Editors from across Winsight's brands set out to understand what the food industry will look like 10 years from now. Expect changes across the foodservice landscape.

THE FUTURE OF FOOD

HOW IS IT ...

PRODUCED? P.28 TRANSPORTED? P.35 SERVED? P.38 CONSUMED? P.44

The year is 2030. A restaurant operator has just orderd a package of lab-grown protein patties on Amazon. It will be loaded onto an electric van and delivered the next day. A hungry drive-thru customer will order one of the burgers via an AI voice bot, and it will arrive in a box made of sugar cane and bamboo. This scenario is just one illustration of how the food chain, from production through consumption, could change in the next decade. Read on to learn more.

PHOTOGRAPHY BY CLINT BLOWERS


Lab-to-table?
Advances in techology and bioscience could fundamentally change where food comes from.

THE FUTURE OF FOOD

How is it produced?

When we talk about the future of food, we first have to examine where food will come from in the future. With concerns around the environment and the sustainability of our existing supplies, changes will have to happen. But what does that look like?

4 CHANGES COMING QUICK

By Jennifer Strailey

Time is of the essence in reshaping the future of food production.

Agriculture laid a foundation of prosperity for the nation, but the time has come to reimagine and rebuild. While farming has always been at the mercy of Mother Nature, climate change, wild weather, water shortages, overproduction and more have dramatically upped the stakes, creating a tenuous global food supply.

Where does that leave the future of food production? Four major movements will change what we eat and how food is grown—and the change is coming fast and furiously, because it must.

1. Vertical farming: Sky's the limit

The conditions outside—droughts, floods, disease, storms and unseasonal temperatures—are driving farming inside. But what's more, experts say, agriculture is contributing to the very aspects of climate change that are proving increasingly challenging to traditional farming methods.

"Food production is responsible for about 15% to 20% of total greenhouse gas emissions globally, which is about as much or more than all transportation forms combined," Amanda Little, author of the book "The Fate of Food: What We'll Eat in a Bigger, Hotter, Smarter World," told "Fresh Air" host Terry Gross in a June 2019 NPR broadcast. "It's a story that's been building for millennia, since ... the dawn of civilization, [and] it's really coming to a head right now."

"We're facing such severe challenges and pressures ahead," Little said, that the need for change is urgent—as in five to 15 years. She points to high-tech disruption such as the aeroponic, vertical indoor growing that's happening at AeroFarms, which grows leafy greens vertically on trellised stacks of metal trays.

"Indoor farming is the future," says Phil Lempert, Winsight contributing editor, known as the "Supermarket Guru." It eliminates the need for pest control, it uses less water and land, and it has higher growth rates because of 24-hour "sun," he adds. Some reports say vertical farming increases yields by as much as 225%.

"Just look at the money venture capitalists are investing in this type of farming and its rate of growth," Lempert says. AeroFarms raised $100 million in late-stage funding in July 2019; Germany's Infarm raised $100 million a month earlier; and Plenty's $200 Series B funding is still the largest in vertical farming history, reports AgFunder Network Partners.

"During the past five years, there has been

a substantial amount of investment in indoor farming and new indoor and high-tech greenhouse farm construction across the country," says Viraj Puri, co-founder and CEO of Brooklyn-based indoor farm Gotham Greens. "The increased funding can help propel the industry in various ways, including increased research and development, consumer awareness and scale."

2. CRISPR gene editing

What if we could design higher heat-tolerant crops that produce more food using less water and fewer chemicals or cultivate a tomato plant that was short and compact, while also densely full of fruit, and therefore perfect for urban vertical farming?

It's the promise of CRISPR (Clustered Regularly Interspaced Short Palindromic Repeats) gene editing, which produces disease-resistant cacao and bananas, caffeine-free coffee beans, flavor-boosted strawberries, and mushrooms and apples that don't brown.

"I think in the next five years the most profound thing we'll see in terms of CRISPR's effects on people's everyday lives will be in the agricultural sector," geneticist Jennifer Doudna told Business Insider in April 2019. Doudna is the University of California, Berkeley geneticist who led the team of scientists who discovered CRISPR in 2012.

In her 2015 Ted Talk, Doudna explains that the CRISPR-Cas9 discovery was made by looking at how bacteria fight viral infections. They realized they could harness this function as a genetic editing tool to aid in everything from treating diseases to streamlining crops farmers grow and the groceries retailers sell.

3. Rooting for regenerative agriculture

These are extremely challenging times for farmers, says Lempert, who partners with U.S. Farmers and Ranchers Alliance to produce a weekly "Farm, Food, Facts" podcast. "Some studies say we have about 30 harvests left," he says, pointing to the Alliance's short film "30 Harvests."

A growing number of farming experts believe regenerative agriculture—a farming system that increases biodiversity, enriches soils, improves watersheds and enhances the ecosystem—is our greatest hope for more harvests. It also aims to capture carbon in soil and above ground, thereby reversing atmospheric accumulation.

Minneapolis-based General Mills funded a life cycle assessment (LCA) of White Oak Pastures in Bluffton, Ga., and found the farm's beef practices resulted in reduced atmospheric carbon. In fact, the farm's regenerative agriculture practices allowed it to sequester more carbon than it produced, thereby offsetting at least 100% of the farm's grass-fed beef carbon emissions.

4. A taste for high-tech

Technology will revolutionize the entire food supply chain, from how things are grown to how they get to market. Investment in ag-tech reached a record-breaking $16.9 billion last year, said Produce Marketing Association (PMA) CEO Cathy Burns in her State of the Industry presentation at the PMA Fresh Summit last October. She added that regenerative agriculture has received so much attention of late that over the next 30 years it is estimated that $700 billion worth of investment in the movement will ultimately return $10 trillion.

"Farming technology is at a point where you can monitor a patch of land down to the square inch to determine if the land needs nutrients, water, etc.," says Lempert. This creates efficiencies overall and helps to save water—an extremely limited and increasingly expensive resource. "We have tractors that run themselves and robotics that can pick strawberries, all of which also means less labor is needed."

Q&A // FUTURIST

BRIAN FRANK, GENERAL PARTNER WITH FTW VENTURES, SHARES HIS EXPERT INSIGHTS.

By Sara Rush Wirth

Do you see a change in where our food will come from?

I think how our food is grown or produced is going to change radically. We look at everything from accelerating or improving traditional farming to modernizing farming or food creation. We look at things like: How are we going to create crops with less resources, less land? How are we going to provide transparent supply chains so people know where their products come from and can track them all the way back to the farm? And how can we ensure that that supply chain is safe and high-quality overall?

Obviously different technologies are going to be applied. One area [where] we see a lot of opportunity is blending life sciences and traditional agriculture to make better products, or more products, for our foodservice operators. The other way is we see a lot of track-and-trace work being done, so [implementing] things like internet of things that can track the product when it is being grown to the field, all the way through the supply chain, and ultimately when it ends up on in a foodservice operation.

Could things such as 3D printing or other technologies gain popularity?

I do think there are a lot of technologies that are going to upend where our food comes from. The first one is our ability to take what the natural world is doing and convert it into a product that we know and love.

Obviously, plant-based foods that simulate meat are a thing. ... The next market I see changing is the raw ingredient market. CPG people were always experimenting with, "How can we create a better ingredient or a better stack to create our food from?" And that's why I [refer to] Dan Barber (chef-owner of Blue Hill Farms) thinking about breeding plants or products specifically for traits that will benefit a foodservice operator.

So imagine a chef, instead of just going to the farmers market, saying, "I need some onions. ... I actually want to design a product using biosciences that will fit a specific need I have for texture, taste, quality."

And I think we actually have to do that. My example: If you eat a tomato today, a generic store-bought tomato for a really cheap price, there's not a whole lot of nutritional value left in that tomato. It had been bred for shipping and transport rather than for nutritional quality. I know a lot of chefs that want to go back to high nutritional quality in these fruits and vegetables.

Do you think that can become affordable?

I think it has to. I think it's going to become a requirement. ... Otherwise, literally, the industry that's feeding people is going to be killing them consistently, and I don't think we want that.

And plant breeding is not the only way to do it. I'm not going to reduce the sugar content of a sugar beet or a sweet potato, but I can supplant the sugar in those with other substances that act like sugar. If I'm [a soda company] and I'm trying to make a better beverage, but I want to use less sugar, how do I reformulate or refactor that using all that nature and science can give me?

I'm not talking about aspartame or chemically derived products that are new and novel. I'm talking about finding things in nature that we can replicate more easily using science. And a good example of that is protein-based sweeteners that don't trigger the glycemic response. And those just aren't very plentiful in the world.

"We're starting to see all these amazing scientific and technological breakthroughs that have an impact on the world."

—Brian Frank

So how does this reach a wide audience?

I had a major nutrition company come to me and say, "I never want one of our scientists to say that I have to climb the high mountains of the Himalayas to get some ingredients." So we look for things that have that opportunity of potential.

We are big proponents of fermentation at our company. ... Fermentation is a process using these amazing bacteria creatures, and all you have to do is train them to create something new and novel, and they can eat one substance and spit out another. ... The net end product you get, whether it be casein, egg white proteins or collagen, it is molecularly identical to the product we get from other ways.

We have to understand the value of these sciences, and we have to leverage them to get the product that we need. For example, if the collagen that the company produces has been consumed or used for hundreds of thousands of years already, and the thing that we're giving you [via fermentation] is molecularly 100% the same exact thing, there is, in my mind, little to no risk of using that exact same product. And it is naturally derived from a natural process we understand.Now, when you start adding chemicals and you start creating things that didn't exist in the world, that's a different story. And when you get to the definition of GMO, when you're actually splicing in other organisms into an existing organism to get something new, that's a different story. But we now have the sophistication of science.

What do all of these changes look like together, in practice, to alter the business?

I think that life sciences and biotechnology as a whole category, and (former Google CEO) Eric Schmidt said this, it's like the internet. It's going to be as big as or bigger than the internet. [That's because] once you understand how you can create products and improve products using biosciences, it's going to unlock a huge opportunity for people to design things that meet specific consumer's or individual's or company's needs. We're just at the very, very early stages of that. There are a bunch of people experimenting with that in the foodservice world.

BEEF TARTARE FROM A TEST TUBE?

By Heather Lalley and Kelsey Nash

Experts are mining science and nature for the next major protein source.

If Joseph Yoon controlled the U.S. food system, restaurants would be serving cricket-crusted tempura shrimp, and consumers would grab bags of chocolate-silkworm pupae protein balls from the corner c-store. Perhaps unsurprisingly, his vision can be a hard sell. But as Yoon, executive director of New York City-based advocacy group Brooklyn Bugs, tempts diners with cricket guacamole or insect-studded fried rice, he often wins them over, spreading the gospel of bugs as a sustainable, delicious protein source. "I see the lightbulbs are going off," Yoon says. "Their perceptions are changing."

A broader approach

It's undeniable that consumers are receptive to protein sources beyond beef, pork and chicken. The environmental impacts of raising meat for human consumption are well-documented. And restaurant chains are noting early (and, often, incremental) success with plant-based menu additions. Burger King's sales rose nearly 11% this past fall after it rolled out the plant-based Impossible Whopper nationwide, for example.

Mentions of "plant-based" on menus are up about 300% year over year at top restaurant chains, in no small part due to the explosion of plant-based patties from Beyond Meat and Impossible Foods, said Clare Aigner, manager of syndicated research for Technomic, during an episode of *RB's* "Menu Feed" podcast. Consumer interest in plant-based beef is highest, Aigner said, followed by plant-based seafood, chicken and pork.

But for Americans to adopt new thinking around protein over the next decade, much needs to change in the way of food systems, governmental regulations and, of course, consumer perceptions, experts say.

"One thing we're looking at is moving beyond the thought process of identifying the next big protein," says Max Elder, research director of the Food Futures Lab at the Institute for the Future in Palo Alto, Calif. "We're not going to move from one monoculture to another. ... We need to put our eggs in more baskets." Currently, 75% of the world's food comes from just a dozen plants and five animals, Elder says, citing a widely quoted statistic from the United Nations Food and Agriculture Organization.

Instead, he sees a future of blended proteins. Think jugs of milk that are a mix of cow's milk and plant-based varieties, or burger patties that combine plant and animal proteins. Such blends feature familiar textures and flavors meshed with more environmentally friendly proteins. "The best of both worlds," Elder says.

Manufacturing muscle

Nate Park agrees that hybrids represent the future of protein. As a chef-turned-director of product development for food company Just (formerly Hampton Creek), Park—who helped develop the company's mung bean-based egg product—is hard at work on the company's latest puzzle: lab-grown meat.

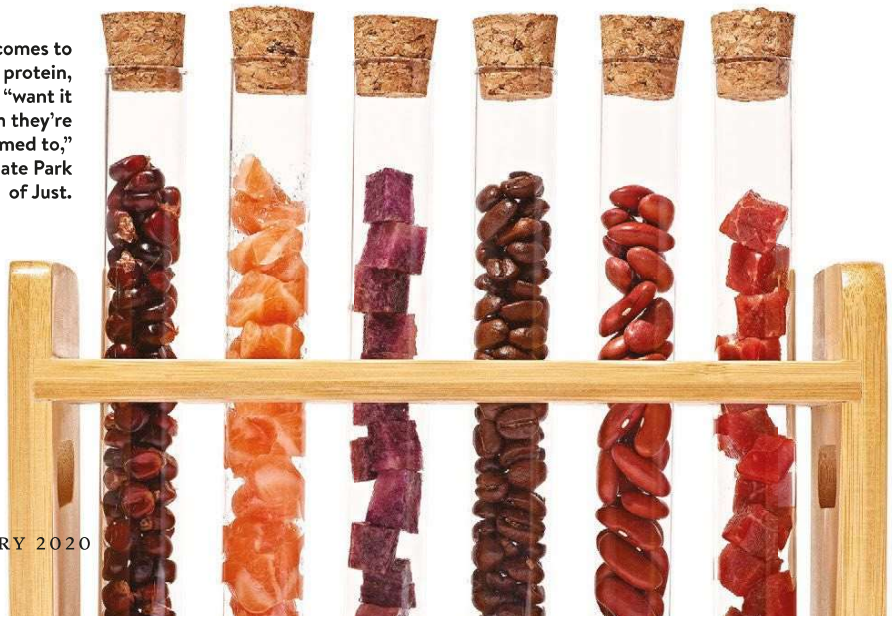
Using mung bean protein to provide structure to a lab-cultured chicken paste, Park can create a chicken nugget that's reminiscent of today's conventional product, he says. "Right now, we're at the tip of the spear," he says. "But whole muscle will be the wave of the future. ... In 10 years, we'll see whole-muscle products, fish fillets, flat-iron steak, possibly a chicken breast. There's a lot of difficulty to that. There's still a lot of things that need to be done."

High up on that societal to-do list? Crafting a food system that recognizes and regulates insects, cultured meats and other nontraditional protein sources.

Last March, the U.S. Food and Drug Administration (FDA) and the U.S. Department of Agriculture (USDA) announced a partnership on the regulation of lab-grown meat products. The agencies "agreed to a joint regulatory team where FDA will oversee the growing of the cells—of cultivated meat cells—and everything up until the harvesting of the cells, at which point USDA will take over and ... oversee the production and labeling of cultivated meat," says Scott Weathers, a senior policy specialist with Good Food Institute, a nonprofit that supports the plant-based food industry.

What's next?

Once regulations are in place to support the production and sale of nontraditional proteins, then comes the public relations push to convince U.S. consumers to try them. "Thirty years ago, sushi was exotic and disgusting," Yoon says, adding that he is in early talks with the New York City mayor's office to develop a curriculum around edible insects for the city's schools. "In 10 years, you'll be able to go in the grocery store and there will be insect protein available on the shelves. They'll be in fast food and in haute dining."



When it comes to lab-grown protein, people "want it in a form they're accustomed to," says Nate Park of Just.

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How is it transported?

The supply chain will change in subtle but important ways, with much of the business of ordering and tracking moving online. And when it comes to packaging, environmental concerns will be front and center.

SHAKE-UPS IN THE SUPPLY CHAIN

By Peter Romeo

Expect lots of small changes, but no magic bullet.

A freight truck packed with supplies pulls up to the back door of a restaurant. It could be any day in the foodservice business. But is that a typical day in 2020, or a snapshot of the restaurant supply chain circa 2030? The differences, though undoubtedly there, are not expected to be as obvious as some of the changes a time traveler might spot through the restaurant's front door.

Experts say the process of supplying restaurants with essential provisions is likely to evolve incrementally rather than jerk from disruption to disruption. They agree technology will shave off inefficiencies and help address demand for fresher, more local fare. But the core process of replenishing restaurants won't change with the calendar. In their view, it's a matter of small but important advances.

Consider, for instance, the vehicle that'll cart the supplies. It may be electric rather than gas-powered, and smaller than the semis and moving van-sized transports that make food drop-offs today, says Mark Allen, CEO of the International Foodservice Distributors Association (IFDA). But contrary to some high-profile experiments, it's not likely to be a drone or driverless rig, at least not for the next decade or so. "Someone still has to get the products off the trucks and into the restaurants," Allen says.

Others say the truck may not sport the signage of the big foodservice distributors. The biggest change they foresee in the supply process is a shift to online marketplaces that ship directly to the restaurant, an echo of e-commerce's challenge to brick-and-mortar consumer retailing. Amazon and its competitors are forging a huge B2B strategy to complement their hold on consumer shopping.

"It is a big, big deal," says Joe Pawlak, managing principal with Technomic. "It's all distributors want to talk about."

About 12% of restaurants are currently buying from a third-party online seller, and "we're sure that number will increase," says Mike Schwartz, VP of member value for the International Foodservice Manufacturers Association (IFMA). "I would imagine that ordering online will be at the center of our industry."

Technomic reports a much higher usage. About 40% of restaurateurs order supplies at least once a month from online sources such as Amazon, according to a recent study.

Even if operators don't buy from an online source, the study noted, they often cite the prices offered in those alternative channels to negotiate lower rates from their distributors.

Many of the familiar names in foodservice distribution are probing for ways they can ride the transformation. Typically, they're aiming to position their own portals as e-commerce marketplaces, using their transportation resources for the last mile of the re-up process.

The shift to third-party internet sources comes with its own challenges for operators, Pawlak says. "You don't know when the package is going to arrive," he says. "Will it show up in the middle of lunch so people wonder, 'Are they really making this food in the kitchen?'"

Plus, if a restaurant runs out of some key ingredient, it can call its distributor and ask for help right away. "Someone can throw a case into a van and run it over to a good customer very quickly," Pawlak says. "I don't think you can do that with a UPS or FedEx."

The product options from alternative suppliers may also be limited. Foodservice suppliers have been loath to showcase their wares on e-commerce sites that ship directly, bypassing the distributor. They don't want to antagonize their last-mile partners, because much of the supply channel is still controlled by the big names in distribution.

Some distributors are trying a touch of supply chain jujitsu, looking to outfox online challengers by shortening the time and distance that a product travels from farm to kitchen. Gordon Food Service, for instance, collaborated with Square Roots, an urban farming company started by The Kitchen CEO Kimbal Musk, to open an indoor growing facility at Gordon's headquarters in Wyoming, Mich. The idea is to supply Gordon customers with locally grown herbs and produce all year long.

Similarly, vertical farms have taken hold in cold weather areas ranging from Pittsburgh to Brooklyn, N.Y., as urban a spot as any in the country. The issue is volume: Can a facility produce enough lettuce or beans to meet the demand of a single high-volume restaurant, never mind a whole market?

"A lot of that is driven by the consumer," says Schwartz of IFMA. "Their demands are changing the expectations of operators, so they're looking for new sourcing models."

Operators will likely benefit from the challenge posed to conventional distributors. Pawlak notes that the big players are stepping up their consultation role, tapping their data to resolve customers' problems and help operators spot opportunities. An emphasis on service is fostering adoption of truck tracking systems so restaurants can pinpoint delivery times.

An easier reach for most links in the chain is providing smaller batches in more frequent drops. The natural response to that is a shift to smaller trucks, and probably ones that don't run on gasoline, Allen says. "Just about every large distributor has invested in battery-powered trucks," he says.

Small trucks could also address the major challenge of the supply chain: people. All segments of the trucking industry are having trouble drawing young people into the business.

Small trucks don't require the special licenses needed for semi-haulers. They also promise less wear and tear on the driver because they're easier to drive and the load is smaller, meaning there's less to lug off the vehicle.

"There are a lot of little things that are being done—there's no silver bullet," Allen says.

EXPERT INSIGHTS // FUTURIST BRIAN FRANK

Will there be more transparency in the supply chain? Is blockchain the model you expect to take hold?

Blockchain is a tool. It's not a solution. Blockchain is answering the question of, "Where did my product come from, and is there one source of truth for what happened to this product through the supply chain?" But this is just a derivative of a database that someone has to maintain. ... And there's this immutable ledger of all the things that have happened with this product.

Now, the challenge with blockchain is getting everyone to agree on the technology they're using to do this. But to be honest, we've had reporting and databases for a long time. It's the same level of consistency, just with a new technology layer introduced.

It's one tool, but not everything needs to be a blockchain to get that same level of clarity. They just need to monitor, track and report on what's going on with their product. It could be a scanning gun that's connected to a database or to a blockchain-based system.

DISPOSABLE PACKAGING GETS PRIORITY

By Patricia Cobe

Companies are racing to find sustainable solutions to keep pace with trends in delivery and legislation.

Pressures from state and local governments, eco-conscious consumers and global environmental groups are forcing the packaging industry to become more sustainable. Plastic and foam polystyrene are the most obvious culprits of environmental harm, but not the only ones. In the short term, switching to recyclable and compostable materials is the path many restaurants and retail outlets are following. At the same time, restaurant delivery and subscription meal kit services are increasing the need for single-use packaging.

"The shift is coming, but in different ways," says Natha Dempsey, president of the Food Packaging Institute (FPI), the "materials-neutral" trade association for the foodservice industry. "Economics play into the choice, but performance and appearance matter to operators too. Packaging today is a complex and evolving landscape."

A question of balance

Since Dos Toros Taqueria launched 10 years ago, the fast casual has made a choice to source sustainable packaging, but "aesthetics and performance have to match those attributes," says co-founder Leo Kremer. Bowls, plates, cups, bags and more are all compostable, but now that takeout and delivery are a much bigger part of the business, the containers have to hold up in transit. "We'd like everything to be rapidly biodegradable, but they can't start to compost in real time."

Kremer says compostables are continually improving. Right now, he purchases bioplastic forks and compostable plant fiber bowls with tight-fitting recyclable plastic lids, but the extra step of disposing the bowl and lid in separate containers can hinder sustainability efforts. Newer on the market are compostable, molded fiber clamshell containers with attached leak-proof lids that would solve that problem.

New materials

Dempsey agrees that innovations in paper and molded fiber packaging are making compostable products much more durable and leak-proof. Pizza Hut is testing a round pizza box developed by Zume Inc. that is made of 100% sustainable sugarcane fiber sourced from agricultural waste. Not only is it better for the environment, but the rounded design also enhances food quality and texture, says Zume CEO Alex Garden.

Zume is also leveraging technology to create custom food packaging designs, including compostable cups, bowls, plates, utensils, trays and more. Unlike polystyrene, "we're now in the advent of a time where, due to technology, there is no longer a trade-off between performance, cost and sustainability," Garden says.

Cutting-edge manufacturers are moving on to sugar cane, bamboo and palm leaves as more sustainable choices than polystyrene. World Centric, a manufacturer of compostable and biodegradable products, now uses a combination of sugar cane and bamboo fibers to mold its cups instead of wood fiber. "These cups are really good at retaining heat and are very close in price to less sustainable ones, almost 1 to 1," says Mark Marinozzi, VP of marketing for the company.

When a chain as large as Pizza Hut gets on board, it creates economy of scale for sustainable packaging and servingware. That bodes well for the future because cost has been a roadblock for operators; newer packaging innovations are always pricier when introduced.

Where do we go from here?

Currently, there are 370 bills in more than 40 states legislating against plastics and other environmentally harmful packaging materials, says Marinozzi. And 2020 will no doubt bring more. There's a groundswell of support for sustainable packaging—especially among the younger generations, he says.

"Retail is ahead of foodservice because restaurants are reluctant to pass on the added cost of sustainable packaging to customers," says Ray Hatch, CEO of Quest Resource Management Group. "This will change five years down the road, as consumers [led by environmentally minded Gen Zers] will be more apt to pay a little more for a meal that comes in sustainable packaging." He and others are suggesting operators add a 2% packaging surcharge to menu prices.

Seaweed, banana leaves and beeswax degrade more quickly than synthetic packaging materials, making them more sustainable.

"There will be more changes in packaging in the next 10 years than have occurred in the last 50," says Dempsey of FPI. Startups are exploring and manufacturing on a small scale disposables made of cassava, mushrooms and seaweed—all materials that degrade more rapidly and can be scaled up for production. The creator of the mushroom packaging claims it's cost-competitive with conventional foam packaging. On the grocery side, edible pods and capsules are already in development for coffee, and boxes that start to degrade along with the pasta or rice inside are realities, says Hatch. "These kinds of packaging will be commonplace in five years," predicts Marinozzi. "They will be second nature."

THE FUTURE OF FOOD

How is it served?

Today's restaurant operator is grappling with a lot of challenges: labor, delivery, food safety, food costs and more. Those disruptors aren't going away in the coming years—but technological innovations have the potential to provide some solutions, as well as some new complications.

"That's the biggest question in my mind right now: Does automation have the biggest impact when it is automating existing food production, or are we going to see completely new food concepts built around automation, and will those displace the existing foodservice providers that are doing it in a more traditional way?"

Futurist Brian Frank, FTW Ventures

What does the foodservice operation of the future look like?

I don't think that there's one concept to rule them all. ... I promote a lot of omnichannel food. It's funny. The retail industry has been doing this for years: Someone either wants to go into your store and pick up a product and handle [it], or they want to go online and never actually see it and just have it show up. Or they want to buy it at a local store because they need it sooner.

I think that the food guys are starting to realize this. Like, "Look. I just need to meet the consumers where they're at. I can't have them always coming in. And so I need to figure out how to layer all these different types of services in an overall offering."

Any major tech-based innovations you expect to have a big impact?

Software to plan and predict ordering so that foodservice operators can accurately predict their demand and their ordering plans. Because, as we know, food waste is one of the biggest things we've got to combat. Every product that doesn't reach the plate is a dollar that that foodservice operator loses. And so how do we make sure that they waste less and have exact amounts of the ingredients that they need?

At the physical locations, we see technology playing a massive role as well. ... One that we're obviously going to go into is automation, in terms of its role in helping us produce consistent high-quality product with a shrinking or challenged labor force.

What impact do you think robotics will have on foodservice and food production?

When we talk about robotics, we're mainly looking at those high-throughput, consistent-products-at-a-reasonable-price-point kinds of foods. What I predict in the next three to five years is we will see more large-scale commissary kitchens that are automated.

What does that look like?

I think when people hear "food factory," they think large-scale, mass-produced foods using chemicals and things like that. As an industry, we've got to come up with a different term for that environment where people are going to be cooking a lot of products en masse, putting it in boxes that will then get delivered, or par-cooking it for foodservice and retail so that you don't have to have large on-site kitchen operations for takeaway or delivery customers. That's why I think we see a lot of movement in the virtual kitchen space. ... But I see those things becoming more automated over time.

How will that affect the workforce of the future?

It goes back to the, "Are you retrofitting, or are you new?" Let's make an assumption that automation will have the biggest impact at all the new concepts, and the existing concepts will still need labor. They're not going to automate as much. Someone from one of the big quick-service chains said to me, "We've already automated all of our processes where two people can run a whole store." ...That is the minimum. You need someone front of house selling to customers, and you need someone operating whatever equipment is behind the scenes.

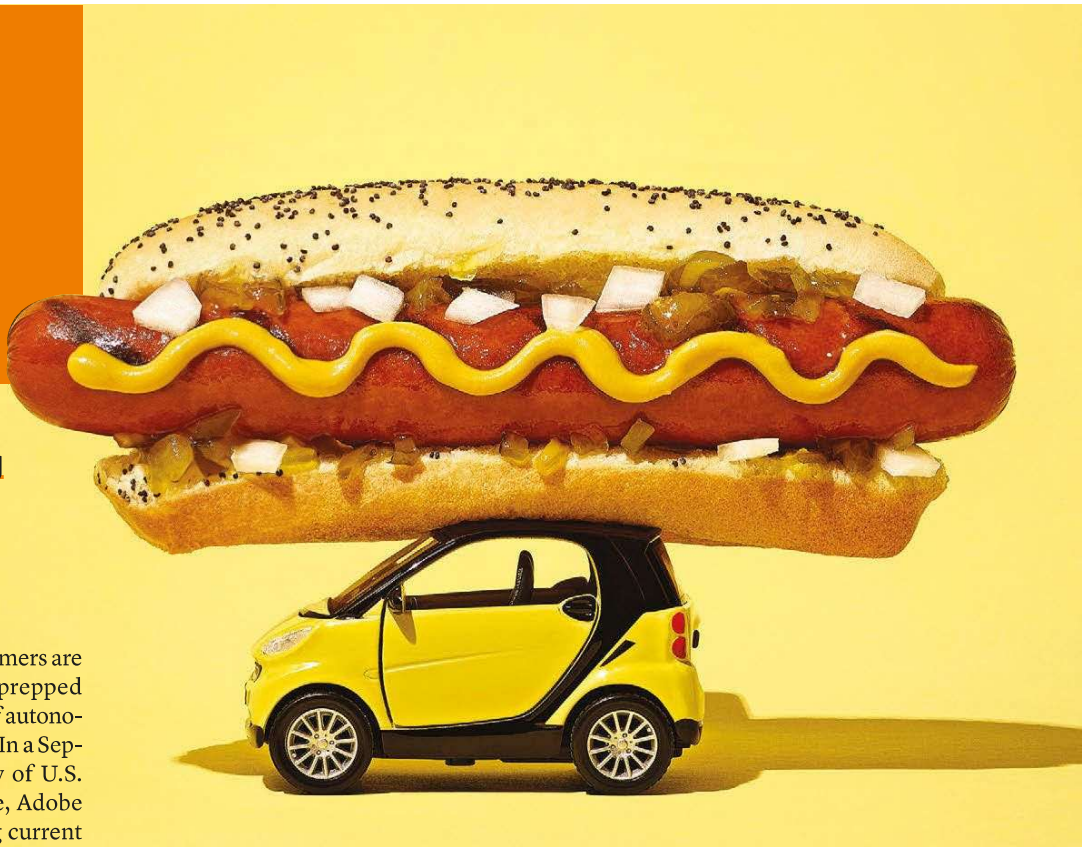
Going to (Union Square Hospitality Group CEO) Danny Meyer as the bellwether for this industry, he said, "Humans are really good at doing a lot of different things, and one of them is providing customer support and the engagement for the brand." And you can't divorce humans from that. In five years, it's not a robot greeting me and taking me to a table and saying, "Hi. Would you like a sparkling water or still water?" There's still some human there that's on the front end.

What about the back of house?

It's a question of who in the back is actually cooking the food and prepping the food. Is that a robot? Even one of my investments is in a dish-washing robot. Who's cleaning the dishes? I think labor in those markets will tend to go away. The analogy I give is the car industry of the 1900s. When cars were first being produced, they were all handmade. That labor that makes the cars has gone away, but the labor has gone into quality checking, managing the equipment, making sure the factories are optimized and run efficiently. And now it's robots doing all the dangerous and hard tasks throughout that process.

WHAT'S NEXT FOR DELIVERY?

By Samantha Oller



Autonomous vehicles can open new branding and eating occasions for restaurants. But how far away is that?

Connected food consumers are increasingly being prepped for the possibilities of autonomous vehicles (AVs). In a September 2019 survey of U.S. drivers who also own a smartphone, Adobe Analytics found that 10% are using current in-vehicle technology—namely, their car's voice assistant—for food delivery or takeout purposes. And 40% of smartphone-owning consumers would like to be able to purchase a self-driving car. When asked which activity they are most excited to do in an AV, the most popular choice was eating or drinking. It outpaced working, reading or sleeping.

While AVs seem like a futuristic concept, several pilot programs are underway that are slowly inching the transportation technology forward. Alphabet's Waymo launched a self-driving taxi fleet in Phoenix and has racked up more than 10 million miles of real-world driving over the past decade, plus 10 billion miles in simulation testing. Uber has made "tens of thousands" of trips with its fleet of 250 AVs. And Tesla was poised to debut full self-driving capabilities by the end of 2019. Meanwhile, major automakers such as General Motors, Ford and Toyota are dedicating billions of dollars to developing AV technology.

Grayson Brulte, an innovation strategist and co-founder of AV consultancy Brulte & Co. LLC, is bullish on the technology's potential. For foodservice brands, it will be a massive opportunity to cement customer loyalty and expand the purchase occasion. The challenge, however, will be to own that space. "It's the next living room," Brulte says.

An experiential service

AV usage will be differentiated by the experience, Brulte says. "Can I get certain dining [experiences] there?" he says. "Can I purchase a product that's only available when I'm riding in that vehicle?"

AVs are expected to be priced at a premium because of their technology. Should the technology adopt a subscription model—in which a business owns a fleet of AVs and consumers pay a subscription fee to use the vehicles—it could pave the way for new loyalty programs. Brulte points to American Express' membership rewards or airlines' frequent-flier programs as models for such an approach.

"The vehicle subscription will be able to add a lot of really interesting exclusive things because there can be hyperlocal [elements] and the vehicle can take you there," he says. "For instance, if you have a subscription for X amount of rides, or you have a certain class of subscription, perhaps you can get invited to a dinner with a famous chef as a perk each quarter." This could also relieve operators of liability concerns when serving alcohol because the AV will control transportation to and from the dining location. In this vein, a hotel—for example, in California's Napa Valley—could offer guests an AV subscription with their stay and connect to local food and beverage experiences. "[The AV] can safely take you to the wineries, you can have wine tastings, and it could have a little wine storage in there," Brulte says.

Beyond being transported to a restaurant or other food destination, there's also the opportunity to dine inside the AV. Imagine the items that consumers typically do not buy for the road because of the difficulty of eating them in the car—anything that requires a utensil and hand-eye coordination, such as spaghetti, an ice cream sundae or a steak. AVs can provide operators with a completely new dining occasion that extends way beyond grab-and-go.

"The biggest thing for [operators] is it takes the focus off portability," says Bob Derian, partner with The Business Accelerator Team and a food industry veteran. "When

you remove that from the equation, it opens up things you can eat with a fork and knife, such as fresh bowls. ... It would really help get more food out the door."

Perfecting that dining experience may be challenging. A 2019 study by the University of Michigan's Transportation Research Institute raised the real challenge of preventing motion sickness in AV passengers.

Act on impulse

For food brands and retailers, having this captive audience also offers tremendous marketing potential. Gary Goralnick, CEO of shopinride, holds two patents on technology that enables in-ride purchases and advertising. The tech, which is set to go into pilot in 2020, will connect a passenger's smartphone to the GPS directions in an AV. A brand can engage with the passenger through an ad in social media and make them an offer. If the consumer accepts the offer—such as special pricing on the purchase of a value meal in the next 30 minutes—the shopinride technology would communicate with the AV's GPS to direct the vehicle to the brand's nearest location.

Goralnick owns commercial real estate and appreciates brick-and-mortar's challenge in connecting with the disruptive power of AVs. He says operators should consider AVs as a "movable computer" that can extend the impulse-purchase occasion. Brulte somewhat similarly sees AVs becoming a "content hub." He envisions screens embedded in the AV's windows, on which passengers can interact with content and shop.

Future vision

Of course, fully autonomous vehicles—or Level 5 autonomy, as defined by the Society of Automotive Engineers—have several hurdles to jump before becoming a viable transportation option. Most experts believe fully autonomous vehicles are decades away from becoming a reality. Brulte, who believes the U.S. is at least 25 years away from AVs having a significant presence in major metropolitan areas or suburban commuting corridors, points to the need to improve autonomous technology, establish federal safety regulations and win public acceptance.

Regardless, he argues that consumers must be the ones ultimately driving the development and design of AVs and their usage.

FOOD SAFETY GETS SMARTER

By Erika Adams

Tech to ease errors is on the way.

The rise of innovation in restaurant technology has dramatically changed the way the future is being defined in all corners of the industry, including the way food will be handled and prepared. It's not all about robotics replacing humans: Technologies to ensure that food is prepared in such a way that it's as fresh and as clean as possible isn't far off.

Remember Google Glass, Google's ill-fated attempt to sell computer-enabled eyeglasses to mass consumer audiences? That project may have failed as a consumer product, but it is still very much alive and well as the Glass Enterprise Edition, a product sold to businesses across a number of industries—including foodservice.

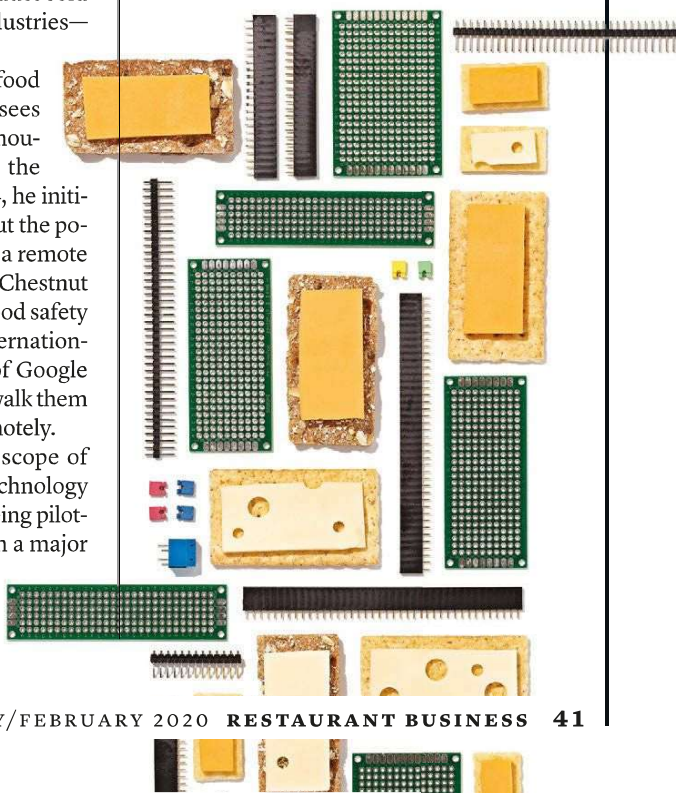
Tom Chestnut, SVP of the global food division for NSF International, oversees a team that conducts hundreds of thousands of food safety audits across the industry on an annual basis. In 2014, he initiated conversations with Google about the potential of using the Glass product as a remote training tool for the industry. At first, Chestnut envisioned that instead of sending food safety auditors around the globe, NSF International would be able to send out pairs of Google Glass to foodservice managers and walk them through the auditing procedures remotely.

Fast forward to today, and the scope of the potential applications of this technology has since expanded. It's currently being piloted as a food safety training tool with a major franchised restaurant chain, and it could eventually make its way into kitchens across the country.

"In food safety, it's all about, 'What if we had the ability to correct human error?'" Chestnut says. "I mean, where we're ultimately going with the technology over the course of the next 12 months is to have that ability to detect human error in real time. If an employee is wearing the device, going step by step through food preparation, and the glasses detect a deviation, it will correct them in real time."

The University of Arkansas Department of Food Science recently conducted a study with Google Glass and NSF International's training software and found that, on average, participants who used the eyeglasses were able to learn and execute proper food handling techniques in half the amount of time as those who were trained with traditional videos. Plus, there's no variance in the training, as opposed to having a manager walk each new employee through proper food handling techniques.

Google just released an updated version of the Glass Enterprise Edition, and Chestnut says his team is preparing for a wider release in the near future. This isn't the only tech in test to improve overall food safety. One other innovation on the market, which is already in place at some chains and universities, is a device that scans employees' hands to identify potential contaminants in less than two seconds. The system alerts employees to contamination, which encourages better in-restaurant sanitation.



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[1]Technomic Soup & Salad Consumer Trend Report, 2018
[2]Technomic Flavor Consumer Trend Report, 2017

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THE FUTURE OF FOOD

How is it consumed?

The intersection of demographics and technology will result in a different kind of customer, one who is more reliant on tech while also being increasingly discerning when it comes to the food they choose to consume. Operations will respond with more individualized offerings and streamlined ordering and payment.

THE FUTURE CONSUMER BREAKS ALL THE RULES

By Kat Martin

Offering personalization will be key as demographic, cultural and behavioral shifts loom large.

What will the American food consumer look like in 2030? Demographically, it's unlike anything the country has seen before.

By 2030, all baby boomers will be older than 65, with 20% of the population at retirement age, according to the U.S. Census Bureau's 2017 National Population Projections. "The aging of baby boomers means that within just a couple of decades, older people are projected to outnumber children for the first time in U.S. history," said Jonathan Vespa, a demographer with the U.S. Census Bureau. This is projected to occur in 2034.

However, boomers won't age like past generations because they are aging in place, remaining in their homes instead of going into nursing homes, says Laura Gurski, senior managing director and global lead of consumer goods and services for Accenture, a global professional services company based in Dublin. "They will be a [food consumer] that will have similar needs to the younger generations in that they will be looking for something personalized, good nutritional value, something that is already prepared and easy to heat up or maybe even arrive hot," she says.

The decade of 2030 is projected to be transformative, because the population is expected to grow at a slower pace and become more racially and ethnically diverse. For example, children under age 10—who will become young adults and consumers by 2030—have no majority race. Those identifying as two or more races is expected to be the fastest-growing demographic for the next several decades, followed by single-race Asians and Hispanics of any race. The percentage of the population identifying as white will continue to fall, while those identifying as Hispanic will continue to grow.

Digital effects

Demographics is only one piece of the puzzle of who will be the food consumer of the future. Other forces will influence the way people look at and consume food. The biggest, of course, is technology, which affects generations differently. By 2030, much of the population will be what Simon Anderson, futurist and founder of Venture Foresight, identifies as digital native (versus older generations that are digital immigrants who have had to learn technology in adulthood).

Anderson identifies artificial intelligence (AI) as one of the biggest trends in the food industry that will greatly affect how consumers interact with food. This has led to what Ernst & Young calls the Smart Consumer, who will use AI to optimize everything, including what they eat. AI bots and smart home services will perform consistent purchases, and people will trust them to make the right decisions, said Kristina Rogers and Andrew Cosgrove in their recent report for Ernst & Young, "Eight

Forces That Will Shape the Future Consumer." This means people will become even more engaged for the items that they actually shop for, such as food.

Gurski of Accenture notes that people in the coming years, particularly younger consumers, will morph more into a "prosumer," which means they "don't simply 'consume' a brand's product or service. Instead, they weigh up all the information from every interaction: the communications they see and read, the design ethos, their direct experience with the brand, their engagements with employees, as well as the product or service itself. These prosumers take all this information and process it to evaluate their broad perception of a brand."

Rise of individualization

What this means is personalization and individualization are going to be table stakes. Consumers will make their own rules about what they consume, says Robert Byrne, senior manager of consumer insights for Technomic. It will become more difficult for food purveyors, because people will say, "I make the rules for me, the individual, and I can therefore break the rules whenever I want, however I want," Byrne says.

Advances in wearables and nutrigenetics that allow consumers to customize a diet that is ideal for them will be possible, "but there will be two categories of people that are going to care about it," Gurski says. "I think there are those with a health condition, like diabetes, for example, they are going to take the time to pay attention to that. Then you go back to the subsegment of people that really care about organic, and they can afford to do that."

While the knowledge will be there, human nature can't be discounted, Byrne says. He notes that currently 84% of the population doesn't follow any diet whatsoever, and the data doesn't point to that changing. "The shift is not going to be so seismic or so massive," he says. "Ultimately, people crave and want to eat comfort foods like french fries."

EXPERT INSIGHTS // FUTURIST BRIAN FRANK

How far away are we from people having so much more knowledge about their own nutritional needs?

I think it's very, very close. And I think that people are also subscribing to what I call these food communities or food tribes. People are already self-selecting, saying, "I'm paleo, I'm keto, I'm gluten-free," and things like that. And now all that just has to be captured. ... I think we're starting to see a first-generation technology take hold both in restaurant and retail. ...

This whole eating for what we individually need, the personalized nutrition, [will have an impact]. But more broadly, how do we understand and collect information about consumers such that the brands and the operators can have that information themselves so they can make better decisions about who they reach out to? So I think customer engagement, direct consumer, as well as more discreteness. I think the days of putting coupons in flyers and sending them out to people is over.

EVOLVING TECH ENTRY POINTS

By Jackson Lewis

Kiosks and voice technology will make ordering easier—and help staff, too.

"The mobile device is going to be the center focus for the foreseeable future looking 10 years out," says Gray Taylor, executive director of technology-standards organization Conexxus. Foodservice has already started transitioning to this new reality. Take the "just walk out," no-checkout experience of the Amazon Go smart c-store as an example. The process is possible because of the mobile device used to open the turnstile doors at the store's entrance.

Taylor says the technology powering mobile devices will extend to in-store kiosks. "There's technology out there that could literally put a kiosk on a cooler door [in a grab-and-go environment] and project a menu board that you can order from or even pay from," he says. "You're going to see a proliferation of consumer touchpoints all over the store."

Then take the quick-service drive-thru. "That's a natural fit for natural language ordering," Taylor says, referring to a verbal interface that allows people to interact with technology. "[The customers] can say they want a No. 5, medium, with a Coke, just like they're doing today with a human being, but the machine is actually going to be more accurate than the human being."

However, Taylor contends that voice computing will be more useful to employees than customers. He suggests operators upload their staff manual, recipes and other training information as an Alexa skill. "Once you get really good at that, then it's time to launch it on your consumer, not the other way around," he says.