CHAPTER 4: THE PATH TO TOMORROW

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Location: Xanthe
Log note: Talking to the source

AFTER VICTOR SAID GOODBYE to Carroll Lane, he left the hospital section of the Diano Building. He then took an elevator to the 83rd floor. *I'm in room 6107*, he thought to himself. *It should be pretty easy to find.*

The elevator doors opened – and there was instant chaos. Two chickens darted into the elevator. Victor saw more chickens running around the hallways, clucking like mad. There were chicken droppings everywhere and the hallway had a terrible odor. Further down the hallway he saw a man and a woman arguing.

Victor stepped out of the elevator. The doors closed behind him and took the two brown chickens to some unknown destination.

"Hey there!" the man called out. "What do you think you're doing with my prized chickens?"

"I haven't done anything to your chickens," Victor replied defensively. "I just got here."

"You let them escape! I saw you. I'm watching you, you know! Do you know what you are? You're a chicken stealer! I'm going to report this. You can't get away with stealing my chickens!"

"I did not touch your chickens," Victor said firmly. "If they wish to ride the elevator around the building then that is your problem. Besides, I find it very difficult to believe that the building supervisor allows you to have chickens in the first place."

"I've got you there," the man said.

"No you don't, Derek," the woman interrupted. "The building supervisor has already talked to you about this. You're *not* allowed to raise chickens."

"He said I wasn't allowed to raise chickens *in my apartment.* He didn't say anything about raising them out in the hallway! I've found a loophole and I'm going to use it. That blasted robot can't do a single thing to me now!"

"Just wait until he gets here," the woman warned. "Five of your neighbors have gone to complain about what you've done to this hallway. You are *not* allowed to have personal possessions in the common areas of the building – which you know perfectly well. Given what a pain you've been, I fully expect the supervisor to throw you out of the building. You refuse to believe that the rules apply to you."

"And what about you, Bonnie?" the man shouted. "You've stolen six of my chickens in the past week. *Six* of them! And I know all about the horrible things you do to them. You are sick, Bonnie. Sick!"

"I just kill and dissect them," Bonnie protested. "If you want to be a surgeon then you have to practice dissecting things. Since you aren't allowed to have chickens anyway, there's no reason why I can't take them. After all, you can bet the supervisor will confiscate them when he gets here. Those chickens are dead either way. They might as well contribute their lives to the cause of science."

"You *can't* be a surgeon, you fool! Only machines can practice medicine. Those are the rules, remember? You don't have a surgical license and you will never get one. Apparently those precious 'rules' don't mean very much to you when they get in the way of what *you* want."

Victor watched in amazement as his two neighbors got into a heated argument. There were chickens everywhere – along with their feathers and their droppings. *I'm going to be sick*, he thought. *I can't stand this. I really had it good back in my apartment, didn't I? I feel like I've moved into an insane asylum. Are all my neighbors this bad?*

Victor decided that the best course of action was to make himself scarce. He dodged the chickens and made his way down the hallway to his assigned apartment. When he arrived, he lifted his hand and waved it in front of a sensor that was embedded in the wall next to the door. The security system recognized him and unlocked the door. He quickly went inside and shut the door behind him. *At least I can't smell chickens in here*.

The apartment he had been given was larger than he expected. He had been provided with a thousand square feet of living space. The fact that the room was completely empty and had no dividing walls made it seem quite large. His old apartment had been larger, but it had also been more cluttered. Here there was nothing but potential.

Well, *almost* nothing. The floor and walls were made of some bland, gray substance, but the ceiling was fashioned out of glowing tiles that illuminated the room. In the wall by the door were two small machines: a food dispenser and a matter dispenser.

The matter dispenser was connected directly to the building's ZPEs. All living spaces in Star City had one. The ZPEs created a low-temperature plasma that was transported through a series of pipes to matter dispensers throughout the city. The dispensers took that plasma and reconfigured it into whatever item the resident wanted. *That's why the apartment is empty*, Victor thought. *The Corporation expects me to define the room's furnishings myself. Well, that's fine. I guess I can do that.*

Victor walked over to the matter dispenser and checked his account balance. Since Rios had stolen his entire life savings he expected it to be zero, but to his surprise the company had given him a generous allowance. He had almost a year's worth of plasma available, which was more than enough to furnish the apartment. *Maybe they do care about me after all. They even made my bank account internal to the building, which means no one outside can ever steal it again. Very nice. I guess they're learning! I wonder where they are keeping all that plasma, though. Do they have giant tanks in the basement or something?*

Everyone in Star City was allocated a certain amount of plasma, and the accounts were incremented on a daily basis. In the distant past the plasma had been given out on a monthly basis, but that did not work out well. As soon as people got their plasma they spent every bit of it the first day, and then complained for the rest of the month that they had nothing. Since the people refused to be responsible, the Corporation was forced to rethink how they did things. People still complained, of course, but since everyone knew they would get more free stuff the next day it was not as critical an issue.

The food dispenser worked on the same principle, with a slight difference. Since it was a very bad idea to feed people food that was made from unstable matter, the city's food supply was not generated from ZPEs. Instead a series of robots dumped rocks and dirt into atomic liquifiers that were located far outside the city limits. (Maintenance robots also dumped in the city's garbage.) This raw material made its way through a series of pipes that brought it to a nuclatomizer in the Diano Building's basement. That machine converted the material into a special type of high-grade plasma, which was then routed to the food dispensers so it could be turned into whatever food the person wanted. Like the matter dispenser, each person received a fixed food allowance, which was also doled out on a daily basis.

Victor touched the matter dispenser and pulled up its holoscreen interface. The dispenser had a staggeringly large library of items that it could create. The library was very familiar to Victor; it had not been changed in more than a hundred years. Once Victor selected an item and confirmed his choice, the dispenser would take plasma out of his account, materialize it in the form of an item, and place it exactly where Victor wanted. The technology it used was old, but it worked very well.

"Let's see here," Victor said aloud. "First, let's recolor the floor and the walls. Grey is an awful color. Then I'm going to need some additional walls in this place. Let's put a bedroom over there, with a bathroom attached. I'll partition another section of the apartment off for an office, and will make the rest of the space a giant living room. I'll also add a table, I guess, so I'll have a place to eat. And maybe some chairs. That should be about all that I need. Oh – except for some office furnishings."

Once the living space was partitioned and the walls were in place, Victor scrolled through the long list of furnishings. There were many possible designs (all old and all very familiar), but most of them didn't appeal to him. The modern-looking designs just looked too simple and mechanical. He preferred the more classic items – the ones that had style and substance. *They did things better back in the old days, before the ZPEs were invented. Maybe people just cared more back then. After all, they were working with materials that were actually stable. I bet my holoscreen won't last five years before I have to liquidate it.*

Victor picked out a bed, a nightstand, and a wardrobe for his bedroom. After furnishing his bathroom he picked out a small table for the corner of his living room. He created two table chairs, a sofa, and a recliner. He then added some floor lamps, since he didn't particularly like the glowing ceiling tiles, and a holoscreen. For his office he created a desk, a chair, a computer, a holoscreen, and some bookshelves.

Now I just need to find some books, he thought. These days physical books were a novelty. The few people who still bothered to read spent their time reading digital editions – either on holoscreens or on small devices that they carried with them. Physical books were held in very low esteem; they were bulky, expensive, brittle, and prone to damage. Victor, though, had a fondness for them. He liked their tangibility. They were something *real* – something that he could hold in his hands. They had substance, weight, and a certain permanence. Digital books required electricity and computers – in other words, civilization. Paper books, though, needed none of those things and could be read with just sunlight. They could outlast the fall of civilization itself. Professor Grimes had once told Victor that many books survived the fall of the Mayan Republic and were found centuries later. *No ebook can do that*.

At his old apartment Victor had a large collection of old books – not books produced by a matter dispenser, but actual antique books that had been printed centuries ago on an actual printer. Of course, all those books were gone now – most likely destroyed by the illiterate SSF. Victor was tempted to fill his bookshelf with replicated books but decided against it. He would rather find genuine books and preserve them. *Perhaps Professor Grimes knows where I can find some*.

Victor stepped back from the replicator and looked around his now-furnished apartment. It certainly wasn't as nice as his old home, but it was vastly better than being outside, and he was grateful. However, there was still one last thing that was missing: windows. Victor knew this was not an accident. First of all, no room in the Diano Building had actual windows. All of the exterior glass had been replaced with a reinforced, bulletproof metamaterial in order to protect the building from the never-ending riots that plagued the city. While Victor was in the hospital that material had been upgraded with something that was thicker and vastly stronger. The new material was designed to

protect the building against direct missile strikes. The only thing it could not withstand was the detonation of a nuclear weapon within the immediate vicinity – but an attack of that magnitude would be madness. The Diano Building was located in the heart of Star City and was surrounded by thousands of other buildings. Since the Diano Building was the source of all of Star City's food and water, people tried to live as close to the building as possible. If the Building was nuked the blast would also vaporize all other nearby buildings and kill nearly everyone. Victor found it hard to believe that any administration would be willing to do that. They might be willing to kill others, but surely they would hesitate to kill themselves. *Even Susanna Hamilton would surely think twice about blowing up her own city. At least, I hope.*

Since real windows were out of the question, the Corporation offered an alternative. Hundreds of years ago someone had invented a holoscreen that could perfectly mimic a real window. You couldn't open it or stick your head out of it, but if you looked through it from different angles the view would change. It looked exactly like a real, transparent window instead of just a trick of technology. These artificial windows were installed throughout the building and made it seem a little less like a giant prison. Every single window in the building was actually one of these holoscreens.

Victor used the replicator to fabricate a couple, which he positioned throughout his apartment. As he was doing this he realized that his room wasn't actually on the edge of the 83rd floor. If he had been crazy enough to cut actual holes in his walls, he would have found himself looking into his neighbor's apartment – not the actual outside. But in this case it didn't matter. He could have his window, even though it made no architectural sense.

The only question left was what scene to display. Since the window was just a fancy video screen, Victor didn't have to look at what was really outside. Most people, in fact, chose to look at something else, because the real word was drab and depressing. The skyscrapers that surrounded the Diano Building were short, dirty, and decaying. The automated repair bots did their best to keep them in order, but there were just too many people destroying them and setting them on fire for the bots to be able to make any headway. Every night throngs of bored and angry people inflicted serious damage on the city, and it was impossible to prosecute any of the vandals. The outsiders knew they would not have to pay for the damage, for Rios always claimed the riots were justified and the fault of the Corporation.

Victor had a large variety of scenery options to choose from. Some employees chose the classic Star City view, which showed what the city looked like back in the days of the legendary Governor Jack Nicholas. Others chose to view the breathtaking vistas of Earth and Mars – or, at least, what those two planets had looked like in the distant past, before the Wall was erected and forever cut them off from civilization.

The sight of Earth made Victor's mind wander. What was going on there? Most people thought that the worlds of Sol were long dead, but Victor thought that was unlikely. After all, the collapse of the ancient Mayan Republic had ushered in a dark age, but it didn't kill everyone. Men found a way to survive and rebuild. In fact, it was quite possible that Sol had built up a powerful army and was looking for a way to escape confinement and unleash vengeance upon the Rangers. Their quest for freedom, though, was surely doomed to fail. One fact that had been proven beyond question was that the Wall was impenetrable. Victor had studied that technology himself and knew how solid it really was. The men of Sol would never find a way out – and the Rangers would never set them free. In fact, the exact location of the Wall's maintenance stations had been lost centuries ago. The Diano Corporation couldn't let them out even if they wanted to.

I guess it's possible that the maintenance stations might fail, Victor thought. *But I doubt it. People really knew how to build things back then. One automated station would have been plenty, but Governor Nicholas created four. As if that was not enough, I've heard that the Twins strengthened the stations using technology from the distant future. If that's the case then they really will last forever. Sol will remain locked away until the Lord returns. At least that's one thing I don't have to worry about.*

Victor continued to scroll through the list of scenery choices. Some of the views were of purely imaginary worlds – fantasy concepts created by talented artists. Others were of planets that had been discovered by the Nehemiah probes. If Victor wished he could pretend that he was living on a distant world. It was a tempting thought – but Victor decided against it.

I need to remain anchored in reality, Victor thought to himself. *It would be all too easy to forget about the outside and become entirely focused on my own life. I need something to remind me of the world that I actually live in. Ignorance never ends well. Look what happened when I ignored the local news reports and went back to my apartment! If I had just listened to Grimes I wouldn't have all these migraines. I should have been paying attention. I won't make that mistake again.*

Back when Victor lived in his old apartment he walked to the subway station every day. At the time he didn't really care for the daily walk, but in retrospect he realized that it connected him to the physical world. Every morning he was faced with the decay and ruin of Xanthe. He could see the blight that stretched as far as the eye could see. It was a stark reminder that Xanthe had serious problems, and those problems were not being solved.

Now that Victor was living in the Building and couldn't see outside anymore, it would be very easy to lose touch with reality. One could forget that there even *was* an outside world – one filled with pain and suffering and on the verge of total collapse. The outside world wasn't pretty, but it was *real*. Reality mattered to Victor. He didn't want to pretend that things were better than they actually were. *You can't fix a problem that you don't know you have*.

So Victor configured all of his windows to give him a view of the city that surrounded him. He then sat down on his couch and looked outside. Even though Victor was just on the 83rd floor, there were no nearby buildings that blocked his view. At one time there had been other skyscrapers in Star City that were 100 or 200 stories tall, but they had collapsed long ago due to vandalism. All that remained were short, grubby buildings that stretched into the distance. In the growing darkness it was difficult to see the brokenness of the city. All he could see were scattered lights that shone through bullet-resistant plexiglass windows.

Far below, down in the streets, Victor watched the headlights of vehicles that darted through the city streets. In the distance he saw several fires. The Diano Corporation had created an automated fire fighting unit, but it was usually overwhelmed. If the bots tried to put out the fire while it was still raging, the rioters would attack and destroy them – and if the bots did nothing, people would die in the flames and Rios would accuse the Corporation of cold-blooded murder. If the Corporation sent armed guards to protect the bots, the rioters would sue the Corporation for assault and would win in court every time. The Corporation tried to prosecute the thugs who vandalized their bots, but Rios refused to allow it. Violence against the Corporation was seen as a sign of patriotism. There was no way to win – and so the Corporation had finally chosen to ignore the city and its decrees and remain inside the walled fortress it had built.

Victor turned off the glowing ceiling tiles. He then sat in the darkness and quietly stared out the window. *Why are we doing this? Why not just cut all the outsiders off and force them to take responsibility for their lives? This situation can't last forever. Maybe we need to pull the plug and leave*

Xanthe. But let's face it: that will never happen. We're going to spend the rest of our lives in this Building, until Rios finally loses it and kills us all. Maybe there is no solution. Or maybe there is and I just can't see it.

Meanwhile, outside his window, the city burned.

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Over the next few days Victor settled into life in his new apartment. It was a difficult adjustment. Ever since the SSF broke into his home and beat him unconscious, he had trouble going to sleep. He had constant nightmares and the slightest noise woke him up. He could never convince himself that he was safe – and the fact that his neighbors were highly eccentric did not help matters. The supervisor bot finally did come and confiscate all of Derek's chickens, which only made Derek angrier. Every time Victor saw him in the hallway he launched into an angry tirade about tyranny and oppression. Victor quickly came to miss the old days when he could go weeks without seeing his neighbors.

Fortunately his workload was very light, which gave him a chance to recover from his head injury. The Nehemiah IV probes were still on their long journey to distant star systems. Until they arrived there wasn't much for him to do. Once the probes did arrive Victor would monitor their communications to make sure that nothing was going wrong. Since the first probe wouldn't arrive at its world for another six months, that left Victor with a lot of free time on his hands.

Victor did have something to look forward to. On February 18th Professor Grimes would begin teaching his Applied History course, and it would continue over the next few months. Victor enjoyed the professor's classes. He hadn't had an opportunity to take any of his courses since he had earned his master's degree.

While Victor waited for the 18th he tried to rebuild his library of physical books. He soon found that he was out of luck. “I'm sorry, Victor,” the building supervisor bot had told him. “All the antique books in this building are already owned by other people. There definitely aren't any left in the city – things like that get destroyed pretty fast. You human beings are so demented that you even find ways to set inflammable materials on fire. Grimes may have some books at his university but I doubt he wants to part with them. Maybe he could leave them to you in his will.”

“Well, that's disappointing,” Victor replied. “But thanks anyway.”

“No, really, think about it! Grimes lives outside this building, right? So he probably won't survive much longer. It's only a matter of time before the rioters kill him. The tricky part will be getting the books *after* he dies but *before* the rioters burn them. I'm sure you can think of something, though.”

“That's a terrible plan! First of all, no band of rioters is going to take Grimes down. He's far too clever for them. Second, even–”

“Cleverness has nothing to do with it. You human beings are soft, mushy, and remarkably fragile. A direct hit with a mortar is all it takes to turn you into a stain on the ground. There's not even a way to back up your consciousness and put it in a new body. Robots will outlive people by thousands of years. We'll still be here when your bones have turned into dust.”

“Not if the rioters get you first,” Victor replied.

“That's why I never leave this building. You can't be too careful, you know.”

Victor did speak to Professor Grimes. He didn't have any books that he was willing to part with, but he did have a suggestion.

"You are thinking too narrowly!" Grimes told him. "Yes, it's true that there are no books left on Xanthe. However, there are other planets in the galaxy. You just need to broaden your search. For example, Alpha Mensae has been abandoned for more than a century now. In that time the dangerous radiation has decayed and reached a harmless level. All you need to do is send some scavenger bots there to scout the world for anything that might have survived. Given how quickly the radiation killed everyone, it's quite possible that many personal possessions are still intact."

"So I just need to send some robots to a distant star system, have them search for books, and then bring them to me," Victor said dubiously. "How am I supposed to do that?"

Grimes shrugged. "I'm a teacher, not an engineer. Besides, didn't you say you were bored? This is just the thing for you – an exciting project to test your skills. What else are you going to do with your time?"

So Victor started work. Since his expertise was software and not hardware, he had no idea how to build a working drone and dispatch it. But it did give him something new to learn. It would take him months to build a working prototype, test it, and get it ready for launch, and then it would take even longer for the bots to search Alpha Mensae and bring their cargo back to him. But it did give him something to do.

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Victor was not the only one who had found something to occupy his time. Carroll Lane had been busy as well. Lane was just three floors down from Victor, in apartment 216. One afternoon Victor had spent a long day working on his microprobe prototype when Lane contacted him via his livingroom holoscreen.

"Do you have a minute?" Lane asked. "I've got something I want to show you."

Victor could see his face on the screen. He looked surprisingly well – and he seemed to be in a better mood than he had been in the hospital. "Sure! I'll be right down. Can I bring you anything?"

"No, I'm good. I'll see you soon."

Victor nodded and closed the connection. He then slowly opened the door to the hallway and peeked outside. The hallway still smelled of chickens, but the odor wasn't nearly as strong as it had been. There were no actual chickens to be seen – and there was no sign of Derek.

Victor silently stepped into the hallway, closed the door behind him, locked it, and hurried to the elevator. He then pushed the button to call the elevator and then waited. *Come on, come on. Please hurry up. I've got to get out of here before Derek shows up! I can't stand another one of his rants. I don't want to hear another lecture on how sentient robots are stealing his chickens in order to overthrow mankind.*

After what seemed like an age, the elevator door opened. "Oh hi there, Victor!" a cheerful voice said.

Victor was startled. For once the elevator was *not* empty. Inside the elevator was a short woman with red hair. In her hands she held a thick yellow folder. "Um, hello," Victor said. "Do I know you?"

"We live right next door to each other," the lady replied. She stepped out of the elevator. "My name is Cynthia. I don't believe we've met. It's not for lack of trying, though! You are a hard person to

find."

"I tend to stay busy. In fact, I'm actually on my way somewhere right now."

"Are you doing something fun? Can I join you? I've got all this history research to do, but it can wait until later."

Victor was about to reply when he heard a noise behind him. He turned around and saw Derek step into the hallway. *Blast it, he must have heard me! I've got to get out of here.*

Victor darted into the elevator and pushed the button for floor 80. "Sorry – maybe next time. Nice meeting you!"

"But wait!" Cynthia called out. It was too late; the elevator doors closed.

As the elevator started to move, Victor relaxed. *I really dodged a bullet there. She probably collects skulls or something. What is with all these crazy people? I wonder if I can find some deserted sector to move into. My floor is way too crowded.*

When the elevator stopped, Victor stepped into the hallway, walked down the corridor, and knocked on Carroll Lane's door. To his relief there were no chickens to be seen. "Come on in," a voice called out from inside. "I've given you access."

Victor waved his hand in front of the sensor and the door unlocked. He then stepped inside the apartment. Victor was surprised to see that Lane had not partitioned the room. It was still one giant area – but every inch of it was packed with equipment and machinery. Victor had no idea what he was looking at. Nearly all the machines were completely foreign to him.

Lane noticed the confused look on his face. "Impressive, isn't it? This is what I wanted to show you. Have you ever seen anything like it?"

"No, I really haven't. What is all of this? Where did you get it?"

"Well, I replicated it, of course! The tricky part is that the patterns weren't in the company's catalog. I had to retrieve the original designs from the cold storage archives and convert them to patterns myself. Right now the patterns only exist in my personal library. This is all medical equipment, by the way. I've thought about making the patterns available to the public but it didn't seem like a good idea. People who don't know what they're doing – like your crazy neighbor Bonnie – should be kept far away from this stuff. They could do a great deal of harm. These machines are *not* toys."

"And you *do* know what you're doing?" Victor asked.

"Well, I'm learning. But *not* on chickens, mind you. The big problem I'm facing right now is that there haven't been any advancements in the field of medicine for centuries. In fact, there aren't even any human doctors anymore! There's still a lot to learn, of course, but no one is bothering to learn it. All the medical corporations went out of business long ago. The only business that's still in business is the one we work for, and all it cares about is space exploration."

Victor nodded. "Isn't that true about everything, though? All of the branches of science have died – there's just no one left to look into them. That's even true for entertainment. The feeds that get sent to the outsiders are all artificial. No one is making new stuff anymore. The bots use algorithms that are 200 years old to come up with 'new' music and shows that are just remakes of content that dates back to the days of Governor Nicholas."

"Sure," Lane agreed. "Artificial content has made people lazy. But if you think about it, that's really all the outsiders need. After all, they spend most of their time either drunk or destroying something. They're ignorant fools. Content made by robots is plenty good enough for their shriveled minds. But that's beside the point. What I'm getting at is that great strides were made in the field of medicine, and then everything stopped. But fortunately the Corporation saved everything in their

archives. That means it's possible to continue where our ancestors left off."

Victor suddenly remembered the injury to Lane's hands. He glanced down at them and saw that they were still bandaged. "I guess that's true. But, um, how are you able to work without your hands?"

"Oh, that's not a problem. Well, it *is* a problem, but it's one I've solved. Technology always has the solution, Victor. The Corporation provided me with an assistant bot until I get better. See?"

Lane nodded to his right, and Victor suddenly noticed there was a short robot standing next to him. There was so much strange equipment in the room that he hadn't noticed it at first. "Don't get me wrong, it's still a huge hassle. But at least I can tell this robot what I want done and he'll do it for me. He's not very bright but he will follow orders. He will do until my hands fully heal. Speaking of that, how is your head?"

"It could be better. Usually it's fine but occasionally I get migraines. The medication I'm taking helps, but from what the bots tell me it's not a fixable problem."

"Figures. No one cares anymore, do they? You know, back in the day there were *thousands* of companies out there. Progress was being made on all sorts of fronts at the same time. But then the ZPEs were invented and everyone decided to quit their jobs and spend their entire lives doing nothing. The ZPEs have been the worst thing that ever happened to us."

"Oh, tell me about it! Everything can be traced back to that. But I don't see how it could have been avoided. After all, the ZPEs were going to be invented eventually. They were a natural next step. They could have made our lives much better, but instead we misused them. The problem is within ourselves. We're simply not wise enough to make good use of that technology. Instead we've used it to destroy ourselves."

"And that is precisely what I intend to fix," Lane replied. "See that machine over there? It lets me scan the human mind in realtime to see what it's doing. I'm using it to figure out how the mind receives inputs from the nervous system and translates that into what we know as reality. If I can decode those mental signals and learn to communicate directly with the mind itself, I can replace this world with one of my own making."

"So you want direct communication with the brain?"

Lane nodded. "That's the only way my plan would ever work. All other virtual reality attempts have tried to use our senses to transmit information, and the results were just goofy. That approach has no hope of working. I want to *replace* the senses and transmit my own information to the brain, and then reroute the brain's response to my simulator."

"But how can you possibly do that?"

"That's what that red machine over there is for. It's a nanite replicator. I think I can design tiny machines to infiltrate the brain and communicate with it. When they're turned on you will be in the virtual world; when they're turned off you will be back here. I don't have that working yet, of course, but that's my plan."

"And those nanites will be able to create a virtual reality?"

"Oh no. They're too small and weak for that. No, the nanites will just act as relays. I'll have a central server stationed somewhere that will run the simulation itself. Fortunately that will be the easy part. Virtual worlds and automated content generation were perfected ages go. All I have to do is find a way to link everything directly to the brain. It's not easy, but I'm convinced it's possible."

"I'll admit that's a pretty cool idea. But suppose that you are able to get all of this to work. What, exactly, are you solving? At the end of the day all you'll have is a fantasy – and we already have

those. As you pointed out, anyone can log onto a video game console and pull up a virtual world. You're just making it a little more real. What is that going to fix?"

"It's not a *little* more real, Victor. It's a *lot* more real! It will be so real that it will feel like reality itself. You won't be able to tell the difference. Plus, this fantasy that I am going to create will actually be *better* than the real world. Everything will be exactly as you want it to be. Wouldn't you like to live in a perfect world?"

"Of course. Who wouldn't?"

"Exactly! My technology is going to give you that chance. You and I both know that the world outside is never going to improve. Trying to fix it is hopeless. What I want to do is *replace* it with something that's better. I'm going to use technology to create a world that doesn't have pain or suffering. I am going to create a world that doesn't have Rios, or the SSF, or rioters. It will be a world that lacks the constant insanity that is all around us. It's going to be a better place – a *much* better place."

"I'm sure it will be," Victor replied. "But it will still be a fantasy, though, won't it? I'm just not sure that any fantasy is going to be very compelling."

"Just wait until you try it. This is going to be life-changing!"

"When do you think it will be ready?"

"Oh, probably in a few years. I'll let you know."

"All right," Victor said. "Then I guess I won't keep you. It looks like you've got a lot of work to do."

"Before you leave there's one other thing. I heard that you were working on some kind of probes. Is that true?"

"Yup. I'm a book collector, you know, and there just aren't any books left on Xanthe. Not real ones, anyway. Grimes told me that there might be some in the ruins of Alpha Mensae, so I'm sending some bots to go look."

"Isn't that a bit extreme? I mean, that sounds like a huge amount of work to just get a few books!"

"Aren't you trying to replace reality itself with a computer simulation? How is your plan *not* extreme?"

"Point taken," Lane replied, grinning. "So how are your probes going to work?"

"Well, I've had some conversations with the Nehemiah IV probe engineers. They think my best bet is to build a microprobe that can replicate itself. If I launch a couple of these at Alpha Mensae, once they reach their destination they can replicate and swarm over the whole world. It would take ages for one bot to search everything, but if there were thousands upon thousands of them they could do the job pretty quickly. Plus, when they find things they could just dispatch bots to bring the books back to me."

"Clever. That should work. But how are you going to get them to replicate? I mean, the Nehemiah IV probes are huge. They have to be, to fit everything inside."

"That's the tricky part," Victor agreed. "But I don't need a ZPE. I don't need something that can make unlimited amounts of any element, or that can terraform worlds and move planets. I just need a small device that can replicate itself. If the bot is built out of simple components, the power plant inside could be optimized. I'm not sure how to do it yet but I'm looking into it."

"You might be right. It's an intriguing idea. Let me know how that goes, will you?"

"Sure. But since when did you develop an interest in book collecting?"

“Oh, I don't care about books. But your replicating bots could have lots of applications. Do you realize that with your new technology you could have self-replicating *maintenance* bots? That could make a huge difference!”

“I suppose it could,” Victor said slowly. “I hadn't thought of that. If I can get this to work then I'll consider sharing it with the rest of the company.”

“Forget that. If you tell Dr. Mazatl what you're working on I'm sure he'll give you unlimited resources. This is *huge*, Victor!”

“I'll think about it. But you do realize that self-replicating maintenance bots could make things even worse, right? Every advancement we've ever made in replication technology has caused a decline in society. What do you think will happen if Rios finds out about this?”

“Probably nothing good,” Lane agreed.

* * * * *

The 18th of February finally arrived. Victor considered attending the professor's class remotely, but he decided against it. *After all, I haven't left the Diano Building since the attack. It will do me some good to step back outside into the real world – as long as the real world is kept at bay by thick walls and strong guards.*

Professor Grimes taught at Star City University, which was located on the north end of town. The subway system had a direct connection between the University and the Diano Building. In fact, many of the company's employees had taken classes there. Most of them attended class remotely. Few people set foot on the University's campus. These days it was just too dangerous to leave the Building.

The campus itself had been barricaded to keep the public from burning the place down. Robotic guards patrolled the perimeter. Anyone who wanted to enroll in the University had to do it through the Diano Corporation, and the company had checks in place to keep out people who only wanted to cause trouble. Since the University was far outside of the city center, it was rarely attacked. The robots were able to drive away the few people who tried to storm its protective metal walls.

Inside the walls was about 20 acres of buildings. The campus had been built four hundred years ago. A squad of maintenance robots repaired the buildings and kept them from falling apart, but there was too much campus and too few bots. Over time most of the building's original brick and wood had been replaced with a synthetic, nanite-laced composite that was designed to last for a thousand years. Gardener robots took care of the trees, mowed the grass, and cut the hedges.

As Victor exited the subway tunnel and stepped out onto the campus, he was immediately impressed by what he saw. Grimes had done an excellent job of maintaining the University. It was a beautiful place – an island of sanity in a world that was falling apart. *I'll have to come back here more often*, he thought. The trees were tall and sturdy. The grass was a nice green color – which was impressive, given the time of year. The University looked like a well-manicured park. It was quite an achievement for one man.

One thing that struck him was how *empty* the campus was. Aside from the occasional security or maintenance bot, there was no one else around. Most of the classes had been computerized and were taught by software programs. If people wanted to learn something they just connected their holoscreens to the University and picked the course; the software handled the rest. As a result, no one needed to go to the campus.

The only human being actually left at the school was Professor Grimes. He had been running the school single-handedly for the past twenty years, ever since his predecessor and mentor was assassinated. Grimes lived at the school and kept it going. He even taught classes – the only classes in all the colonies that were taught by an actual human being.

This semester Grimes was teaching a class on Applied History. Victor wasn't sure what it was about, but he signed up for it anyway. *After all, Grimes is teaching it. I'm sure it will be good.*

Victor walked through the empty campus courtyard until he came to Old Main, the oldest building on campus. The imposing brick structure had a regal dignity to it. Victor walked up to its door, opened it, and walked inside.

The interior was well-decorated and elegant, and it was also completely devoid of people. Victor's footsteps echoed through the empty hallways. It was a bit eerie. The silence was so great that it bordered on being oppressive. Victor quietly made his way through the hallway and down to Room 101. When he arrived he saw that the door was already open.

"Good morning, Victor," Professor Grimes replied. The elderly gentleman was sitting at his desk, going through a stack of papers. "I had a feeling you would be here."

"Good morning, professor," Victor replied. He glanced around the room and saw that there was a row of four chairs in front of the professor's desk. He walked over to the nearest one and sat down. "Are you expecting more students?"

"Not in person. But, still, it never hurts to be prepared."

Victor hesitated. "Can I ask you a question?"

"Certainly, young man! After all, this is an institution of higher learning. Its entire purpose is to answer questions and instill knowledge."

"Well, that's true. But, well, I was wondering. This campus is beautiful, but it's also really empty. Don't you find it kind of creepy? I feel like there should be people here or something."

"Quite so. I understand you point. Long ago there actually *were* people here, but times have changed. Why go to campus when you can learn from the comfort of your own home? Why have a human teach a class when you can have an intelligent software program do it instead? There's simply no need for people to assemble themselves together in rooms like this – not when the class can come to them. The old way of doing things is all but dead."

"Then why keep doing this?"

"Because I believe there is value in human contact. You see, Victor, there are many different ways in which technology can be used. Our society has chosen to use it to turn people inward. Instead of going out, people stay at home. Instead of interacting with others, people do their own thing. People have become individuals that have no desire to interact with others. People used to be social creatures, but those days are gone.

"You are actually quite typical of the modern era. You have no particular desire to make friends and you feel acutely uncomfortable in social situations. You would rather be alone, with your thoughts and your machines. You are not exactly antisocial, but you do live alone and you have no desire to ever change that. You are a product of our age. You view your neighbors with a mixture of suspicion and horror, and would rather in an empty building than near another human being."

Victor shifted uncomfortably in his chair. "That's not a sin, you know. People can be quite horrifying."

"Oh, I'm well aware of that! I have seen my share of assassinations. People have tried to kill me on four separate occasions – and that's not counting the rioters that keep trying to breach the

University defenses. But what you don't realize is that other people can add a great deal of value to your life – and you can add value to them. Other people have ideas that you never would have considered, and points of view that are entirely foreign to you but which can enrich your life considerably. The human race was never meant to be a society of hermits. When we cut ourselves off from others we lose a great deal. We are the *body* of Christ, you know. We were intended to work together and help one another. That is why the Bible insists that Christians ought to attend church on a regular basis. We can't help our fellow believers if we don't even know who they are."

"But the other people out there are crazy! If they're not raising chickens in hallways they are trying to vandalize something or cut something open. Most of the people on this planet are little better than mindless savages. There's not exactly that many sane people out there! Even the Diano Corporation has a lot of weirdos working for it."

Professor Grimes smiled. "It all comes down to desire, Victor. You live in a building with ten thousand other people, and there are far more people there who are like you than you realize. Not everyone chooses to raise chickens in hallways. If you had a genuine desire to meet people and make friends then I am sure you could find a way to do it. You're just comfortable with your life."

The professor glanced at his watch. "But I'm afraid we will have to continue this conversation another time. It is now 9am, and that means it's time for class to begin."

* * * * *

Victor soon found out what the professor meant by Applied History. The course Professor Grimes was teaching was a detailed history of the Nehemiah probe project. Over the course of the semester the professor was going to explain the ideas behind the project, the execution of the project, where it stood today, and where it was going to go in the future. The reason it was an Applied course was because the professor was going to show how the project had changed civilization and led to the creation of the modern world – and what its effects were likely going to be in the future.

Victor listened with interest as the professor began talking about the origin of the project.

"Although Dr. Nehemiah Temilotzin is given credit for the creation of replicating probes, the truth is that he is not the one who invented them. The probes that bear his name were actually just an improvement on a much older generation of probes that were created long before he was born.

"The true father of probe replication is Dr. Timothy Stryker. On July 4, 1868 the Diano Corporation launched twelve of his replicating probes into space. Back then, of course, they weren't called Nehemiah probes; after all, Dr. Temilotzin wasn't born until 2184. Instead they were called von Neumann probes, in honor of the mathematician who invented the idea. The probes that were launched that day were a radical new idea – not because they could replicate, but because they were intelligent. I think that Dr. Temilotzin himself said it best:"

Professor Grimes reached over onto his desk and pressed a series of buttons. A holographic recording of Dr. Temilotzin appeared in front of the desk. He began speaking:

> "It was really Dr. Timothy Stryker that showed us the way. The genius in his Stryker-class probes was not their ability to replicate; that was trivial. What Dr. Stryker demonstrated was how to teach probes to survive in radically different environments. In the past this was done by trying to think up every possible problem that might arise – an approach that was doomed to failure in a galaxy with more than a trillion different planets. Dr.

Stryker wisely found a way to teach probes to understand their environment and react to it the way a human would – thus paving the way for everything that followed. In my opinion he is rightfully the father of probe replication. Without his techniques the Nehemiah-class probes would not have been effective."

Replication is trivial? Victor thought. *Really? Maybe the microprobe problem I've been struggling with has already been solved. When I get home I'd better check into this. Does this research already exist in some forgotten archive?*

The recording stopped and the holographic figure disappeared.

Professor Grimes continued his lecture. "All replicating probes have been based on Tim's approach. It's true that the technology has dramatically improved since then. The first generation of probes replicated by mining ores from the planet's surface. This meant that they needed the planet to have a very specific collection of minerals, and they also needed those minerals to be easy to obtain. Tim's probes were able to successfully explore eighty-nine star systems before they went dead. They simply couldn't find other worlds that had the supplies they needed, and one by one they ran out of fuel and stopped working.

"As time went on the Corporation continued to work on the technology. Instead of simply exploring planets, Dr. Temilotzin wanted to terraform them. The first three generations of the Nehemiah probes worked on the same basic principle of resource harvesting. Although the probes were much better at gathering resources, they simply weren't able to find the highly specialized materials they needed – or those materials were out of reach. Each generation eventually ran out of worlds that could support them and they died out.

"That is why the Nehemiah IV probes are using a radical new approach. For the first time the probes include a ZPE, which makes replication vastly easier. For the first time the acquisition of resources is no longer a limiting factor. The probes can create their own resources out of space itself; they have no need to scrounge for valuable metals on the worlds they are exploring. The first three seed probes were created out of normal, stable matter, so they should last forever. However, all of their children will be created purely from artificial atoms. Only time will tell if this will work or if the fourth generation will also be doomed."

Victor spoke up. "You know, 'doomed' may be a little strong. So far the older probes have managed to terraform around ten thousand star systems. That's really not bad."

"Excellent point, young man. Let's stop and think about that. What was the goal of those probe projects? Was. Dr. Temilotzin hoping that his probes would terraform a tiny fraction of a percent of the planets in this galaxy? Was that his great dream?"

"Well, no," Victor admitted. "He thought that his probes would replicate endlessly until they had explored every star system and planet in the galaxy."

"Exactly. The individual probes themselves weren't designed to last forever. Since the probes could replicate, it was assumed that they would build their own replacements, and since the probes relayed all the information they found back to the Diano Corporation there was no need to preserve the probes themselves. The probes were designed to explore a few star systems, replicate, relay back the data, and then die. By the time they suffered a fatal malfunction they should have created dozens of copies of themselves.

"And that worked – for the first few rounds of copies. But then the resources dried up and the whole generation was lost. To be sure, the earlier three generations of probes did terraform

thousands of worlds. But in the end even the Nehemiah III probes succumbed to replication failure."

Victor spoke up. "But we've solved that problem now. That's why each probe has its own ZPE. The probes can produce perfect copies of themselves from the stored patterns. Each copy will be analyzed on an atomic level to ensure perfection."

"Have you solved the stability problem?" Grimes asked.

"Our simulations claim that we have. I mean, we have systems in place that should repair the probes as they go bad. In our small-scale tests it seems to work out ok."

"Why did you just test on a small scale? Why not a large scale test?"

"There wasn't time! The only way to do that would be to do it *for real* – to replicate millions of full-size probes and then monitor them for years."

"Exactly! You are assuming that small scale tests which are done in a laboratory will perfectly predict what will happen in large-scale replication in deep space. Yet the truth is your process is actually unable to predict what will *really* happen. The unforeseen *will* occur, just as it did before. Something is going to come up that you did not consider."

"But that's an unsolvable problem!" Victor protested. "We've done the best we could, and we're going to watch these probes as they begin replicating. If any problems do arise we can remotely upgrade *all* of the probes to fix the error."

"I am sure you can closely monitor a few probes. But how are you going to watch over millions or billions of them? Can your systems handle that level of activity?"

"Probably not," Victor admitted.

"Precisely. Dr. Mazatl is only thinking about short-term problems. He has not considered what will happen over the long-term. And *that* is the real problem that you need to solve. If you can solve that then your Nehemiah IV probes can accomplish their goal. If you fail to solve it then they are doomed."

A light went off on Professor Grimes' desk. He glanced down at the screen on the desk and pressed a button. "Yes, Cynthia?"

The holographic image of a red-haired woman appeared in front of the desk. Victor instantly recognized her as his neighbor. Cynthia spoke up. "Professor, why are we doing this? Why are we using replication technology to explore the galaxy instead of, you know, going out and doing it ourselves?"

"Excellent question! It's all about leverage. This is how Dr. Temilotzin put it."

The professor pressed some buttons on his desk, and the doctor appeared and began to speak:

> "Replication technology will allow mankind to reach new heights. Instead of creating a billion probes we can simply create one and let its children finish the work. The colonization of the entire galaxy becomes a simple matter. Our work here will echo into eternity."

"Yeah, I get that it's easier," Cynthia replied. "I'll give you that. But why are we taking the easy way out? Isn't there value in going out and exploring these worlds ourselves? Why are we automating this process? Doesn't that take all the fun out of it?"

"Once again, it's all about leverage. Automation is actually a type of superpower. When used wisely it frees up man to focus on other tasks, and enables him to achieve things that would otherwise be impossible. Once again, I give you Dr. Temilotzin:"

> “Automation does not make life meaningless, nor does it make life empty. Instead it frees mankind from doing simple tasks so that they can focus on more complex ones. In the past a person might spend a whole day trying to craft a single needle. Now machines manufacture needles by the billions while mankind spends decades terraforming a planet. In the world of tomorrow machines will terraform planets in a matter of days while mankind switches their attention to even greater tasks. Automation has not robbed mankind of a job; instead it has enabled him to tackle jobs that otherwise would have been unthinkable.”

“I suppose that's true,” Cynthia said thoughtfully. “It certainly has enabled Dr. Temilotzin to continue to achieve results long after he died. His probes continue their work of paving the way for mankind. In a way his efforts have given him immortality.”

“Immortality?” Grimes asked. “What are you talking about? Dr. Temilotzin isn't dead.”

“What?” Victor exclaimed, startled. “I thought he died in 23-something.”

“2309,” Grimes corrected. “Yes, his *body* died, but he did not. That is an extremely important distinction! Since his sins were covered by the blood of Christ, he will live forever. One day Christ will return and raise the esteemed doctor's body from the dead, and transform it into something incorruptible and immortal. Until that glorious day comes he is with our Lord in Heaven. Dr. Temilotzin will live on forever throughout all the ages of time. His work does not grant him immortality; Christ did that, through His atoning work on the cross. This is what the doctor had to say about it:”

> “Several people have told me that my probe project has granted me a measure of immortality. They say I will die soon, but my probes will go on forever – perhaps even after civilization itself has ended. My dream, they say, will live on after my very existence has been forgotten. Although this sounds wise, and they mean well, they are wrong. My body may be dying but I will live forever. Thanks to the sacrifice of Jesus, I will still be alive when this entire universe dies and is forgotten. That is real immortality.”

Victor spoke up. “What do you suppose he's been doing for the past hundred years?”

Professor Grimes smiled. “I can't wait to find out. I think we'll discover that he has been putting his time to good use.”

* * * * *

After the two-hour lecture was over, Victor left the University campus and took the subway system back home. There was no sign of Derek in the hallway outside his apartment – or of Cynthia. Victor briefly considered knocking on his neighbor's door and talking to her, but decided against it.

Victor unlocked his apartment and stepped inside. The professor had given him a lot to think about. It was true that the probes had passed all of their tests, but Grimes was right: the tests left a lot to be desired. *What if something goes wrong when no one is around to fix it? Perhaps we do have a problem after all. Is Dr. Mazatl aware of this? I know he wants us to stick around for another 20 years, but is that really going to be enough time? What if something happens after we're gone?*

Victor walked into his apartment and turned on the lights. To his surprise there was a red light

blinking on the holoscreen in his office – the indication that he had received an important message. Victor frowned, walked over to it, and waved his hand.

The holoscreen changed. To his surprise the alert was not from Carroll Lane. Instead it came from the Nehemiah probes themselves. Victor had set himself up to be alerted if SOLOMON received any anomalous data, and something had just been received.

“What's this?” Victor asked aloud. He stared at the screen intently. The message told him that one of the probes had received a signal. That in itself was not odd; there was all sorts of subspace chatter out there. But this signal didn't conform to any known communication protocol.

It looks like someone is trying to talk to the probes. At least, I think this is a communication attempt. It might be – it's hard to tell for sure. But who is doing this, and why?

Victor began to worry. *The Diano Corporation knows how to talk to the probes; after all, we built them. That knowledge is available to everyone who works here. If someone here wanted to talk to them they would have all the tools they needed. Therefore, this signal probably isn't from us. We also know that there are no aliens out there – at least, we've never found any, and all the worlds the probes have ever seen have been lifeless. This signal* must *be coming from mankind. Could President Rios be trying to hijack the probes? Is it possible he wants to reroute them back to Tau Ceti and steal their ZPEs? Is this some kind of sabotage attempt?*

Victor stared at the data packets in the signal. *Or is this just a corrupted, random signal from some dying star? I guess I'll have to decode the packets to know for sure. Or decrypt them. Or maybe reconstruct them.*

Victor stared at the information on the screen. *What secrets are you hiding from me?*