Quantum Ignition

Growing Up (outtakes 3)

Bob Cox

Author's Note

These fragments are excerpts from the first draft of my sequel to *Quantum Ignition: Earth and Moon*. The action takes place in the decades following the conclusion of the first novel, starting with Lilliana's meeting with President Riley a few days after her UN speech. My plan for this book was to tell the story of the growth of the Luna Concord from minor colony to powerful nation.

The chapter included has been excised from the sequel, which is going in different directions. The outtake included in this manuscript is the story of how the state of Hawai'i became associated with the Lunar Concord. However, the events described herein are still relevant and part of the *Quantum Ignition* universe.

The sequel novel is now tentatively titled *Quantum Ignition: War of the Anas*. Not all of my first draft has been relegated to these outtakes. Several chapters are being worked into the new book, which will have a grander scope than my original plans.

Bob Cox — May 2024

New Foundations [2080-82]

Marek Janski

I rolled into the bar at the Ala Moana right at 11 am, when they opened up. Home sweet home. Alan, the barman, came over to my regular table and asked, “Single or double this morning, Mr Janski?" I liked that he pronounced my name correctly, YAWN-skee, and had done so since my first visit 20 months ago.

“Let’s start with a single today, Alan.” He nodded, and came back in a moment with a reassuringly solid whisky glass holding my Blue Label, and with an ice-free glass of water on the side. Just the way I wanted it.

You don’t gulp Blue Label. You inhale its powerful aroma, then take a tiny sip, roll it on your tongue, and let nirvana slip down your throat. I wasn’t a drunkard, not any more. The first 12 months after I was released from the hospital — yes, I was drinking way too much then. The nagging pain, the pointlessness of my life, and then the loneliness. My fiancée had walked out after saying, “I’m not marrying a morose alcoholic cripple, even if some people think you are a hero. Goodbye, Marek.” Well … I wouldn’t want to marry a morose alcoholic cripple, either, so she had a good point.

That’s me again, seeing things from the other person’s point of view. A very useful skill in a criminal lawyer, defense or prosecution. Helps plan for what the other side will have waiting for you in court.

I just liked to stay tipsy all day, that’s all. Less than a pint of whisky a day, spread out slowly over the long hours, did the job. Took the edge off my life, what there was left of it. Was I still morose? Some, I suppose, but I felt like I was now more stuck in neutral than going backward — and at least I was stuck in neutral in Honolulu. I wasn’t bitter any more, bitter at myself, I mean. I’d made choices that day, and making choices is what a man has to do now and then.

I made a new choice. One drink was enough for the morning today. I called out, “Alan, it’s a beautiful day. I’ll be back in a couple hours." I tooled out of the bar into the glorious light from the sun, towards the Ala Moana park, just west of Waikiki. Maybe I could get something to snack on there, now that the city allowed a few food trucks back in the area after the infection scare of last year.

Ice cream! That’s what I needed. I didn’t actually *know* I needed ice cream until I saw the truck parked next to the plaza which had replaced the decrepit tennis courts. I rolled up to the truck, and studied the list of possibilities. “Treat yourself once in a while, Mareczek”, my mother had said. I had been such a serious boy once I turned twelve.

During my ice cream menu investigation, a kid came up and asked, “You in line, mister?” Before I could say “not yet”, he stepped around me and ordered. He offered up a five dollar bill, and the vendor handed back some grotesque multicolored concoction, then turned away. The kid yelled, “Hey, where’s my change?”

The vendor was not shaved and looked to me like he had a hangover. A look I’d seen too often in the mirror. He scowled, and said, “You gave me two ones, and that’s the price. Get lost kid.”

"I gave you a five dollar bill. You owe me three dollars. You’re a cheater!" I looked at the boy a little more. Good for him for sticking up for himself. He was mixed race, hard to identify, like about 70% of Honolulu, and maybe 10 years old.

I rolled forward a bit, and said, “The kid’s right, buddy. I saw it all. Give him his three bucks.”

“You gonna make me, cripple?”, was the response. I smiled. Years in court had made this easy.

I handed him up my business card. “Marek Janski / Attorney at Law / Partner, O’Toole and Hokusai.” Formally, I was still a partner, though I hadn’t done any work in two years. They hadn’t wanted to drop me after the accident, and after I became (briefly) famous. I added, “Petty theft from a minor. Discrimination against the disabled. Oh yes: is your license and health inspection up to date? They’re pretty picky about those things these days." I pulled my phone out.

The answer was a look of disgust, followed by three one dollars bills being tossed out the vendor’s window. I’d have to go somewhere else for my ice cream.

The kid busied himself picking up the bills, then said, “Thanks, mister”, and turned to leave. I noticed a tall woman, with beautiful olive oil skin, closing in on us from across the plaza, and the boy said, “Mom, this man got my money back for me. He just handed the guy a card. Then he said a couple sentences to him. Then the next thing you know money is flying out the window. My money.”

She said to me, “Thank you, sir.”

I handed her another card. “This is the magic incantation I use to deal with minor morons. No one likes a lawyer. At least, no one who is actively cheating people in public.”

“Thank you, Mr Janski”, she repeated, pronouncing my name correctly. “I’m Julieta Krumholz, and this is my boy Astor.” Astor was busy now working on his garish frozen thing, whatever it was. Revoltingly sweet, I’m sure. I can remember being a kid, the time of life when sugar is at least 3 of the 5 major food groups.

It was noon-ish, so why not? “Ms Krumholz, let me take you and Astor out for lunch. There are a few good places nearby.”

We ended up at an eatery I wouldn’t have chosen myself, the Piikoi Place, which was geared to sandwiches and crap food. But it was the only place Astor would eat. I said, “Don’t worry about it. I remember being a stupidly picky eater myself when I was young. Grew out of it when I had to.”

Somehow we got on the subject of my wheelchair, probably something Astor said between bites. Then after a few seconds, before I could even compose an answer, she said, “Wait. Aren’t you the man who …?”

I interrupted, “Yes, that was me. The old me, I mean. Now I’m the new me. Frankly, I don’t remember a lot of it.”

Julieta asked, “Did they try the Ebbets procedure on you, after your immediate recovery from the, uh, accident?”

I answered with a question, “How do you know about the Ebbets procedure? Yes, they did, and it was partially successful. A few neural pathways were salvaged, and I can walk a little bit with these two canes. Not far, though.”

Astor said importantly, “Mom is a spinal neurosurgeon. She’s a big shot at the hospital. I’m going to be a doctor when I get older.” It was nice to see a kid sticking up for his mother, and even nicer to see a modern kid having some ambition past 3D sensorium games.

She said, “I’m sorry it didn’t work better. Still, it’s a tricky operation and therapy, and you did get something out of it.”

I found myself saying, “You know, I’ve been thinking that recently. For the last two years I’ve been miserable, but a few days ago I woke up and said to myself ‘Sure, it could be better, but it could

be worse. Stop being a clod.' I spent those years mourning the 'better' which I'll never have again, instead of celebrating the fact that I didn't end up with a life sentence of 'worse'."

She leaned forward. "Mr Janski, there are reports from the Moon that they have recently used neural implants to restore functions which were thought impossible to fix. Damaged vision, for example. You are an important and well known person. Do you have any contacts in the Lunar Concord? Someone who could get you an 'in' up there?"

I shook my head, "Not really. Maybe. My old law firm did some work for their operations here in Hawai'i, but I've been out of touch for two years. And legal or business contacts aren't likely to help me get into a Lunar hospital. But you know, I was thinking to roll into the old offices and see what's up, maybe talk about getting back to what I used to be good at. Thanks for the suggestion."

That was the end of it. There was one good thing though — talking to an accomplished attractive woman again, equal to equal, had cheered me up. I spent the rest of the day slowly rolling around Ala Moana park and Waikiki, letting the tropical sunlight keep my mood in the place I wanted it to be.

Ana Lilli

As "Prime Ana", I attended meetings of the Presider's Council every so often, to discuss issues, to report progress, to take questions, and when urgent matters came up. In this case, I was asked to attend at very short notice. A crisis was looming.

Presider Robyn started, "The situation on Earth is getting worse. Now that the climate is slowly returning to 'normal', something else has to come along to cause trouble. At this moment, the Near East, West Asia, is a focus point. Kamil?"

Kamil, head of our Earthside observers (AKA spies), said, "I'll be blunt. Greater Israel and the New Caliphate are close to war. Each one thinks they can win with a surprise attack. At best one of them is right. Our estimate is that neither of them can actually knock the other out quickly. In any scenario, the most likely result is disaster for both sides."

I asked, "They don't have a common border. How will they attack? Missiles? Drones? Aircraft?" There were smiles at the latter — military aircraft had become almost obsolete in the last two decades.

Kamil answered, "All of them, at least by Israel. They think they have a way to neutralize hypersonic drone swarms and anti-aircraft missiles. They may even be right. We haven't been able to get the details of their tech in this area, though. Remote observation has its limits, even using AI to filter out the junk. Finding underground installations is difficult — the digging machines we've sold to Earth nations make it hard for our observers to sort through the spaghetti mazes of tunnels which a determined nation can easily build."

Presider Robyn asked the head of security, "Guardian Rojina, can Luna stop the attacks if they are launched? Can we detect if nukes are launched? What will it take?"

She answered, "Remote detection can look for the various explosive isotopes, so yes, we can 'see' if nukes are present. I can't believe that aircraft will be used in any first wave. They are too slow. Missile flight time between the two nations is a few minutes, no more. Hypersonic drones are a little slower, and each drone of course has a much smaller payload than a missile. Drones might be used to carry toxins such as nerve gas. Or bioweapons." The last one made everyone grimace. Modern

biotech could in principle cause terrible destruction. No one wanted to see the principle turned to practice.

She took a deep breath. “Missiles can be knocked out by translocated hypervelocity pellets, since they are easy to spot in flight. Modern drones are harder — smaller to hit, and with flight paths that are harder to predict. Swarms of drones can be found easily. We have two ways to deal with those. One is to swat them from the sky, projecting force beams to their locations. The other is to physically scramble them in the air, where the objects’ atoms are prised apart from virtual space — kind of like what would happen in a translocator if the device didn’t keep your parts all attached to each other.”

I could see some quick faces being made at the latter thought. We all translocated multiple times per day. It had never happened, but it wasn’t easy to ignore the sudden vision of arriving with atoms scrambled.

Rojina finished with, “Finding a single drone is hard. They aren’t very big. We can imagine launching thousands of drones on random individual courses to meet up at their final targets. Picking those off would be a challenge.”

Kamil said, “There’s no good way to stop such a dispersed drone attack?”

I told them, “There is no *good* way. The travel time of the drones is too short to pick them out, one at a time. Too many details to resolve quickly from a remote distance. There is a *bad* way. Which involves killing large numbers of the people below the area of the drones’ paths. Hypersonic drones are fragile, if we hit them with one-tenth gram hypervelocity particles, they’ll break up. So we translocate several million tons of little rocks down on top of where we think the drones are, and hit everything underneath. Birds, drones — and people on the ground.”

This idea didn’t meet with immediate approval. The Concord wasn’t squeamish, but this would be mass killings of people who probably would have no idea what was going on. Much like the terror bombings of World War Two which all sides used and justified in their own minds.

War was coming soon, most likely. There was only one thing to do. The Council of Anas. I told the Presider’s Council that we would get back to them as soon as possible.

Emily Williams

Pheebs came back from the Anas’ meeting upset and depressed. “If I drank, I’d ask you to get me a whisky”, she said first thing.

“What is it, honey? Can you tell me?”

She shrugged, “Oh, why not? It’s only a few days away, probably. Israel and the Caliphate are about to try to sneak attack each other. It doesn’t seem like Luna can crush the attacks remotely, not without huge loss of civilian life. Luna’s policy is to stop a nuclear war if possible. That was an implied part of Mama’s ‘Save The Earth’ message. But with hypersonic drone technology, how can we stop it?” She described the problem, ending with, “It’s like trying to kill all the flies inside a village, all at once. Just smash the village to the ground with a giant fly swatter. Easy. Except for the people in the village, of course.”

I knew what the Presider wanted from the Council of Anas — another magical solution. Which meant Ana Lilli or my wife, the two Anas who were by far the best at most physics and engineering problems. I asked, “Did you have any good ideas?”

She looked at me bleakly. “At best, so-so ideas. We could pump energy into the atmosphere near the border and whip up windstorms which would make flying drones problematic. Even if we could get that working right away, how long can we keep it up? We can try to scare the leaders with some massive display over their capital cities.” She scowled. "I don’t think that would buy us more than a few days.”

I hugged her. She went on, “The crazy thing, the infuriating thing, is that in fact I *do* have ideas. But they involve developing new physical hardware which will take several years. Finer management of the Deep Physics is possible, you’ve heard me talk about it.” Indeed I had, but even after years of marriage I still could mostly just nod. It didn’t bother me any more. Blanca told me that’s what she did when Pheebs dove into the deeper parts of the Deep Physics end of the pool. I’m very sure that only their mother really understood Pheebs at such times.

She added, “In another decade, we could project detailed Next Physics programs over large areas at once. But for now, we are limited to small regions at a time for anything which involves fine control. Large scale destruction can be accomplished now, if that counts as an *accomplishment*. But shooting down 10,000 buzzing flies inside a town, firing all the way from Luna, without hurting anything else — give me seven years, not seven days.”

I tried to have ideas. “What about threats? They don’t know what Luna’s limits are. A demonstration like you mentioned plus vague threats, or explicit ones, might at least pause the rush to attack.”

“Maybe. That’s not a question for the Anas, not entirely. That’s mostly a political decision. How far out on a limb does the Presider’s Council want to go? Speaking of tree limbs, did you know that on the lower elevations of Nearside, the ecologists are going to start planting things soon? Experimental, of course.”

Now, that was something hopeful to hear. The estimate was that people would be able to go outside without a suit by 2090, perhaps earlier.

I asked, “Did you see Aunt Phoebe at this meeting?”

My Phoebe said, “Oh. Yes. She wanted to thank you again, and tell you that her vision is still stable. There’s no obvious sign the brain is rejecting the vision implant.”

I said, “I’ll get her in soon and do another molecular scan of the region, to see if there is any undesired growth of cells around the implant. She was our first human patient for this kind of thing, so we need to keep tabs on her brain. Besides, she is always a delight to have in the clinic. When she turns on her Alabama drawl and dialect, everyone laughs.”

Pheebs said, “If only we could find the leaders inside their maze of tunnels. We could strike *them* blind or something. Or put anesthetic gases into their locations — xenon would work well." I liked the idea of knocking their key people out with xenon, and said so.

Then I asked, “Can’t you find them? I mean, the leaders of both countries are prone to giving speeches. I know they deliver them remotely, but can’t you trace their transmissions backwards? Using some variation on your remote viewing gadgets?" I added facetiously, “Too bad they don’t wear Lunar identity rings. They’d be easy to find.”

Pheebs laughed, which had been my goal. She then said, “Maybe we could scan for some signature of each person. Genetics? No, I don’t think that’s possible, even if we knew the genomes of the people we want to reach. Well, what do you want to eat? Some smoked tofu on angel hair pasta, with a nut cream sauce, would be good.”

We made dinner together, and then she sat thinking, picking at her food. After a moment she said, "I think the weather is the thing, sort of. We can do it energy-wise, but it isn't fast enough to unleash if there's an ongoing attack. It has to work in minutes, not the hours it would take to build up the winds."

I kept trying to help. "What else could you whip up there with enough power? Lightning bolts? Rain or hail?"

She said, "It's a little hard to target lightning bolts, and …." She paused, then said, "Yes, *that's* it. If we detect a large-scale attack, we slap the area with an electromagnetic pulse. That was a non-existent weapon supposedly based on nuclear bombs, mostly talked about to scare people. A huge pulse of energy will induce currents in metals and then burn out electronics over an area. The downside will be that it would burn out *all* of the electronics in the area, including whatever is on the ground. A few people would die, such as those on some life support equipment. But the attack drones would fail, too. It should only take a moment to activate it when the attack is detected, if we prepare for it now."

She paused for a moment. Then, "I wonder. Can we levitate drones *below* the attack and direct the energy mostly upwards? That would minimize the damage on the ground. Kamaria will certainly have some ideas about that."

I asked the obvious questions, "Where would you get so much energy? I know that the Ana tech energy boxes are limited in their output. Can you do this?"

Phoebe lifted one corner of her mouth in a half smile. "That limitation was set by Mama a long time ago, and it is almost arbitrary. With the newer chips, getting the energy needed is simple. Controlling it in a fine way is not simple, but here we are just making a 'bomb', sort of — one whose explosion is in the form of electromagnetic energy rather than chemical energy. If only the glorious leaders will hold off for a couple days, we should be ready to stop them. Kami can help work out the fine details of our design; this is right up her alley."

She spoke to the house system. "*Attenzione*. Ana Phoebe calling for First Guardian Rojina, Prime Ana Lilli, and Ana Kamaria. Emergency." Within a few moments, they answered, voice only.

"Mama, Rojina, Kami. Emily just said something which gave me an idea. We have to act soon to get ready. Let's meet in ten minutes at Security HQ. I'll explain there."

She got up, but I said, "You haven't eaten enough. You're too skinny. You have at least eight minutes before you have to go." One advantage of living with an Ana was that we had a translocator just outside our door, in case of emergency.

She smiled at me, relaxed for the first time since coming home, then sitting down again. "Too skinny to be sexy? Of course, you're right. Too much thinking." Between bites, she said, "We have to position our own satellite drones over the Near East to be able to confine the EMP to a smallish region. We can launch those tonight, and program them remotely. I hope those bastards give us enough time. Got to go. We have work to do. Love you. Thanks for the idea."

Marek Janski

I rolled into the bar at the Ala Moana right at 11 am, when they opened up. Home sweet home, it had felt like. Alan, the barman, came over to my regular table and asked, "Single or double this morning, Mr Janski?"

You can't stay home forever, and I was leaving. I said, "Today, Alan, I'll have a zero. I mean, ice tea with lemonade. Not too much ice."

"Arnold Palmer coming up, Mr Janski. It *is* a beautiful day out."

I said, "It's Hawai'i, Alan. Almost every day is a beautiful day. Not that I'm objecting. Turn on a news feed, will you? Not too loud."

I nursed my Arnold Palmer, and viewed the news. Trouble in the Near East, as always. Then there was a FLASH on the display, and the news reader said, "Satellite reports indicate that Greater Iraq, the New Caliphate, has launched an attack on Greater Israel. Missile firings are reported, and signs of drone swarms. Wait … it looks like Israel has launched as well. Hang on to your seats, or sit down if you're standing. This could get big time ugly."

Not an exaggeration. Every pipsqueak country had nukes. Would they use them in first strikes? Did the world need a remake of the Asian Wars? God, I hoped not. Videos from satellites clearly showed the missile firings from both sides. I had to take the drones on faith. Wonderful.

Maybe I should just go enjoy the Honolulu sun. The last thing I needed was to get depressed again. I had climbed out of nearly two years of self pity, mixed with feelings of helplessness and worthlessness. That afternoon, I was going back into O'Toole and Hokusai to scope out the territory. A lawyer can work from a wheelchair — who cares?

I was about to call Alan over to pay my tab, when the new feed stopped being dully repetitive. "Reports are coming in. All missiles fired by both sides have broken up in mid-trajectory. Drones are crashing over parts of Jordan, the neutral country between Greater Israel and the Caliphate. Thousands of drones. Electrical power distribution is out over parts of Jordan, as well as areas in Greater Israel and the Caliphate. Did both sides use countermeasures and cancel out each other's attack? Stay linked to this feed for further updates on these strange developments. Meanwhile, our analysts will …." I ignored what their analysts might guess at. They didn't know enough to do anything but wing it.

If each side just blew up a few billion bucks worth of hardware, that was fine with me, as long as mass graves wouldn't be involved. On the other hand, leaders bent on war usually find a way around initial setbacks. On the third hand, I'd never read about a near-simultaneous dual attack which fizzled out so rapidly.

I decided to go out, enjoy the sunlight, let it cheer me up.

Ana Lilli

A few weeks after Luna shot down the Iran-Israel war, Presider Robyn Watters visited me.

"Lilliana, we have a political decision to make which will affect you and all the Anas. In short, several smaller Earth nations have asked to be protected by Luna against external attacks and invasions. What's more, they have floated the idea of adopting systems something like our Concord. They think they know enough about our lives here on Luna and they want the expanded benefits of Ana tech in their countries."

I stalled, "Why does this affect the Anas? Fundamentally, we are technicians and scientists. Policy is *your* job."

The Presider smiled at me, and said, "Prime Ana Lilli, you know that such an expansion of the scope of nations built around Ana tech can only be done with your consent and active participation. There are five Anas now, and you are all already involved in major projects. We can easily sell some

of our Luna-specific devices to Concords on Earth — translocator networks, for example. But inevitably their varying needs will require changes to your quantum programming — which only an Ana can do. Besides, a change this big in policy requires enthusiasm from all important branches of our system — and you five are the foundation of the Concord."

I gave in. "What's the population of these possible Concords, compared to ours? Our economy revolves around quantum tech, which depends on the chips. If we have to expand our chip output greatly to bring these nations up to our level — well, that will not be quick. Not at least until we can stop depending on classical chip fabrication."

She asked, "Is that possible? What do you mean, how would you control the quantum physics world without chips?"

I said, "We need chips, yes." I didn't want to talk about Phoebe's notion of a self-sustaining quantum computer in the Deep Physics world, needing no external hardware to keep going once it was ignited. That was just speculation. Instead, I went on, "Ed and Phoebe have ideas about building a chip so powerful it can run a program to replicate the chip itself, atom by atom. It won't be easy, and their ideas are just sketches now — not yet plans. But if they succeed, everything we do will accelerate."

Presider Robyn said, "Fascinating. Really. But in the problem at hand, I'd say that we will have to calibrate the level of Ana tech we release to any new Concords to match what we can support. A bigger political problem is how close to our economic, legal, and eventually social system does a nation have to be to 'qualify' under these plans?"

I told her, "You know what I think already, and it will be up to you and the Council to work out the details. The dominance structures of old societies have to be damped down. 'No rich, no poor' is one thing. Realistic equality or equity is another. Up here, we started from zero and could build these into our world, with some trial and error. Down there, I just don't know how systems structured around privilege, wealth, discrimination, and so forth, can morph into something resembling ours."

She said, "We are going to start talking to people in a few Earth nations. If things go well, we'll bring some people up here to help them find out more about how parts of our system work. To a large extent, they will have to be the ones to work out how to reform their countries."

I shook my head. "I wish you well. The Anas will support you, don't worry. However, I'm not sure what you propose is possible. I hope it is. The next war could be far worse, and trying to bring amity to the people of Earth might be the best way to avoid that war."

Marek Janski

They were glad to see me back at O'Toole and Hokusai. I'd forgotten how I liked most of the people there, unlike the firm I'd worked at on the mainland. In a few weeks, they made office space for me, and I was back at work. But not back to drinking. I went back to the Ala Moana bar just one more time, and gave Alan a solid tip for his nearly two years of tending and humoring me.

I eased back into the law with a simple-ish case, then a more complicated one defending an executive accused of criminal tax fraud. After some poking around, I got that one dismissed because the prosecution hadn't disclosed all the information they had about my client, as required. I liked having a win (who doesn't?), but I had a bad feeling afterwards. My client had certainly done some shady things, maybe or maybe not criminal, and he had avoided significant penalties just because the prosecution had been clumsy in their documents management — and because I had uncovered their

errors. Maybe I wasn't cut out to be an unquestioning hired gun any more: "Shoot that guy. Beat that one up. No, don't ask why." Two years had changed me, I thought.

At times, I found it hard not to drink. The stress of the work came back to bite me, and I also felt there was extra pressure to re-prove myself after the long absence. Nobody said anything, not even Hokusai, but I still had that feeling. Slowly, I dragged myself away from the immediate temptation for the bottle. I'd go for long rolls in my chair. I'd practice walking with the canes. I worked out with my upper body until at least one half of me looked pretty damn good.

It came out that the Lunar Concord had squashed the Israel-Iraq war like a bug. Some sci-fi weapon from space which short circuited everything in the vicinity. Luna apologized to the people of Jordan, which had been the "battleground" of the One Hour War, and paid for them to get back on their feet. It became known that several of the recovered payloads had included nuclear bombs.

Everyone had wondered about the limits of Lunar technology and power. This demonstration made them recalibrate their wonderings. Upwards. Which led to worrying noises about the "threat of Lunar domination of Earth". Were these people idiots? If Lilli Ana had wanted that kind of power, she'd have had it two-plus decades ago.

There was a movement in a number of smaller countries around the world to somehow join up with Luna. "No rich, no poor" was a slogan which resonated with a lot of people, and the vague prospect of being under the "Lunar tech umbrella" was another incentive.

Hawai'i had belonged to the United States for two centuries, but not always voluntarily or happily. I heard that the Concord idea was spreading here, too. It wasn't secret or underground — we weren't back in the Riley days, when the looseness of Hawaiian life had offended the Federal regime. That intolerance had led to arrests and kangaroo trials for sedition against Riley's "New American Order". But the memory of those bad old days — and other ones, farther back — still lingered. President Smythe's current attitude of neglect towards Hawai'i could be summed up as, "You didn't vote for me and won't vote for me, so screw you."

Me? I kind of liked the idea of being attached to Luna. It wasn't just my damaged spine. In my two year exile, I'd given up my dream of being "rich". What was the point? I had been a prosecutor and then a defender. I knew how the "poor" got a very different justice than the "rich" — was that really necessary? On the other hand, I didn't know much about how the Concord administered the law or dealt with criminals. Was it better than our legal system, which had started as trial by combat?

I went to a couple of meetings of "Concord Hawai'i" (also called "Hui Hawai'i"). Mostly talk, no planning, no path forward. About what I expected. Except at the second meeting, a civil litigator I had known well, Jake Kekoa, came up to me as I was waiting for the crowd to thin before I tried to roll out.

"Marek! Haven't seen you for a long time. Not since the, uh …."

I said, "Accident. That's what I call it. Just an accident."

Jake shrugged a little. "Okay. Accident. What did you think of tonight's show?"

I shrugged. "Not much. Setting up a new government is a big business, and these people mostly haven't a clue. Me, I'd like to explore the options, but this kind of gabbling will never get anywhere."

Jake asked, "Are you free now? I mean, to go out for a drink and chat?"

"Sure, but I'll skip the drink. I'm off the stuff for now. Have a place in mind?"

Jake had a vodka martini, something I'd never liked. I stuck with an Arnold Palmer and an appetizer.

After some chit chat ("I see you have canes. How well can you walk?"), Jake got to the night's subject. "There are other meetings, not so crowded, much more productive. Are you interested? You're a bright guy, active, …." Most people I knew from the old days trailed off at some point like this when we met now. They wanted to ask if I was *still* whatever, "bright", "active", and so on. Many of them knew I'd been drinking, and had probably written me off.

I was used to it. I said, "Yes to 'bright'. Yes to 'active' as well, at least in mind. Less so in body. But I'll bet my arms are stronger than yours now."

He laughed. "That thing's not powered? Okay, let's skip the arm wrestling. I'm sure you'd win. Look, I'll pick you up tomorrow evening for some dinner with a more focused group. They might surprise you."

I *was* surprised. Most of the people there were lawyers, not kids but relatively senior people. I knew at least half of them, or *had* known them. Some of them surprised me, as they represented families with serious money. The one thing everyone knew for certain about the Lunar Concord was "no rich, no poor". A number of these guys lived on the lower slopes of Mauna Richistan. A few worked for people near the summit of that peak.

People were glad to see me, up and about (figuratively). Then the guest got up to speak, laboring a bit. The moderator of the meeting said, "Fresh from the Moon, representing the Concord, here to talk about the legal system on Luna — Henry Ngumbo."

Henry was a short Black man, who spoke English smoothly and pleasingly, with a slight Southern Africa accent layered over his surprisingly deep voice. He started, "Excuse me, but I'll sit down in a moment. You people have way too much gravity down here. But I'm not here to complain about something you can't fix. I'm here to tell you about laws and justice in the Concord.

"You all know the catch phrase, popularized by Ana Lilli, 'no rich, no poor'. Our commercial system is based on that. There is a minimum wage, which is enough to get by on. There's also a maximum wage, and a maximum wealth. From these bases flow the laws about labor and businesses." At this point, Henry sat down, and continued going over their commercial law.

There were many questions, of course, which he welcomed. This subject only interested me marginally. Naturally, the questions veered into discussions of the economic system. One thing he said stuck with me, "I'm an attorney, you'll have to ask the economic delegate from Luna to discuss the time scale for Earth nations to get the same technology. There are a lot more of you than us, so scaling up will take time. On these matters, Luna will give priority to nations which form a compatible Concord system. You might ask why? The answer lies in the wreckage strewn across Jordan. The Lunar Concord wants peace, wants fairness … whatever that is. We aren't looking to dominate Earth. We look outward for our goals — to the surface of Luna first, and then to the rest of the Solar System. Oppressing people, bankrupting them, that's not the way we will expand and thrive."

The moderator steered the meeting back to the theme. "Mr Ngumbo is here mostly to talk about the legal structures of the Lunar Concord, not about philosophy or dreams. No matter how much more fun that kind of chat would be, let's continue."

I raised a hand. "What about crime and criminal law? 'No rich, no poor' doesn't seem to provide much of a foundation for that, even if it does for commercial law."

Henry said, "Certainly, although the underlying theme of taking care of everybody equitably does have some relevance. Of course, most Earth criminal law at least pretends to treat everyone the

same — if charged with a crime, you are all free to hire any lawyer you can afford. If you can't afford a good lawyer, or if your lawyer is afraid of retaliation, that's too bad for you." I nodded.

He went on, "Our foundations of criminal law are restitution and protection. Our foundation of criminal procedure is truth. Noble sounding, but it has consequences in light of one new technology, created by Ana Kamaria. It is impossible to lie and get away with it when your brain electricity is being scanned in real-time at a neural level. There is no right against self-incrimination on Luna." There was some murmuring at *that* statement.

He continued, "Another point is to exist in the Lunar world, each person now needs an identity ring." He showed his, a silvery band with some strange pattern on it. "This lets me move around in the translocator system, it lets me pay for things, it monitors my physical condition, and can summon help if I'm hurt. The ID system knows where I am when I wear it. Take it off to commit a crime? Barely useful — you can't get to or away from the scene of the crime without it. You can't use someone else's ring — it won't work if you put it on your finger."

I asked, "OK, but suppose there *is* a crime — murder of passion, say. Wife stabs husband, or vice-versa. What then?"

Henry nodded. "It happens. We haven't changed human nature, we're just trying to modulate it a little. To my knowledge, no serious violent crime on Luna has ever failed to be solved. After a hearing before an arbiter to determine the truth, judgment must be rendered."

I asked about punishment. The moderator stepped in again. "As fun as this discussion is, we've gone on long enough. Henry wants to get home. I expect that after a couple days of thought, there will be a thousand more questions. I'd like each of you to write your questions out, and send them to me, say by 48 hours from now. Speed is necessary at this point. All the committees are getting ready for the next phase of our studies, which will become apparent soon."

Henry "wants to get home". Of course, he could zap right back there, faster than I could get to the elevator in this building. There was something to the idea of building your economy around quantum tech.

I waited until the room was mostly clear, to make it easier for me to roll out. Before I could leave, the moderator came over and introduced himself as Stanley Okasake. He motioned Henry over, and we shook hands, although I gathered that wasn't common on Luna. Henry said, "Stanley here says you are a very sharp criminal defense attorney, Mr Janski. Even on Luna, we've heard a little of what happened two years ago. I'm glad to see you have partially recovered."

Stanley broke in, "Luna is going to hold briefings, you might call them classes, on how their Concord works, in various fields. Law, economy, administration, medicine, and so on. A few representatives in each discipline from the places seriously interested in forming their own Concords. How would you like to go to Luna as the Hui Hawai'i representative for criminal law and justice?"

I said, "I *would* like that, but why me? I've been out of it for a while. There are at least a dozen attorneys in Honolulu with better legal reputations than myself, and more prestige to boot."

Stanley said, "More prestige? In legal circles, very true. To the public? Marek, you are famous. You saved those kids, and paid a big price. Here's the thing: changing our legal system to be more like Luna's will be a big sell. No Fifth Amendment? That's tough to get across. You are as qualified as anyone to learn about the Concord's legal processes, having been on both sides of criminal trials. In addition, you are almost uniquely qualified to help advocate to the public *and* to the legal profession."

Henry Ngumbo added, “You’ll find it very interesting, as well. Not just learning about how our laws and courts work, but also the general impressions of life on Luna. You’ll be up there for a month, perhaps two, and be immersed in how we *live*. There’s no better way to understand a place than to be embedded in it.”

“What about *this*?”, I asked, gesturing at my wheelchair and canes.

Henry answered, “If you can walk at all with those canes, the lower gravity of Luna will make it much easier for you. Since the entire habitation of Luna has been built from scratch over the last 30 years, it is not hostile to people with mobility issues.”

There was more to think about and ask, naturally. Then I went to the Moon.

I’ll skip the part about translocating, the train ride into Galileo City, how people fell down (slowly) a lot at first, and so forth. That story has been told before.

On the train, our greeter passed out small boxes with name labels. After some sorting around, everyone had theirs. “These are your identity rings. Put your ring on your finger of choice. It will adjust to you, and be your companion while you are on Luna. Each of you has a credit account, to enable you to make small purchases. You will also be paid at the minimum wage rate for your ‘work’ in attending our educational sessions. Keep your ring on you at all times outside your dwelling units. You need it to move around on the translocator system, to make calls, and so forth. In the event of accident or health emergency, your ring will summon help if you are incapacitated.”

Someone in the crowd asked, “What is the minimum wage?”

“One hundred credits per hour. It is hard to compare Lunar credits to Earth currencies. However, for a simple reference, you can buy a vegetarian meal which uses Luna grown food at a decent café for about 100 credits. Imported food is more expensive. I hope you all paid attention and brought your favorite Earth commodities with you.”

We were staying in habitat GCU-37. It was a large cave with apartment buildings in a park-like setting. Very peaceful. I was given a unit on the ground floor because of my chair. Everyone else was grouped by study subject. Lawyers on floors 7 and 8.

For food, we were shown some small stores nearby. To dine “out”, we had to translocate to another cave — I mean, hab. Our guides gave us all some advice on that, and added, “You can also search using your rings, or from the projection displays in your units. Explore — almost anyone on Luna will be glad to help you. You can translocate to other cities for dinner and then zip back here. Every public place on Luna is the same distance apart, even though our world is only slightly smaller than Asia — that is, the distance is the walk to the hab’s translocator bank, and then the walk from the destination’s translocators.” That would certainly cut down on the morning commute.

I unpacked what little I’d brought, and decided to try walking with the canes in the park “outside”. On Earth, I couldn’t get too far that way, but here I only weighed about 30 pounds. Dexterity and balance might be the problem, rather than strength. I hoped I could do without the chair while I was up here. I’d do it now, before everyone else was finished settling in, so I didn’t make a fool of myself to all my colleagues, old and new.

I did fall down a few times, mostly by applying too much force with my feet. “Too much force with my feet” was a very strange thing to say to myself, since on Earth my problem was that my legs were too weak, as well as being too uncontrollable and too insensitive. But it was much easier to get up from the ground than it was on Earth. In fact, on Earth I couldn’t get up at all if I fell, unless I could grab onto something or someone. Here, it wasn't hard at all, using my strong upper body.

I got the hang of moving around, using the canes like a person on Earth might use handrails to stabilize themselves. Then as my movements got more fluid, I started to feel that Luna was the place for me. Could I immigrate? Have to look into that.

Jake Kekoa came out of the building, and walked carefully over to me. “You’re really looking good, Marek. I expect it feels good, as well. You might be getting around here better than I am.”

I said, “It does feel good. Do you have any ideas where we can eat? I didn’t do any research, I’ve spent my time going from clumsy oaf to suave athlete.”

Jake answered, "I asked the display in my unit for suggestions, and it gave me several habs which have a lot of eateries. Let’s just translocate to one of them, wander around, pick something, and see what happens.” He added hesitantly, “Are you up for the wandering around part, O newly suave athlete?”

I said, “Just try me. At worst, you’ll have to help me up, and at this low gravity, you shouldn't have any trouble.” Of course, the *actual* worst was that he’d have to come back to fetch my wheelchair while I lay pitifully on the ground, but I ignored that possibility.

Jake said, “Let’s wait for a few more people. We’ve got attorneys from Yunnan, Uruguay, Namibia, and Iceland on our floor. We can try to snag a couple of them and get their perspectives.”

I didn’t have any trouble getting around. When my legs got tired, it was still easy enough to walk, taking more of the burden on the canes. My arms were plenty strong to take the small load. The real problem was to make myself keep moving slowly. I knew from my practice that speeding up would lead straight to loss of balance.

Dinner was vegetarian, Lunar grown food. It was delicious. We talked at length with lawyers from Namibia and Uruguay. Most of it was political, about *why* their countries (and our state) wanted to follow the lead of Luna. We all agreed that the entrenched interests were the real obstacle: not just the rich and super-rich, but the military and other power centers. I observed, “We have a problem which you don’t — the American Navy has gigantic resources built in Hawai’i and won’t want to give them up.”

The woman from Namibia said, “But are those resources of any value now? The era of hypersonic drones must make those partly obsolete. And after what Luna did over Jordan? Isn’t almost any Earth large scale military hardware now pointless? It would be like fighting machine guns with spears. That didn’t work out well for the men with spears.” She had a valid argument.

There were about 40 people from Hawai’i here, and similar numbers from the four nations. In total, about 200 Earthies present to find out how things worked in the Lunar Concord, in as much detail as possible.

The first day turned out to be common for everyone. We met in an open hab, a kind of grassland with seats spaced around. The whole cavern was a conference room, basically. At the center was a raised space for speakers. The first one up introduced herself, “Hi, Earthies. I’m Ayana Berhane, and I’m here to get you up to speed generally on how things work up here. Are there any questions?”

I was ready with a question, and raised my hand instantly. “How long does it take to make a habitat, say this one?” Most of the audience looked puzzled, and seemed to be thinking, “What a strange thing to ask *first*.” But I had a reason.

Ayana answered, “At this time, it takes about a day to finish the cavern itself and prep the soil. Obviously, getting the grass to grow takes longer. There’s no quantum tech to speed *that* up.” The crowd laughed.

There were a few more questions by others who were similarly prepared. Ayana was humorous and relaxed in her answers. Then she started her talk.

“The Concord system is organized around an economy of plenty, as well as being based on a philosophy of equality and equity. The economy of plenty is the outgrowth of Ana tech, the manipulation of physics invented by First Ana Lilli. The philosophy of equality guides our society. How many of you ate at restaurants last night?” The large majority raised their hands. “Everyone who works at a restaurant is paid a living wage, of course, usually 200 to 300 credits per hour. The owner is paid most highly, often 600 to 700 credits per hour, and can retain part of the profits. The maximum wage for anyone, even the Presider and even Ana Lilli herself, is 1000 credits per hour. Not perfect equality, but nothing like the poisonous distortions present on Earth.”

More questions. Ayana answered, and went on, “Changing the subject to something very unequal is how we treat violent criminals. In our minds, they are still citizens of Luna, and thus entitled to a living. However, if they cannot be reliably reformed, the rest of us must be protected from them. Our solution is to provide them with a private hab, about 80 meters across. There they are given the means to grow their own food — that is, to make a living. They are not given the means to leave their cavern. They can, however, communicate with the outside world in a monitored fashion.”

She turned to me, and asked, “Is that why you asked your question, Mr Janski?” She pronounced my name correctly, first time. They’d done their homework.

I said, “Yes. I’d heard of this type of imprisonment, and wondered how hard and expensive it was to set up a whole habitat for just one person. Not that hard, apparently, if you’ve got the right technology.”

Serious questions were raised. Solitary confinement for life? Wouldn’t they go mad? What if they refuse to grow food? Or are incapable? What about non-food items? Ayana raised a hand, “These points will be covered in the criminal justice briefings for the lawyers among you. I just wanted to point out how our foundational principles lead to our treatment of people who must be cast out of the society of others in some sense. We don’t keep them in small cages, as is common on Earth. I’ll add that release is possible under certain conditions — it is not an inflexible sentence. Our goals do not include retribution, much as it is sometimes desired. That is one of the foundational principles, directly from Ana Lilli. She herself did not seek retribution on those behind the murder of her mother in 2053. Before the Concord separated from Earth.”

After Ayana, a lighter tone was struck as the hab lighting was dimmed and projected views of Lunar life were shown. Low gravity sports. Humans flying like birds — that was a popular one! Scenes from various types of jobs peculiar to Luna, such as a video of how a habitat cavern was dug from the viewpoint of the machine operator. The speaker pointed out, “You can’t see the second operator, but there is one — back at a control center, monitoring progress of the dig, ready to translocate out the digger operator if there is any serious risk.”

Someone asked how often that happened. “About once per 1000 habitats. A cave-in is the biggest danger, if the rock is rotten. Don’t worry about the habs you are in, though. All finished habs are encased in a thick titanium alloy shell and also supported by Ana tech force beams — stronger

versions of the ones in your apartments which replace your Earth elevators." I hadn't tried those yet, being on the ground floor. I decided to see what they felt like later that day.

Just before we broke up for the lunchtime meal, I asked, "So much that you've shown us is based on quantum technology, Ana tech, which we have only vague ideas about on Earth.
My question is: do we get a chance to meet Lilliana, Ana Lilli? Most of us would like to, I'm sure."

Ayana stood back up, and said, "That could not be arranged. There are just five Anas, the only people who have the ability and training to implement new and modified quantum tech. They are simply too busy. However, Ana Lilli's elder daughter, Ana Blanca, will be meeting with the medical teams here to outline recent advances in applying her mother's physics to medicine. Ana Lilli's younger daughter, Ana Phoebe, will meet with the engineering teams here to brief them on some new applications of Ana tech which could be used on Earth."

We lawyers had to be happy with the First Arbiter, the head of what passed for the judicial system in the Lunar Concord. We received a thorough overview of the laws and how they worked in society. Property was treated very differently from Western traditions, especially "land". People had a license to occupy a space in a habitat, but did not own it and could not sell it. This led to a question about allocation of rare 'positional' goods, like beachfront property. The arbiter said, "On Earth, such things go to the rich, by money, or by power. At present, on Luna we don't have so many items like that. But when the surface is habitable, perhaps in a decade, there will certainly be beachfront housing — probably not as nice as you have in Hawai'i, though!" He nodded in our direction. "The current plan is that use of these properties will be allocated by lottery, for a period of time — a year, perhaps. You might ask about the cost of construction to make a beach lot habitable and pleasant. The answer is that many things you find costly to do on Earth are easier on Luna, with the use of Ana tech. It doesn't take a rich man to build a nice house. Our economy is increasingly based around the offshoots of quantum technology, and that transition is projected to be nearly complete by the end of the century. Perhaps sooner."

In turn, we debated how such a system could be made to work on Earth, where the rich and ultra-rich owned so much property. The arbiter said, "Of course, it will ultimately be your problem to work out, not ours. A transition period will be needed, I'm sure."

We talked about how to get the transition working. All property reverts to the new Concord when the owner dies — we'd have to outlaw trusts and other dodges. Or, all property ownership transfers to the Concord at a rate of 5% per year, so that after 20 years, the Concord owns the land — a kind of "property tax". Or, buying all the land directly. This last idea ran into the difficulty of the maximum wealth principle, about which the arbiter was very firm.

We saw videos of several trials. One had been just a year back, of a man suspected of poisoning another fellow who was having a sexual affair with the first man's wife. The arbiter remarked, "This case was probably the most complicated murder we've had on Luna, which is why I selected it." The victim had died of cancer, accelerated greatly by a toxin stolen from a research lab. The killer had thought the death would appear as "natural causes", as the man had recently been diagnosed with cancer. However, molecular scans during the man's quick decline showed how the disease course had sped up so fast as to be untreatable and traces of the toxin were detected in the body. Anyone who had been close enough to the toxin to steal it, as shown by identity ring data, was a suspect, but none of them fit any other part of the crime. The identity ring sweep was extended to

cover anyone who had been in any of the few habs where the toxin was kept, to cover the situation where a person took off their identity ring.

I asked, “All the people who’d been in one of those habs for how long back? Months? That would be a huge number of potential suspects.”

The arbiter said, “Fewer than you think. If you take off your identity ring, the system also logs that. There are of course legitimate reasons to remove the ring, but most people don’t do it often. We just had to focus on those who took it off and kept it off for some time. Then correlate those back to people who had any contact with the victim. Once we made that connection, the case was over.”

I asked, “Over? It’s impressive to find this link, but how did you prove that these two people committed the murder?”

The arbiter said, “You’re forgetting the truth detector. We questioned the first person, the one who had been in the hab where the toxin was stored. It’s no use refusing to answer questions. That itself is *prima facie* evidence of guilt. In addition, the scanner can detect the answer to simple binary Yes/No questions even if the suspect stays silent. After questioning, the case was easily solved. Both of them are solo farmers now. Probably for years to come, as such elaborate premeditation doesn’t give a lot of promise for safe reintegration into society.”

Another Earth lawyer asked, “What if the second person, the actual killer, had run and gone into hiding?” Then she caught herself, and said, “No, that doesn’t work here, does it?”

The arbiter said, “No, it doesn’t. A person without an identity ring is only slightly less helpless than a baby. Hiding isn’t easy without an identity ring, either. With the identity ring abandoned for long, all video surveillance Oversight systems will look for the individual. If they aren’t found that way, more efforts will be made — they could be the victim of a crime, or accident, or suicide. Once we found a poor person who had taken off her ring, managed to enter the inter-habitat tunnel system, and hung herself there. Even in that case, we were only about 20 minutes too late to save her. If she’d had her ring on, she’d have been remotely translocated directly to a hospital once her ring sounded the medical alert. Otherwise, she’d have been stopped shortly after she entered the tunnel without authorization.”

Someone else asked, “What about a psychotic criminal, who believes their lies? Or someone with advanced dementia, who is in a brain fog?”

The answer was, “There are edge cases which present difficulties. Fortunately, they are very rare. In both situations that you describe, therapy and treatment would be mandated. In confinement, most likely.”

All this was fascinating. There were many more details. Financial and tax crimes were almost non-existent, even in principle, since all money — I mean, credit — was exchanged through a central system. There were no large accumulations of wealth controlled by one individual. Many of the other sad panoply of human crimes still happened, though.

In the evenings, I talked endlessly with my fellow Earth attorneys about how we could adapt Lunar legal principles to our homelands. I said, “Their technology is essential for this new criminal law — identity rings, truth detection, and so on. Those will be the easy parts. Most people don’t interact with the criminal legal system. As long as a new system seems to be fair, most people will get used to it. But the rest … How can we change the economic system and its legal basis? Every adult interacts with them every day.”

Those of us from Hawai'i agreed that the super-rich could just pick up and leave. It was the low-to-middling rich which would be the hard cases — just the sort of people with the political clout to abort sabotage any transition process. "It's not fair" would be their rallying cry. The attorneys from Yunnan were more optimistic, or perhaps more brutal. One of them said, "After we gained independence from the tyranny in the Civil War, life in the new Chinese Republics was hard. It has slowly improved, and we do have the kind of people you are talking about. But they aren't deep-rooted like in your country. The vast majority of people in Yunnan will scour them out of the nation if they try to prevent reforms to make the lives of everyone better."

There was no solution. Not for Hawai'i, anyway. Workshops and brainstorming sessions within each national group, and with all groups together, led us to that conclusion. Only a drastic strategy could work, and only in drastic circumstances. Other nations, poorer nations, had a better chance of leapfrogging into the future.

We got ready for the return to Earth, not particularly happy. I'd never had a chance to try flying, and probably never would. I'd miss Luna, and not just for the low gravity. I didn't feel disabled there at all. Life there, even on the minimum wage, was quite pleasant.

Two days before departure, I was approached by Ayana Berhane, the lead organizer of this entire effort and the lead speaker on our first day. She said, "Mr Janski, someone important would like to meet you. Are you free tomorrow?" Certainly I was, there was nothing scheduled for that day.

Ayana met me at my apartment building, and we translocated to a place I'd never been. The hab was larger than any I'd seen, and had bigger buildings scattered around. I asked what it was. She said, "This is one of the habs for the VIM, the Vesalius Institute of Medicine. It is the center of medical research on Luna." That sounded interesting.

A tall blond woman met us outside at a plaza garden. Ayana introduced her, "Mr Janski, this is Dr Emily Williams, head of the neuro-repair research program." You can imagine how closely I paid attention after that!

Emily (so I came to know her) said, "Mr Janski, Marek, we have developed methods to implant neural prosthetics to replace and augment damaged tissue. It's simple: we want to use you as a test subject for spinal cord repair. With good luck, you could walk again, without those canes even on Earth. With bad luck, you could lose what function you have. Or you could have any outcome in between."

I had a lot of questions about how it worked, but the first one was simpler. "Why me?"

Emily said, "Your case is a nice one for this test. You have some function remaining after your injury, which bodes well for a positive outcome. In fact, your type of spinal cord damage is not common on Luna. Falls here are unlikely to cause major damage, for one thing. We don't have automobiles or motorcycles, except for recreation. More common on Luna is spinal degeneration with aging, which presents a more complex set of problems than traumatic injury. We have done a few trial operations to repair loss of cerebral brain functions due to trauma, and those were successful. Now we want to move downwards in the central nervous system. Here, let's sit on this bench to discuss the details."

They would measure my nervous system above and below the injury while they stimulated my legs, tracing out the working pathways. They'd scan the injury site in microscopic detail. She said, "I'm sure they did that on Earth, but they don't have the new instruments we have, designed by my sister-in-law. We can map every neuron in your spinal cord, sensory and motor, working and

damaged. Then we can design the prosthetic, synthesize it, and put it in its place. Then you'll have to learn to walk all over again."

One of my questions was, "How long does the surgery take?"

She laughed at that. "It's not really surgery any more. Well, yes it is, but there is no direct cutting and sewing as you know it. My sister-in-law, Ana Blanca, invented micro-translocation to use in medicine. We can put into and take from the body at the micrometer scale, the size of a single cell, as needed. It takes time to get everything done so precisely, but it isn't unpleasant. You can be awake or under, as you choose — for your case, awake would be better to enable us to test the functioning and sensing as pieces are taken out and put in place. There will be only a little surgical trauma; recovery is very quick. You needn't worry. I operated on Blanca's aunt and repaired her damaged visual cortex about a year ago. That was very precise work, and Aunt Phoebe had to relearn vision, almost like babies do. But she can see again, decades after her injury."

That certainly sounded positive. I said, "Sounds great. When do we start?"

Ayana laughed and said, "I told you he was decisive. Three years ago, he …."

I cut her off. "Please don't talk about those events. It's not comfortable for me, and you shouldn't take what happened then as defining me. I'm pleased, excited, to be your test case. Both to help your research and to help myself. Let's leave the past out of it."

Emily Williams

When I got home, Pheebs was already there. That was unusual. I had long hours, physicians having so many demands on their time, but Anas could work 96 hours a day and still not meet what was "needed" from them. In addition, Pheebs was consumed by her devotion to the Deep Physics. I was really happy to see she had stopped doing Ana things early and come home.

She told me she'd made a big step that day. She had found the path to translocate an active Ana tech chip and keep it ignited. There were details to work out, but it was exciting. Chips for mobile applications wouldn't necessarily have to be self re-igniting, as were those in the ID rings. She added, "And the technique doesn't stop there. You and Blanca control structures at the micron level when you want. I see now, at least in principle, how to control structures at the atomic level, or even finer. I could write an object atom by atom, making a duplicate of something, or making completely new materials."

We liked to joke, so I said, "So you can make dinner with Ana tech now? That will be popular, if the menu is right."

She answered me seriously. "Not just now. It will take some time to develop the chip which can implement this control. I'll have to talk to my father about that soon. But yes, then it might someday be possible to whip up a nice tasty dinner from rock dust. Until then, someone will have to cook. Someone will have to farm. Plus, I'm not sure synthesized food will allow much room for creativity."

Over dinner, I told Pheebs that I was going to do our first neural prosthetic for spinal cord injury. She asked, "Who's the victim?"

"One of the delegates from Earth, from Hawai'i in fact. You know, I can't wait until we have real beaches here on Luna. The ersatz beaches in the vacation habs don't do it for me. Anyway, this lawyer was walking in Honolulu when a building facade started to collapse. He grabbed two children off the sidewalk in front of him, threw them under a parked bus, and dove in on top of them, covering

them with his body. The bus was crushed by the debris, and he was seriously injured. Surgeons and neurologists were able to restore some minimal function on Earth. I think we can fix him right up."

She said, "I'd take you to Hawai'i, but … you know." I did know. Security for Anas who went to Earth was extremely tight, and it didn't make sense to cause so much trouble just for fun. It would look like abuse of her position — it *would* be abuse of her position.

Marek's operation went well. A lot of finicky detail. It wasn't much like the surgery I'd been trained for in the bad old days of the 2070s. I spent the majority of my time at a console, staring at realtime imagery of neural paths, carefully designating spots for micro-translocations, running diagnostic tests on the pieces of the implant as they were sent in, and so on. He was awake, but mercifully didn't ask many questions while I was concentrating.

In fact, I liked him. He had a warm and engaging talent for conversation. During pre-surgical testing, he had kept the techs enthralled with stories from Hawai'i, including some from his courtroom experiences. I could see how juries on Earth would be swayed by his easy and convincing way of speaking.

At the end of the surgery, I told him, "That's it. Now we'll take you to a room where you'll rest lying still for a day, letting the implant grow into its surrounding neurons, and vice-versa. Then we'll try you out. Don't get your hopes up, though. At best it will be a slow process of trial and error learning. We don't have the knowledge to hook up the correct descending neurons above the injury to their exact corresponding locations below — just to the approximately correct spots."

He said, "At least when I fall here, it's in slow motion. Put a few pads on the floor and I'll bounce right back up."

I smiled at him. "At first, you'll be in a harness which won't let you fall. The day you can take the harness off will feel like your birthday."

He asked, "Do people celebrate birthdays here on Luna? Or did that custom disappear?"

I said, "People from Western cultures do, although birthday candles are not popular. Birthday bashes are less common for those from Asia or Africa. This new nation has people from all over Earth, and the majority are not from the West. Surely you've noticed that."

He replied, "Of course. It looks a lot like Hawai'i to me in that regard. What's the problem with birthday candles? Oh wait, let me guess." He paused. "It's because you import them from Earth, am I right?" I told him that was correct. No one had thought it was important enough to make them on Luna, and no one cared enough to make it an issue. He said, "No entrepreneur wants to start a business for that?"

I told him, "I think it was tried once, but didn't work out. But I'm not really sure."

He progressed well through rehabilitation. His first attempts at leg movements were fairly spasmodic, worse than he had before the surgery. I told him, "That's what I expected. You're firing muscles you haven't used for a long time, and they are overwhelming the muscles your brain does know how to use. Our therapists will run you through some one-leg-at-a-time exercises to let you get basic control back. Remember, you are the first person this has been tried on. We don't know how long it will take. I'm hoping you can walk moderately well with the canes in a week or less, and without the canes in two more weeks. But that's just a hope. You will define the reality."

He tried to be jaunty, "Whatever you say, Doc. Let's get started with those exercises. I feel great, I have much better sensation than before. It's a little weird in places, but I'll get used to it."

I went back to see him after a week of therapy, and to check on the scans of his spine. “Watch me — look Ma, no canes!” He walked haltingly without support, but still in his harness.

“Marek, it seems to me you’re in the best case scenario. I don’t like to over-hype the possibilities, but you are looking set for a full recovery." I added, “With a lot more work. You’ve got to practice until you drop, literally, then recover and practice more. After that, we’ll have to put you into a higher gravity environment so you can get ready to return to Earth.”

He looked at me, and said, “A higher gravity environment? You have that? How does it work?”

I shook my head, “You’ll have to ask my wife. She knows all about that. I just use them. Most people on Luna spend a little time in a high-g hab. It helps with bone strength. Anyone who plans to travel down to Earth has to do it regularly. I have relatives back on Earth, so I’m in one a lot.”

Two months later, he was walking in a full one gee environment. Ready for the return to Earth. By then, we’d done our first neural prosthetic insertion for motor neuron disease.

I met Marek for his going home party. Pheebs joined the crowd, which was a little unusual for her. She was a classic introvert, not comfortable in social situations with people she didn’t know. I introduced Marek to her, and he said, “So, you’re the one who can explain all the physics to me? How do the high gravity habs work, anyway?”

She looked at him, and said drily, “It’s a pseudo-force applied by manipulating the Higgs boson field, using sub-time manipulation of hexaton braids. I hope that makes it clear. Don’t spread it around, though, or everyone will think it’s easy. Then I’d be out of a job.”

He nodded. “I’ll keep it a secret. Which won’t be hard, since I didn’t understand any of it. Was that just gibberish?”

Pheebs said, “No, that’s the simplest explanation. There are a few details I left out. But down on Earth, you don’t need any extra gravity. I’ve been there, and you’ve got too much of it already. I’m the second person born on Luna, you might know. Only my twin sister comes before me.”

He said, “Well, thanks for the high-g Higgs thingy. I’m ready to go back to Earth thanks to that.”

Pheebs asked, “You’re welcome, Marek. Tell me, why are you so reluctant to talk about your accident? Most people wouldn't shut up about it if something like that happened to them.”

Marek looked bleak. Pheebs just stared at him. Finally, he said, “They called me a hero for saving two kids. No one remembers there was a third kid there. I shoved those two kids under the bus and jumped in on them in one motion. I didn’t see her well, just in the corner of my eye, and didn’t do anything for her as I acted. She died when the rubble fell. Her name was Sandy Akana. Being called a ‘hero’ always makes me think of her life being cut down so young. That shouldn’t happen to anybody. I failed her.”

Pheebs looked at him for a moment longer, and then said, "I understand. Good luck to you back in Hawai’i, Marek. I’d like to see it someday, but that seems unlikely. If I ever get a chance to go there, I’ll look you up.”

Marek Janski

I went back to Honolulu via the Lunar Waimānalo facility. I’d brought my chair and canes back for donation. I still had to strengthen my leg muscles some more — no long hikes for me soon — but otherwise I was doing well.

I walked into the office at O’Toole and Hokusai a few days after my return. It took a moment for people to recognize me. “Marek, what the hell?!”, often followed up with, "I can’t believe it!”, or with,

“Is this a trick?” by the more suspicious. I laughed them all off. I explained that I’d had an experimental treatment while I was away. Of course, I was pressed for details, but I avoided further explanations.

Back in touch with Jake Kekoa, I heard, “The whole Hui Hawai’i thing has gone asleep, or comatose. It’s not like people aren’t interested, but it seems impossible. As we said on Luna, the situation would have to be desperate, or was ‘drastic’ the word we used?”

I said, “That’s too bad, Jake. I have something to tell you, and it would be best in person. My condo’s still not fit for company. How about I come over to your place tonight? Is Marie home?”

Marie *was* home. When I walked up to their house, the pair of them just stood still staring at me. I’d had enough of that at the office, and said, “Yes, it’s Marek Janski walking. Let’s go inside and we’ll talk about it.”

Inside, I told the story of my operation and rehab. I ended with, “Luna is going to share all their medical knowledge, but the hardware and expertise for such detailed surgeries, manipulating individual body cells, will take time to roll out over the Earth. Years, if not longer. Nations allied closely with them, adopting some version of their system based on fairness for all, will get the first crack at such new technologies. They don’t want to rule the Earth. They just want to help fix it.”

Marie said, “Like they did for the climate. It is a nice dream, but people are … well, you know. Nice until they’re not, defining ‘fair’ to favor themselves, jealous, grasping, afraid, ….”

I said, “The Concord isn’t paradise. Just a sizable step forward, in my opinion. But what do you think, Jake? Is the promise of access to such medical technology a lever to pry out some support for Hui Hawai’i? They are treating cancer cell by cell, patching damaged brains, and so on. We need that, everyone needs that.”

Jake shook his head. “It’s a good lever, but not strong enough. There are too many changes needed, too many vested interests, to transition to a Concord system here. Who owns this house after we Concord-ize? Who owns those palatial houses along the shores? What happens to our savings and investments in US dollars? Marie and I are willing to adapt, but many people will be afraid. And sadly, people that are afraid are easily whipped into a lather by the cynical.”

Drastic or desperate. One kind of fear had to be there to wipe out the other kind of fear.

Hawai’i has seven “active” volcanoes — but most of them were pretty quiet, and had been for decades. The one on Maui hadn’t erupted in five centuries. It wasn’t like we didn’t have any warning. The geologists said that new magma was working its way up, and something bigger than usual would happen, probably at Kilauea on the Big Island and at Lo’ihi in the sea south of Kilauea.

“Bigger than usual” was true — a mountainous understatement. All seven volcanoes erupted violently in the span of three days, spewing liquid lava and toxic gases. Then continued erupting. Thousands of people died from the poisoned air in the first days. Hundreds of thousands of people were displaced as the air got worse and the lava rolled down, igniting forests, farms, and approaching towns. The fabulous old telescopes on Mauna Kea were destroyed.

President Smythe delayed emergency relief, citing “budget issues”, “there’s nothing we can do to stop the lava and gases”, and generally being a prick. He did order the military based in Hawai’i to help carry out evacuations from the Big Island and Maui, mostly to Oahu, which wasn’t too badly affected. But the capacity to move hundreds of thousands of people on short notice wasn’t there — air travel was very chancy due to the turbulent hot air. Boats were even riskier.

Luna stepped in. It came out that the Lunar Presider had beamed down and spoken directly to the Governor, offering aid. All he could say was, “Yes. Now, please.” Equipment was brought from Luna, starting with large scale translocators which were taken (at serious risk, but there was no shortage of volunteers) to the islands in trouble. Then more equipment was translocated to those islands. The residents lined up in huge queues, and within two days had been evacuated. Then the Lunar engineers built something which stopped the flow of lava down the slopes and towards the towns. The volcanoes were still erupting, but there were invisible walls holding back the oozing molten stone. Forest fires were quenched by water appearing in the sky. Some woods had to be flattened to put those invisible walls up, but by then not even the environmentalists cared. The poisoned air was harder to deal with, and it took Luna several weeks to begin solving that problem.

I got a call from the Governor’s office eight or nine weeks into the crisis, when it looked like the situation was stabilizing. “Mr Janski, the Governor would like to meet with you this afternoon. Can you come to Washington Palace at 4 pm?” I’d chatted with the Governor once or twice before, at some legal functions. I was sure he didn’t remember me, so the whole thing was a little strange. But if there was something special I could do to help ….

I was shown into his office, and he stood up to greet me, looking worn out. There were two women with him. One was stocky and young, scarcely more than a girl. The other one … she looked familiar, and just before I placed her, she said, “Marek, I said I’d look you up if I made it to Hawai’i. Here I am.”

“Ana Phoebe! Are you here to help with the recovery? I’m so … glad to see you again.” It was incredibly lame, but it was the best I could do to express the strong emotions I had in that moment. Her wife had revived my spine from its near death, and now she herself was reviving my homeland.

The Governor said, “Ana Phoebe is responsible for the design of the force walls holding back the lava and the water sprays which doused the fires. The air cleansing devices now hovering near the volcanic vents were designed by Ana Samaya. It’s remarkable, and every person in Hawai’i owes them more than can be repaid.”

I could tell that Ana Phoebe wasn’t comfortable getting praised, any more than I was. I said, “What did you do, supercharge those old hexatons, twist them into new braids? Whatever you did, it didn’t take infinite time.”

She smiled the smile of a serious person. “That’s about it. Really, it was just a matter of scale, making giant versions and variations of things which existed in smaller editions before. A lot of details, of course, especially to do it so quickly. Don’t forget that many engineers here on Earth helped with the construction plans and execution. Samaya and I both had to throw things together so quickly. I’m afraid the whole job isn’t as elegant as we would like it to be. Next time, give us six month’s notice before setting off any more volcanoes.”

I said, “Governor, you are looking at probably the only human beings alive who could help Hawai’i in our time of ultimate need. Phoebe, Samaya, there is nothing more to say that is adequate. Thank you. Together, you two have rescued so many people from suffering and death, and kept our Hawai’i livable.”

Phoebe answered, “My mother could have done my part, but I’m younger and the long hours required here didn’t bother me so much as they would her. Samaya is a chemical physics genius, and figured out how to purify your air. However, I personally am tired now. Governor, by chance do you have any places a person can relax in Hawai’i?”

Drastic and desperate. We'd had plenty of both in the last months. The story of how the Hui Hawai'i movement spread like the wildfires which Luna had stopped is well known, taught in schools. Accommodations which had been thought impossible suddenly became thinkable, possible, doable. Naturally, there was a host of problems, arguments, maneuvers, pressures, threats.

And stupidities, like the attempt to bribe Ana Phoebe. It was that event, recorded by Lunar security in the middle of a secluded beach, which ultimately put the opposition forces into the ground. She said in an incredulous tone, "Ten billion dollars? Are you joking? Or mad? Of what possible value to me is ten billion dollars? Or ten trillion, for that matter? Go away and don't come back."

Hawai'i became the fourth major Earth Concord, following Yunnan, Iceland, and Uruguay. Namibia ended up joining the new Southern African Confederation, a rising continental power.

I was chosen to be the Prime Arbiter for our new government. It would take a lot of getting used to. Truth and fairness. There would be a lot of adapting to do in our criminal legal system. It was my job to lead those changes, and to sell them to the people at every step. The next few years would be an adventure — difficult, uncomfortable … and rewarding.

Appendix - Timeline

2007	Twins Penni and Phoebe Tarella are born in Alabama
2028	Infant Lilliana Buckeye is found abandoned at an Ohio fire station She is place for fostering (and possible adoption) with an evangelical family
2030	Lilliana teaches herself to read and do arithmetic
2031	Foster parents return her to state custody, as the child refuses to go to church
2032	Lilliana fostered by Blanca Ortega
2034	Lilliana starts teaching herself calculus, begins first grade
2038	Lilliana starts her machine learning research and development
2039-42	The Asian wars[†] (see below)
2040	Lilliana applies for a patent on her machine learning method
2042	Patent is granted; Marketing to NSA succeeds; Creation of STELA
2042-3	Lilliana instructs NSA data analysis team on her machine learning methods Lilliana starts to study cutting edge quantum mechanics Her frustration mounts as her progress is slow
2045	Begins collaboration with Edward Mitsui
2046	Fires her first attorney William Gorman Hires Richard Clifton and Cydney Fredholm Organizes STELA hedge fund Hires Edward Mitsui to start Qcoh chip design
2048	First working chips; Begin redesign
2049	Second generation chips with high output power Engineering for practical power boxes Initial breakthroughs for translocation, etc
2050	Beginning of personal relationship with Edward Mitsui Construction of underground station beneath Mt Sneffels (the first “hab”)
2051	Acquisition of smaller power companies, secret rollout of power in USA Establishment of Lunar station and what will become Habitat A Marriage to Edward Mitsui
2053	Pregnancy with the future “twin Anas” Meeting with Secretaries of Defense and Energy in new Sanchez administration Return of William Gorman; FBI investigation of STELA; Legal troubles Kidnapping and rescue of Lilliana, death of Blanca Ortega; Battle of Sneffels Ranch Birth of the twin Anas Blanca and Phoebe on Luna

2054	Rapid expansion of Lunar station Close relation with President Sanchez
2055	Death of President Sanchez, replaced by House Speaker Riley Battle of Lunar Habitat A Creation of Lunar Republic
2056	Lilliana steps down as First Presider of Luna
2057	Cydney Fredholm becomes first elected Presider of Lunar Concord
2058	Lilliana gives speech to United Nations, meets with world leaders Atmosphere projects begin on Earth and Luna
2060	Kathleen Turnbull elected American President
2062-5	Gigantic Qcoh “negative entropy” coolers to preserve ocean species affected by warming
2063-6	Construction of Luna’s first chip foundry Generation 3 (gen3) Qcoh chips are designed and created
2063	Kamaria is born somewhere in northern Afghanistan
2065	Dominic Newman’s run for Presider-ship is cut short by scandal Cydney Fredholm elected to her second term as Presider Dominic Newman is “extracted” from his refuge on Earth Two year old orphaned Kamaria is adopted by the Parvin family Kamaria is singled out for Ana training after the Parvin’s arrival on Luna Samaya Regas is born in Tasmania First generation identity rings introduced on Luna
2069	Regas family emigrates from Tasmania to Luna Samaya is selected for Ana training
2071-3	Ana Blanca attends medical school on Earth Ana Phoebe begins her reformulation of the Next Physics and the Deep Physics
2072	Kamaria’s father leaves Luna to return to Persia
2074	Founding of the Vesalius Institute of Medicine, including a medical school
2076	Ana Blanca graduates from VIM, begins developing micro-translocation surgery Marriage of Ana Phoebe and Dr Emily Williams
2077	gen4 Qcoh chips developed Adoption of third generation Lunar identity rings, including tiny gen2 Qcoh chips
2079	Suicide of Kamaria’s adoptive mother; Kamaria “runs away” to Shaft City Aariz
2080	Abortive war between the Israeli and Sh’ia Ali theocracies VIM develops highly refined neural implants Phoebe Tarella’s vision is restored using the Next Medicine

2081	The Yunnan Republic becomes the first Earth nation to adopt a Luna-style Concord Luna pledges to defend Concord nations on Earth from external violence
2082	Luna begins aiding Earth nations in dealing with natural disasters when practicable Hawai'i becomes the first American state to secede and form a Concord Design of gen5 Qcoh chip begins
2083	Birth of Phobos, son of Ana Phoebe and Dr Emily Williams
2085	First voyage to Mars

†The "Asian Wars" (2039-42)

- Second Korean War
    - Much of the Korean peninsula is devastated after the war starts almost accidentally
    - War spills over the border into China, with catastrophic consequences
- Second Chinese Civil War: aftermath
    - China splits into several independent southern republics (e.g., Yunnan and Guangdong) and the northern Great Unity China (a rigidly hierarchical mix of Confucian and Maoist governance)
- South Asian nuclear exchange
    - Clashes between Indian and Chinese forces in the Himalaya regions bordering Tibet cause Pakistan to "aid" China by an impromptu (and unsolicited) nuclear attack on Indian forces
    - Retaliation by India, then tit-for-tat by Pakistan, escalates the disaster: destroyed cities, downwind radioactive contamination zones, spreading to neighboring countries