



ANNALS OF TECHNOLOGY

THE BAKEOFF

Competing to create the ultimate cookie.

BY MALCOLM GLADWELL

Steve Gundrum launched Project Delta at a small dinner last fall at Il Fornaio, in Burlingame, just down the road from the San Francisco Airport. It wasn't the first time he'd been to Il Fornaio, and he made his selection quickly, with just a glance at the menu; he is the sort of person who might have thought about his choice in advance—maybe even that morning, while shaving. He would have posed it to himself as a question—Ravioli alla Lucana?—and turned it over in his mind, assembling and disassembling the dish, ingredient by ingredient, as if it were a model airplane. Did the Pecorino pepato really belong? What if you dropped the basil? What would the ravioli taste like if you froze it, along with the ricotta and the Parmesan, and tried to sell it in the supermarket? And then what would you do about the fennel?

Gundrum is short and round. He has dark hair and a mustache and speaks with the flattened vowels of the upper Midwest. He is voluble and excitable and doggedly unpretentious, to the point that your best chance of seeing him in a suit is probably Halloween. He runs Mattson, one of the country's foremost food research-and-development firms, which is situated in a low-slung concrete-and-glass building in a nondescript office park in Silicon Valley. Gundrum's office is a spare, windowless room near the rear, and all day long white-coated technicians come to him with prototypes in little bowls, or on skewers, or in Tupperware containers. His job is to taste and advise, and the most common words out of his mouth are "I have an idea." Just that afternoon, Gundrum had ruled on the reformulation of a popular spinach dip (which had an unfortunate tendency to smell like lawn clippings) and examined the latest iteration of a low-carb kettle corn for evidence of rhythmic munching (the metronomic hand-to-mouth cycle that lies at the heart of any successful snack experience). Mattson created the shelf-stable Mrs. Fields Chocolate Chip Cookie, the new Boca Burger products for Kraft Foods, Orville Redenbacher's Butter Toffee Popcorn Clusters, and so many other products that it is impossible to walk down the aisle of a supermarket and not be surrounded by

ethnovation—and had some of the foremost talents in the food industry go head to head.

evidence of the company's handiwork.

That evening, Gundrum had invited two of his senior colleagues at Mattson—Samson Hsia and Carol Borba—to dinner, along with Steven Addis, who runs a prominent branding firm in the Bay Area. They sat around an oblong table off to one side of the dining room, with the sun streaming in the window, and Gundrum informed them that he intended to reinvent the cookie, to make something both nutritious and as “indulgent” as the premium cookies on the supermarket shelf. “We want to delight people,” he said. “We don’t want some ultra-high-nutrition power bar, where you have to rationalize your consumption.” He said it again: “We want to delight people.”

As everyone at the table knew, a healthful, good-tasting cookie is something of a contradiction. A cookie represents the combination of three unhealthful ingredients—sugar, white flour, and shortening. The sugar adds sweetness, bulk, and texture: along with baking powder, it produces the tiny cell structures that make baked goods light and fluffy. The fat helps carry the flavor. If you want a big hit of vanilla, or that chocolate taste that really blooms in the nasal cavities, you need fat. It also keeps the strands of gluten in the flour from getting too tightly bound together, so that the cookie stays chewable. The flour, of course, gives the batter its structure, and, with the sugar, provides the base for the browning reaction that occurs during baking. You could replace the standard white flour with wheat flour, which is higher in fibre, but fibre adds grittiness. Over the years, there have been many attempts to resolve these contradictions—from Snackwells and diet Oreos to the dry, grainy hockey pucks that pass for cookies in health-food stores—but in every case flavor or fluffiness or tenderness has been compromised. Steve Gundrum was undeterred. He told his colleagues that he wanted Project Delta to create the world’s greatest cookie. He wanted to do it in six months. He wanted to enlist the biggest players in the American food industry. And how would he come up

with this wonder cookie? The old-fashioned way. He wanted to hold a bakeoff.

The standard protocol for inventing something in the food industry is called the matrix model. There is a department for product development, which comes up with a new idea, and a department for process development, which figures out how to realize it, and then, down the line, departments for packing, quality assurance, regulatory affairs, chemistry, microbiology, and so on. In a conventional bakeoff, Gundrum would have pitted three identical matrixes against one another and compared the results. But he wasn’t satisfied with the unexamined assumption behind the conventional bakeoff—that there was just one way of inventing something new.

Gundrum had a particular interest, as it happened, in software. He had read widely about it, and once, when he ran into Steve Jobs at an Apple store in the Valley, chatted with him for forty-five minutes on technical matters relating to the Apple operating system. He saw little difference between what he did for a living and what the software engineers in the surrounding hills of Silicon Valley did. “Lines of code are no different from a recipe,” he explains. “It’s the same thing. You add a little salt, and it tastes better. You write a little piece of code, and it makes the software work faster.” But in the software world, Gundrum knew, there were ongoing debates about the best way to come up with new code.

On the one hand, there was the “open source” movement. Its patron saint was Linus Torvald, the Norwegian hacker who decided to build a free version

of Unix, the hugely complicated operating system that runs many of the world’s large computers. Torvald created the basic implementation of his version, which he called Linux, posted it online, and invited people to contribute to its development. Over the years, thousands of programmers had helped, and Linux was now considered as good as proprietary versions of Unix. “Given enough eyeballs all bugs are shallow” was the Linux mantra: a thousand peo-

ple working for an hour each can do a better job writing and fixing code than a single person working for a thousand hours, because the chances are that among those thousand people you can find precisely the right expert for every problem that comes up.

On the other hand, there was the “extreme programming” movement, known as XP, which was led by a legendary programmer named Kent Beck. He called for breaking a problem into the smallest possible increments, and proceeding as simply and modestly as possible. He thought that programmers should work in pairs, two to a computer, passing the keyboard back and forth. Between Beck and Torvald were countless other people, arguing for slightly different variations. But everyone in the software world agreed that trying to get people to be as creative as possible was, as often as not, a *social* problem: it depended not just on who was on the team but on how the team was organized.

“I remember once I was working with a printing company in Chicago,” Beck says. “The people there were having a terrible problem with their technology. I got there, and I saw that the senior people had these corner offices, and they were working separately and doing things separately that they had trouble integrating later on. So I said, ‘Find a space where you can work together.’ So they found a corner of the machine room. It was a raised floor, ice cold. They just loved it. They would go there five hours a day, making lots of progress. I flew home. They hired me for my technical expertise. And I told them to rearrange the office furniture, and that was the most valuable thing I could offer them.”

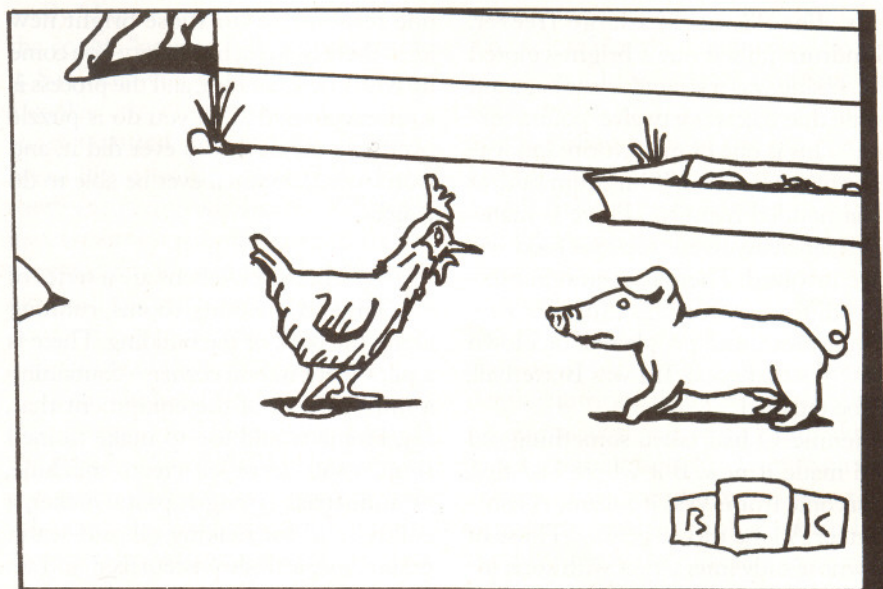
It seemed to Gundrum that people in the food world had a great deal to learn from all this. They had become adept at solving what he called “science projects”—problems that required straightforward, linear applications of expensive German machinery and armies of white-coated people with advanced degrees in engineering. Cool Whip was a good example: a product processed so exquisitely—with air bubbles of such fantastic uniformity and stability—that it remains structurally sound for months, at high elevation and



at low elevation, frozen and thawed and then refrozen. But coming up with a healthy cookie, which required finessing the inherent contradictions posed by sugar, flour, and shortening, was the kind of problem that the food industry had more trouble with. Gundrum recalled one brainstorming session that a client of his, a major food company, had convened. "This is no joke," he said. "They played a tape where it sounded like the wind was blowing and the birds were chirping. And they posed us out on a dance floor, and we had to hold our arms out like we were trees and close our eyes, and the ideas were supposed to grow like fruits off the limbs of the trees. Next to me was the head of R. & D., and he looked at me and said, 'What the hell are we doing here?'"

For Project Delta, Gundrum decreed that there would be three teams, each representing a different methodology of invention. He had read Kent Beck's writings, and decided that the first would be the XP team. He enlisted two of Mattson's brightest young associates—Peter Dea and Dan Howell. Dea is a food scientist, who worked as a confectionist before coming to Mattson. He is tall and spare, with short dark hair. "Peter is really good at hitting the high note," Gundrum said. "If a product needs to have a particular flavor profile, he's really good at getting that one dimension and getting it right." Howell is a culinarian—goateed and talkative, a man of enthusiasms who uses high-end Mattson equipment to make an exceptional cup of espresso every afternoon. He started his career as a barista at Starbucks, and then realized that his vocation lay elsewhere. "A customer said to me, 'What do you want to be doing? Because you clearly don't want to be here,'" Howell said. "I told him, 'I want to be sitting in a room working on a better non-fat pudding.'"

The second team was headed by Barb Stuckey, an executive vice-president of marketing at Mattson and one of the firm's stars. She is slender and sleek, with short blond hair. She tends to think out loud, and, because she thinks quickly, she ends up talking quickly, too—in nervous brilliant bursts. Stuckey, Gundrum decided, would represent "managed" research and develop-



"I can't find a decent bagel in this place."

ment—a traditional hierarchical team, as opposed to a partnership like Dea and Howell's. She would work with Doug Berg, who runs one of Mattson's product-development teams. Stuckey would draw the big picture. Berg would serve as sounding board and project director. His team would execute their conceptions.

Then Gundrum was at a technology conference in California and heard the software pioneer Mitch Kapor talking about the open-source revolution. Afterward, Gundrum approached Kapor. "I said to Mitch, 'What do you think? Can I apply this—some of the same principles—outside of software and bring it to the food industry?'" Gundrum recounted. "He stopped and said, 'Why the hell not!'" So Gundrum invited an elite group of food-industry bakers and scientists to collaborate online. They would be the third team. He signed up a senior person from Mars, Inc., someone from R. & D. at Kraft, the marketing manager for Nestlé Toll House refrigerated/frozen cookie dough, a senior director of R. & D. at Birds Eye Foods, the head of the innovation program for Kellogg's Morning Foods, the director of seasoning at McCormick, a cookie maven formerly at Keebler, and six more high-level specialists. Mattson's innovation manager, Carol Borba, who began her

career as a line cook at Bouley, in Manhattan, was given the role of project manager. Two Mattson staffers were assigned to carry out the group's recommendations. This was the Dream Team. It is quite possible that this was the most talented group of people ever to work together in the history of the food industry.

Soon after the launch of Project Delta, Steve Gundrum and his colleague Samson Hsia were standing around, talking about the current products in the supermarket which they particularly admire. "I like the Uncrustable line from Smuckers," Hsia said. "It's a frozen sandwich without any crust. It eats very well. You can put it in a lunchbox frozen, and it will be unfrozen by lunchtime." Hsia is a trim, silver-haired man who is said to know as much about emulsions as anyone in the business. "There's something else," he said, suddenly. "We just saw it last week. It's made by Jennie-O. It's turkey in a bag." This was a turkey that was seasoned, plumped with brine, and sold in a heat-resistant plastic bag: the customer simply has to place it in the oven. Hsia began to stride toward the Mattson kitchens, because he realized they actually had a Jennie-O turkey in the back. Gundrum followed, the two men weaving their way through the maze of corridors that make up the Mattson of-

fices. They came to a large freezer. Gundrum pulled out a bright-colored bag. Inside was a second, clear bag, and inside that bag was a twelve-pound turkey. "This is one of my favorite innovations of the last year," Gundrum said, as Hsia nodded happily. "There is material science involved. There is food science involved. There is positioning involved. You can take this thing, throw it in your oven, and people will be blown away. It's that good. If I was Butterball, I'd be terrified."

Jennie-O had taken something old and made it new. But where had that idea come from? Was it a team? A committee? A lone turkey genius? Those of us whose only interaction with such innovations is at the point of sale have a naïve faith in human creativity; we suppose that a world capable of coming up with turkey in a bag is capable of coming up with the next big thing as well—a healthy cookie, a faster computer chip, an automobile engine that gets a hundred miles to the gallon. But if you're the

one responsible for those bright new ideas there is no such certainty. You come up with one great idea, and the process is so miraculous that all you do is puzzle over how on earth you ever did it, and worry whether you'll ever be able to do it again.

The Mattson kitchens are a series of large, connecting rooms, running along the back of the building. There is a pilot plant in one corner—containing a mini version of the equipment that, say, Heinz would use to make canned soup, a soft-serve ice-cream machine, an industrial-strength pasta-maker, a colloid mill for making oil-and-water emulsions, a flash pasteurizer, and an eighty-five-thousand-dollar Japanese-made coextruder for, among other things, pastry-and-filling combinations. At any given time, the firm may have as many as fifty or sixty projects under way, so the kitchens are a hive of activity, with pressure cookers filled with baked beans bubbling in one corner, and someone

rushing from one room to another carrying a tray of pizza slices with experimental toppings.

Dea and Howell, the XP team, took over part of one of the kitchens, setting up at a long stainless-steel lab bench. The countertop was crowded with tins of flour, a big white plastic container of wheat dextrin, a dozen bottles of liquid sweeteners, two plastic bottles of Kirkland olive oil, and, somewhat puzzlingly, three varieties of single-malt Scotch. The Project Delta brief was simple. All cookies had to have fewer than a hundred and thirty calories per serving. Carbohydrates had to be under 17.5 grams, saturated fat under two grams, fibre more than one gram, protein more than two grams, and so on; in other words, the cookie was to be at least fifteen per cent superior to the supermarket average in the major nutritional categories. To Dea and Howell, that suggested oatmeal, and crispy, as opposed to soft. "I've tried lots of cookies that are sold as soft and I never like them, because they're trying to be something that they're not," Dea explained. "A soft cookie is a fresh cookie, and what you are trying to do with soft is be a fresh cookie that's a month old. And that means you need to fake the freshness, to engineer the cookie."

The two decided to focus on a kind of oatmeal-chocolate-chip hybrid, with liberal applications of roasted soy nuts, toffee, and caramel. A straight oatmeal-raisin cookie or a straight low-cal chocolate-chip cookie was out of the question. This was a reflection of what might be called the Hidden Valley Ranch principle, in honor of a story that Samson Hsia often told about his years working on salad dressing when he was at Clorox. The couple who owned Hidden Valley Ranch, near Santa Barbara, had come up with a seasoning blend of salt, pepper, onion, garlic, and parsley flakes that was mixed with equal parts mayonnaise and buttermilk to make what was, by all accounts, an extraordinary dressing. Clorox tried to bottle it, but found that the buttermilk could not coexist, over any period of time, with the mayonnaise. The way to fix the problem, and preserve the texture, was to make the combination more acidic. But when you increased the acidity you ruined the flavor. Clorox's food engineers worked on



"He'll call you back as soon as he's had his coffee."

Hidden Valley Ranch dressing for close to a decade. They tried different kinds of processing and stability control and endless cycles of consumer testing before they gave up and simply came out with a high-acid Hidden Valley Ranch dressing—which promptly became a runaway best-seller. Why? Because consumers had never tasted real Hidden Valley Ranch dressing, and as a result had no way of knowing that what they were eating was inferior to the original. For those in the food business, the lesson was unforgettable: if something was new, it didn't have to be perfect. And, since healthful, indulgent cookies couldn't be perfect, they had to be new: hence oatmeal, chocolate chips, toffee, and caramel.

Cookie development, at the Mattson level, is a matter of endless iteration, and Dea and Howell began by baking version after version in quick succession—establishing the cookie size, the optimal baking time, the desired variety of chocolate chips, the cut of oats (bulk oats? rolled oats? groats?), the varieties of flour, and the toffee dosage, while testing a variety of high-tech supplements, notably inulin, a fibre source derived from chicory root. As they worked, they made notes on tablet P.C.s, which gave them a running electronic record of each version. “With food, there’s a large circle of pretty good, and we’re solidly in pretty good,” Dea announced, after several intensive days of baking. A tray of cookies was cooling in front of him on the counter. “Typically, that’s when you take it to the customers.”

In this case, the customer was Gundrum, and the next week Howell marched over to Gundrum’s office with two Ziploc bags of cookies in his hand. There was a package of Chips Ahoy! on the table, and Howell took one out. “We’ve been eating these versus Chips Ahoy!,” he said.

The two cookies looked remarkably alike. Gundrum tried one of each. “The Chips Ahoy!, it’s tasty,” he said. “When you eat it, the starch hydrates in your mouth. The XP doesn’t have that same granulated-sugar kind of mouth feel.”

“It’s got more fat than us, though, and subsequently it’s shorter in texture,” Howell said. “And so, when you break it, it breaks more nicely. Ours is a little harder to break.”

By “shorter in texture,” he meant that the cookie “popped” when you bit into it. Saturated fats are solid fats, and give a cookie crispness. Parmesan cheese is short-textured. Brie is long. A shortbread like a Lorna Doone is a classic short-textured cookie. But the XP cookie had, for health reasons, substituted unsaturated fats for saturated fats, and unsaturated fats are liquid. They make the dough stickier, and inevitably compromise a little of that satisfying pop.

“The whole-wheat flour makes us a little grittier, too,” Howell went on. “It has larger particulates.” He broke open one of the Chips Ahoy!. “See how fine the grain is? Now look at one of our cookies. The particulates are larger. It is part of what we lose by going with a healthy profile. If it was just sugar and flour, for instance, the carbohydrate chains are going to be shorter, and so they will dissolve more quickly in your mouth. Whereas with more fibre you get longer carbohydrate chains and they don’t dissolve as quickly, and you get that slightly tooth-packing feel.”

“It looks very wholesome, like something you would want to feed your kids,” Gundrum said, finally. They were still only in the realm of pretty good.

Team Stuckey, meanwhile, was having problems of its own. Barb Stuckey’s first thought had been a tea cookie, or, more specifically, a chai cookie—something with cardamom and cinnamon and vanilla and cloves and a soft dairy note. Doug Berg was dispatched to run the experiment. He and his team did three or four rounds of prototypes. The result was a cookie that tasted, astonishingly, like a cup of chai, which was, of course, its problem. Who wanted a cookie that tasted like a cup of chai? Stuckey called a meeting in the Mattson trophy room, where samples of every Mattson product that has made it to market are displayed. After everyone was done tasting the cookies, a bag of them sat in the middle of the table for forty-five minutes—and no one reached to take a second bite. It was a bad sign.

“You know, before the election *Good Housekeeping* had this cookie bakeoff,” Stuckey said, as the meeting ended. “Laura Bush’s entry was full of chocolate chips and had familiar ingredients. And Teresa Heinz went with pumpkin-

spice cookies. I remember thinking, That’s just like the Democrats! So not mainstream! I wanted her to win. But she’s chosen this cookie that’s funky and weird and out of the box. And I kind of feel the same way about the tea cookie. It’s too far out, and will lose to something that’s more comfortable for consumers.”

Stuckey’s next thought involved strawberries and a shortbread base. But shortbread was virtually impossible under the nutritional guidelines: there was no way to get that smooth butter-flour-sugar combination. So Team Stuckey switched to something closer to a strawberry-cobbler cookie, which had the Hidden Valley Ranch advantage that no one knew what a strawberry-cobbler cookie was supposed to taste like. Getting the carbohydrates down to the required 17.5 grams, though, was a struggle, because of how much flour and fruit cobbler requires. The obvious choice to replace the flour was almonds. But nuts have high levels of both saturated and unsaturated fat. “It became a balancing act,” Anne Cristofano, who was doing the bench work for Team Stuckey, said. She baked batch after batch, playing the carbohydrates (first the flour, and then granulated sugar, and finally various kinds of what are called sugar alcohols, low-calorie sweeteners derived from hydrogenizing starch) against the almonds. Cristofano took a version to Stuckey. It didn’t go well.

“We’re not getting enough strawberry impact from the fruit alone,” Stuckey said. “We have to find some way to boost the strawberry.” She nibbled some more. “And, because of the low fat and all that stuff, I don’t feel like we’re getting that pop.”

The Dream Team, by any measure, was the overwhelming Project Delta favorite. This was, after all, the Dream Team, and if any idea is ingrained in our thinking it is that the best way to solve a difficult problem is to bring the maximum amount of expertise to bear on it. Sure enough, in the early going the Dream Team was on fire. The members of the Dream Team did not doggedly fix on a single idea, like Dea and Howell, or move in fits and starts from chai sugar cookies to strawberry shortbread to strawberry cobbler, like Team Stuckey. It

came up with thirty-four ideas, representing an astonishing range of cookie philosophies: a chocolate cookie with gourmet cocoa, high-end chocolate chips, pecans, raisins, Irish steel-cut oats, and the new Ultragrain White Whole Wheat flour; a bite-size oatmeal cookie with a Ceylon cinnamon filling, or chili and tamarind, or pieces of dried peaches with a cinnamon-and-ginger dusting; the classic seven-layer bar with oatmeal instead of graham crackers, coated in chocolate with a choice of coffee flavors; a "wellness" cookie, with an oatmeal base, soy and whey proteins, inulin and oat beta glucan and a combination of erythritol and sugar and sterol esters—and so on.

In the course of spewing out all those new ideas, however, the Dream Team took a difficult turn. A man named J. Hugh McEvoy (a.k.a. Chef J.), out of Chicago, tried to take control of the discussion. He wanted something exotic—not a health-food version of something already out there. But in the e-mail discussions with others on the team his sense of what constituted exotic began to get really exotic—"Chinese star anise plus fennel plus Pastis plus dark chocolate." Others, emboldened by his example, began talking about a possible role for zucchini or wasabi peas. Meanwhile, a more conservative faction, mindful of the Project Delta mandate to appeal to the whole family, started talking up peanut butter. Within a few days, the tensions were obvious:

From: Chef J.

Subject: <no subject>

Please keep in mind that less than 10 years ago, espresso, latte and dulce de leche were EXOTIC flavors / products that were considered unsuitable for the mainstream.

And let's not even mention CHIPOTLE.

From: Andy Smith

Subject: Bought any Ben and Jerry's recently?

While we may not want to invent another Oreo or Chips Ahoy!, last I looked, World's Best Vanilla was B&J's # 2 selling flavor and Haagen Dazs' Vanilla (their top seller) outsold Dulce 3 to 1.

From: Chef J.

Subject: <no subject>

Yes. Gourmet Vanilla does outsell any new flavor. But we must remember that DIET vanilla does not and never has. It is the high end, gourmet segment of ice cream that is growing. Diet Oreos were vastly outsold by new entries like Snackwells. Diet Snickers were vastly outsold by new entries like bal-

ance bars. New Coke failed miserably, while Red Bull is still growing.

What flavor IS Red Bull, anyway?

Eventually, Carol Borba, the Dream Team project leader, asked Gundrum whether she should try to calm things down. He told her no; the group had to find its "own kind of natural rhythm." He wanted to know what fifteen high-powered bakers thrown together on a project felt like, and the answer was that they felt like chaos. They took twice as long as the XP team. They created ten times the headache.

Worse, no one in the open-source group seemed to be having any fun. "Quite honestly, I was expecting a bit more involvement in this," Howard Plein, of Edlong Dairy Flavors, confessed afterward. "They said, expect to spend half an hour a day. But without doing actual bench work—all we were asked to do was to come up with ideas." He wanted to bake: he didn't enjoy being one of fifteen cogs in a machine. To Dan Fletcher, of Kellogg's, "the whole thing spun in place for a long time. I got frustrated with that. The number of people involved seemed unwieldy. You want some diversity of youth and experience, but you want to keep it close-knit as well. You get some depth in the process versus breadth. We were a mile wide and an inch deep." Chef J., meanwhile, felt thwarted by Carol Borba; he felt that she was pushing her favorite, a caramel turtle, to the detriment of better ideas. "We had the best people in the country involved," he says. "We were irrelevant. That's the weakness of it. Fifteen is too many. How much true input can any one person have when you are lost in the crowd?" In the end, the Dream Team whittled down its thirty-four possibilities to one: a chewy oatmeal cookie, with a pecan "thumbprint" in the middle, and ribbons of caramel-and-chocolate glaze. When Gundrum tasted it, he had nothing but praise for its "cookie hedonics." But a number of the team members were plainly unhappy with the choice. "It is not bad," Chef J. said. "But not bad doesn't win in the food business. There was nothing there that you couldn't walk into a supermarket and see on the shelf. Any Pepperidge Farm product is better than that. Any one."

It may have been a fine cookie. But,

since no single person played a central role in its creation, it didn't *seem* to anyone to be a fine cookie.

The strength of the Dream Team—the fact that it had so many smart people on it—was also its weakness: it had too many smart people on it. Size provides expertise. But it also creates friction, and one of the truths Project Delta exposed is that we tend to overestimate the importance of expertise and underestimate the problem of friction. Gary Klein, a decision-making consultant, once examined this issue in depth at a nuclear power plant in North Carolina. In the nineteen-nineties, the power supply used to keep the reactor cool malfunctioned. The plant had to shut down in a hurry, and the shutdown went badly. So the managers brought in Klein's consulting group to observe as they ran through one of the crisis rehearsals mandated by federal regulators. "The drill lasted four hours," David Klinger, the lead consultant on the project, recalled. "It was in this big operations room, and there were between eighty and eighty-five people involved. We roamed around, and we set up a video camera, because we wanted to make sense of what was happening."

When the consultants asked people what was going on, though, they couldn't get any satisfactory answers. "Each person only knew a little piece of the puzzle, like the radiation person knew where the radiation was, or the maintenance person would say, 'I'm trying to get this valve closed,'" Klinger said. "No one had the big picture. We started to ask questions. We said, 'What is your mission?' And if the person didn't have one, we said, 'Get out.' There were just too many people. We ended up getting that team down from eighty-five to thirty-five people, and the first thing that happened was that the noise in the room was dramatically reduced." The room was quiet and calm enough so that people could easily find those they needed to talk to. "At the very end, they had a big drill that the N.R.C. was going to regulate. The regulators said it was one of their hardest drills. And you know what? They aced it." Was the plant's management team smarter with thirty-five people on it than it was with eighty-five? Of course not, but the expertise of

those additional fifty people was more than cancelled out by the extra confusion and noise they created.

The open-source movement has had the same problem. The number of people involved can result in enormous friction. The software theorist Joel Spolsky points out that open-source software tends to have user interfaces that are difficult for ordinary people to use: "With Microsoft Windows, you right-click on a folder, and you're given the option to share that folder over the Web. To do the same thing with Apache, the open-source Web server, you've got to track down a file that has a different name and is stored in a different place on every system. Then you have to edit it, and it has its own syntax and its own little programming language, and there are lots of different comments, and you edit it the first time and it doesn't work and then you edit it the second time and it doesn't work."

Because there are so many individual voices involved in an open-source project, no one can agree on the right way to do things. And, because no one can agree, every possible option is built into the software, thereby frustrating the central goal of good design, which is, after all, to understand what to leave out. Spolsky notes that almost all the successful open-source products have been attempts to clone some preexisting software program, like Microsoft's Internet Explorer, or Unix. "One of the reasons open source works well for Linux is that there isn't any real design work to be undertaken," he says. "They were doing what we would call chasing tail-lights." Open source was great for a science project, in which the goals were clearly defined and the technical hurdles easily identifiable. Had Project Delta been a Cool Whip bakeoff, an exercise in chasing tail-lights, the Dream Team would easily win. But if you want to design a truly innovative software program—or a truly innovative cookie—the costs of bigness can become overwhelming.

In the frantic final weeks before the bakeoff, while the Dream Team was trying to fix a problem with crumbling, and hit on the idea of glazing the pecan on the face of the cookie, Dea and Howell continued to make steady, incremental improvements.

"These cookies were baked five days

ago," Howell told Gundrum, as he handed him a Ziploc bag. Dea was off somewhere in the Midwest, meeting with clients, and Howell looked apprehensive, stroking his goatee nervously as he stood by Gundrum's desk. "We used wheat dextrin, which I think gives us some crispiness advantages and some shelf-stability advantages. We have a little more vanilla in this round, which gives you that brown, rounding background note."

Gundrum nodded. "The vanilla is almost like a surrogate for sugar," he said. "It potentiates the sweetness."

"Last time, the leavening system was baking soda and baking powder," Howell went on. "I switched that to baking soda and monocalcium phosphate. That helps them rise a little bit better. And we baked them at a slightly higher temperature for slightly longer, so that we drove off a little bit more moisture."

"How close are you?" Gundrum asked.

"Very close," Howell replied.

Gundrum was lost in thought for a moment. "It looks very wholesome. It looks like something you'd want to feed your kids. It has very good aroma. I really like the texture. My guess is that it eats very well with milk." He turned back to Howell, suddenly solicitous. "Do you want some milk?"

Meanwhile, Barb Stuckey had a revelation. She was working on a tortilla-chip project, and had bags of tortilla chips all over her desk. "You have no idea how much engineering goes into those things," she said, holding up a tortilla chip. "It's greater than what it takes to build a bridge. It's crazy." And one of the clever things about cheese tortilla chips—particularly the low-fat versions—is how they go about distracting the palate. "You know how you put a chip in your mouth and the minute it hits your tongue it explodes with flavor?" Stuckey said. "It's because it's got this topical seasoning. It's got dried cheese powders and sugar and probably

M.S.G. and all that other stuff on the outside of the chip."

Her idea was to apply that technique to strawberry cobbler—to take large crystals of sugar, plate them with citric acid, and dust the cookies with them. "The minute they reach your tongue, you get this sweet-and-sour hit, and then you crunch into the cookie and get the rest—the strawberry and the oats," she said. The crystals threw off your taste buds. You weren't focussed on the fact that there was half as much fat in the cookie as there should be. Plus, the citric acid brought a tangy flavor to the dried strawberries: suddenly they felt fresh.

Batches of the new strawberry-cobbler prototype were ordered up, with different formulations of the citric acid and the crystals. A meeting was called in the trophy room. Anne Cristofano brought two plastic bags filled with cookies. Stuckey was there, as was a senior Mattson food technologist named Karen Smithson, an outsider brought to the meeting in an advisory role. Smithson, a former pastry chef, was a little older than Stuckey and Cristofano, with an air of self-possession. She broke the seal on the first bag, and took a bite with her eyes half closed. The other two watched intently.

"Umm," Smithson said, after the briefest of pauses. "That is pretty darn good. And this is one of the healthy cookies? I would not say, 'This is healthy.' I can't taste the trade-off." She looked up at Stuckey. "How old are they?"

"Today," Stuckey replied.

"O.K. . . ." This was a complicating fact. Any cookie tastes good on the day it's baked. The question was how it tasted after baking and packaging and shipping and sitting in a warehouse and on a supermarket shelf and finally in someone's cupboard.

"What we're trying to do here is a shelf-stable cookie that will last six months," Stuckey said. "I think we're better off if we can make it crispy."

Smithson thought for a moment. "You can have either a crispy, low-moisture cookie or a soft and chewy cookie," she said. "But you can't get the outside crisp and the inside chewy. We know that. The moisture will migrate. It will equilibrate over time, so you end up with a cookie that's consistent all the way through. Remember we did all



that work on Mrs. Fields? That's what we learned."

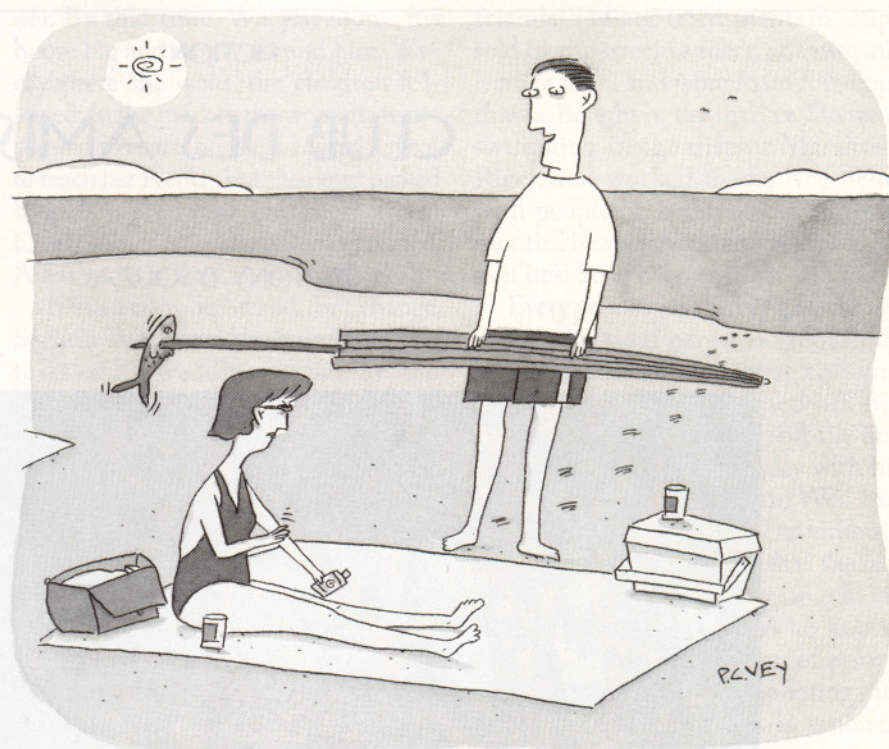
They talked for a bit, in technical terms, about various kinds of sugars and starches. Smithson didn't think that the stability issue was going to be a problem.

"Isn't it compelling, visually?" Stuckey blurted out, after a lull in the conversation. And it was: the dried-strawberry chunks broke through the surface of the cookie, and the tiny citric-sugar crystals glinted in the light. "I just think you get so much more bang for the buck when you put the seasoning on the outside."

"Yet it's not weird," Smithson said, nodding. She picked up another cookie. "The mouth feel is a combination of chewy and crunchy. With the flavors, you have the caramelized sugar, the brown-sugar notes. You have a little bit of a chew from the oats. You have a flavor from the strawberry, and it helps to have a combination of the sugar alcohol and the brown sugar. You know, sugars have different deliveries, and sometimes you get some of the sweetness right off and some of it continues on. You notice that a lot with the artificial sweeteners. You get the sweetness that doesn't go away, long after the other flavors are gone. With this one, the sweetness is nice. The flavors come together at the same time and fade at the same time, and then you have the little bright after-hits from the fruit and the citric crunchies, which are"—she paused, looking for the right word—"brilliant."

The bakeoff took place in April. Mattson selected a representative sample of nearly three hundred households from around the country. Each was mailed bubble-wrapped packages containing all three entrants. The vote was close but unequivocal. Fourteen per cent of the households voted for the XP oatmeal-chocolate-chip cookie. Forty-one per cent voted for the Dream Team's oatmeal-caramel cookie. Forty-four per cent voted for Team Stuckey's strawberry-cobbler.

The Project Delta postmortem was held at Chaya Brasserie, a French-Asian fusion restaurant on the Embarcadero, in San Francisco. It was just Gundrum and Steven Addis, from the first Project Delta dinner, and their wives. Dan Howell was immersed in a confidential project for a big food conglomerate back East. Peter Dea was working with Cargill on a well-



"I love it when something has many uses."

ness product. Carol Borba was in Chicago, at a meeting of the Food Marketing Institute. Barb Stuckey was helping Ringling Brothers rethink the food at its concessions. "We've learned a lot about the circus," Gundrum said. Meanwhile, Addis's firm had created a logo and a brand name for Project Delta. Mattson has offered to license the winning cookie at no cost, as long as a percentage of its sales goes to a charitable foundation that Mattson has set up to feed the hungry. Someday soon, you should be able to go into a supermarket and buy Team Stuckey's strawberry-cobbler cookie.

"Which one would you have voted for?" Addis asked Gundrum.

"I have to say, they were all good in their own way," Gundrum replied. It was like asking a mother which of her children she liked best. "I thought Barb's cookie was a little too sweet, and I wish the open-source cookie was a little tighter, less crumbly. With XP, I think we would have done better, but we had a wardrobe malfunction. They used too much batter, overbaked it, and the cookie came out too hard and thick."

In the end, it was not so much which cookie won that interested him. It was

who won—and why. Three people from his own shop had beaten a Dream Team, and the decisive edge had come not from the collective wisdom of a large group but from one person's ability to make a lateral connection between two previously unconnected objects—a tortilla chip and a cookie. Was that just Barb being Barb? In large part, yes. But it was hard to believe that one of the Dream Team members would not have made the same kind of leap had they been in an environment quiet enough to allow them to think.

"Do you know what else we learned?" Gundrum said. He was talking about a questionnaire given to the voters. "We were looking at the open-ended questions—where all the families who voted could tell us what they were thinking. They all said the same thing—all of them." His eyes grew wide. "They wanted better granola bars and breakfast bars. I would not have expected that." He fell silent for a moment, turning a granola bar over and around in his mind, assembling and disassembling it piece by piece, as if it were a model airplane. "I thought that they were pretty good," he said. "I mean, there are so many of them out there. But apparently people want them better." ♦