

Part One



A New Operating System

CHAPTER 1

The Rise and Fall of Motivation 2.0

Imagine it's 1995. You sit down with an economist—an accomplished business school professor with a Ph.D. in economics. You say to her: "I've got a crystal ball here that can peer fifteen years into the future. I'd like to test your forecasting powers."

She's skeptical, but she decides to humor you.

"I'm going to describe two new encyclopedias—one just out, the other to be launched in a few years. You have to predict which will be more successful in 2010."

"Bring it," she says.

"The first encyclopedia comes from Microsoft. As you know, Microsoft is already a large and profitable company. And with this year's introduction of Windows 95, it's about to become an era-defining colossus. Microsoft will fund this encyclopedia. It will pay professional writers and editors to craft articles on thousands

DRIVE

of topics. Well-compensated managers will oversee the project to ensure it's completed on budget and on time. Then Microsoft will sell the encyclopedia on CD-ROMs and later online.

"The second encyclopedia won't come from a company. It will be created by tens of thousands of people who write and edit articles for fun. These hobbyists won't need any special qualifications to participate. And nobody will be paid a dollar or a euro or a yen to write or edit articles. Participants will have to contribute their labor—sometimes twenty and thirty hours per week—for free. The encyclopedia itself, which will exist online, will also be free—no charge for anyone who wants to use it.

"Now," you say to the economist, "think forward fifteen years. According to my crystal ball, in 2010, one of these encyclopedias will be the largest and most popular in the world and the other will be defunct. Which is which?"

In 1995, I doubt you could have found a single sober economist anywhere on planet Earth who would not have picked that first model as the success. Any other conclusion would have been laughable—contrary to nearly every business principle she taught her students. It would have been like asking a zoologist who would win a 200-meter footrace between a cheetah and your brother-in-law. Not even close.

Sure, that ragtag band of volunteers might produce something. But there was no way its product could compete with an offering from a powerful profit-driven company. The incentives were all wrong. Microsoft stood to gain from the success of its product; everyone involved in the other project knew from the outset that success would earn them nothing. Most important, Microsoft's writers, editors, and managers were paid. The other project's contributors were not. In fact, it probably *cost* them money each time they performed free work instead of remunerative labor. The question was such a

no-brainer that our economist wouldn't even have considered putting it on an exam for her MBA class. It was too easy.

But you know how things turned out.

On October 31, 2009, Microsoft pulled the plug on *MSN Encarta*, its disc and online encyclopedia, which had been on the market for sixteen years. Meanwhile, Wikipedia—that second model—ended up becoming the largest and most popular encyclopedia in the world. Just eight years after its inception, Wikipedia had more than 13 million articles in some 260 languages, including 3 million in English alone.¹

What happened? The conventional view of human motivation has a very hard time explaining this result.

THE TRIUMPH OF CARROTS AND STICKS

Computers—whether the giant mainframes in Deci's experiments, the iMac on which I'm writing this sentence, or the mobile phone chirping in your pocket—all have operating systems. Beneath the surface of the hardware you touch and the programs you manipulate is a complex layer of software that contains the instructions, protocols, and suppositions that enable everything to function smoothly. Most of us don't think much about operating systems. We notice them only when they start failing—when the hardware and software they're supposed to manage grow too large and complicated for the current operating system to handle. Then our computer starts crashing. We complain. And smart software developers, who've always been tinkering with pieces of the program, sit down to write a fundamentally better one—an upgrade.

Societies also have operating systems. The laws, social customs,

DRIVE

and economic arrangements that we encounter each day sit atop a layer of instructions, protocols, and suppositions about how the world works. And much of our societal operating system consists of a set of assumptions about human behavior.

In our very early days—I mean *very* early days, say, fifty thousand years ago—the underlying assumption about human behavior was simple and true. We were trying to survive. From roaming the savannah to gather food to scrambling for the bushes when a saber-toothed tiger approached, that drive guided most of our behavior. Call this early operating system Motivation 1.0. It wasn't especially elegant, nor was it much different from those of rhesus monkeys, giant apes, or many other animals. But it served us nicely. It worked well. Until it didn't.

As humans formed more complex societies, bumping up against strangers and needing to cooperate in order to get things done, an operating system based purely on the biological drive was inadequate. In fact, sometimes we needed ways to *restrain* this drive—to prevent me from swiping your dinner and you from stealing my spouse. And so in a feat of remarkable cultural engineering, we slowly replaced what we had with a version more compatible with how we'd begun working and living.

At the core of this new and improved operating system was a revised and more accurate assumption: Humans are more than the sum of our biological urges. That first drive still mattered—no doubt about that—but it didn't fully account for who we are. We also had a second drive—to seek reward and avoid punishment more broadly. And it was from this insight that a new operating system—call it Motivation 2.0—arose. (Of course, other animals also respond to rewards and punishments, but only humans have proved able to channel this drive to develop everything from contract law to convenience stores.)

The Rise and Fall of Motivation 2.0

Harnessing this second drive has been essential to economic progress around the world, especially during the last two centuries. Consider the Industrial Revolution. Technological developments—steam engines, railroads, widespread electricity—played a crucial role in fostering the growth of industry. But so did less tangible innovations—in particular, the work of an American engineer named Frederick Winslow Taylor. In the early 1900s, Taylor, who believed businesses were being run in an inefficient, haphazard way, invented what he called “scientific management.” His invention was a form of “software” expertly crafted to run atop the Motivation 2.0 platform. And it was widely and quickly adopted.

Workers, this approach held, were like parts in a complicated machine. If they did the right work in the right way at the right time, the machine would function smoothly. And to ensure that happened, you simply rewarded the behavior you sought and punished the behavior you discouraged. People would respond rationally to these external forces—these extrinsic motivators—and both they and the system itself would flourish. We tend to think that coal and oil have powered economic development. But in some sense, the engine of commerce has been fueled equally by carrots and sticks.

The Motivation 2.0 operating system has endured for a very long time. Indeed, it is so deeply embedded in our lives that most of us scarcely recognize that it exists. For as long as any of us can remember, we’ve configured our organizations and constructed our lives around its bedrock assumption: The way to improve performance, increase productivity, and encourage excellence is to reward the good and punish the bad.

Despite its greater sophistication and higher aspirations, Motivation 2.0 still wasn’t exactly ennobling. It suggested that, in the end, human beings aren’t much different from horses—that the way to get us moving in the right direction is by dangling a crunchier carrot

DRIVE

or wielding a sharper stick. But what this operating system lacked in enlightenment, it made up for in effectiveness. It worked well—extremely well. Until it didn't.

As the twentieth century progressed, as economies grew still more complex, and as the people in them had to deploy new, more sophisticated skills, the Motivation 2.0 approach encountered some resistance. In the 1950s, Abraham Maslow, a former student of Harry Harlow's at the University of Wisconsin, developed the field of humanistic psychology, which questioned the idea that human behavior was purely the ratlike seeking of positive stimuli and avoidance of negative stimuli. In 1960, MIT management professor Douglas McGregor imported some of Maslow's ideas to the business world. McGregor challenged the presumption that humans are fundamentally inert—that absent external rewards and punishments, we wouldn't do much. People have other, higher drives, he said. And these drives could benefit businesses if managers and business leaders respected them. Thanks in part to McGregor's writing, companies evolved a bit. Dress codes relaxed, schedules became more flexible. Many organizations looked for ways to grant employees greater autonomy and to help them grow. These refinements repaired some weaknesses, but they amounted to a modest improvement rather than a thorough upgrade—Motivation 2.1.

And so this general approach remained intact—because it was, after all, easy to understand, simple to monitor, and straightforward to enforce. But in the first ten years of this century—a period of truly staggering underachievement in business, technology, and social progress—we've discovered that this sturdy, old operating system doesn't work nearly as well. It crashes—often and unpredictably. It forces people to devise workarounds to bypass its flaws. Most of all, it is proving incompatible with many aspects of contemporary

business. And if we examine those incompatibility problems closely, we'll realize that modest updates—a patch here or there—will not solve the problem. What we need is a full-scale upgrade.

THREE INCOMPATIBILITY PROBLEMS

Motivation 2.0 still serves some purposes well. It's just deeply unreliable. Sometimes it works; many times it doesn't. And understanding its defects will help determine which parts to keep and which to discard as we fashion an upgrade. The glitches fall into three broad categories. Our current operating system has become far less compatible with, and at times downright antagonistic to: how we *organize* what we do; how we *think about* what we do; and how we *do* what we do.

How We Organize What We Do

Go back to that encyclopedic showdown between Microsoft and Wikipedia. The assumptions at the heart of Motivation 2.0 suggest that such a result shouldn't even be possible. Wikipedia's triumph seems to defy the laws of behavioral physics.

Now, if this all-volunteer, all-amateur encyclopedia were the only instance of its kind, we might dismiss it as an aberration, an exception that proves the rule. But it's not. Instead, Wikipedia represents the most powerful new business model of the twenty-first century: open source.

DRIVE

Fire up your home computer, for example. When you visit the Web to check the weather forecast or order some sneakers, you might be using Firefox, a free open-source Web browser created almost exclusively by volunteers around the world. Unpaid laborers who give away their product? That couldn't be sustainable. The incentives are all wrong. Yet Firefox now has more than 150 million users.

Or walk into the IT department of a large company anywhere in the world and ask for a tour. That company's corporate computer servers could well run on Linux, software devised by an army of unpaid programmers and available for free. Linux now powers one in four corporate servers. Then ask an employee to explain how the company's website works. Humming beneath the site is probably Apache, free open-source Web server software created and maintained by a far-flung global group of volunteers. Apache's share of the corporate Web server market: 52 percent. In other words, companies that typically rely on external rewards to manage their employees run some of their most important systems with products created by nonemployees who don't seem to need such rewards.

And it's not just the tens of thousands of software projects across the globe. Today you can find: open-source cookbooks; open-source textbooks; open-source car design; open-source medical research; open-source legal briefs; open-source stock photography; open-source prosthetics; open-source credit unions; open-source cola; and for those for whom soft drinks won't suffice, open-source beer.

This new way of organizing what we do doesn't banish extrinsic rewards. People in the open-source movement haven't taken vows of poverty. For many, participation in these projects can burnish their reputations and sharpen their skills, which can enhance their earning power. Entrepreneurs have launched new, and sometimes lucrative, companies to help organizations implement and maintain open-source software applications.

The Rise and Fall of Motivation 2.0

But ultimately, open source depends on intrinsic motivation with the same ferocity that older business models rely on extrinsic motivation, as several scholars have shown. MIT management professor Karim Lakhani and Boston Consulting Group consultant Bob Wolf surveyed 684 open-source developers, mostly in North America and Europe, about why they participated in these projects. Lakhani and Wolf uncovered a range of motives, but they found “that enjoyment-based intrinsic motivation, namely how creative a person feels when working on the project, is the strongest and most pervasive driver.”² A large majority of programmers, the researchers discovered, reported that they frequently reached the state of optimal challenge called “flow.” Likewise, three German economists who studied open-source projects around the world found that what drives participants is “a set of predominantly intrinsic motives”—in particular, “the fun . . . of mastering the challenge of a given software problem” and the “desire to give a gift to the programmer community.”³ Motivation 2.0 has little room for these sorts of impulses.

What’s more, open source is only one way people are restructuring what they do along new organizational lines and atop different motivational ground. Let’s move from software code to the legal code. The laws in most developed countries permit essentially two types of business organizations—profit and nonprofit. One makes money, the other does good. And the most prominent member of that first category is the publicly held corporation—owned by shareholders and run by managers who are overseen by a board of directors. The managers and directors bear one overriding responsibility: to maximize shareholder gain. Other types of business organizations steer by the same rules of the road. In the United States, for instance, partnerships, S corporations, C corporations, limited liability companies, and other business configurations all aim toward a common end. The

DRIVE

objective of those who run them—practically, legally, in some ways morally—is to maximize profit.

Let me give a rousing, heartfelt, and grateful cheer for these business forms and the farsighted countries that enable their citizens to create them. Without them, our lives would be infinitely less prosperous, less healthy, and less happy. But in the last few years, several people around the world have been changing the recipe and cooking up new varieties of business organizations.

For example, in April 2008, Vermont became the first U.S. state to allow a new type of business called the “low-profit limited liability corporation.” Dubbed an L3C, this entity is a corporation—but not as we typically think of it. As one report explained, an L3C “operate[s] like a for-profit business generating at least modest profits, but its primary aim [is] to offer significant social benefits.” Three other U.S. states have followed Vermont’s lead.⁴ An L3C in North Carolina, for instance, is buying abandoned furniture factories in the state, updating them with green technology, and leasing them back to beleaguered furniture manufacturers at a low rate. The venture hopes to make money, but its real purpose is to help revitalize a struggling region.

Meanwhile, Nobel Peace Prize winner Muhammad Yunus has begun creating what he calls “social businesses.” These are companies that raise capital, develop products, and sell them in an open market but do so in the service of a larger social mission—or as he puts it, “with the profit-maximization principle replaced by the social-benefit principle.” The Fourth Sector Network in the United States and Denmark is promoting “the for-benefit organization”—a hybrid that it says represents a new category of organization that is both economically self-sustaining and animated by a public purpose. One example: Mozilla, the entity that gave us Firefox, is organized

The Rise and Fall of Motivation 2.0

as a “for-benefit” organization. And three U.S. entrepreneurs have invented the “B Corporation,” a designation that requires companies to amend their bylaws so that the incentives favor long-term value and social impact instead of short-term economic gain.⁵

Neither open-source production nor previously unimagined “not only for profit” businesses are yet the norm, of course. And they won’t consign the public corporation to the trash heap. But their emergence tells us something important about where we’re heading. “There’s a big movement out there that is not yet recognized as a movement,” a lawyer who specializes in for-benefit organizations told *The New York Times*.⁶ One reason could be that traditional businesses are profit maximizers, which square perfectly with Motivation 2.0. These new entities are *purpose maximizers*—which are unsuited to this older operating system because they flout its very principles.

How We Think About What We Do

When I took my first economics course back in the early 1980s, our professor—a brilliant lecturer with a Patton-like stage presence—offered an important clarification before she’d chalked her first indifference curve on the blackboard. Economics, she explained, wasn’t the study of money. It was the study of behavior. In the course of a day, each of us was constantly figuring the cost and benefits of our actions and then deciding how to act. Economists studied what people did, rather than what we said, because we did what was best for us. We were rational calculators of our economic self-interest.

When I studied law a few years later, a similar idea reappeared. The newly ascendant field of “law and economics” held that precisely

DRIVE

because we were such awesome self-interest calculators, laws and regulations often impeded, rather than permitted, sensible and just outcomes. I survived law school in no small part because I discovered the talismanic phrase and offered it on exams: “In a world of perfect information and low transaction costs, the parties will bargain to a wealth-maximizing result.”

Then, about a decade later, came a curious turn of events that made me question much of what I’d worked hard, and taken on enormous debt, to learn. In 2002, the Nobel Foundation awarded its prize in economics to a guy who wasn’t even an economist. And they gave him the field’s highest honor largely for revealing that we *weren’t* always rational calculators of our economic self-interest and that the parties often *didn’t* bargain to a wealth-maximizing result. Daniel Kahneman, an American psychologist who won the Nobel Prize in economics that year for work he’d done with Israeli Amos Tversky, helped force a change in how we think about what we do. And one of the implications of this new way of thinking is that it calls into question many of the assumptions of Motivation 2.0.

Kahneman and others in the field of behavioral economics agreed with my professor that economics was the study of human economic behavior. They just believed that we’d placed too much emphasis on the *economic* and not enough on the *human*. That hyperrational calculator-brained person wasn’t real. He was a convenient fiction.

Play a game with me and I’ll try to illustrate the point. Suppose somebody gives me ten dollars and tells me to share it—some, all, or none—with you. If you accept my offer, we both get to keep the money. If you reject it, neither of us gets anything. If I offered you six dollars (keeping four for myself), would you take it? Almost certainly. If I offered you five, you’d probably take that, too. But what if I offered you two dollars? Would you take it? In an experiment rep-

The Rise and Fall of Motivation 2.0

licated around the world, most people rejected offers of two dollars and below.⁷ That makes no sense in terms of wealth maximization. If you take my offer of two dollars, you're two dollars richer. If you reject it, you get nothing. Your cognitive calculator knows two is greater than zero—but because you're a human being, your notions of fair play or your desire for revenge or your simple irritation overrides it.

In real life our behavior is far more complex than the textbook allows and often confounds the idea that we're purely rational. We don't save enough for retirement even though it's to our clear economic advantage to do so. We hang on to bad investments longer than we should, because we feel far sharper pain from losing money than we do from gaining the exact same amount. Give us a choice of two television sets, we'll pick one; toss in an irrelevant third choice, and we'll pick the other. In short, we are irrational—and predictably so, says economist Dan Ariely, author of *Predictably Irrational*, a book that offers an entertaining and engaging overview of behavioral economics.

The trouble for our purposes is that Motivation 2.0 assumes we're the same robotic wealth-maximizers I was taught we were a couple of decades ago. Indeed, the very premise of extrinsic incentives is that we'll always respond rationally to them. But even most economists don't believe that anymore. Sometimes these motivators work. Often they don't. And many times, they inflict collateral damage. In short, the new way economists think about what we do is hard to reconcile with Motivation 2.0.

What's more, if people do things for lunk-headed, backward-looking reasons, why wouldn't we also do things for significance-seeking, self-actualizing reasons? If we're predictably irrational—and we clearly are—why couldn't we also be predictably transcendent?

DRIVE

If that seems far-fetched, consider some of our other bizarre behaviors. We leave lucrative jobs to take low-paying ones that provide a clearer sense of purpose. We work to master the clarinet on weekends although we have little hope of making a dime (Motivation 2.0) or acquiring a mate (Motivation 1.0) from doing so. We play with puzzles even when we don't get a few raisins or dollars for solving them.

Some scholars are already widening the reach of behavioral economics to encompass these ideas. The most prominent is Bruno Frey, an economist at the University of Zurich. Like the behavioral economists, he has argued that we need to move beyond the idea of *Homo Oeconomicus* (Economic Man, that fictional wealth-maximizing robot). But his extension goes in a slightly different direction—to what he calls *Homo Oeconomicus Maturus* (or Mature Economic Man). This figure, he says, “is more ‘mature’ in the sense that he is endowed with a more refined motivational structure.” In other words, to fully understand human economic behavior, we have to come to terms with an idea at odds with Motivation 2.0. As Frey writes, “Intrinsic motivation is of *great importance* for all economic activities. It is inconceivable that people are motivated solely or even mainly by external incentives.”⁸

How We Do What We Do

If you manage other people, take a quick glance over your shoulder. There's a ghost hovering there. His name is Frederick Winslow Taylor—remember him from earlier in the chapter?—and he's whispering in your ear. “Work,” Taylor is murmuring, “consists mainly

The Rise and Fall of Motivation 2.0

of simple, not particularly interesting, tasks. The only way to get people to do them is to incentivize them properly and monitor them carefully.” In the early 1900s, Taylor had a point. Today, in much of the world, that’s less true. Yes, for some people work remains routine, unchallenging, and directed by others. But for a surprisingly large number of people, jobs have become more complex, more interesting, and more self-directed. And that type of work presents a direct challenge to the assumptions of Motivation 2.0.

Begin with complexity. Behavioral scientists often divide what we do on the job or learn in school into two categories: “algorithmic” and “heuristic.” An algorithmic task is one in which you follow a set of established instructions down a single pathway to one conclusion. That is, there’s an algorithm for solving it. A heuristic task is the opposite. Precisely because no algorithm exists for it, you have to experiment with possibilities and devise a novel solution. Working as a grocery checkout clerk is mostly algorithmic. You do pretty much the same thing over and over in a certain way. Creating an ad campaign is mostly heuristic. You have to come up with something new.

During the twentieth century, most work was algorithmic—and not just jobs where you turned the same screw the same way all day long. Even when we traded blue collars for white, the tasks we carried out were often routine. That is, we could reduce much of what we did—in accounting, law, computer programming, and other fields—to a script, a spec sheet, a formula, or a series of steps that produced a right answer. But today, in much of North America, Western Europe, Japan, South Korea, and Australia, routine white-collar work is disappearing. It’s racing offshore to wherever it can be done the cheapest. In India, Bulgaria, the Philippines, and other countries, lower-paid workers essentially run the algorithm, figure out

DRIVE

the correct answer, and deliver it instantaneously from their computer to someone six thousand miles away.

But offshoring is just one pressure on rule-based, left-brain work. Just as oxen and then forklifts replaced simple physical labor, computers are replacing simple intellectual labor. So while outsourcing is just beginning to pick up speed, software can already perform many rule-based, professional functions better, more quickly, and more cheaply than we can. That means that your cousin the CPA, if he's doing mostly routine work, faces competition not just from five-hundred-dollar-a-month accountants in Manila, but from tax preparation programs anyone can download for thirty dollars. The consulting firm McKinsey & Co. estimates that in the United States, only 30 percent of job growth now comes from algorithmic work, while 70 percent comes from heuristic work.⁹ A key reason: Routine work can be outsourced or automated; artistic, empathic, nonroutine work generally cannot.¹⁰

The implications for motivation are vast. Researchers such as Harvard Business School's Teresa Amabile have found that external rewards and punishments—both carrots and sticks—can work nicely for algorithmic tasks. But they can be devastating for heuristic ones. Those sorts of challenges—solving novel problems or creating something the world didn't know it was missing—depend heavily on Harlow's third drive. Amabile calls it the intrinsic motivation principle of creativity, which holds, in part: "Intrinsic motivation is conducive to creativity; controlling extrinsic motivation is detrimental to creativity."¹¹ In other words, the central tenets of Motivation 2.0 may actually *impair* performance of the heuristic, right-brain work on which modern economies depend.

Partly because work has become more creative and less routine, it has also become more enjoyable. That, too, scrambles Motivation 2.0's assumptions. This operating system rests on the belief that

The Rise and Fall of Motivation 2.0

work is *not* inherently enjoyable—which is precisely why we must coax people with external rewards and threaten them with outside punishment. One unexpected finding of the psychologist Mihaly Csikszentmihalyi, whom we'll encounter in Chapter 5, is that people are much more likely to report having “optimal experiences” on the job than during leisure. But if work is inherently enjoyable for more and more people, then the external inducements at the heart of Motivation 2.0 become less necessary. Worse, as Deci began discovering forty years ago, adding certain kinds of extrinsic rewards on top of inherently interesting tasks can often dampen motivation and diminish performance.

Once again, certain bedrock notions suddenly seem less sturdy. Take the curious example of Vocation Vacations. This is a business in which people pay their hard-earned money . . . to work at another job. They use their vacation time to test-drive being a chef, running a bike shop, or operating an animal shelter. The emergence of this and similar ventures suggests that work, which economists have always considered a “disutility” (something we'd avoid unless we received a payment in return), is becoming a “utility” (something we'd pursue even in the absence of a tangible return).

Finally, because work is supposed to be dreary, Motivation 2.0 holds that people need to be carefully monitored so they don't shirk. This idea, too, is becoming less relevant and, in many ways, less possible. Consider, for instance, that America alone now has more than 18 million of what the U.S. Census Bureau calls “non-employer businesses”—businesses without any paid employees. Since people in these businesses don't have any underlings, they don't have anybody to manage or motivate. But since they don't have bosses themselves, there's nobody to manage or motivate them. They have to be self-directed.

So do people who aren't technically working for themselves. In

DRIVE

the United States, 33.7 million people telecommute at least one day a month, and 14.7 million do so every day—placing a substantial portion of the workforce beyond the gaze of a manager, forcing them to direct their own work.¹² And even if many organizations haven't opted for measures like these, they're generally becoming leaner and less hierarchical. In an effort to reduce costs, they trim the fatty middle. That means managers oversee larger numbers of people and therefore scrutinize each one less closely.

As organizations flatten, companies need people who are self-motivated. That forces many organizations to become more like, er, Wikipedia. Nobody “manages” the Wikipedians. Nobody sits around trying to figure out how to “motivate” them. That's why Wikipedia works. Routine, not-so-interesting jobs require direction; non-routine, more interesting work depends on self-direction. One business leader, who didn't want to be identified, said it plainly. When he conducts job interviews, he tells prospective employees: “If you need me to motivate you, I probably don't want to hire you.”

TO RECAP, Motivation 2.0 suffers from three compatibility problems. It doesn't mesh with the way many new business models are organizing what we do—because we're intrinsically motivated purpose maximizers, not only extrinsically motivated profit maximizers. It doesn't comport with the way that twenty-first-century economics thinks about what we do—because economists are finally realizing that we're full-fledged human beings, not single-minded economic robots. And perhaps most important, it's hard to reconcile with much of what we actually do at work—because for growing numbers of people, work is often creative, interesting, and self-directed rather than unrelentingly routine, boring, and other-directed. Taken

The Rise and Fall of Motivation 2.0

together, these compatibility problems warn us that something's gone awry in our motivational operating system.

But in order to figure out exactly what, and as an essential step in fashioning a new one, we need to take a look at the bugs themselves.