this particular point in the match.

“That’s where someone like Anson really shines. He’s augmenting the computer with his own native abilities,” Hernandez says. “A chess player has got a certain set of cognitive equipment. A superhuman memory is what’s required, a tremendous ability with spacial concepts and to be able to look ahead, a great strategic sense of when you should exchange this piece for that.”

Think of it as something like a trip to the moon: A pilot has the skill to land a spaceship on the lunar surface and he or she can use his or her eyesight and human experience to determine whether a landing area is suitable. But the pilot would never be in the position to be making those decisions without a big boost from the rocket that got him or her to the moon’s orbit in the first place.

The rocket for Team Anson Williams (The trio plays in different tournaments by different names to make it harder for opponents to scout them.) consists largely of Hernandez’s massive database of tens of millions chess games that have been played by computers and humans – every move, every outcome.

Hernandez says he’s spent more than 10 years compiling the data, which he says the team uses to rank the best moves after analyzing the game situation with custom, proprietary software.
“I hardly ever take a day off,” he says. “I have this incredible talent for dull, repetitive tasks. Who else would spend 10 years of their life, every single day, collecting chess games for their database? It’s almost borderline crazy.”

As much as he loves data, Hernandez is well aware that as with data in so many fields, it’s not just having lots of data that matters, it’s what you do with it.

“What Anson does, probably as well or better than anyone else, it’s his secret really, is you need to be able to process real-time data sets more efficiently, more rapidly than anyone else. That’s a cognitive skill. You need incredible nerve, really. You’re under a clock.”

The combination of Williams’ cool under pressure and the machine’s vast catalogue of chess moves works. Cowen’s book recounts a four-tournament run in which Williams’ team won 23 games and lost one while playing 27 to a draw.

Williams did not respond to requests for an interview. Reserved, remember?

So which is more important in the world of centaur chess? The human or the machine?

“It’s absolutely more important to have good hardware and software,” Hernandez says. “In Freestyle, we have competed against grandmasters two times and we have defeated two grandmasters. And we’re not chess players, you know. To me, that tells the story. Is chess knowledge useful? Of course it is. It’s not that it’s useless. I’m just saying that if that’s your main strength and not a lot of other things, you’re going to lose. It’s simply not enough.”

In other words: Back in the Deep Blue days, at least Garry Kasparov on his own had a fighting chance. Today, not so much.

**Put it to Work:** The key, then, is to think of the machines as a teammate, not as a threat. Machines can get you to the point in a process where your human intellect is at its most valuable.
It’s Hard to Assign a Value to Human Foibles

And so those who fret about – or even celebrate – the idea that one day machines will be powerful enough to do most anything on their own are fretting about and celebrating something that seems well beyond our reach. In fact, when it comes to the notion that machines could someday be adequate replacements for humans, the best advice appears to be: Don’t bet on it.

Maybe you’ve read about Cortana, Microsoft’s digital assistant, and its effort to pick the winners of National Football League games. It certainly hasn’t embarrassed itself, picking right more often than not. But in the real world, it’s not as simple as simply picking which team will win. In the real world, bookmakers create propositions, in which the underdog is given points – a sort of head start to make the game more interesting, even when one team is decidedly better than the other. (The point spread, as it’s called can also be manipulated to even out the betting on the two teams. Sports books rely on fees to make their money and therefore prefer to see roughly the same amount bet on each team, as a hedge.)

Cortana doesn’t fool with point spreads. Instead Cortana crunches data – wins; losses; artificial turf or grass; home or away; weather; strength of schedule; team statistics. Then it adds in public sentiment gathered from Facebook and Twitter; an attempt to inject some human wisdom into the process. The idea: If the “crowd” is really big on a team or really down on a team, it could be an indication that something is going on that isn’t reflected in the numbers.
The machine has done well, predicting correctly two-thirds of the time late into the season. And theoretically, it will do even better next season, as Cortana relies on algorithms and machine learning to continuously refine its performance.

But even Cortana is not all about the machine. First, it’s telling that its designers pulled in the human element by turning to Facebook and Twitter. And they worked hard at making their machine feel more human by helping it master the art of chitchat. Next up: Mastering the art of trash talk. Kidding.

Yet despite the efforts at humanizing Cortana, the football-picking prognosticator lacks the human wisdom and inquisitiveness that one bookmaker says is significant in puzzling out who is going to win and who is going to lose.

“You have your empirical data, which is out there. There is so much data, so many statistics on sports. You could rate so many columns of data, coming down to anything,” including which team wins when a particular announcer is calling the game, says the bookie, who asked that his name not be published. “The thing that you can’t do, is essentially know what’s happening, to have that inside information. It’s that last little tidbit of information that skews (things). That’s the true element that tips the scale.”

The little things, like knowing which player’s marriage is on the rocks; or who’s battling addiction, are sometimes the keys to the game that don’t show up on television graphics, the bookie says. And the only way to learn about that stuff is to build relationships and develop sources.

Maybe the bookie sounds like an old salt pining away for pre-machine days. Not so. He crunches data, but he adds human intelligence to the mix for what he sees as the best result. As data maven Nate Silver says, Las Vegas betting lines rely on a lot more information than the typical game-picking program.

And so who you know is key in betting games. Yes, build relationships, the way humans do – and machines don’t.

**Put it to Work:** No matter how powerful machines become, the distinctly human trait of building relationships will never becomes obsolete. Don’t underestimate the sort of data that networking and touching base with fellow humans can yield. Sometimes it’s just the edge you need to be a winner.
There is Big Money in Finding the Balance Between Human and Machine

The true puzzle in this world of humans and machines is knowing how to best marry the two. Is it a dash of human and a heaping helping of machine? Or is it the other way around? Naturally, there is no right answer. It very much depends on what goal you are trying to achieve; what question you are trying to resolve.

Where there are problems, there are opportunities and venture capital firms have kept a keen eye on solutions that turn to combining human strengths and machine capabilities.

Big data rock star Hilary Mason works for venture firm Accel Partners as its data scientist in residence. Why wouldn’t an investment company have a data scientist on board? The explosion of gatherable data and the growing challenge of combining humans and machines is creating abundant business opportunities for innovators who can find fresh approaches. In fact, IDC says venture capital firms invested about $3 billion between late 2009 and early 2013 in companies self-identifying as big data companies.

And besides finding new opportunities, data scientists provide VC firms with another weapon, given that any company in a venture firm’s portfolio can benefit from understanding the best ways to produce actionable data.

Mason herself is not hung up on the term “big data.” Call it what you like, as far as she’s concerned. What she’s passionate about is the way data can be leveraged to make humans better at what they do.

“It’s not so much a matter of the human vs. the machine, as it is the human using the machine to process a volume of information that the human, unaided, simply could not even comprehend.

“With any of these terms, it generally takes me awhile thinking about it to come to some understanding,” she said when asked about the idea of “thick data” vs. big data.
Big data is one where I don’t like the phrase because it doesn’t really matter how big it is.”

What matters is how people use it.

“If everyone in the world were using this thing, how does the world change?” She says is the sort of question she ponders. “What capabilities does humanity really gain?”

In her view, big data has the power to make us more creative, insightful and productive. Big data is a partner to us mere humans; a tool that makes us better at what we want to do. And, of course, she is right about that as long as we know what we need data to do for us.

“It is the human augmented by the machine,” she says. “The systems, they’re dumb, right? They just run code; so what code are we going to tell them to run? It’s not so much a matter of the human vs. the machine, as it is the human using the machine to process a volume of information that the human, unaided, simply could not even comprehend.”

Remember, she says, big data is nothing new. We’ve been surrounded by data and lots of it for a very long time. What’s new is the ability to analyze the data at speeds that were once unimaginable.

“I think the real progress in data science is in telling these stories that come from data,” she says, “and the stories are things only humans would know are interesting.”

Mason has her own favorite example. She told of an assignment she gave to a class that she was teaching at NYU. She asked students to examine the publicly available data on bridge traffic in New York City (how much, on what bridges, during what times etc.). Simple stuff, right?
“Even in that, there was this weird anomalous week. So a computer could have told me that that was an anomalous week,” she says. “The traffic dropped to very low numbers, then to zero for several days.”

She said her human brain first went to conspiracy theory: The government was withholding the information for some reason.

“And then the intelligent human in me said, ‘Oh, that’s Hurricane Sandy.’ So there is that example of the algorithm and the human interplay.”

It’s the sort of interplay that Mason and many others are convinced is going to become increasingly important as our data tools become increasingly more sophisticated.

**Put it to Work:** Sure, rely on the machine, but keep an eye out for anomalies. Often a machine can tell you what happened, but not why. That’s where you come in; and where you add incredible value. Don’t squander it.
Marketers Know What to do in the Machine Age; They Just Haven’t Done It

Already, of course, there is no shortage of tools. In fact, the problem is that there are too many that change too quickly and often promise too much.

The choices are a reminder that talking about big data is easy. Figuring out what to do about it, or more importantly with it, is a bigger challenge. eMarketer recently released a report based on third-party research that pointed out that 59 percent of executives worldwide said that big data was “extremely important” to their operations. Moreover, 80 percent of executives said that companies that don’t embrace big data would lose their competitive edge and possibly fail entirely.

“Of course, technologies are needed to make sense of and combine all of this information, and Accenture noted that using such tools to understand big data could transform an entire enterprise—if done correctly,” the eMarketer report concluded, citing Accenture’s research.

Making productive use of big data is an an area that calls for combining human intelligence and intuition with machine learning — the human plus machine model. Figuring out how to marry the two powerful forces, of course, is the overriding challenge.

The eMarketer report, which cited separate research by Accenture and Signal, noted that 53 percent of U.S. marketers surveyed said that they had increased their technology spending in the last three years. But it pointed out:

“Simply adding separate technologies isn’t enough. Thanks to consumer use of multiple devices each day, marketers must also focus on integrating technologies and data across channels.”
And yet, Signal’s research showed a disconnect between what marketers understand and what they are doing. According to Signal, 90 percent of marketers agreed that integrating their marketing technology in a way that provides a full view of customers and prospects is an important way to boost business. But only 4 percent felt confident that they were well-prepared to conduct marketing across all channels and devices.

It’s something of a paradox: As the tools to make marketers lives easier are rapidly developed; discovering the right tool for the job can sometimes become more difficult. It wouldn’t be crazy to conclude that marketers are overwhelmed by the choices and rosy claims made by a growing array of companies that insist they can crack the code. It’s almost as if marketers need big data and machines to tell them what big data and machines they need.

It’s going to be the people, the data, all of the above. This notion of man and machine just has to be the answer.

ClickZ Live is a regular gathering of digital marketers searching for the next big thing. You could forgive the hundreds of marketers who recently descended on the San Francisco Hyatt for the conference if they found themselves feeling a tad overwhelmed, dashing from presentation to presentation to hear about programmatic marketing, attribution modeling, social metrics, linguistic analysis, and the like.

Digital marketing, which wasn’t even a thing two decades ago, is evolving at warp speed and the tools and techniques that make it possible are coming at marketing professionals at an ever-accelerating pace.

But that doesn’t mean that the situation is hopeless or that finding the right tool for the right job is impossible. Again and again at the conference, the theme was repeated: Automation and the machines are not here to bury us. They’re here to help us.
Ben Maitland, executive vice president for sales and marketing at B2B marketing firm Multiview, attacked the issue of human vs. machines head-on at ClickZ Live.

His presentation looked at trends in programmatic ad buying, which is all about the machine, right? The algorithm knows how to find your customers when they need to be found and how to deliver them just the right message. But how does the algorithm know?

That starts with the human.

“Programmatic should make you better,” Maitland said, during his talk about real-time bidding and programatic buying. “It shouldn’t replace you.”

Data alone doesn’t do it, Maitland explained, turning to a favorite example of author and Harvard Business School professor Clay Christensen. Christensen likes to cite a fast-food chain that wanted to boost its milkshake sales. Maitland said the chain had segmented its customers and was confident that they needed to focus on mothers with children because they fit the profile of milkshake buyers.

Instead of relying solely on data, though, Christensen’s colleagues stood in one of the restaurants, starting when it opened, and observed the behavior of the humans who patronized the place.

“Within five minutes, they saw milkshakes going out of the building, at 6 a.m.,” Maitland said.

Lots of milkshakes. And who was buying them? Commuters, commuters who needed a treat to ease the pain and keep them occupied as they fought their way through traffic. “It’s sad to see people over-trust the technology,” Maitland said in an interview after his talk. “The idea is to slow down and just use it as a tool.”

Humans will never match algorithms and computers in raw data processing power, but the data sets that computers produce will always be secondary to human insight, he said.
“It’s going to be the people, the data, all of the above,” Maitland added. “This notion of man and machine just has to be the answer.”

Katie Seegers, a manager with Amazon Local, made a similar point regarding e-mail campaigns. Yes, you can - and should - test everything, she said. Test-generated data is extremely valuable in determining what grabs consumers’ attention, when consumers are most prone to having their attention grabbed, and the like.

Still, you need to weave human insights into the process. Seegers talked about a successful initiative in which Amazon Local sent travel offers to customers who had purchased travel books. Yes, machines were able to capture and categorize the consumer’s behavior. This is a person who is interested in travel books. But it took humans to understand that that same consumer might also be interested in actually traveling somewhere. So why not send the customer travel offers? And it took humans to determine how often that offer should be sent -- probably not as often, for instance, as an offer for a deal at a local restaurant. Consumers eat out more often than they take vacations.

“You can’t lose that human element,” Seegers told us after her talk. “We’ll let the data tell us, but I wouldn’t have figured that out by just letting the data run. We have to find the nuggets. It’s still kind of letting the humans craft it.”

Maybe that seems entirely intuitive: A machine is only as good as the people who built and programmed it. Whether it’s big or small data, the only good data is actionable data. But there are pressures pushing marketers to give in to the machine, to turn everything over to automation.

“I think that the seduction,” Maitland said, “is saving money. And scale.”

Maitland, Seegers and others made a compelling case that it’s wise to resist the temptation to turn the whole job over to the machine. The best way to build a successful enterprise, they argued, is to marry the strengths of humans and machines. All of which turns the accelerating explosion of digital marketing tools – the
increasing availability of the machine, in other words -- from being an overwhelming array of solutions to being an area of nearly unbounded opportunity.

But how to take advantage of those opportunities when everything is moving so fast? It’s a question that BloomReach marketing technologists Jason Seeba and Adam New-Waterson think about -- a lot. They say there are three guiding principles that will make the job of balancing humans and machines considerably easier.

1. **Hire highly adaptable humans.** Look for people who are hungry to learn and who understand the limitations and potential of new technologies when it comes to amplifying human performance.

2. **Look for technology that actually brings something new to the table.** Marketers need to get over their low expectations. There are nimble companies out there working on useful innovations. Don’t get caught up in the hype; and don’t follow the herd. Don’t waste time trying technologies that won’t scale. You want your business to scale; your technology is going to have to scale with it.

3. **Don’t be afraid to give up control.** Marketers have staked their careers on the idea that they are the people who can discover and oversee the technology that adds value. To say you’re going to let the computer do part of the job can be frightening. Instead of resisting, look at giving up some control as a way to broaden your reach; as a way to better focus on the things that matter.

The machines have risen. Let them do their work. And in doing so, let the machines let you focus on the challenges that are best left to the humans among us.

**Put it to Work:**
- Divide projects into machine-friendly task and human friendly tasks; let go jobs that can be easily automated.
- Remember that machines have limits. You invent; let the machines iterate.
- Look for scalable technology that helps you get to where your intellect is at its most valuable.
BloomReach is headquartered in Mountain View, CA, with offices in New York, London and Bangalore. Created in 2009 and launching publicly in 2011, BloomReach is backed by investment firms Bain Capital Ventures, NEA, and Lightspeed Ventures.

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