Maximum Impact

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Extract

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Those great and good men foresaw that troublous times would arise when rulers and people would become restive under restraint, and seek by sharp and decisive measures to accomplish ends deemed just and proper, and that the principles of constitutional liberty would be in peril unless established by irrepealable law. The history of the world had taught them that what was done in the past might be attempted in the future.

The Constitution of the United States is a law for rulers and people, equally in war and in peace, and covers with the shield of its protection all classes of men, at all times and under all circumstances. No doctrine involving more pernicious consequences was ever invented by the wit of man than that any of its provisions can be suspended during any of the great exigencies of government.

Such a doctrine leads directly to anarchy or despotism, but the theory of necessity on which it is based is false, for the government, within the Constitution, has all the powers granted to it which are necessary to preserve its existence, as has been happily proved by the result of the great effort to throw off its just authority.

—U.S. Supreme Court Ex parte Milligan, 71 U.S. 2 (1866)

As the circle of light increases,
so does the circumference of darkness
surrounding it.

—*Albert Einstein*

PART I

0

The sun had been up for over two hours, and as the city outside got itself underway on a bright late summer morning, the world turned into just the position to put the coffee on.

High on a shelf before his kitchen window was a small model of Stonehenge. The sarsen monoliths were shaped of polymer clay, oven-cured, weathered, and airbrushed in obsessive detail. The monument was not fashioned after the vandalized and ragged shadow of itself that survives on the bleak chalk plains of Salisbury today, but as it had stood in its full Pagan glory five thousand years before.

The ancient circle was modeled in precise concentric scale on a miniature landscape of stubbly green grass and scattered rock, rotating infinitesimally to compensate for the tilt and orbit of the Earth around the Sun. The intricate mechanism was built on the guts of a pawn-shop Pioneer turntable, though its original manufacturer wouldn't have had the clues to claim it. It had pleased him to rescue the old-tech of this record-playing machine into a new form and a more timeless purpose. Now as the sun rose over Manhattan, just as it would have in a cool September two millennia before the dawn of the Iron

Age, a ray of morning light filtered through a warren of calendar stones to mark the coming of the new day.

The pencil sunbeam struck the face of the coffeemaker, itself a Sunbeam, and illuminated a solar cell that activated the highly modified machine. A measure of espresso beans skittered through a funnel into the electric mill, spun down to a play-sand grind, dropped into a filter in the grip of an advancing articulated arm, and the strong coffee began to brew.

Back when he'd still been ship-shape to do so, his father might have tut-tutted at such elaborate mechanics applied to a simple manual task. The same class of mind, of course, would have looked on in clueless wonder as the ancient Britons dragged their 50-ton quarry stones for twenty miles into the middle of nowhere to build a mystery for the ages.

The apartment was awakening. Here and there a relay or solenoid clicked in response to an infrared or RF signal from a timer, sensor, or from a complementary device in an ensemble. Over two decades he had patiently handmade his space to be as alive as a thing that was not alive can possibly be. Normally in robotics, the goal was to miniaturize and make independent an analogue of some living thing. Those were trinkets, crude science-fair novelties, and John Fagan had gone in the other direction. His idea of a mechanical companion was writ 4,000 square feet large, the walls, ceiling and floor humming with hundreds of trillions of bits of silicon intelligence, and he lived inside of it.

The clear weather outside selected two CDs to spin-up in a rack of players, one of autumn bird songs and the other Rautavaara's *Angel of Light*. Indirect lamps hummed gradually to their gentle dawn settings. He preferred artificial

illumination since the Sun signaled a day too short by half for his body clock. Today, his morning actually happened to be morning.

John had slept at his desk as he usually did, reclined in an electronically tricked-out La-Z-Boy worthy of a spot on the bridge of the Starship Enterprise. He would never have made the Trekkie reference himself, of course. Everything after the second season had been horseshit of Shatnerian proportions.

And besides, this was the real deal.

Behind him, a rectangular mosaic of hundreds of salvaged LCD screenlets flickered alive in a domino sequence, row upon row, to form a twelve-foot diagonal, 16×9-format high-definition window on the outside world. Every small screen had an intelligent feed from a separate source of news on the Internet, from favorite sites, RSS feeds and newsgroups to hacked satellite and cable video, tapped surveillance gear, Webcams and instant messaging streams.

Each screenlet chose and displayed its content based on a buzz algorithm that parsed for personal relevance, keywords, proximity, source and substance. They could work together or individually, forming larger or smaller subscreens in the array as the significance of the content warranted. It was an ever-changing symphony of visual input that CNN would have paid billions to develop, if such a thing could have crossed a corporate mind.

John was becoming conscious, and it wasn't a welcome sensation. Along with his usual discomforts something warm and wet was slapping the back of his hand as it hung over the arm of the chair.

"Boner, please, for God's sake," he said. The dog sat, and gave a low, timid bark in answer. He looked

something like a small Shepherd, though with a healthy mixture of many other fine breeds in patchy evidence.

"Feed the dog, please, and make it a half-hour earlier tomorrow, all right?" he said.

"Understood, and adjusted," a digitized voice answered, in a refined emulation of Kate Jackson, of *Charlie's Angels*.

A spout extended from a cabinet near floor level by the door, and a cup of lamb-and-rice kibble filled a low dish adorned with cartoon pawprints. Thin beams of sentient light danced briefly across a nearby bowl, confirming the level, temperature and clarity of the water within it. Boner trotted over to his breakfast.

John lifted a hand to rub his eyes awake, and a hangover was pounding just behind them. He reached out blind for the remains of a pint of Old Crow on the arm of the chair, and killed the last two swallows. His dad would have called this a little morning pick-me-up. The old prick had been right, though, about the nuances of alcoholism if nothing else. The pain in his head began to dissolve, and he cracked opened his eyes.

Near the upper left-hand corner of the media wall, a new image abruptly replaced the talking head that had occupied the spot a moment before. In the mirror of his darkened desktop computer monitor he only noticed the reflected image as it expanded to take up four, then eight, then sixteen segments of the array behind him. Something was growing newsworthy, at least in the group-mind of the news services and the Net. He reached for his glasses, put them on, and swiveled his chair to face the screen.

The image he saw there in the corner took several moments to begin to register. He had seen its subject a

thousand times, but it looked so different now that his mind wouldn't immediately accept it as itself. The image doubled in size again, blotting out border wars, famine and disease, George Clooney and Chandra Levy.

It was bigger now, but still not real. There was so much smoke, far too much for a fire that could ever be contained. The picture took two jumps larger then, pushing aside politics, Palestinians, earthquakes and all manner of human mayhem, as all the world's attention began to take focus on a single spot.

John stood up slowly, and walked a few steps toward the moving image that now rippled outward to fill the entire wall. Then there it was, realization.

A quarter of a mile up in the sky, tower one of the World Trade Center was burning.

Scrolling text at the bottom of the screen said the north tower had been struck by an aircraft, possibly a small private plane, about fifteen minutes ago. He took another step closer to the screen, which was now showing a wide GyroCam shot from News Chopper 4 of the unreal scene unfolding only blocks from where he stood.

John checked his watch. It was 9:03. He was growing numb, but his mind was still working.

"Any second now," he breathed.

A moment later, United Flight 175 outbound from Boston sliced into the south tower, releasing thirty thousand liters of jet fuel and all souls on board into the conflagration.

1

Jeannie Reese looked out through the tint of the wide conference room window, took a deep breath in, closed her eyes and exhaled on an eight-count. She was calm, and for the moment she was allowing herself to consider that she wasn't reacting rationally to the situation. Two passenger airliners, after all, had been driven into the World Trade Center twenty minutes ago, and clearly this was no accident. All hell was breaking loose throughout the building. But here of all places, didn't business still have to be done?

Her meeting had been interrupted by the news, and if there was one thing she hated more than waiting, it was interruptions. She'd called a ten-minute break, and her audience had scattered like fifth-graders at the bell on the last day of school. We were now at sixteen wasted minutes and counting.

No, not irrational, she thought, *by all evidence you're the only one on the floor with your wits about you. There's work to be done, and this attack only underscores the urgency of that work. People are dying, yes, I understand. People die every day. If I'm the only one who sees the need to keep my head on straight, so be it. I will not be terrorized. We must focus. Extraordinary times demand extraordinary people.*

That word, extraordinary, had been yoked to her for as long as she could remember. By age ten, she had achieved more notoriety as a theoretical heurist than the combined army of Princeton mathematicians they'd deployed to evaluate her. She had been a rare find, a true math prodigy and a computer wunderkind wrapped in a single, recruitable unit.

Before she'd hit puberty she had proven herself capable of thinking deeper and wider than the best in the field, and a precocious Mozart in the emerging art of differential cryptanalysis. And though she had only achieved legal drinking age last year, it was Jeannie's charge to design and marshal the government's eyes and ears in the electronic battle zone, translating what she saw, suspected or forecast into the language and tactics of war.

And she got things done. The day she'd met Don Rumsfeld, a few days after his appointment as Secretary of Defense in the new administration, he'd given her his signature squint and intoned, "And you, young lady, I'm led to understand that you are the grand mistress of the instrumentality."

Damn right, Rummy.

Jeannie checked her watch. There were no friends in New York to call, even if the land-lines and cell carriers weren't log-jammed already. She had no idea where her parents or any of her siblings were, and she was dead certain that the inverse was true. Everything she could do in the face of this crisis she could do here, now, but not before an empty room.

She closed her eyes and tried to clear her mind, but it wouldn't rest. The thought of her family had reliably triggered a spate of memories, and before long she was mentally fast-forwarding through the details of the events

that had both launched her career and robbed her of her childhood.

By 1990 Jeannie Reese had turned eleven and the telephone system had grown so complex and so dependent on lightning speed that moment-to-moment control of it had been turned over completely to computers. Human hands simply couldn't move fast enough, and human minds couldn't meet the demand for the required instantaneous reactions. The network nearly ran itself, with the help of software programs designed to execute literally billions of routing and management instructions every second.

Phone traffic is extremely variable, and the thousands of interlinked networks had been painstakingly designed to share their power to keep the calls going through at all costs, regardless of the ever-changing load. The system was built with a great deal of flexibility, so when occasional problems did occur at a station the load could be switched out to that station's designated backup, and the extra traffic would be seamlessly handled until the afflicted section of the network had cleansed itself of the error. This scheme of programmed backups was the fundamental safety valve that allowed the phone system to weather virtually any traffic storm, automatically.

But there had been a weakness built into the programming, a narrow doorway through which a brilliant opportunist would send a silver bullet to the heart of the Bell System. The Achilles' heel in the code was actually documented in the AT&T technical manual for the new 4ESS Digital Switching System, on page 114, and again in Appendix G. The subroutine wasn't listed there as a weakness, of course, just as a beta-level feature of the

upgrade that facilitated a quicker response to potential system crashes.

In the event of a problem in any individual 4ESS switch, that switch would take itself offline by shutting down and restarting, wiping out its glitch by committing digital suicide and then coming back to life a minute later, born again, all clear. Just before it did so, the switch would send a "Get Ready!" message to the next 4ESS down the line, which would slow itself down temporarily to handle the incoming extra traffic from the failing switch. When the troubled 4ESS was ready to come back online, then it would send an "I'm Back!" message to its helper switch, and the traffic would be re-diverted back to its original pathway.

The flaw was this: in the few seconds that the traffic was being diverted, if during the transition just two phone calls happened to arrive within the same hundredth of a second, the helper switch itself would momentarily overload, causing it to fail as well. The traffic of both switches would then be sent to the next station down the line. Under innocent circumstances, this was still a perfectly reasonable, nearly fail-safe little routine. To a malicious hacker, however, it was to become the lynchpin of the mother of all domino effects.

The virus that brought down the entire phone system of New York City had four simple functions: 1) wait for a legitimate triggering of the fail-safe system in a 4ESS switch, 2) follow the "Get Ready!" distress call that the failing switch sent down the line to its helper, 3) route two simultaneous phone calls to the helper switch, and 4) go to #1.

This self-replicating code was released into NYNEX on that Monday morning in 1991, and within an hour, one

4ESS in downtown Manhattan experienced a routine, minor overload. That switch followed its programmed orders, and dutifully prepared to send its "Get Ready!" warning to the next station in line as it shut itself down. The virus infected that first distress call, and the now-diseased alert message shot down the phone lines to its helper switch. The second failure triggered, the infected switch called for help, and the snowball had begun its roll.

The resulting cascade of unrecoverable system crashes didn't end until the Basking Ridge technicians literally pulled the plug late in the day, counted to ten, and then plugged the whole thing back in again. This effectively destroyed the virus, of course, along with every other byte of running software in the telephone system. They had cured the disease by killing the patient.

The only thing that had prevented a widespread, region-hopping phone-out on that day was an accidental firebreak, a single outdated station, still sporting electromechanical switches, on the outskirts of the NYC service area. This hub was at the narrowest part of an electronic funnel that connected New York City to the rest of the interstate phone network. The old switches were immune to the virus, being just smart enough to either shut down completely or explode with a bright, purple bang when hit by the tsunami of diverted phone traffic that smashed down on them that morning.

Though still two years a pre-teen, little Jeannie Reese had earned a top spot on the FBI's short list of potential perpetrators of the NYNEX hack. Between cello lessons and karate class, she'd been finding time to write some of the nastiest computer viruses on record. The tiny agents of chaos she'd unleashed from her upstairs bedroom were of a new breed entirely, hiding themselves perfectly

amongst the background code of the fledgling Internet, spreading like an e-pandemic. Her work was inspired, revolutionary, the agents had said, if only for its wickedly elegant inventiveness.

Her parents had seemed suitably surprised and affronted when the Feds had come calling, but though she'd never gotten a full confession Jeannie was certain that her mother was the one who'd dropped dime on her.

It turned out they'd been watching her for a while, and in the profilers' opinions her psychological dossier had *prime suspect* written all over it: *A loner, IQ off the scale, not socially integrated, child prodigy, prominent family/broken home*, that sort of thing. In any case, within a week of the attack they came to either arrest her or hire her. To this day she sometimes wondered which one they'd actually done.

Since the evidence had been destroyed in the brute-force disinfection of NYNEX, they'd needed to reconstruct the virus so measures could be taken to prevent a repeat performance. While the technicians sat with her, Jeannie spent an hour with the 4ESS tech manual and had written her version of the malignant code before her Saturday afternoon soccer game. She had crossed paths with her first computer criminal, and to her government's delight, she had risen to the challenge and was eager for more.

After the folks and the family lawyer had signed her over, she passed a polygraph and the agents relaxed a bit and gave her the scoop. The man who was probably behind this, they told her, was the uber-hacker, long thought only an urban myth, a shadowy rumor of the Usenet counterculture. They had no name and only a sparse description, but his work, when it emerged, was as unmistakable as a fingerprint. On the newsgroups this

man was called Phr33k, with a "Ph" instead of an "F" and two 3s for the "ea" sound, because it was hacker jargon.

At that tidbit she'd given them a naïve little *oh-my* worthy of a vintage Shirley Temple flick. She'd been fluent in the lingo of the cyber-underground since she was eight, of course, but there was no reason to let the stiffs know that.

She'd heard of this Phr33k, and now she felt as though she'd met him, the author of the brilliant seven-line masterpiece she'd just reconstructed for these serious men in their dark suits. There was an unfamiliar stirring down in her stomach as she looked over what this anonymous, faceless genius had made, and that she had reverse-engineered *in simpatico* with him. In her young life, this was the first piece of someone else's work she'd yet come across that actually earned her respect.

From that day forward she'd been a government asset, and on the day she got her driver's license, her last zit and her doctorate from MIT, she punched-in full time as a federal asset.

Today's presentation was the culmination of six years of work, her grand unified strategy for security in the age of electronic warfare. The broad concepts of TIA, or Total Information Awareness, had been floating around since she'd proposed them in her first months with the Agency, and this morning she was to make a strong case for final approval and deployment of the whole shebang. In a nutshell, TIA would link all the US intelligence data, foreign and domestic, into a single cyber-supermind. At the same time, it would revoke or relax most of the outdated and overliberal privacy protections granted to the burgeoning millions of Internet users. These rights were a treacherous

holdover from the days when most online citizens were themselves government entities, and it was way past time to tighten the screws.

But things moved so slowly. The glacial pace of government galled her on a daily basis, as did the impassable walls that had been erected between factions of the intelligence community. Tens of billions were being spent on duplicate research, offices refused to collaborate for fear of getting their lunch eaten by rivals for budget dollars, and it went on and on. The result was an almost perfect lack of communication. But TIA would fix that too.

This morning's terrorist attack only confirmed that the time had come to circle the wagons and make security our nation's prime directive until further notice. We had long needed to act with authority, to do some perhaps unpleasant and unpopular things in order to avoid some truly unthinkable consequences in the future. And today the unthinkable had finally happened.

Okay, enough.

She shot a signal to Rudy Steinman, her boy Friday, to go into the hall and muster the meeting back to order.

Gradually the group began to filter back into the room, with many still wrapping up their cell conversations. She had a genuinely heavyweight audience today; every intel, counter-intel and DoD department was represented here, along with emissaries from House and Senate subcommittees and senior White House staffers. Rumsfeld himself was downstairs making a similar case to an even higher level of decision-makers.

When they had taken their seats Rudy lowered the lights, and as the room quieted, she picked up her presentation.

*

"Thank you in advance for your time and attention, everyone. In light of the disaster at the Trade Center, I trust you've made the calls you need to make and have cleared yourselves for the next hour or so. If you're feeling an impulse to run from this room to go and do something about the attack we suffered this morning, let me assure you that by giving me these few minutes, you will be taking direct and immediate action, right here and now. If you get an urgent call, of course I'll understand."

Jeannie clicked her remote to display the next slide on the screen behind her.

"In January of 1991, a hacker brought down the telephone system in the five boroughs of New York City, with seven lines of code and a stolen tech manual from the phone company." She advanced to a God's-eye-view graphic of the tristate area, with the critical telco stations circled in red.

"SysAdmins at NYNEX had seen the first signs of something serious coming at 8:30 A.M. Service outages started to appear one after the other, and the automatic countermeasures were failing to keep up. The superstructure of software and hardware charged with managing the most performance-critical phone network in the US was cracking, and the human managers were proving equally inadequate. The network was coming unraveled as they watched, and everything they did to try and stop it only made things worse."

On the screen, concentric circles were radiating out around the scattered central office locations, like fallout zones in a nuclear-war training film.

"Something exponential was happening, something working from the inside. By 10:00 A.M. the NYNEX status wall was lit up like a roller disco with warning

lights that never came on outside the monthly diagnostics. Then some big, bad things started to happen."

Jeannie quickly scanned the conference table for full attention. She had it, with the exception of a young Navy man who seemed to be intensely daydreaming about the contents of her blouse. Without a pause in her presentation, she shot from the hip with her laser pointer and nailed him in the left eye.

There, now he was listening.

"At 10:20 A.M. the New York Stock Exchange lost all contact with the outside world. Ten minutes later, 911 emergency services went down all over the city. At 10:45, the air traffic control systems at La Guardia, Kennedy, and Newark airports began to fall apart, and within minutes they all went blind, deaf and dumb, having lost all their vital data and voice uplinks. Then, at noon Eastern Standard Time every phone in the New York City metropolitan area rang once and went stone dead.

"The crisis lasted seven hours, and the phones were back by sundown. By then, though, the damage had been done. The stock market had taken an eight per cent correction, triggered by the disruption of tens of thousands of automated computer transactions and the resulting waves of investor panic. The airlines recorded five near-misses over the metropolitan area, four of which they managed to keep out of the papers. Business ground to a halt, and traffic completely clogged the bridges and tunnels. Those of you who were in the city at the time will remember, the police were overwhelmed, emergency services were in disarray, and Manhattan was effectively shut down for the day.

"This was not an equipment failure, an innocent glitch or a legitimate software bug. For the first time, we had

hard evidence of computer sabotage, electronic terrorism. We were hit by a logic bomb, and like any other bomb, its only possible purpose was to cause destruction.

"This was a big one, and it really opened our eyes," Jeannie said, "but there've been other attacks before and since, to the power grid, 911 emergency, military installations, government databases and satellite communications. Most of these crimes were perpetrated through the Internet, and we believe that many of them can be attributed to the work of one man."

She advanced to the next slide. It showed a composite line drawing of a man's face, Caucasian, perhaps thirty years old. It lacked human detail, like most such drawings; it could have been nearly anyone.

"This is all we have of a physical description, and we have very little else. The anonymity of the Internet continues to tie our hands as we endeavor to bring this man and the thousands who aspire to his capabilities to justice. We are ready to address that challenge, and we need your cooperation and support in some critical areas. That's what we're here to discuss today."

As she clicked to the next slide, she noticed that the young man to her right, the breast man, was now looking out the conference room windows. She cleared her throat and waited. He didn't seem to get the message, but his eyes narrowed a bit.

The ensuing silence in the room put everyone's attention on him, but he didn't seem to notice at all. He rolled his chair back a few inches, and as he stood slowly, others followed his eyes outside, and Jeannie followed with them.

The Pentagon was not a tall building, but in this wing they had an unobstructed view for several miles. Way out

over the western suburbs of DC, a jet was making a wide turn. Dulles and Reagan National were nearby so the sight should have been nothing at all unusual. But she fixed on it, like the others were beginning to.

It was too far away to pinpoint the class, but it was an airliner, not military, and it looked to be in a landing pattern. She followed its descending flight path as it came around ninety degrees onto final, with two thin lines of black exhaust now tracing straight back toward the horizon, and she saw what was wrong. It was going too fast, true, much too fast, but even at this distance and at that speed, looking head-on at what was now clearly a 757, she was able to spot the really obvious flaw in the image of a landing jumbo jet.

No wheels.

It seemed for the next few moments to be suspended in the air, only growing gradually larger and settling gently lower to the ground as it came. It hung over the landscape, the aileron corrections of its pilot causing it to rock left, then smoothly right to wings-level again. And then suddenly, the illusion broke and the plane accelerated to half a thousand miles per hour, struck streetlights cartwheeling in its wake turbulence, the ascending whine of its engines almost but not quite outrun.

The room was quiet. There was only one last moment to accept, and surrender.