

SMALL BUSINESS

by Edward M. Lerner

New forms of industry will engender new forms of competition—though not *entirely* new....

The blue shirt moved out of the holo at a glacial pace, as though sliding to the left down a very sticky inclined plane—not that, in microgee, any plane inclined more than any another. Just as a hint of the objective finally appeared, the bored technician, to the soft *zzzp* noise of Velcro parting, sidled in front of the camera. Sweat-stained denim once again filled the scene.

There went an hour's slow progress.

"Damn," Jason Grimaldi muttered. He batted aside a floating clipboard. His companions shushed him, although the only sound accompanying the video at that moment was the *whirrr* of a ventilation fan. Jason studied the wrinkled garment for clues to the nearest side of the obstruction.

"Should we wait? He might step back." The comment was a vintage Bill-ism. Jason did not get how someone who always hoped for the best became a revolutionary.

Jason nudged a joystick. "Too risky, with the batteries so low. I won't make a bet on how he'll next move, either. I'm going for altitude." Most rooms in the space station had an orientation, even when nothing but convention distinguished floor from walls from ceiling.

The view in the holo display crept upward. A frayed collar came into view, then a neck. The nightshift stuckee needed a new uniform and a haircut. Channeling Bill, Jason hoped the sloppiness denoted lax discipline. They needed all the help they could get.

Moving to either side of the neck would bring their objective into view the fastest—unless the tech moved again. Checking the power readout, Jason rejected the gamble. The gauge was approaching redline; they might not recover from another setback. So: onward and upward.

It would be minutes until they could see over the man's head. Jason stretched tense muscles as best he could. At two meters and almost a hundred kilos, he overflowed the standard-sized command seat. The bridge, alas, offered no room for pacing.

In the holo, salt-and-pepper hair gave way to shiny scalp. The target peeked at them through sparse wisps.

The batteries were down to two percent.

“Increase the focal length,” Sherry suggested.

The hair in the foreground softened to a blur; details of equipment across the room became maddeningly *almost* discernible. Jason panned. The image vibrated as though, as though ... As though what? The camera platform’s steady pace was not the problem—computers compensated for that. Jason gnawed on a pencil stub, staring at the fuzzy picture. Vibration? Why would there be...?

Uh-oh. He cranked up the volume of the audio pickup. What was that tone beneath the ubiquitous fan noise? The microphone must be very near an unsuspected air vent to capture the bass rumbling of a duct. *Too* near.

Target and technician alike spun from sight as Jason lunged for the joystick. For a time, the image tumbled too quickly for digital correction. The scene finally resolved into an ant’s-eye view of the console shelf onto which air currents had delivered the ‘bot. The speaker emitted *zzzps* Jason had no problem identifying: approaching footsteps. Over the tearing sounds came a disgusted voice: “I *hate* bugs.”

They glumly watched the descent of a bent-double sheaf of printout.

* * * *

Six months earlier, Jason would never have expected to end up a revolutionary either. Comfortably settled at K-State, he pursued his studies with monomania and a few close friends. When the mood was right, he and his university buddies might rail against the injustices of life. Why not? Griping was free, and a way to let off steam.

Still, Jason listened more than he griped. His parents drove FedEx trucks. No matter what those boxes contained, delivery could only happen locally. He gave little thought to where the goods in those boxes were made. Preoccupied with his dissertation research, his material needs were few. His stipend as a graduate assistant paid the rent, and he tutored for mad money.

That complacency vanished the day Sherry Nilsson appeared in the Student Union. Every move she made declared her a spacer. Somehow she made the unaccustomed struggle against gravity graceful and exotic. He admired her from afar, giving no thought to the improbability of a spacer picking Manhattan, Kansas as a destination. Looking back, he didn't think much in those days—or the thinking he did wasn't done with his head.

Opposites truly did attract. Sherry was as willowy as Jason was burly, as blond and Nordic as he was dark and Mediterranean, and—the biggest contrast of all—an econ postdoc. Had he found buttons cute, doubtless he would have added cute-as-one to Sherry's list of virtues. She drew Jason like a moth to a flame, and he could only hope that his fate would be less clichéd and fatal.

It would be weeks before he wondered whether Sherry was here precisely because she was his "type." Or that his technical skills and working-class roots, not his diamond-in-the-rough charms, had attracted anyone's interest.

Jason tried to insinuate himself into her circle. Sherry and her friends seemed always to be debating politics or economics. He often couldn't tell which. He decided that the boundary wasn't necessarily clear cut.

With uncharacteristic patience he dallied at the outer fringes of her clique. Then one day the main topic was government regulation of innovation. He swallowed hard. The verbal jousting had at last touched on a subject in which Jason could claim expertise. It had something to do with technology, anyway.

It was time to make his move.

Jason coughed softly. He cleared his throat. He eventually got Sherry's attention, which turned out to be as unsettling as her smashing good looks.

"So what's the big deal about these little machines?" Sherry asked when he named his field, smiling at her own pun. Aimed directly at him for the first time, her ice-blue eyes almost left him tongue tied. "Of what conceivable use is a millimeter-long gear or motor? And if smaller is better, why settle for half measures? Why not go all the way to nanotech?"

He rallied: This was his chance to make an impression. "Of what use is *any* gear or motor? We size machines for the tasks they handle. Micromachines ideally suit specific tasks."

“Surgery on mosquitoes?”

He nearly melted at the saucy curl of her lip even as he took exception. Lord, but he was smitten. “No, Sherry, although I could probably build the tools for that job.”

Micro electromechanical systems were a narrow specialty even within the engineering field. MEMS robotics was a niche indeed. K-State had a solid program, as did a handful of other schools worldwide, but that was it. Jason had plenty of experience explaining his passion to relatives and friends—and that MEMS devices were about a million times larger than nanobots.

He chose an example that worked for most laypeople. “Look, say an optical fiber goes dead in a trans-Atlantic cable. Signal repeaters are hundreds of kilometers apart, so a break—say, from a shark bite—could be anywhere between. Locating the damage by timing reflections from the break isn’t precise. Searching for a break by sub or remote-controlled submersible is damned expensive. So is laying new cable. *That* is a suitable problem for micromachines.”

“Huh.” She cocked her head. “What does a micromachine do? The backstroke?”

He had to laugh. “Imagine a gnat-sized robot able to move among the fibers within the cable sheath. Deploy a few gnatbots in every repeater. If a repeater loses signal from one direction, it sends a gnatbot creeping down the cable toward its silent neighbor. When the ‘bot sees light leaking out of a damaged fiber, it’s found the problem. Having counted its steps along the way, it reports back the exact location of the break.”

“How?”

Her friends looked bored. Some wandered off. For all their haranguing about technology regulation, few of them ever showed *interest* in technology.

“How can it report?” Jason grinned. “It’s easy. Look, the robot is tiny. It’s inside a fiber-optical cable. It simply polishes the broken fiber end into a usable state and beams its own light signal down the fiber.” It could even be designed with a bit of fiber running through its body. Polish *both* ends of the break, and splice the ends to itself: repair the quick-and-easy way.

Sherry considered. “That’s clever. But how would you control such a gadget?”

He reveled in her interest. “For a task that simple, I’d program it to be autonomous. For more complicated jobs, adding a low-power laser comm link is appropriate.”

One of the hangers-on inched closer. He was a jaundiced, gaunt fellow, a painter of some kind enamored of the starving artist tradition. “Could your creature find its way back out?”

“Device,” Jason corrected automatically. “Sure, but why bother? Gnatbots should be dirt cheap.” And for that reason, the ‘bots would not be stationed hundreds of kilometers apart, only in the repeaters, but scattered along the length of the cable.

People looked surprised at that answer. (Jason did not process at the time that *Sherry* showed no surprise. It all came clear later.)

Jason said, “A micromachine is a few pennies-worth of silicon and metal, no different than an integrated circuit. The machinery and its controls are formed at the same time, by the same industrial processes, from the same chip. The big costs are upfront: design labor and manufacturing equipment.” Like nanotech, for that matter.

More of Jason’s audience excused themselves, headed for a laser-art exhibition. His ire—he’d listened to their preaching often enough—vanished when Sherry made no move to follow.

“So you *can* talk. I had begun to wonder.” She laid a hand on his elbow. “Buy a girl a cup of coffee, sport?”

* * * *

For weeks, he and Sherry discussed politics, life in space, economics, and—to his unending surprise—microengineering. Some of her questions, hindsight being 20/20, suggested more than passing familiarity with MEMS.

Sherry’s friends kept happening by to chime in. Over beer and pizza one evening, when they were curiously alone, Jason asked when their chaperones were due.

“I deserve that.” Sherry sighed. “You really understand

microengineering, don't you?"

Some sixth sense told him that, contrary to appearances, she had not changed the subject. "No offense, but how would an economist know?"

"Does Ron understand poli sci?"

Ron was one of Sherry's maddening crowd. Ron sounded off now in Jason's mind's ear, pedantic and domineering. Jason grimaced. "I have my doubts."

"Why?" Sherry persisted.

"Ron is too sure of himself. Too much of a know-it-all. I can't respect someone incapable of saying 'I don't know.'"

She smiled. "While you pick words carefully and consider the ramifications of what you say. And you do occasionally say 'I don't know.' *That's* how I'm sure you know your stuff."

By that standard, he would concede she knew economics. "What bearing does this have on your chaperones?"

"Co-conspirators," Sherry whispered, standing. "We were evaluating you." And in the course of a long, moonlit stroll, she explained.

* * * *

"Are you with us?"

It was obvious in retrospect: Her cronies had been probing Jason for his political views. Sherry was the bait to keep him there. It was unclear whom that admission most embarrassed.

What did he think? With a few reservations, he sympathized with her aims—and so what? The ends were not the issue. The proposed means were.

And prison, quite likely, if things went wrong.

Had Sherry educated him? Indoctrinated him? Were hormones making his decisions? Or did they simply agree?

"Jason?" Sherry's voice cracked, her face drawn with worry.

Every prospective recruit was a prospective informant or undercover Syndicate agent. She had not decided lightly to approach him.

This was not, Jason decided, a deceitful face. Yes, he was in—although he had a final bit of due diligence to perform. He would do that on his own.

Whatever he learned, he wouldn't—couldn't—turn in Sherry. "Okay, I'm in."

She slumped in relief.

He continued, "Sure, I could use the university microengineering labs to build you tiny spybots. I could teach you and your friends to control them. But I have a better idea."

* * * *

"...Announced today that the *SSS Helsinki* will be commissioned on Tuesday. The *Helsinki*, eighth and newest member of the Syndicate's deep-space fleet, will accommodate missions of up to a year's duration. Equipped with the latest engines, the *Helsinki* will be the fastest of the Europa-class cruisers. Syndicate spokesman Alain Lamoureaux stated that..."

Shortness of breath did nothing to mitigate the propaganda. Freefall jogging only looked easy. Every step Jason took on the treadmill tried to bounce him—equal and opposite reactions made undeniable—into the air. Powerful bungee cords hooked to belt loops yanked him back. Wrist and ankle weights (okay, not *weight*, but still mass: resistance in the form of added inertia to be fought) intensified the workout.

Exercise here. Be pushed from the ship in a wheelchair when we return to Earth. It's your choice, Sherry had said.

So he exercised every chance he got.

Just twenty minutes offworld Jason had hurled, spraying lunch and probably the two meals before that. Loudly and sloppily. And floated through his own drifting vomit, too nauseous to care. That was plenty to live down.

His stomach lurched at the memory, and he tried to focus on the newscast. Four Europa-class ships were being shown. At the center of the image utility craft swarmed. They serviced the nearly outfitted *Helsinki*, hanging in space beside its birthplace: Syndicate Station Three. The camera shot came from the tethered sensor pod that orbited three hundred meters Earthward from the main body of the station.

Jason trudged on, his sweaty tunic clinging. The few metal ships looked crude and quaint among the translucent diamond hulls of the nano-grown Syndicate ships. Craning for a different view into the holo, he glimpsed the metal ship docked at Beta port.

This ship.

For years, the *Tom Paine* had shuttled between Earth and the Lagrange points, tapping the mineral wealth of the Earth/Luna Trojan asteroids. Scarcely a third the length of the sparkling Syndicate cruisers, the *Tom Paine* was representative of independents' ships: an antique.

The logic was inescapable. Metal hulls massed more than carbon, burning more fuel. Metal hulls were less dependable. A few grams of nannies kept the new-style hulls in repair—not that much could harm a diamond—but a metal ship needed an inventory of spare parts. Spares sacrificed that much more potential cargo capacity. And lugging extra fuel and spare parts required even more fuel....

When diamond spaceships began working the Trojans, independent miners could not compete.

Independents like Bill Nilsson remained in space any way they could. Too often that meant demeaning support contracts for near-Earth Syndicate operations, and even that work was disappearing. They saved their pennies and dreamt of the day when they would buy their own synthetic diamond hulls—

Until, Bill said, even the cockeyed optimists had to accept the truth. The Syndicate would never, for any price, equip potential rivals.

Breathing deeply to clear his head, Jason tried again to focus on the vid.

“In other news today,” the ‘caster went on, “Edouard Smithson, France’s ambassador to the United Nations, formally introduced the much-discussed global legislation to ban nanoengineering activities on

Earth. Citing two recent loss-of-containment incidents on Syndicate Station One, the ambassador called nanites, ‘Too great a risk to life for prudent terrestrial development.’”

The holo cut to Smithson, a long-faced man with eyebrows like woolly caterpillars. In dolorous tones, the ambassador said, “While my colleagues and I recognize the promise of nano-fabrication, we must not—and we will not—endanger life on Earth through hasty and potentially irreversible experiments. The technology can only be developed safely in space, where any incidents are intrinsically isolated.”

Jason managed, just barely, not to shout at the vid. How interesting that these incidents occurred on an obsolete station. Was Syndicate Station One more valuable as an object lesson than as scrap?

Toweling wet hair, Sherry entered the ship’s tiny dayroom. “You know, we *do* have exercise videos.”

Jason gestured at the vid. “Sanctimonious scumbag. Who besides the Syndicate works with nanites on an industrial scale in space? Everyone else works Dirtside—and without any *incidents*.”

She killed the webcast. “We knew this was coming, Jason. That’s why you’re here. We need to stay on task.”

He was so sick of this treadmill. The station gym had a dozen kinds of zero-gee exercise equipment, none of which he would use. Docking charges alone were more than they could afford. Every minute any of them spent off the ship added “environmental fees.” Breathing was not to be taken for granted in space.

He kept trudging. “You’d never guess from any words leaving Smithson’s lips that the Syndicate is a state-owned enterprise of the Eurasian Union. Or that without nano-fabbed diamond hulls and platforms, no one can compete out here with the Syndicate.”

She gave a minimal flick of hand and arm that reminded, “Who told you?”

Syndicate lobbyists were all over this “issue.” The money was flowing. Campaign contributions. Economic development aid. R&D grants. Outsourcing contracts. Syndicate scientists normally unavailable for comment were suddenly everywhere on the ‘net, gloomily asserting the inevitability of further incidents. Three media giants (all well supported by

Syndicate advertising) were promoting epic miniseries about gray-goo disasters. Never mind that, for reasons of safety, no one made nanoconstructors robust enough to survive in the wild. And that people smart enough to build a nanoscale self-replicator were smart enough not to try.

Spacer sympathizers Dirtside predicted Smithson—meaning the Syndicate—had ample votes in the General Assembly to enact the ban.

Sherry's econometric models projected the Syndicate would drive the independents from space within three years, before they could complete their own offworld nano-fabs. The Syndicate would own all the resources of space, with Earth's billions as a captive market.

Jason brushed a sodden lock of hair from his forehead. "Yeah, Sherry. You told me. I guess I didn't *really* believe it. It's easier, somehow, to believe it out here."

He stopped the treadmill. Carefully, he detached the taut bungee cords, then put on his Velcro slippers. They went together to the bridge, and Jason belted himself into the chair at his control console. "I believe it, but I refuse to accept it. Let's go get the bastards."

* * * *

Sherry plucked at her hamburger bun and then in the air at the crumbs she had set loose. Her hair was pulled back in a long ponytail that floated behind her baseball cap. She returned Jason's smile of encouragement.

If only someone could encourage him.

"Very illuminating." Bill spoke from the ship's galley, to which he had disappeared for a coffee bulb. Caffeine megadosing was the older man's one vice. The dour spacer had fallen upon hard times—he was ship's captain, pilot, engineer, and cook.

"Yeah, right." Jason considered another burger and thought better of it. The first churned unhappily in his stomach. Today's swatted scout was their sixth try at crossing that room.

Bill called out, "No, I mean it. Literally. The lighting in that service area was fairly bright. Could you add photocells to a scout? It could recharge its batteries for the final sprint."

“Hmm.” Jason straightened out of a slouch. “If we could...” They couldn’t, of course. He pulled up the schematics anyway, hoping to be wrong.

A gnatbot had six independent legs, each with a dedicated micromotor. Locomotion was the biggest drain on the internal battery that filled the ‘bot’s guts.

“Zoom, please,” Sherry said. He did and she leaned closer anyway. “Fewer legs?”

Maybe it could get around with fewer legs—but no. Jason shook his head. “Can’t, without sacrificing its disguise. To pass for a bug”—unwelcome, but innocent; the station was full of stowaway insects and their spawn—“it needs six legs.”

The head was dominated by two integral CCD cameras, each capped with a fisheye lens for one-hundred-eighty degree visibility. Two piezoelectric sensors astride the head served as ears. Jason thought aloud. “We need both cameras for stereoscopic imaging. We need both mikes to triangulate sound sources.”

Four dark regions, stubby steerable rods, marked the robot’s back. The right pair were infrared lasers; the left pair photodetectors.

The whole damn surface was in use! Where could he possibly add photocells?

“We’re so close,” Bill said. “You’ll find a way.”

Jason closed his eyes. “You know, Bill? That optimism of yours can be really annoying.”

The hell of it was they were so close.

In just a few days they had stretched a comm network, an invisible daisy chain of two-way infrared links, across the station. (Only one link, from the *Tom Paine* itself to the relay in the docking collar, used radio, at less-than-cell-phone power levels, so they could conspire behind closed airlock hatches.) The first relay placements were easy. While playing tourist they stuck ‘bots to dimly lit spots in the public corridors. These fixed relays needed only to pivot and twist for aiming.

Then they dumped mobile ‘bots into the station’s air ducts to extend

the network into the guarded and secure Syndicate-only lab annex. Fans did the work, delivering 'bots across the station. The micromachines grabbed hold where they could. In seams between duct segments? To dirt within the pipes? They would never know, and it hardly mattered.

For one 'bot to detect another's flailing laser beam took time, but link by link the network took form. Random distribution meant gaps, but the third 'bot-swarm release plugged the holes. They could see and hear much that transpired in the control room of the Syndicate's main orbital fabrication facility.

Then they sent scouts through the ducts to explore the secret labs.

Scant meters short of their ultimate goal, they were stuck. Repeatedly. For want of a microwatt the gnatbot was lost...

His sarcasm weighing on his conscience, Jason opened his eyes. "There's hardly any free surface area, Bill. I can't add enough photocells to matter."

Bill made no comment, letting silence speak for him: You're the expert. Make it work.

Jason hummed. He studied the ceiling for a while. He whistled tunelessly. He drummed fingers on the dayroom table. He gave up the tapping to stroke his chin in thought. There *had* to be a way. "Unless..."

Sherry sat up. "Unless what, hot shot?"

"Unless we build the 'bots from diamond," Jason said.

"You're kidding, right?" Even Bill's optimism knew limits.

"Actually, no." Jason stretched as much as the cramped dayroom would allow. "It's an easier problem than nanite-grown hulls. I don't know anyone making microbots from diamond, but synthetic diamond *is* used for special-purpose computer chips.

"Carbon atoms are smaller than silicon, so we can shrink most everything in the 'bot. Expand it back to its current size, and there'll be some uncommitted surface area for photocells."

Jason warmed to the idea, his words tumbling out faster and faster. "Another thing: diamond bearings will mean less friction in the micromotors.

That'll reduce power use.”

Bill emerged from the galley with the inevitable coffee bulb. “Can your friends Dirtside make diamond ‘bots for us?”

The K-State labs had the necessary equipment; motivation was the question. His buddies knew only that he was away with Sherry—and when he went back, they expected to hear all the prurient details.

That was the least of his worries. He had more serious matters to lie about.

Jason thought about his tech-junkie friends back on Earth. He considered the practical challenges in making a diamond ‘bot. The *fun*. “Yeah,” he said, smiling. “They’ll do it. Count on it.”

* * * *

A package for Jason arrived from Dirtside. An imperious summons followed close after.

The Syndicate heralded its messages, no matter how trivial, with high-priority tones. The ominous brass cadenza preceding *this* message had to signify a communication from a Syndicate bigwig. With a shiver, Jason opened the message.

Barbara Shaw, the station director, appeared. “I’ve scheduled ten minutes for Jason Grimaldi at 14:15 Station time.” That was in twenty minutes, barely time to put on fresh clothes and reach her office. “Be prompt.”

Shrewd eyes peered at Jason from the end-of-message still frame. He did not relish feeling that gaze in person. “Sherry, Bill ... I can’t explain that call. I’ve never met the woman.”

To Jason’s surprise, Sherry laughed. “You kicked up a stir Dirtside at the Syndicate regional office. Maybe Ms. Evil Eye means to resume the conversation you started with her campus recruiter.”

He goggled. “You *knew*?”

“That you visited the local Syndicate office after I approached you? Yeah, we knew that. The receptionist is one of us.”

“Then why am I here?”

Bill fielded that one. “Our agent listened in by intercom. You got into a nasty fight with the company man. You kept working with Sherry, so we decided you were on our side.”

Jason looked away, red-faced. “Sherry gave me a lot to think about, but I had to make up my own mind about the Syndicate. You couldn’t have known that. The scene could have been staged for your benefit.”

Sherry squeezed his hand. “It could. I told Uncle Bill I didn’t believe it had been. I trust you.”

Jason had to know. “Why?”

She winked. “You talk in your sleep.”

* * * *

The director took a call just as an aide escorted Jason in. She waved him to a seat, her attention on the call.

The butter-soft leather of the autochair molded itself to Jason. Its gentle embrace, not a mundane seat belt, held him in place. Like everything in this luxurious office, the chair reeked of affluence.

There’s an interesting expression, he thought. Pre-Sherry, did I ever consider affluence capable of reeking?

Not important, Jason. If this woman learned what he, Sherry, and Bill were up to, they would all be in the station’s brig. Could Sherry be right? Was this merely a continuation of his argument with the Syndicate recruiter? Why would Shaw bother?

The office was oak paneled, with plush oriental rugs over an Italian marble floor. Merely the chair that nestled him would cost his parents a year’s salary. To lob such opulence up from the bottom of the gravity well? It was a brazen display of wealth. (Display? Another interesting word choice.) Jason could not fathom the mindset that valued such ostentation while a breathtaking view of Earth went unappreciated *behind* Shaw’s desk.

At first glance, Barbara Shaw looked little older than Sherry. That had to be ReJuv shots; she could surely afford them. Her level, penetrating gaze spoke of many years in command. Despite microgee, Shaw’s drifting,

flowing hair somehow stayed coiffed. She probably spent more on her hair than he spent, Dirtside, on rent. He fought—unsuccessfully—the urge to squirm in the autochair. It buzzed softly, remolding itself to him.

Shaw finished her call. “Thank you for coming, Mr. Grimaldi.” She tapped at her computer console. “Ah, there you are. Tough classes, good grades, significant dissertation project. And very resourceful.”

Jason had not come expecting compliments. “Excuse me?”

“Picking a fight with a Dirtside recruiter to raise your visibility, then coming to a Syndicate Station. Ever since the system flagged your name on a passenger manifest, I’ve been expecting your call. I had begun to wonder if you’d gotten cold feet.

“Naturally, the system has followed you since *Tom Paine’s* arrival. Zero-gee sports”—the station’s tourist annex was famous for them—“seemed a bit extravagant for a grad student.” Shaw arched an eyebrow. “Although I imagine you and Ms. Nilsson have another zero-gee sport to divert you.

“When the cargo manifest for today’s shuttle named you as receiver of a gemstone shipment, I understood the delay: careless packing.” Shaw smiled broadly at him. “Gifts aren’t necessary, of course, but I won’t say no.”

Damn the guys anyway, declaring the diamond ‘bots as gemstones. No doubt they thought they were being clever.

How could the occupant of *this* office want a bribe from an entry-level applicant? “Uh ... so Mr. Chrisp was negative about me?”

She laughed heartily. “You actually compared the Syndicate to the British East India Company?”

“Yes. Are you offended?”

“Flattered. Commercial control of the subcontinent pushed the state of the art in the 1700s.”

Like commercial control of a planet today? The chair fought Jason as he leaned forward abruptly. “Then you admit it!”

“You have something against profits? That’s *not* an attitude I look for

in employees.”

Jason said, “I’m normally all for profits. It’s monopoly profits I question.”

Shaw frowned. “What are you suggesting?”

“License your nanotechnology. Allow some healthy competition.”

“Nanites give us a technological edge, Jason. Why give it away?”

It was wasted breath, but Jason felt compelled to try. “Licensing isn’t giving it away. You could earn substantial fees without stifling all competition, *and* the solar system would get settled much faster.”

She sniffed. “Licensing offers only a pittance. We’ll make a lot more keeping the technology to ourselves.”

“The technology should never have been exclusively yours. Just like the British East India Company, the Syndicate is a *political* monopoly. Oh, what you have is more subtle than a royal letter of patent, but it’s a political creation none the less.”

Sherry had spent years deconstructing a system of subsidiaries, joint ventures, shell companies, strategic investments, corporate alliances, political obligations, and research foundations. Jason summarized as best he could. “There’s Syndicate funding behind every alarmist, lunatic fringe, anti-nanny group on Earth. Your ‘edge’ comes from hobbling nanite competitors more than from your own research.”

He ignored her deepening glower. “The Smithson bill to stop nanotech work Dirtside will give you an insurmountable lead. Your ships will drive all the other companies, and all the independents, from space. And *then* won’t we be surprised when prices rise—not quite to the levels that would let another megacorp back into space.”

Shaw leaned forward. “We’re done, Mr. Grimaldi. With your attitude, I can’t imagine why you bothered coming here.”

Jason stood to leave. And I hope, he thought fervently, that you never do.

* * * *

The *Tom Paine's* bridge felt hotter and more cramped than ever. Perspiration coated Jason's face, beads of sweat floating free from time to time, as he willed forward another tiny robot. They were working round the clock, certain that Director Shaw would invent a reason for canceling their berthing privileges.

Jason drove their tiny scout faster than he had ever before dared, telling himself better camouflage made that safe. Random defects induced on the diamond surface scattered light and suppressed reflections. The translucent material took the color of any surface on which the 'bot found itself.

And thanks to Bill's brainstorm, this scout had begun its cross-room scurry with its batteries fully recharged.

"Go, baby, go," Sherry urged.

The holo view crept along by another tiny step, and another, and another. The 'bot crawled along the wall to a corner. Then a second corner. Then down the third wall onto an instrumentation shelf. They cheered as the 'bot neared a testing port for the immense synthesis vat. The vat itself abutted the station, unseen beyond the bulkhead. Inside the vat the ninth Europa-class cruiser was taking shape.

Bill clasped Jason's shoulder. "A lot rides on this, son, for the planetful of people below and a few more offworld. They'll never know what happens here. But mostly I'm thinking of good folks who died in the Trojans, Sherry's parents and brothers among them.

"Sure, they came for the money, but that was only part of it. A small part. They believed humanity's future was in space. Not the Syndicate's future, but mankind's.

"We mustn't allow them to have died in vain."

Sherry hugged her uncle, leaving an arm draped across his shoulders as the 'bot took its final steps. The virtual bull's-eye lay perfectly centered in their display. In a corner of the image, a timer counted down.

The moment, when it came, would be too brief for human reflexes. Now everything depended on software.

There. A sampling port slid open. The automated quality-assurance probe stabbed into the aperture. Just as rapidly the 'bot thrust itself through

the opening. They glimpsed dark turbulence before an eddy swept away the 'bot. The holo dissolved into static.

With one keystroke Jason switched their point of view. From the fly-on-the-wall perspective of the nearest relay, they watched the service port slide shut.

Jason squeezed the leathery hand that still gripped his shoulder. "Now, we wait."

* * * *

Macromolecules swam purposefully through stygian darkness, grazing on glucose dissolved in the murky fluid. The breaking of chemical bonds provided power; the carbon atoms liberated from the nutrients were retained as essential building material. One by one, their carbon receptors sated, the nanites switched to delivery/construction mode.

Molecular programs sensed and adapted to past progress. And while each nanobot worked alone, placing one carbon atom at a time, they numbered in the trillions. Together, they built with amazing speed.

A structure of marvelous complexity emerged.

Freed of their carbon cargo, programming sent the tiny machines back into the solution to gorge and build anew.

A process so massively parallel entailed many missteps. Only less-than-microscopic bits of the evolving construction ever came within range of any one constructor's chemical sensors. Decisions made from such limited data were often incorrect. A single atom bonded to the wrong place might miscue other constructors and lead to more mistakes. Errors would propagate....

Quality assurance nanites prowled the border of the ever-expanding structure, comparing whatever they found to hull blueprints encoded in their molecular memory arrays. These fixers tagged and snipped out the anomalies that inevitably crept into the construction.

Scavenger nanites, like white blood cells, hunted foreign substances suspended in the solution. They engulfed stray contaminants and swarmed scraps tagged by the QA 'bots, before plunging sacrificially, clutching their prey, into a sticky entrapment filter.

A scavenger nanite, one of billions in the synthesis vat, encountered something unusual. It hunted the unexpected and its software anticipated many possibilities, but no programmed response suited *this* discovery. Diamond fragments were to be expected, but not with traces of phosphorus, boron, and aluminum. Creeping along the immense object, apparently millions of angstroms in length, the scavenger reached a decision. The object did not belong. The scavenger prepared to release a stream of chemical signal markers. It would need many helpers to engulf the diamond fragment.

It never got the chance.

A vortex formed in the fluid. Other nanobots, closer than the scavenger to the turbulence, were immediately swept away. The scavenger struggled, its flagella flailing, against the suction. Even at full power it could not resist. The nanite was sucked through a tunnel into a vast cavity. The tunnel disappeared, sealed by a diamond slab. Emergency programming took control and the scavenger darted in all directions without effect.

It took no solace from its chemically sensed company: a herd of constructors, a smaller set of fixers, and other scavengers. It did determine, as it reflexively swam and grazed, that enclosed with it were sufficient dissolved nutrients for a lengthy stay.

* * * *

“Kashmir?”

“Yes, Ms. Shaw,” answered Keith Higgins, the director’s flustered, balding deputy. “The cryptogram to Grimaldi’s woman companion originated in Kashmir. Remember the spokesman for the Kashmir Liberation Front? Something Umar. He was at the independence talks in New Delhi. The tall, swarthy guy with the scruffy mustache. He’s the new Kashmiri foreign minister.”

Accessing the private message was illegal and contrary to Syndicate policy. Barbara Shaw shrugged. Self-defense was a higher policy.

She could picture Nayeem Umar, all right. So: The local malcontents were dealing with a Third World terrorist. Clearly, she should have taken more seriously the name *Tom Paine*, in honor of the infamous colonial radical.

“Time for our own ‘Common Sense.’ Let’s see that recording,

Higgins.” She wondered how much computing time had gone into cracking the cryptogram.

Umar’s message was terse. “*Salaam*, my friend. I’m pleased to say the cabinet has completed its debate. We accept your Tweedledee proposal. Succeed, and the sum we discussed will be invested in your enterprise. Good hunting. *Allahu akbar*.”

Tweedledee? Why, Shaw wondered, not Tweedledum? She could never tell them apart.

In a way, that was the point. Newly independent Kashmir must be planning to bootstrap its economy through the methods pioneered by Singapore, South Korea, China, and Vietnam.

Unauthorized copying.

* * * *

Within the body of the swimming gnatbot, on nearly frictionless diamond bearings, tiny gyroscopes spun. Despite currents and turbulence in the synthesis vat, the gyrocompass maintained range and bearing to the access hatch used by the quality-assurance probe.

Its sampling complete, the ‘bot swam back to the QA portal to await the hourly opening.

* * * *

Despite maximum magnification and computer enhancement, the three conspirators could see no sign of the overdue scout.

“Move closer,” Bill urged.

Jason resisted the temptation. Any time the relay moved, it chanced losing its grip on the bulkhead—and with it, any hope of relinking with the missing ‘bot.

They wanted a better view. They *needed* an operational comm link.

“Sorry,” Jason said. “It stays.”

They stared and wondered and worried. The QA sampling had happened right on schedule. Their scout should have emerged then from

the vat, clutching the probe needle. It should have reestablished communications minutes ago. Where was it?

An emergency siren howled. Jason twitched; only a loosely fastened seatbelt kept him in his chair. He slapped the ACCEPT key. "*Tom Paine*."

The synthesis-chamber anteroom shrank into a corner of the holo. A balding man with a smirk took its place. His blazer bore a Syndicate crest. "Good day. Captain Nilsson, please."

Bill leaned in front of the camera. "Speaking."

"Keith Higgins, here, Manager of Station Operations. I'm afraid, Captain, I have some inconvenient news for you."

"You're awfully wordy for an emergency," Bill said.

Higgins shrugged. "Your comm is queuing routine calls. Rather than leave a message, I thought I'd get your attention. You might appreciate the lead time."

Bill sighed. "Get to the point, please."

Higgins' sneer broadened. "Beta port is overdue for maintenance. At this time, our other ports are either busy or reserved for incoming Syndicate ships. Bottom line, the *Tom Paine* must undock by midnight, station time."

Midnight was scarcely ten hours away.

Flickering in a corner of the holo caught Jason's eye. He passed a scribbled note to Bill: Follow my lead. To the camera, Jason said, "That's impossible, I'm afraid. Our main radio blew its power transformer." He looked expectantly at Bill.

The captain nodded. "Right, Higgins. The transmitter is a discontinued Sony-Boeing model. The station doesn't stock parts for it."

"We were unaware of this problem," Higgins said.

Jason glowered. "Why would you be? Are you monitoring our messages?"

Higgins' smirk faded a bit. "No, no, of course not."

Meaning almost certainly that the Syndicate *had*. Uh-oh, Jason thought. What about the message from Kashmir? Had it been sufficiently secure?

Jason tried to put that out of his mind. They could do nothing about it now. “A friend from O’Neill Two passes through next week. He’s scrounged a second-hand unit to bring us. Your routine maintenance will have to wait.”

“Unacceptable,” Higgins snapped. “Have the part sent up on the next shuttle. Under the circumstances, we’ll pay the difference. You have twenty-four hou—”

Long enough. Jason thumped the CANCEL key. The flickering picture-in-picture zoomed to refill the display. “Look, guys.”

The grainy cross-room view gave way to a blurry close-up of the sampling equipment. The new scene wavered before flipping back to the fly-on-the-wall perspective. The images toggled jerkily.

“See that power reading? I had to act fast.” Jason typed frantically. “It’s almost drained.” It: the overdue scout.

“Where’s it been? What’s going on?” Bill demanded.

Jason kept his eyes on the console. “I’m still working that out. The ‘bot must have come out on schedule. The QA port has only reopened the once.”

Jason paused the image on a dim close-up of the QA probe. “Look how dark the scout’s vision is. The nutrient glop is thicker than anything we’d imagined.”

“It won’t be just the eyes,” Sherry said. “The glop must be all over the ‘bot. Is that why it didn’t reconnect to the comm relay? Gunk on the lasers and photodetectors?”

Jason nodded. “That’s my guess. Without a link, the ‘bot would’ve gone into default mode. That means jiggling about randomly, trying to get away from a presumed obstruction.”

“Fat lot of good that will do,” Bill contributed. “It’s *wearing* the obstruction.”

Uh-oh, Jason thought. “Coating the photocells, too. The ‘bot’s not

recharging.”

Sherry studied the gauge. “So the random motion is draining the battery—what little juice it has left after an hour swimming in syrup.”

Jason’s fingers raced over the keyboard. They did not have much time.

Bill kicked off toward the airlock. “I can’t contribute anything here, and someone has to order a new widget. I’ll downlink from someplace very public and make a great show of it.” The inner hatch sighed shut behind him.

“Done.” Jason slumped in his chair. “I’ve knocked together a program tweak and downloaded it to the relay. If we’re undeservedly lucky, the intermittent link will stay up long enough to deliver the new subroutines.”

“Why is the ‘bot returning to life now?”

“Best guess, Sherry? Some of the goop is evaporating. Maybe it’s jiggled some off. If we can’t recharge the ‘bot soon, ‘why’ won’t matter. It’s got a long walk ahead.”

If the little diamond robot never reached a public area of the station for retrieval, everything would have been for naught.

Jason took Sherry’s hand. “*If* the new program gets installed, we have a chance. It’ll send the ‘bot walking straight up the nearest bulkhead toward a ceiling fixture. Light is trickling into the photocells, just not enough to fully replace the power it’s using. The closer, the better.”

Sherry squeezed Jason’s hand. “The closer, the better,” she agreed.

* * * *

Infrared flashes, insistent but meaningless.

The gnatbot scout could not localize the source. What signal it received was oddly weak. It could not sense the nutrient residue over its photodetectors, dimming the IR laser signal.

The little machine kept transmitting in the best-guess direction. The feeble incoming signal implied a distant source, so it boosted power to its comm laser.

The draining of its battery accelerated.

Side by side, silently, Jason and Sherry watched the downward crawl of the simulated power gauge. The simulated needle kissed the redline: five percent power remaining. The rate had slowed, but the image still flickered.

Nails pinched Jason's hand as the sampling port, glimpsed in flickers, began slowly to swing from sight. The view shifted by thirty degrees, then forty-five. It kept on turning. He did not breathe again until the glacial turn revealed the back wall. Then he checked the power reading. Then he cheered. After a moment's delay, Sherry joined him.

The scout 'bot had accepted the new programming. It was headed across the shelf toward the bulkhead for its long climb upward to the light.

* * * *

Epilogue

New hulls grew in three enormous floating microgee vats, soon to join the ten deep-space vessels docked to the Independent Miners orbital station. Cargo lighters, passenger shuttles, orbital utility craft, and space-suited figures jetted everywhere. Tethered bales of nanite-grown diamond struts and panels for the station's continual expansion floated everywhere. Luna, austere and majestic, was two hundred clicks below, almost close enough to touch.

And the colonists below were close enough to quickly reach *here*. Away from Earth's bureaucracy meant away from the rule of law. No overt action had ever been taken against this station, and perhaps the proximity of the helium-3 mines—and hundreds of independent miners—was only a coincidence.

And perhaps not.

But this was not the day for negative thoughts. Jason stood to go meet his visitor, the new CEO of the Syndicate, in the station's main lounge. He had not quite reached the office door when Barbara Shaw burst in, with Jason's apologetic-looking deputy trailing after.

The brisk *zzzp-zzzp* of Velcro footwear turned Shaw's grand entrance almost comical. She ignored Jason's outstretched hand.

“Grimaldi, you cannot imagine how I’ve anticipated this day.”

“I’m sure you’ll tell me. Why don’t we sit down first?”

She remained standing. “Nice office. Think you can still afford it?”

From what Jason remembered, this cabin could not hold her old desk. His token nod toward personalizing the office involved a couple of liters of paint and some holo art. “Can I?”

“My accountants predict that you’ll squeak by. That proved to me that my lawyers were not sufficiently ... motivated. I fired them.”

Sighing, Jason grabbed two empty drink bulbs from a cabinet. “Coffee?”

The hospitality made her blink. “Don’t you realize I did my best to ruin you and your precious Independent Miners? You stole Syndicate nanites—somehow—and used them to jumpstart your own corporate empire. It’s taken me five years to establish your piracy, but now I’ve stopped you in your tracks.”

He filled both bulbs and handed her one. “Look, Barb”—she bristled at the familiarity—“you haven’t *established* anything. The Independent Miners settled out of court. True, the Syndicate will get a lump-sum payment now, and royalties on our future ships, but we’ve admitted no wrongdoing.”

“And the ships that are indistinguishable from half my fleet?”

Jason gestured at his window, its polarization set high to soften the lunar glare. “Look two docks over. That’s the *Madrid*, the ship you rode out here. It mates easily with our docking ports and our fueling rigs, and we can service pretty much any part of it. And although it probably galls you, our ships sometimes dock at Syndicate stations. They can refit and repair with parts from your depots. Standardizing on size and shape is simply practical.”

In her right temple, a blood vessel throbbed. “And there was no significance to the name of your first diamond ship? Do *not* take me for a fool!”

“Ah, the *Growing Paine*. I’ll tell Sherry you appreciated her little joke.”

“The monetary settlement is no joke,” Shaw snapped. “I came to watch you transfer the funds, and I want to see that *now*. We’re meeting here, Grimaldi, rather than in my office, for one reason. So you can’t pretend that paying up doesn’t hurt.”

Shaw didn’t get it; maybe she never would.

“Look outside first, Barbara. Tell me what you see.”

“A space station, some construction, modern ships—if all, like this office, rather Spartan. Nothing I didn’t see as a station exec. What’s your point, Grimaldi?”

Twice as many ships were here today as Jason had seen at Syndicate Station Three, but he chose not to quibble. “We’re opening the solar system faster than the Syndicate ever would have—certainly faster than it once chose to. These ships, and more like them, bring us all—Earth, the Luna settlements, the O’Neill colonies, Mars base—far cheaper resources than five years ago. And they’re giving *you* a bit of honest competition.” (Shaw snorted at “honest.”) “From its last annual statement, I doubt the Syndicate has suffered much from vastly expanded markets.”

Jason smiled. “And, at least after the fact, every one of our new ships was built under license from the Syndicate.”

“Under license?” she scoffed. “You once sat in my office and dared me to license our technology. You planned this even then, down to settling out of court. It’s very clear now. Admit it.”

Jason turned to admire the nearest synthesis vat. “Clear? A new cruiser is growing inside, nanoseeded the day your lawyers and ours reached agreement.

“We call it the *Window Paine*.”