Cities of Light

When Trisha first stepped out of the gates of Europa's main spaceport, it was with a feeling of awe. When you are living as a single you tend to become more aware of your social needs, and usually this results in a deeper humility and respect towards your surroundings. Depending on the circumstances, this may turn out positive or negative. In Trisha's case it was the former. Working as a diplomat, her life was very social and filled with purpose, and whenever she approached other cultures in studies or in real life, it was always with a genuine respect.

With the Europeans though, it was respect out of the ordinary. The European society was considered everywhere as the overall most advanced civilization in the solar system, and to Trisha, Europa was a thing out of legend. It was with this attitude that she stepped out of the spaceport, but what triggered the feeling was the sight that met her, and for which no hologram or video could have prepared her. The rotational period of Europa is 3.551 Earth days, which means that a night on Europa last on the average almost two Earth days. Very early in the history of European society it had turned out that even though the human body and mind were quite capable of adapting to the environment, this was by far too long a period for a whole community to be inactive. The small communities had found ways to enlighten their surroundings to a degree where most day activities would be convenient even at night. Because the sunlight on Europa is 27 times weaker than on Earth, and because Europa does not have an atmosphere, this was of course just an extension of the necessity of having to utilize the sunlight efficiently. And the Europeans had done that with ingenuity. When the first cities were built, the quasi-transparent domes encapsulating them had been made with such skill and care that they were still considered perhaps the most marvellous constructions ever build by man. Through advanced circuits and material structure light was redirected, concentrated, bend and transformed to the desired colour and magnitude. The major part of the nocturnal illumination was recycled city light and thermal radiation from the city.

When Trisha stepped out of the spaceport it was night. A myriad of tiny lights were spread throughout the sky, like a starlit sky on the countryside back on Earth, but much brighter and with a great variation in colour. In some parts were thin sheets of light with gradient distributed colour and brightness, softly wavering and sometimes forming smooth 3-dimensional surfaces. The artificial stars in turn would form abstract figures and 2-dimensional structures. Across the central part of the sky ran a trail of silvery dust. There were other more subtle effects as well, which tended in a natural way to blend into this great concert of soft lighting.

Being a diplomat on duty, Trisha was not allowed to dwell upon this wonder but for a brief moment. There ought to be some kind of welcome committee, probably some people dressed in official clothing. Looking around the plateau in front of the space port she saw only about a dozen people, all wearing strange and elegant but quite unofficial clothes. A few of them were heading away from or towards the building, while the rest all seemed to be waiting to meet somebody. One of them caught sight of her and came towards her.

”Welcome to Europa, miss Antoniette,” he said, smiling and holding out his hand for greeting. ”My name is Adain Eckhard. I am here to escort you to your vehicle. If you would please follow me.” He motioned her to walk in a direction away from the spaceport.

”I trust you had a pleasant journey? To a secretary of the interplanetary council one would expect space travel to be a common experience. For those with non-government employment like myself,

it is still an exotic event. Even here on Europa.” Trisha smiled. Space travel was not a common experience to her either. She was a bit taken aback by the rather direct and informal way this man, who was supposedly just here to escort her to her vehicle (and without any kind of security escort) was initiating the conversation. Especially the neglect of not using the term CIPA (Council of InterPlanetary Affairs) was a clear violation of etiquette. Being on a diplomat mission, she did not allow herself to be offended. And somehow it actually made her feel more at ease.

”As usual it was a pleasure. Even more so when you include the smoothness of the landing phase...”

As they reached a very broad flight of stairs leading from the plateau to a line of vehicles, Mr Adain Eckhard motioned her towards one of them. ”It's the silvery blue vehicle over there. This colour is reserved for government vehicles.” It had on it's side in discreet colours the schematic drawing of a Jupiter storm above two curved lines, the interplanetary symbol of Europa.

As they walked down the stairs, Trisha surveyed her surroundings. At the foot of the stairs there was a large pedestrian area, stretching at least 10 meters outwards from the stairs and narrowing in to become a street trailing off to the left. Along the side of the area closest to the stairs was a line of little boxes, seemingly holes in the ground, each with a trail leading down a tunnel in the ground. The pavement itself was bend upwards in a flat, bell shaped curve to form a roof at each tunnel entrance. In most of the boxes a vehicle stood motionless, floating in the air above the ground, and in front of each box was a computer terminal. Trisha knew this to be the maglev transportation system, the only urban ground transportation system of Europa. Small busy robots silently kept the area clean, withdrawing whenever somebody was in the vicinity.

On the far side of the pedestrian area was a luminous, translucent barrier with a turquoise hue, and with openings for every fifty meters. Beyond, and as far as the eye could see, there was a park area, with hardwood being the dominant vegetation. It was well lit through a complex system of softly glowing open and closed pipes and pools of flowing water, light dancing on the side like small will-o-wisp. Add some ambient music, Trisha thought, and it could be a scene taken from the typical fantasy movie. She found it quite appealing.

When they reached the vehicle, not only the doors but the roof as well opened by retracting into itself, allowing the passengers to seat themselves without having to bend their heads. Trisha sat down beside a familiar figure.

”Advisor Xian! I didn't expect you to come and pick me up in person,” she said. She grasped his outstretched hands and were greeted by a firm squeeze of both hands. He usually only greeted her this way when something important was on the agenda.

”Hello Trisha. Well, we wouldn't want you to get lost on your first visit to Europa. Besides it gives the opportunity for both of us to become up to date with the latest information. But first there are a few practical matters. Did you register your personal ID card at the spaceport?”

”Yes..?” Trisha said. As Adain seated himself in front, the doors to the vehicle closed, and Xian withdrew a flat box from his briefcase.

”Please hand me your ID card,” Xian said. She did so, and watched while Xian opened the box, inserted the card and hit a few buttons on the build-in keyboard. He handed back her card. ”Now you are registered as a diplomat visitor, and with all the privileges of a local CIPA member. On Europa, this does not mean that you are a queen or a princess, but it will make things a little easier on the practical level.”

”The second matter,” he continued, ”is about your clothes. When you arrived at the spaceport, you were given a gravity suit to wear inside your normal dress. In modern european textiles the gravity elements are integral parts of every piece of clothing. I suggest you get yourself a wardrobe of local clothes for your stay. It will also make your identity as a foreigner less obvious. Ask for a cloth facility.”

”You will be living in your own apartment with a kitchen and modern cooking machines. If you want to make your own food, you can get premade dishes of good quality in any food store, but you will have to ask someone how to operate the machines. If you want to eat out, ask for a dining place. Asking for a restaurant will lead you to more exotic establishments trying to imitate famous

restaurants on other planets."

"You are taking good care of me," Trisha said. "If there is some reason for this besides general politeness, I would like to know. After all, the final negotiations are not to take place in the near future. And yet there were no security guards at the spaceport."

Xian leaned back in his seat. He said: "As you well know, violence on Europa is a very rare incident and is treated with utmost sincerity. Armed violence, as in the case of a politically motivated assassination attempt, is almost unthinkable. The few times it has happened, the perpetrator was either permanently expelled from Europa, his identity and physical features being registered in a central database, or treated for physical neural defects or serious mental disruptions. Employing a security guard, if such a thing even exist on Europa, would be quite provocative to any European citizen.

But there are more cunning means for those who are determined on furthering their own goals. And I can assure you, that I am not the only one who considers your visit to be more than just a triviality. And this is why I will make sure that you are surrounded by people who share our view of the matter, unless you explicitly wish otherwise. You must understand that I am not trying to dramatize things, but you brought up the security issue yourself, and this is where I stand."

"You have my full confidence of course," she said, knowing Xian to be not the least attracted to conspiracies and machinations. "Please elaborate on why this visit is so important."

"Europeans are concerned about the extremes," he answered. "On the one hand too many restrictions may be very harmful to the political structure of European society. On the other hand, if the reform is too weak it may jeopardize the whole idea behind it. Which to the average European is about raising the minimum standards of society in the terms of living conditions, democracy and technology throughout the solar system. The real split is between those who actually care about what is going on outside Europa, and those who don't. For the latter part, any restrictions are generally viewed as a possible threat to European society structure."

"Which is why we want the reform to focus on principles and be flexible on the specifics," Trisha added.

"Yes, and most Europeans acknowledge this to be a sound strategy. However, one of the key elements, from a European perspective, is the psychology lessons, and on this issue Europa is not so flexible. It has to be there, and it must live up to European standards. Now it seems religious fractions on Earth are trying to block this part."

"I don't think so. We reached a compromise. Institutions which due to their religious or ideological foundations are not capable of offering psychology lessons may refrain from doing so, provided the pupils or students are offered the possibility of obtaining it elsewhere within the limits of the class schedule. And provided the institution or the local authorities will cover all expenses. That is of course only if the institution wants to be part of the CIPA program. I don't think you have to worry about that part."

"But I do worry," Xian said, "because two days ago, a secretary of the council announced that he was going to work for a proposition which would make it possible for religious schools to offer VR based psychology teaching. The software had already been developed."

Trisha was surprised. "Who would do such a thing. Hopefully it is nothing but a clumsy attempt to gain attention."

"I don't know him. His name is Assenti Barbarosso Logros. I was unable to get in contact with him, so I booked a meeting with him at the first available time on his scheduler. In 10 days! I suggest we wait to discuss the matter until then. Now I believe Adain has a question for you."

Adain turned halfway in his seat in the front to face them. "Go ahead mr...," she began, and then he interrupted: "You may call me Adain, or Eckhard if you insist on using the second name. On Europa we only use the title for introduction, if at all. It sounds too artificial."

"Very well Adain," she continued, "and you may call me Trisha. Please tell me your question."

"When you arrived in Jupiter orbit," Adain said, "you were transferred to the *Starfish* for the final stage of your journey. You had expressed a wish to see the *Starfish*, and we thought this would provide the best opportunity for this. The reason I know this is because I helped in the design, and

later became a member of the evaluation group."

"Then you must know a lot about the technology behind. If you want to discuss technical issues, I'm afraid I won't be of much help.."

"I do not know much about electronics or advanced materials. I know 5 different Earth languages, I know something about cooking and a lot about choreography, but not much about technology in the conventional sense. My focus in the design group was on the aesthetics of the design. What I am interested in is your personal impression of the vehicle. Did you see it from the outside?"

She had seen it from the outside. One of the stewardesses of the Earth space liner had taken her to the window room to view the rendezvous with the *Starfish*. First she had seen nothing but the stars and empty space, then there was the tiny reflections switching on and off, like a giant carpet of moving mirror fragments. After a while she could make out the outline of the construction. It looked like a huge round fragmented mirror, but the lack of ambient light in the space environment gave it a ghostlike appearance. She thought she could make out some of Jupiter's features in the reflection. It could only be the solar sail, she had thought. As it came closer she was able to get an idea of the size and shape of the thing. What in the distance had looked like one coherent mirror surface was actually a collection of thousands of smaller solar sails, attached to a web of very long arms so thin that they could only barely be made out. The radial arms were seamlessly attached to a central dark metallic disc, which independent of the arms was slowly rotating to provide artificial gravity for the crew members. The diameter of the whole construction she guessed to be at least ten kilometers, and the diameter of the central part between forty and eighty meters. Although it was impressive as a whole, solar sail driven space liners had existed for many decades, and it seemed European engineers had just made some upscaling and refinements. It was the thing that happened next that really surprised her. The Earth space liner had extracted its docking tube, and the *Starfish* was positioning itself for docking. When a solar driven vehicle is changing its orientation, each solar sail has to be continuously realigned to provide thrust in the right direction. In a rendezvous situation, it usually deploys its sail at some point and the remaining positioning phase is managed by small chemical thrusters. The *Starfish* seemed insistent though on managing all movement with its solar sails. One by one, the arms deployed their solar sails until only half a dozen sail bearing arms remained. The empty arms then bend backward, not in a mechanical way as one would expect for a robotic arm, but in a soft, organic movement, presumably not to be in the way. The *Starfish* just lay there like a giant squid, its arms gently waving, while its docking tube moved to connect to the Earth space liner. All this she related to Adain, who listened carefully.

"The function of the arms' movement," Adain said, "is to stabilize the central part through dynamic force control. It is not strictly necessary, but it does give some protection against aggressive inner movement and unforeseen events."

Entering the *Starfish*, the first thing Trisha had noticed was the smoothness of it all. Even on the most modern space ships there were always a few things that wasn't quite perfect. The light was too bright, or the colours too dull or too aggressive. Or you might spend more than a minute looking for a button or a laser activation of the door before you noticed the pressure plate on the floor. On the *Starfish*, everything worked just the way you expected it to. Perhaps it was a coincidence. The light originated from walls, floors, ceilings and the furniture in a non-offensive way. One of the crew members, a woman named Teena, had given her a small tour around the interior. When they passed a small stand with a music sign on it, Teena had pushed a touch panel and a pair of small balls about 1 cm in diameter fell out on a wide plate. It was new technology she had explained, warning Trisha that some people might find it too intrusive, because they reacted on brainwaves to select from a large music library the music which most appealed to the listener. Trisha had not hesitated to insert the little soft balls in her ears, where they felt to be melting into the skin. In fact they merely adjusted their shape to fit the ears. For two minutes she had listened to a chaotic mix of all major categories of music, before she found herself enjoying a nice piece of classical music. It reminded her of Vivaldi, but most of the instruments were unfamiliar to her. Little portable control devices were available to manually tune in to radio channels, video displays or communication units. When shut off, it worked as a general amplifier of sound in the environment. After a while she had been

invited to the ball-shaped pilot room, where the space environment were displayed on the walls in a full 360 degrees view through cameras on the exterior. A transparent floor divided the upper and lower half. There she had spent most of the time in conversation with the crew members, watching Jupiter and the approach to Europa. She recalled the question she had asked herself, and which she now asked Adain.

”During the landing phase I did not notice any disturbances except a gradual decrease in gravity. But since the artificial gravity is directed outwards, shouldn't the direction of gravity change?”

”Naturally,” he answered, ”but the question you failed to ask is: Did the same apply to the room? You see, the interior of the *Starfish* is actually a collection of linked rooms, each able to rotate on encircling rings. That is why you did not exit through the gravity control chamber.”

They went into some minor details about the interior of the *Starfish*, until Trisha looking at her watch suddenly realized that more than thirty minutes had passed in conversation. ”Shouldn't we be going now? I know your metro system is fast, but after all the distance from Waterfront City to Manta City is about 1200 kilometers.”

”I think your compliment about our metro system is greater than you intended,” Xian said with humour in his voice, ”you assume we are still at the spaceport because you didn't feel the acceleration. The truth is, if I'm not mistaken, that we are almost there.”

Three minutes later the doors opened and they found themselves in a hollow of a large square.

* * *

It had been a while since Danel had been nervous about a lecture. He had started giving real lectures when he was 25. Now he was 32 and had a great deal of experience and routine, and he usually felt quite comfortable even when he was standing in front of a big audience. Today there was only a small group, but one of them was a CIPA member and she also happened to be one of the members he respected the most. Danel considered himself rational and non-religious, and had no intention of changing his beliefs or abandon his lack of religious faith. But perhaps more than the average European he allowed himself philosophical reflections where he for lack of words had to reach into the areas of mysticism and religion. His respect for Trisha Antoniette he had decided was based on her ability to walk what he privately termed the *golden path*, a concept relating to political decisions. It was not a personal path, nor a fixed path to some predefined perfect society, in which he did not believe. In contrary he imagined there to be usually plenty of good choices, crossroad with paths leading in directions of which none was objectively better or worse. But in between there was a greater infinity of paths leading absolutely nowhere, and people had a tendency of constantly falling into these pits, and then to spend a lot of their own and other peoples personal energy to climb back up. He suspected some people even did it on purpose. The *golden path* was not so much about political professionalism as it was about being able in a limited sense to predict the future and about not letting personal ambitions ruin your judgement.

He was sitting in a cafe on the second floor of a public area building where he went through his notes for a final time. Had it been any other audience he would not have bothered. It was all trivial stuff, general information about Europa, the planet and the society. Danel had been an active member of first a regional committee of science and education then the principal committee of education, and his work in the principal committee had introduced him to the political life on Europa, providing contacts in other councils and committees, including the planetary council. It was through these contacts he had been invited to join a guide group for the visiting CIPA secretary. He had accepted partly because he thought the guide job would be interesting and give him an excuse to take a break from his other activities, and partly because he wanted to meet the secretary in person. He knew her only from the few virtual meetings about the coming school reform arranged by the planetary council, in which he had participated as a representative of the principal committee. Trisha Antoniette had been a representative of CIPA and also of Earth. The cafe was one of those self-service places with modern style plastic-like surfaces, everything designed to be cleaned in a few seconds and to last for a hundred years or more. In other words, it was quite

anonymous in itself, but it was favored by students because of the proximity to the university. It also provided a good view over the university area.

He had not been here since his university days, now on an impulse he had chosen this place for his reading. Why? Perhaps to refresh his memory. Anyway, it didn't matter. He went through his notes for a final time, until a soft ringing tone from his watch told him it was time to leave. He left his cup for the robots and headed towards the metro.

The Central Conference Building was a display in architecture. It was shaped like a large central sphere surrounded by four smaller spheres partly merged into the large one. All of the smaller spheres were partly open to the outside at the upper floors, with the open area boundary forming a waved curve on the spherical shell. The outer walls were all quasi-transparent, and from the outside had an appearance like obsidian with artistic mosaics in dark colours, some dull, some glassy or metallic. The mosaics on the central sphere symbolized Jupiter, and the ones on the smaller spheres symbolized the Galilean moons. The building was a light source in itself like most public buildings, but the property of enhanced reflection gave an illusion of ambient light.

Inside the central sphere four major theatres with spherical ceilings used for lectures and virtual mass conferences stood facing each of the smaller spheres, and above them smaller rooms. In the central area there were open space all the way to the outer ceiling through which the light of the city dome could be seen. Danel went around one of the theatres and climbed the stairs to the labyrinth of staircases leading into the Europa sphere. His destination was a room on one of the upper floors facing the open part of the sphere, so that part of the room was like a large balcony. When he entered, the CIPA secretary was having a conversation with Shakira Linn, an expert in robot autonomy and a former CIPA advisor. The reason why she was here was of course that she was also a university teacher and involved in the reform work. Danel had met her on several occasions. He went straight to the women and introduced himself to Trisha.

”Your name seems familiar, but I'm afraid I don't recognize you from the conferences,” she said. ”There are so many people speaking at those meetings you have to sort out. Sometimes I just read the speeches. I may have read something of yours. Was it you who wrote an article about social structures in virtual group sessions and the fundamental limitations of such systems?”

”Yes, I gave that speech,” he answered, trying not to give the impression he was correcting her.

”As I recall your listed title was *propagator*. I remember wondering about the title,” she said.

”It is a university master degree. My primary specialization is science propagation. It is the study of basic science knowledge and the processes and techniques involved in obtaining and passing on knowledge. It draws a lot on psychology and social science, but it really is a crossroad between all sciences.”

”I think to most people on Earth your speech is quite controversial. There are taboos not only on sexuality but also on the concept of technological progress. I think Shakira would know about that,” Trisha said, turning to Shakira.

Shakira caught on: ”I spend a large part of my time and energy in CIPA elaborating on why European technology could not just be transferred to Earth. That it was not just about Europa wanting to be superior.”

The conversation went on for a few minutes before others started arriving. They were all visitors or immigrants who had signed up for an introductory course. Danel had stepped in as a guest lecturer for this one lecture. When all had arrived, Shakira left, and Danel started his lecture:

The 14.8 million citizens of Europa are distributed between 412 cities with an average diameter of about 110 kilometers. The cities cover a total area of 12.7 % of the planets surface, and the city population density is 3.8 people per square kilometer. The reason for these low figures is that the population is regulated through birth and immigration control to meet the limits set by the citizens through planetary referendums. It is one of the few issues where planetary referendums are used.

This brings us very naturally to the political system, which in general terms is something in between a direct democracy, a representative democracy and a consensus democracy. For any aspect of the European society there is a democratic institution to administer and regulate

according to needs. These all work together to form a whole, their areas of influence and their means of regulation defined by the constitution. What makes this system work is that every time there is a disagreement, for instance a dispute in overlapping areas of influence, consensus must be reached. Because the system is not based on law enforcement, failure to reach an agreement is usually not a nuisance to the public, although it may be for an impatient initiative group whose plans are delayed. In rare cases, the city council or the planetary council will step in and call for a public referendum.

The most important institutions are the planetary council, the city councils, the technology council, the committee on science and education and the system design center. The planetary council monitors the overall planetary development and infrastructure, acting like a central coordinator, and may make changes to the constitution through planetary referendums, requiring unanimity in the council and 90 percent majority in the population. The council also acts like a ministry of foreign affairs and as the official authority on Europa in terms of foreign policy. Polls and referendums are used when major steps are taken. The city councils are in charge of the city infrastructure and generally act as the planetary council on the city level.

Perhaps the institution with most influence on the European society is the technology council, empowered to authorize innovation projects and production series of non-food material goods, and to regulate existing manufacturing plants in terms of raw materials and nominal employment. Of course any single person or group of people may start their own production independent of the technology council, but the natural resources, including the production ground area must be taken from their allowances as individuals. And the employment will have to be privately organized, so usually it is based on payment in solars or other currency. But even the private production series must be approved by the whole network of technology assessment groups, on ethical and environmental grounds, and especially with regard to waste management. All public goods must be registered and electronically branded, and it is custom for private goods to be registered and branded as well.

The principal and regional committees on science and education set the framework for scientific research and the educational system. Especially they authorize the construction of public schools, colleges, universities and research centers and manage the nominal employment figures of existing ones. They also assist in organizing initiatives in research and education.

The system design center is responsible for maintaining and improving public databases, communication systems and electronic user interfaces throughout the cities. The center has an obligation to deal with any suggestion or complaints by the citizens, and to arrange for an opinion poll upon request. It may sound like an area of less importance, problems to be left for technicians, but it is actually loaded with political choices. Perhaps most important is the dilemma between ease of data access and the desire to protect and prevent misuse of personal data.

For all institutions the members or the personnel are selected through an advanced electronic public election system.

Danel paused to give the audience a chance to ask questions. A woman wanted to know why Europa did not have a local currency, and if the public employees were paid in solars. Danel answered: ”Europa does not have a local currency, but we do have a kind of credit system. I believe there is a lecture later in the course that will elaborate on this, and I would rather postpone the answer since it is quite an extensive subject. But I can tell you that once you get familiar with the credit system it is even more simple than a system based on currency.” He continued:

I will return again to the physical structure. All cities are enveloped in a shell which consist of a strong layered bottoms-up bowl-shaped bottom shell with a curving slightly greater than the moon surface at the bottom and a quasi-transparent top shell, usually referred to as the city dome. The dome is made up of small uniform sections of light-weight material, and on the inside of the dome is a network of service robots attached to movable structures ready to replace any damaged or aged sections at a moments notice. In the case of a serious accident, the dome can be quickly repaired

and the damages caused by falling debris will be minimal. The probability of such an event is fortunately very small.

Below the ground level are five transportation or distribution systems. These are the water supply, the sewer system, the cables for power and data transmission, the metro and the maglev transportation of material goods. The latter is also called the TRUG, which is short for transportation underground.

The largest city is Manta City with no less than 92,000 inhabitants. It houses many offices of the planetary council most of which are located in this building, and it is home to various other institutions as well. The city square outside the building is part of a larger unique area of about 1,400 square kilometers called the Pandemonium. Here there are no restrictions whatsoever on what can be build or why, and there is free access for the public to everything that is build or made on the grounds. The only rule is that you must put up a special sign with contact information if you do not want someone else to take over the land. Naturally it is a market place for artists and others who wants to display something for the public. It is also the place to go if you want to get in touch with the general public in a more direct way, whether you are a private or a public institution. And though it was not primarily made for this purpose it has also attracted a lot of dining places, amusement parks and other entertainment, private shops and parks in general. There is a fruit garden for instance with a great variety of fruit trees and bushes where you can pick as much fruit and as many berries as you like, even some species which are not available in food stores.

Danel went on to some more trivial stuff as to where to go to get information about housing, schools, employment and sports activities, and then he told about some of the more specific sports that he found worth mentioning, like solar surfing along the beach on the large salt water lake in Waterfront City. As he had anticipated, he had to answer a lot of questions from the audience about specific details of all kinds of sports, some of which he had never heard about. It was a statistical fact that every time a space colony reached a certain size, it would start to develop a whole new set of sports, most of course similar to traditional Earth sports. Soon the lecture had turned into dialogue, and Danel suggested that they spend the remaining time in a more relaxed setting in the balcony area. They went to one corner of the room which was raised above the general floor level to provide a good view of the city square and seated themselves in comfortable chairs around low tables. After a while the conversation turned to the society structure and the political system.

”I find it hard to imagine how you can regulate the private sector without some kind of law enforcement,” Trisha said.

”Yes, perhaps that calls for elaboration,” Danel replied. ”You see, the compulsory part of manufacturing and distribution of goods like branding, ensuring variety and quality etc. is taken care of by the public sector, so the only really important issues regarding private goods are health and environment. Since the Europeans in general do not want to be kept under surveillance, no active control is carried out by public institutions. The way it works is that people bring in unregistered items to the Center for Assessment of Unidentified Goods for examination, and the item is then registered in a public database. If the item constitutes a serious risk to the public health or the environment the center will attempt to trace it to the source. In severe cases, and if the responsible party refuse to cooperate, the authorities may cut of their power supply and their means of transportation of goods.”

A young man pursued the subject: ”But how about the economic aspects. What for instance if a person or a group of people were put in economic depth by a private company and they couldn't pay?”

”It wouldn't happen, simply because it is stated in the constitution that you cannot make any legal claim to other people's possessions, which in fact is just an aspect of the basic civil rights. A private business group once tried to circumvent this by introducing a credit card for the private sector where depth would be registered, and it would be impossible for the customer to buy anything until the depth was paid, but the reply from society was swift. It was simply made possible to obtain identity cards with fake id's so that you could buy on credit imposing as a non-existing person.

Since the private group did not have internal access to the public databases there was nothing they could do, and they quickly gave up the idea."

"Well, maybe it's because law enforcement is such a natural part of Earth societies, but I am still sceptical," Trisha said. "On Earth people disagree from time to time over various issues, and sometimes this results in violence, where the police is needed to protect the weaker part. Why would this not happen on Europa?"

"You are raising a good question and it may deserve a better answer than what I can give." Danel thought for a second. "I think one would have to consider Europa's past. Before the cities, everyone depended on everyone else for the survival of the colony. And people could not just be ordered or forced to do their job because many of them were skilled scientists or technicians who were expects in their own field. So democracy became the natural choice, a democracy based on respect for the individual. And because everyone knew that conflicts would have to be solved in a way so that work and cooperation could be continued afterwards, preferably in a good spirit, it evolved into a culture of non-violence and mutual respect. Later I think it was the psychology teachings and the decentralized power structure that has kept the tradition alive. In any case the result is that physical violence or pressure is just unthinkable as a political instrument, and to put other people in situations where they might be forced into aggressiveness is also something you would never do intentionally. If violence did occur it would likely be the result of an emotionally stressed situation, and nobody would be punished. I think the best way to put it is that we don't want to create a problem where there is none. If you feel threatened you can always call an emergency unit, which could help by initiating dialogue between the persons involved. Usually it is better to do it yourself though."

The conversation went on until at some point one person decided to leave, and the rest of the group followed the example, leaving Trisha and Danel alone at the table.

"Benton Jaan from the university asked me if I would be your guide and help you find your way around the cities," Danel said. "If there is anything you want to know about or if you want me to take you somewhere just say so. I assume you have my identity code, so you can call me from a comm device. I am also going to participate in all of the meetings planned by Xian."

"That sounds nice." Trisha got up and as a response to the questioning look from Danel she said "I just need to stretch my legs." She walked to the railing and looked at the sky for a moment, then turned to Danel: "There is one thing you can do for me."

"Yes..?"

"When I arrived here it was night. Now I have been here for one day and it is still night, at least in the terms of planetary orientation. Do you know when the next transition is, and could you show me a good place to see it?"

"I think the next transition is tomorrow about noon. And a good place to view it would be at the beach in Waterfront." He remembered how as a kid he had gone with his friends to the beach to make a campfire and watch the transition. "I can take you there if you want."

"I still have to get used to the metro system, so if you could pick me up at my apartment, that would be nice. I may also have more questions for you."

They agreed to meet the next day, and Danel left, relieved that the conversation had been so without tension. The secretary seemed to be the calm and undemanding type of person, meaning that he didn't have to worry so much about putting up a professional attitude. He spend the rest of the day working out a bit and reading some texts related to the school reform. He then showed up the next day at a metro entry near Trisha's place to pick her up.

She wanted to learn how to operate the metro system, so he showed her how to locate and set the destination at the terminal and how to use the ID card to unlock and activate the vehicle. He told her that she could use any of the standard public vehicles, but with her privileges she could also order a government vehicle which would usually arrive within 5 minutes. In front of the vehicle was a control panel which allowed the 'driver' some limited control of the acceleration and to monitor the present position and speed, and also to change destination while in transit.

When they arrived at the beach, it was almost empty. He took her to the near-by self-service cafe

where diet soda was poured from a machine. He filled two cups and placed them at a table.

”Are these free for the taking?” Trisha asked, a bit surprised. He confirmed. ”Now you have to tell me about your credit system. I know of some economists back on Earth who would categorically deny that a society like this could ever exist without money as the driving force. I know a little of course, but I would like to have the full story.” She took a sip of her soda.

”Okay, this is how it is,” Danel began.

First it is important to understand the purpose or the paradigm behind the credit system, which in contrast to any monetary system is not to support a fair distribution of goods according to whatever definition of fairness is presently dominant. It does to some extent do that, but that is merely a resulting factor. No, the main idea behind the system is to enable people in a rationalized way to choose what kind and how much of food, material goods and services should be available and the means and efforts by which to obtain these goals. As in any system there is a bias with regard to the distribution of goods. But the principles constituting this bias is taken only to the point where they still make sense, forming what could be called a kind of rationalized fairness.

On the manufacturing side food and goods are produced if the following conditions are met: One - there must be someone to take the initiative. Two – the required workforce must be available and willing. Three – the production must be approved by the general public. On the service side it is the same. So what happens when a facility has been approved is that a nominal number of work hours for any type of work skill is allocated to the facility. The facility may employ as many people as it wants to, and it must then report the work skill and the number of work hours for each person to a central database. If a facility wants to make modifications to its services it must apply for it, and the nominal work hours are adjusted accordingly. It may sound overly complicated, but over time some standards has evolved so that only the unconventional cases require special attention. For each skill the total nominal work hours are divided by the total amount of work hours to get the skill factor as a percentage. For any given amount of work within a skill the number of credits received is the number of work hours multiplied with the skill factor.

On the distribution side there are no restrictions on the consumption of food and goods as long as the supply is able to support the demand. If supply runs low for a given item, that item is rationed, so that only a limited amount is available to each citizen within a given time interval. The amount available to any citizen is a fraction of the number of credits of that citizen plus a minimum amount which is given as a fixed percentage of the total average, set by the planetary council through referendums. The credit factor is derived from statistics. Even currency is distributed and rationed this way. Europa exports a fair amount of high quality goods through public trade offices. The revenue from this trade is distributed just as any other public goods.

By obtaining rationed services or items you are spending your credits. The personal minimum and the total average decay of credits are set by the planetary council through referendums. Each day a small fraction of a citizens total credits are subtracted from the total. This fraction depends on the expenditure of rationed services or goods by the citizen. The weighing of items and services are based on the amount of work hours needed for the production and distribution. The fixed values are often converted to levels of conservatism which is easier to relate to in a less mathematical context.

”So what would you do if you are in sudden need of a large quantity of a certain item that has been rationed?” Trisha asked.

You may either ask people to send items to you, or you may try the open market, trading in solars. Most common goods are never rationed, and most of the goods that are rationed usually won't stay rationed for were long, so in practice it is not a big problem. The distributors are very good at spotting changes in supply and demand before it becomes critical. Currency is an exception though, since the demand for foreign goods can be quite unpredictable. The most important factor here is the cloth fashion. As you probably know the Triton fashion industry is a heavy competitor to our

home market in textiles, and we import a great deal of cloth from Triton.

Looking out to the horizon, Danel noticed that the blackness of the night sky had brightened a bit. ”I think the transition has started now. But it will take some time before it becomes clearly visible.” They watched in silence for a few minutes, but there was nothing to see except perhaps a bit more brightening.

”You said it was a salt lake, but it looks and feels more like an ocean. On the horizon there is only sea, and even the air smells like a fresh sea breeze on Earth.” Danel tried to smell the sea, but he could smell nothing except Trisha's perfume. An expensive perfume he would guess, without knowing anything about perfume.

”It's because of the curvature of Europa. If it was build on Earth you would probably be able to see the other side in the distance,” he said.

”Yes, but still. I have never seen anything like this. Artificial I mean.”

”And I have never seen anything like this which was not artificial. To me this is natural. The water and the sand is very real, so the only thing that makes it artificial is the fact that it was made by man and not by geological and biological processes. I would say the question of whether you prefer a real or an artificial beach like this is more philosophical than it is practical.”

”I don't think it is purely philosophical,” Trisha said. ”I am sure there is a lot of difference in the geological features and the biological life. I don't see any seaweed for instance.”

”From what I know there are many beaches on Earth where you don't see any seaweed,” Danel answered. ”But you are right, we have been selective about the biological species. And even if we wanted to, we would never have been able to duplicate all the geological features of a natural sea in any reasonable timespan. But when you are sitting here on the beach, it doesn't matter. It's only when you dive you will see the difference. It's not completely flat though. There are lot's of reefs and other features, and more than a few species of fish.” Danel had done a great deal of diving and in his teenage years he had seen documentaries and VR's about the ocean life in Europa's artificial seas and on Earth. It did not take much encouragement from Trisha to lead him into a lengthy tale about the ocean life. At some point Trisha was loosing attention and looking up he saw that the transition had begun.

Trisha did not say much during the transition except for a few trivial comments about the colours and the light effects, but it was clear to Danel that she was impressed. He wondered whether he would feel equally impressed when he one day would get to see a real sunrise on Earth.

”Have you ever tried solar surfing yourself?” Trisha asked when the sun was well above the horizon.

”If you're interested I can show you how it is done.”

”You mean you would take me out there on a surfboard? That could be interesting, but you see, I don't have any swimming suit,” Trisha said, smiling now.

”They have suits at the place where you get the boards.” Danel was not sure if it had been a good thing to suggest.

”Okay then, lead the way.” They left for the boathouse, which was located more than a hundred meters down the beach, stopping once to take off their shoes. The sand was still cool. In the boathouse Danel managed to get the attention of one of the crew. Their job was to service the people on the beach, but Danel knew the main reason many of them were here was because they liked working with the boats and the surfboards, always engaged in improving some artistic details. Within twenty minutes they were out in the water wearing the special surf suits. The suits had only minor gravity elements in them, increasing the maneuverability but posing an extra challenge for the inexperienced. He showed Trisha the underside of the board with the two fins for propulsion.

”I have seen these on large ships, but they are big mechanical things,” Trisha said. ”These look much more smooth and organic.”

”Well, they are supposed to imitate fins on fish,” Danel answered. He then showed her how to control the speed and direction of movement with her feet. ”When you are experienced it's much easier to use a single board. With a tandem board you have to coordinate movements, but the

advantage is I can guide you." Inserting their feet into the foot holders added power from the light receiving suits to the board. At first they zig-zag'ed through the water, but quickly Trisha learned how to adapt to the foot controls. Clearly she enjoyed it, and she was talented enough for Danel to have fun too. Danel bend down and made a series of splashes with his hand, a little trick he had learned and used as a boy. It took perhaps a bit longer than he had expected, but then it was there. A large dolphin shot out of the water in front of the board in a flat curve. It was a thing that was sure to impress any people from Earth since the dolphins could jump much higher in the gravity of Europa.

Later when they were resting in the deck chairs on the beach, Trisha asked: "You seem quite confident in your domes and your technology. What if some day a space army showed up and threw something big through the domes? Or landed troops with powerful nuclear weapons? It would be political suicide of course, but someone more indifferent about democracy and human life might consider it an option. The reason I ask is because it is very unusual for a society of this scale and level of advancement not to have any armed defense."

"But we do have a defense system," Danel said. "Not an armed one, but just as efficient. Our meteor defense system is designed to protect us from space debris such as asteroids and comets, but it is able to target any object from microscale particles to small moons. Next to our quasi-transparent materials I think it is our greatest technological achievement. Throughout the Jupiter system there are vast armies of space robots of all sizes ready to attach themselves to any object on a collision course with Europa. Their maneuverability is unprecedented, especially when they work together using gyros, tethers and small thrusters in perfect coordination based on very advanced artificial intelligence. Although it is not designed for this purpose, I believe that if a space ship or maybe even a group of science fiction-like battle droids were targeted they would find themselves on course towards the edge of the solar system before they knew what had happened. But to me it seems a very unreal and unthinkable situation. I think Europa is much better off relying on diplomacy and good relations, and so does the planetary council. And I can't think of anyone who would want to attack us or any other space colonies for that matter."

"I think of it more of a potential threat in power games," Trisha said. "On Earth there is a different tradition with regard to violence and power. It is just my job to consider every option."

There was a pause. Danel was not used to think of such unpleasant issues. Then it made him think of something else. "Yesterday we talked about violence and law enforcement. There is a story that might be relevant. It is used in educational material, but it is not a popular subject for conversation. It is something that happened long ago when the level of immigration was high and almost half of the population were immigrants or descendants of immigrants to the third generation. A small group of nationalists tried to gain support for the idea that the reason why Europa was so advanced was because Europeans were destined to take control of the solar system using superior technology. All they managed to do was isolate themselves socially. Then later there was a series of serious accidents causing death and injury of civilians. It was not until the metro bomb and the letters claiming that the responsible party was a group of Earth citizens wanting part in the wealth of Europa it was realized that terrorists was behind the accidents. Naturally it struck horror in the population and the planetary council set the whole network of public institutions on the task of identifying the terrorists. When they were finally caught it was due to an extensive study of a huge number of reports from citizens claiming to have observed something unusual, and it turned out to be the very same group of nationalists now trying to cause enmity towards Earth. One of them had a brain defect which we were able to correct, and the only side effect was a minor case of amnesia. Most of the remaining people from the group had strong psychic weaknesses making it very difficult for them to interact with other people on a socially mature basis. When faced with the anger of a whole planet and the pressure from family members all except one who had no strong family ties and thus chose to leave Europa accepted the offer of extensive therapy. Only two had no real mental disabilities psychologically speaking. To characterize their mental unfitness one would have to draw upon a branch of science called *structural mass psychology*. Despite its name it has its roots in sociology and mathematics, and in short it is the science describing the dynamics and

stability of a society, including all significant aspects if possible. It is not an exact science, since there is no way in practice to describe the full complexity of a society by mathematics alone. Anyway, when evaluating the fitness of an individual in this context, the ability for the personality to fit into the society and its value systems is assessed, allowing for the possibility of the individual to influence his surroundings and society as a whole. That part has more to do with psychology. They were both deemed highly unfit, primarily because inequality was such an inseparable part of their conception on social structures."

Trisha interrupted: "And why would you need such an advanced set of scientific tools to draw that conclusion?"

"The science is obviously not required in order to say that they were unfit, and that their belief in strong hierarchies was the main cause. What could not be said without the extensive analysis was how deeply rooted this was in their personality, and that any attempt to change their attitude to make them fit could only succeed by causing severe irreversible psychic damage. This concept was conceived I think already in the late part of the second millennium on Earth, but it was not until much later on Europa that the science reached a mature state with the aid of powerful computers. In my opinion the science's greatest contribution to society is the possibilities it gives to make more qualified choices about the direction and evolution of cultures, not only for experts but also for people with little or no education." Danel would have liked to have gained some proficiency in structural mass psychology, but it would inevitably have been at the expense of something else. Xian was the real expert in the field.

"So what happened to the last two?" Trisha asked.

"They were sent back to their home country somewhere in Asia. The unofficial story goes that they received life-long imprisonment there not only because of their terrorist acts but also for the cause of bringing their country into disrepute."

They sat for a while just relaxing in the warm sunlight. "So it would seem your system is not completely invulnerable," Trisha said as if she had been reflecting on the story. "Allow me one more fictional question about your system."

"Granted," Danel said, knowing that he would allow any number and any kind of questions from the secretary.

"Assume that a large group of people had joined in a common cause to sway the European society in a direction towards an ideal development, something that appealed to the average citizen as a necessity to avoid a greater evil, still democratic, but perhaps requiring a transitional period with a less democratic rule. And suppose that they because they were so determined were able to promote themselves as individuals and come to occupy a large number of high positions throughout the system. Would that not be a very real threat to your democracy?"

"It might. There has been some discussions about introducing random election pools as they have done on Mars for the councils where it is practical, meaning the city councils and the planetary council..."

"But even so, the power is not centralized, so the system and society could easily be changed by controlling most other councils and committees, don't you think?"

Danel could think of no reason why not. "I guess that is the flaw of any democracy. The fragile nature of the human being."

Trisha leaned back and closed her eyes. "I guess so too."

* * *

The day of arrival had been eventful. After having arrived at the conference building Trisha was joined with a handful of people whom she knew personally or through VR conferences. She was greeted by each of them, and then they had a standing nutri-lunch while they engaged in casual conversation, before the meeting began. The coming meetings and discussions had to be structured, and they all had their agendas. There were no real disagreements, but it took time for everyone to express their views and afterwards to make a structure that would satisfy everyone. They had to

take a break before the meeting had ended.

Accompanied by Xian and Shakira, Trisha went to the balcony area to have a look at the surrounding city environment. It was not so much the city she wanted to watch though, as it was the thing she had catched a glimpse of on her way to the conference building. Partway above the horizon rose Jupiter, as a giant ghostly ball of interwoven white, blue, red and brown colours. It was so great in size that even though only a small part of it were visible it completely dominated the sky view, and without the city dome it would have easily outshone the stars. She didn't say anything. What could she say? ”You have such a magical environment...” ? Even Trisha would not be sure how to reply on that without seeming either arrogant or indifferent. It was Shakira who broke the silence.

”I am sorry that your first meal on Europa would have to be a nutri meal. I guess we have just confirmed a common Earth prejudice about space colonies and outer-world societies: That our favourite meal is a nutri meal.”

”As I recall, I was the one insisting on the tight schedule,” Trisha said. ”After several weeks in a space liner, relaxation is not what you need the most. And compared to the food on the space liner I think it was actually quite delicious. So perhaps you could tell me about our political opponents here on Europa?” The question was directed at Xian, who recounted.

Politics on Europa are complicated, much more complex I would imagine than politics on Earth. Those who are your opposition in one regard would be your strongest allies in another. Personality traits are also important, but it will only help you sell your message if you have a good case. Manipulation and intimidation should be avoided. In the case of the school reform the opposition appears to be less organized and centered around individuals.

First we have Yanik the sculpturer who is also a skilled technician working in hard plastic composites and metal alloys. He fears that Europeans may become strangers to their surroundings because they are too little in touch with things, spending too much time in academic discussions and experiencing things in virtual environments. Part of his politics has to do with changes in the area of education, and he has gained enough public sympathy to make it very likely that at least some of his ideas will become reality. What he and his supporters fear is, that if the school reform impose too many restrictions on the educational system it might become too rigid and too focused on theoretical knowledge.

Then there is this Adam Dasir who wants to create order in the solar system..

”I did not know you had fascists here on Europa,” Trisha said, not knowing whether she should look worried or amused.

Not that kind of order. Physical order. He wants to clean up the mess he says. I am sure you are familiar with the definitions used in the classification of non-stellar astronomical objects. A planet is a body large enough for gravity to pull it into a spherical shape. A temperate planet is a planet which under Earth-like atmospheric conditions will have peak temperatures above the melting point of water and minimum temperatures below the melting point. A regular planet is a planet with a size and mass that under temperate conditions and if equipped with a sufficiently strong magnetic field will support an atmosphere similar to Earth's, meaning it is able to hold on to its nitrogen with a surface pressure at least that of Earth's, but lighter elements such as hydrogen and helium will escape to space. In the solar system Mercury, Venus, Earth and Mars are regular planets. What Adam has in mind is to remove all non-planetary material in the solar system by adding it to the irregular planets, thereby eliminating the risk of unwanted catastrophes involving asteroids and comets. This of course is not really related to the reform issue, but it illustrates the way he thinks. In his opinion Europa's natural ties lie with the outer solar system simply because we share the same environment and conditions for life, and he can see no reason why we should join forces with a population group that far outnumber our own and have no preconditions for understanding the problems and challenges faced by a small minority in the outer system.

”He may have a point, if you look at it in a simplistic way. What do you think about his plans for the solar system, Shakira? Are they realistic? And what would be the time perspective on such a feat? You are in the field, so to speak.”

”Yes it could be done, within a few decades if you were in a hurry, or within half a century if you did not want to put any stress on society. But I fail to see the need for such a uni-targeted course of action. You know we have cleared pathways in the asteroid field to allow safer passage between the inner and outer solar system. This was a joined effort with Earth, Mars and Europa as the prime contributors. In this process, smaller asteroids were directed towards controlled collisions with Ceres or on of the larger asteroids whenever it was feasible. And since the pathways has to be kept clear, redirecting asteroids is a slow but ongoing process. We do that with space debris in the Jupiter system as well using a combination of light beams and tethered robots.”

”The Ganymede project?”

”That too, yes. I believe that within a few centuries due to human activity there will be only a very small fraction of the natural debris left, without any effort directed specifically towards that goal. The real challenge then will be how to handle the debris produced by humanity, and to determine who has the responsibility or the right to handle it, and when it should be categorized as debris. The hidden agenda in Adam Dasir's politics is that if the outer system in its present state gets its own debris handling system, it will be based on European design and management. Maybe he even thinks that Earth and Mars will change their ways by way of the good example.”

”If he does that I think he is mistaken,” Xian broke in. ”They are simply too great in numbers and the alternatives are too many for that effect to occur.”

”Any more I should be aware of?” Trisha asked.

”There are a few, but none with the same popularity,” Xian said. ”And then of course there are the more neutral ones, mostly teachers and people from the universities. A few private companies are also involved.” The break had ended and they returned to the table.

When the meeting was finally over, it was getting late. Shakira escorted her through the metro system to her apartment which turned out to be a small house in the typical European style. It had rounded corners and straight walls and was oddly shaped, suggesting that the outer walls had been designed to fit the interior rather than the other way round. On top of the roof was a small area with some chairs and a table surrounded by plants, and there were plants hanging more than a meter down the walls. No windows were visible from the outside.

”You have been registered as the administrator, so you will need your ID to unlock the door,” Shakira said. Putting up her card in front of the door a button icon changed from a red closed lock to a green open lock, another button icon changed from a red closed door to a green open door and the door slid silently open. A numeric keypad was located next to the buttons, probably for the purpose of manually entering the ID code.

The interior consisted of a bedroom, a bathroom, an exercise room, a large living room with nice and comfortable looking furniture, and a very large kitchen with a dinner table in a soft fiber material decorated with ceramics. All around the house small sound generators were attached to the ceiling with adhesives. Everything was spotlessly clean. The kitchen had a huge amount of machines and utilities many of which she did not know the purpose of. Shakira told her she only needed one machine for all of the premade meals in the refrigerator, a universal oven, and the meals had bio circuitry specifications for the cooking so she only had to push one button. In the living room Shakira opened a large panel which was all but invisible until touched, and by the touch of a button the ghostly outline of a window appeared on the opposite wall.

”Where do you want your window?” she asked, manipulating the frame back and forth on the walls. Trisha picked a spot and the window took shape revealing the outdoor environment.

”Will it show on the outside also?” Trisha asked.

”Oh yes,” Shakira said. ”Optical windows are always designed like that. Most people like to send a social signal.” She left Trisha with the promise that she would receive a call at eight o'clock.

Trisha went around the living room to have a closer look at her new temporary home. In a corner

was a large desk with a touch panel. When touched it raised to form a keyboard. No screen were visible. She pushed the *on* button and a large rectangular area on the wall in front of her changed colour and an icon menu faded into view. A soft female voice spoke:

”Good evening Trisha. I am Linda, your personal virtual assistant. You may ask me any question by using my name Linda in the beginning of the sentence. You may also rename me or change my voice profile. I can be switched off at any time.”

Trisha was surprised and also curious. ”Linda, can you manipulate the controls of this house?”

”I can manipulate the media devices of this house.”

She couldn't resist the temptation. ”Linda, where are you located?”

”I cannot answer your question.” She re-phrased the question.

”Linda, where is the workstation computer located?”

”A workstation computer on Europa is not bound to any one location. Usually there is a basic library of knowledge embedded in the keyboard panel. Workstations on Europa draw on multiple shared resources, but workstation computers having a private set of resources do exist on other planets.”

”Linda, are you intelligent?”

”I simulate logical intelligence by the use of vocabularies, language constructors and deconstructors, interpreters, rationalizers, aestheticators, deductors and knowledge databases.”

”Linda, can you find me a video clip of the *Starfish* landing on Europa?” There was a slight delay, no more than half a second.

”It is showing now.”

The image on the wall shifted to display the Starfish in outer space on a starlit background. Like all video less than three centuries old it was in 3D so presumably the walls had the same holographic properties of a media display. Which of course was also needed for the optical window, Trisha thought. The vehicle had its arms bend forward. A male voice commentated the clip. ”This is the *Starfish* approaching Europa. The arms are bend in a forward position to prevent damage from the exhaust of the fusion drives, located on the underbelly of the center disc. The fusion drives are of martian design and are used for short trips and for trips without a straight trajectory.” Europa came into view, and the arms bend backwards. The vehicle shifted its orientation so the arms were now pointing towards the planetary surface. Some of the arms raised to an outward pointing position. As the vehicle approached the surface, there was a clip to another camera near the surface. The fusion drives were obviously not active, because the arms were spiraling beneath like waves propagating along the surface of a cylinder and the vehicle did not slow down. The approach angle seemed too steep to avoid a crash landing. When the arms touched the icy surface they did so with an amazing control of movement, avoiding damage to the arms as well as the ice, creating just enough push to decelerate the vehicle little by little. The male voice commentated: ”The rotation of the arms are synchronized with the forward speed to prevent impact damage and to create a smooth movement.” The center disc outer frame was slowly rotating. The *Starfish* was still approaching the ground, but slower now and when it seemed about to crash it started moving upwards until it lost touch with the ground. During this sequence the view had shifted several times, and now there was a clip to another camera showing the *Starfish* coming towards it in one giant leap that must have spanned hundreds of kilometers. The pattern now repeated, except the vehicle and the arms movement had slowed down considerably, and the height quickly stabilized. The commentator continued: ”The arms initially touch the surface at a height of about nine kilometers. The speed has now slowed to about 700 kilometers per hour and the height is held at a steady six kilometers above ground until the vehicle reaches its destination at Waterfront.” The *Starfish* continued to slow down and soon reached a building complex centered around one very large building. The arms had changed their configuration from spiral to 3 dimensional wave and now danced gracefully upon the ice. It stopped exactly above the large building and very slowly the center disc was lowered while the roof of the building slid open. The arms continued their movement, never resting upon the ground. When the disc had disappeared inside all the arms raised skywards and retracted into the building in one gentle spiral movement. There was a short clip showing the *Starfish* standing on its

landing gear with the arms spiralled around it, and then the image faded into the icon menu.

Trisha shut off the workstation and went to the kitchen to have dinner. For an industrial meal it was definitely in the high end. Not only because of the quality of the food itself, but also because of the rather sophisticated cooking one would not normally expect from an oven, even if it was computerized. Shakira had told her to just leave the dishes for the house robots, so she did. Then she went to the TRUG cupboard to retrieve her luggage. She was still unpacking when the voice of her personal computer assistant spoke: ”There is a call for you, Trisha, from Shakira. Would you like to answer it?”

”Linda, I would like to answer it in the living room if possible,” she replied. There was no answer. She went into the living room and discovered that a new window had appeared, covering one entire wall. It was not a window to the outside, but to a small room with a large cubic pillow chair and Shakira on top of it.

”Oh there you are. The others should be joining us in a moment.” Trisha positioned herself on the floor in a cross-legged position. Within half a minute holograms began to appear on both sides of Shakira showing people she was highly acquainted with. In the holographic reality they were sitting in a circle, some of them inside the room. There was Laureen from Oberon II, a partly private, partly public financed self-governed space colony which thanks to European technology was slowly transforming into a small local paradise. And there was Kim, a machine-worker woman and laboratory assistant from Iapetus III working for the petrochemical industry on Titan. Miko was a biology student from the elevated dwellings on Geminus and Nieia a very dark-skinned outgoing martian field worker. She was also the youngest member of the group, only 17 years old and very proud to have been selected as a member. Then there was the middle aged couple Zhata and Beatrice both working at the UN embassy on Triton, and two journalists David and Frann working for the same news agency on Earth. Francois was the major shareholder in a company that owned two medium-sized space colonies, more than a handful of space stations and about 4 - 6 percent of the total private space industry. He was also the protector of many second millennium castles in the region of Bordeaux where he lived. Nowadays there were restrictions in most regions on what and how much you could own. In space however it was a different matter. Finally there was Aron who worked in the Mercury mine owned by Francois' company. Twelve they were in total. Shakira smiled at them.

”I welcome you who follow the cradle of life. I welcome you who follow the rise and the fall. I welcome you who follow the flow of change and transformation. I welcome you who follow the way of the water.”