





the GOOGLE PHONE

HERE COMES **ANDROID**, THE OPEN SOURCE OPERATING SYSTEM THAT WILL BREAK THE CORPORATE STRANGLEHOLD ON THE WIRELESS WEB, MAKE IT FUN TO SURF FROM YOUR CELL, AND (OH YEAH) SCOOP UP BILLIONS OF DOLLARS IN MOBILE ADS.

BY DANIEL ROTH

"IS THIS INTERESTING TO GOOGLE?"

That's what Andy Rubin was asking Larry Page. It was a spring day in 2005, and the two were in a conference room just off the main lobby at Google's headquarters. A simple yes and Rubin would have walked away happy. • They had met three years before, when Rubin was about to launch a smartphone he'd invented called the Sidekick. At the time, Google was just an up-and-comer, trailing AOL and even Lycos in traffic. But Rubin, a well-known Silicon Valley player, chose Google as the Sidekick's default search engine. Page was flattered by the unexpected endorsement. So when Rubin called out of the blue and requested this meeting, well, Page couldn't say no. • The Google cofounder arrived late, as usual. Rubin walked to the whiteboard and began his pitch. There were nearly 700 million cell phones sold each year compared with fewer than 200 million PCs—and the gap was widening. Increasingly, he said, phones were the way people wanted to connect with each other and with everything else. Yet the mobile industry was stuck in the dark ages. Unlike the Web, where open standards had fostered a multitude of cool companies and applications, mobile was a tyrannical, closed system, repelling all innovators and disrupters who tried to gain entrance. • Rubin said his startup, called Android, had the solution: a free, open source mobile platform that any coder could write for and any handset maker could install. He would make his money by selling support for the system—security services, say, or email management. Android would have the spirit of

▶ Known in Silicon Valley as a brilliant gadget guy, Andy Rubin wants to bring the coolest bits of the Web to your cell phone.



Linux and the reach of Windows. It would be a global, open operating system for the wireless future.

Rubin didn't want money from Page. He already had funding. What he wanted was Google's imprimatur—even an email from Page would do. Rubin figured he could attract more VC funds with the search giant on board, possibly with a hint that Google might be interested in developing its own branded phone. He pulled out a prototype.

Page picked up the device. He had been personally frustrated yet fascinated by the mobile market for years. He already knew the numbers—he didn't need Rubin to tell

him how many PCs and mobile phones were out there. He also knew that it added up to a massive problem for Google.

The desktop metaphor was fading. Phones were going to replace PCs as the main gateway to the Internet, and they were going to do it soon. Why would consumers tether themselves to a PC when phones were growing more and more powerful—and were cheaper, too?

But because cell phones ran on different software, had less memory, and operated under the constraints of pay-per-byte wireless networks, the mobile Web was a stripped-down, mimeographed version of the real thing. Read-

the always-connected consumer whenever and wherever needed. That was easy on PCs, but phones didn't play nice with the cloud. Google dominated the Web today, but tomorrow might be a different story.

Working the problem had been a nightmare. Google engineers had a closet overflowing with mobile phones to test the company's wireless applications—mobile Google, Blogger, search over SMS. There were dozens of operating systems to navigate, a mobile Tower of Babel completely at odds with the easy access and universal language of the Web.

What worried Page most was that the only firm from the PC world that seemed to be successfully navigating the mobile labyrinth was Microsoft, one of Google's biggest rivals. The Windows Mobile platform had less than 10 percent of the US smartphone market, but it was growing fast. Microsoft's system, however, was the ugly stepsister of what Rubin was proposing: Redmond executives cared less about opening up the Net to mobile users than about tying the mobile operating system into its desktop dominance. A decade ago, Microsoft had underestimated the growth of the Web and then lost control of it to Google. Now it looked like it was Google's turn to be caught flat-footed.

If Google had it bad, users had it worse. Every year since 2002, the wireless sector managed to place at or near the top of the Better Business Bureau's tally of the most

There had to be pent-up demand out there for something better.

So was Rubin's pitch interesting to Page? Absolutely. But he didn't want to stick his logo on Rubin's phone. Or write a supportive email. He had a better idea: Google would buy Android.

Rubin was floored. He had come in looking for an encouraging word and left with the biggest payday in his life. (The eventual purchase price was estimated at as much as \$50 million.) Now all he had to do was live up to his own hype.



GOOGLE'S MODEL is to build a killer app, then monetize it later," Rubin says. We're sitting in another conference room across the street from where he and Page struck their deal three years ago. The building, which houses Google's mobile division, is Rubin's domain now. There's a self-piloting model helicopter bearing an Android logo parked in the hall—Rubin builds them in his spare time. Beyond are floors of people who think of nothing but the cellular future of their employer. In the lobby, a flatscreen TV shows a spinning globe with animated flares erupting wherever people are using Google to search from their mobile phones. This fall, when the first Android phones hit the market, those flares will presumably flame even higher.

Rubin is tall and skinny and a casual dresser even by Google standards. He's 45 but seems younger. Sitting with one leg

tucked beneath him, he explains the mission of the Googlefied Android to me, but I barely follow the words. I'm staring at his phone. It's clearly a demo—black, scuffed, covered with fingerprints; most of the face is taken up by the screen. Rubin absentmindedly slides it around the big wooden

table, then picks it up and shifts it from hand to hand. It's maddening. All I want to do is get a closer look at his killer app.

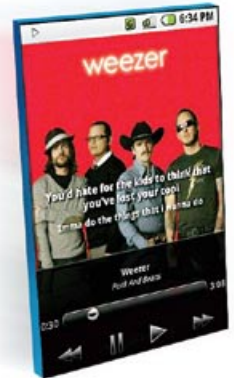
After Google bought Android in July 2005, Silicon Valley pulsed with gossip and speculation about what the search giant was planning. Everyone figured Apple had a phone in the works and assumed Google must be developing one too. Rubin and his cofounders, Rich Miner, Nick Sears, and Chris White, weren't

SINCE GOOGLE DOESN'T DO HARDWARE, IT DOESN'T CARE HOW ANY INDIVIDUAL PHONE IS PIMPED OUT—AS LONG AS THE THING RUNS ON **ANDROID** SOFTWARE.

ing and surfing and—more to the point—viewing Google ads was a slow, stultifying chore. Even worse, a second-class Web could derail Google's grand strategy. The company was trying to worm its way deeper into users' lives by hosting applications and personal files on Google servers, then dishing them out to

complained-about industries. Americans would rather do business with a used-car salesman or a collection agent than with a customer service rep for, say, T-Mobile or Motorola. And who could blame them? The plans were expensive, pricing was complex and capricious, and the phones never lived up to expectations. Constant innovation, the first principle of Page and Rubin's world, was anathema to phone companies.

ANDROID'S KILLER APPS



Nearly any new phone will be able to run Android (HTC, LG, and Motorola have dedicated models on the way). But the OS is just the start; the phone evolves as users add apps from indie developers to take advantage of the seamless Web access. [Top picks](#) ▶

COOKING CAPSULES

Displays cooking videos and ingredient lists, then uses the phone's location awareness to find the nearest grocery store. Now you're cooking with GPS.

ANDROID SCAN

When users snap a shot of a bar code, the app pulls up reviews and price comparisons from across the Web. If you're shopping for music, it'll find online samples.

COMMANDRO

A GPS-enhanced social networking app that lets you map and track your friends in real time while using the IM function to plan impromptu meet-ups on the go.

TUNEWIKI

A karaoke-style music app that syncs lyrics from its server to your tunes. Users crowd-source the process by tapping the screen to "teach" the program where each line goes.

talking. "Trying to guess Google's next move recently replaced digging through Steve Jobs' garbage... at the top of our weekend activities list," wrote tech blog Engadget. When Apple unveiled the iPhone last summer, expectations for a gPhone—could it be called anything else?—grew even more feverish.

But when Google finally broke its silence in early November, there was nothing about a gPhone. Instead, there was a press release. Thirty-four companies—firms like Texas Instruments, Intel, T-Mobile, and Sprint Nextel—were joining Google to build a wireless interface based on open source Linux software. The group dubbed itself the Open Handset Alliance. Competitors sighed in relief. This was how Google planned to shake up the nearly trillion-dollar global wireless market? A consortium?

"Their efforts are just some words on paper," remarked Steve Ballmer, CEO of Microsoft, at a conference in Japan. "Another Linux platform," shrugged the CEO of Symbian, the dominant smartphone operating system outside the US.

A week later, Google upped the ante. The company put a free Android software developer's kit on its Web site and announced the Developer Challenge, with \$10 million in

prize money to be parceled out to the creators of the best applications for the new system—a great social networking tool, say, or a handwriting recognition program. The Challenge was an open call; anyone was invited to take a shot.

Those hoping for a new gadget to rival the iPhone finally understood that Google had something radically different in mind. Apple's device was an end in itself—a self-contained, jewel-like masterpiece locked in a sleek protective shell. Android was a means, a seed intended to grow an entire new wireless family tree. Google was never in the hardware business. There would be no gPhone—instead, there would be hundreds of gPhones.

HTC, Motorola, and LG all announced plans to market new Android phones in a multitude of shapes and sizes, each with different software options. Android was a fully customizable system. Any application could be removed or swapped out for another. Even the few programs that Google was creating from scratch—an email app, a contacts manager—could be replaced with third-party software that did the same thing. Google didn't care how any individual model was pimped

out as long as the hidden Android DNA was there underneath, keeping everything tied to the Internet and running smoothly.

The company's theory was that if you make browsing by phone easy and fun, people will use it just like a desktop browser, with Google search as the main port of entry. Christmas Day 2007 offered Google proof that the strategy could work. That morning, people unwrapped their iPhones, powered them up, clicked on the easy-to-use Safari browser—and pointed to Google. In 24 hours, the iPhone, which accounted for fewer than

RISE OF THE SMARTPHONE

5 percent of all smartphones worldwide, drove more traffic to Google than any other mobile device. If Apple could generate that much business for Google, surely Google could do even better for itself. CEO Eric Schmidt, a BlackBerry man at heart, was initially skeptical about teaming up with Rubin. But once he embraced the idea of Android,

GOOGLE WANTS DEVELOPERS TO WRITE PROGRAMS THAT DRAW SWATHS OF USERS, WHICH IN TURN ATTRACT MORE DEVELOPERS.

he did it with a convert's zeal. "That is the re-creation of the Internet. That is the re-creation of the PC story," Schmidt told business leaders at the World Economic Forum in Davos a month after Christmas. "And it will happen in the next year."

Rubin finally turns on the battered phone and launches Google Maps. "So, here we are," he says, moving the satellite image of San Francisco by dragging one finger along the screen. "This is the Embarcadero. I can manipulate it. I can zoom." He taps to focus in on a street view of a truck's license plate, then clicks to a new application. "Let's see, let's go to a music player. I can go to Artist here and get my list of—oops, it says the SD card is missing."

He squints into the tiny card slot. "Hmm, it's there. Looks like I have a little bit of a bug." He shrugs, taps on an icon to go to the browser, and checks out CNN.com. It looks good—a small but fully functional version of the Web site. Back when he and Page were first talking, this would have been amazing. But now, with the iPhone and other enhanced smartphones out there? No big deal. A minute later the battery dies.

He pockets the phone and finishes up. I can't help feeling a little disappointed. This is the phone Page is making his big bet on? In Google's regular line of business, the strategy has always been to unveil innovative, occasionally flawed products—like Google Docs—then keep them in beta for months or years. But people don't want to buy a phone in beta. Android products have to work right from the start. Is this really the phone that's going to change everything?

IT WAS DAN MORRILL'S first time out of the country, and that made him a little nervous. But as he gathered his bags in the Munich airport on a surprisingly warm January morning earlier this year, after the last leg of a long, exhausting flight from San Francisco, he looked up to see a Paul Bunyan-sized BMW grill fixed to the wall. If you're looking for engineers, he thought, there are worse places to go than a city that welcomes you with an oversize Beemer.

Morrill is a software engineer turned "developer advocate." He's a roving evangelist to the coder world. But that's just his cover. Morrill's real mission is to make sure Android triggers a full-on network effect—that mystical melding of passion and self-interest that fueled the growth of behemoths like eBay and Facebook. Google wants developers to build cool programs that can draw huge numbers of users, creating an expanding market that attracts more developers to build more cool programs to attract more users. If the \$10 million prize is the spark, Morrill's job is to make sure there's ignition. Google had dispatched him to Germany to meet with a small group of local mobile programmers.

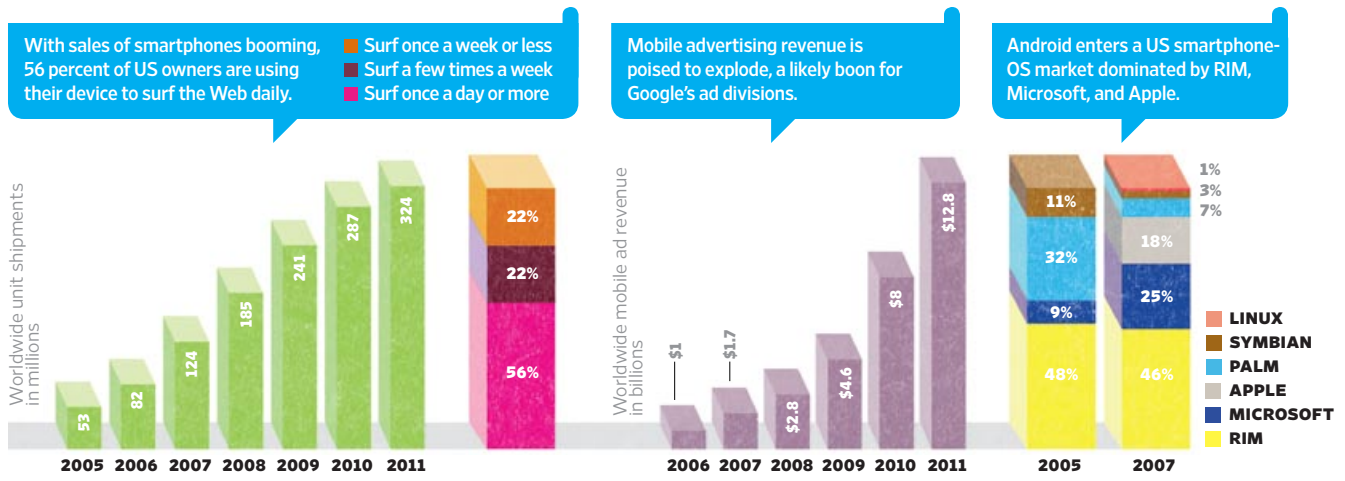
The morning of his talk, Morrill dresses in his usual uniform, an untucked button-down over a silk-screened T-shirt, this one with the image of a friendly green robot, the Android icon. He walks into the confer-

ence room of the Ininside Hotel and stops. There are almost 200 people, more than twice what he expected. A dozen developers are sitting on the floor in the back of the room, computers propped on their knees. There are hobbyists, chief technical officers, indie programmers, and students.

Morrill runs through his prepared remarks then starts taking questions. They want to know about Android programming, of course, but they also ask why Google is doing this, what the company's expectations are, and what the criteria will be for awarding the prize money. At one point, hotel management shows up to warn Morrill that the size of the gathering violates the fire code.

The virus was spreading. At an event the next day in Israel, the local Google office had to switch locations to handle the overflow crowd. In London, registration for the developer's conference filled up in two hours. Fanboys were putting up sites for the platform: AndroidGuys, Phandroid, Planet Android. In Thailand, the government carved out an entire floor of Software Park—a federally funded business incubator housed in a skyscraper north of Bangkok—for Android development work. In Japan, quickie books on Android programming were appearing in major bookstores. In Chennai, India, attendees at a Nokia developer conference compared notes on Android's coding kit during the presentations. | CONTINUED ON PAGE 146

SOURCES: CANALYS, COMSCORE NETWORKS, GARTNER, IHSIPLI





Android

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As soon as programmers started playing with the emulator, they saw how big Google's ambitions were. The company was trying to make programming for a cell phone analogous to programming for a PC or the Web. Coders were told that their applications would have constant access to the Net, not the usual mobile hurry-up-and-wait feel. Working with the cloud—enabling programs to push or pull info to or from the Web—was a must. All Android phones would know where they were at all times, either by tapping into onboard GPS or by cross-referencing cell towers using a proprietary database owned by Google. And applications would be allowed to share information, which at the simplest level meant the kind of copy-and-paste functionality across all programs that cell phones currently lack.

Even better, at least in a developer's eyes, the Android team had violated an essential tenet of the wireless industry: that users are too dumb and dangerous to be trusted with downloadable software. Engineers who write for just about any mobile operating system today have to spend time and cash obtaining security keys and code-signing certificates. Android would allow any application to be installed and run, no questions asked.

By the April 14 deadline for the first round of the Developer Challenge, Google had received nearly 1,800 submissions. Entrants ranged from huge corporations to single-person shops and came from all over the world. Only a third were from the US.

Among the contact management systems and shopping tools, there were applications that truly fulfilled Android's promise, particularly in their use of location awareness, social networking, and cloud computing. One developer offered up Jamdroid, a program that you turn on in your car to feed real-time traffic data to a central server; the info is then compiled and beamed to other

Jamdroid users, crowdsourcing road conditions. LifeAware tracks friends or family, plotting them on a map and alerting the user when, say, a kid leaves a preset area. E-ventr mashes up evites and Google Maps to organize parties on the fly. BreadCrumbs lets you share photo-enhanced driving and walking routes with the world. Already, Android has half as many outside applications as RIM's BlackBerry platform and about 10 percent the number offered for Windows Mobile at Handango, a leading application download site—and that's still months before it launches.

No wonder Rubin seemed so unconcerned with the faulty prototype he showed me back in Mountain View: It was just a framework waiting to be filled out by others. Google will supply the basic starter apps, but Android's secret weapon is really the network effect.

Among developers there is a giddy sense that Android is ushering in Web 2.0 to the barely 0.5 world of mobile. But it won't take much to stop the movement. If manufacturers like Motorola and HTC put out lousy phones, Android suffers. If carriers like AT&T and Verizon Wireless block the gates to their networks, Android fails.

"Working with partners is not easy, and the operating system is just a part of it," says Scott Rockfeld, group product manager for Microsoft's Mobile Communications Business. "It seems like Google's strategy is 'Just get something out there so we can put our services on top.' Well, very quickly they're going to see that mobile operators don't want to be dumb pipes and that manufacturers want to differentiate their phones."

Windows Mobile is now installed on 140 devices, hosted by 160 carriers around the world. Key to its success was Microsoft's ability to use its desktop domination as a battering ram. Businesses wanted seamless integration between their office-based email and mobile phones, and by offering that, Microsoft was able to challenge the BlackBerry. "Google is just trying to copy our model," adds Rockfeld. (Not that Microsoft isn't a bit unnerved. Earlier this year, it bought Rubin's old company, Danger, for \$500 million. Steve Ballmer now owns the Sidekick, just in case.)

Google says it has learned the rules of the game—sometimes the hard way. Not long ago, the company enhanced its mobile version of Picasa, a photo-editing, storage, and

slide-show service, so users could instantly upload images from their camera phone. Google took it to a phone company for placement but couldn't get the necessary sign-off. The service, which was free, would have competed with a similar proprietary offering the carrier was rolling out—and charging \$10 a month for. The idea of instant mobile uploading to Picasa was quietly shelved.

This time Google is going out of its way to assuage the fears of potential partners and pay the necessary fealties. The cockiness that marked its relationships in the past has been replaced by at least the appearance of empathy and cooperation. When one chipmaker got cold feet at the idea of having some of its code open-sourced, Rubin immediately called senior executives to talk over the benefits. Then he had his top engineer, Brian Swetland, sit down with the chipmaker's attorneys and engineers to work out solutions. "You have to very carefully figure out how to help them help you do the right thing," Swetland says.

Rubin has a well-rehearsed spiel for the handset makers, too. They fear losing their individual identities. Rubin counters that Android will liberate them from having to spend valuable resources managing and maintaining vast amounts of code. Instead, they can concentrate on phone design and proprietary apps (which Google's open source license allows).

You can imagine heads nodding in boardrooms as Rubin finishes his talk—*he gets us!*—and in fact it has worked pretty well. HTC, an upstart Taiwanese handset maker that is closely tied to Windows Mobile, has built a 200-person engineering team to focus on Android. Motorola has gone a step further. The company's handset business, slated to be spun off, is on life-support, and it's counting on Android for a comeback. It has assigned its top designers—the people who crafted the Razr—to create new must-have models. Engineers from Good Technology, the BlackBerry competitor Motorola purchased in 2006, are now writing applications for Android. For Motorola, Android *has* to work.

"The handset makers are on a treadmill, trying to turn out hardware every six months that's innovative and thinner, with bigger displays and lower costs, while having to do the systems integration," Rubin says. "The net result is no innovation. They don't have time. You know what? We make really good software. We can take on all that work."

Convincing the big carriers—that's been the tougher task. For them, Rubin is offering Android's unbeatable price: free. Software normally makes up about 20 percent of the cost of a phone. The service providers will be able to pocket the savings or use lower-priced handsets to get more consumers hooked on smartphones, increasing the number of lucrative wireless-data plans. Plus, Rubin insists that the Android software will take the limits of the carriers' networks into consideration. "We have to be conscious of the cost they incurred to purchase the air," he says. "So we don't want to use too much data. We have to constantly think about how we can give users a great experience without wasting the spectrum."

So far, Android has been able to persuade only T-Mobile and Sprint Nextel to join the Open Handset Alliance. Neither is a surprise: T-Mobile partnered with Rubin on the Sidekick, and as one of the smaller carriers it's more willing to take risks. Sprint, suffering from massive consumer churn and almost junk-rated debt, seems game for anything that might help. But the two biggest players, Verizon Wireless and AT&T, have passed. "There wasn't anything viable we were willing to entertain," says Verizon Wireless spokesperson Jeffrey Nelson. This spring, the carrier even backed an Android competitor, an open source consortium called the LiMo Foundation.

And why *would* a network operator join Android's cause? Android—like the iPhone—will hasten the day when phone companies become nothing more than dumb pipes to deliver data. If it manages to turn the cell phone into a perfect tool for surfing and cloud computing, with voice as just another cool app, then the only things left to differentiate one carrier from another are which has the most towers and which the cheapest unlimited data plans. Android's decision to let anyone make add-ons and applications is also a threat. Today, developers who want to have their application on an AT&T phone have to fork over a chunk of their revenue while meeting stringent security requirements. (Apple has copied this model: Jobs & Co. will skim 30 percent off all sales of iPhone apps, which will be available only through Apple.) Under Android rules, everyone's their own boss.

No big carrier is going to hand over its network to Google for nothing. And if Google

doesn't show up on the two biggest networks, which together control 54 percent of the US wireless market, it might as well not show up at all.

There is, however, one incentive that Google can still offer that might bring the carriers around: access to its advertising mother lode, expected this year to top \$16 billion. The chance for a taste of Google gold has lured competitors like AOL, Ask.com, and potentially even Yahoo into partnership deals. Mobile advertising is expected to grow from more than \$1.7 billion in 2007 to \$12.8 billion in 2011. If Google can translate its Web dominance into the mobile arena, who wouldn't want to partner with it? (Google says it can't comment on future ad-sharing deals.)

"You have a significant challenge in mobile, in that the screens are much smaller, so you can't display nearly as much advertising or take as much space," Google cofounder Sergey Brin told Wall Street analysts on a recent conference call. "On the other hand, you have much more relevant and timely information, like what location the person might be in, so on balance that leaves me quite optimistic."

Telecom consultant Chetan Sharma says that Android's success depends on Google's willingness to share the wealth. "What's the relationship going to be between Google and the carriers in terms of advertising dollars?" he asks. "That needs to be nailed down before we know how big Android can be."

And if the carrot doesn't work, Google also wields a pretty hefty stick: more than \$12 billion in cash that it can use either to force the carriers to open their gates or to launch a competitive wireless network of its own. In early 2008, the company bid \$4.7 billion to buy up prime 700-MHz spectrum in an FCC auction. Google lost to Verizon Wireless but drove the price high enough to trigger a rule requiring the spectrum's new owners to allow access to nearly any device. (Google is now furiously lobbying the FCC to make a reluctant Verizon Wireless live up to the rules.)

In May, Google committed \$500 million to bankroll Clearwire, a national WiMax system with partners that include Intel, Comcast, and Time Warner Cable. Any device, including Android phones, will be able to use the high-speed wireless network, cutting the carriers out of the picture. "You need something more substantial than a

coalition of the willing to cut the ice with Verizon and AT&T," says Jeffrey Lindsay, an analyst with Sanford C. Bernstein in New York. "They are formidable competitors." Google would rather partner, but it appears ready to fight.

Larry Page doesn't seem worried about the details. He's got people who will hammer out the business deals necessary to make Android work. We're just around the corner from his office, in yet another Google conference room. "That phone you're carrying around," he says, "we think of it as a phone, but it's really a computer, right?" Page is dressed in a blue blazer over a white T-shirt. He leans forward in his chair. "We've learned from computers that it's really nice to have complete connectivity, to be able to connect anything in a kind of open way. We've also learned that it's really nice to be able to run any application you want to run, also in an open way. For a lot of people and a lot of the time during your life, the phone is your main computing platform. We look at those technologies and say, wow, we could do a whole lot more."

Page rarely shows much emotion, but I detect a flicker of genuine excitement when he's talking about Android. This isn't just another of the mini apps, like Google Checkout or Google Desktop, that the company's engineers seem to air-drop onto the Web every week—each of which has the potential to become a massive challenge to an entrenched competitor or remain forever in development. This is a much bigger gamble. It's designed to change an industry and Google along with it. "People can debate how long it will take us, but I have 100 percent confidence that eventually we'll get there," Page says.

And if they don't? Not much downside. If the only thing Android achieves—as Page knew before Rubin walked into Google three years ago—is getting more people to spend more time online, then Google still profits. More users mean more people viewing pages with Google ads. If they're doing that from an Android phone, great. If not, but they're on a phone made more Web-friendly thanks to competitive pressure from Google, that's also fine. "I hope it's Android," Page says. But either way, Google wins. [W](#)

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